

Energy Dossier: Trinidad & Tobago

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Abstract

This Energy Dossier is part of a series of publications produced by the Energy Division of the Infrastructure and Environment Department of the Inter-American Development Bank. It is designed to increase the knowledge base about the composition and organization of the energy sector of Latin American and Caribbean countries. Each dossier describes the energy matrix of the country under analysis and then dives deeply into the institutional organization and regulatory framework of the energy sector in that country.

Keywords: Energy; electricity; energy matrix; Caribbean

JEL Codes: Q40, Q43, Q48

Index

Acronyms	4
Country Overview	5
The Energy Matrix	6
Institutional Organization of the Energy Sector	19
Historical Development of the Sector	40
Evolution of Energy Production, Trade, Transformation, and Consumption	43

Acronyms

CR&W	Combustible Renewables & Waste
EMA	Environmental Management Authority
GWh	Gigawatt hour
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
Kboe/day	Thousand barrels of petroleum equivalent per day
MEEA	Ministry of Energy and Energy Affairs
MW	Megawatt
NEC	National Energy Company
NGC	National Gas Company of T&T
PETROTRIN	Petroleum Company of Trinidad & Tobago Limited
PowerGen	Power Generation Company of T&T
PPA	Power Purchase Agreement
REC	Renewable Energy Committee
RIC	Regulated Industries Commission
T&TEC	Trinidad and Tobago Electricity Commission
TGU	Trinidad Generation Unlimited
TPL	Trinity Power Limited

Country Overview: Trinidad and Tobago

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 5,100 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 resides in urban areas.¹

Map 1 Trinidad and Tobago



Source: Author's own work.

Trinidad and Tobago has a high level of development with a score of 0.766 ranking 64th out of 187 countries on the 2013 Human Development Index (HDI).² In 2013 it recorded a national GDP of US\$26.7bn and its per capita GDP stood at US\$20,054.³

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. In contrast to most other Caribbean states the tourism sector plays a minor role, contributing only around 1 percent to the national GDP.⁴

1 Environmental Management Authority, 2001

2 UNDP, 2014

3 IMF, 2015

4 International Monetary Fund, 2012; MEEA, 2012a; Ministry of Planning and the Economy, 2012

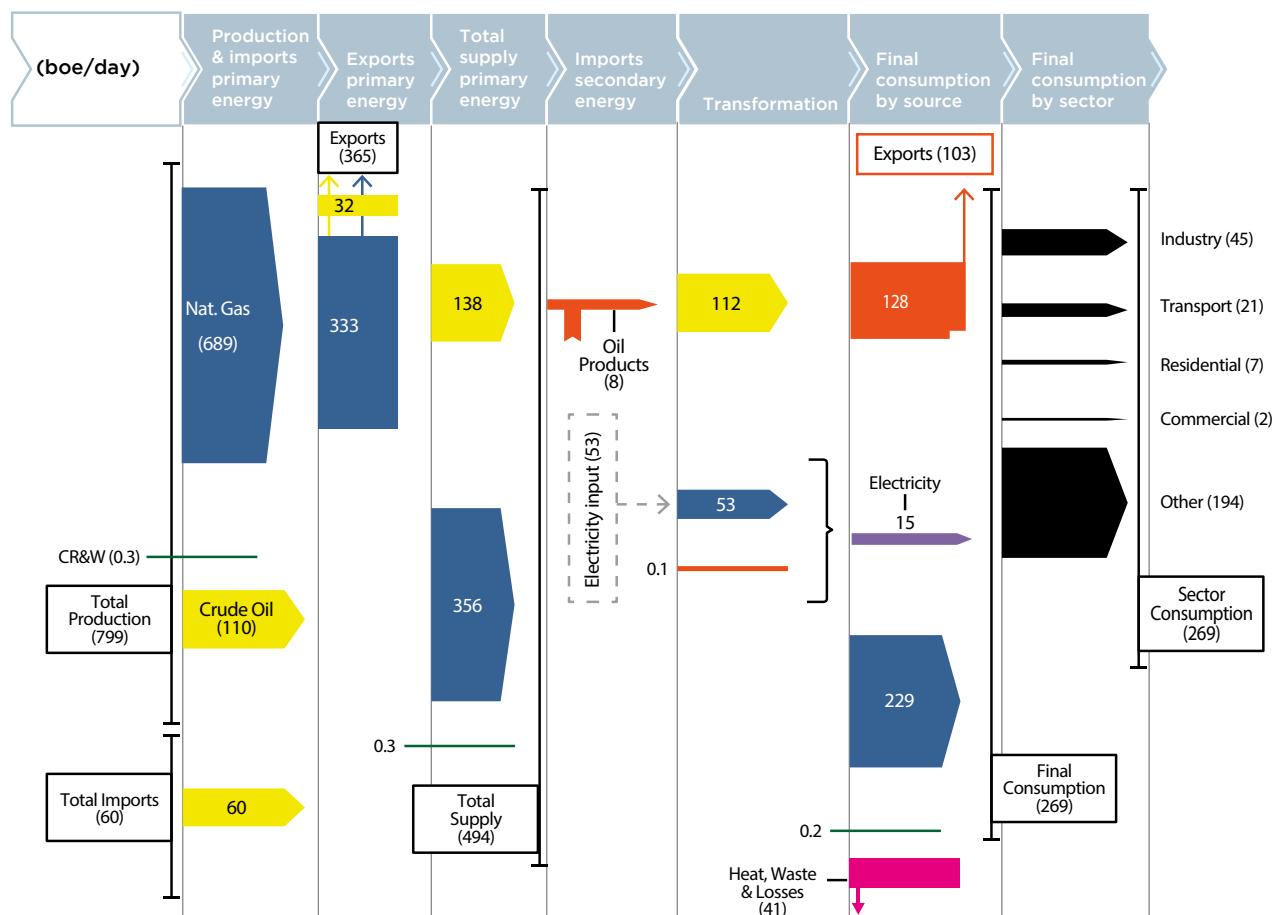
The Energy Matrix of Trinidad and Tobago

In 2012 the Trinidad and Tobago produced 689 kboe/day of natural gas and 110 kboe/day of crude oil. In addition it imported 60 kboe/day of crude oil. A bit less than half of its natural gas production is designated for export and it exported 333 kboe/day in 2012. The country also exported 32 kboe/day of crude oil. This left a total primary energy supply of 494 kboe/day consisting of 356 kboe/day of natural gas and 138 kboe/day of crude oil. In addition the country also generated a primary energy supply of 0.3 kboe/day in the form of combustible renewables and waste (CR&W).

The country's electricity is produced using 53 kboe/day of natural gas and 0.1 kboe/day of oil products, delivering 15 kboe/day equivalent of electricity. During the conversion of natural gas into electricity and the refining of crude oil into refined oil products 41 kboe/day are lost as heat and waste. The country also exports 103 kboe/day of refined petroleum products.

In total, final consumption of Trinidad and Tobago stands at 269 kboe/day. The industrial sector accounts for 45 kboe/day, followed transport with 21 kboe/day, residential with 7 kboe/day, and commercial with 2 kboe/day. Other consumption accounts for the majority of consumption with 194 kboe/day.

Figure 1 Trinidad and Tobago, 2012



Inter-American Development Bank, 2015
Infrastructure & Environment / Energy

Editor: Ramón Espinasa (INE/ENE).
Authors: Carlos Sucre (INE/ENE)

Source: Own calculations based EIA World Energy Balances

Total Energy Supply

The Total Energy Supply (TES) of Trinidad and Tobago was 502 kboe/day in 2012. Natural gas production accounted for just over two-thirds of supply at 356 kboe/day. Crude oil, most of it from domestic production, accounted for 138 kboe/day representing 38 percent of TES. Imported oil products represented 1.5 percent of supply with 8 kboe/day and CR&W represented 0.05 percent with 300 boe/day.

Figure 2 Share of Total Energy Supply, 2012



Source: IEA, 2012

Domestic Production

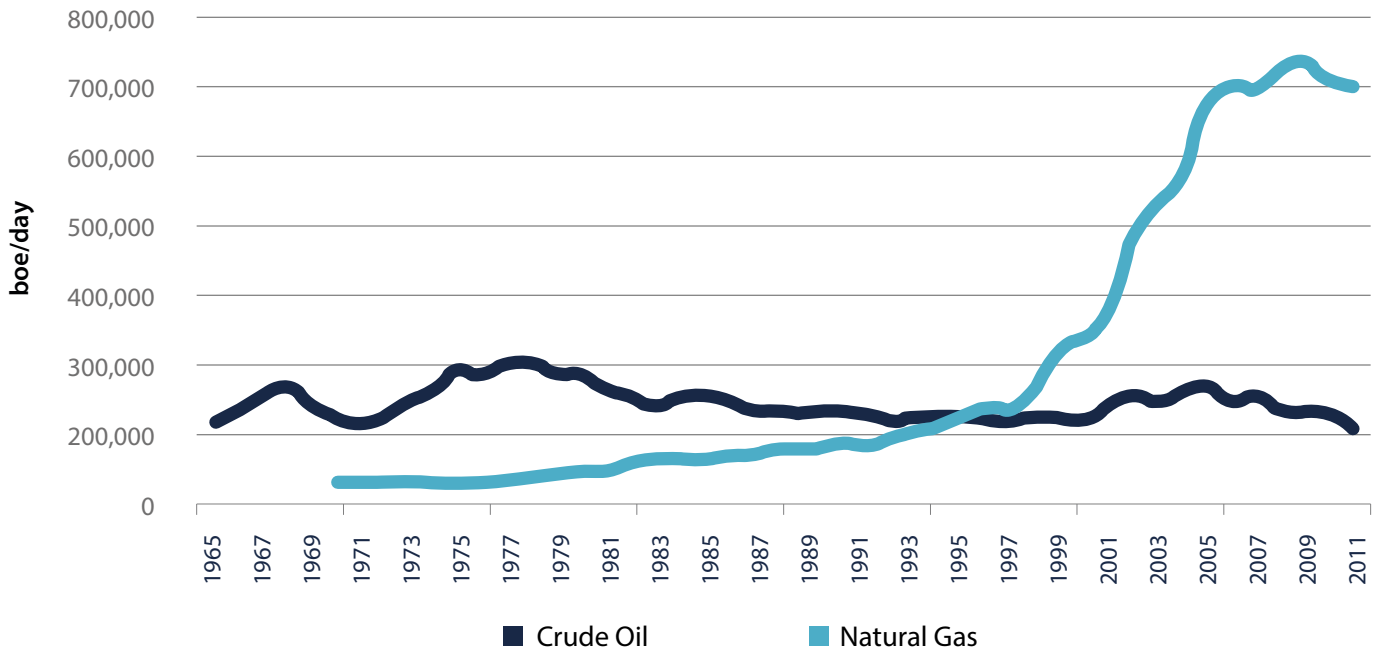
Trinidad and Tobago, unlike all other Caribbean island states, is largely energy self-sufficient and primary energy production (PEP) stood at 799 kboe/day. It produced 689 kboe/day of natural gas and 110 kboe/day of crude oil. It also produced 300 boe/day from combustible renewables and waste. Trinidad and Tobago's primary energy production is almost exclusively based on hydrocarbon production representing 99.97 percent of supply.

Trinidad and Tobago domestic energy production has seen a marked shift over the past 15 years. Throughout the 1960s, 1970s and early 1980s crude oil dominated the country's total energy supply. With declining crude oil production rates, however, since the 1980s, and a simultaneous increase in natural gas production the primary energy production has seen stark shift away from crude and towards natural gas.

Natural gas surpassed crude oil as the largest contributor to the PEP in 1996 with 142.6 kboe/day compared to 141 kboe/day. Between 1995 and 2006 natural gas production experienced an average growth rate per year of more than 16 percent growing from 126.6 kboe/day to 669.4 kboe/day. Natural gas production has since remained roughly stable around 700 kboe/day. Production peaked at 746.7 kboe/day achieved in 2010.

Crude oil production experienced its peak production in 1978 at 230 kboe/day and has since declined by almost 50 percent to 118 kboe/day in 2013. After having fallen to a low of 134 kboe/day in 1998 production experienced a temporary increase in 2006, growing at an average annual growth rate of 4.7 percent to 193.6 kboe/day. Production has since declined again.

Figure 3 Trinidad and Tobago Crude Oil and Natural Gas Production, 1965-2012



Source: BP, 2014b

Commercial Balance of Primary Energy

To supplement its domestic production the country also imported 60 kboe/day of crude oil. About 48 percent of natural gas production, equivalent to 333 kboe/day, was subsequently exported, leaving 356 kboe/day for domestic consumption, primarily for the electricity and industrial sectors. It also exported 32 kboe/day of crude oil leaving 138 boe/day as primary energy supply.

Domestic Primary Energy Supply

The Primary Energy Supply (PES) of Trinidad and Tobago stood at 494 kboe/day. Of this 356 kboe/day came from natural gas, 138 boe/day from crude oil and 0.3 kboe/day from CR&W. Fossil fuels represent 99.95 percent of primary energy supply.

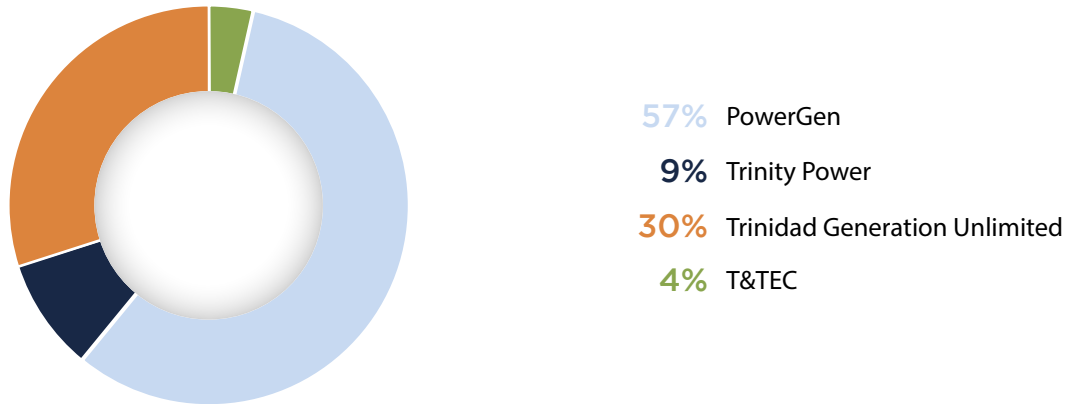
Electricity

Installed Capacity

In 2014 Trinidad and Tobago had an installed capacity of 2428.7MW, split between four electricity producers. The largest provider is the Power Generation Company (PowerGen), which operates an installed capacity of 1386MW. Trinidad Generation Unlimited provides 720MW of capacity, followed by Trinity Power with 225MW. The Trinidad and Tobago Electricity

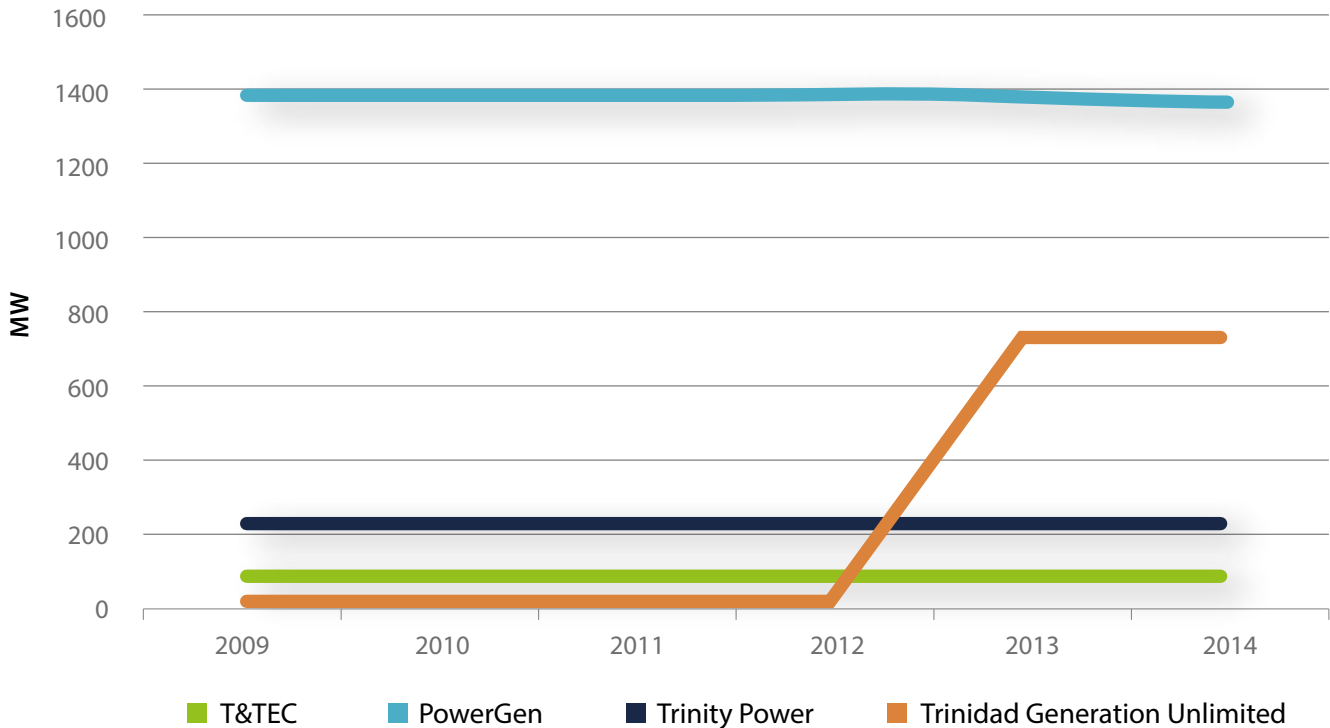
Commission (T&TEC), a state-owned company, provides 85.7MW of capacity and is also solely responsible for distributing generated electricity. For this task it purchases all produced electricity from the three Independent Power Producers before transmitting and distributing it to consumers

Figure 4 Trinidad and Tobago Share of Installed Capacity by Provider, 2013



Source: MEEA, 2014a; Samuel, 2013

Figure 5 Trinidad and Tobago Installed Capacity by Provider, 2009-2014



Source: MEEA, 2014a; PowerGen, 2014a; PowerGen, 2014b; PowerGen, 2014c; RIC, 2014a; RIC, 2014b; Samuel, 2013

T&TEC was the only electricity producer until 1994 when it decoupled its Trinidad-based generation operation and vested its Trinidad-based generation assets in a newly created subsidiary called PowerGen. T&TEC continues to produce electricity on the island of Tobago. PowerGen operates as an Independent Power Producer (IPP) with its own Power Purchase Agreement, although it is technically a majority-owned subsidiary of T&TEC. In 1998 T&TEC signed another PPA with the IPP Trinity Power, followed by a third PPA with the newest IPP Trinidad Generation Unlimited in 2009.

5 Figures: 2009-2011 from Samuel (2013a), T&TEC and Trinidad Generation Unlimited 2012-2014 from MEEA, 2014, PowerGen 2012-2014 from RIC (2014a), Trinity 2012-2014 from RIC (2014b).

The four electricity producers together operate eight power plants, two on Tobago and six on Trinidad. T&TEC operates a 64MW gas turbine at its Cove power plant. The plant opened in 2009 and was converted to natural gas in 2011. The Scarborough power plant consists of a 22.1MW medium speed diesel generator, also owned by T&TEC, and provides backup capacity in case the 25MW inter-island link or the Cove power plant experience outages.

PowerGen operates the bulk of Trinidad's capacity with 1386MW. It operates power plants at Port of Spain, Point Lisas and Penal, all natural gas fired. The Point Lisas complex is the largest with a capacity of 839MW, followed by the Port of Spain facility with 308MW. The Penal station consists of a combined cycle natural gas turbine with a capacity of 236MW. Under the 2014 Power Purchase Agreement the amount of capacity provided by PowerGen will decrease sequentially from 819MW in 2013 to 742MW

in 2014 and 624MW by January 2016. PowerGen's aging Port of Spain will be phased out in favor of more modern and efficient facilities, which have come available since Trinidad Generation Unlimited began operation. The reduction in power generation provided by PowerGen will provide savings of \$84 million for T&TEC. In total T&TEC will have to meet annual guaranteed payments to PowerGen in the vicinity of \$600 million.⁶

Trinity Power operates a 225MW gas turbine at its Couva power station. The facility came online in 1999.

Trinidad Generation Unlimited represents the newest and most efficient generation asset. The combined cycle natural gas turbine came online in October 2013 and provides 720MW of capacity.

T&TEC's PPAs are for 624MW (starting January 2016) with PowerGen, 225MW with Trinity Power, and 720MW with Trinidad Generation Unlimited.⁷

Table 1 Trinidad and Tobago Installed Capacity, 2013

Gas Turbine	Combined Cycle	Diesel	Steam Turbine
1230.6 MW	916MW	87.7MW	260MW

Source: Inkim, 2013; MEEA, 2014a; PowerGen, 2014a; PowerGen, 2014b; PowerGen, 2014c; RIC, 2014a; RIC, 2014b

⁶ Ministry of Finance, 2014
⁷ Ministry of Finance, 2014

Table 2 Total Net Generation and Sales of Electricity in GWh, 2007-11

Power Stations	Fuel	Capacity	Details	Heat Rate kJ/kWh	Year of PPA
T&TEC Tobago (Scarborough)	Automotive Diesel Oil	22.1MW	Medium Speed Diesel (backup only)	10,832	
Tobago (Cove)	Dual Fuel (Natural Gas and Diesel)	65.6MW	2009: 4x 16.4MW (gas-powered since Sep 2013)	8,707 (diesel)	
PowerGen Port of Spain	Natural Gas	308MW	<u>Steam Turbine:</u> 1965: 2x50MW 1969/74: 2x80MW <u>Gas Turbine:</u> 1984: 2x24MW	14,377	1994-2014 2014-2029
Point Lisas	Natural gas	852MW	<u>Gas Turbines:</u> 1977: 1x88MW 1978: 2x20MW 1980-82: 3x88MW, 4x62.5MW 2007: 2x105MW	16,944 12,711	1994-2014 2014-2029
Penal	Natural gas	236MW	<u>Steam Turbine:</u> 1953/55: 2x5MW 1957: 20MW 1960/62: 2x20MW <u>Gas Turbine:</u> 1976: 2x20MW <u>Combined Cycle:</u> 1985: 196MW (2x GE Gas Turbine/1x GE Steam Turbine)	11,416	1994-2014 2014-2029
Trinity Power Limited Couva	Natural Gas	225	<u>Gas Turbines:</u> 1999: 3x75MW	13,194	1998 (online 1999)
Trinidad Generation Unlimited Union Estate	Natural Gas	720MW	<u>Combined Cycle</u> 2013: 720MW (6x GE Gas Turbine: 450MW, 2x Steam Turbines: 270MW)	7,500 (estimate by RIC)	2009 (online 2013)

Source: Castalia Consulting, 2011; Inkim, 2013; PowerGen, 2014a; PowerGen, 2014b; PowerGen, 2014c; RIC, 2014a; RIC, 2014b

Trinidad and Tobago does not have utility scale renewable energy generation capacity and non-fossil fuel generation is limited to small-scale of wind and solar photovoltaic installations by private households and small businesses or pilot programs on Government facilities.⁸

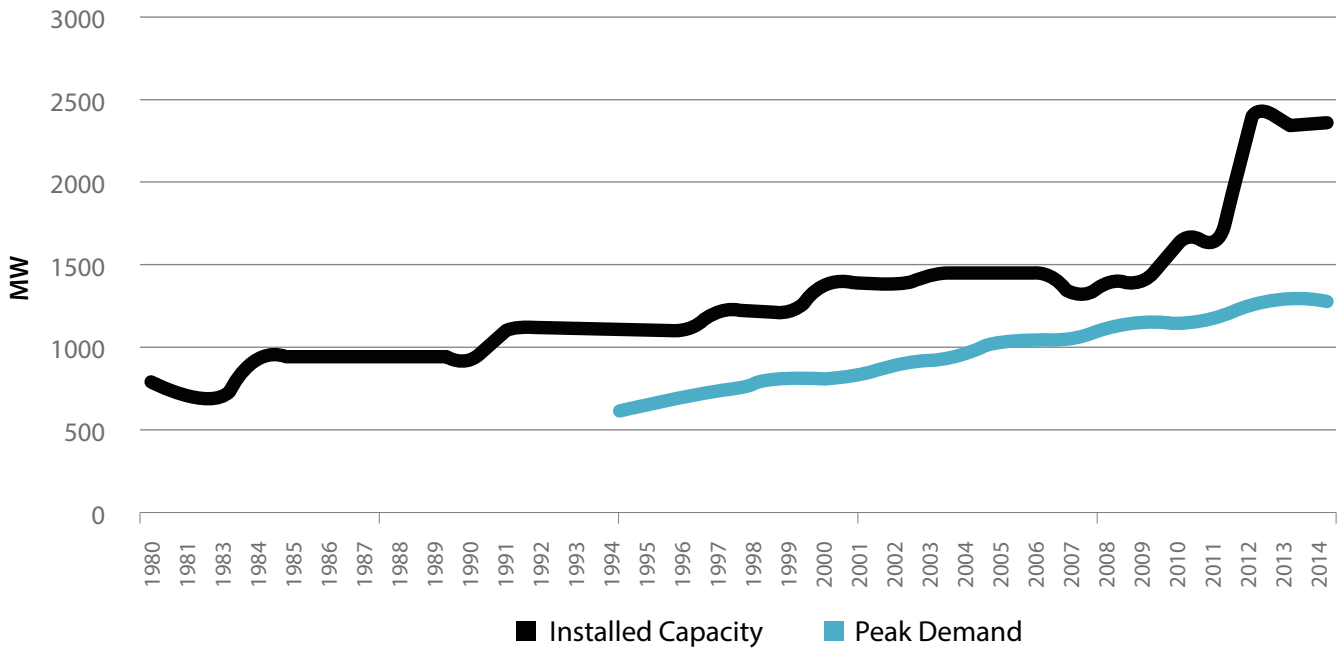
The electricity sector is subject to high levels of energy subsidies. While this policy has resulted in the lowest electricity prices throughout the Caribbean, it also presents a major challenge to the promotion and implementation of renewable energy technology. Wind and solar systems with high upfront costs are uneconomical in the face of subsidized electricity from large natural gas fired power plants. Very low electricity prices also have led to overconsumption and have made it hard to implement energy efficiency or conservation measures. Electricity generation in Trinidad and Tobago is highly subsidized as a result of which the country has high per capita consumption.⁹

⁸ Castalia Consulting, 2011

⁹ Samuel, 2013

¹⁰ Installed Capacity Figures: 1980-2008 from EIA (2012), 2009-2011 from Samuel (2013a), 2012-2013 from Inkim (2013); Peak Demand Figures: 1994-2004 from RIC (2006), 2005-2010 from T&TEC (2011) and T&TEC (2004), 2012 Castalia Consulting (2011), 2013 Inkim (2013).

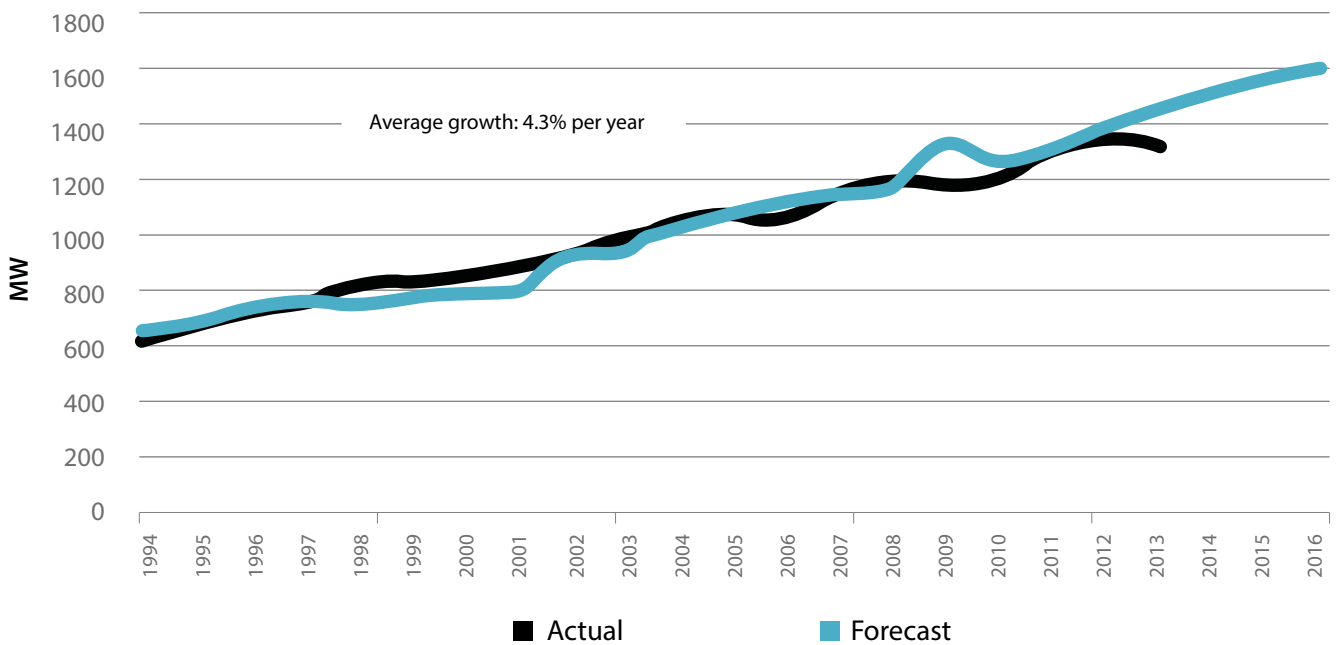
Figure 6 Trinidad and Tobago Installed Capacity and Peak Demand, 1980-2013



Source: Castalia Consulting, 2011; Inkim, 2013; RIC, 2006; Samuel, 2013; T&TEC, 2004; T&TEC, 2011

Between 1994 and 2012 T&TEC average peak load increased at an average annual rate of 4.3 percent. T&TEC and the RIC have been able to accurately forecast the growth of peak demand over the years. By 2016 peak demand is expected to reach 1600MW up from 800MW in 2000.

Figure 7 Trinidad and Tobago Peak Demand, 2007-2013, Forecast 2014-2016¹¹



Source: Castalia Consulting, 2011; Inkim, 2013; RIC, 2006; T&TEC, 2004; T&TEC, 2011

¹¹ Actual Figures: 1994-2004 from RIC (2006), 2005-2010 from T&TEC (2011) and T&TEC (2004), 2012 Castalia Consulting (2011), 2013 Inkim (2013) Forecast Figures: 1994-2008 from RIC (2006), 2005-2016 from T&TEC (2011)

Input to Electricity Generation

Of the 38.1 kboe/day intended for electricity generation in 2008, 38 kboe/day came from natural gas and 0.1 kboe/day came from liquid fuels, exclusively diesel.

Electricity Matrix

In 2012, T&TEC's sales stood at 8,708 GWh, an increase of 590 GWh or 7.2 percent over 2011. Electricity sales increased by 54 percent between 2002 and 2012 representing an annual growth rate of 4.5 percent. Almost all of this increase can be attributed to higher per capita consumption of electricity as Trinidad and Tobago's population grew by only 4.6 percent over the same period.

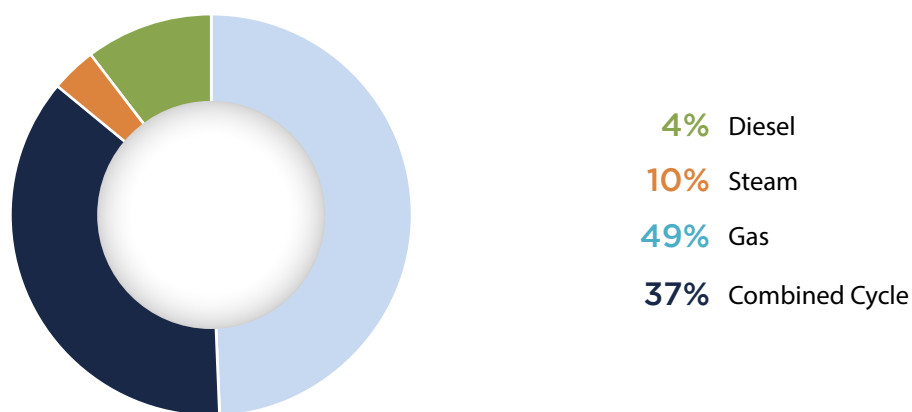
Table 3 Trinidad and Tobago Electricity Net Generation in GWh, 2007-2012

Electricity Sales in GWh	2012	2011	2010	2009	2008	2007
Total	8,708	8,119	7,910.7	7,287.1	7,535.9	7,536.2

Source: Inkim, 2013; T&TEC, 2011.

About 96 percent of Trinidad and Tobago's installed capacity is gas-fired. Just under half of capacity comes from single-cycle gas turbines operated primarily by PowerGen at its Point Lisas plant and by Trinity Power Limited. Combined-cycle generation represents 37 percent of installed capacity. Trinidad Generation Unlimited's new plant makes up the bulk of combined-cycle capacity. Steam turbines account for 10 percent of capacity operated by PowerGen at its Port of Spain and Penal power stations. Diesel generation capacity is operated by T&TEC at its Cove and Scarborough plants (also runs on natural gas).

Figure 8 Trinidad and Tobago Share of Installed Capacity by Fuel Type, 2013



Source: Inkim, 2013; MEEA, 2014a; PowerGen, 2014a; PowerGen, 2014b; PowerGen, 2014c

In 2011 T&TEC's electricity sales by sector were as follows: The industrial sector represents the by far largest consumer of electricity in the country and accounted for 60 percent of sales with 4,825 GWh. Of the 60 percent, heavy industrial consumption represented 36 percent and light industrial consumption accounted for 24 percent.

The residential sector consumed 29 percent of T&TEC's sales equaling 2,412 GWh. The commercial sector came in as the third largest consumer with 773 GWh representing 10 percent of sales. Other consumption, primarily street lighting, accounted for sales of 109 GWh representing 1 percent.¹²

Figure 9 Trinidad and Tobago Electricity Consumption by Sector, 2011



Source: Inkim, 2013

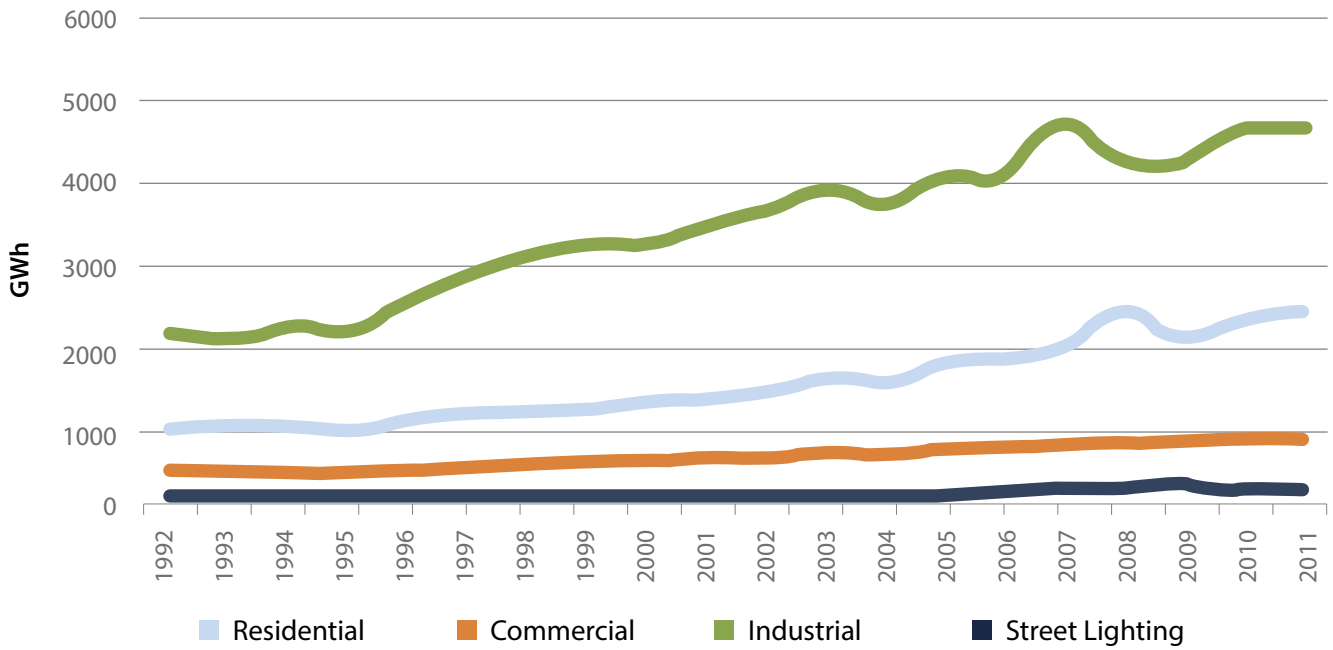
In 2001, the residential sector represented 24.1 percent of sales. By 2011, its share increased to 29.7 percent. Over the same time span, the industrial sector's share of electricity sales decreased from 65.8 percent to 59.4 percent.

Commercial consumption remained largely stable, falling slightly from 9.8 percent to 9.5 percent. The role of street lighting was expanded, and its share tripled from 0.4 percent to 1.3 percent.

The industrial sector experienced its most significant decrease in consumption from 2007-2008 when its consumption dropped from 4,833 GWh to 4,345 GWh, resulting in its share falling from 64.1 percent to 57.7 percent. The global economic downturn can help to explain this significant decrease in consumption of the industrial sector.

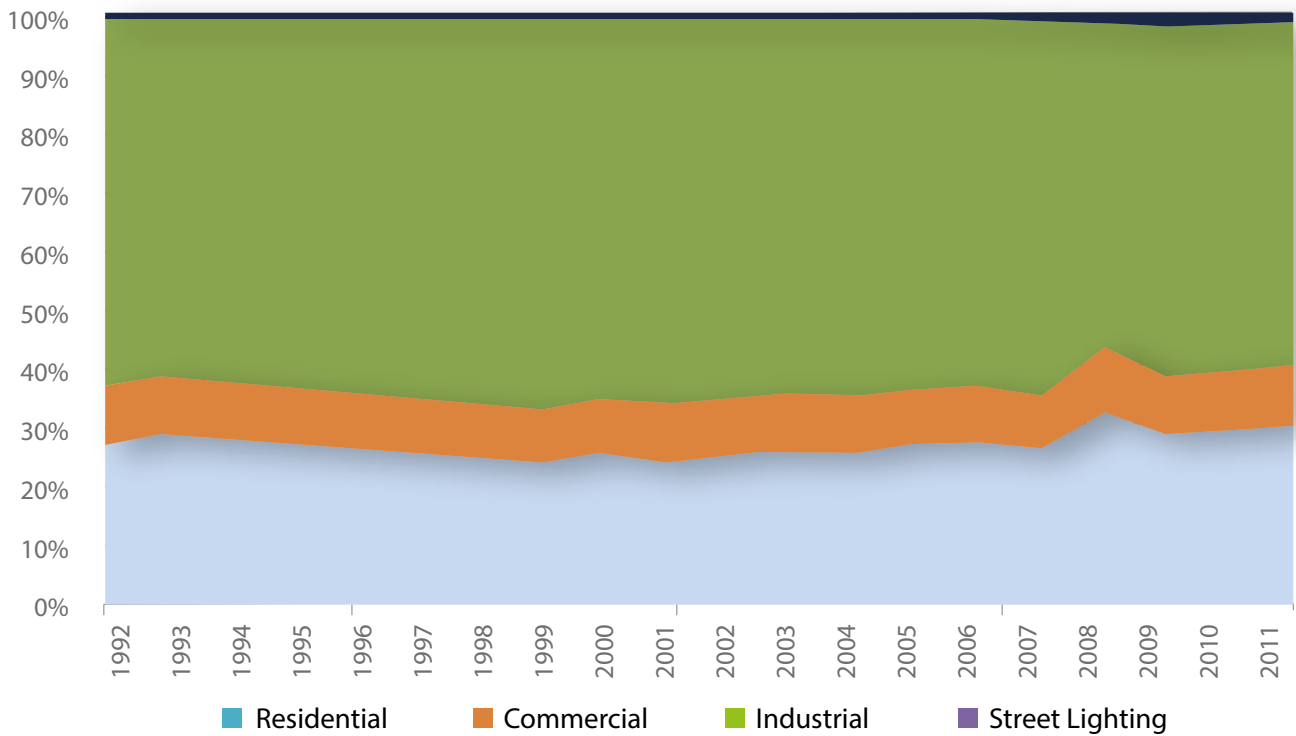
¹² Inkim, 2013

Figure 10 T&TEC Electricity Sales by Sector, 1992-2011 ¹³



Source: RIC, 2006; Samuel, 2013; T&TEC, 2011

Figure 11 Share of T&TEC Electricity Sales by Sector, 1992-2011 ¹⁴



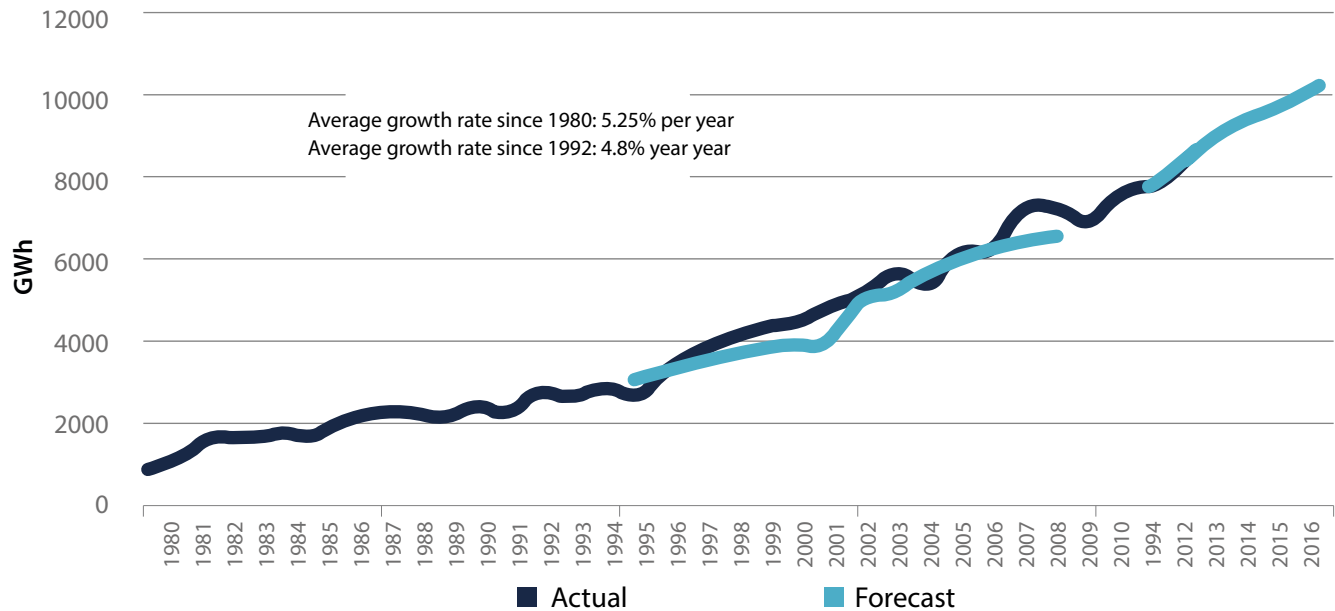
Source: RIC, 2006; Samuel, 2013; T&TEC, 2011.

13 Figures: 1992-2003 from RIC (2006), 2004-2008 from Meister (2011), 2009-2010 from Samuel (2013a), 2011 from T&TEC (2011).

14 Figures: 1992-2003 from RIC (2006), 2004-2008 from Meister (2011), 2009-2010 from Samuel (2013a), 2011 from T&TEC (2011).

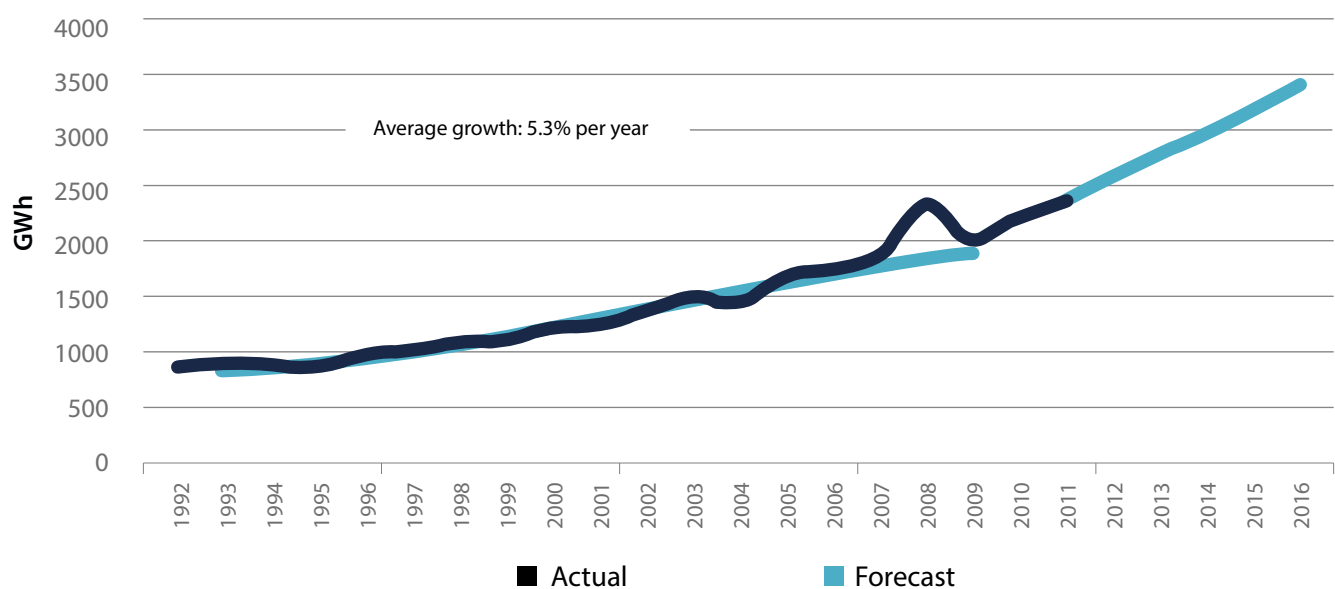
T&TEC's electricity sales have been growing at an annualized rate of 5.25 percent per year between 1980 and 2011. Sales grew from 1,706 GWh in 1980 to 8708 in 2012. Growth has slowed somewhat over the past 20 years growing at an annualized rate of 4.8 percent year. Between 2011 and 2016 the T&TEC forecasts an annual average growth rate of 4.8 percent with sales growing from 8,121 to 10,272 by 2016.

Figure 12 T&TEC Electricity Sales, 1980-2016¹⁵



Source: EIA, 2015; RIC, 2006; Samuel, 2013; T&TEC, 2011

Figure 13 T&TEC Residential Sector Sales, 1992-2016¹⁶

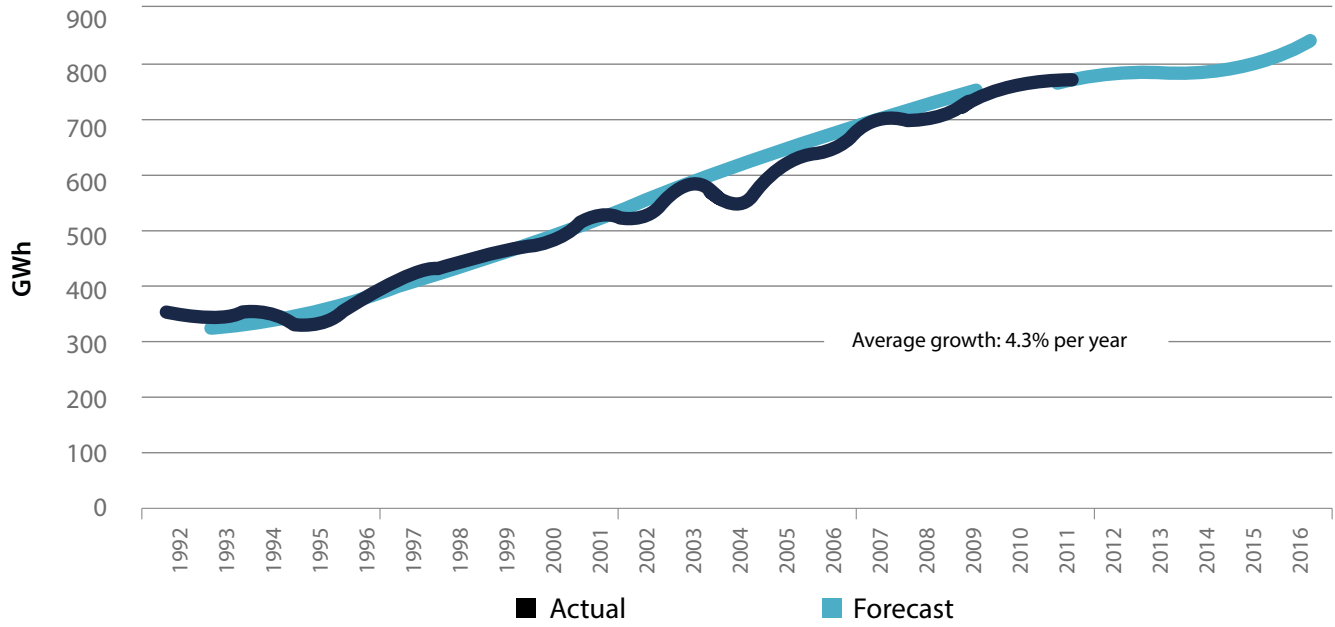


Source: Meister Consultants Group, 2011; RIC, 2006; Samuel, 2013; T&TEC, 2011

15 Actual figures: 1980-1991 from EIA (2012), 1992-2003 from RIC (2006), 2004-2008 from Meister (2011), 2009-2010 from Samuel (2013a), 2011 from T&TEC (2011). Forecast figures: 1992-2009 from RIC (2006), 2010-2016 from T&TEC (2011).

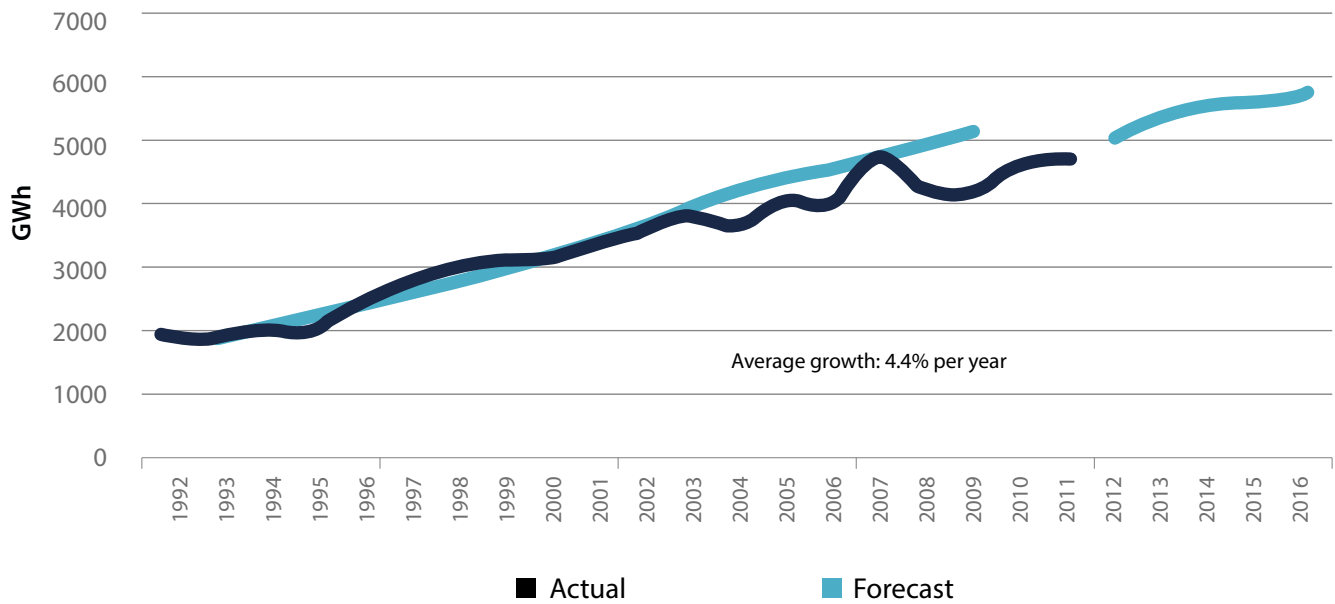
16 Actual figures: 1980-1991 from EIA (2012), 1992-2003 from RIC (2006), 2004-2008 from Meister (2011), 2009-2010 from Samuel (2013a), 2011 from T&TEC (2011). Forecast figures: 1992-2009 from RIC (2006), 2010-2016 from T&TEC (2011).

Figure 14 T&TEC Commercial Sector Sales, 1992-2016¹⁷



Source: RIC, 2006; Samuel, 2013; T&TEC, 2011

Figure 15 T&TEC Industrial Sector Sales, 1992-2016¹⁸

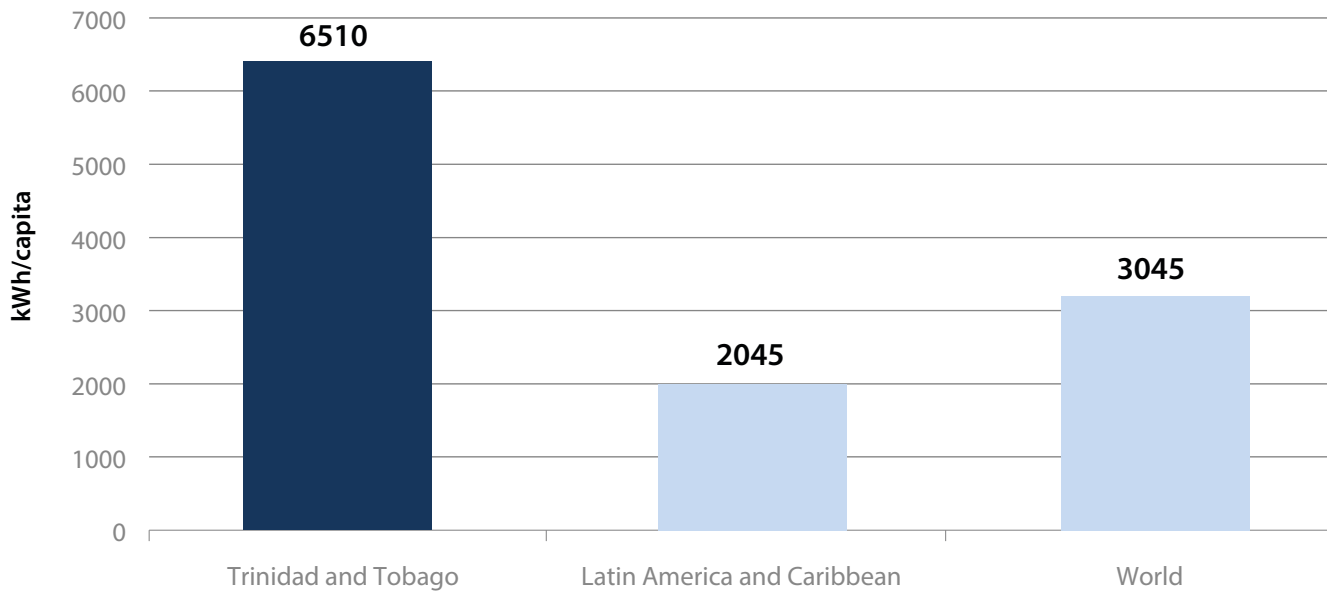


Source: Meister Consultants Group, 2011; RIC, 2006; Samuel, 2013; T&TEC, 2011

¹⁷ Ibid, note 6
¹⁸ Ibid, note 7

In 2012 per capita consumption in Trinidad and Tobago stood at 6510 kWh, more than three times the Latin American and Caribbean average, and more than twice the world average. The extraordinary rate of per capita consumption can be attributed to the high energy intensity of the industrial sector. Artificially low prices due to energy subsidies in Trinidad and Tobago also provide little incentive for conservation in the residential sector and efforts in this regard have only just begun. Due to the country's energy intensive industries per capita consumption of electricity is among the highest in the Caribbean at over 6,500 kWh.¹⁹

Figure 16 Electricity Use per Capita, 2012



Source: Inkim, 2013; T&TEC, 2011; UN, 2014; World Bank, 2014

Secondary Balance and Final Consumption

Secondary Energy Balance

In 2012 Trinidad and Tobago imported 8 kboe/day of oil products and exported 103 kboe/day. This left 25 kboe/day of oil products for domestic consumption.

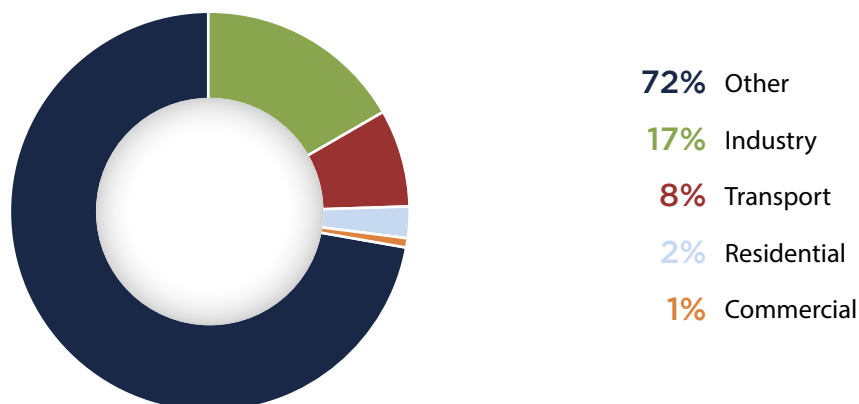
Final Consumption by Sector

Final consumption by sector in 2012 totaled 269 kboe/day. The industrial sector consumed 45 kboe/day equaling 17 percent of final consumption. The transportation sector represented 8 percent of final consumption with 21 kboe/day, followed by the residential sector with 2 percent and 7 kboe/day.

The commercial sector accounted for 2 kboe/day equaling 1 percent. Other consumption represents the largest share of final consumption representing 72 percent and 194 kboe/day. Unlike the transportation sector in other Caribbean countries, which often accounts for between 50-60 percent of consumption, transportation is, as a proportion, only a minor consumer due to the expansive petrochemical industry which consumes the vast majority of energy in the country.

¹⁹ IRENA, 2012

Figure 17 Energy Consumption by Sector, 2011



Source: IEA, 2012

Institutional Organization of the Energy Sector

The energy sector in Trinidad and Tobago involves a plethora of actors ranging from ministries, committees, state-owned and privately-owned energy producers and exporters and statutory agencies and regulators. Overall energy and mineral policy, which includes the oil, gas and electricity sector, is set by the Ministry of Energy and Energy Affairs (MEEA).

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. MEEA also decides which areas are made available for exploration and production and receives applications for the competitive bidding process.

Current Institutional Structure

Ministry of Energy and Energy Affairs

The Ministry of Energy and Energy Affairs (MEEA) is responsible for monitoring, controlling and regulating the energy and mineral sectors of Trinidad and Tobago. It determines, formulates, implements and enforces the country's energy policy.

Specifically, MEEA manages and regulates upstream and downstream oil and gas operations and marketing activities as well as the petroleum services industry and mineral sector. Furthermore, it develops and implements fiscal, environmental, pricing and industry policies related to the energy sector. It also controls state-owned energy and energy-related companies.

The following state-owned enterprises, among many others, are regulated by MEEA: National Gas Company (NGC), Petroleum Company of Trinidad and Tobago Limited (PETROTRIN), Trinidad and Tobago National Petroleum Company Limited (NP),

Trinidad and Tobago Marine Petroleum Company Limited, Alutrint Limited, and National Energy Corporation of Trinidad and Tobago (NEC).

Among other functions, MEEA is responsible for (i) providing leases and licenses for petroleum exploration and production, (ii) regulating and managing all oil and gas sector development activities and upstream operations of the oil refinement process, (iii) administering the marketing of oil products, natural gas transmission and sales, the petrochemical manufacture and other natural gas-related industries in the domestic market, (iv) formulating and implementing legislation for the petroleum sector, (v) collecting, with the Ministry of Finance, revenue derived from the petroleum sector, and (vi) planning, developing and implementing long-term policy for the petroleum sector.²⁰

MEEA is divided into seven divisions dealing with minerals, energy research and planning, downstream and retail marketing, resource management, LNG and gas exports, contract management, and commercial evaluation.²¹

The Commercial Evaluation Division is responsible for fiscal and economic modeling, commercial evaluation, development of new business opportunities, and contract negotiations. Specific tasks include (i) modeling for up-, mid-, and downstream projects, (ii) calculating revenues from Production Sharing Contracts (PSCs), (iii) providing technical support for petroleum taxation, legislation and fiscal policy, (iv) identifying new business and investment opportunities, (v) evaluating plans and projects submitted by energy companies on their commercial merits, (vi) taking the lead on PSCs negotiations and exploration and production (E&P) licenses.²²

The Contracts Management Division is responsible for the monitoring of PSCs and E&P licenses, including profit sharing under PSCs, and ensuring that all contracts conditions are met.²³

The Downstream and Retail Marketing Division is responsible for computing petroleum revenues and royalties, monitoring downstream and refining operations, and supervising wholesale and retail marketing operations, including the distribution of compressed natural gas (CNG) and liquefied petroleum gas (LPG) for domestic consumption.²⁴

The Energy Research and Planning Division is responsible for planning, research, quantitative evaluation and analysis, and renewable energy. Specific tasks include (i) analyzing the socio-economic impact of the energy sector and optimizing energy sector investment opportunities, (ii) collecting and evaluating intelligence, statistics, and technical knowledge on the energy sector, (iii) evaluating and analyzing economic and statistical data of the energy sector, (iv) managing the Standing Committee on Energy, and (v) promoting renewable energy developments, investments, and usage.²⁵

The LNG and Gas Exports Division is tasked with (i) identifying and maximizing opportunities along the natural gas value chain, (ii) evaluating and granting pipeline license applications and optimizing the gas transmission infrastructure, and (iii) marketing of natural gas resources received from PSCs. Its area of responsibility also includes the natural gas-related industries, LNG plant operations, and the shipping and re-gasification of natural gas.²⁶

The Minerals Division is tasked with “promoting and facilitating the effective and efficient management and development of mineral resources.” The Division’s two Sections, the exploration and development section and the operations section, are, among other functions, responsible for (i) conducting and evaluating geophysical surveys, (ii) advising the Minerals Advisory Committee on the establishment of new mineral blocks and zones, and (iii) regulating and monitoring mining sector operations and ensuring compliance with the Act and regulations.²⁷

The Resource Management Division is responsible for acreage management, exploration and development planning, research development and data. Its tasks include (i) conducting enhanced oil recovery studies, (ii) technical and commercial evaluation of idle or unused acreage, and (iii) energy data management and improving MEEA data quality.²⁸

In 2008 MEEA also created the Renewable Energy Committee (REC). The REC’s first task was to develop a framework for a renewable energy (RE) policy, which it completed in 2011. The REC’s tasks are to (i) review the national energy mix and assess RE application and research activities in the RE sector, (ii) identify feasible RE technologies for all industry sectors, (iii) set realistic targets and timeframe for RE as part of the energy mix, (iv) make recommendations as to the extent of RE incentives including tax breaks, subsidies, and grants, (v) identify appropriate research and development to advance RE, (vi) investigate mechanisms and strategies to finance RE projects including by local and international agencies, and (vii) research legislative and regulatory approaches to support the exploitation, development and use of RE.²⁹

20 MEEA, 2014c; MEEA, 2014d; MEEA, 2014e; Samuel, 2013

21 MEEA, 2013a

22 MEEA, 2013a

23 MEEA, 2013a

24 MEEA, 2013a

25 MEEA, 2013a

26 MEEA, 2013a

27 MEEA, 2013a

28 MEEA, 2013a

Standing Committee on Energy

The Cabinet Standing Committee on Energy (SCE) represents Trinidad and Tobago's highest forum and decision-making body for the energy sector. The ad hoc Committee is chaired by the prime minister and composed of ten government ministers, senior

MEEA officials, energy sector technocrats from MEEA, Ministry of Finance and Ministry of Planning, as well as the chairs and chief executives of the energy sector state enterprises NGC, NEC, Petrotrin and T&TEC. The CSE takes the lead on all important strategic decisions and development in the energy sector.³⁰

The Environmental Management Authority

The Environmental Management Authority (EMA) within the Ministry of the Environment and Water Resources functions as Trinidad and Tobago's environmental regulator. The EMA approves applications for oil, gas and mineral developments and provides Certificate of Environmental Clearance for all economic activities with potential impacts on the environment and monitors. This is particularly relevant for developments in the oil and gas sector. The Authority also ensures compliance with the rules and guidelines set forth by the certificate.

The Environmental Management Act (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.³¹

Town and Country Planning Division

The Town and Country Planning Division (TCPD) within the Ministry of Planning and Sustainable Development is responsible for reviewing, approving and providing licenses for land use. Under Section

9 of the Town and Country Planning Act a land use license is required before any business development can begin. The TCPD evaluates applications from a land use perspective.

Land Management Division

The Land Management Division (LMD) within the Ministry of Food Production, Land and Marine Affairs deals with issues pertaining to land ownership and the use of the seabed. The LMD administers all state land and provides licenses and special permits and agreements and acquires privately held land intended for public use.³² Furthermore, it provides licenses for developments impacting the seabed, such as oil and gas exploration, mining, installation of pipelines, and offshore structures touching the seabed.

below the median high water mark as well as the seabed within the Exclusive Economic Zone. Currently, the state owns 26.6 percent of land, with an additional 31.6 percent part of the forest preserve.

The remaining 41.8 percent are part of private holdings. Furthermore, the state retains rights to all subsurface and pore spaces, even on privately held land. Exceptions exist for some titles granted during the late nineteenth and early twentieth century. In those cases private owners also own the subsurface rights as long as lands are not sold, in which case the subsurface rights revert back to the state.³³

Generally, all land not held privately is owned by the state and the government also owns the shoreline

29 REC, 2011

30 Morton, 2012; Samuel, 2013

31 Environmental Management Authority, 2013

32 Morton, 2012

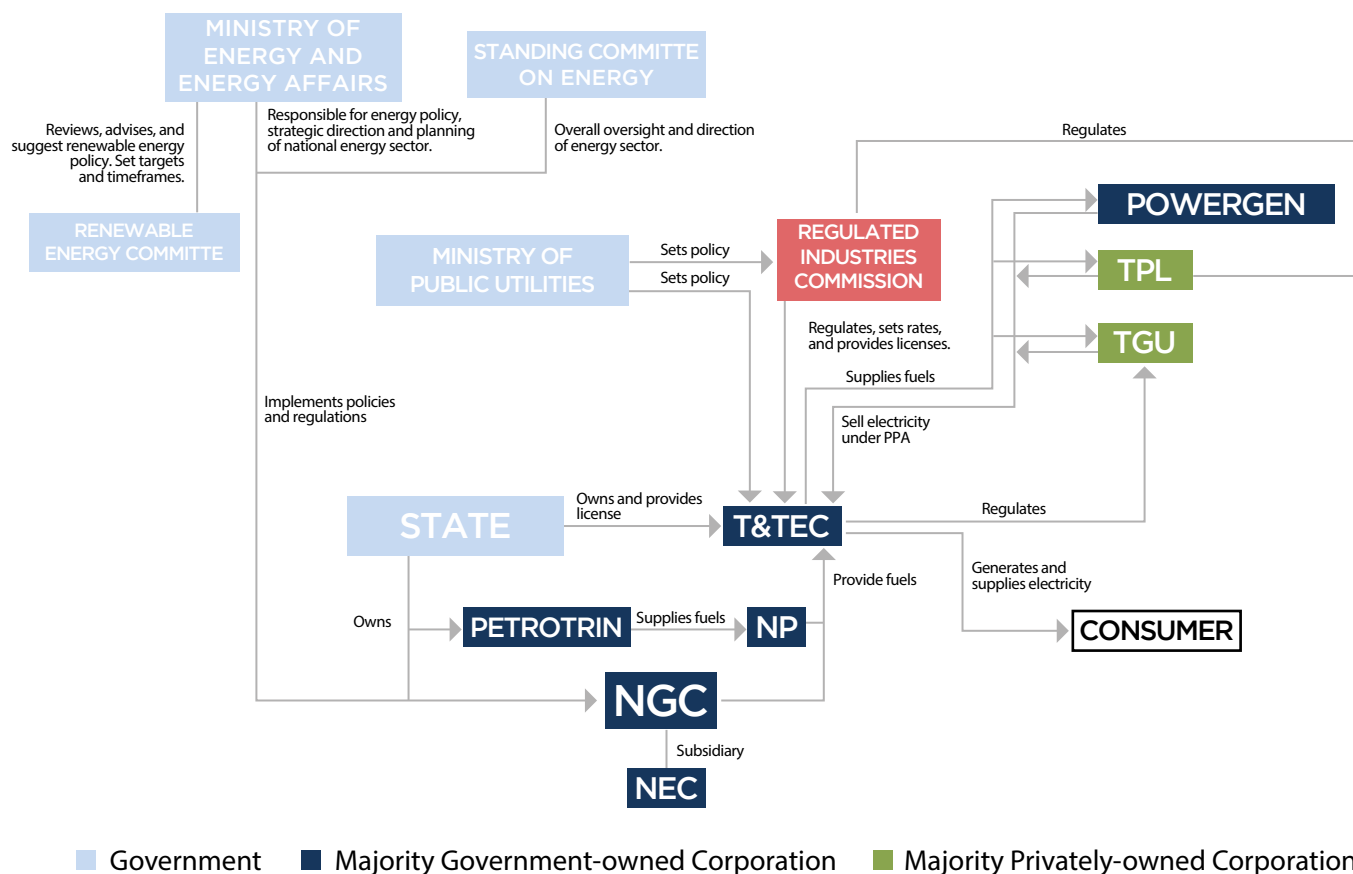
33 Morton, 2012

Table 4 Energy Sector Responsibilities

Ministry	Type	Tasks and Responsibilities
Standing Committee on Energy	Ad hoc committee as part of cabinet chaired by Prime Minister	Responsible for overall oversight and direction of the energy sector. Composed of cabinet ministers, energy sector representatives, and senior technocrats from MEEA, the Ministry of Finance and Ministry of Planning.
Ministry of Energy and Energy Affairs (MEEA)	Government Ministry	Responsible for energy policies, strategic direction and planning of the national energy sector.
Renewable Energy Committee (REC)	Committee of the MEEA	Responsible for the review of and advising on renewable energy potential, defines and sets renewable energy targets and timeframes for overall energy mix, suggests policy and legislative changes to support renewables.
Petroleum Company of Trinidad & Tobago Limited (Petrotrin)	State-owned, integrated oil and gas company	The country's largest producer of crude oil. Operates country's sole petroleum refinery.
National Gas Company of Trinidad & Tobago (NGC)	State-owned energy company	Responsible for purchasing, transporting, distributing and selling of natural gas to industrial and commercial consumers. Owns, operates, and maintains T&T's on- and offshore distribution network. It is involved in gas-sector activities through subsidiaries such as infrastructure, services, upstream gas and LNG production.
National Energy Company (NEC)	Wholly-owned subsidiary of NGC	Responsible for developing and maintaining gas-related infrastructure to facilitate and promote natural gas-related developments.
The Energy Chamber	Private-sector trade association	Responsible for representing and ensuring the interest of companies operating in the country's energy sector.
Regulated Industries Commission	Independent statutory body	Responsible for regulating utility services and ensuring fair and quality services. Tasked with licensing, rate-setting, customer advocacy and competition.
Environmental Management Authority, Ministry of Housing and the Environment (EMA)	Statutory agency	Responsible for developing and implementing standards and environmental management standards for all aspects of the country's economy. Tasked with educating the public on environmental and conservation issues.
Trinidad and Tobago Electricity Commission (T&TEC)	State-owned, vertically integrated utility	Responsible for the generation, transmission, distribution and sale of electricity.
Power Generation Company of T&T (PowerGen)	IPP, public-private joint venture	Responsible for providing generation capacity for the T&TEC's grid. Operating under a Power Purchase Agreement (PPA)
Trinity Power Limited (TPL)	IPP, privately-owned	Responsible for providing generation capacity for the T&TEC's grid. Operating under a Power Purchase Agreement (PPA)
Trinidad Generation Unlimited (TGU)	IPP, privately-owned	Responsible for providing generation capacity for the T&TEC's grid. Operating under a Power Purchase Agreement (PPA)

Source: Castalia Consulting, 2011; RIC, 2014c; Samuel, 2013

Figure 18 Organization and Functioning of the Energy Sector, 2015



Source: Author's own work based on information Morton, 2012; RIC, 2014a; RIC, 2014b; T&TEC, 2011 Morton, 2012

Table 5 Key Legislation and Structure of the Energy Sector

Key Legislation	Regulator	Utility	Ownership structure
Petroleum Act, 1969 Pipelines Act, 1933 Town and Country Planning Act, 1960 State Lands Act, 1918 Land Acquisition Act, 1994 Petroleum Taxes Act, 1974 Minerals Act (Chapter 61:03)	MEEA (overall energy sector) RIC (electricity)	T&TEC	Government-owned, 100%

Source: OAS, 2010; Samuel, 2013

The Environmental Management Authority

There does not exist one single designated regulatory authority in charge of overseeing the entire energy sector. Overall control and guidance of the energy sector is the responsibility of MEEA.

Institutional Structure of the Electricity Subsector

The electricity sub sector in Trinidad and Tobago falls under the purview of the Ministry of Energy and Energy Affairs. It was under the control of the Ministry of Public Utilities until 2001 when responsibility shifted to MEEA.

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. It is also the sole power generator on the island of Tobago. Until 1994 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.

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 in rates as historically electricity rates are set too low for T&TEC to recover its costs 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.

Electricity Commission Act (No. 42 of 1945)

The Electricity Commission Act established the Trinidad and Tobago Electricity Commission (T&TEC) as a vertically integrated electricity company with the task of generating and supplying electricity. According to the Act the T&TEC ("the Commission") consists of between five and nine members with at least four members having backgrounds in engineering, accountancy, law, economics and business management appointed the President.

The President also appoints the Chairman and Deputy Chairman from the members of the Commission. Members are limited to a period of five years but may be reappointed by the President. Furthermore, the President may give general directives on the policies of the Commission. The Act vested in the Commission the absolute ownership of the entire electricity undertakings and properties of the Port-of Spain and San Fernando Corporations.

The Commission is given the right, with the approval of the President, to borrow, secure or raise money through the issue of stocks or other securities. It may furthermore borrow any sums necessary for carrying out its operation, from the government. Under the Act the Commission has the power to generate, transmit, transform and sell energy to consumers in the entirety of Trinidad and Tobago and may,

with the consent of the Minister, purchase electricity from an approved generator.

The Act grants the Commission the exclusive right for the generation of electricity but allows the Commission to enter into license agreements, with consent of the Minister, with approved generators of electricity. Such license however only extends to the generation of electricity and the supply of energy in any part of the two islands is vested only in the Commission (since May 1, 1954). Specifically, "the right to lay, place, and carry electric lines through, across, over or under any land in connection with the supply of energy [...] are vested in the Commission exclusively and shall not be transferred or assigned to an approved generator of electricity." (Section 30)

The Act also gives the Commission the right to set the electricity tariff at rates that ensure adequate and sufficient revenue to cover operating expenses, maintenance, and depreciation, interest payments and repayment of debt, as well as creation of reserve funds for future expansion. (Section 53)

The Commission is exempt from the payment of customs duty, stamp tax, and income tax on all plants machinery, mechanical appliances, etc. relevant for the carrying out of its duties under the Act.

Ministry of Public Utilities

The Ministry of Public Utilities (MPU) was the line Ministry for T&TEC and set the sector policy until 2001 when responsibility for the sector shifted to the Ministry of Energy and Energy Affairs (MEEA). The Ministry of Public Utilities' primary role is to ensure a modern and technologically advanced utility sector (electricity, telecommunications and mail) that provides cost effective and quality services to all consumers. Under the RIC Act the Ministry of Public Utilities remains responsible for the granting of licenses.

T&TEC

Trinidad and Tobago Electricity Commission is the state-owned utility responsible for the generation, transmission, distribution and sale of electricity. It also designs, constructs, operates and maintains the country's transmission and distribution network. Under the Electricity Commission Act of 1945, last amended in 2013, T&TEC is given a legal monopoly for the generation, transmission, transformation, distribution, purchase and sale of electricity in the whole of Trinidad and Tobago (Section 31).

The Act, however, allows it to enter into license agreements with approved generators of electricity, also known as Independent Power Producers (IPP), to provide electricity on a non-exclusive basis, subject to the terms and conditions set by the Minister. In 1994 T&TEC moved away from operating as a vertically integrated utility to focus on transmission and distribution when it divested all its Trinidad-based

generation assets at the Port of Spain, Point Lisas and Penal Power Stations to form a majority-owned subsidiary called Power Generation Company (PowerGen).

In addition to PowerGen, which technically operates as an IPP although it is still majority-owned by the Commission, the Commission has also granted generation licenses to Trinity Power Limited and Trinidad Generation Unlimited. Although no longer directly involved in the generation of electricity on Trinidad, T&TEC it continues to directly own and operate all utility-scale generation facilities in Tobago.

It also remains the sole supplier of electricity purchasing all generated electricity from the IPPs before transmitting, distributing and selling it to consumers. T&TEC purchases all gas required for the generation of electricity from the National Gas Company and supplies it to the IPPs.³⁴

Power Generation Company

The Power Generation Company (PowerGen) was created in 1994 when T&TEC vested it with its generation assets on Trinidad. At the time of its founding ownership was split between T&TEC (51 percent), Southern Electric International (39 percent) and NEL Power Holdings Limited (10 percent). Ownership has since changed five times. While T&TEC has retained its 51 percent stake ownership the two other ownership stakes have change five times since.

In 1998 BP Amoco took over Amoco's share followed by BP replacing BP Amoco in 2000. BP's stake was then taken over by National Enterprises Power Holdings Ltd in 2013. In 2007 Mirant Corporation took over Southern Electric International's share, followed in 2007 by Marubeni Corporation replacing Mirant Corporation.

Thus ownership structure today stands at 51 percent T&TEC, 39 percent Marubeni Corporation, and 10 percent National Enterprises Power Holdings Ltd. PowerGen operates a total generating capacity of 1386MW with 308MW at the Port of Spain Power Station, 842MW at the Point Lisas Station, and 236MW at the Penal Station.³⁵

Trinity Power Limited (Trinity)

Trinity and T&TEC signed a Power Purchase Agreement in 1998 and it began commercial operations in September 1999. The company has since provided electricity from its Couva Power

Station where it operates a capacity of 225MW. Trinity is owned by a US consortium of firms with the controlling stake held by an independent power and infrastructure company.³⁶

³⁴ Government of Trinidad and Tobago, 2013; Samuel, 2013; T&TEC, 2014a

³⁵ MEEA, 2014a; RIC, 2014a

³⁶ MEEA, 2014a

Trinity Generation Unlimited

Trinity Generation Unlimited is the latest IPP having signed a PPA with T&TEC in 2009. It began commercial operations in October 2013 and operates 720 MW of combined cycle capacity at the Union Estate power station based at the Union Industrial Estate in La Brea.

It was originally supposed to supply 240MW capacity to a newly build Alutrint Aluminum Complex via two dedicated transmission lines operated by T&TEC and 480MW to the national grid. The aluminum project, however, has since been cancelled, and all of its capacity is fed into the national grid. Trinity Generation Unlimited was planned as a 60-40 percent joint venture between United States-based AES Corporation and the Government of Trinidad and Tobago.

Following the financial crisis in 2008 the ownership structure was modified and the Government assumed majority role. The facility was built at a cost of approximately US\$740 million. Before operations began in October 2013, the government bought AES' remaining stake in the Trinity Generation Unlimited for US\$31 million in July 2013.³⁷

Table 6 Trinidad and Tobago Electricity Tariff Regulation

Who sets tariffs	Who controls tariff changes	How is the tariff calculated	How are tariff changes calculated
RIC T&TEC submits tariff proposal	RIC	Calculated based methodology set in rate determination studies by RIC.	Annual adjustments based on T&TEC proposal. RIC evaluates proposal against set performance standards and goals.
Who monitors and enforces fairness of tariff	Who can alter terms of how tariff is calculated	How frequently is tariff revised	Is there a guaranteed rate of return
RIC	Parliament	Reviewed every 5 years by RIC. T&TEC can submit request for rate adjustment to RIC.	No guaranteed rate. RIC takes into account e.g. sufficient revenue generation, interest of shareholders, and ability of consumers to pay the rate.

Table 7 Renewable Energy Support Policies, 2013

Feed-In Tariff	Net Metering	Renewable Portfolio Standard	IPPs Permitted	Tax Credits	Tax Reduction/Exemption	Public Loans/Grants
Suggested	-	-	✓ ³⁸	-	-	-

Regulator

The Regulated Industries Commission is a consumer-oriented statutory body responsible for the regulation of the electricity sector. Its key function, among many, consists of establishing the principles upon which the electricity tariffs are calculated and ensuring compliance with these tariffs and other regulatory rules. It was established in 1998 with the Regulated Industries Commission Act, No. 26 of 1998 and began operation in 2000. It replaced the Public Utilities Commission, which had performed as the regulator since its inception in 1966. In addition to regulating the electricity services it also regulates water utility services.

The RIC functions as an independent statutory body tasked with promoting the highest quality of service, ensuring reasonable rates, and building a regulatory framework ensuring the fairness and transparency of utility services in

³⁷ MEEA, 2014a

all of Trinidad and Tobago.³⁹ The RIC currently regulates three power providers: T&TEC, Trinity Power, and PowerGen. The fourth and newest provider, Trinidad Generation Unlimited, does not fall under the purview of the RIC, but is regulated by the terms and conditions of the PPA it signed with T&TEC.⁴⁰

Under the RIC Act the Commission consists of between five and seven board members, all appointed by the President and two of which are designated chairman and deputy chairman. Board members need to have extensive training and experience in “economics, finance, engineering, law, business, human resource management or public administration.” (Section 5)

According to Section 6 of the RIC Act its key functions are to (i) make recommendations on the issuance of licenses to IPPs and monitor and enforce that license conditions are met, (ii) set and monitor the guidelines under which electricity tariffs are determined, (iii) define quality of service standards and ensure the efficient and economical operation of the sector, (iv) investigate customer complaints pertaining to the electricity providers, (v) facilitate competition where possible and desired, (vi) impose and collect license fees, and (vii) ensure that providers earn sufficient and reasonable return on their investments.⁴¹

In order to participate in the supply or distribution of electricity or water, a license is required. (Section 37) The Minister can grant such license only on the advice of the Commission and if it is in the public interest. The Minister, however, has the power to grant licenses independently if “he is of the opinion that [...] it will promote competition,” and if it does not conflict with a previously issued license. (Section 38) License applications are submitted to the Minister and then forwarded to the Commission, which, within sixty days, makes a recommendation as to the merit of the application. The Minister, however, “is not bound to accept the advice or any part thereof.” (Section 39) The Minister also holds the power to suspend or cancel a license after consultation with the Commission. (Section 43)

According to the RIC Act the RIC is tasked to review and determine electricity rates every five years unless the specific license prescribes shorter intervals or a review of the license following a “fundamental change in circumstances” has been requested by the provider. (Section 48 and 49)

The Commission has the power to review complaints regarding the rate charged, the billing services, or the

standard of supply of service and consult with the parties involved. (Section 53) Due to the absence of enforcement powers under the RIC Act the RIC primarily acts as facilitator between parties in dispute.⁴²

According to Section 67 the Commission defines the principles according to which the electricity tariff is determined. When setting out the principles the Commission has to (i) ensure sufficient revenue generation for providers to perform their function, (ii) take into account the interests of provider shareholders, (iii) ensure the ability of consumers to pay the rates, (iv) consider the rate of inflation, and (v) take into account national environmental policy. Furthermore, the Commission bases its tariff considerations on the results of its efficiency and economy studies. In its 2006 rate determination, setting the methodology for the electricity rates for 2006-2011, the Commission reviewed the average system heat rate and found that “the annual savings on fuel costs [...] are significant” and that “T&TEC must insist that power generators, especially PowerGen, reduce their heat rate.”⁴³

The Commission decided to reduce the pass-through rate of fuel costs to 90 percent to provide greater incentive for providers to save on fuel costs by introducing combined cycle plants. The Commission noted that “there should be only 90% pass-through for fuel costs and the costs for failing to introduce combined cycle plant should not be borne by the consumers” and that all additional capacity “should be through the installation of combined cycle units.”⁴⁴ Despite the recommendations of the Commission “no capital investments have been made for improving the efficiency of existing system capacity.”⁴⁵

The Commission began work on a new tariff determination in 2010 and was expected to publish it in October 2011. However, due to the lack of a functioning board in 2010 and 2011 the process continues to be delayed. In June 2013 RIC Executive Director Hadjinder Atwal, stated that a 500-page draft determination had been completed. Thus far, this draft has not been made public.

Also in 2013 the chairman of the RIC, Anne-Marie Mohammed, reported that there were no immediate plans to increase electricity rates.⁴⁶ T&TEC made a submission in July 2011 applying for a 21 percent rate increase for all classes of consumers. The requested rate increase follows the reduction of the fuel pass-through rate to 90 percent as a result of which T&TEC annual return decreased from 16 percent in 2003 to -2.2 percent in 2007.⁴⁷

38 Only with license from T&TEC

39 Ministry of Public Utilities, 2014

40 Morton, 2012

41 Ministry of Public Utilities, 2014; Parliament of Trinidad and Tobago, 1998

42 Morton, 2012

43 RIC, 2006

44 RIC, 2006

45 Castalia Consulting, 2011

46 Singh, 2013; Trinidad and Tobago Newsday, 2013

47 Castalia Consulting, 2011

In contrast to electricity or regulatory acts in neighboring Caribbean countries, Trinidad and Tobago's RIC Act does not make any provisions for utility-scale generation from renewable energy sources or for fossil fuel or RE generation by individual households. Hence, self-generation in Trinidad and Tobago is permitted with the certification of the Chief Electrical Inspector following the inspection of such installations.

The Electricity (Inspection) Act on this matter states: *“On the completion of a new installation, the owner thereof shall give notice in writing to the Chief Electrical Inspector, who shall cause inspection and tests to be made within the prescribed period and, if the installation satisfies the requirements of this Act and the rules made hereunder, certify or cause to be certified accordingly in the prescribed form. No installation shall be operated until such certificate has been obtained.”* (Section 4)⁴⁸

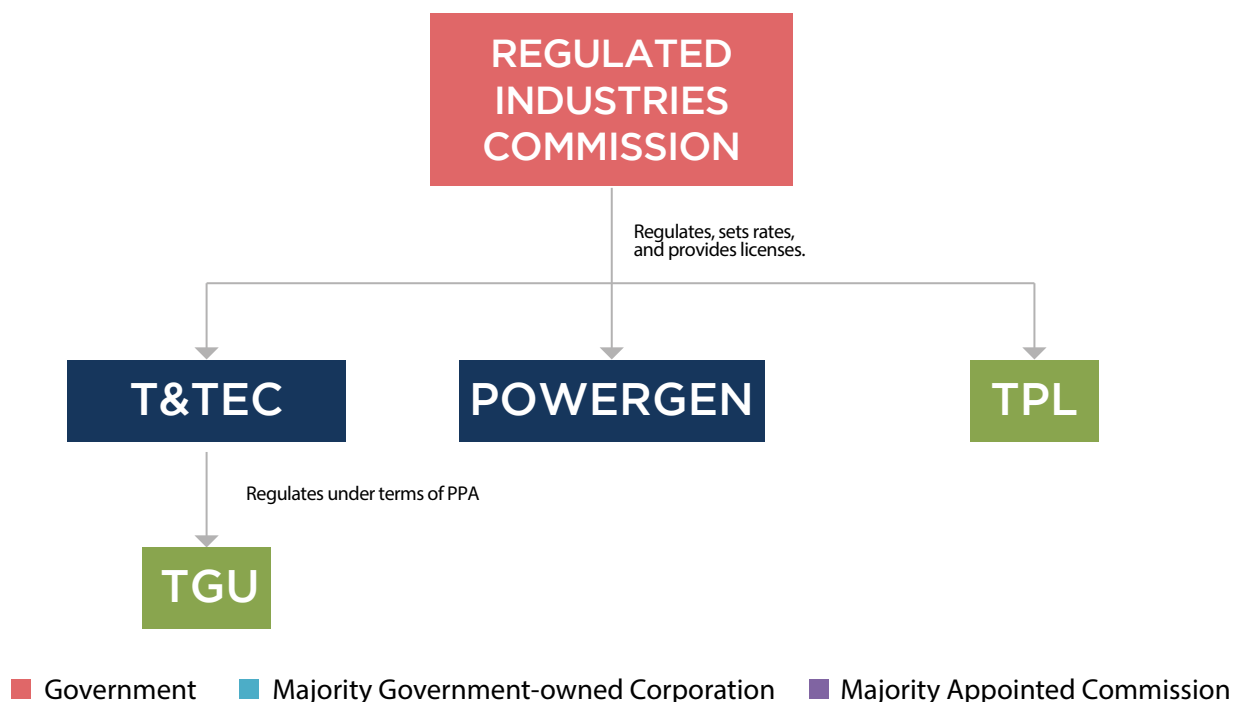
Regulatory and Policy Framework of the Electricity Sector

The MEEA and the Minister of Public Utilities, both part of the Government of Trinidad and Tobago, are the key regulatory entities in the electricity sector. MEEA sets policy guidelines for the independent electricity providers as well as the National Gas Company (NGC) and National Petroleum (NP). The Ministry of Public Utilities provides policy guidelines to T&TEC and the RIC.

The RIC in turn regulates the independent electricity generators, with the exception of Trinidad Generation Unlimited. T&TEC purchases fuel supplies from the NGC and NP, which it then passes on to the independent producers and in turn receives bulk electricity. T&TEC then transmits, distributes and sells electricity to the consumers.

It remains unclear whether Trinidad Generation Unlimited underlies the regulatory control of the RIC or T&TEC. Trinidad Generation Unlimited is not listed as one of the producers the RIC oversees and secondary sources report that T&TEC regulates Trinidad Generation Unlimited according to the rules and guidelines set out in the Power Purchase Agreement.⁴⁹

Figure 19 Trinidad and Tobago Regulatory Framework of the Electricity Sector



Source: Author's own work based on information Morton, 2012; RIC, 2014a; RIC, 2014b; T&TEC, 2011 Morton, 2012

48 Parliament of Trinidad and Tobago, 1976
49 Morton, 2012

Transmission and Distribution

The country's electrification rate stands at 99 percent. To keep up with growing demand T&TEC has been engaged in the expansion of the national transmission system since 2008. As part of this effort T&TEC expanded the existing 33kV, 66kV and 132kV system. In 2010 it began constructing 220kV lines.

T&TEC transmits and distributes electricity from 34 generating units via 30 transmission substations.

Trinidad and Tobago is connected via two submarine cables rated at 20MW and 25MW to meet the islands' maximum demand, which stands around 40MW. Tobago also has its own electricity supply. The new Cove power plant, commissioned in 2009, with a capacity of 64MW runs on both diesel and natural gas and will meet the growing demand on the island. The older Scarborough diesel plant with a capacity of 21.7MW is used as a standby backup facility.⁵⁰

Table 8 T&TEC Overhead Transmission and Distribution Lines in Kilometers, 2005-2010

Voltage	2005	2006	2007	2008	2009	2010
132kV	123.25	171.65	171.65	255.3	255.3	279.9
66kV	314.67	449.69	449.69	482.4	482.4	512.2
33kV	575.8	575.8	575.8	575.8	576.9	578.9
2.3-12kV	2319.56	2396.44	2397.32	6552.38	7056.12	6681.89
Medium and low Voltage	2636.01	2914.7	2963	6756.88	6797.46	7288.61
Total	5057.72	5417.71	5466.89	14012.4	16574.7	16691.6

Table 9 T&TEC Underground Transmission and Distribution Lines in Kilometers, 2005-2010

Voltage	2005	2006	2007	2008	2009	2010
132kV	0	0	0	0.78	1.57	1.57
66kV	12	6.63	6.63	6.73	8.95	9.09
33kV	113	119.63	113	113.5	113.56	113.56
2.3-12kV	1143.32	1143.32	1149.09	1501.42	1532.34	1557.9
Medium and low Voltage	0.06	0.06	6.26	21.15	32.84	80.28
Total	1268.38	1269.64	1274.98	1643.58	1689.26	1759.19

Source: T&TEC, 2011

T&TEC's system losses compare favorably with most neighboring countries in the Caribbean. A key factor in limiting overall losses is the country's low transmission losses. More than 40 percent of demand load is located close to the generation facilities and the remaining load is transmitted via high-voltage lines, both factors limiting transmission losses.⁵¹

Loss rates have declined continuously since the 1960s. During the 1960s loss rates declined from around 25 percent to around 15 percent. Throughout the 1980s and 1990s loss rates hovered around 10 percent before decreasing further during the 2000s. Since the late 2000s and early 2010s loss rates have stood around 7 percent.⁵²

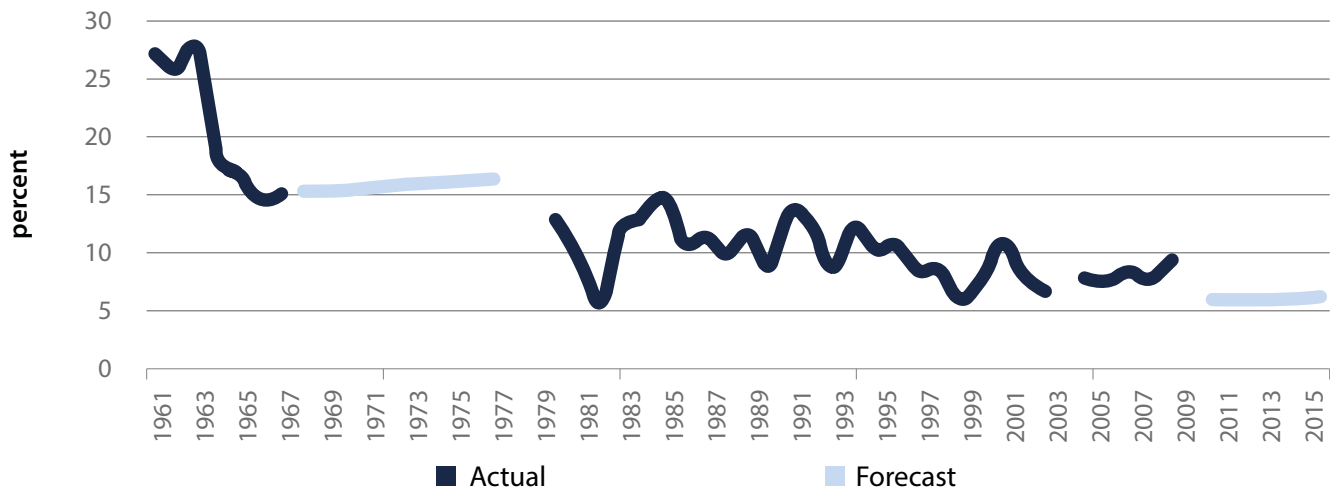
50 T&TEC, 2014a

51 RIC, 2006

52 EIA, 2015

53 Actual Figures: 1961-1967 from World Bank (1969), 1980-1998 from EIA (2012), 1999-2003 from RIC (2005), 2005-2009 from RIC (2011) Forecast Figures: 1968-1977 from World Bank (1969) 2011-2016 from T&TEC (2011)

Figure 20 Trinidad & Tobago Transmission & Distribution Losses (Share of Sales), 1980-2011⁵³



Source: EIA, 2015; RIC, 2005; RIC, 2011; T&TEC, 2011; World Bank, 1969

According to the EIA Trinidad and Tobago distribution loss rates were the lowest in the Eastern Caribbean in 2009 with 2.3 percent, far below distribution losses in all other Caribbean countries.

Electricity Rate

Every five years the RIC determines the principles and methodology upon which the electricity tariffs are calculated. The current five-year regulatory period began on June 1, 2011. Within each regulatory period the RIC annually reviews the cap on T&TEC's revenues and adjusts tariffs accordingly to meet this cap. The T&TEC submits a rate adjustment proposal at least two months before the end of each annual control period.

The RIC evaluates this proposal based on a set of performance standards, e.g. heat rate, transmission and distribution losses, and either approves the adjustment or rejects it. If the new rate is approved T&TEC needs to inform its customers at least two weeks prior to the new rates taking effect. The current price control period ended on May 31, 2011. As the Commission did not have a functioning board in 2010 and 2011 the RIC is only now working on finalizing a new rate determination. The latest available rates available on either the T&TEC or RIC website were valid until May 31, 2011.

In its 2006 rate determination, setting the methodology for the electricity rates for 2006-2011, the Commission reviewed the average system heat rate and found that "the annual savings on fuel costs [...] are significant" and that "T&TEC must insist that power generators, especially PowerGen, reduce their heat rate."⁵⁴ The Commission decided to reduce the pass-through rate of fuel costs to 90 percent to provide a greater incentive for providers to save on fuel costs by introducing combined cycle plants. The Commission noted that "there should be only 90% pass-through for fuel costs and the costs for failing to introduce combined cycle plant should not be borne by the consumers" and that all additional capacity "should be through the installation of combined cycle units."⁵⁵

T&TEC categorizes tariffs for five different types of consumers: residential, commercial, industrial, heavy industrial, and street lighting:

- Residential customers pay a basic charge of TT\$6.00 with an additional usage charge between TT\$0.26-0.36 depending on consumption. Customers are billed every other month.
- Commercial consumers, with a demand up to 50kVA, pay a basic charge of TT\$25.00 and a fixed rate of TT\$0.4150 per kWh. Commercial consumers with a demand between 50-350kVA pay a rate of TT\$0.61 per kWh.
- Industrial customers with a demand between 50-350kVA pay a rate of RR\$0.1990 per kWh, customers with demand between 350-4000kVA are charged TT\$0.2180 per kWh.
- Heavy industrial consumers with demand between 4,000-25,000kVA at 6.6kV, 12kV or 33kV pay a rate of TT\$0.1830 per kWh. Consumers with demand 4,000-25,000kVA at 66kV or 132kV pay a rate of TT\$0.1670 per kWh. Heavy Industrial Customers requiring a standby supply with a maximum demand greater than 4,000kVA at 66kV or 132 kV are charged TT\$0.16 per kWh.

⁵⁴ RIC, 2006
⁵⁵ RIC, 2006

- Very large load industrial customers with load demands in excess of 25,000kVA at 66kV or 132kV and with energy usage up to 100 million kWh per month are charged TT\$0.1450 per kWh. The demand charge per kVA varies from TT\$41.00 to 45.00 depending on energy usage.
- All charges are subject to a 15 percent value added tax. T&TEC, 2014b

Table 10 T&TEC Electricity Tariff Schedule Valid until March 31, 2011

Class	Tariff	Frequency of Billing	Fixed Charges				Usage Charges			
			Customer Charge	Single Energy Rate	Base Energy Rate: 1-400 kWh	401-1000 kWh	Over 1000 kWh	Max. Demand Charge per kVA per month	Minimum Bill	
Residential	A	Every 2 months	\$6.00		\$0.260	\$0.320	\$0.370	N/A	2-monthly customer charge	
Commercial	B (<50kVA)	Every 2 months	\$25.00	\$0.415	N/A	N/A	N/A	N/A	2-monthly customer charge	
	B1 (>50kVA)	Monthly	\$0.00	\$0.610	N/A	N/A	N/A	N/A	Equivalent to 5,000 kWh	
	D1 (small)	Monthly	N/A	\$0.199	N/A	N/A	N/A	\$50.00	Equivalent to Demand Charge for 75% of Customer's Reserve Capacity	
Industrial	D2 (medium)	Monthly	N/A	\$0.218	N/A	N/A	N/A	\$50.00	as above	
Heavy Industrial	D3 (large)	Monthly	N/A	\$0.183	N/A	N/A	N/A	\$42.50	as above	
	D4 (large)	Monthly	N/A	\$0.167	N/A	N/A	N/A	\$40.00	as above	
	D5 (large - standby)	Monthly	N/A	\$0.160	N/A	N/A	N/A	\$37.00	as above	
	E1 (very large load)	Monthly	N/A	\$0.145	N/A	N/A	N/A	\$44.50	as above	
	E2 (very large load)	Monthly	N/A	\$0.145	N/A	N/A	N/A	\$44.00	as above	
	E3 (very large load)	Monthly	N/A	\$0.145	N/A	N/A	N/A	\$43.00	as above	
	E4 (very large load)	Monthly	N/A	\$0.145	N/A	N/A	N/A	\$42.00	as above	
	E5 (very large industrial)	Monthly	N/A	\$0.145	N/A	N/A	N/A	\$41.00	as above	
	Street Lighting	S1 - 1	Annually	N/A	\$848.72	N/A	N/A	N/A	N/A	N/A
		S1 - 2	Annually	N/A	\$565.81	N/A	N/A	N/A	N/A	N/A
S1 - 3		Annually	N/A	\$411.5	N/A	N/A	N/A	N/A	N/A	
S1 - 4		Annually	N/A	\$372.92	N/A	N/A	N/A	N/A	N/A	
S2 - 2		Annually	N/A	\$450.08	N/A	N/A	N/A	N/A	N/A	
S2 - 3		Annually	N/A	\$347.20	N/A	N/A	N/A	N/A	N/A	
S2 - 4		Annually	N/A	\$282.91	N/A	N/A	N/A	N/A	N/A	

Source: T&TEC, 2011

Table 11 Matrix of the Electricity Sector

Generation		Transformation		Distribution	
T&TEC	Ownership Government-owned, 100%	T&TEC	Ownership Government-owned, 100%	T&TEC	Ownership Government-owned, 100%
PowerGen	Government, 51% Marubeni, 39% National Enterprises Power Holdings, 10%				
Trinity	US consortium, 100%				
Trinidad Generation Unlimited	Government-owned, 100%				

Institutional Structure of the Hydrocarbon Subsector

Trinidad and Tobago is a major oil and gas producer in the region and its oil products are widely used on neighboring Caribbean countries both for transportation and power generation. There are a number of oil and gas companies operating in Trinidad and Tobago. Petrotrin and NGC are wholly state-owned and other companies include but are not limited to Atlantic LNG, BP, BHP Billiton, Chevron Texaco, Repsol and Shell.

In 2013 Petrotrin accounted for 53 percent of the country's crude oil production of 81,000 barrels per day. Repsol made up 15 percent, followed by BHP Billiton at 13 percent, BPTT at 11 percent and others at 8 percent.⁵⁶

The MEEA is responsible for setting the overall policy, managing, and regulating of the oil, gas and minerals sector in Trinidad and Tobago.

Petroleum Act and Petroleum Regulations

The Petroleum Act of 1969 and the therein-included Petroleum Regulations govern the upstream and downstream operations of the petroleum market. Together they establish the legal framework for the granting of licenses and contracts for both onshore and offshore resources as well as the application process to obtain licenses.

The Act applies to the entire production chain from exploration, development and production to refining, transportation and marketing of petroleum products. According to the act, MEEA administers, oversees and ensures compliance under the rules set out by the Petroleum Act and the Petroleum Regulations. It also regulates gas flaring and venting.

MEEA grants three different types of licenses to persons or companies wishing to participate in the exploration and production of oil and gas resources:

- An Exploration (Public Petroleum Rights) License, which provides a licensee with a non-exclusive right to conduct petroleum operations in a geographically specified area and under the terms set out in the license. (Section 14)
- An Exploration and Production (Public Petroleum Rights) License provides a licensee with an exclusive right to conduct exploration, production and disposition of petroleum in a geographically specified area and under the terms set out in the license. The license does not confer ownership over any petroleum in strata or any land ownership rights. (Section 15)
- An Exploration and Production License (Private Petroleum Rights) grants a private licensee the exclusive right to conduct exploration, production, and disposition of petroleum in a geographically specified area and under the terms set out in the license. (Section 4 and Section 25 of Petroleum Regulations)⁵⁷

⁵⁶ Petrotrin, 2014
⁵⁷ Morton, 2012

The Act, for the first time, also sanctioned the use of production sharing contracts (PSCs) between the government and companies. PSCs allow for petroleum operations in the exploration, production and disposition of petroleum within the geographically specified area. (Section 6)

The Petroleum Act states that ownership of oil and natural gas is vested in the State and no entity, be it private or public, may engage in any form of petroleum activity without the prior granting of a license. (Section 3, 4 and 6) Applications to obtain a license must be made to MEEA and MEEA is the responsible agency for granting licenses. (Section 7 and 9) MEEA also holds the power to revoke licenses if a license holder is found to be in violation of the license conditions. (Section 17) The process of granting a license may be subject to a competitive bidding process if the President determines such a need. (Section 10) A license holder has to meet a number of financial obligations including royalties, minimum payments, petroleum impost to cover the costs of petroleum administration, surface rent, import duties, and other taxes including income and corporation tax. (Section 11) Licensees are permitted to issue sublicenses with approval from the Minister. (Section 24)

In addition to the above-mentioned powers of the President the Act also grants broad powers to the President stating that “[he] may make any such Regulations as he considers necessary or expedient for carrying out the purposes of this Act, and in particular [...] for determining the types of licenses and the procedure for issuing those licenses, for the fixing the fees chargeable [...], for regulating the assignment or transfer of licenses [...].”(Section 29)

The Minister is also given the power to, after consultation with the Minister of Finance, “fix the prices or the basis for determining the price at which petroleum products may be disposed” and “fix the price at which compressed natural gas may be sold [...].”(Section 31 and 31A)

Petroleum Regulations

The Petroleum Regulations represent subsidiary legislation of the Petroleum Act. In addition to the aforementioned licenses granted by MEEA, the Ministry can also issue Refining Licenses, Liquefaction of Natural Gas License, Pipeline Licenses, Transportation (excluding Pipeline) Licenses, Marketing Licenses for wholesale, peddling, retail transactions and bunkering, Petrochemical Licenses, Compressed Natural Gas Licenses for service, marketing and consumer refueling. (Section 3)

The Regulation also specifies that the term of Exploration Licenses shall not exceed three years, but may be renewed for additional three-year periods at the discretion of the Minister. Exploration and Production Licenses for Private Petroleum Rights are limited to twenty years and can be renewed for successive periods of twenty years.

Exploration and Production Licenses for Public Petroleum Rights are limited to six years, but may be extended by the Minister for up to 25 years if he deems it necessary. (Section 13) Furthermore licensees are required to begin exploration operations within one year from the effective date of the license or risk losing the license at the discretion of the Minister. (Section 48)

No later than at the end of the sixth year of the license period, the license area is reduced by 50 percent with additional reductions possible if specified in the license. The Minister, however, may permit the

“surrender of a lesser portion [...] if he considers it to be in the public interest.” (Section 17 and 18)

License holders own the right to “export all petroleum, petroleum products and petrochemicals won, saved or manufactured from the licensed area and to sell the same, whether in Trinidad and Tobago or abroad.” (Section 30)

Large-scale producers of crude oil with a daily production rate in excess of 100,000 barrels or 50,000 barrels with proven reserves, which would support production at 100,000 for seven and a half years, are required to obtain a Refining License and erect a refinery with at least 50 percent throughput of their aggregate daily production in Trinidad and Tobago. (Section 51) The Minister, however, may permit the licensee to make alternative arrangements for the refining of crude oil.

Producers not meeting the levels laid out in Section 51 may be required, by the President, to deliver up to 100 percent of their produced crude oil to refineries in Trinidad and Tobago, if they have sufficient available capacity. (Section 53 and 54)

The royalty amount is specified by each individual license and applies to the net petroleum “won and saved” in the respective license area and is to be paid quarterly. (Section 61 and 70) The Minister may, with the approval of the Cabinet, reduce the royalty rate for a specified period of time. (Section 63)

Price of Petroleum Products Order

According to the Price of Petroleum Products Order the ex-refinery price for each type of petroleum product is set according to a specific formula: (Market Related Price * Adjustments factor) + Excise Duty + Handling Charge.

The market-related price for each type of product is adjusted by a factor prescribed by the Minister of Energy in consultation with the Minister of Finance. The handling charge is determined by the Minister in consultation with the refining industry. (Section 1)

Pipeline Act

The Pipeline Act of 1933 sets out the rules and regulations under which licenses are granted to construct “any pipeline, in, along, across over or under any road, trace, waterway, railway or land [...]” (Section 4) This applies to mineral oil, natural gas and any derivatives thereof. (Section 3) The owner of the pipeline is liable to pay compensation for any damage or injury resulting from the pipeline. (Section 20)

Pipelines (Specification of Fees) Order

The order sets specific and detailed fees, which must be paid on an annual basis. (Section 3) For pipelines laid or connected along, over or under a trace, or along a roadway or railroad the fee is four cents per foot of pipeline. In addition each pipeline laid or connected across state lands, across a road, or across a railway track is charged a fee of ten dollars. (Section 2)

Petroleum Taxes Act 1974

The Petroleum Taxes Act specifies taxation of activities carried out in connection with petroleum operations, including exploration, production, refining and marketing of petroleum products. The Board of Inland Revenue is responsible for administering the Act and collecting and recovering taxes. (Section 5)

One key element of the Act is that it classifies exploration and production, refining, and marketing as three separate businesses even if carried out by the same person or company. As a result companies cannot calculate losses in on part of the production chain against profits in another. (Section 6)

Taxes are chargeable on all profits, losses cannot be carried over from one year to another, and taxes are to be paid quarterly. (Section 7, 10 and 11) Certain types of expenditure costs can apply as allowance. For example, expenditure costs on heavy oil products on land or submarine lands conducted after Jan 1, 1988 can be applied as a 60 percent allowance in the year of expenditure or as a 15 percent allowance for each of the following five years. (Section 12C)

Petrotrin

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.⁵⁸ It is involved in the full process of petroleum related operations including exploration, development and production of hydrocarbon resources and the manufacturing and marketing of petroleum products.⁵⁹

Petrotrin was formed on January 21, 1993 and vested with the assets from Trinidad and Tobago Oil Company Limited (Trintoc) and Trinidad and Tobago petroleum Company Limited (Trintopec) in an effort to consolidate all state-owned petroleum producing, refining and marketing assets under one roof. The Ministry of Finance is the inline ministry with direct oversight over Petrotrin while MEEA provides technical expertise and analysis and ensures adherence to government policy and guidelines.⁶⁰

It is the main producer of oil in Trinidad and Tobago and produces jet fuel, kerosene, diesel, liquefied petroleum gas, gasoline and fuel oil at its Pointe-a-Pierre refinery with a capacity of 168,000 bpd with an average throughput of 127,650 bpd in 2012.⁶¹ In 2012 Petrotrin produced around 45,000 b/day of crude oil and 179,4 mmcf/day of natural gas for a total of 75,950 boe/day. Part of the domestically produced crude oil is exported without being refined. Hence, the Pointe-a-Pierre refinery is partly supplied by imported crude oil. In 2013, of the 111,376 barrels per day used as refinery feedstock on average, 55 percent were from foreign purchases.⁶²

58 MEEA, 2013b

59 Petrotrin, 2013c

60 Petrotrin, 2013b

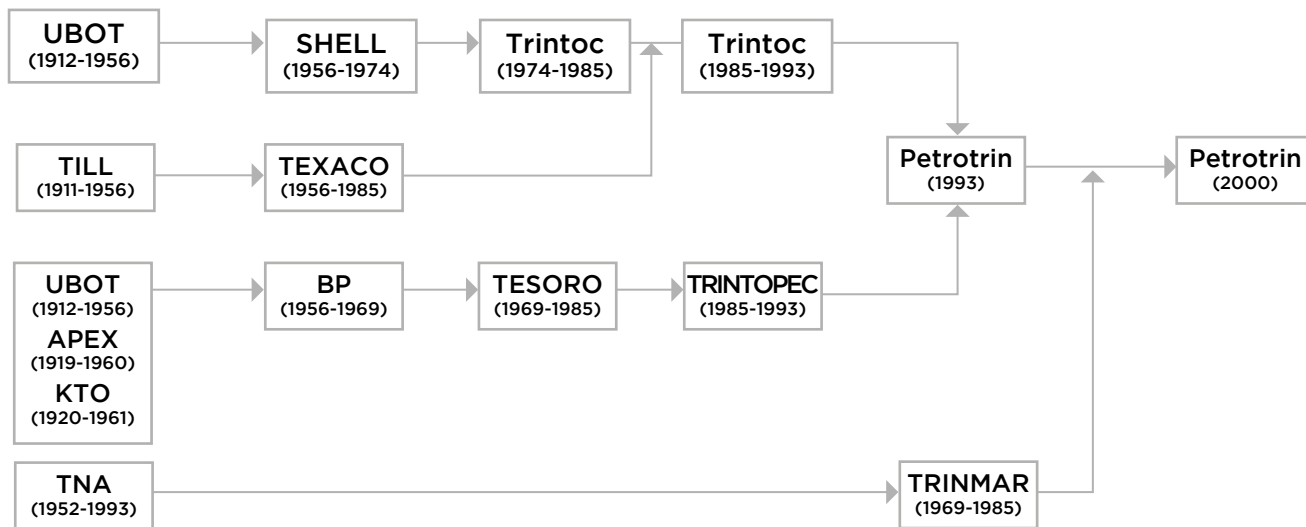
61 Petrotrin, 2013e; Petrotrin, 2013f

62 Petrotrin, 2014

Petrotrin receives foreign crude oil and ships exports of refined products via its loading and receiving facility at Pointe-a-Pierre which can handle vessels up to 120,000 DWT.⁶³ In 2013 it received about 69 vessels per month. Its refinery has a storage capacity of 2.3 million barrels of crude oil, equivalent to 13 days of refinery throughput and 5.6 million barrels capacity for refined product.⁶⁴

The company operates fields onshore in southern Trinidad and offshore off the west coast with a total of around 4,000 wells on land and 750 in Trinmar on 162,861 and 1,539,417 acres respectively.⁶⁵ Petrotrin controls or has a controlling stake over the majority of the country's oil reserves and has proven crude oil reserves of 446.7 million boe.⁶⁶

Figure 21 Petrotrin Company History



Source: Own work based on Petrotrin, 2013d

Petrotrin

The National Gas Company of Trinidad & Tobago (NGC) was established in 1975 as an 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” natural gas. 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.⁶⁷ It owns, operates and maintains the

national gas transmission system comprised of approximately 1,000 kilometers of pipelines and also sets the prices of natural gas.

There is currently no legislation which prohibits the construction and operation of a gas distribution network by third parties.⁶⁸ 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 ammonia, methanol and LNG exporters in the world.⁶⁹

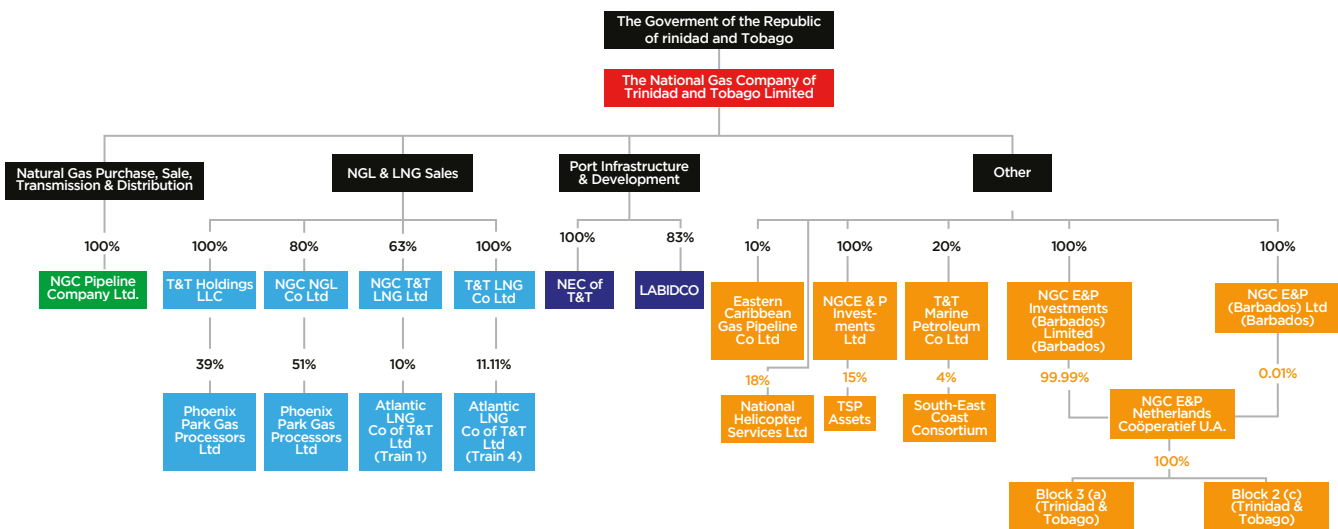
63 Petrotrin, 2013d
 64 Petrotrin, 2014
 65 Petrotrin, 2013d; Petrotrin, 2013e
 66 Petrotrin, 2013b; Petrotrin, 2013e
 67 NGC, 2014b
 68 Johnson, 2011
 69 NGC, 2014b

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).⁷⁰

Over 75 percent of NGC’s revenue comes from the compressing, purchasing, transporting and selling of natural gas to industrial customers. T&TEC is responsible for procuring natural gas from the NGC before supplying it to the IPP. NGC’s key industrial customers are the operators of the Cove-Tobago, Point Lisas, Couva, Union, Penal and Port of Spain power plants, large petrochemical, iron and steel plants of the Point Lisas Industrial Estate and other manufacturing and commercial businesses in the country.

In addition to operating more than 1,000 kilometers of off- and onshore pipeline infrastructure NGC has invested in industrial sites, port and marine infrastructure, offshore production of natural gas and oil, as well as the manufacturing and shipping of Natural Gas Liquids (NGLs) and Liquefied Natural Gas (LNG).⁷¹

Figure 22 NGC Organizational Structure and Subsidiaries



Source: NGC, 2014a; NGC, 2014c

National Energy Corporation

The National Energy Corporation (NEC) is a wholly owned subsidiary of the NGC. The NEC was incorporated in 1979 and emerged out of the Coordinating Task Force set up in 1976. Its early key tasks were the developing and promotion of natural gas-based projects and related infrastructure.

As part of this effort it was instrumental in creating the Point Lisas Industrial Estate and the construction and operation of the first petrochemical plants. Current responsibilities include the development and management of industrial, port and marine facilities. Its assets include the Point Lisas Channel, the turning basin, four multi-use piers at Point Lisas, and a small fleet of marine vessels consisting of nine tug boats and two work boats.⁷²

70 MEEA, 2012b
71 NGC, 2014b

Atlantic

Atlantic (known as Atlantic LNG of Trinidad and Tobago prior to September 2010) is the operator of a four-train liquefaction facility located at Point Fortin in the southwest of Trinidad. It is the sole producer of LNG in Trinidad and Tobago and ranks as the sixth largest LNG producer in the world and the largest in the western hemisphere.

It is the single most important contributor to Trinidad and Tobago's exports and its activities constitute more than half of the economic output of the refining sector. Atlantic was formed in 1995 and represents a joint venture between four major international energy companies and the Government of Trinidad and Tobago.

Train 1 made its first delivery of LNG in 1999, followed by Trains 2 and 3 in 2002 and 2003 and Train 4 in 2005, which at that point in time was the largest train in the world. Each of the four trains is owned by a holding company, which in turn has its own group of member companies. The four trains, using the Phillips Optimized Cascade Process, have a daily capacity of up to 100,000 cubic meters of LNG. The thus-produced LNG is primarily shipped to South America, Asia and Spain.

Atlantic is not involved in the exploration, distribution or shipping of LNG but acts solely as a processor. Operations in Trains 1, 2, and 3 receive natural gas from Trinidad and Tobago's on- and offshore fields to the north and east under a 2-year supply agreement between AMOCO Trinidad Oil Company and Cabot Corporation.

The produced LNG is then sold under long-term contracts to LNG Buyers. Atlantic LNG's Train 4 "operates as a processor of gas."⁷³ Liquefied gas is stored onsite in four tanks awaiting export. The Point Fortin facility includes two 700 meter jetties allowing LNG tankers up to 145,000 cubic meters in capacity to dock.⁷⁴

As part of the negotiations to renew the gas supply contract for Atlantic, the Government of Trinidad and Tobago has stated that it wants to increase its ownership share of Atlantic's Train 1. The gas supply agreement expires in 2018 and negotiations are slated to start in 2014.⁷⁵

Table 12 Atlantic Four LNG Trains

Train/Year	Owner/Member Companies	Share	Capacity
1 (1999)	Atlantic LNG Company of T&T: BP (Barbados) Holding SRL BG Atlantic 1 Holdings Limited Shell LNG Port Spain BV NGC Trinidad and Tobago LNG Ltd Summer Soca LNG Liquefaction S.A.	34 percent 26 percent 20 percent 10 percent 10 percent	LNG: 3.0 mtpa NGLs: 6,000 bpd
2 (2002) 3 (2003)	Atlantic LNG 2/3 Company of T&T: BP Train 2/3 Holding SRL BG 2/3 Investments Limited Shell LNG Port Spain BV	42.5 percent 32.5 percent 25 percent	LNG: 2x 3.3 mtpa NGLs: 2x 5000-6000 bpd
4 (2005)	Atlantic LNG 4 Company of T&T: BP (Barbados) Holding SRL BG Atlantic 4 Holdings Limited Shell LNG Port Spain BV Trinidad and Tobago LNG Limited	37.78 percent 28.89 percent 22.22 percent 11.11 percent	LNG: 5.2 mtpa NGLs: 12,000 bpd

Source: Atlantic, 2014c

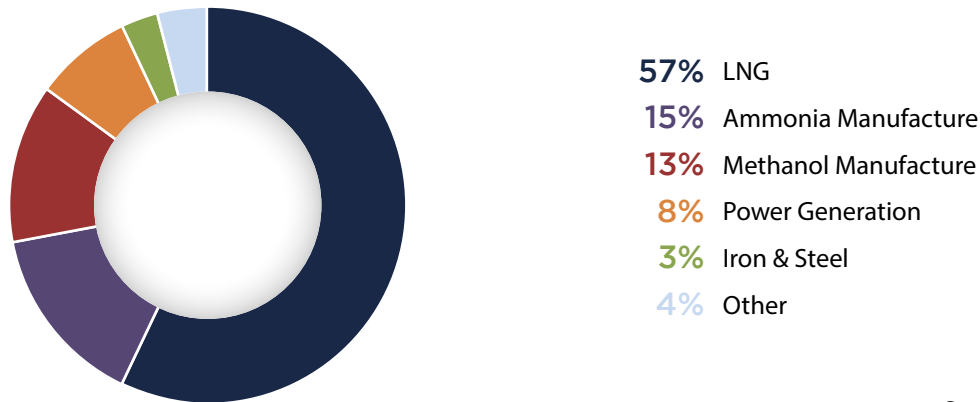
72 MEEA, 2014b

73 Atlantic, 2014d

74 Atlantic, 2014a; Atlantic, 2014b; Atlantic, 2014d

75 Williams, 2014

Figure 23 Natural Gas Consumption by Sector, 2012



Source: MEEA, 2012c

National Petroleum

The Trinidad and Tobago National Petroleum Marketing Company Limited was incorporated in 1972 when the government acquired BP Caribbean Ltd's assets. Today it is the most diversified petroleum marketing company not only in Trinidad and Tobago, but in all of the English-speaking Caribbean. It markets petroleum fuels, lubrication oils and greases, liquefied petroleum gas and compressed natural gas, and automotive specialty products.

Following its incorporation in 1972 the company expanded further the following year when the government purchased 50 percent of ESSO Standard Oil's assets and vested them in NP.

Three years later in 1976 NP became the sole distributor of petroleum fuels in Trinidad and Tobago, after it acquired the marketing assets of Trinidad and Tobago Oil Company (Shell Trinidad Ltd.) and Texaco Trinidad Ltd. NP owns the largest network of service stations on the two islands and with the acquisition of Shell's assets it began operating a blending plant at Sea Lots with a capacity of 270,000 boe/year. It continued production of Shell-branded products under license until 1981 when it launched its own brand of lubricants.

The company's operations are steered by a Board of Directors, which reports to MEEA in technical matters, and the Minister of Finance in corporate matters.

Petrotrin supplies NP from its Pointe-a-Pierre refinery and fuels are stored at NP's facilities at Sea Lots and Crown Point, Tobago. From here NP products are distributed locally as well as throughout the Caribbean, including to Anguilla, Antigua, Barbados, Grenada, Guyana, Montserrat, Saint Lucia, Saint Kits and Nevis, Saint Vincent, Jamaica, Saint Maarten, Suriname, Tortola and Grenada.

NP's pricing of petroleum products is dictated by the price structure set forth by the Pricing Orders of the Petroleum Act. The price structure includes ex-refinery price, excise duty, wholesale margin, retail margin, value added tax, road improvement tax and subsidy.⁷⁶

Hydrocarbon Sector Overview

There are a number of private and state-owned oil and gas companies operating in Trinidad and Tobago. Petrotrin and NGC are wholly state-owned. Private companies engaged in the sector include but are not limited to BPTT, BHP Billiton, BG T&T, Repsol, and Total. The hydrocarbon sector in Trinidad and Tobago can be split into roughly three sectors: upstream, midstream and downstream.

Upstream involves the exploration and production of oil and gas resources. This part of the hydrocarbon economy is dominated by large multinational companies, primarily BG T&T, BPTT, BHP Billiton, Total and Repsol. Petrotrin represents the largest local and, in this case, state-owned company engaged in upstream activities.

⁷⁶ NP, 2014a; NP, 2014b; NP, 2014c

Midstream activities include the transmission and transformation of hydrocarbon resources for use by end markets. Specific tasks include the processing, refining, transmission and distribution of crude oil and natural gas and the products subsequent marketing. In the oil subsector Petrotrin is the dominant actor as it operates the sole refinery in Trinidad and Tobago.

NGC and Phoenix Park Gas Processors Limited (PPGPL) are the two major midstream gas sector companies. NGC purchases, compresses, transmits, distributes and sells natural gas to a variety of clients and consumers including the petrochemical industry, steel producers, and to T&TEC for electricity generation. PPGPL's activities include the extraction of propane and butane from the natural gas stream. For this purpose it operates a processing plant at the Point Lisas industrial estate. Part of the midstream sector is also the conversion of natural gas into LNG which is exclusively conducted by Atlantic.

Downstream operations include the production of petrochemicals, which in Trinidad and Tobago are primarily ammonia, methanol and urea. The country is the largest exporter of ammonia and methanol in the world. Methanol is primarily produced by two companies, Methanol Holdings Trinidad Ltd., a locally-owned joint venture, and Methanex, the world's largest producer of methanol. Ammonia is produced by a variety of companies including PCS Nitrogen, Tringen, Point Lisas Nitrogen Limited, Tara and Caribbean Nitrogen Limited.

Urea is produced by PCS Nitrogen and Aum. The retail distribution of oil products is dominated by the National Petroleum Marketing Company Limited (NP) and United Independent Petroleum Marketing Company Limited (UNIPET), both locally owned.⁷⁷

Key producers in the natural gas sector are BP T&T and BG TT, which together produce about 80 percent, 55 percent and 24 percent respectively, of natural gas. EOG Resources accounts for 13 percent

Table 13 Matrix of the hydrocarbon sector

Market Segment	Company	Ownership
Upstream	Petrotrin	Local
	BPTT	Foreign
	Primera Oil and Gas Ltd.	Local
	New Horizon Energy T&T Ltd.	Foreign
	Trinity Exploration and Production	Local
	Repsol	Foreign
	Trinidad Exploration and Development	Local
	BG Group BHP Billiton	Foreign Foreign
Midstream	NGC	Local
	Atlantic	Local/Foreign
	Phoenix Park gas Processors Limited	Local
Downstream	AUM Ammonia	Local/Foreign
	CNC	Local/Foreign
	Methanex	Foreign
	MHTL	Local/Foreign
	Nitrogen 2000	Local/Foreign
	PCS Nitrogen	Foreign
	PLNL	Foreign
	Tringen Yara	Local/Foreign Foreign

Source: BDO Consulting, 2011; New Horizon Exploration, 2014; Repsol, 2014

⁷⁷ Atlantic, 2014a; BDO Consulting, 2011; BP, 2014a; New Horizon Exploration, 2014; Repsol, 2014; Trinity, 2014

Transportation

The transportation sector in Trinidad and Tobago consumes around 6 percent of final energy. However, this figure is distorted due to the fact that the industrial sector, especially the petrochemical industry, consumes vast amounts of energy. In fact, per capita ownership of motor vehicles is very high with a ratio of 2.5 people for each car.

In 2010 there were 518,831 motor vehicles on the road and in total more than one million vehicles have been registered. Over the last decade alone more

than 250,000 cars have been added to the network. Public transportation is poor and consists primarily of private vans and small busses.

In total there are around 25,000 4-5 passenger taxis and 4,500 9-25 passenger vans. Management of the influx of motor vehicles from a policy side has been poor. There has been no Physical Development Plan since 1984 and no approved National Transportation Policy since 1967.⁷⁸

Historical Development of the Sector

Trinidad and Tobago is one of the oldest petroleum producing countries in the world. Oil was first discovered in 1857 and first drilling operations commenced in 1866. Commercial production began in 1913 and until the 1970s the primary focus of the hydrocarbon industry in the country was on oil. Natural gas occurred primarily as a byproduct and was flared throughout the industry.

Key operators during the early years and into the 1950s were British Petroleum, Royal Dutch Shell, and Texaco, all of which operated their own refineries in the country. These refineries did not only process domestically-produced crude but also handled imports from Venezuela. Foreign investments were widespread during the 1950s and the government at the time promoted investments through the use of tax incentives, subsidies, loans and tariff protection.

Following independence in 1962 the government of Trinidad and Tobago established the Ministry of Petroleum and Mines tasked to oversee the entire industry. This represented a stark contrast to and improvement over the Petroleum Inspectorate, which existed previously as part of the Ministry of Agriculture, Lands and Fisheries and operated with very limited staff. At the time much of the oil industry was controlled and operated by foreign companies. Not only were seven foreign-owned companies controlling exploration and production, they also operated the two sole refineries, as well as all distribution and marketing of petroleum products.

The first opportunity for Trinidad and Tobago to directly become engaged in the petroleum sector arrived in 1969, when BP Trinidad Ltd., the third largest oil producer in the country at the time, decided to close its Trinidad-based operations. The government decided to purchase BP's assets, in part

because a significant number of jobs were associated with the operation, and began partnering with a small US-based petroleum corporation named Tesoro.

The government held 50.1 percent with Tesoro holding 49.9 percent. Although the government was technically the majority owner, the joint company was largely run independently by Tesoro. Tesoro's expertise and experience proved crucial for the successful operation during the early years. The company furthermore benefitted from the tripling of oil prices following the 1973 Arab-Israeli war.

Concurrently with the direct involvement in the petroleum sector the government set out to create an overarching legal framework for all companies to operate it. It passed the Petroleum Act of 1969, which contained the key provision of permitting Production Sharing Contracts. The Act itself provided broad and general guidelines allowing for flexibility and promoted investments.

The government continued the construction of the legal and policy framework by passing the Petroleum Taxes Act in 1974 which included three key provisions allowing the government to recoup as much revenue from the sector as possible. First, the government implemented a "tax reference price system" within which the government set the price of crude oil independent from world prices. Second, for the purpose of taxation it separated the production, refining, and marketing of petroleum activities.

As a result of this, companies engaged in these activities, which at this point in time were still mostly foreign-owned multinationals, would not be allowed to calculate gains in one part of the production chain against losses in another. Furthermore, companies could no longer carry over losses from previous years. And third, the government began taxing crude processing by creating a refinery throughput tax.

78 Central Statistical Office, 2010; Townsend, 2012; Trinidad Express, 2013a; Trinidad Express, 2013b

In 1972 a new 30-year era of offshore oil activities started when the Amoco Trinidad Oil Company began production of Trinidad's east coast. The same year the government created the National Petroleum Marketing Company of Trinidad and Tobago (NP) and vested it with the assets it had acquired from BP Caribbean. NP grew quickly, taking over assets and retail networks that were previously owned by ESSO, Shell and Texaco and by the end of 1976 all domestic marketing operations were combined under NP's umbrella.

The government further expanded its involvement in the oil sector by purchasing Shell Trinidad Ltd's onshore fields and its refinery operation at Point Fortin. With this purchase Trinidad and Tobago Oil Company (Trintoc) was born. In contrast to Trinidad-Tesoro, where the government could rely on Tesoro's technical expertise, Trintoc was fully government owned and as such was entirely dependent on local resources and expertise.

The year 1978 saw the peak of oil production at 240,000 boe with an average daily production of 229,598 boe.

The government's foray into the oil sector continued in 1985 when Trintoc acquired the assets of Texaco Trinidad Incorporated, at the time the largest onshore producer of crude oil and operator of the country's largest refinery, the Pointe-a-Pierre refinery. While the refinery had at one point during the 1970s been one of the largest in the western hemisphere, it had since lost prominence. Production output had fallen from 360,000 boe/day to 120,000 boe/day.

That same year the government bought out Tesoro's 49.9 percent share in the joint company and subsequently changed its name to Trinidad and Tobago Petroleum Company Ltd. (Trintopec). Both companies, Trintoc and Trintopec, began inviting small independent operators to actively participate in the upstream business with the aim of reviving and extracting additional crude from thousands of retired wells. This practice became known as leaser operatorship (LO) and farm out (FO) program and proved feasible, as smaller operators did not face the same burden of high labor costs as the unionized Trintoc and Trintopec.

Trintoc and Trintopec continued operating as individual companies for another eight years until they were merged in 1993 to form Petrotrin. Despite the fact that gas production has long surpassed oil production in terms of absolute volume and oil production has halved since its peak in 1978, oil remains an important source of revenue. It is easier and quicker to process and monetize. Furthermore, revenue derived from the oil sector was crucial in financing the development of a modern gas sector.

Natural Gas

Soon after gaining independence in 1962 the government made the decision to use the growing revenue from its oil-based operations to actively support and finance the commercialization of natural gas and develop the gas reserves at the Point Lisas Industrial Estate.

Natural gas had begun to grow in importance in 1953 when the national electric utility company, today referred to as T&TEC, decided to use natural gas for the generation of electricity. However, it took another decade before the government adopted a deliberate and planned out approach to the promotion and utilization of natural gas. In contrast to the oil sector, which had often evolved in a policy vacuum and without a national sectoral development plan, the government aimed to put in place targeted policies to steer the development of the gas sector.

The first steps in this direction came under the country's first Prime Minister, Eric E. Williams, who, in the early 1970s formed a policy that aimed at using the revenue from the oil industry to develop the national natural gas resources and its associated infrastructure, including roads, ports, and power generation. The long-term goal was to offset declining revenue from maturing oil fields with growing revenue from the country's vast natural gas reserves.

Key gas reserves were discovered off the northern coast in 1971 following extensive government-sponsored surveys in 1968. These discoveries allowed for the rapid expansion of the gas industry and continue to drive the sector, including the production of LNG to this day. The push to develop natural gas included the formation of the National Gas Company (NGC) as a wholly government-owned company in 1975.

NGC was tasked with the purchasing, selling, and distribution of natural gas to industrial and commercial customers. In 1979 the government took measures to reduce the flaring of natural gas and also began construction of a 24-inch cross-island natural gas pipeline to supply the newly created Point Lisas industrial estate.

Since the 1980s, natural gas has taken the front seat not only in government policies related to the hydrocarbon sector but also in terms of investments and industrial activities. To break Amoco's controlling influence on the national gas supply Trintopec, Trintoc and NGC established Trintomar in 1990 with the aim of developing offshore natural gas reserves in the South East Coast Consortium (SECC) block.

This initial attempt of the government to become active in the exploration and production of natural gas, however, proved to be a failure. Rising costs of the project were subordinate to the political will to overcome Amoco's "stranglehold on the gas supply."

This effort also represents the last time that the government attempted to fund exploration and production efforts as the sole investor and all such activities by Petrotrin since have been on the basis of a minority partner in joint ventures. Today NGC is not involved in the exploration and production of natural gas.

To provide a counterbalance to Amoco's dominant market position the government turned to British Gas/Texaco to function as a new gas supplier and signed the first Production Sharing Contract with them in 1993. The importance of natural gas continued to increase and by 1996 gas production as measured in barrels of oil equivalent surpassed the production of crude oil. In 2012 revenue derived from the export of natural gas vs. the export of oil stood at a ratio of 60-40.

A key development to monetization and large-scale export of natural gas was the entry into the LNG market in 1999. For this purpose Amoco, BG, Repsol, Cabot LNG and NGC formed a joint venture called Atlantic LNG, today known as Atlantic, to invest in an LNG plant, which today operates four trains. Today Atlantic's operations consume 59 percent of all gas produced in Trinidad and Tobago.

History of Petrotrin

Petrotrin, the Petroleum Company of Trinidad and Tobago, emerged in 1993 following the merger of the two state-owned oil companies Trintopec and Trintoc. Seven years later, in 2000 Trinmar was also merged with Petrotrin. Trintoc was created in 1974 when it took over Shell's assets.

Eleven years later, in 1985, Trintoc expanded when it absorbed Texaco's Trinidad and Tobago based operation and assets. Trintopec was created in 1985 when the government purchased Tesoro's assets in the Trinidad-Tesoro joint venture. The joint venture had existed since 1969 when it took over the assets of BP.

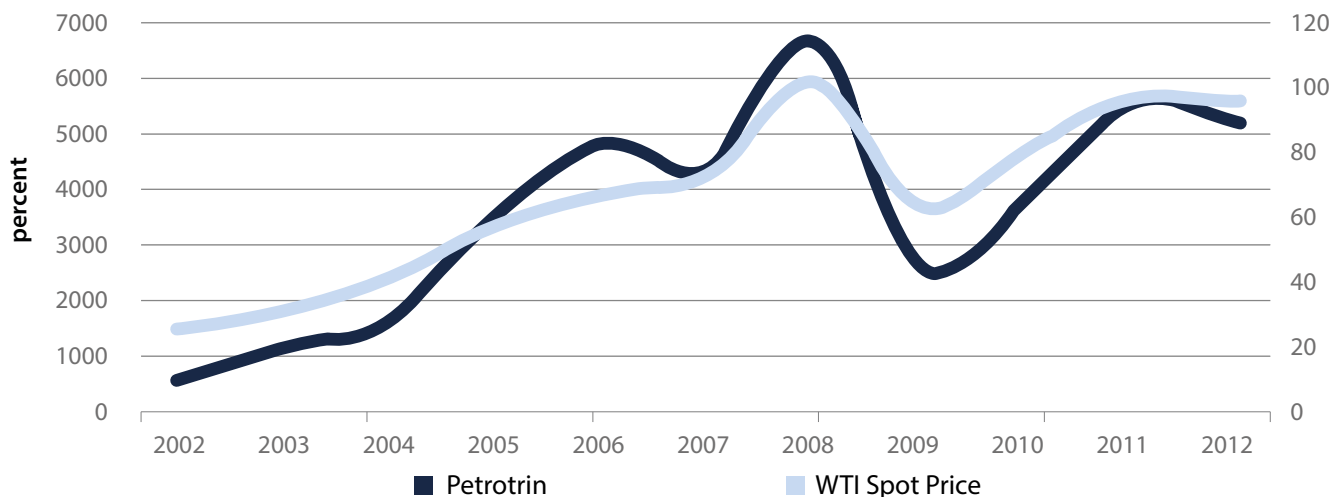
Shell's and Texaco's operations in Trinidad and Tobago go back to United British Oilfields of Trinidad (UBOT) and Trinidad Leaseholds Ltd. (TLL) having operated in the country since 1912 and 1911 respectively.

Petrotrin operates primarily mature onshore fields located in the south of Trinidad and has leased areas with very mature and unprofitable wells to small local producers, who, due to lower labor costs, are able to extract a profit from such wells. Petrotrin's activities reach far beyond exploration, production and refining operations as it is also involved in the transportation, storage and marketing of oil products and LNG.

Petrotrin's contributions to government revenues and the overall GDP closely follow the fluctuations of the price of crude oil. Following the price increase between 2002-2007 Petrotrin's contributions soared before falling sharply in 2008. They have since rebounded to the level of 2007.⁷⁹

⁷⁹ Petrotrin, 2013a

Figure 24 Petrotrin's Contributions to Government Revenue vs. WTI Spot Price, 2002-2012



Source : EIA, 2014; Petrotrin, 2013a

Evolution of Energy Production, Trade, Transformation, and Consumption

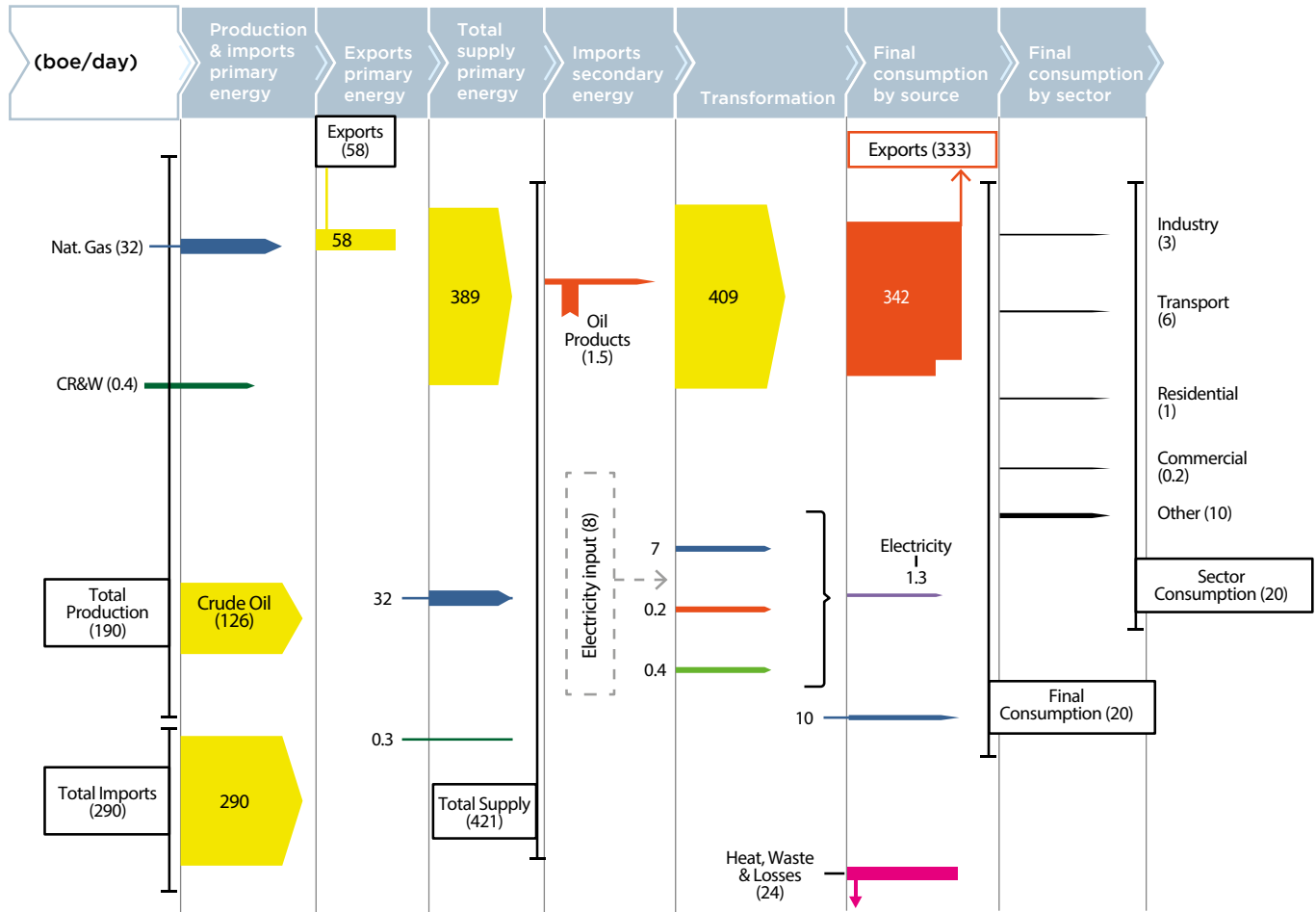
During the period of 1971-1974 Trinidad and Tobago's energy sector was dominated by crude oil production and imports and their conversion into oil products and their subsequent exports. For that period the island nation produced 157 kboe/day of crude oil, 32 kboe/day of natural gas and 0.4 kboe/day of CR&W. In addition it imported 290 kboe/day of primary energy in the form of crude oil.

The country exported 58kboe/day of crude oil leaving 389 kboe/day of crude for transformation into oil products. In total the country had a primary energy supply of 421 kboe/day with 389 kboe/day from crude oil, 32 kboe/day from natural gas and 0.4 kboe/day from CR&W. It imported 1.5 kboe/day of oil products and produced 339 kboe/day of oil products domestically. Of this 333 kboe/day were exported leaving 8 kboe/day of oil products for domestic consumption.

The electricity sector received 7.4 kboe/day of energy input, of which 7.2 kboe/day were natural gas and 0.2 kboe/day were oil products, primarily diesel. After conversion, transmission and distribution losses 1.2 kboe/day of electricity were supplied to consumers. Total final consumption stood at 20.2 kboe/day less than 5 percent of total primary energy supply, consisting of 8 kboe/day of oil products, 9.8 kboe/day of natural gas, 1.3 kboe/day of electricity and 0.4 kboe/day of CR&W.

In terms of final consumption industry accounted for 2.7 kboe/day, transport for 6 kboe/day, residential for 1.4 kboe/day and commercial for 0.2 kboe/day. Other sectorial consumption accounted from 9.9 kboe/day.

Figure 25 Trinidad and Tobago Energy Matrix, 1971-1974



Inter-American Development Bank, 2015
 Infrastructure & Environment / Energy

Editor: Ramón Espinasa (INE/ENE).

Authors: Carlos Sucre (INE/ENE)

Source: Own calculations based EIA World energy Balances

During the period of 1984-1987 Trinidad and Tobago's energy sector continued to be dominated by crude oil production but crude oil imports fell dramatically. As mentioned earlier, the Pointe-a-Pierre refinery, which had produced as much as 360,000 kboe/day of oil products, now operated at much lower volumes. Rising crude oil prices had reduced the profitability of imported crude oil for refining purposes and the refinery had difficulties competing with more technological advanced refineries in the US.

For the period of 1984-1987 the island nation produced 174 kboe/day of crude oil, 74 kboe/day of natural gas and 0.7 kboe/day of CR&W. It is interesting to note that natural gas production

doubled compared to a decade earlier and the effects of the government's policy to develop the natural gas sector had begun to take shape. In addition to domestic production it imported 12 kboe/day of primary energy in the form of crude oil, less than 5 percent of the amount 10 years earlier.

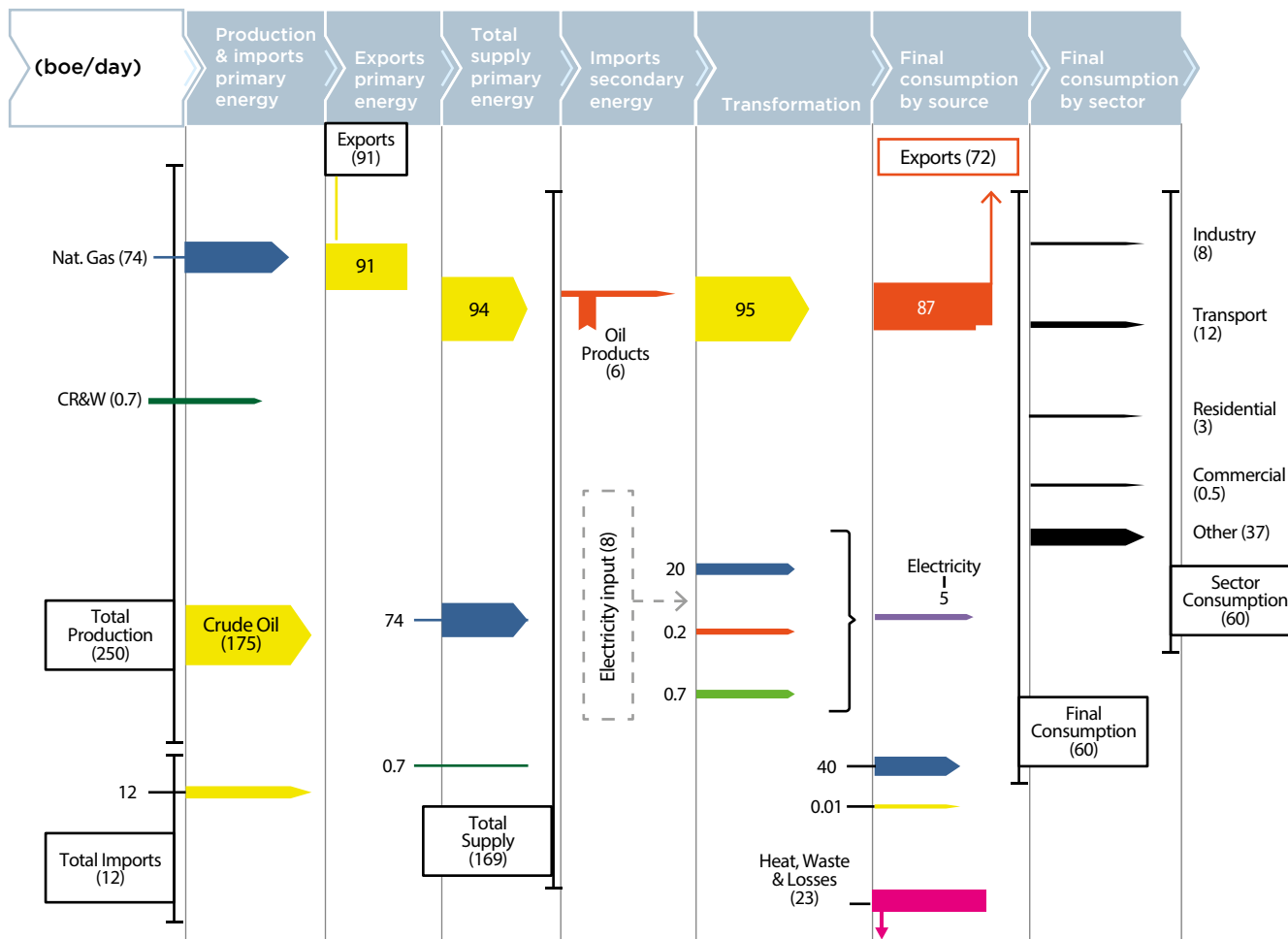
The country exported 91 kboe/day of crude oil leaving 94 kboe/day of crude for transformation into oil products. Again, this stands in sharp contrast to the previous period and a decline of more than 75 percent. In total the country had a primary energy supply of 169 kboe/day with 94 kboe/day from crude oil, 74 kboe/day from natural gas and 0.7 kboe/day from CR&W. At

this point in time natural gas already represented 40 percent of total primary energy supply.

The country imported 6.3 kboe/day of oil products and produced 81 kboe/day of oil products domestically, of which is exported 72 kboe/day. This figure represents a decline of nearly 75 percent compared to the production of oil product in the early 1970s. The electricity sector received 20.2 kboe/day of energy input, of which 20 kboe/day were natural gas and 0.2 kboe/day were oil products, primarily diesel.

After conversion, transmission and distribution losses, 6.3 kboe/day of electricity were supplied to consumers. Total final consumption stood at 59.6 kboe/day, triple the amount of the previous period. Final consumption by source consisted of 15 kboe/day of oil products, 40 kboe/day of natural gas, 6.3 kboe/day of electricity and 0.7 kboe/day of CR&W. In terms of final consumption industry accounted for 7.8 kboe/day, transport for 11.6 kboe/day, residential for 2.7 kboe/day and commercial for 0.5 kboe/day. Other sectoral consumption accounted for 37 kboe/day.

Figure 26 Trinidad and Tobago Energy Matrix, 1984-1987



Inter-American Development Bank, 2015
Infrastructure & Environment / Energy

Editor: Ramón Espinasa (INE/ENE).
Authors: Carlos Sucre (INE/ENE)
Source: Own calculations based EIA World energy Balances

The period of 1999-2002 shows the conversion of Trinidad and Tobago's energy sector further away from crude oil and towards natural gas. During this period the island nation produced 143 kboe/day of crude oil, 261 kboe/day of natural gas and 0.6 kboe/day of CR&W. Natural gas production more than quadrupled compared to 15 years earlier while crude oil production shrank by 20 percent.

In addition to domestic production it imported 92 kboe/day of primary energy in the form of crude oil. The country exported 71 kboe/day of crude oil and for the first time also exported natural gas in the amount of 62 kboe/day. After exports Trinidad and Tobago had a total primary energy supply of 363 kboe/day with 164 kboe/day from crude oil, 199 kboe/day from natural gas and 0.6 kboe/day from CR&W. Natural gas overtook crude oil as primary supplier of primary energy.

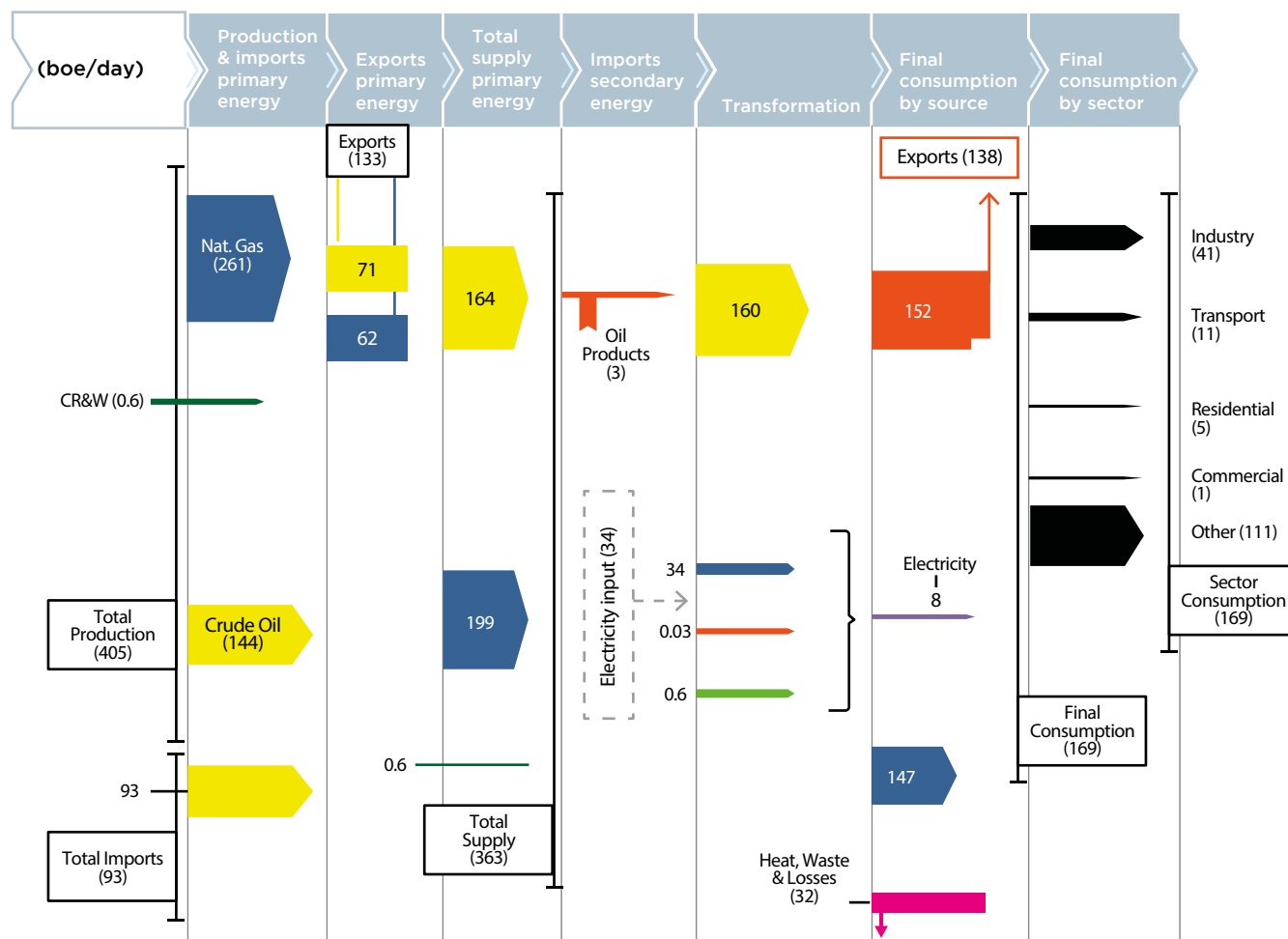
The country imported 3 kboe/day of oil products and

produced 149 kboe/day of oil products domestically, of which it exported 140 kboe/day. After limited oil product exports during the previous period, exports in this category rebounded, although not to the levels seen during the 1970s.

The electricity sector received 34 kboe/day of energy input, of which 34 kboe/day were natural gas and 0.03 kboe/day were oil products, primarily diesel. After conversion, transmission and distribution losses 8.3 kboe/day of electricity were supplied to consumers. Total final consumption stood at 169.6 kboe/day, almost triple the amount than in the previous period.

Final consumption by source consisted of 12 kboe/day of oil products, 147 kboe/day of natural gas, 8.3 kboe/day of electricity and 0.6 kboe/day of CR&W. In terms of final consumption industry accounted for 40 kboe/day, transport for 11 kboe/day, residential for 5 kboe/day and commercial for 1 kboe/day. Other sectorial consumption accounted for 111 kboe/day.

Figure 27 Trinidad and Tobago Energy Matrix, 1999-2002



Inter-American Development Bank, 2015
 Infrastructure & Environment / Energy

Editor: Ramón Espinasa (INE/ENE).

Authors: Carlos Sucre (INE/ENE)

Source: Own calculations based EIA World energy Balances

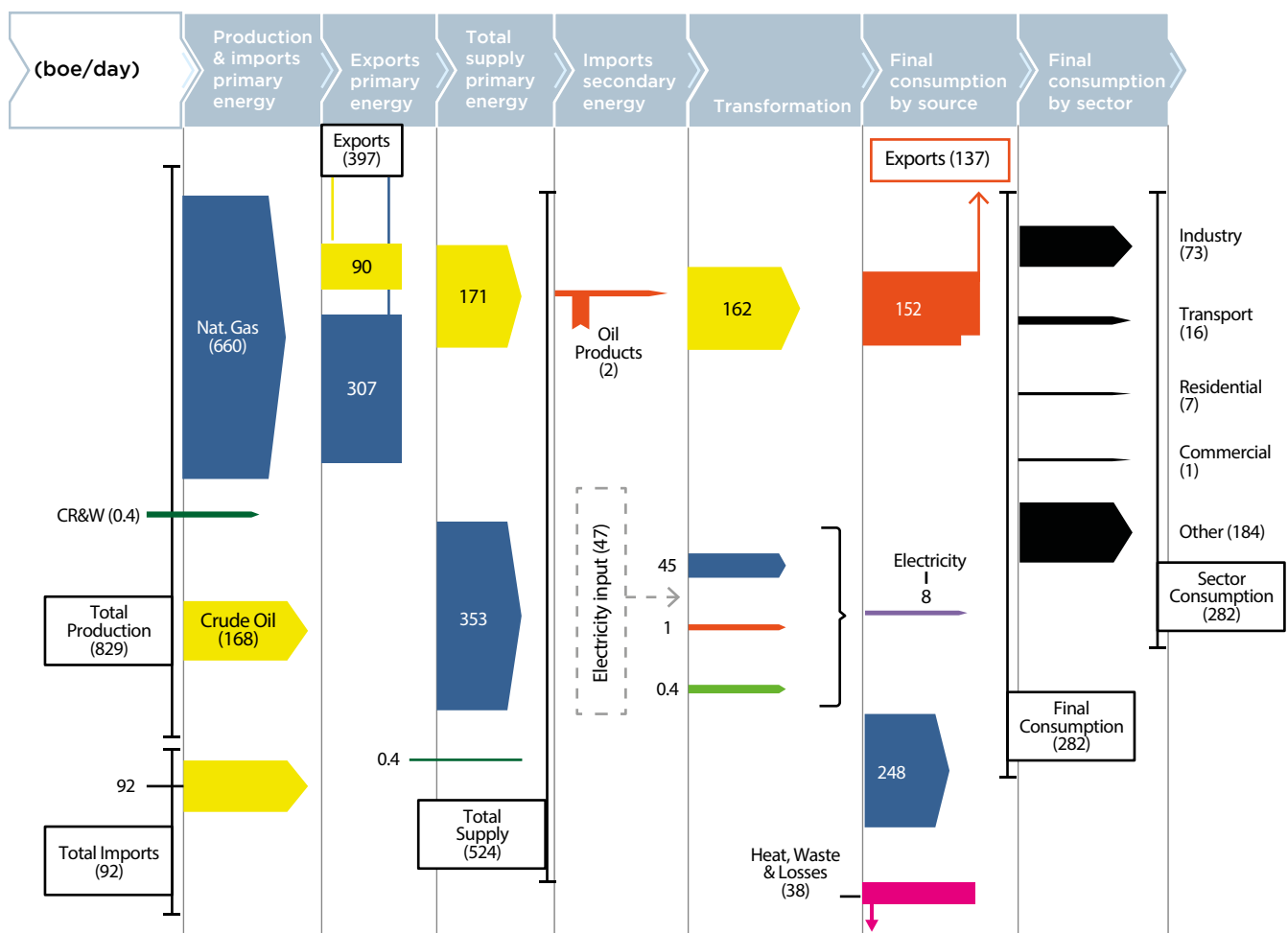
The period of 2005-2008 shows the continuation of the rapidly expanding natural gas sector. For this period the island nation produced 168 kboe/day of crude oil, 660 kboe/day of natural gas and 0.4 kboe/day of CR&W. Natural gas production almost tripled compared to just 5 years earlier. In addition to domestic production it imported 92 kboe/day of primary energy in the form of crude oil.

The country exported 90 kboe/day of crude oil and 307 kboe/day of natural gas, the vast majority of which came in the form of LNG following the construction of Atlantic's LNG trains. After exports Trinidad and Tobago had a total primary energy supply of 524 kboe/ with 171 kboe/day from crude oil, 353 kboe/day from natural gas and 0.4 kboe/day from CR&W. Natural gas now represented two-thirds of total supply of primary energy.

The country imported 1.9 kboe/day of oil products and produced 157 kboe/day of oil products domestically, of which it exported 136 kboe/day. The electricity sector received 46.1 kboe/day of energy input, of which 45 kboe/day were natural gas and 1.1 kboe/day were oil products, primarily diesel. After conversion, transmission and distribution losses 11.9 kboe/day of electricity were supplied to consumers.

Total final consumption stood at 282 kboe/day, an increase of 60 percent compared to five year earlier. Final consumption by source consisted of 23 kboe/day of oil products, 248 kboe/day of natural gas, 11.9 kboe/day of electricity and 0.4 kboe/day of CR&W. In terms of final consumption industry accounted for 73 kboe/day, transport for 16 kboe/day, residential for 7 kboe/day and commercial for 1.2 kboe/day. Other sectoral consumption accounted for 282 kboe/day.

Figure 28 Trinidad and Tobago Energy Matrix, 2005-2008



Inter-American Development Bank, 2015
 Infraestructura & Environment / Energy

Editor: Ramón Espinasa (INE/ENE).
 Authors: Carlos Sucre (INE/ENE)

Source: Own calculations based EIA World energy Balances

Methodology

The matrices were constructed with data from the International Energy Agency World Energy Balances based on calculations by the IDB Energy Division.

Annex

Natural gas Consumption by Sector, in percent

LNG	57
Ammonia Manufacture	15
Methanol Manufacture	13
Power Generation	8
Iron & Steel	3
Other	4

Source: MEEA, 2012c

Energy Consumption by Sector

Kboe/day

Industry	79
Transport	19
Residential	7
Commercial	2
Other	203

Source: IEA, 2012

Electricity Consumption by Sector, 2011, in percent

Commercial	10
Residential	29
Industrial	60
Other	1

Source: Inkim, 2013

Installed Capacity in MW

2009

2010

2011

2012

2013

2014

T&TEC	85.7	85.7	85.7	85.7	85.7	85.7
PowerGen	1,386	1,386	1,386	1,386	1,386	1,386
Trinity Power	225	225	225	225	225	225
Trinidad Generation Unlimited	0	0	720	720	720	720

Source: Inkim, 2013

Consumption by Sector in GWh

Residential

Commercial

Industrial

Street Lighting

Total

1992	894.6	342.0	2,116.2	14.5	3,367.3
1993	935.9	334.5	2,062.3	14.5	3,347.2
1994	921.2	343.9	2,210.5	15.0	3,490.6
1995	897.2	319.9	2,178.1	15.0	3,410.2
1996	1,002.0	360.4	2,565.6	15.7	3,943.7
1997	1,060.2	410.3	2,877.6	15.8	4,363.9
1998	1,117.9	432.3	3,127.4	18.8	4,696.4
1999	1,144.7	456.6	3,270.5	17.3	4,889.1
2000	1,250.6	475.1	3,271.7	18.0	5,015.4
2001	1,285.0	522.9	3,513.1	18.8	5,339.8
2002	1,398.7	520.2	3,706.8	20.3	5,646.0
2003	1,541.6	581.4	3,942.0	23.1	6,088.1
2004	1,493.7	545.3	3,800.8	24.3	5,864.1
2005	1,728.2	618.7	4,168.7	26.7	6,542.3
2006	1,798.6	649.8	4,157.1	49.3	6,654.8
2007	1,933.8	701.1	4,833.5	67.8	7,536.2
2008	2,398.3	700.1	4,345.9	91.6	7,535.9
2009	2,071.2	739.6	4,336.1	140.2	7,287.1
2010	2,271.1	765.2	4,763.7	110.7	7,910.7
2011	2,412.0	773.0	4,825.0	109.0	8,119.0

Source: RIC, 2006; Samuel, 2013

System Losses as Share of Sales	Forecast in %	Actual in %
1961		25.7
1962		24.5
1963		26.2
1964		17.6
1965		16.2
1966		14.2
1967		14.8
1968	14.9	
1969	14.9	
1970	15.0	
1971	15.2	
1972	15.3	
1973	15.5	
1974	15.6	
1975	15.7	
1976	15.8	
1977	15.9	
1978		
1979		
1980		12.5
1981		9.7
1982		6.0
1983		11.9
1984		12.7
1985		14.3
1986		10.7
1987		11.2
1988		9.9
1989		11.4
1990		8.9
1991		13.2
1992		12.1
1993		8.8
1994		12.0
1995		10.2
1996		10.5
1997		8.6
1998		8.6
1999		6.3
2000		7.7
2001		10.7
2002		8.0
2003		6.9
2004		
2005		7.9
2006		7.7
2007		8.5
2008		7.8
2009		9.4
2010		
2011	6.3	
2012	6.2	
2013	6.2	
2014	6.3	
2015	6.4	
2016	6.5	

Source: EIA, 2015; RIC, 2005; RIC, 2011; T&TEC, 2011; World Bank, 1969

Trinidad and Tobago	Installed Capacity in MW	Peak Demand in MW
1980	837.0	
1981	765.0	
1982	765.0	
1983	987.0	
1984	990.0	
1985	990.0	
1986	990.0	
1987	990.0	
1988	990.0	
1989	990.0	
1990	1,155.0	
1991	1,155.0	
1992	1,155.0	
1993	1,155.0	
1994	1,155.0	607
1995	1,155.0	665
1996	1,258.0	710
1997	1,258.0	746
1998	1,258.0	806
1999	1,422.0	815
2000	1,422.0	834
2001	1,421.7	876
2002	1,485.0	925
2003	1,485.0	970
2004	1,485.0	1034
2005	1,485.0	1057
2006	1,359.0	1070
2007	1,430.0	1131
2008	1,430.0	1181
2009	1,695.7	1182
2010	1,695.7	1222
2011	2,416.7	1287
2012	2,364.0	1322
2013	2,364.0	1322

Source: Castalia Consulting, 2011; Inkim, 2013; RIC, 2006; Samuel, 2013; T&TEC, 2004; T&TEC, 2011

T&TEC Sales in GWh	Residential		Commercial		Industrial		Total
	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast
				342			
1992		894.6	315.1	334.5		2,116.2	3,367.3
1993	865.5	935.9	325.9	343.9	2,079.4	2,062.3	3,347.2
1994	884.9	921.2	342.8	319.9	2,206.5	2,210.5	3,490.6
1995	926.9	897.2	370.2	360.4	2,355.9	2,178.1	3,410.2
1996	988.3	1,002.0	396.6	410.3	2,554.2	2,565.6	3,943.7
1997	1,047.5	1,060.2	422.1	432.3	2,732.0	2,877.6	4,363.9
1998	1,111.1	1,117.9	449.7	456.6	2,909.4	3,127.4	4,696.4
1999	1,179.4	1,144.7	479.4	475.1	3,093.6	3,270.5	4,889.1
2000	1,256.8	1,250.6	512.5	522.9	3,300.3	3,271.7	5,015.4
2001	1,336.2	1,285.0	544.4	520.2	3,534.8	3,513.1	5,339.8
2002	1,429.7	1,398.7	585.6	581.4	3,781.3	3,706.8	5,646.0
2003	1,524.3	1,541.6	620.4	545.3	4,047.6	3,942.0	6,088.1
2004	1,600.8	1,493.7	649.4	618.7	4,320.5	3,800.8	5,864.1
2005	1,678.4	1,728.2	675.7	649.8	4,497.9	4,168.7	6,542.3
2006	1,748.0	1,798.6	700.3	701.1	4,670.7	4,157.1	6,654.8
2007	1,814.1	1,933.8	726.1	700.1	4,841.7	4,833.5	7,536.2
2008	1,881.8	2,398.3	752.7	739.6	5,025.3	4,345.9	7,535.9
2009	1,949.0	2,071.2		765.2	5,213.1	4,336.1	7,287.1
2010		2,271.1	773.0	773.0		4,763.7	7,910.7
2011	2,412.0	2,412.0	784.0			4,825.0	8,119.0
2012	2,652.0		784.0		5,156.0		8,708
2013	2,853.0		790.0		5,465.0		9,218
2014	3,051.0		809.0		5,637.0		9,599
2015	3,256.0		843.0		5,714.0		9,900
2016	3,480.0				5,823.0		10,272

Source: RIC, 2006; Samuel, 2013; T&TEC, 2011

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