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Challenges and Opportunities for the Energy Sector in the Eastern Caribbean

Saint Kitts and Nevis Energy Dossier

Ramon Espinasa
Malte Humpert
Christiaan Gischler
Nils Janson

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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. This series is an important contribution to the understanding of the energy sector of the Eastern Caribbean countries, as many projects providing comparable information have been carried out in this part of the hemisphere.

Keywords: Energy; electricity; energy matrix; Caribbean; Eastern Caribbean

JEL Codes: Q40, Q43, Q48

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Index

Acronyms

Boe/day	Barrels of oil equivalent per day
CR&W	Combustible renewables and waste
DOMLEC	Dominica Electric Company
ECERA	Eastern Caribbean Energy Regulatory Authority
ESA	Electricity Supply Act of 1994
GDP	Gross domestic product
GWh	Gigawatt hour
IPP	Independent power producer
IRC	Independent Regulatory Commission
IRENA	International Renewable Energy Agency
Kboe/day	Thousand barrels of petroleum equivalent per day
kW	Kilowatt
kWh	Kilowatt hour
MW	Megawatt
MWh	Megawatt hour
NEP	National Energy Policy
NEAP	National Energy Action Plan
NEVLEC	Nevis Electricity Company
NIA	Nevis Island Administration
NREI	Nevis Renewable Energy International
PDVSKN	PDV Saint Kitts and Nevis Ltd.
PUC	Public utilities commission
SKED	Saint Kitts Electricity Department
SOL	Simpson Oil Limited
SKELEC	Saint Kitts Electricity Company
TDC	Trading and Development Company Limited
UNFCCC	United Nations Framework Convention on Climate Change
WIP	West Indies Power

Country Overview: Saint Kitts and Nevis

The two-island state of the Federation of St. Christopher (St. Kitts) and Nevis is part of the Leeward Islands chain in the Eastern Caribbean and is located west of Antigua and Barbuda and Anguilla. The Federation of Saint Kitts and Nevis covers a land territory of 269 square kilometers and has population of 54,191. Saint Kitts covers about two-thirds of the territory (176 square kilometers), with Nevis encompassing the remaining 93 square kilometers. Roughly 75 percent of the population, about 42,000 people, resides on Saint Kitts, with the remaining approximately 12,000 people living on Nevis (World Bank, 2014).

Map 1 Saint Kitts and Nevis

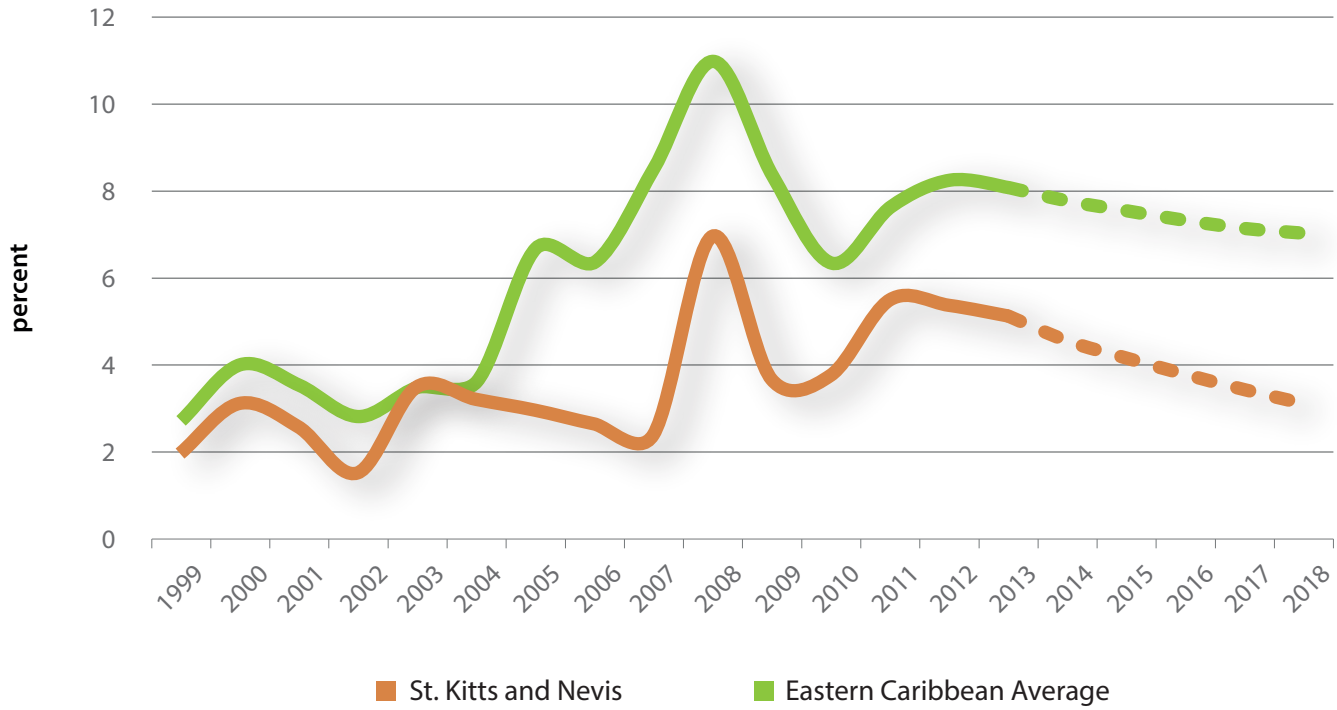
Source: Author's own work.

Saint Kitts and Nevis has a high level of development, with a score of 0.75, ranking 73rd out of 187 countries on the 2013 Human Development Index (UNDP, 2014). In 2013, it recorded a national GDP of US$774m, and its per capita GDP stood at US$13,238 (IMF, 2015).

Saint Kitts and Nevis' economy, similar to the economies of most of its Caribbean neighbors, is disproportionately service oriented and is dominated by the tourism sector, which has grown significantly over the past decade. In 2009 tourism contributed 31.7 percent to total GDP and employs 32.2 percent of the workforce. Other important contributors to national GDP come from government services and the banking and insurance industry. Manufacturing and mining also play a role (Government of Saint Kitts and Nevis, 2010). Until the 1970s, sugar exports provided the main source of income for the country. As revenues began to decline, the government began to diversify the economy, and the sugar industry closed its doors in 2005 (de Cuba, 2006).

Like many island states, Saint Kitts and Nevis is highly reliant on imported fossil fuels to meet its energy needs. However, due in part to relatively efficient generation, its oil import costs have historically remained below the Eastern Caribbean average. At its peak in 2008, oil imports accounted for roughly 6.6 percent of GDP, well below the Eastern Caribbean average of 10.9 percent at the time. As crude oil prices have since declined, this figure has fallen to 4.9 percent, again below the Eastern Caribbean average of 8.1 percent (IMF, 2013).

Figure 1 Oil Import Costs as Share of GDP



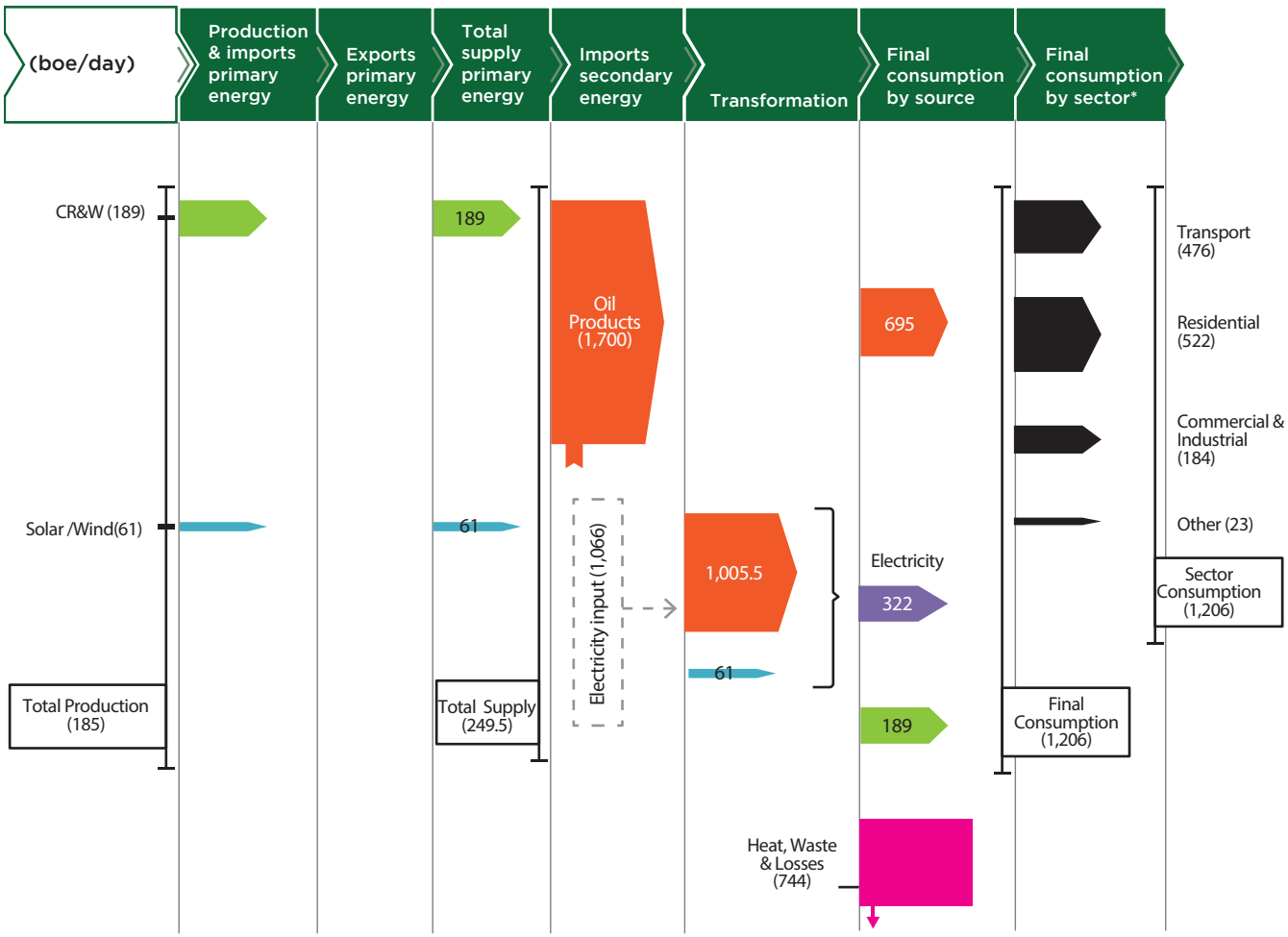
Source: IMF (2013).

The Energy Matrix of St. Kitts and Nevis

The county's production of primary energy is limited to 189 barrels of oil equivalent per day (boe/day) from combustible renewables and waste (CR&W) and 60.5 boe/day from wind and solar. The vast majority of energy (around 87 percent) is imported in the form of oil products. The country imports a total of 1700 boe/day of oil products. About 59 percent of oil products (1005.5 boe/day) are used to generate electricity. Losses during generation, distribution, and transmission total 744 boe/day, leaving 322 boe/day of electricity for final consumption. In total, final consumption of St. Kitts and Nevis is 1205.5 boe/day, of which 694 boe/day are oil products, 322 boe/day are consumed in the form of electricity, and 189 boe/day are CR&W.

Consumption by sector is as follows: the residential sector consumes 43 percent of energy with 522 boe/day, followed by the transport sector with 476 boe/day representing 40 percent, and the commercial and industrial sector with 184 boe/day and 15 percent. Other consumption accounts for 23 boe/day representing 1.8 percent.

Figure 2 Saint Kitts and Nevis, 2013



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Infraestructure & Enviroment / Energy

***Sector consumption only represents rough estimates. Calculations are based on 1994 CO_2 Emissions data.**

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

Total Energy Supply

Saint Kitts and Nevis receives about 87 percent of its overall energy through imported oil products, with the remaining share coming from CR&W as well as wind and solar power.

The total energy supply in Saint Kitts and Nevis was 1949.5 boe/day in 2013. Imported oil products accounted for 1700 boe/day and made up 87 percent of total energy supply, with 10 percent equal to 189 boe/day coming from CR&W and 3 percent accounting for 60.5 boe/day from solar and wind energy (EIA, 2012; IRENA, 2012b; NREL, 2015).

While Saint Kitts and Nevis has no proven fossil fuel resources, it possesses substantial renewable energy potential. Its geothermal prospects are excellent, and its location in the tropics ensures widespread availability of wind and solar resources. Nevis's estimated geothermal resources are sufficient to supply both islands and export to neighboring states via an undersea cable. The NIA drilled a successful slim-hole well and signed a 20-year con-

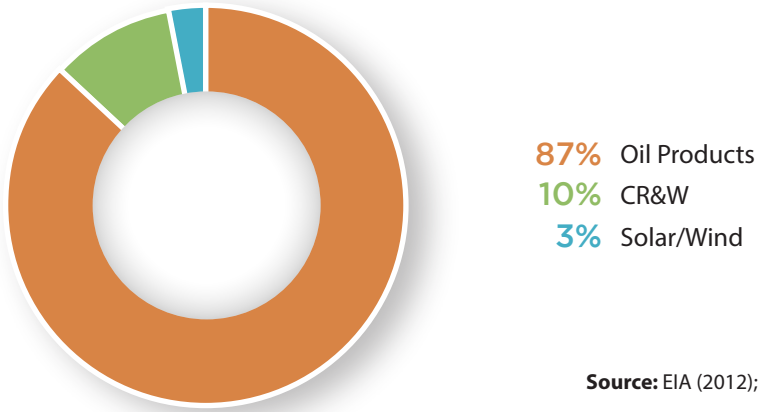
cession agreement with Nevis International to develop a geothermal power plant. The draft power purchasing agreement and lease for exploiting the exploration areas are under review, and exploratory drilling is expected to begin in 2015 or 2016 (Castalia, 2015).

Domestic Production

Saint Kitts and Nevis, like most Eastern Caribbean countries, is characterized by a high dependence on imported fossil fuels to meet its energy demand. Saint Kitts and Nevis has no known petroleum reserves and, apart from limited usage of combustible renewables and small-scale production of electricity from solar and wind energy, all energy is imported. The country receives about 87 percent of its overall energy through imported oil products, with the remaining share coming from CR&W as well as solar and wind.

While the island state has significant wind and geothermal energy potential, other indigenous energy sources, such as hydropower and fuel wood, are limited. A 2.2 MW wind farm began operation on Nevis in late 2010 (Castalia Consulting, 2012; Government of Saint Kitts and Nevis, 2010).

Figure 3 Share of Total Energy Supply, 2013



Source: EIA (2012); IRENA (2012b); NREL (2015).

In addition to using CR&W, wind, and solar energy to generate electricity, Saint Kitts and Nevis employs a limited number of solar water heating systems in the residential sector and the hotel industry. To increase the penetration of this and other renewable energy technology, the country began offering tax waivers in 2012 (Caribbean 360, 2012).

Commercial Balance of Primary Energy

Saint Kitts and Nevis did not import any primary energy in 2012.

Domestic Primary Energy Supply

The primary energy supply of Saint Kitts and Nevis was 249.5 boe/day in 2013 (EIA, 2012; IRENA, 2012b).

Electricity

Installed capacity

The islands of Saint Kitts and Nevis each have their own electricity utility company and electricity grid. There is no interconnection between the two islands. Saint Kitts Electricity Company (SKELEC) operates on Saint Kitts, while Nevis Electricity Company Limited (NEVLEC) operates on Nevis.

SKELEC began operations on August 1, 2011, and evolved out of the Saint Kitts Electricity Department (SKED). Like its predecessor, SKELEC is fully state-owned.
SKELEC operates around a dozen diesel generators at its Needsmust Power Plant, with a total capacity of 43MW. Peak demand stands at 24 MW, with base load at 14 MW (SKELEC, 2014c). Over the past six years, SKELEC commissioned a number of new generators to either add new capacity to the system or replace ageing inventory. It purchased two 4MW MAN diesel generators between 2006 and 2008, replaced a damaged 4MW generator in 2009, and added additional capacity in 2011 when it installed four additional 4MW MAN diesel generators. Prior to these upgrades, capacity stood at 33.5MW (CaribNRG, 2012). It also installed 1MW of solar PV at Robert Llewellyn Bradshaw International Airport on Saint Kitts.

NEVLEC was founded in 2000 as a subsidiary of the NIA. It owns and operates generators with a capacity of 13.7 MW, with peak demand of around 10.4 MW and a base load of 5 MW. The Four Seasons Hotel alone represents 1.1–1.2 MW of peak demand (Government of Saint Kitts and Nevis, 2012; NEVLEC, 2013).

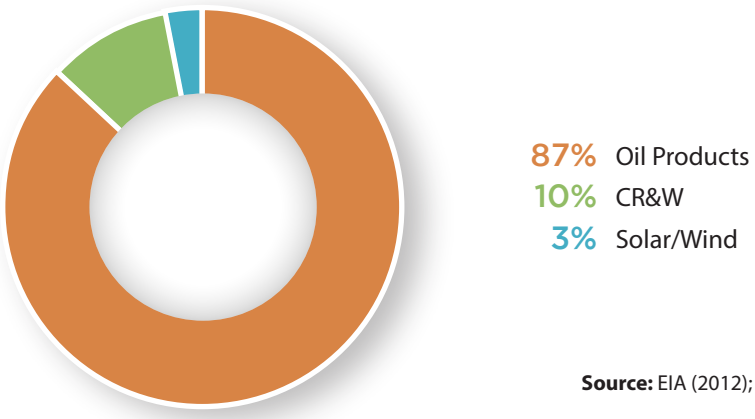
WindWatt Power Inc. has operated a small wind farm with a capacity of 2.2 MW since 2011, providing a limited amount of electricity to the Nevis grid. It is the largest wind farm in the Eastern Caribbean to date (Government of Saint Kitts and Nevis, 2010). According to NEVLEC, WindWatt's output to the island's grid is limited to 1.6MW under the existing power purchasing agreement (NEVLEC, 2012). WindWatt's installation consists of eight GEV MP 275/32 turbines rated at 275 kW each.

In addition to utility-scale generation, many businesses—especially in the tourism sector—rely on self-generation either part or full time. One example is the Marriott Hotel on Saint Kitts, which has a self-generation capacity of 4MW using diesel generators (Government of Saint Kitts and Nevis, 2010).

Total installed capacity by SKELEC, NEVLEC, and WindWatt stands at 58.9MW, with a peak demand of around 34MW on the two islands.

In contrast to utility companies in other Eastern Caribbean countries, in the past, SKELEC and NEVLEC set subsidized tariffs not high enough to recover the costs of generation. As neither SKELEC nor NEVLEC publishes annual reports, it is impossible to know if this practice continues (Government of Saint Kitts and Nevis, 2010). The artificially low electricity tariffs encouraged overconsumption and, as a result, the country's per capita electricity consumption and GHG emissions are higher than in other Eastern Caribbean countries (Government of Saint Kitts and Nevis, 2010).

Figure 4 Share of Installed Capacity, 2014



Source: EIA (2012); IRENA (2012b); NREL (2015).

Table 1 Inventory of SKELEC Power Stations, 2012

Power stations	Type	Capacity	Details	Year installed	Year decommissioned
Needsmust Power Plant	Diesel	43 MW	~~Mirrlees KV12 2x 3.6MW~~ Mirrlees K8 1x3.5MW ~~Caterpillar 3616 2x4.4MW~~ ~~Mirrlees12MB430 1x7.9MW~~ Mirrlees8MB430 1x6.1MW MAN Holeby 18V28/32S 2x3.9MW MAN Holeby 18V28/32s 4x3.9MW Additional Units: ~9MW	1971 1987 1989, 1995 1999 1999 2007,2009 2010,2011 unknown	 2008, 2010 2008 (fire)
Robert Llewellyn Bradshaw Airport	Solar PV	1 MW		September 2013	

Source: OAS (2012); SKELEC (2014a; 2014b).

Table 2 Inventory of Nevis Power Stations, 2014

Power stations	Type	Capacity	Details	Year installed
Prospect Power Plant (old building)	Diesel	~11MW	Blackstone 2x 0.9MW Blackstone 1x2.0MW EMD (GM) 1x2.5MW Blackstone 1x2.2MW Blackstone 1x2.5MW	1983, 1985 1990 1992 1996 1996
Prospect Power Plant (new building)	Diesel	2.7MW	Wartila 1x2.7MW	2002

Source: NEVLEC (2014c); NREL (2015); OAS (2012).

The combined capacity of SKELEC and NEVLEC remained steady throughout the 1980s and early 1990s at 15MW. Expansion began in 1994 with capacity increases to 16 MW and 19 MW the following year. A significant expansion in 2001 increased capacity from 20MW to 43.5MW.

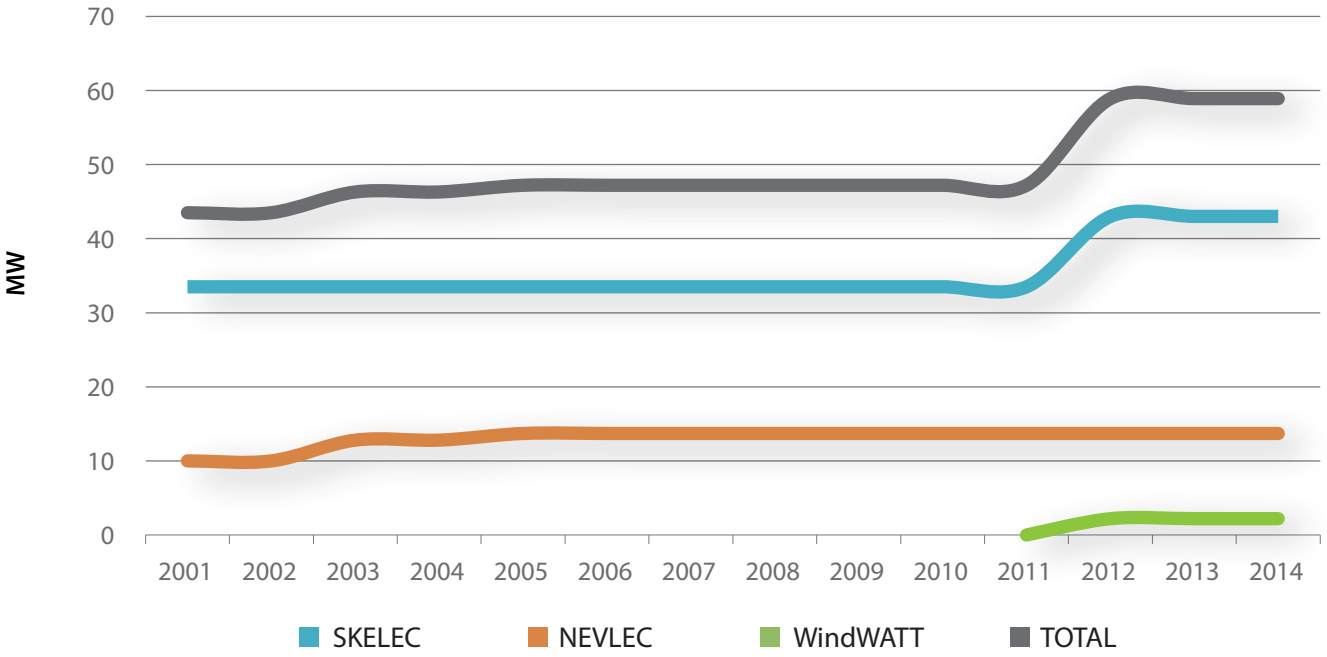
Following a fire in the Needsmust power plant in 2008, a 7.9MW generator was destroyed and subsequently replaced by new MAN units. With SKELEC's recent expansion and the installation of WindWatt's wind farm capacity reached a new peak at 58.9 MW in 2012.

Table 3 Saint Kitts and Nevis Installed Capacity, 2009–2014

in MW	2014	2013	2012	2011	2010	2009
Installed capacity	58.9	58.9	58.9	47.2	47.2	47.2

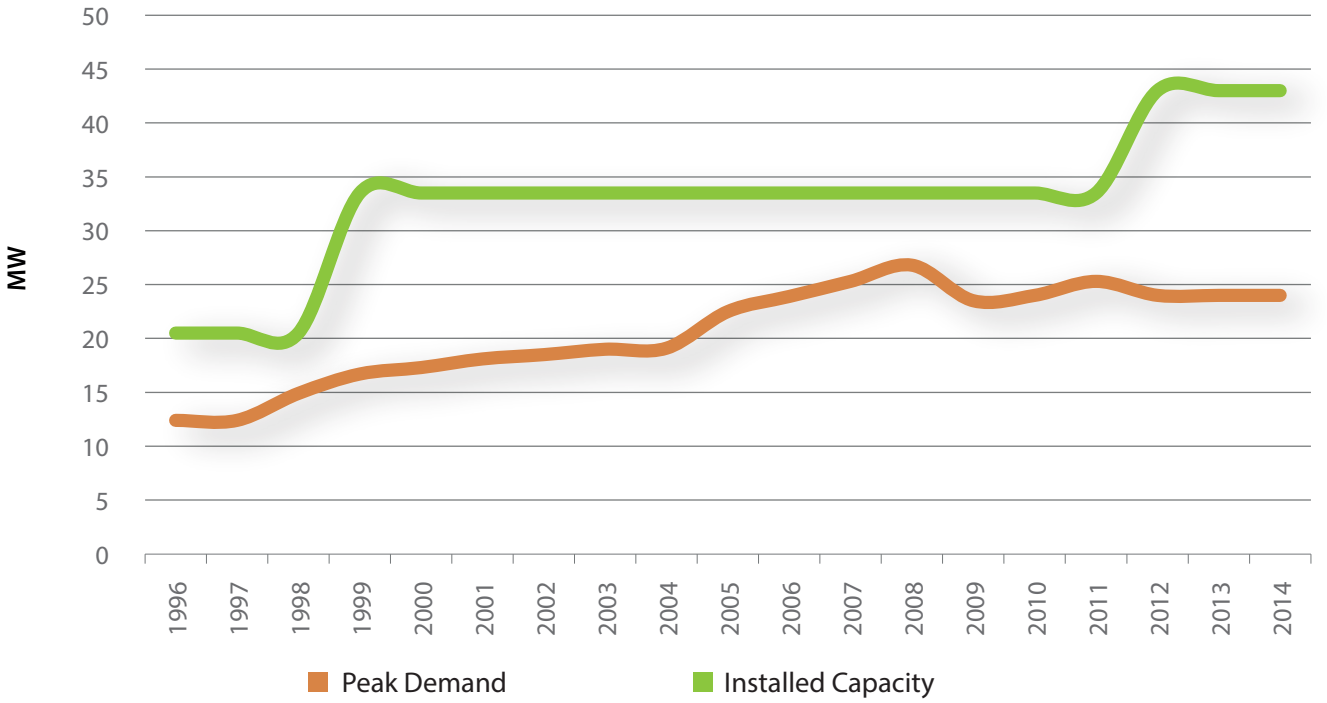
Source: EIA (2012); NEVLEC (2015); NREL (2015); OAS (2010); SKELEC (2014c).

Figure 5 Saint Kitts and Nevis Installed Capacity, 2001–2014



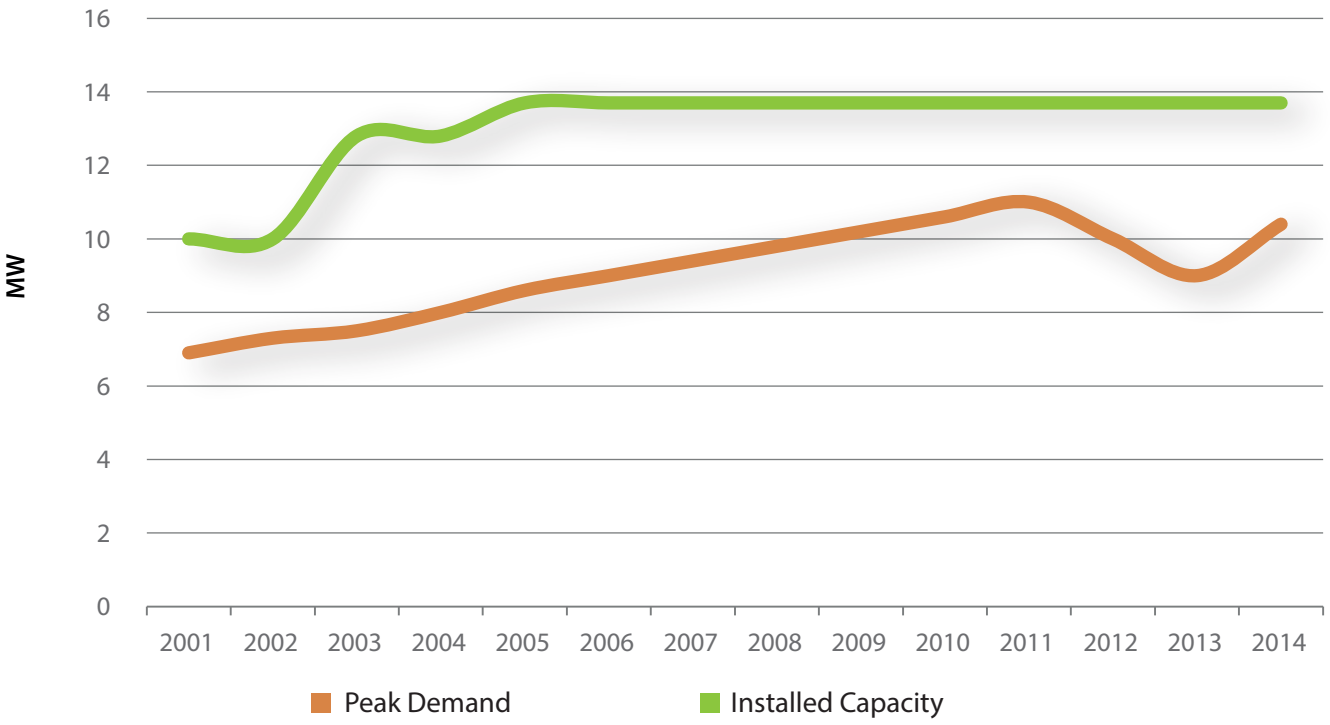
Source: de Cuba (2006); Ministry of Sustainable Development (2007); NEVLEC (2014c); NREL (2015); OAS (2012); Samuel (2013); SKELEC (2014c); World Bank (2010).

Figure 6 SKELEC Installed Capacity, 1996–2014



Source: de Cuba (2006); Ministry of Sustainable Development (2007); NREL (2015); OAS (2012); Samuel (2013); SKELEC (2014c); World Bank (2010).

Figure 7 NEVLEC Installed Capacity, 2001–2014



Source: de Cuba (2006); Ministry of Sustainable Development (2007); NEVLEC (2014c); NREL (2015); OAS (2012); Samuel (2013); SKELEC (2014c); World Bank (2010).

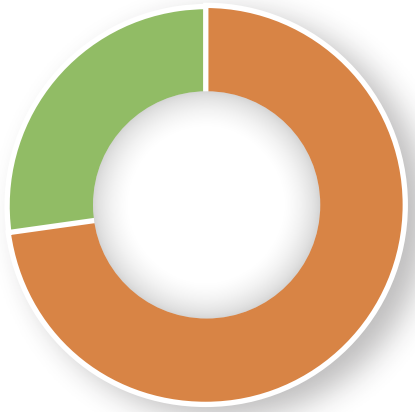
Input to Electricity Generation

Of the 1066 boe/day intended for electricity generation in 2012, 1005.5 boe/day came from liquid fuels and 60.5 boe/day came from solar and wind.

Electricity Matrix

In 2013, Saint Kitts and Nevis' net generation stood at 206.1GWh, of which 150GWh were generated by SKELEC, and 56.1GWh were generated by NEVLEC.

Figure 8 Electricity Generation SKELEC vs. NEVLEC, 2013



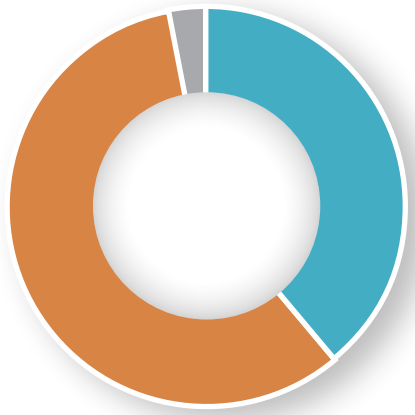
73% SKELEC

27% NEVLEC

Source: Ministry of Sustainable Development (2013).

Sectoral electricity consumption on Saint Kitts and Nevis is as follows: commercial consumption accounts for 58 percent, followed by residential consumption, with 39 percent. Other sectoral consumption represents 3 percent.

Figure 9 Saints Kitts and Nevis Electricity Consumption by Sector, 2013



58% Commercial

39% Residential

3% Other

Source: NREL (2015).

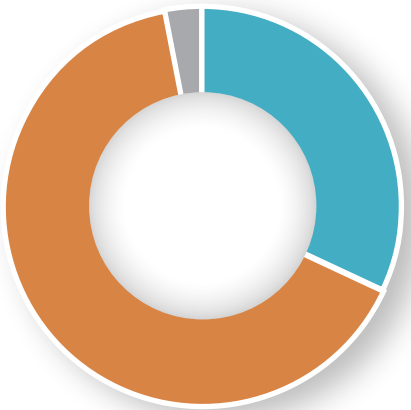
On Saint Kitts, residential customers consumed 41 percent of electricity, the commercial sector consumed 58 percent, and street lighting made up the remaining 1 percent.

Figure 10 Saint Kitts Electricity Consumption by Sector, 2004

58% Commercial / Industrial
41% Residential
1% General Supplies

Source: Ministry of Sustainable Development (2007).

Figure 11 Nevis Electricity Consumption by Sector, 2004



65% Commercial / Industrial
32% Residential
3% Street Lighting

Source: Ministry of Sustainable Development (2007).

On Nevis, residential customers accounted for 31 percent, the commercial sector for 65 percent, and 3 percent was consumed for street lighting (de Cuba, 2006).

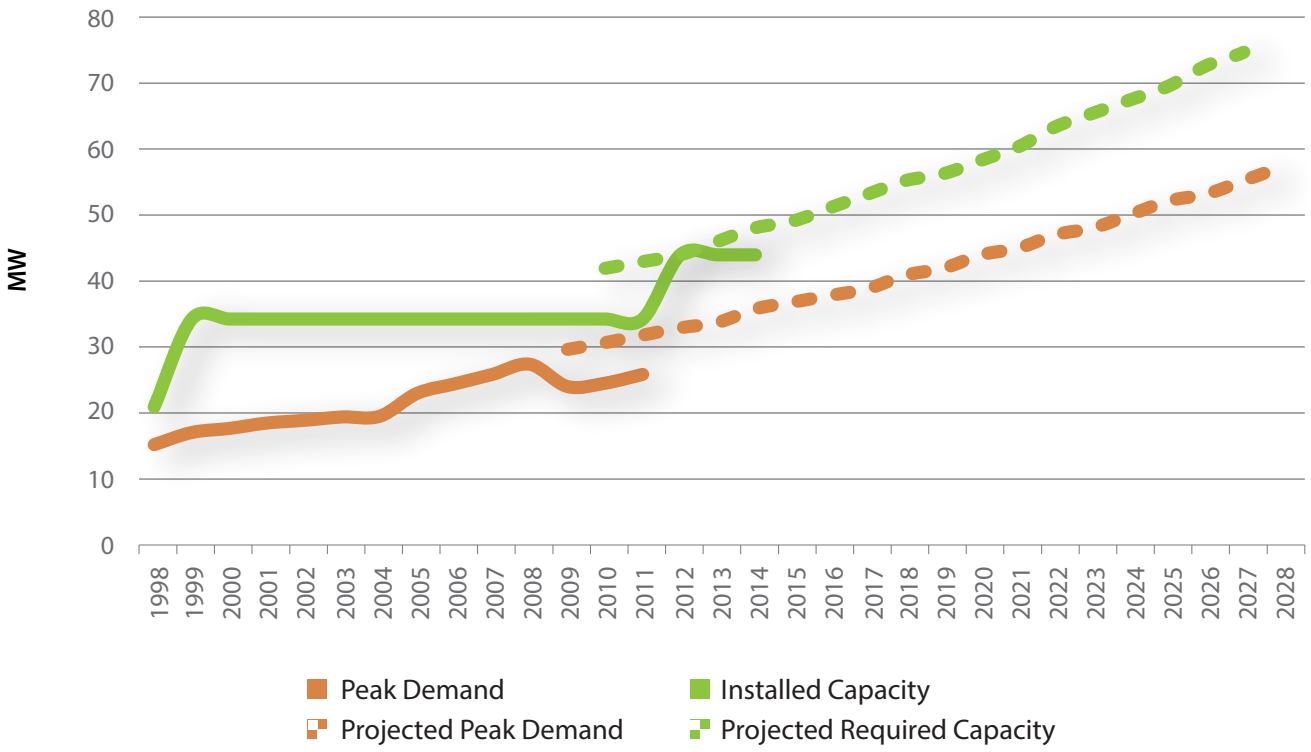
Based on 2010 forecasts, Saint Kitts' currently installed generating capacity was projected to meet demand until around 2013, at which point SKELEC was expected to need to add new capacity to meet growing demand. However, based on relatively flat growth and a temporary decline in peak demand between 2007 and 2012, the original 2010 demand forecasts may prove to be too aggressive.

Table 4 Saint Kitts' Projected Capacity Needs and Peak Demand in MW

	2015	2017	2019	2021	2023	2025	2027
Projected capacity needs	48	52	55	59	64	68	73
Projected peak demand	36	38	41	44	47	51	54

Source: World Bank (2010).

Figure 12 Saint Kitts' Projected Capacity Requirement and Peak Demand in MW



Source: World Bank (2010).

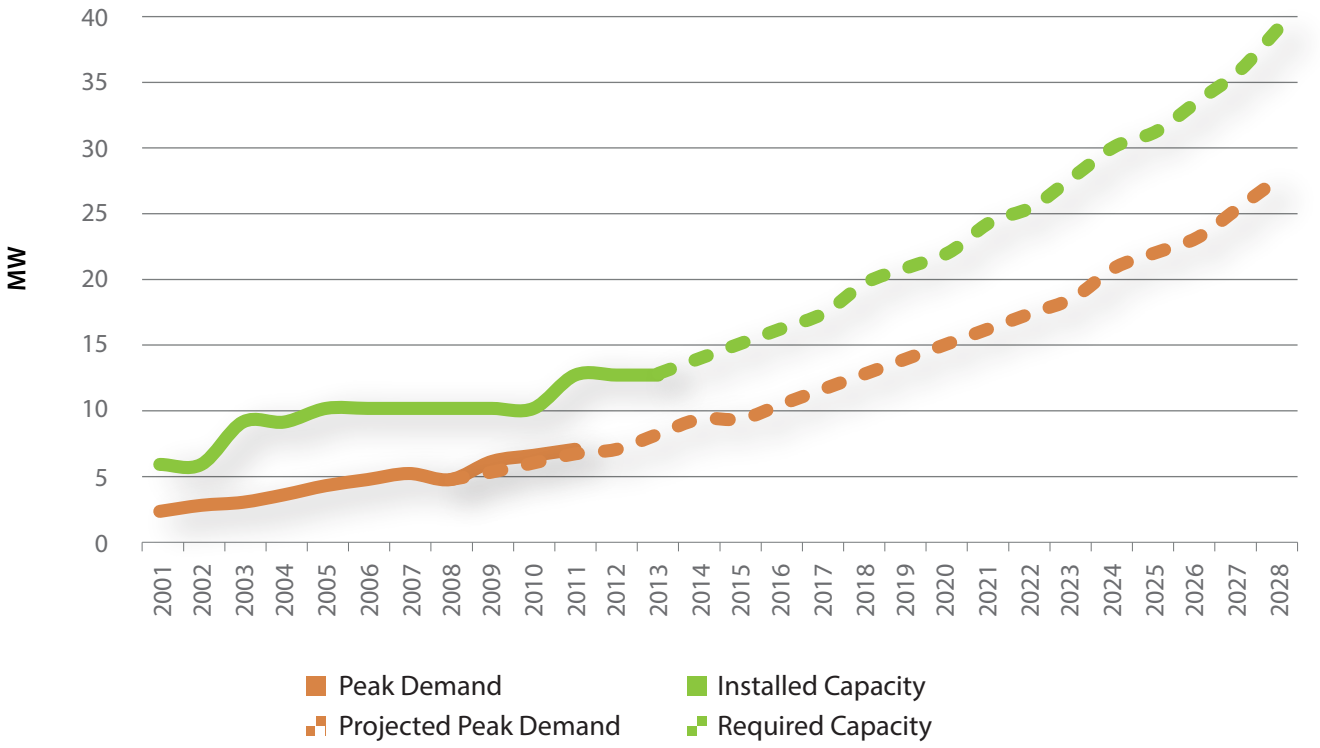
Based on 2010 forecasts, Nevis' currently installed generating capacity is projected to meet demand until around 2015, at which point NEVLEC will need to add new capacity. However, based on relatively slow growth in peak demand between 2010 and 2012, the original 2010 demand forecasts may prove to be slightly too aggressive.

Table 5 Nevis' Projected Capacity Needs and Peak Demand in MW

	2015	2017	2019	2021	2023	2025	2027
Projected capacity needs	18	20	23	26	29	32	36
Projected peak demand	13	15	17	19	21	24	27

Source: World Bank (2010).

Figure 13 Nevis' Projected Capacity Requirement and Peak Demand in MW



Source: World Bank (2010).

In Saint Kitts and Nevis, the full range of renewable resources is available, with the exception of hydropower. In the short term, Saint Kitts plans to build 5.4 MW of wind power, while Nevis plans to develop 10MW of geothermal power. In the medium term, an additional 20 MW of wind, 5 MW of solar, and 35 MW of geothermal are planned (NREL, 2015b).

Table 4 Saint Kitts and Nevis's Resource Availability

Geothermal	Solar (PV and hot water)	Energy Efficiency	Waste to Energy	Wind	Hydro
✔	✔	✔	✔	✔	

Source: Castalia (2015).

Generation Forecast

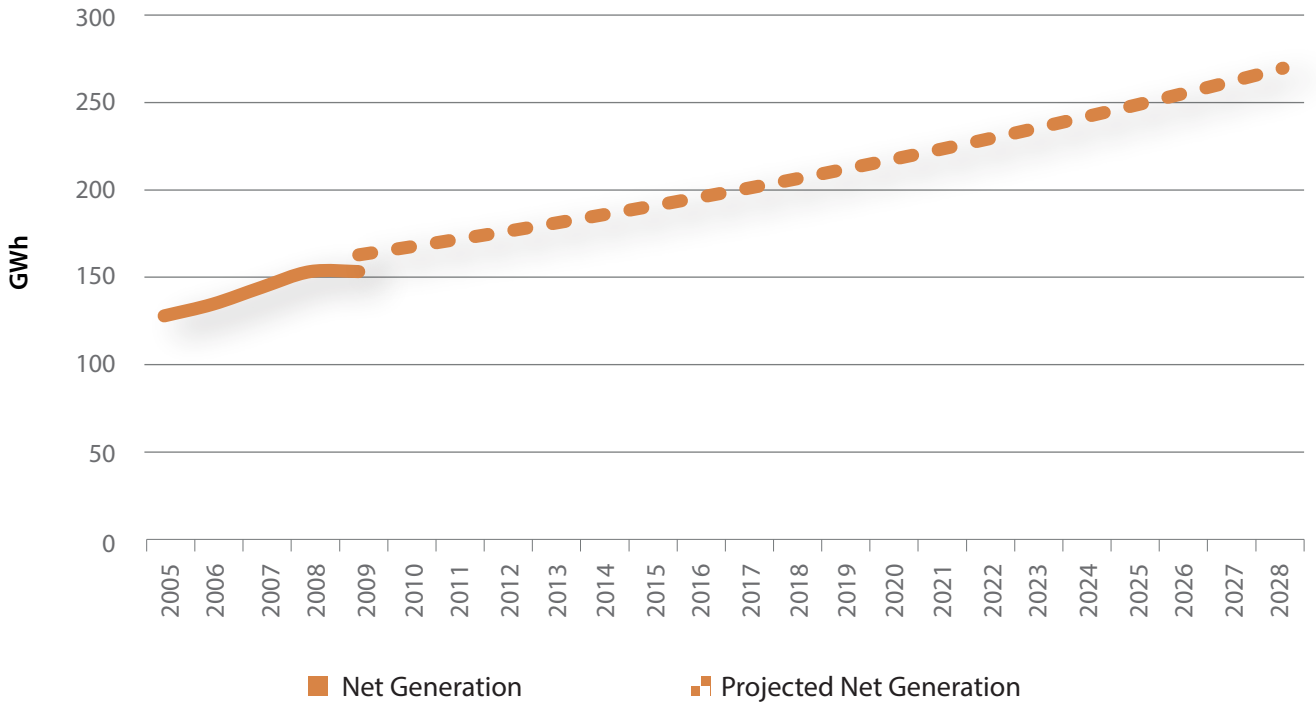
Based on forecasts from 2010, Saint Kitts' net generation was projected to increase at a rate of 2.9 percent per year between 2009 and 2028. As of 2013, net generation stood at 150 GWh, indicating that growth is slightly slower than originally forecasted.

Table 6 Nevis' Projected Capacity Needs and Peak Demand in MW

	2015	2017	2019	2021	2023	2025	2027
Projected generation	191	202.1	213.9	226.3	239.5	253.4	268.2

Source: World Bank (2010).

Figure 14 Saint Kitts' Projected Net Generation



Source: World Bank (2010).

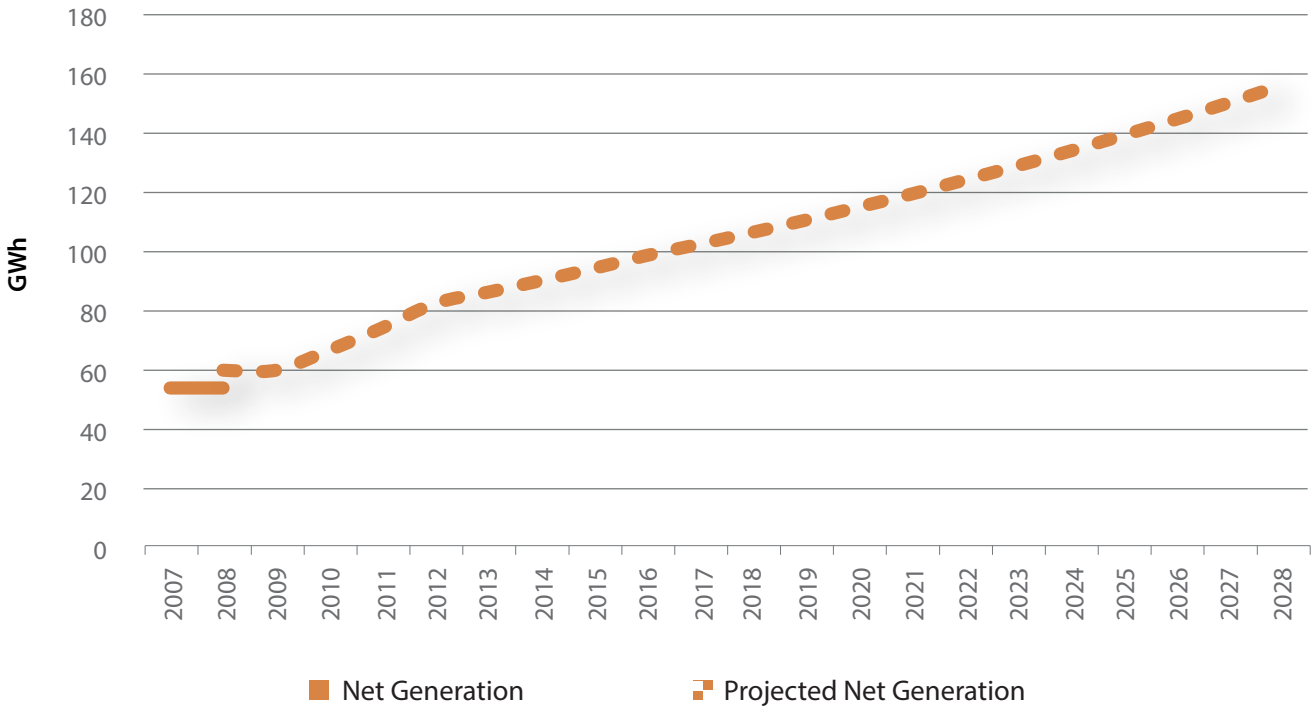
Based on forecasts from 2010, Nevis' net generation was projected to increase at a rate of 5.2 percent per year between 2009 and 2028. As of 2013, net generation stood at 56 GWh, indicating that growth is slightly slower than originally forecasted.

Table 7 Nevis' Projected Net Generation in GWh

	2015	2017	2019	2021	2023	2025	2027
Projected generation	94.3	102.5	110.6	119.4	128.9	139.2	150.2

Source: World Bank (2010).

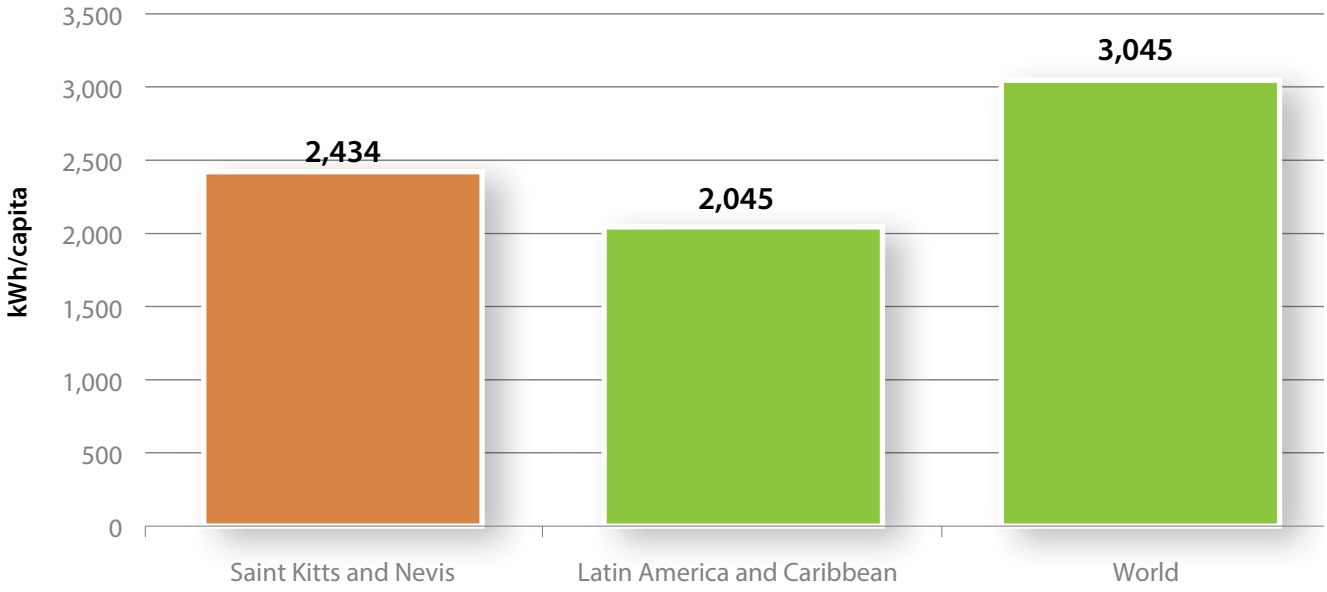
Figure 15 Nevis' Projected Net Generation



Source: World Bank (2010).

In 2012, per capita consumption in Saint Kitts and Nevis stood at 2,434 kWh, about 20 percent higher than the Latin American and Caribbean average of 2,045 kWh and the highest of all Eastern Caribbean countries.

Figure 16 Electricity Use per Capita, 2012



Source: EIA (2012); UN (2014); World Bank (2014)

Secondary Balance and Final Consumption

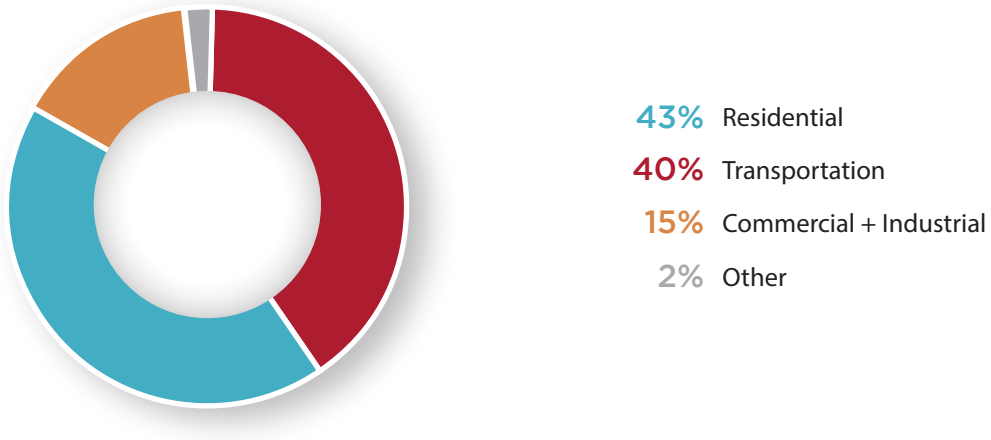
Secondary Energy Balance

Saint Kitts and Nevis imports all oil products.

Final Consumption by Sector

Final consumption by sector in 2013 totaled 1,205.5 boe/day. The residential sector consumed 522 boe/day representing 43 percent of all energy, followed by transportation sector with 476 boe/day accounting for 40 percent. The commercial and industrial sector combined consumed 184 boe/day representing 15 percent. Other consumption accounted for 2 percent.[1]

Figure 17 Energy Consumption by Sector, 2013



Source: EIA (2012); Government of Saint Kitts and Nevis (1994); IRENA (2012b).

The transportation sector accounts for 40 percent of energy consumed in Saint Kitts and Nevis. As in all Caribbean countries, the growing penetration of motor vehicles over the past two decades has led to increased energy consumption by the transportation sector. There has been a net increase in registered vehicles, but exact current figures are not available, as Saint Kitts and Nevis does not maintain accurate official databases tracking the number of vehicles on its roads. There are very few hybrid or electric vehicles on the island, and no true public transportation system exists.

1 Sectoral consumption of energy is based on the 1994 Saint Kitts and Nevis' First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC). These figures represent rough estimates and are based on calculations using 1994 CO_2 emissions data. As the report notes, "the partitioning of the total fuels used in the different subsectors is the main source of uncertainty." Hence, the abovementioned data should be used with these limitations in mind.

Institutional Organization of the Energy Sector

Current Institutional Structure

As Saint Kitts and Nevis are a federation, the energy sectors on the two islands operate independently, with different institutions and regulatory frameworks.

The parliament of Saint Kitts and Nevis has the prerogative to pass energy legislation on Saint Kitts. The Ministry of Housing, Public Works, Energy and Public Utilities has overall responsibility for the direction of the energy sector in the Federation of Saint Kitts and Nevis. It sets strategic direction and guides long-term planning. The Ministry of Sustainable Development is tasked with the development of sustainable development policies, a key part of which are energy issues. The Ministry of International Trade, Industry, Commerce and Consumer Affairs is responsible for the taxation and regulation of imported petroleum products. Under the Public Utilities Commission Act of 2011, a newly created public utilities commission (PUC) would be responsible for regulation and oversight of the electricity sector, including tariff setting, ensuring quality and reliability of service, and long-term planning of the sector. However, no funding or staff has been allocated to create the commission, and tariffs are set by the Governor General's office. As a result, SKELEC largely self-regulates (Castalia Consulting, 2012; Government of Saint Kitts and Nevis, 2014c; OAS, 2010; Samuel, 2013).

The Nevis Island Legislature is responsible for passing energy legislation, which is subsequently implemented by the NIA. The Nevis Ministry of Communications, Works, Public Utilities, Posts, Physical Planning, Natural Resources, and Environment is responsible for the overall guidance and the strategy of the electricity sector on Nevis. In theory, a PUC should provide oversight and set tariffs.

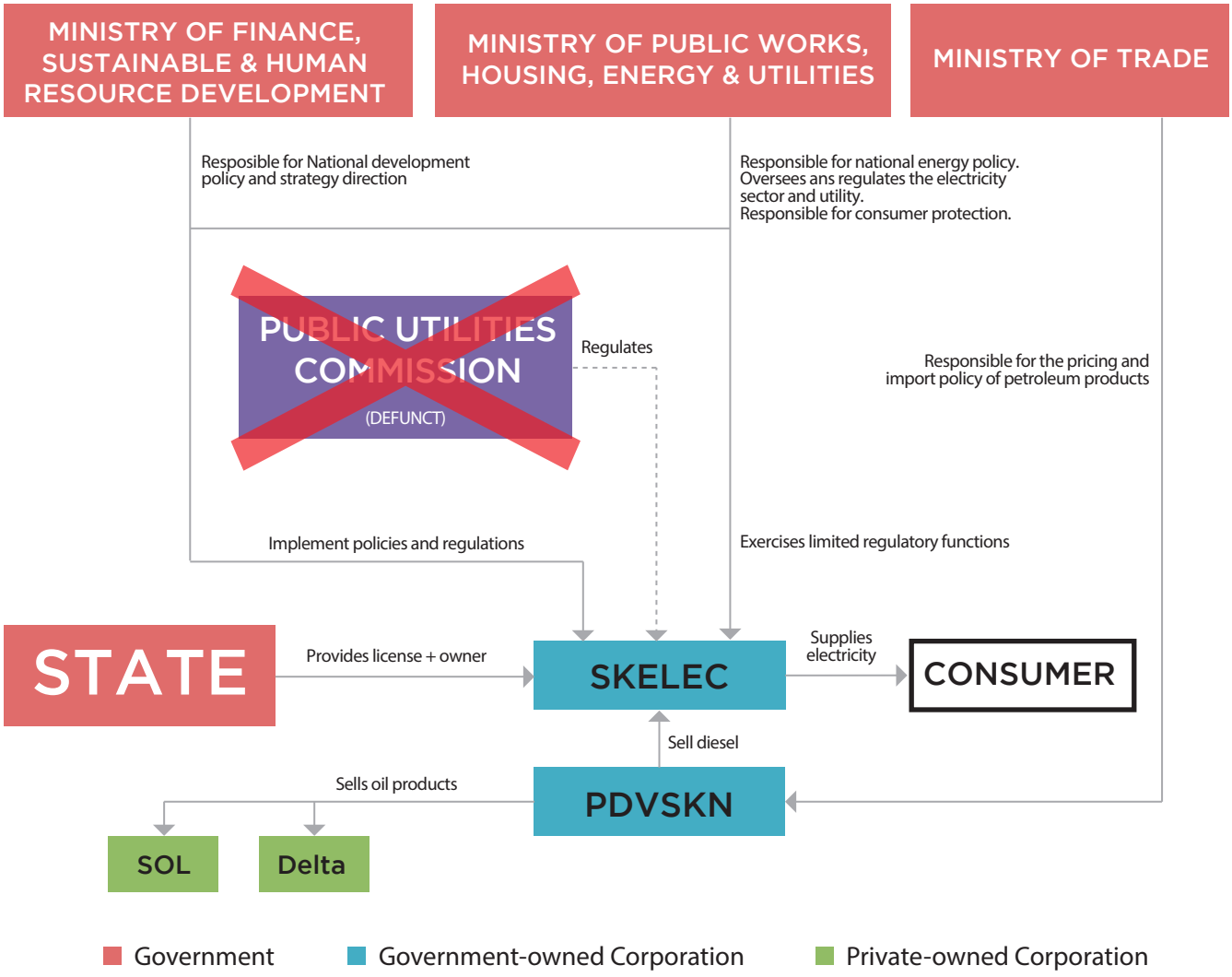
However, as this body does not exist, NEVLEC is largely self-regulated, with limited oversight by the Ministry of Communications, Works, Public Utilities, Posts, Physical Planning, Natural Resources, and Environment (Castalia Consulting, 2012; OAS, 2010; Samuel, 2013). Nevis also created a Geothermal Resources Advisory Committee, which leads the development of geothermal resources on Nevis, including negotiating the terms of geothermal development. The Minister of Natural Resources chairs the Committee, and the Premier of Nevis also participates (Castalia, 2015).

Table 8 Saint Kitts Institutions and Responsibilities of the Energy Sector

Entity	Type	Tasks and Responsibilities
Ministry of Sustainable Development	Government ministry	Responsible for development of policies and strategic direction to achieve long-term sustainable development
Ministry of International Trade, Industry, Commerce and Consumer Affairs	Government ministry	Responsible for the import and regulation of petroleum products.
Ministry of Housing, Public Works, Energy and Public Utilities	Government ministry	Responsible for direction of overall national energy policy, strategic direction and future development of the energy sector. Responsible for regulation and oversight of SKELEC. Tasked with consumer protection and ensuring quality of service.
PUC (defunct)	State-appointed regulator	Responsible for the regulation of the electricity sector. Exists in name only.
SKELEC	State-owned, vertically integrated utility	Responsible for the generation, transmission, distribution, and sale of electricity.

Source: Government of Saint Kitts and Nevis (2014b); IRENA (2012a); Samuel (2013).

Figure 18 Organization and Functioning of the Energy Sector on Saint Kitts, 2014



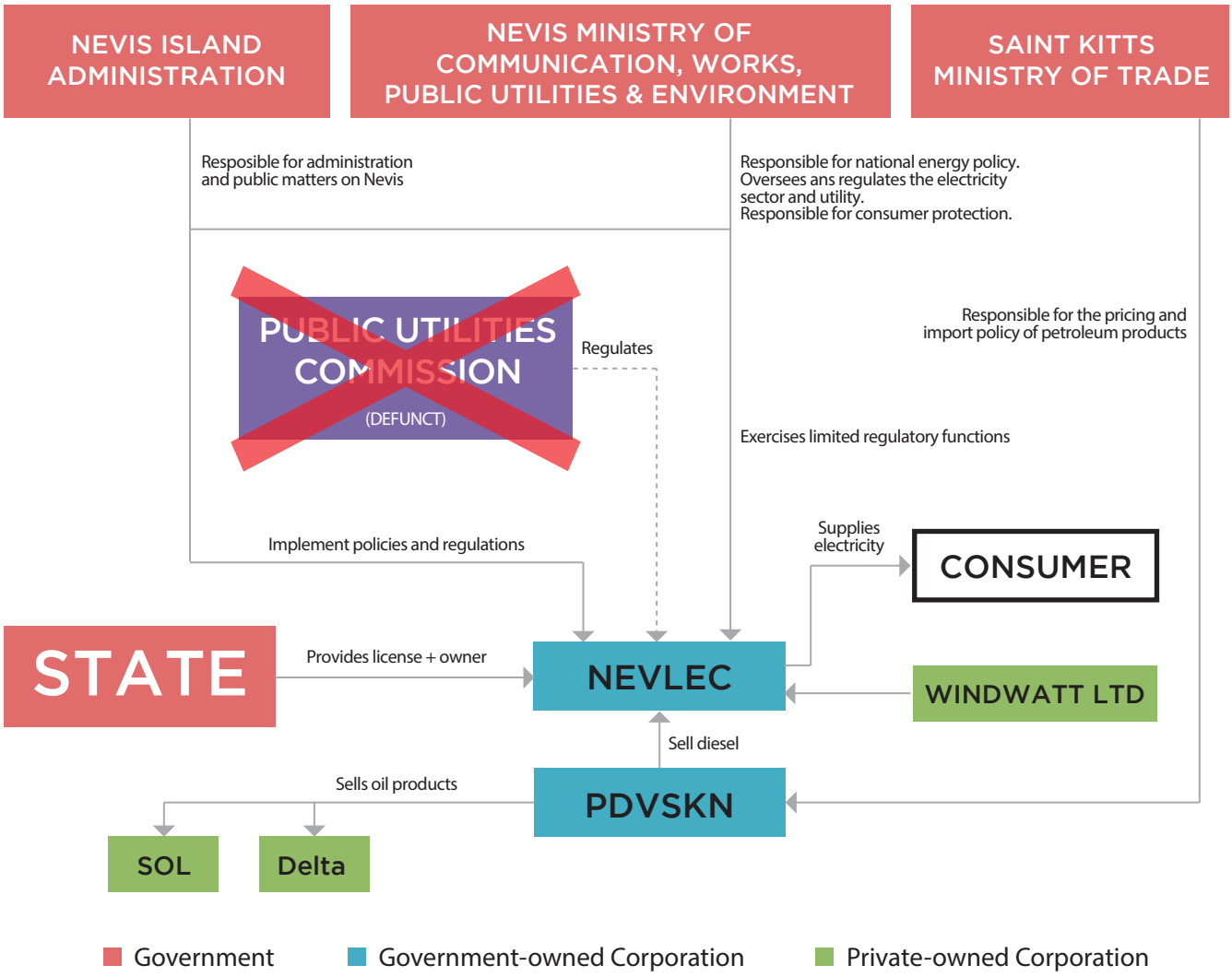
Source: Authors' elaboration based on information from Government of Saint Kitts and Nevis (2010; 2012; 2014b); IMF (2014); IRENA (2012a); Samuel (2013).

Table 9 Nevis Institutions and Responsibilities of the Energy Sector

Entity	Type	Tasks and Responsibilities
NIA	Nevis Island government body	Responsible for all administration and public matters on Nevis Island. Part of the Office of the Premier.
Nevis Ministry of Communications, Works, Public Utilities, Posts, Physical Planning, N atural Resources and Environment	Government ministry of the NIA	Responsible for oversight and regulation of energy sector, NEVLEC, and natural resources.
NEVLEC	Vertically integrated utility, established by statute and owned by the NIA	Responsible for the generation, transmission, distribu- tion, and sale of electricity. Self-regulates and sets electricity tariffs.

Source: Government of Saint Kitts and Nevis (2014b); IRENA (2012a); Samuel (2013).

Figure 19 Organization and Functioning of the Energy Sector on Nevis, 2014



Source: Author's own work based on information from Government of Saint Kitts and Nevis (2010; 2012; 2014b); IMF (2014); IRENA (2012a); Samuel (2013).

Table 10 Key Legislation and Structure of the Energy Sector

Key Legislation and documents	Regulator	Utility	Ownership structure
National Energy Policy, 2011 Electricity Supply Act, 2011 Draft National Energy Action Plan, 2010 Petroleum Ordinance, 1954 Public Utilities Commission Act	Ministry of Housing, Public Works, Energy and Public Utilities	SKELEC	100% government-owned
Electricity Supply Act, 1998 (Nevis) Electricity Ordinance, 1998 (Nevis) Nevis Geothermal Resources Development Ordinance, 2008	Nevis Ministry of Communications, Works, Public Utilities, Posts, Physical Planning, Natural Resources and Environment	NEVLEC	100% government-owned

Source: OAS (2010); Samuel (2013).

National Energy Policy

In 2009, the government began work on a draft National Energy Policy (NEP) and National Energy Action Plan (NEAP). The NEP was subsequently published by the Ministry of Public Works, Utilities, Energy and Housing of the Federal Government of Saint Kitts and Nevis in April 2011 and approved later that year (Government of Saint Kitts and Nevis, 2014a). As of July 2014, however, the draft NEAP, which lays out specific steps to implement the NEP, had not been approved (Samuel, 2013).

The NEP lays out a path to implement a comprehensive and lasting transition toward a more sustainable energy matrix to achieve a sustainable energy sector where reliable, renewable, clean and affordable energy services are provided to all citizens.

The policy's overarching goal is a cleaner, more reliable, and affordable energy supply. The government hopes to achieve this by following two key pillars: (i) increased diversification and (ii) the promotion of smarter, efficient, and innovative approaches. Under increased diversification, the policy specifies a greater reliance on indigenous renewable energy sources, considering alternative energy supply routes, a possible power interconnection between Saint Kitts and Nevis, and reducing the impact of energy on the environment, the economy, and society.

The promotion of smart, efficient, and innovative approaches relies on demand and supply management, reducing losses, improving energy generation and consumption patterns, and encouraging decentralized generation and interconnection options. The policy lists few specific technology prescriptions as market conditions and technological advances are hard to predict.

The government also outlines a number of goals for the energy sector management to ensure efficient and well-coordinated planning and to achieve sustainable supply, generation, distribution and use of energy. To this end the policy calls for: (i) transparent, inclusive, and informed decision making in the energy sector; (ii) efficient, cost-effective, and sustainable use of all energy resources; (iii) continuous improvement, expansion, updating, and dissemination of energy statistics; (iv) promotion of efficient and cost-effective energy supply and a fair, competitive, coherent, and clear regulatory regime; (v) an adequate institutional framework with clear legal authority to all entities critical to the energy sector; (vi) appropriate staffing and financing of energy units of entities within the government; (vii) increased knowledge sharing and energy awareness among stakeholders and the public related to conservation, efficiency, and renewable energy; (viii) ongoing review and updating of the NEAP to include new technological developments and to meet future demand; and (ix) promotion of research in and development of renewable energy resources and conservation measures.

Furthermore, the policy prescribes a set of policy goals for energy supply and the import sector, calling for: (i) a secure and reliable supply of imported fuels at the lowest possible cost while adhering to environmental regulations and agreed licensing rules; (ii) improved decoupling of economic growth from energy use through conservation and efficiency measures; (iii) adequate fuel storage facilities throughout the two islands; (iv) secure collection, transportation, and disposal of oil products to minimize environmental impacts; (v) improved cost benefits calculations for renewable energy technologies through interconnection between the two islands; (vi) increased use of centralized and decentralized energy technologies; (vii) development of local expertise in the energy sector; (viii) private participation in the energy sector through public-private partnerships; and (ix) stimulation of renewable energy technologies to allow it to become market competitive.

With regard to the electricity sector, the government calls for: (i) improvement of efficiency in generation,

transmission and distribution; (ii) stimulation of environmentally, economically, financially, and socially appropriate and viable renewable energy sources for electricity generation; (iii) fair access to transmission and distribution infrastructure for both utility and small-scale generation, allowing for strong and competitive participation of the private sector; and (iv) collection, monitoring, and reporting of greenhouse gas emissions by the electricity sector.

The policy also specifies a number of policies for the transportation sector, such as increased use of fuel-efficient motor vehicles and regular emissions inspections, and general energy use, such as improved efficiency and conservation practices, new building codes, and mandatory installation of solar thermal collectors for major water users.

National Energy Action Plan

The NEAP was originally published as part of the NEP, but it was not passed by Parliament and remained in draft form as of July 2014. It can be seen as complementary to the NEP. It proposes a series of actions for the period between 2010 and 2030 to implement the policies proposed by the NEP. It distinguishes between short-term (1–5 years), medium-term (5–10 years), and long-term (10–20 years) actions, but in fact the draft plan only contains short-term actions.

A key short-term goal is the creation of a high-level advisory National Energy Committee to provide advice on energy-related issues and serve as a discussion forum for government, non-governmental organizations, and private sector representatives. It is also supposed to act as a regulatory body for the entire energy sector and to assist the ministry responsible for the sector in the implementation and enforcement of all relevant policies and laws. Aside from proposing standards for service quality and pricing, it will assist the government in licensing decisions and the formulation of new laws. It will also serve as an arbitrator between the private sector, the public sector, and civil society.

The committee will consist of representatives from the ministries responsible for energy, public utilities, finance, transportation, and tourism and the Chamber of Commerce. The government originally aimed to establish the committee by mid–2010, but no action had been taken as of July 2014. The key proposed responsibilities and actions of the committee would be: (i) formulating the terms of conditions for the issuance of licenses for the generation, transmission, and distribution of electricity from both conventional and renewable sources as well as for self-generation; (ii) defining the terms for the issuance of licenses to independent power producers (IPPs) for generation of electricity from renewable sources; (iii) regulating the electricity sector, ensuring quality of service, and setting a tariff structure; (iv) determining the specifics for net metering and tariffs for delivery of electricity into the grid; and (v) acting as an arbitrator in case of disputes between utilities and end users.

A second short-term goal is the establishment of an energy unit or department within the Ministry of Public Works, Utilities, Energy, and Housing responsible for coordinating, supervising, and evaluating the implementation of the NEP. Among the responsibilities of the energy unit is guiding the corporatization process to convert the SKED into a corporation.

This action was successfully completed on July 31, 2011. The unit is also responsible for analyzing the current regulatory framework and suggesting improvements and for issuing licenses for all private and public electricity generation and imports of fossil fuels. Its actions also include a host of other task, including facilitating educational efforts, improving efficiencies and conservation, fostering private-public partnerships, and promoting international cooperation.

The NEAP also proposes to improve the capacity of the National Statistics Department to collect, compile, and make available relevant energy data. It furthermore suggests a long list of actions and responsibilities for the Department of Planning and Environment, the most important of which will be assessment of the renewable energy potential in the Federation in cooperation with the energy unit.

For the electricity sector, the NEAP suggests the following actions: (i) create a network of small distributed PV systems and solar water heating systems; (ii) reduce the generation, transmission, and distribution system losses; and (iii) cooperate regionally to explore alternative fuel options. It does not propose regulatory or legislative changes for the electricity sector and states that IPPs can only exist if they have a build, operate, and transfer contract with either SKELEC or NEVLEC (Government of Saint Kitts and Nevis, 2010).

The passage of the revised Electricity Supply Act (ESA) for Saint Kitts in 2011 may conflict with, or may have even rendered obsolete, the NEAP's proposed actions. For example, the responsibilities of the PUC—established, albeit in name only, by the ESA—appear to conflict with those of the National Energy Committee. The NEAP also proposes to institute an independent and permanent Energy Regulatory Board for controlling energy market specifics like energy

pricing for consumers. Under the ESA, these tasks are the prerogative of the PUC.

In general, despite providing more specifics than the NEP, the NEAP fails to lay out a clear path for implementation of policy prescriptions. It does not describe which institutions will be responsible for implementing specific actions, nor does it provide measurable goals and targets or set priorities or timelines, and its language remains vague in many places (OAS, 2010).

Regulator

There is no single or designated regulatory authority in charge of overseeing the energy sector. The Ministry of Housing, Public Works, Energy, and Public Utilities is responsible for overall control and guidance of the energy sector on Saint Kitts. On Nevis, the Ministry of Communications, Works, Public Utilities, Posts, Physical Planning, Natural Resources, and Environment of the NIA is responsible for the energy sector. Under the draft NEAP, a newly created high-level advisory National Energy Committee would act as the regulatory agency for the entire energy sector. It remains unclear if its control would be limited to Saint Kitts or if it would also encompass the island of Nevis.

Institutional Structure of the Electricity Subsector

The government also initiated cooperation with Speedtech Energy Company Limited, of the Republic of China, to construct a solar panel manufacturing plant at the C.A. Paul Southwell Industrial Complex. Speedtech constructed a five-acre 750kW solar farm at the Robert L. Bradshaw International Airport on behalf of Saint Christopher Air and Sea Ports Authority and SKELEC. The farm was opened in the Fall of 2013 and is the largest of its kind in the Eastern Caribbean (Government of Saint Kitts and Nevis, 2013; Jamaica Observer, 2013; National Broadcasting Corporation of Saint Kitts and Nevis, 2013). It produces around 3000kWh a day. In January 2015, SKELEC broke ground for the installation of an additional 1MW of solar capacity. The projected is financed in cooperation with the Republic of China, which contributes 55 percent of the funds, with the remaining 45 percent coming from SKELEC. In total, this installation will produce around 4000kWh per day of electricity and save SKELEC $8million in avoided fuel costs (Government of Saint Kitts and Nevis, 2015; South Florida Caribbean News, 2015). SKELEC also offers a process for rooftop solar panel installations and pre-qualification for funds under the Saint Kitts and Nevis Sugar Industry Diversification Foundation. Only consumers with monthly consumption between 350kWh and 800kWh qualify for funding. No further details on the program, grid interconnection, and potential net metering or billing schemes are available (SKELEC, 2015).

The electricity sector in Saint Kitts is guided by the ESA of 2011. The Parliament has the exclusive right to make laws relating to the generation, transmission, and distribution of electricity on Saint Kitts. Under the Act, the ministry with responsibility for the energy sector, currently the Ministry of Housing, Public Works, Energy and Public Utilities, is tasked with control of and planning for the electricity subsector. The minister grants license(s), exclusive or non-exclusive, for the generation, transmission, and distribution of electricity for a period of up to 25 years. Licenses can be restricted to generation from wind and solar energy sources only or can also include generation from hydrocarbon fuels. According to the ESA, the PUC, created by the Public Utilities Commission Act, is tasked with regulating the sector, including setting and adjusting tariffs; monitoring, planning and expansion of the sector; and ensuring quality of service. No such commission, however, has been established. As a result, the regulatory function falls to the Ministry of Housing, and in practice SKELEC is largely self-regulating.

The ESA of 1998 guides the electricity sector in Nevis. The Nevis Island Legislature has the exclusive right to make laws relating to the generation, transmission, and distribution of electricity on Nevis Island. The Nevis Ministry of Communications, Works, Public Utilities, Posts, Physical Planning, Natural Resources and Environment is responsible for the overall energy sector, natural resources, and the electricity subsector.

A PUC is responsible for the oversight and regulation of NEVLEC and the electricity sector. No such commission, however, exists, and regulation and oversight falls to the Ministry.

SKELEC is a vertically integrated utility and is the sole provider of grid-connected electricity on Saint Kitts. It is a wholly government-owned corporation. It operated as the SKED until August 2011, up to which point it did not have a corporate structure or financial or generation performance metrics, nor did it conduct metering operations of government buildings (Samuel, 2013). Following the conversion from SKED to SKELEC, the government contracted COMS, a Saint Maarten-based company, to manage the utility for a period of three years. It is unclear whether the contract was extended in 2014, if a new company began managing SKELEC, or if the utility decided to manage its own operations.

As SKELEC does not publish annual reports or tariff or generation information, it is not possible to know if electricity rates and fuel surcharges are sufficient to recover the cost of generation. There are no data on operating efficiency and system losses. As Nevis has provided subsidized electricity services, it is likely that the same practice exists on Saint Kitts. SKELEC declined to provide any documentation.

NEVLEC is a vertically integrated utility and is the sole provider of grid-connected electricity on Nevis. It is a wholly state-owned subsidiary, and has been operating as a corporate entity since 2000. The utility entered into a power purchase agreement with WindWatt Power Inc. in 2010, the first such agreement in Saint Kitts and Nevis. In the past, NEVLEC has been unable operate profitably; fuel surcharges are generally set too low to cover the cost of generation. As NEVLEC does not publish annual reports, its present financial situation is unclear and it is not known whether current electricity tariffs are sufficient to recover its cost of operation (Castalia Consulting, 2012; NEVLEC, 2014b; Samuel, 2013).

As NEVLEC is owned by the NIA, this has led to de facto government-subsidized electricity tariffs. NEVLEC's generation efficiency at its Prospect Power Station appears to have improved somewhat over the past two years, from 17.45 kWh per gallon in 2012 to 17.65 kWh in 2014 (Castalia Consulting, 2012; NEVLEC, 2014c).

The Saint Christopher (Saint Kitts) ESA of 2011 provides a legal framework for the supply of electricity on Saint Kitts as well as the corporatization of electricity services on the island. According to the Act, the minister responsible for energy is responsible for granting license(s) for the supply, generation, distribution, and transmission of electricity. Licenses can be exclusive and may be granted for a maximum of 25 years. No license is needed for generation of electricity from wind and solar for self-consumption.

The minister may revoke licenses if the licensee is found to be in violation of orders by the PUC or other rules and regulations. The government may then buy the utilities assets at the market rate. According to the Act, SKED was to cease its functions of generation, transmission, and distribution on July 31, 2011. SKED continued operation as SKELEC under new management while retaining most of the original staff.

The Act also provides details about the PUC, established by the Public Utilities (Commission) Act to regulate and oversee the supply of electricity in Saint Kitts. It will promote the interests of consumers, including sustainable and fair electricity, and ensure quality, reasonable prices, and continuity of service. It is also tasked with data collection and dissemination and furthering regional cooperation.

The general functions of the PUC are to review and advise the minister on legislation relating to the electricity sector and on issues related to generation, transmission, and distribution. The Commission will also review and set appropriate electricity tariffs and rates. Rates charged shall be in accordance with the tariffs described in the Public Utilities Act. Furthermore, the PUC sets, reviews, and enforces technical and safety standards and reviews the development and expansion plans of the utility and its fuel efficiency (Government of Saint Kitts and Nevis, 2012).

On July 8, 2008, the Nevis Island Assembly passed the 2008 Nevis Geothermal Resources Development Ordinance. The legislation was tabled by the Minister for Natural Resources, Carlisle Powell, and provides for the reconnaissance, exploration drilling, production, and use of geothermal resources and vesting of all geothermal resources in the Crown.

Previous versions of the bill, known as the Geothermal Resource Development Bill, introduced in 2004, made no provisions for the revenue derived from geothermal resources to be managed by the people of Nevis. Instead, the National Renewable Resources Policy Council, run by the Federal government, would have administered all revenue.

The Ordinance ensures that all revenue flows to the NIA through the Treasury in Charlestown. It also provides for the establishment of a Geothermal Resources Advisory Committee, chaired by the minister responsible for natural resources and comprising the ministers for finance, land, physical planning, and legal councils.

Furthermore, representatives from the Geothermal Resource Development Promotion Commission and the Geothermal Resource Compliance Commission and two public representatives, one each from the business and conservation communities, both appointed by the Premier, also serve as members of the Committee (Nevis Island News and Notes, 2008). The NIA issued a license for the exploration of geothermal resources and building of a plant to West Indies Power (WIP) in February 2007.

According to news reports and opposition politicians, the contract to the small Saint Kitts-based company was awarded without a public bidding process, and the details have not been made public. WIP managed to drill three slim-hole wells, Nevis 1–3, between June and October 2008, to a depth between 732 and1065m.

Nevis 2 did not have any flow, and of the two wells that did, Nevis 3 was the more impressive, registering 201 degrees centigrade at a pressure of 16 bars at a depth of 899m (Maynard-date and Farrell, 2011).

After ongoing delays and changes to the project, it appears that the government filed suit against the company in May 2012 and was awarded the right to terminate the contract with WIP. It remains unclear from the judgment whether the NIA received compensation or was awarded damages (Eastern Caribbean Supreme Court, 2013; Jackson, 2014).

Following this ruling, the NIA began searching for a new partner to develop its geothermal resources. It issued a request for proposals in September 2012, and in December 2013 selected Nevis Renewable Energy International (NREI) to continue the development of the resource. NREI is a U.S. consortium consisting of experienced engineering firms TetraTech and AltaRock Energy, which have developed geothermal resources in the United States, Canada, Chile, Peru, Saint Lucia, and Kenya (West Indies News, 2013).

The Public Utilities Commission Act is mentioned in the ESA of 2011. It remains unclear if a single PUC was to be created with responsibility for both Saint Kitts and Nevis, or if each island was to have its own PUC. No public copy of the Act could be found, and the government did not provide a copy on request.

The Electricity Ordinance of Nevis of 1998 allows for self-generation from wind and photovoltaic sources without a license from the minister. No public copy of the Ordinance could be found, and the NIA did not provide a copy on request (OAS, 2010). The Electricity Supply Act of Nevis was passed in 1998. No public copy of the Act could be found, and the NIA did not provide a copy on request. The 1954 Petroleum Ordinance regulates the importation, storage, and sale of petroleum products. No public copy of the Ordinance could be found, and the government did not provide a copy on request.

Table 11 Saint Kitts Electricity Tariff Regulation

Who sets tariffs	Who controls tariff changes	How the tariff is calculated	How changes in tariffs are calculated
PUC (PUC does not exist)	PUC (PUC does not exist)	According to the ESA, rates must be in accordance with the Public Utilities Commission Act	According to the ESA, rates must be in accordance with the Public Utilities Commission Act
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**
PUC (PUC does not exist)	Parliament	As set out in Public Utilities Commission Act	Unknown

Source: Government of Saint Kitts and Nevis (2012); World Bank (2011).

Table 12 Nevis Electricity Tariff Regulation

Who sets tariffs	Who controls tariff changes	How the tariff is calculated	How changes in tariffs are calculated
PUC (PUC does not exist)	PUC (PUC does not exist)	"Fair and reasonable rates"	NEVLEC applies to PUC for tariff change. (PUC does not exist)
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**
PUC can require information about tariff and levy fines if it finds overcharging (PUC does not exist)	Parliament	At any time; PUC determines the frequency (PUC does not exist)	Fair and reasonable

Source: World Bank (2011).

Table 13 Renewable Energy Support Policies, 2014

Feed-in tariff	Net metering	Renewable portfolio standard	IPPs permitted	Tax credits	Tax reduction/ exemption	Public loans/ grants
–	–	–	✔	–	✔	✔

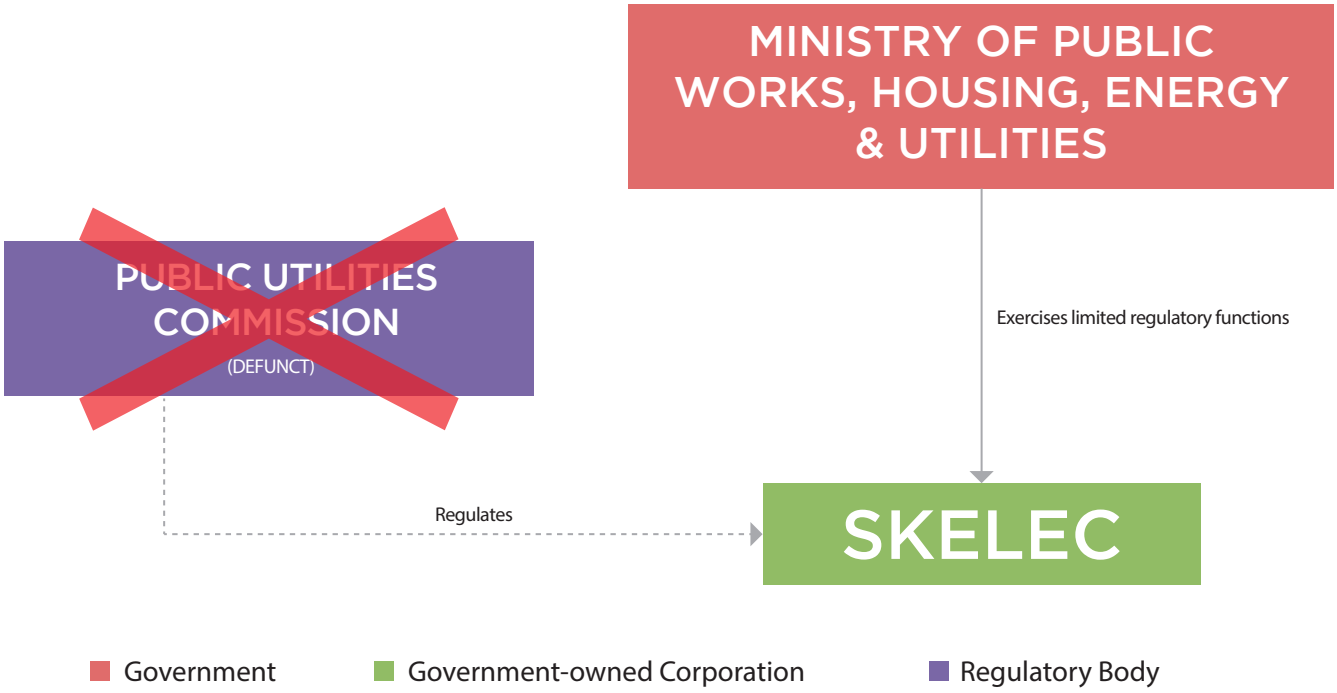
Source: : Auth et al. (2013); NREL (2015).
Note: IPPs permitted only with a license from the minister or through power purchase agreements directly from SKELEC or NEVLEC.

Regulator

In theory, the PUC is the regulator of the electricity sector. However, the PUC, which was to be established following the Public Utilities Commission Act, was never created and, in practice, the respective ministries responsible for the energy sector regulate SKELEC and NEVLEC. On Saint Kitts this falls to the Ministry of Housing, Public Works, Energy and Public Utilities.

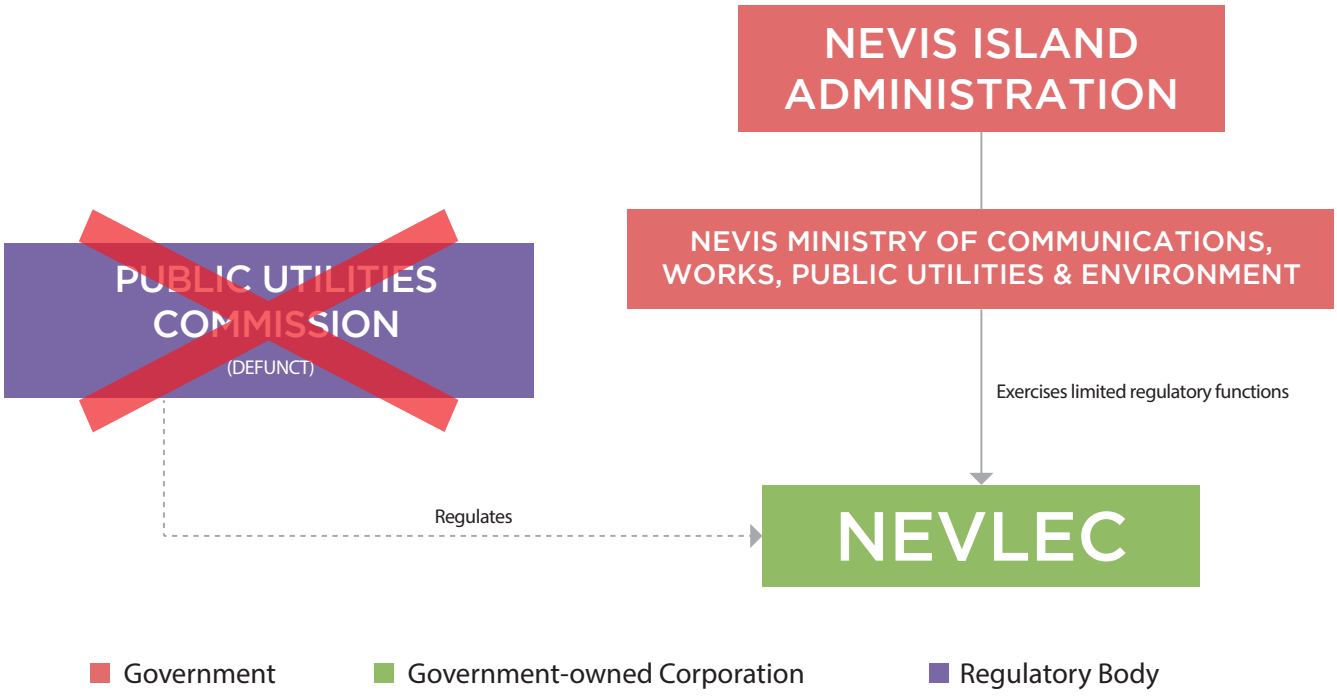
In Nevis, regulatory oversight falls within in the area of responsibility of Nevis Ministry of Communications, Works, Public Utilities, Posts, Physical Planning, Natural Resources, and Environment. It is unclear what level of oversight the ministries provide and, in practice, the two utilities may be largely self-regulating.

Figure 20 Saint Kitts Regulatory Framework of the Electricity Sector



Source: Author's own work based on information from Government of Saint Kitts and Nevis (2012); Samuel (2013); World Bank (2011).

Figure 21 Nevis Regulatory Framework of the Electricity Sector



Source: Authors' elaboration based on information from Samuel (2013); World Bank (2011).

Transmission and Distribution

SKELEC's power station is located at Needsmust and comprises 10 generators from where the electricity is transmitted along 12 3-phase, 3-wire, 11kV radial feeders, both above and below ground. The 11kV electricity is then stepped down to 3-phase, 4-wire, 400V and single phase, 2-wire, 230V. The system frequency is 60Hz (SKELEC, 2013b).

NEVLEC operates an 11kV feeder system, with electricity stepped down to 400V and 230V.

Saint Kitts and Nevis' technical and non-technical losses, such as unmetered consumption, are substantial. SKELEC's losses stand at 17 percent and NEVLEC records losses of 20.3 percent (NREL, 2015).

Electricity Rate

According to the ESA of 2011, electricity tariffs must be set in accordance with the rules set out in the Public Utilities Commission Act.

On Saint Kitts, electricity tariffs are in line with average rates in the Caribbean. No specific rate information is available from SKELEC, but according to the government, residents who consume 161 kWh per month spend about US$684 on electricity annually. SKELEC's tariff consists of a base rate and a fuel surcharge, adjusted according to the market price of fuel.

The government of Saint Kitts routinely provides subsidies on an ad hoc basis. For residential consumers that use less than 250kWh per month, the government fully subsidizes the fuel surcharge. About 65 percent of residential consumers benefit from this subsidy (Castalia, 2015).

In the past, Nevis had some of the lowest electricity rates in the Eastern Caribbean, as the government effectively subsidized the utility. Electricity tariffs appear to have increased somewhat over the past few

years and are now more in line with other countries in the region. As NEVLEC does not publish annual reports it is not possible to determine if the utility is generating a profit or continues to operate at a loss.

NEVLEC's electricity charge is composed of a demand charge, a standing charge, and a fuel surcharge, which NEVLEC began billing in 2005. While the fuel surcharge is fixed and not dependent on the level of consumption of the consumer, the demand charge and standing charge (for domestic consumers only) vary according to consumption.

Table 14 NEVLEC Electricity Rates, 2014 in EC$ per kWh

Charge	Domestic	Commercial
Demand charge	First 50kWh: $0.51/kWh Next 75 kWh: $0.49/kWh Above 125 kWh: $0.47/kWH	First 50kWh: $0.52/kWh Next 75 kWh: $0.50/kWh Next 125 kWh: $0.48/kWh all units above: $0.44/kWh
Standing charge (fixed rate)	If total consumption: <120 kWh: $7.20 120–250kWh: $12.00 >250kWh: $18.00	$13.20/kVA 1kVA = 250 kWh
Fuel surcharge (May 2015)	$0.18 per kWh	$0.24 per kWh
VAT	17 percent	17 percent

Source: NEVLEC (2014a; 2014d; 2014e).

Table 15 Matrix of the Electricity Sector

Generation	Transmission	Distribution
SKELEC (Saint Kitts)	SKELEC (Saint Kitts)	SKELEC (Saint Kitts)
NEVLEC (Nevis)	NEVLEC (Nevis)	NEVLEC (Nevis)
WindWatt (NEVIS)		

Institutional Structure of the Hydrocarbon Subsector

The Ministry of International Trade, Industry, Commerce, and Consumer Affairs is responsible for the taxation and regulation of imported petroleum products. As Saint Kitts and Nevis does not produce hydrocarbon resources and has no transformation capacity, all oil products are imported. Saint Kitts and Nevis joined the PetroCaribe Agreement in 2005 and set up PDV Saint Kitts and Nevis Ltd. (PDVSKN) in early 2006. PDVSKN is majority-owned (55 percent) by PDV Caribe, a subsidiary of PDVSA. The government of Saint Kitts and Nevis holds the remaining 45 percent. In 2014, PDVSKN imported an average of 500 boe/day under the preferential lending terms of the PetroCaribe Agreement. The country's quota is 1200 boe/day. In total, Saint Kitts and Nevis imported 10.7 million boe between 2005 and 2014 under the terms of the Agreement (PDVSA, 2014).

The commercialization of oil products falls primarily to Simpson Oil Limited (SOL) and Rubis Caribbean, which are the largest operators of gas stations on the two islands. There are also a number of independent operators.

SOL was created when Barbadian businessman Kyffin Simpson purchased Shell's Caribbean downstream business in 2005. In addition to operating under the Shell brand under license it unveiled its first SOL Service Stations in Saint Kitts in 2010. Its offices are based on Saint Kitts at the Fort Pine Depot where SOL constructed a 14,000 barrel diesel storage tank in 2011 (Ramsey, 2014).

It further expanded its Caribbean operation when it purchased Shell's aviation business in 2009 and ExxonMobil's

fuels marketing businesses in some Caribbean countries in 2014. In total Sol operates 480 gas stations, 14 aviation facilities, 24 marinas, and 32 import terminals throughout the Caribbean (SOL, 2014).

Rubis Caribbean began operation in the Eastern Caribbean on April 1, 2011, when it purchased assets owned and operated by Chevron under its Texaco brand. Apart from Saint Kitts and Nevis, Rubis operates in the downstream business in Antigua and Barbuda, The Bahamas, Barbados, Dominica, Grenada, Guyana, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago. It also operates in several dependencies such as Cayman Islands and Turks and Caicos Islands. In total, it owns and operates more than 200 service stations throughout the region (Rubis, 2014).

SKELEC's operation is in part supplied from an 8,000-barrel storage facility operated by PDVSKN.

Table 16 Matrix of the Hydrocarbon Sector

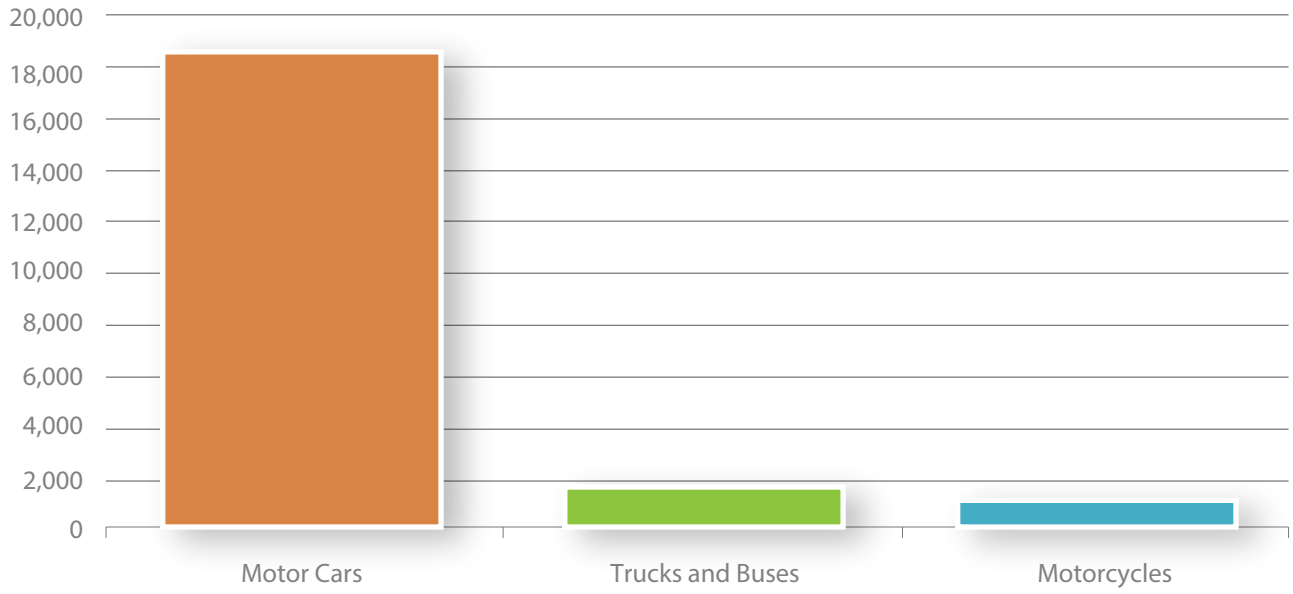
Production	Imports	Transformation	Commercialization
	PDV Saint Kitts and Nevis		National Petroleum Company/ PDV Caribe Dominica Limited
	SOL Petroleum		SOL Petroleum
	Rubis Caribbean		Rubis Caribbean

Transportation

In 1994, Saint Kitts had approximately 99.1 kilometers of paved roads as well as 40.1 kilometers of unpaved roads. A ring road around the entire island serves as main transportation corridor, from which a number of secondary roads feed into local communities and residential areas. In the same year, Nevis' road network consisted of 93 kilometers of paved road as well as 45 kilometers of unpaved roads. Like the neighboring island, a ring road provides primary transportation infrastructure with secondary roads linking to communities (Government of St. Kitts and Nevis, 1994).

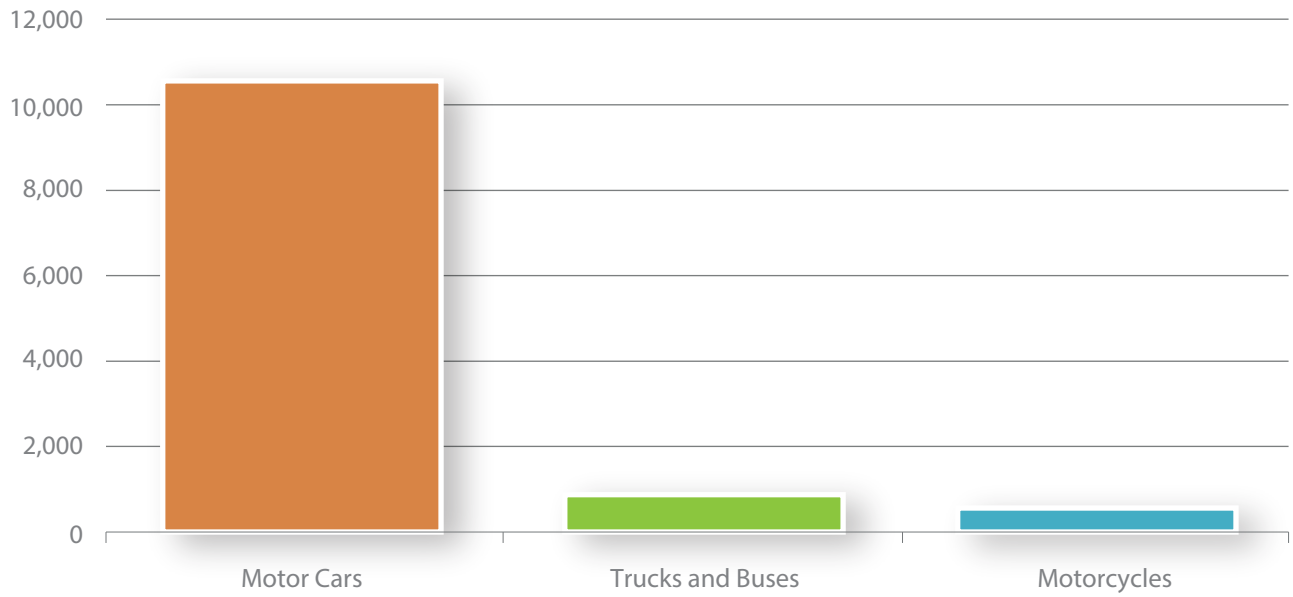
In 2010, there were 18,588 motor vehicles, 1,659 busses and trucks, as well as 1,049 motorcycles on the islands of Saint Kitts and Nevis. The majority of vehicles are based on Saint Kitts, as data from the year 2005 indicates. At that point, there were 10,780 motor vehicles, 904 busses and trucks, and 518 motorcycles on Saint Kitts (OAS, 2007; WHO, 2010).

Figure 22 Saint Kitts and Nevis Motor Vehicle Stock, 2010



Source: WHO (2010).

Figure 23 Saint Kitts Island Vehicle Stock, 2005



Source: OAS (2007).

Historical Development of the St. Kitts and Nevis Energy Sector

Saint Kitts' first state-operated power station was inaugurated in 1928. Located on Central Street, it provides a total generation capacity of 200kW coming from two 100kW 400V DC Allen generators and distributed in small parts of Basseterre.

Operations at Needsmust Power Station began in 1952 and housed three eight-cylinder Mirrless Nationals with a capacity of 270kW each. In 1956, the island suffered a three-month power outage. Between 1950 and 1980, the capacity of the Needsmust Station increased significantly. In 1958, two 800kW generators were added, followed by two 3.5 MW generators in 1971. In 1987, another 3.5MW of capacity was added, followed by two 4.4 MW Caterpillar generators in 1989 and 1995, which replaced the Mirrless Nationals.

In 1999, two new Mirrless Alstom generators with a capacity of 6.1 and 7.9 MW were added, followed by additional expansion in 2007 and 2009 with two 3.9 MW Man Holeby generators. A fire in October of 2008 destroyed the 7.9 MW Mirrless Alstom generator, and it was replaced with a 3.9 MW Man Holeby generator in 2009. The Needsmust Station was expanded in 2010, adding included two new Man Holeby generators followed by two more of the same type in 2011 (SKELEC, 2013a). On Nevis Island, utility-scale electricity arrived in 1954 when two generators began providing electricity in Charlestown. Island-wide electricity, however, did not become available until 1971 (Hubbard, 2002).

Methodology for Energy Matrix

The matrix was constructed with data from the Energy Information Administration (EIA), the National Renewable Energy Lab (NREL), NEVLEC, SKELEC, IRENA, and the Government of St. Kitts and Nevis.

	CR&W	Oil imports	Electricity input oil products	Electricity consumption	Final consumption by sector
2013	189 boe/day	1700 boe/day	1005.5 boe/day	322 boe/day	
Source	Based on IRENA 2009 figure assuming continuous decrease continuing the trend between 2000 and 2009.	Based on EIA data.	Based NREL generation data and on NEVLEC and SKELEC heat rate.	Based on NREL net generation figure minus average	Estimates based on CO2 emissions by sector from 2001 UNFCCC First National Communication on Climate Change.

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