EAS

ENERGY AUTHORITY SURINAME

ELECTRICITY SECTOR PLAN

Volume I – Strategic Plan

May 2025

CASTALIA

GRID ADVISORS

Electricity Sector Plan

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Abbreviations and acronyms

CARILEC	Caribbean Electric Utility Services Corporation
CROSQ	CARICOM Regional Organization for Standards and Quality
EAS	Energy Authority of Suriname
EBS	Energie Bedrijven Suriname
EIA	Energy Information Administration
ENIC	Energie Voorziening Nickerie
EPAR	Energie Voorziening Paramaribo
ESP	Electricity Sector Plan
GDP	Gross Domestic Product
GHG	Greenhouse gas
GWh	Gigawatt-hour
HFO	Heavy Fuel Oil
HH	Henry Hub
Hm3	Cubic hectometers
IEA	International Energy Agency
IMF	International Monetary Fund
ISO	International Organization for Standardization
km	Kilometer
km2	Square kilometers
kV	Kilovolt
kW	Kilowatt
kWh	kilowatt-hour
LNG	Liquefied Natural Gas
LPG	Liquified Petroleum Gas
LV	Low voltage
m3	Cubic meters
MMBtu	Million British thermal units
MNH	Ministry of Natural Resources
MV	Megavolt
MVA	Megavolt-ampere

MW	Megawatt
NDC	Nationally Determined Contributions
PPA	Power Purchase Agreement
PV	Photovoltaic
RGM	Rosebel Gold Mine
RICE	Reciprocating Internal Combustion Engines
SPCS	Staatsolie Power Company Suriname
SRD	Surinamese dollar
SSB	Surinaams Standaarden Bureau
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States Dollar
V	Volt
VAT	Value-Added Tax
WTI	West Texas Intermediate

1 Introduction

As a statutory requirement,[1] the Electricity Sector Plan (ESP) is a critical element of the reform of Suriname's electricity sector's governance framework, complementing the establishment of the Energy Authority of Suriname (EAS), the implementation of cost-reflective yet affordable tariffs, and the strategic reorganization of the sector. The ESP covers a 20-year long-term strategic view with a 5-year action plan.

The ESP includes:

- **Volume I – Strategic Plan**, which covers an outlook of Suriname's energy sector domestically and within the international context, and targets regarding renewable energy, energy efficiency, and energy access.
- **Volume II – Technical Plan**, which covers the electricity demand forecast, the expansion plan for generation, transmission, and distribution, an energy efficiency plan, an investment plan for rural electrification, and a tariff/subsidy evolution path.
- **Volume III – Regulatory Plan**, which covers tariff and feed-in tariff methodology, single-buyer procedures, regulatory accounting rules, performance standards, interconnection rules, subsidy policies, and rural electrification initiatives.

This document is Volume I of the ESP, outlining its Strategic Plan. It is structured as follows:

- Recent developments in Suriname's oil and gas industry are expected to lead to economic growth in the next 5 years and beyond. Section 2 assesses the current and projected macroeconomic situation, taking into account the measures the Government is implementing in accordance with its arrangement with the International Monetary Fund (IMF), and the implications these measures have on the electricity sector;
- Offshore oil and gas discoveries warrant strategic considerations for the planning, coordination, and legal and regulatory framework of Suriname's electricity sector. The ESP takes into account these considerations. Section 3.1 describes the current institutional, legal, and regulatory arrangements in the electricity sector. Changes in the electricity sector will also impact the energy balance and physical characteristics of Suriname's systems, which are described in Section 3.2;
- Oil and gas discoveries will transform not only the economy but the energy sector as well. Natural gas is expected to replace crude oil as the main thermal fuel source as natural gas becomes a cheaper alternative. Section 4 presents projected international fuel prices of natural gas and crude oil that will inform the optimal generation mix in the ESP.
- As part of its Nationally Determined Contribution (NDC), Suriname aims to maintain over 35 percent of electricity generation from renewable sources by 2030. Suriname is also

[1] Electricity Act, 2016. Articles 8 to 9.

targeting implementing energy efficiency measures and increasing electricity access. Section 5 describes Suriname's energy sector targets.

2 Macroeconomic outlook

The Government's efforts to stabilize the economy following the pandemic are yielding positive results. Growth reached 3 percent in 2024, inflation is steadily declining, investor confidence is growing, and international reserves are increasing.[2] Developments in the energy sector are expected to create economic growth, which will have implications on the electricity sector as demand is expected to increase. This section provides an overview of the current and projected macroeconomic situation in Suriname and how it relates to the electricity sector (Section 2.1). Section 2.2 describes how ongoing measures to reduce electricity and fuel subsidies will impact the sector and economy.

2.1 Economic overview

Suriname's economic outlook is positive. The IMF projects real GDP to grow by 3.0 percent annually through at least 2029.[3] Ongoing oil exploration is expected to attract more foreign investment. The growth of the local oil and gas industry, along with the sectors that service it directly and indirectly (such as exploration, drilling, testing, and clean-up for oil and gas wells) will also contribute to economic growth.

Although now showing signs of recovery, Suriname experienced an economic recession triggered by COVID-19. Between 2019 and 2020, real GDP decreased 16 percent. Even though it has yet to recover to pre-pandemic levels, the economy achieved growth in 2022, with a 2.4 percent increase in real GDP, surpassing the expected growth of 1.0 percent.[4] Suriname experienced similar growth in 2023, reaching 2.5 percent.

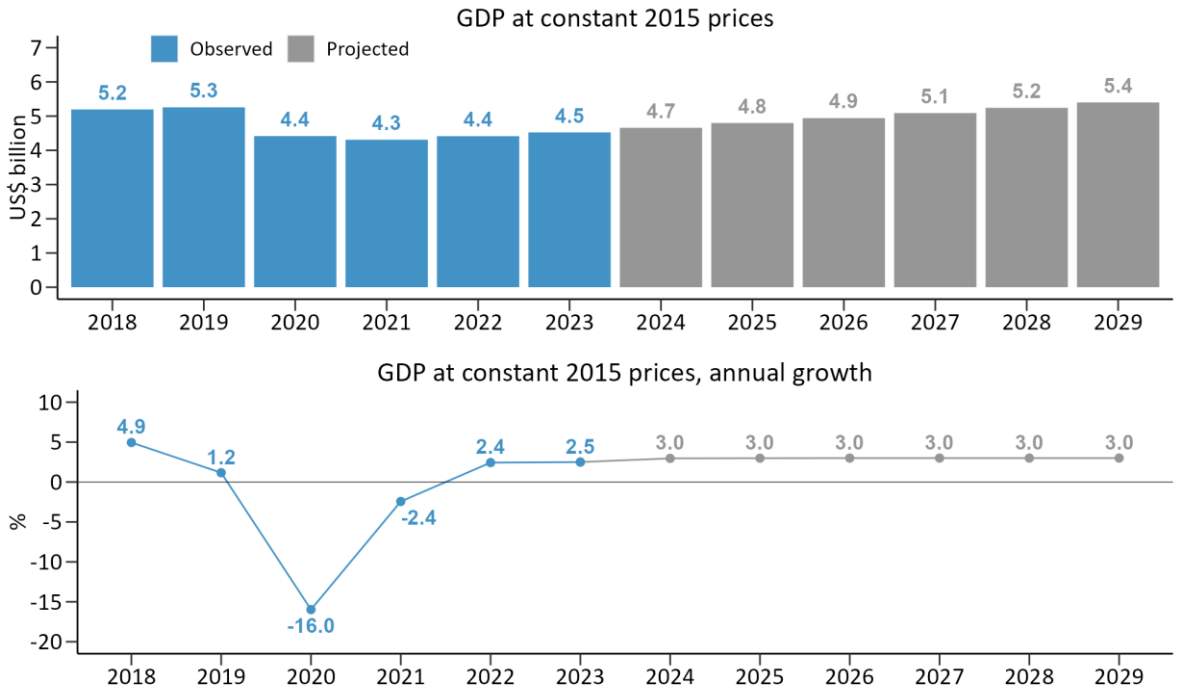
Figure 2.1 shows GDP from 2018 to 2023 and projections through 2029.

[2] IMF, 2024. "Suriname and the IMF Reach Staff-Level Agreement on the Fifth Review of the Extended Arrangement Under the Extended Fund Facility." https://www.imf.org/en/News/Articles/2024/03/07/pr2474-suriname-imf-reach-sla-5th-rev-extended-arrangement-eff#:~:text=Growth%20is%20projected%20to%20return,15%20percent%20by%20end%2D2024

[3] IMF, 2023. "Suriname: Third Review Under the Extended Arrangement Under the Extended Fund Facility." p 2. https://www.imf.org/en/Publications/CR/Issues/2023/10/16/Suriname-Third-Review-Under-the-Extended-Arrangement-Under-the-Extended-Fund-Facility-Press-540618

[4] IMF, 2024. "4th Review: Suriname." p. 4.

Figure 2.1: Observed and projected GDP and annual growth



Note: Projected GDP was estimated by applying the IMF's growth forecast to the latest observed data from the World Bank.
Sources: Observed data: World Bank;[5] Projected data: IMF.[6]

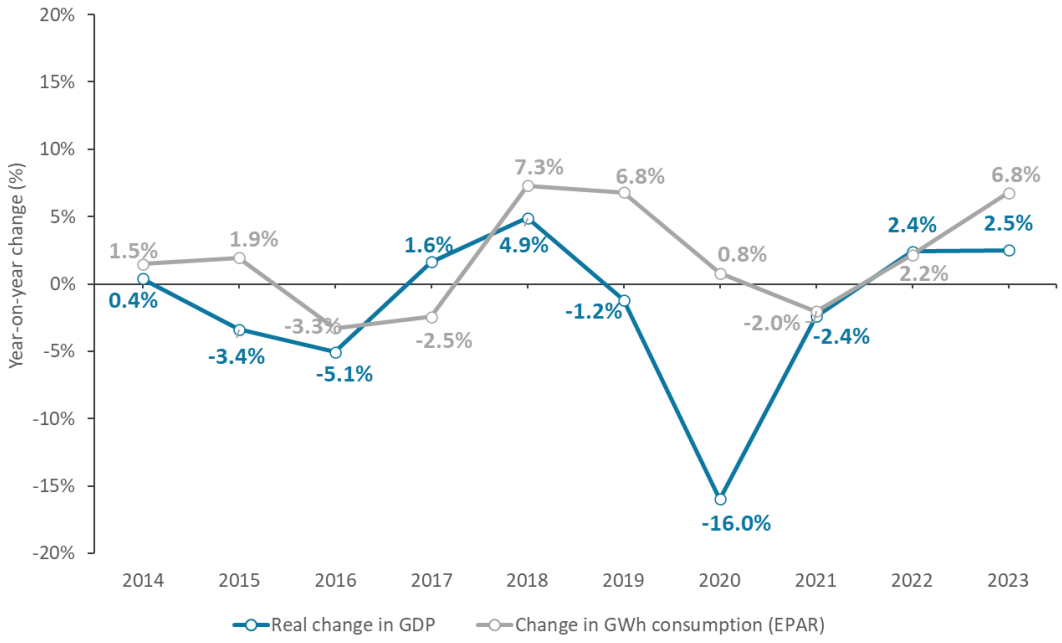
Historically, there has been a strong correlation between GDP and electricity demand in Suriname, with economic performance driving electricity consumption. The correlation coefficient of the year-on-year change in electricity consumption and change in real GDP for the year prior equals 0.7.[7] Figure 2.2 shows the year-on-year change in Energie Voorziening Paramaribo (EPAR) electricity consumption and real GDP over the past 10 years.

[5] World Bank, "GDP growth (annual %)." https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=SR

[6] IMF, 2024. "World Economic Outlook." https://www.imf.org/en/Publications/WEO/weo-database/2023/October/select-country-group

[7] The correlation coefficient is calculated using the year-on-year change of real GDP and electricity consumption in the EPAR system.

Figure 2.2: Comparison of year-on-year change in real GDP and electricity demand, 2014-2023



Note: Consumption data above only reflects the EPAR system.
Sources: GDP: World Bank;[8] EPAR consumption: EBS[9]

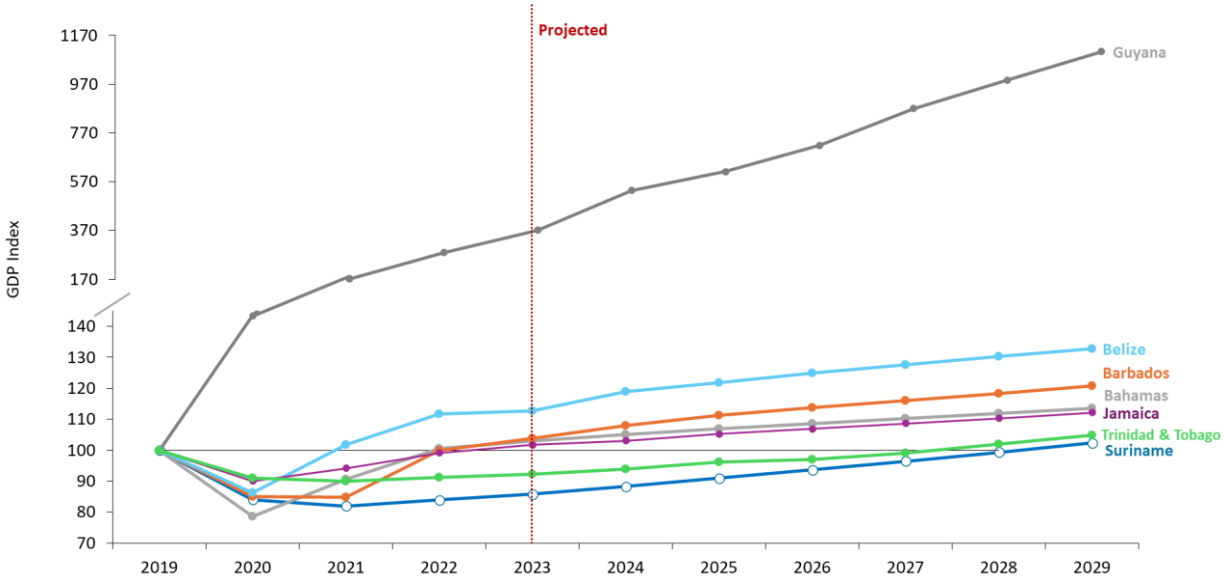
Suriname's projected economic growth rate over the next 6 years is expected to slightly outpace that of other Caribbean countries. As shown in Figure 2.3, neighboring Caribbean countries (excluding Guyana) expect an average annual growth in real GDP of 2.3 percent between 2019 and 2029, compared to 3.0 percent in Suriname.[10]

[8] World Bank, "GDP growth (annual %)." https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=SR

[9] EBS, 2024. Excel file "ESP_CASTALIA_EAS-1.5 EPAR." Shared by EBS with the Castalia-Grid Advisors Team in May 2024.

[10] IMF, 2024. "World Economic Outlook." https://www.imf.org/en/Publications/WEO/weo-database/2023/October/select-country-group

Figure 2.3: Real GDP index in selected Caribbean countries (base 2019 = 100)



Notes:

- *Please note the break in the y-axis.*
- *A GDP index with a base year of 2019 = 100 means that the economic output in 2019 is used as the reference point, and the index value for subsequent years indicates the relative change in GDP compared to 2019.*

Source: IMF[11]

Guyana is the clear outlier in the figure above, with the expected real GDP growth to be close to 30 percent annually, driven by developments in the oil and gas sector. Prospects for Suriname's oil industry are often compared to Guyana's, as the two countries share the same hydrocarbon basin.[12] Box 2.1 provides an example of what could happen in Suriname in the future as it summarizes how Guyana's oil boom has impacted its economy and the planned investment in the electricity sector,

Box 2.1: Guyana's oil boom and impact on planned electricity sector investment

The oil and gas industry is expected to transform Suriname's economy and has significant potential to drive economic growth. Since economic growth has historically been accompanied by increased energy demand, Suriname must prepare its energy sector for this anticipated growth. Suriname can learn from Guyana's recent oil boom and its plans for investing in its electricity system.

[11] IMF, 2024. "World Economic Outlook." https://www.imf.org/en/Publications/WEO/weo-database/2023/October/select-country-group

[12] IMF, 2023. "Guyana: 2023 Article IV Consultation-Press Release; and Staff Report." p 2. https://www.imf.org/en/Publications/CR/Issues/2023/12/01/Guyana-2023-Article-IV-Consultation-Press-Release-and-Staff-Report-541920

Guyana is quickly becoming a global leader in oil production as it expects to rank as one of the world's top five oil producers by 2035.[13] Guyana has transitioned from no oil production in 2018 to 645,000 barrels per day as of early 2024.[14] Production is expected to reach nearly 1 million barrels per day by 2028.[15]

Since the start of oil extraction in 2019, Guyana's economy has boomed, tripling in size in 4 years. Notably, in 2022, Guyana experienced the highest economic growth in the world, with a 62 percent growth in GDP in a single year.

Guyana's Government expects the emerging oil and gas industry to continue to drive economic growth. Real GDP is expected to grow by an average 30 percent annually through 2028.[16] As a result, the Government anticipates electricity consumption to increase an average of 27 percent annually between 2022 and 2026, compared to the average annual increase of 8 percent between 2014 and 2021.[17]

Guyana is preparing its energy sector for the anticipated growth in demand and new oil discoveries. Guyana plans to invest about US$3.2 billion[18] between 2022 and 2026 to increase its installed capacity by more than 500MW, more than double its current installed capacity. New generation projects include the Amaila Falls Hydropower (165MW) and a second phase for the development of a natural gas-fired plant (200MW).[19] To support the new generation capacity, Guyana will also invest in the necessary transmission, substations, and distribution infrastructure.[20]

Source: Guyana Power & Light INC[21]

2.2 Arrangement with the IMF

Over the last 10 years, Suriname's economy has experienced high inflation (averaging 27 percent), increasing debt, and currency devaluation. Further, the Government has subsidized electricity and fuel prices, exacerbating the fiscal strain on Government. Electricity subsidies represented an average of 2.6 percent of GDP between 2015 and 2023.[22]

Under its arrangement with the IMF, the Government has committed to the following:

- Increasing the average electricity tariff to achieve full cost recovery;
- Reducing untargeted and poorly targeted transfers and subsidies; and

[13] Rystad Energy. 2022. "Guyana Upstream: Industry and Country Benchmarking Update." p 11. Link

[14] EIA, 2024. "Guyana becomes a key contributor to global crude oil supply growth.."" Link

[15] IMF. 2023. "Guyana: 2023 Article IV Consultation-Press Release; and Staff Report." p 5. Link

[16] IMF. 2023. "Guyana: 2023 Article IV Consultation-Press Release; and Staff Report." p 12. Link

[17] Guyana Power & Light INC. "Development and Expansion Programme 2022-2026." p 61. Link

[18] This figure includes development and expansion projects such as new generation, transmission, and distribution projects, as well as upgrades to current power plants, among other initiatives.
Guyana Power & Light INC. "Development and Expansion Programme 2022-2026." p 33. Link

[19] Guyana Power & Light INC. "Development and Expansion Programme 2022-2026." p 135-136. Link

[20] Guyana Power & Light INC. "Development and Expansion Programme 2022-2026." p 136-140. Link

[21] Guyana Power & Light INC. "Development and Expansion Programme 2022-2026." p 61. Link

[22] World Bank. GDP (Current LCU). Link

- Replacing the sales tax with a new value-added tax (VAT).[23]

The Government is implementing the following:

- **Fuel taxes:** In March 2023, the Government discontinued fuel subsidies. An automatic pricing mechanism now determines fuel prices based on international prices. In May 2023, the Government reinstated fuel taxes at SRD3.50 per liter.[24]
- **Eliminating electricity subsidies:** Average electricity tariffs have increased more than 80 percent since the start of 2023[25] and tariffs for commercial users reached cost recovery in June 2024. Low- and middle-income households (identified based on electricity consumption) are receiving discounts on their energy bills, which will be phased out once a more effective cash transfer program is in place.[26]
- **Phasing out liquified petroleum gas (LPG) subsidies:** In September 2023, the Government reduced the LPG subsidy, which increased LPG prices by about 425 percent. Prices are set to grow further by a fixed amount each quarter beginning in December 2023, yielding full-year savings of 0.2 percent of GDP in 2024.[27]
- **Cash transfers:** The Government has increased cash transfers to protect low-income households from the impacts of the fiscal adjustment. In July 2023, the Government increased the value of cash transfers by around 45 percent and expanded coverage of the social beneficiary program to include recipients of the general old age pension.[28]

3 National energy outlook

Suriname's electricity sector is expected to undergo significant changes, notably due to the discovery of and plans to extract oil and gas. Relevant stakeholders, including the Government, the utility, the regulator, and investors, will need to decide how to adapt to new technologies, resources, and market dynamics. Depending on the path the Government and other stakeholders choose to take as the sector evolves, new institutional, regulatory, and legal arrangements may be needed. Section 3.1 describes the current arrangements.

Multiple independent systems make up Suriname's electricity sector. The two centralized systems, Energie Voorziening Paramaribo (EPAR) and Energie Voorziening Nickerie (ENIC), are described in

[23] International Monetary Fund, 2021. "Request for an extended arrangement under the extended facility." Link

[24] International Monetary Fund, 2024. "Suriname: Fourth Review Under the Extended Arrangement Under the Extended Fund Facility." p 9-10.Link

[25] As of April 2024.

[26] International Monetary Fund. 2025. "Suriname: 2024 Article IV Consultation and the Eighth Review Under the Extended Arrangement Under the Extended Fund Facility." p 11. Link

[27] International Monetary Fund, 2024. "Suriname: Fourth Review Under the Extended Arrangement Under the Extended Fund Facility." p 9-10. Link

[28] International Monetary Fund, 2024. "Suriname: Fourth Review Under the Extended Arrangement Under the Extended Fund Facility." p 9-10. https://www.imf.org/en/Publications/CR/Issues/2024/01/08/Suriname-Fourth-Review-Under-the-Extended-Arrangement-Under-the-Extended-Fund-Facility-543586

Sections 3.2.1 and 3.2.2, respectively. Section 3.2.3 describes the smaller, more isolated systems. The ongoing transformation of the sector will impact the energy balance of these systems differently. For these systems, the ESP will need to consider the following:

- **Generation capacity**: Growth of the local oil and gas sector, along with the sectors that service it directly and indirectly (such as exploration, drilling, testing, and clean-up operations for oil and gas wells), may increase electricity demand. This could put pressure on the current installed generation fleet.
- **Resource allocation**: The development of new oil fields, combined with more renewable energy, will diversify the energy mix. The energy balance will show a more varied and resilient energy portfolio capable of meeting demand and mitigating supply risks.
- **Possible network constraints**: Growth in demand, the generation mix, and demographics across service areas can all introduce different network constraints. Integrating more intermittent generation sources, such as solar and wind, can cause issues with grid stability. Increased production capacity can overload the system, especially from decentralized renewable sources. Upgrading or expanding these networks will be essential to manage larger loads. Further, expanding the grid to more remote areas or interconnecting currently independent networks may introduce network constraints.
- **System stability and flexibility**: Natural gas may also be used as a transition fuel while variable renewable generation grows, as plants running on gas can quickly ramp up generation to meet demand, preserving system stability.
- **Sustainability**: The Government is committed to generating over 35 percent of electricity from renewable sources by 2030 through its Nationally Determined Contributions (NDC).[29] The Government will need to consider developments in renewable energy technologies, both at the utility-scale and distributed levels. Further, droughts and other hydrological conditions may limit the production capacity of the Afobaka hydropower plant in the near future, which may push the Government to consider other renewable energy options.

3.1 Institutional, legal, and regulatory frameworks

The Electricity Act and the Energy Authority of Suriname Act are the key pieces of legislation that comprise Suriname's legal framework for the electricity sector. These laws are supported by additional decrees addressing tariffs, subsidies, and environmental standards.[30] The Government is reviewing the Electricity Act and its secondary legislation, which is expected to be complete by the end of 2024.[31] Section 3.1.1 describes the institutional framework of Suriname's electricity sector, while Section 3.1.2 describes the legal and regulatory framework in more detail.

[29] Government of the Republic of Suriname, 2020. "Nationally Determined Contribution." https://unfccc.int/sites/default/files/NDC/2022-06/Suriname%20Second%20NDC.pdf

[30] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 8.

[31] Information gathered from a meeting with the EAS held on 8 April 2024.

3.1.1 Institutional framework

The following entities make up Suriname's electricity sector:

- **Ministry of Natural Resources (Ministerie van Natuurlijke Hulpbronnen, MNH):** The Central Government entity responsible for water, minerals, and energy policy.[32] Additionally, the MNH's Electricity Supply Service is responsible for electricity supply in the hinterland and operates and maintains around 130 small diesel power systems in isolated and remote communities.[33]
- **Department for Rural Electrification:** Part of the MNH, the Department's purpose is to extend electricity access to rural areas lacking a connection to the national grid.[34]
- **Ministry of Finance and Planning:** Monitors the revenue and expenditure of the State. Among its duties, it deals with the Government's subsidies,[35] including those designated for the electricity sector.
- **Energie Bedrijven Suriname (EBS):** State-owned company responsible for providing and operating a share of the electricity generation, transmission, and distribution infrastructure and its services. EBS provides about 25 percent of the national electricity supply. EBS is also responsible for certifying electricity installers and inspecting electrical installations under the Government's and the EAS's oversight.[36]
- **Staatsolie Maatschappij Suriname N.V. ('Staatsolie'):** A wholly-owned Government company that manages upstream and downstream oil operations. It has exclusive rights to oil exploration, production, and refining.[37]
- **Staatsolie Power Company Suriname (SPCS):** A Staatsolie subsidiary responsible for a share of Suriname's generation using heavy fuel oil (HFO) and hydropower from the Afobaka facilities.[38] SPCS sells electricity to EBS via Power Purchase Agreements (PPAs) between the Government and SPCS.[39]
- **Energy Authority of Suriname (EAS)**: The independent regulator responsible for regulating and monitoring Suriname's energy sector, providing information to sector participants, and advising MNH on energy-related matters.[40]

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[32] Government of Suriname. Ministry of Natural Resources. https://gov.sr/ministeries/ministerie-van-natuurlijke-hulpbronnen/over-ons/

[33] EBS-MNH, 2024. "Stakeholders Engagement Plan (SEP) for the project 'Rural electrification with renewable energy, potable water, and telecommunications in Suriname.'. https://nvebs.com/uploads/files/page/sep-rural-electrification-south-suriname-project-final1-1.pdf

[34] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 9.

[35] Ministry of Finance and Planning. "About us." https://gov.sr/ministeries/ministerie-van-financien-en-planning/over-ons/

[36] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p. 9.

[37] Staatsolie Maatschappij Suriname N.V website. https://www.staatsolie.com/en/about-us/

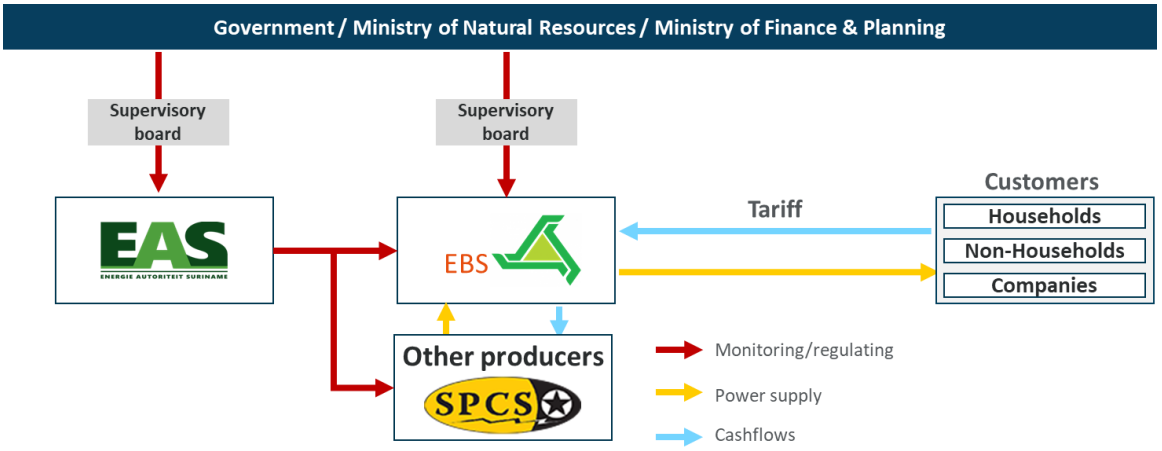
[38] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p. 9.

[39] IMF-Fiscal Affairs Department, 2023. "Suriname: Reforming Electricity Subsidies." p. 19.

[40] EAS website. "About us." https://eas.sr/overons/

Figure 3.1 illustrates these institutions and the relationships between them.

Figure 3.1: Current structure of the electricity sector



Note: Non-household customers include small businesses and shops. Section 3.1.2 describes the customer categories in more detail.
Source: EAS[41]

These entities are described in more detail below.

EBS

The Electricity Act defines the Electricity Company (EBS) as the single-buyer and retailer of electricity for the National Grid.[42,43] As the single-buyer and retailer, EBS is responsible for:

- The dispatch of electricity via the National Grid;[44]
- Measuring the electricity supplied by a producer and providing the producer with the measured data obtained; and
- Measuring consumers' electricity consumption and invoicing them following the tariffs methodology specified in the ESP.[45]

EBS is also the Grid Operator for the National Grid,[46] providing electricity to more than 185,000 customers.[47] As the Grid Operator, EBS is responsible for:

- Maintaining, repairing, renewing, or expanding the National Grid;

[41] EAS, 2023. "Overview of the energy sector in Suriname: Suriname's resolve towards balanced energy planning and transition." p. 7.

[42] National Grid is defined as all the grids operated by the Electricity Company.
Electricity Act 2016. "Article 1."

[43] Electricity Act 2016. "Article 10."

[44] Electricity Act 2016. "Article 10."

[45] Electricity Act 2016. "Article 13."

[46] Electricity Act 2016. "Article 10."

[47] EBS website. "Who we are." https://nvebs.com/over-ons/wie-zijn-wij

- Operating the National Grid in an efficient, effective, and reliable way;
- Ensuring the safety and reliability of the National Grid;
- Connecting third parties to the National Grid by Article 16 of the Electricity Act; and
- Ensuring sufficient grid capacity to meet electricity demand.[48]

In addition to owning and operating the grid, EBS generates about 25 percent of the total electricity supply for the EPAR, ENIC, and some rural systems. EBS's generation capacity relies on thermal sources.[49,50] EBS is also responsible for the procurement of additional capacity through public tender.[51]

EBS is undergoing a structural transformation in line with the provisions of the Electricity Act.[52] The Act mandates its unbundling into separate units for generation, transmission, distribution, and retail.[53]

Staatsolie

Staatsolie is a wholly owned Government company founded in 1980. Staatsolie is responsible for the exploration, drilling, production, refining, marketing, and sales of crude and refined products, including service stations and transport.[54]

Staatsolie explores and extracts crude oil as part of its upstream operations. It conducts onshore, nearshore, and shallow offshore exploration. Staatsolie produces oil in its fields in the Saramacca District.[55]

Staatsolie also operates downstream. It processes crude oil into fuel oil, diesel, gasoline, and bitumen in its refinery. Its refinery products are mainly retailed through its subsidiary GOw2 Energy Suriname N.V.[56] Staatsolie sells various grades of low-sulfur and low-vanadium fuel oils primarily to significant industries in Suriname, Guyana, and other Caribbean territories, namely Antigua and Barbuda and Barbados.[57]

Staatsolie's revenues depend on domestic and Caribbean markets. A majority of revenue comes from domestic oil sales, totaling US$434 million (60 percent of its total revenues) in 2023. Oil exports to Guyana generated US$95 million (13 percent of total revenue), while US$98 million (14

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48 Electricity Act 2016. "Article 13."

49 IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 10.

50 EAS, 2023. "Overview of the energy sector in Suriname: Suriname's resolve towards balanced energy planning and transition." p 10.

51 Electricity Act 2016. "Article 21."

52 EBS restructuring will impact the implementation of the ESP, but not the preparation. Similarly, performance standards and targets set under the ESP are not affected by the structure of the utility.

53 IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 9.

54 Staatsolie website. "About us." https://www.staatsolie.com/en/about-us/

55 Staatsolie website. "Our Business." https://www.staatsolie.com/en/our-business/

56 Staatsolie website. "Our Business." https://www.staatsolie.com/en/our-business/

57 Staatsolie website, "Our business." https://www.staatsolie.com/en/our-business/#Products&services

percent) came from other Caribbean countries. The remaining revenue comes from other geographies, as shown in Table 3.1 below.

Table 3.1: Staatsolie revenue from oil sales by geography

Country/Region	US$ million	% of total revenue
Suriname	434.3	60.2%
Other Caribbean territories	98.2	13.6%
Guyana	95.3	13.2%
United States	36.7	5.1%
Middle East and Asia	15.6	2.2%
Europe	5.2	0.7%
Other	36.6	5.1%
Total revenue	**722.0**	**100.0%**

Note: Data is from 2023.
Source: Staatsolie[58]

SPCS

SPCS is a wholly-owned subsidiary of Staatsolie responsible for operating the majority of generation capacity in Suriname. SPCS operates 256MW of generation capacity, producing approximately 75 percent of electricity in Suriname. SPCS's generation capacity includes the 189MW Afobaka hydropower plant and a 96MW HFO-fired power plant next to Staatsolie's refinery near Paramaribo. Part of the electricity supplies electricity to the refinery, while the remaining electricity is sold to EBS and the Rosebel Gold Mine in the EPAR system.[59,60]

EAS

The Suriname Energy Authority Act establishes the EAS as an independent regulator.[61] The EAS regulates and monitors Suriname's energy sector, provides information to sector participants, and advises MNH on energy-related matters.[62]

[58] Staatsolie, 2023. "Annual IFRS Consolidated Financial Statement." p 79. https://www.staatsolie.com/media/fg3fcelv/staatsolie-full-annual-report-2023.pdf

[59] In 2020, SPCS took over ownership and operations of the Afobaka hydropower plant from the Suriname Aluminum Company (SURALCO) when the latter closed.

Dutch Caribbean Legal Portal. 2020. "Suriname now owns Afobaka hydroelectric dam." http://www.dutchcaribbeanlegalportal.com/news/business-financial/9420-suriname-now-owns-afobaka-hydroelectric-dam)

[60] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 10.

[61] Suriname Energy Authority Act. "Article 1."

[62] EAS website. "About us." https://eas.sr/overons/

EAS is responsible for overseeing the preparation and implementation of the ESP.[63] This includes setting tariffs according to a cost-reflective methodology,[64] monitoring facilities and systems to ensure compliance with technical installation standards,[65] and supervising the expansion capacity to produce renewable energy.[66] Oversight of the ESP also includes settling disputes between the EBS and electricity producers and imposing administrative penalties for violating sector rules and regulations.[67]

In addition, the EAS can provide binding instructions to EBS to ensure compliance with the ESP. Binding instructions are directions the EAS gives to enforce standards in the new regulations. Examples of binding instructions are requesting more detailed specifications for cost accounting, setting more conditions for electricity producers to maintain installations and equipment, and setting additional rules on outage recordings, system failures, and corresponding reporting processes.[68]

Other duties of the EAS include:

- Collecting and producing statistical information for the sector;[69]
- Monitoring the quality and capacity plans of the Electricity Company;
- Carrying out management and engineering audits of relevant sector actors; and
- Supervising compliance of agreements between the Electricity Company, the Government, and energy producers.[70]

3.1.2 Legal and regulatory framework

The legal and regulatory framework is made up of the following:

- **Electricity Act, 2016:** Provides the overarching legal framework for Suriname's electricity sector. The Electricity Act aims to improve the electricity sector's availability, affordability, and environmental sustainability by improving the technical and financial performance of

[63] Electricity Act 2016. "Articles 4 and 8."

[64] For more information on tariffs, see Section 3.1.2.

[65] Electricity Act 2016. "Article 14."

[66] Electricity Act 2016. "Article 21."

[67] Electricity Act 2016. "Articles 24 and 26."

[68] Electricity Act 2016. "Articles 12, 20, and 15."

[69] For example, the EAS must receive data on a regular basis from the Electricity Company and electricity producers. Data from the Electricity Company should include information about connections, relevant operation expenses, staff turnover, load and supply curves in the National Grid, monthly kWh consumption per consumer group, monthly charges per consumer group, and monthly cost per producer for the supply of electricity. Electricity producer must also provide data on the MWh supplied per month to the Electricity Company, the amount of fuel consumed during generation, and availability of capacity. EAS may also request data from other stakeholders including electrical contractors, the certification institute, private producers, and subsidized customers (Article 6, Electricity Act 2016)

[70] Electricity Act 2016. "Article 4."

the sector, encouraging private sector participation, and creating a regulatory framework for the sector.[71] The Electricity Act is described in more detail below.

- **Energy Authority of Suriname Act, 2016:** Establishes the EAS as the supervisory authority and directing body in the energy supply sector, promoting availability, affordability, sustainability, and environmental wellness of the sector.[72]
- **Tariff Methodologies and Subsidy State Decrees, 2021:** State Decree No. 88[73] sets the procedures for setting electricity tariffs, while State Decree No. 89[74] outlines subsidies for eligible consumers.
- **Environmental Framework Law, 2020:** Sets the protection and sustainable management of the environment in Suriname and the implementation and carrying into effect obligations deriving from Suriname's membership to international agreements.[75]
- **State Decree on Procurement Regulations for Works, 2011:** Establishes guidelines for tendering and managing construction and energy-related projects, ensuring transparency and fairness in public procurement.[76]
- **General and Connection Terms for Prosumers, 2018:** Issued by the national electricity company, this document outlines legal and technical standards for individuals and entities generating their electricity, facilitating the integration of renewable sources into the national grid.[77]

Electricity Act

The Electricity Act establishes three objectives to improve performance and sustainability in Suriname's electricity sector:

- **Improving the availability of electricity**—Ensuring that customers have a reliable supply of electricity and that electricity suppliers have sufficient energy sources that can be used to meet current and future demand.[78]
- **Ensuring the affordability of supply**—Minimizing supply costs and efficiently allocating resources. The Act explores other energy sources and incentivizes other energy producers to supply more cost-effective solutions.[79]

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[71] Electricity Act 2016. "Explanatory notes - Safeguarding the public stake in the electricity sector by the State"

[72] Suriname Energy Authority Act, 2016. "Article 2"

[73] State Decree No. 88, 2021. "Cost allocation, structure and methodology for calculating the electricity tariff, the feed-in tariff and a methodology to determine the connection rate."

[74] State Decree No. 89, 2021. "Determination of groups or categories of customers that are eligible for subsidies, as well as the amount."

[75] Environmental Framework Law, 2020. https://leap.unep.org/en/countries/sr/national-legislation/environmental-framework-act-no-97-2020

[76] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 8.

[77] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 8.

[78] Electricity Act 2016. "Explanatory notes - Safeguarding the public stake in the electricity sector by the State."

[79] Electricity Act 2016. "Explanatory notes - Safeguarding the public stake in the electricity sector by the State."

- **Increasing environmental quality**—This includes using diversified sources of energy and reducing CO_2, other greenhouse gases, harmful substances, and waste.[80]

The Electricity Act establishes the framework to meet the following objectives:

- **Promoting an integrated long-term vision with implementable short-term plans**: The Electricity Act mandates the creation of the ESP, which is intended to integrate a 20-year Strategic Plan with a 5-year Technical Plan and Regulatory Plan. The Strategic Plan establishes long-term sector targets, while the shorter-term Technical Plan sets out the roadmap for effectively meeting the targets. The Regulatory Plan enforces the established tariff mechanism and ensures entities meet the set technical standards.[81]
- **Outlining the duties of the EAS**: The Electricity Act sets out the EAS's powers and duties to ensure financial sustainability, accountability for performance, and coordinated generation and transmission expansion of the electricity sector.[82]
- **Introducing cost-reflective and affordable tariffs**: The Electricity Act requires the ESP to include a methodology for structuring cost-reflective and affordable tariffs. The tariff methodology should also provide incentives for achieving efficiency and quality of service while discouraging inefficient consumption (see subsection on tariff-setting principles and methodology below).[83]
- **Reorganizing the electricity sector to promote transparency and efficiency**: The Electricity Act defines the roles and responsibilities of actors in the sector. It specifies the actors eligible to generate electricity and the types of generation sources that can be explored.[84] The Act requires the unbundling of EBS into separate business units to improve efficiency and ensure financial accountability.[85]
- **Encouraging private participation**: The Electricity Act allows consumers to generate electricity. If the production is not synchronized with the consumption, offsetting via the National Grid will be allowed. The condition is that the electricity is generated in facilities using only renewable energy sources.[86]
- **Introducing competition where feasible**: The Electricity Act opens the possibility of admitting several producers of sustainable electricity to the market. The Act imposes rules for both existing and new producers. With the provisions of Article 21 of the Act, the legislators aim to promote the operation of the contracting process fairly and

[80] Electricity Act 2016. "Explanatory notes - Safeguarding the public stake in the electricity sector by the State."

[81] Electricity Act 2016. "Article 8."

[82] Electricity Act 2016. "Articles 3 and 4"

[83] Electricity Act 2016. "Articles 9 and 17."

[84] Electricity Act 2016. "Explanatory notes - Offsetting electricity generated by Private Producers (net-metering/feed-in tariffs)."

[85] EBS will be unbundled into several units, including the Electricity Company (which will oversee transmission and distribution, and the single buyer and retailer functions), C-Level N.V. EBS, and three subsidiary companies— N.V. EBS Power Company, N.V. EBS Shared Services, and N.V. Ogane. (EBS internal report. 2017. "EBS in transition")

[86] Electricity Act 2016. "Explanatory notes - Offsetting electricity generated by Private Producers (net-metering/feed-in tariffs)."

transparently. Production of electricity from fossil fuels remains a matter for state-owned companies.[87]

The Electricity Act defines the regulatory methodologies for the electricity sector. The Act defines the following methodologies and procedures for the sector:

- **Single buyer procedures**: The Electricity Act grants single buyer and retailer responsibilities to the Electricity Company,[88] mandates the creation of single buyer procedures to incorporate new generation capacity onto the National Grid,[89] and specifies the types of producers eligible to generate electricity.[90] The ESP will provide more specific guidance on procedures for selecting, tendering, and procuring utility-scale renewable energy. These procedures should follow a phased approach that can guide the Electricity Company through each step of the procurement process.
- **Commercial terms for the sale of electricity by prosumers:** The Electricity Act allows consumers to install small-scale renewable energy facilities and sell their excess power to the grid up to the consumer's total annual consumption.[91] Before 2021, excess power was sold under a net metering arrangement whereby excess power was discounted from the consumer's monthly bill. If the power injected into the grid exceeded the consumer's consumption for a given month, that surplus rolled over to the following month. Any surplus held by a customer was reduced to zero on the first month of every fiscal year.[92] Since 2021, the "Tariff Methodologies and Subsidy State Decree No. 88" mandates a net billing system with a feed-in tariff of 115 percent of the energy rate that applies to the consumer. As of May 2024, EBS has not updated the 2018 General Terms and Conditions of Use for Self-Producers.
- **Interconnection rules**: The Electricity Act states that producers must follow rules and conditions to connect to the National Grid. It requires a Certification Institute to verify electrical installations to ensure compliance with the interconnection rules and conditions.[93] The Planning Code provides guidelines related to the management of the electricity system and for connecting customer installations to the electricity system.[94] The Operation Code provides the technical conditions and requirements for generating units, customer facilities, and distribution systems on the transmission grid.[95]

[87] Electricity Act 2016. "Explanatory notes - Electricity production."

[88] Electricity Act 2016. "Article 10."

[89] Electricity Act 2016. "Article 10."

[90] Electricity Act 2016. "Article 20."

[91] Electricity Act 2016. "Articles 1 and 20."

[92] N.V. Energie Bedrijven Suriname, 2018. General Terms and Conditions of Use for Self-Producers, Article 12. https://nvebs.com/uploads/files/page/algemene-voorwaarden-zelfopwekkers.pdf

[93] Electricity Act 2016. "Explanatory notes – Certification institution"

[94] EBS. 2020. "Surinamese Grid Code: Planning Code."

[95] EBS. 2020. "Surinamese Grid Code: Operation Code."

Further, the Government has made commitments under international legal frameworks, notably the Sustainable Development Goals and the United Nations Framework Convention on Climate Change (UNFCCC). Suriname's NDC under the UNFCCC framework includes an unconditional commitment to reduce energy-related emissions by generating over 35 percent of electricity from renewable sources by 2030.[96]

Supply contracts

Under its fuel supply contract with the Government, Staatsolie delivers 30,000 barrels of fuel per month to EBS. EBS contracts directly with Staatsolie for any usage above this amount.[97]

Additionally, the Government has two PPAs with SPCS for power supply:

- For hydroelectricity from Afobaka: The sale of up to 920GWh annually priced at US$19.7 per MWh;[98] and
- For thermal electricity: Signed in 2013, this PPA is set to expire in February 2028. The contract stipulates a minimum energy output of 443GWh per year.[99] The monthly price is set based on:
  - A fixed cost of US$40 per MWh, which covers capital costs, non-fuel operations and maintenance costs, plus a margin; and
  - The variable cost of fuel and lubricants. The price of fuel is determined as in the fuel supply contract mentioned above. The quantity of fuel assumed to be used for thermal generation is determined based on a fuel efficiency factor,[100] not the actual amount of fuel used.[101] However, the PPA is currently under review and one of the proposed modifications is to amend the contract so that the actual amount of fuel used is paid for.

The Government pays for the electricity and fuel that is delivered to EBS. Payments are not made directly to the supplier.[102] Payments are settled through net amounts in taxes and dividends owed to the Government by Staatsolie and SPCS.

[96] Government of the Republic of Suriname. 2020. "Nationally Determined Contribution." https://unfccc.int/sites/default/files/NDC/2022-06/Suriname%20Second%20NDC.pdf

[97] IMF-Fiscal Affairs Department, 2023. "Suriname: Reforming Electricity Subsidies." p 19.

[98] IMF-Fiscal Affairs Department, 2023. "Suriname: Reforming Electricity Subsidies." p 19.

[99] IMF-Fiscal Affairs Department, 2023. "Suriname: Reforming Electricity Subsidies." p 19.

[100] The lower the fuel efficiency factor, the less fuel is needed to generate 1MWh of thermal energy. Depending on the quality and type of the machines used, the quantity of oil needed to generate 1MWh of thermal energy differs. For instance, high quality and newer machines usually need less fuel to generate the same quantity of electricity. The original contract had an assumed fuel efficiency factor of 1.50, which has been reduced most recently to 1.38.

[101] IMF-Fiscal Affairs Department, 2023. "Suriname: Reforming Electricity Subsidies." p 19.

[102] IMF-Fiscal Affairs Department, 2023. "Suriname: Reforming Electricity Subsidies." p 19.

3.1.3 Tariffs and subsidies

In 2021, the Government approved a tariff and subsidy methodology as established in State Decrees No. 88[103] and 89,[104] respectively. EAS is establishing the Regulatory Accounting Rules that will determine the processes to calculate the cost of service and set tariffs.[105]

Current tariff regime and rates

Tariffs are to be set using a methodology that ensures recovery of costs related to electricity production, purchase, transmission, distribution, and retail, and a permissible return on investment.[106] The tariff consists of the following components:[107]

- The base rate: a fixed charge paid monthly by consumers, regardless of electricity usage. This charge covers the fixed costs associated with the power supply, including personnel, depreciation, and certain transmission costs;[108] and
- A variable charge: known as the consumption rate, it is levied on a per kWh basis based on electricity usage and customer category. The variable charge covers expenses such as purchasing energy and fuel, maintenance, and other variable operating costs.[109]

Table 3.2 shows the tariff schedule as of January 2025.

[103] State Decree No. 88. 2021. "Cost allocation, structure and methodology for calculating the electricity tariff, the feed-in tariff and a methodology to determine the connection rate."

[104] State Decree No. 89. 2021. "Determination of groups or categories of customers that are eligible for subsidies, as well as the amount."

[105] Information gathered from meetings with EAS and key stakeholders during the inception visits during the week of 8 April 2024.

[106] Electricity Act 2016. "Article 17"

[107] EBS website. https://nvebs.com/elektriciteit/stroomtarieven

[108] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 12.

[109] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 12

Table 3.2: Tariff schedule

Type of Customer	Tariff structure	Consumption rate (SRD/kWh)	Base rate (SRD/month)
Households	0-400kWh	1.471	Phase 1: 212
	400-900kWh	2.350	Phase 2: 294
	900-1,500kWh	2.830	Phase 3: 350
	>1,500kWh	4.270	-
Non-households (<24kVA and small businesses)	All	2.664	Phase 1: 335
			Phase 2: 670
			Phase 3: 718
Commercial (>24kVA)	11 pm – 9am	1.785	798
	9am – 11pm	2.664	798
Industrial (>24kVA)	11pm – 9am	1.275	798
	9am – 11pm	2.664	798
Streetlighting	-	3.150	-

Source: EBS[110]

Tariff reform

The State Decree No. 41, dated 4 April 2024 introduced significant tariff reforms covering:

- **Fuel surcharge:** This modification directly links fuel costs to consumption levels, ensuring that changes in fuel prices are transparently passed on to consumers;
- **Quarterly adjustments based on exchange rates:** Tariffs will now be adjusted quarterly based on the quarterly average of the exchange rate published by the Central Bank;
- **Quarterly adjustments linked to fuel costs:** This entails a quarterly review and adjustment of consumption rates according to projected and actual fuel costs;
- **New business-related consumer group:** The decree recognizes the distinct energy requirements of large-scale industrial users and establishes a customized tariff structure for consumers with a connection capacity exceeding 2MW; and
- **Prepaid electricity options:** The introduction of prepaid electricity services for both household and non-household users provides flexibility in managing energy consumption and costs.[111]

[110] EBS. "Electricity tariffs." https://nvebs.com/elektriciteit/stroomtarieven

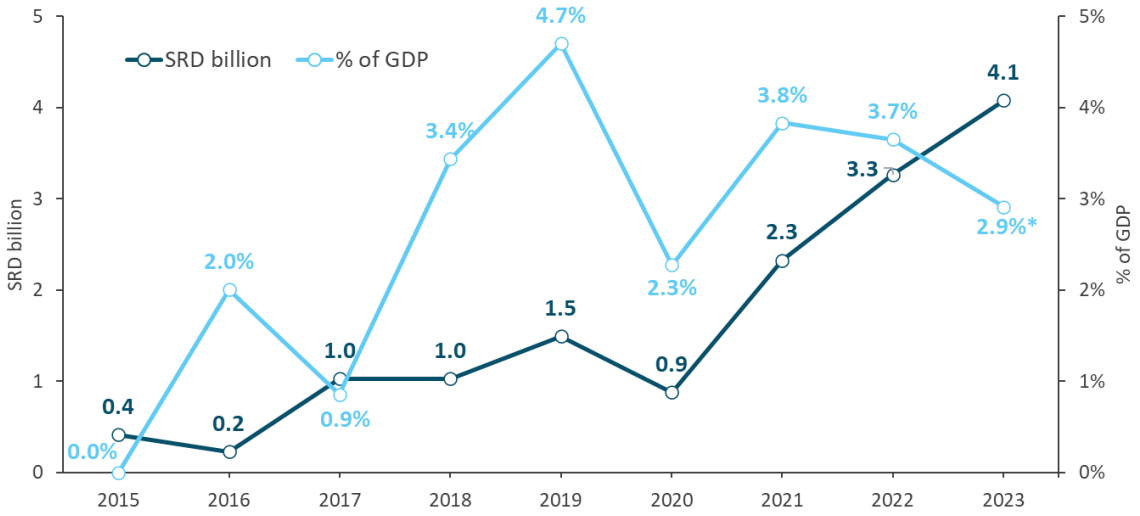
[111] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p. 12-13.

Subsidies

In addition to the tariff reforms described above, the Government is gradually eliminating subsidies to bring tariffs to cost-recovery levels. All tariffs were expected to be cost-reflective by 2025.[112]

Historically, the Government has subsidized the price of electricity. Between 2015 and 2023, subsidies to EBS averaged 2.6 percent of GDP,[113] covering roughly 55 percent of the generation cost.[114] Figure 3.2 shows the evolution of subsidies provided to EBS.

Figure 3.2: Subsidies to EBS, 2015-2023



Note: GDP for 2023 was estimated using the IMF's GDP growth forecast.
Sources: Subsidies to EBS: Ministry of Finance and Planning;[115] Current GDP: World Bank;[116] 2023 GDP: IMF[117]

Certain low-income households are eligible to continue benefiting from partial consumption subsidies.[118] Household customers consuming 900kWh or less per month can qualify for a subsidy, as shown in Table 3.3.

[112] Information gathered from meetings with EAS and key stakeholders during the inception visits during the week of 8 April 2024.

[113] World Bank. GDP (Current LCU). https://data.worldbank.org/indicator/NY.GDP.MKTP.CN?locations=SR

[114] IDB. 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 13.

[115] Ministry of Finance and Planning. Tabellen Overheidsfinanciën. https://gov.sr/ministeries/ministerie-van-financien-en-planning/documenten/?dir=62809

[116] World Bank. GDP (Current LCU). https://data.worldbank.org/indicator/NY.GDP.MKTP.CN?locations=SR

[117] IMF, 2023. "World Economic Outlook." https://www.imf.org/en/Publications/WEO/weo-database/2023/October/select-country-group

[118] Information gathered from meetings with EAS and key stakeholders during the inception visits during the week of 8 April 2024.

Table 3.3: Subsidies for households (phases 1, 2, and 3)

Consumption (kWh per month)	Subsidy (SRD per month)	Subsidy (US$ per month)
Up to 150	85	2
151-300	150	4
301-450	225	6
451-500	300	8
501-900	400	11

Note: US$ values were estimated using the April 2024 exchange rate of SRD35.43 per US$.
Source: Subsidy per month: EBS;[119] Suriname's exchange rate: Central Bank[120]

3.2 Overview of power systems

Suriname's electricity sector is made up of multiple independent power systems. EPAR and ENIC are the largest of these. Smaller decentralized power systems serve customers in rural and village systems.

Section 3.2.1 describes the energy balance in EPAR, which serves Paramaribo and its surrounding areas.[121] EPAR has a total installed generation capacity of approximately 488MW, comprised of thermal and hydropower facilities, including the Afobaka hydropower plant.

Section 3.2.2 describes ENIC, which supplies electricity to Nieuw Nickerie and the surrounding areas.[122] The ENIC system relies on a thermal generation plant located at Clarapolder, with an installed capacity of 25.6MW and the 2MW Bryan Overeem hybrid solar PV-battery plant.

Rural districts and village systems are described in Section 3.2.3. The rural districts include Albina, Apoera, Coronie (Totness), Moengo, Pokigron, and Wageningen. Most rural districts depend on generation from HFO and premium diesel power plants. Rural districts are increasingly using hybrid solar-diesel generation systems, such as the 500kW solar PV plant in Pokigron, which works in hybrid mode with a 700kW diesel generator.[123]

[119] EBS website. https://nvebs.com/elektriciteit/stroomtarieven

[120] Suriname's Central Bank. "Monthly average exchange rates 2024." https://www.cbvs.sr/en/statistics/financial-market-statistics/monthly-average-exchange-rates

[121] EAS, 2022. "Report on regulation for SDG 7 in Suriname." p 7.

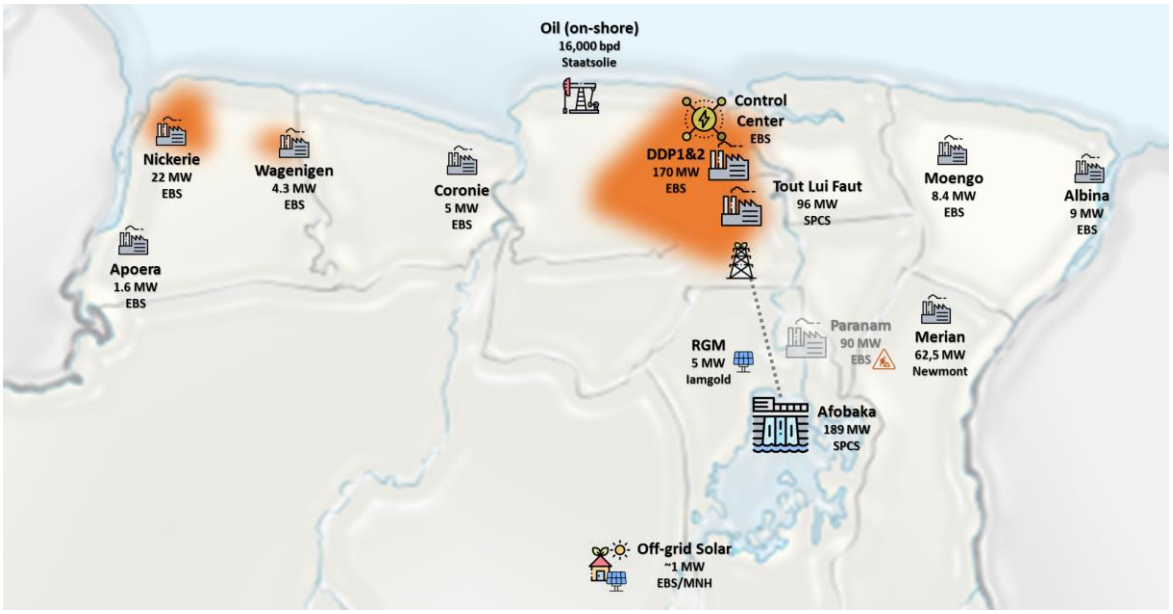
[122] EAS, 2022. "Report on regulation for SDG 7 in Suriname." p 7.

[123] Government of Suriname. 2019. "Off-grid Renewable Energy Solutions in Rural Suriname." p 22. https://gov.sr/wp-content/uploads/2022/07/NAMA-report-Suriname-Final-1-1.pdf

There are 135 village systems across Suriname.[124] These village systems are smaller than rural districts and use small diesel generators to supply 4 to 6 hours of electricity daily.[125] The MNH owns and operates all the systems and provides services to the villages for free.[126]

Figure 3.3 shows a map of EPAR, ENIC, and some of the rural and village systems.

Figure 3.3: Map of the electricity sector



Source: EAS[127]

3.2.1 EPAR

EPAR is the largest power system in Suriname in terms of installed generation capacity, number and length of transmission and distribution lines, number of customers, peak demand, and electricity consumption.

Supply

The electricity in EPAR comes from four sources, totaling about 488MW of installed capacity and generating around 1,464GWh in 2023, as shown in Table 3.4.

[124] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 11.

[125] Government of Suriname, 2019. "Off-grid Renewable Energy Solutions in Rural Suriname." p 25. https://gov.sr/wp-content/uploads/2022/07/NAMA-report-Suriname-Final-1-1.pdf

[126] Government of Suriname, 2019. "Off-grid Renewable Energy Solutions in Rural Suriname." p 25. https://gov.sr/wp-content/uploads/2022/07/NAMA-report-Suriname-Final-1-1.pdf

[127] EAS, 2023. "Overview of the Energy Sector in Suriname: Suriname's resolve towards balanced energy planning and transition." p 10.

Table 3.4: EPAR generation sources, 2023

Plant	Fuel/resource type	Installed capacity (MW)	Generation (GWh)	% of total generation in EPAR
DPP1	Diesel/HFO	73	16	1%
DPP2	HFO	130	195	13%
SPCS	HFO	96	328	22%
Afobaka	Hydro	189	924	63%
Total		488	1,464	100%

Note: Data as of 2023.
Source: EBS[128]

These generation sources are described in more detail below.

EBS-owned generation assets

EBS owns and operates about 202MW of generation, with an effective capacity of approximately 164MW. These assets consist of reciprocating internal combustion engines (RICE) installed in Paramaribo's DPP1 and DPP2 thermal power plants. DPP1 has units that burn HFO and diesel and, combined, have an effective capacity of about 44MW. DPP2 only burns HFO and has an effective capacity of 120MW.

The DPP1 units that burn diesel are nearing the end of or have surpassed their useful lives. The diesel units have an average age of over 38 years, with the oldest being 47 years old. The HFO units are newer than the diesel units, averaging about 17 years in service.

The average availability of the DPP1 units between 2018 and 2023 was 67 percent. During that period, their average plant factor (energy produced/generable energy at nominal capacity) was 6 percent.[129] The HFO units at DPP1 perform in line with industry averages as they are newer and more efficient compared to the diesel units. Table 3.5 and Table 3.6 provide further detail broken down by unit for DPP1 and DPP2, respectively.

[128] DPP1 data: EBS, 2024. Excel file "Opwekkingsdata t b v ESP rev 01 2024."

[129] EBS, 2024. Excel file "Opwekkingsdata t b v ESP rev 01 2024." Shared with the Castalia-Grid Advisors Team by EBS in May 2024.

Table 3.5: DPP1 units, 2023

DPP1 genset	Installed capacity (MW)	Effective capacity (MW)	Fuel type	Gross energy produced (MWh)	Service hours	Commission year	Age (years)
Unit 4	5.2	3.0	Diesel	40	19	1977	47
Unit 7	5.2	0.0	Diesel	11	8	1979	45
Unit 12	5.2	0.0	Diesel	24	15	1982	42
Unit 14	7.6	5.5	Diesel	172	56	1995	29
Unit 15	7.6	5.5	Diesel	160	52	1995	29
Unit 16	8.2	7.5	HFO	4,020	685	2005	19
Unit 17	8.2	7.5	HFO	7,752	1,286	2005	19
Unit 18	8.2	0.0	HFO	0	0	2006	18
Unit 19	8.7	7.5	HFO	170	40	2008	16
Unit 20	8.7	7.5	HFO	6,675	1,117	2010	14
Gross total	**72.8**	**44.0**		**19,024**			
Plant consumption				**2,674**			
Net total				**16,349**			

Note: Data as of 2023.
Source: EBS[130]

Table 3.6: DPP2 units, 2022

DPP2 genset	Installed capacity (MW)	Effective capacity (MW)	Fuel type	Gross energy produced (MWh)	Service hours	Commission year	Age (years)
DE 01	21.6	20.0	HFO	24,781	1,656	2013	11
DE 02	21.6	20.0	HFO	39,397	2,645	2013	11
DE 03	21.6	20.0	HFO	1,674	0	2013	11
DE 04	21.6	20.0	HFO	30,240	1,508	2016	8
DE 05	21.6	20.0	HFO	75,832	3,816	2021	3
DE 06	21.6	20.0	HFO	45,584	2,213	2021	3
Total	**129.6**	**120.0**		**217,509**			

Note: Data as of 2023.
Source: EBS[131]

SPCS-owned generation assets

SPCS owns and operates 285MW of total installed capacity comprised of the 189MW Afobaka Hydro Power Facility and a 96MW thermal plant.

The thermal plant is comprised of four 7MW units and four 17MW units. The plant is used to generate electricity to supply SPCS's own industrial processes. Any surplus generation is delivered to EBS's customer base.

The maximum water discharge from Afobaka can reach up to 552m^3 per second. The Afobaka powerhouse is equipped with six Kaplan turbines, totaling 189MW of installed capacity. Table 3.7 shows the technical details of each unit.

Table 3.7: Afobaka generation units

Afobaka unit	Installed capacity (MW)	Average capacity (MW)	Type
Kaplan Unit # 1	30.0	29.2	Fixed Blade
Kaplan Unit # 2	33.0	32.1	Adjustable Blades
Kaplan Unit # 3	30.0	29.6	Fixed Blade
Kaplan Unit # 4	33.0	32.1	Adjustable Blades
Kaplan Unit # 5	30.0	29.1	Fixed Blade
Kaplan Unit # 6	33.0	32.3	Adjustable Blades
Total	**189.0**	**184.3**	

Source: SPCS[132]

The Brokopondo reservoir feeds the Afobaka powerhouse. The reservoir has a maximum elevation of 80.5m above sea level, with a useful volume of 12,409hm^3, and a maximum area of 1,564km^2. Between 1952 and 2016, the average inflow to Brokopondo was approximately 327m^3 per second. This means the Brokopondo reservoir could store more than a year of inflows if the useful volume is used at its maximum.[133]

Between 2012 and 2023, the average discharge at Afobaka was reported at 321m^3 per second (maximum and minimum discharge values were 390 and 234m^3 per second, respectively).[134] The

[130] EBS, 2024. Excel file "Opwekkingsdata t b v ESP rev 01 2024." Shared with the Castalia-Grid Advisors Team by EBS in May 2024.

[131] EBS, 2024. Excel file "DPP2 JAARRAPPORT 2023." Shared with the Castalia-Grid Advisors team by EBS in August 2024.

[132] SPCS. 2024. Excel file "SPCS power generation overview oct 23." Shared with the Castalia-Grid Advisors team by SPCS in May 2024.

[133] Gajadin, R., 2022. Hydro Lake Simulations for Presidentiële Commissie Ontw. Brokopondo/ EAS & Parsons, W. 2011. TAPAJAI HYDROPOWER PROJECT

[134] SPCS, 2024. Excel file "SPCS Castalia 2024 information request answers.xlsx."

average energy production in that period was 984GWh per year, with an average capacity of 112MW.[135]

Stakeholders have raised concerns that hydrological conditions may change Afobaka's output in the next 5 to 10 years, mostly as a consequence of climate change. For example, from 2022 to 2023, Afobaka had an effective capacity of 138MW. In 2024, this effective capacity dropped to 93MW.[136]

Transmission and distribution

Transmission

EBS owns and operates most of the transmission lines, substations, and transformers in the EPAR system. These transmission lines operate at 161kV and 33kV. EBS plans to introduce a new voltage of 110kV soon.[137]

The 161kV lines interconnect EBS's transmission network to the delivery points of the energy supplied by SPCS. There are three interconnection points:

- Substation P (Paranam) via a 74km, 161kV double-circuit overhead line from Afobaka;
- Substation R (Menckendam) via two 161kV cables of 6km each from Substation SPCS; and
- Substation R (Menckendam) via a 26km, 161kV double-circuit overhead line from Substation P (Paranam).

Additionally, the Rosebel Gold Mine,[138] a gold mining and refining company in Brokopondo owns and operates 35km of 161kV lines originating at Afobaka.

EBS owns and operates 366km of 33kV circuits. These circuits transport electricity from the Menckendam substation to EBS's distribution substations in Paramaribo and surrounding areas.

The EPAR transmission network includes two substations operating at 161kV, Menckendam and Paranam, and 28 substations operating at 33kV. The 33kV substations supply the EPAR distribution system using two main step-down transformation ratios: 33/12.6kV and 33/6kV.

There are 40 power transformers in the transmission substations in EPAR, with a total installed capacity of approximately 734MVA. Of this transformation capacity, approximately 255MVA is from 161kV to 33kV, and 479MVA from 33kV down.

The layout of the EPAR system is shown in Figure 3.4.

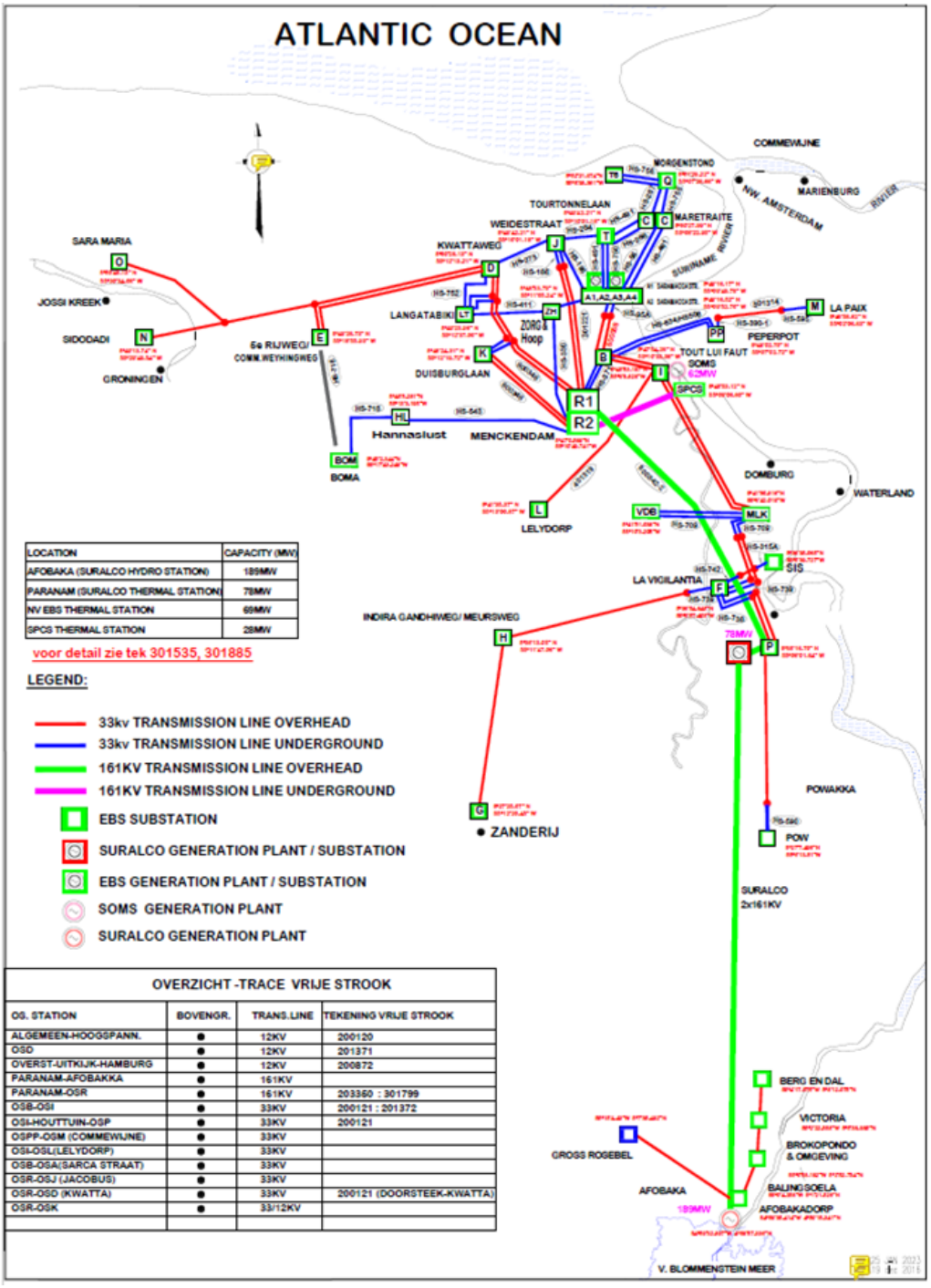
[135] Gajadin, R., 2022. Hydro Lake Simulations for Presidentiële Commissie Ontw. Brokopondo/ EAS & Staatsolie. Excel file "Lake Elevation 2023-Nov" Shared with the Castalia-Grid Advisors team by Staatsolie in May 2024.

[136] Information gathered from a meeting with the EAS held on 8 April 2024.

[137] EBS. 2024. Excel file "EBS project pipeline VSA - 3.3"

[138] The Rosebel Gold Mine is located in the Brokopondo District approximately 85km south of Paramaribo.

Figure 3.4: Layout of the EPAR System



Source: EBS[139]

[139] EBS, 2024. "Geographical EPAR"

Distribution

EBS owns and operates all distribution assets in the EPAR system, which supplies electricity to customers in Paramaribo and surrounding areas.

The EPAR distribution system operates at the nominal frequency of 60Hz and uses 12kV, 6kV (Medium Voltage, MV), and 127/220V (Low Voltage, LV) as distribution voltages. The 12kV (i.e., 12.6kV, 12.3kV, and 12kV) and 6kV (i.e., 6.3kV and 6.0kV) voltage classes are three-phase AC operation. Low voltage operation is a single-phase or three-phase AC operation.

The EPAR grid has 28 distribution substations with a total installed transformation capacity of approximately 510.5MVA. These substations operate at 12kV or 6kV, and all connect to the 33kV transmission system. The general location of these substations within the EPAR grid is shown in Figure 3.4 above.

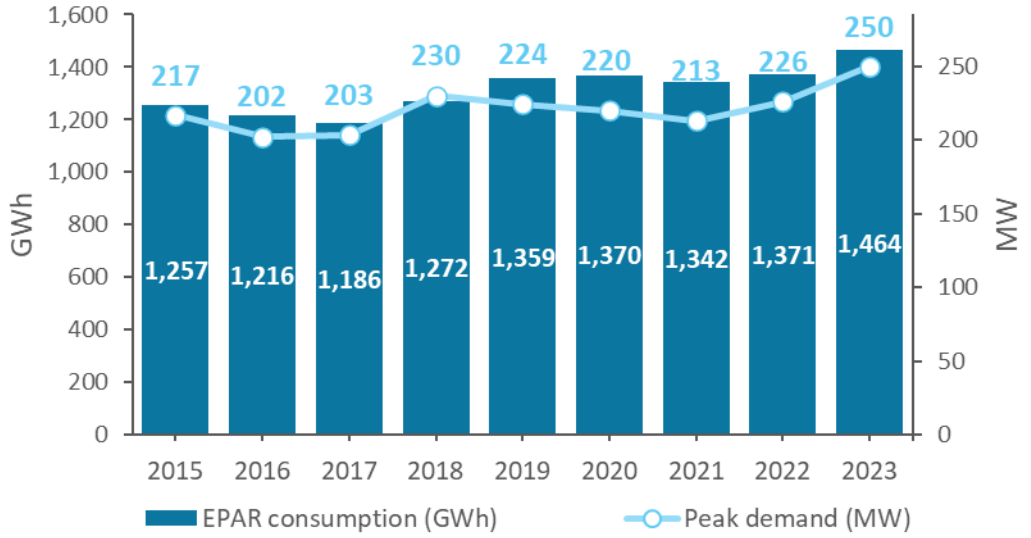
Most distribution substations are fitted with a single step-down transformer from 33kV. This does not meet the reliability criteria the ESP will adopt. 142 feeders supply the customer load from these substations. Most 12kV feeder lengths are overhead, while those at 6kV are primarily underground.

Demand

Peak demand in the EPAR system is 250MW, as of 2023. Both peak demand and consumption have increased by about 2 percent annually since 2015, as shown in Figure 3.5.[140]

[140] EBS, 2024. Excel file "ESP_CASTALIA_EAS-1.5 EPAR." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

Figure 3.5: Consumption and peak demand in the EPAR System, 2015-2023



Note: Consumption for 2018 was estimated as the average of 2017 and 2019 since data for that year was not provided.
Source: EBS[141]

The EPAR system serves approximately 171,320 customers.[142] A majority of these customers, 88 percent, are households, as shown in the breakdown of customers in Table 3.8 below.

Table 3.8: EPAR customer breakdown

Type	Number of connections
Households	151,028
Non-households (primarily small businesses and shops)	12,487
Commercial	2,882
Industrial	229
Other	4,694
Total	**171,320**

Source: EBS[143]

The Rosebel Gold Mine and Brokopondo (a rural system served by EBS in the vicinity of the Afobaka power plant) are connected to the high-voltage EPAR network. The Rosebel Gold Mine is

[141] EBS, 2024. Excel file "ESP_CASTALIA_EAS-1.5 EPAR." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

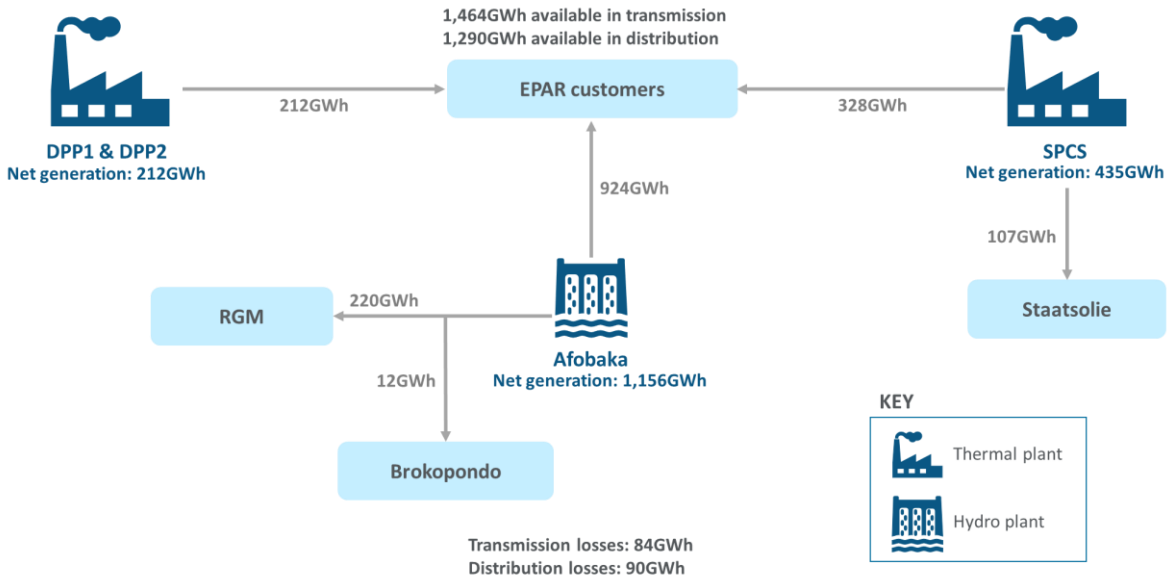
[142] The share of consumption and/or sales by customer category needs to be confirmed with EBS, as the provided data contains significant discrepancies.

[143] EBS, 2024. Excel file "ESP Information Request_Sales in KWh_2018-2024." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

the largest single consumer of electricity in the EPAR system (although it is not a customer of EBS). Between 2019 and 2023, RGM consumed an average of 220GWh annually, accounting for 16 percent of total system consumption during that period.[144]

Figure 3.6 shows the electricity flows in the EPAR system. In 2023, 1,464GWh of net electricity was injected to the EPAR system by EBS, SPCS, and the Afobaka hydro plant. Losses in the transmission grid were reported at 84GWh (5.7 percent). Technical losses in the distribution system were estimated at 90GWh (6.5 percent). This leaves about 1,290GWh available for distribution to low voltage end consumers.

Figure 3.6: Energy flows in EPAR system (2023)



Note: The figure above represents 2023 data.
Source: EBS[145] and SPCS[146]

3.2.2 ENIC

The ENIC system supplies electricity to the city of Nieu Nickerie and the rice plantations around the city, which include the Corantijn Ricer in the west to Groot Henar polder in the east and from the Nickerie River in the North to Europolder in the South. EBS owns and operates all assets that make up the ENIC system.

[144] EBS, 2024. Excel file "ESP_CASTALIA_EAS-4.3 RGM." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

[145] EBS, 2024. Excel file "ENERGY FLOW DECEMBER 2023." Shared with the Castalia-Grid Advisors team by EBS in August 2024.

[146] EBS, 2024. Excel file "SPCS power generation overview oct 23." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

Supply

ENIC has a total installed capacity of about 27.6MW, comprised of a 25.6MW thermal power plant at Clarapolder, which runs on HFO and premium diesel, and the 2MW Bryan Overeem solar plant. Table 3.9 below shows the main characteristics of the generation units at the Clarapolder Plant.

Table 3.9: Clarapolder generation units, 2023

Unit	Installed capacity (MW)	Effective capacity (MW)	Commission year	Age (years)
1	2.1	1.8	2002	22
2	2.1	0.0	1999	25
3	2.1	1.8	1999	25
4	2.1	1.8	2002	22
5	4.3	4.0	2019	5
6	4.3	4.0	2019	5
8	3.2	2.9	2009	15
9	3.2	2.8	2009	15
16	1.1	0.8	2019	5
17	1.1	0.8	2019	5
Total	25.6	20.7		

Source: EBS[147]

Transmission and distribution

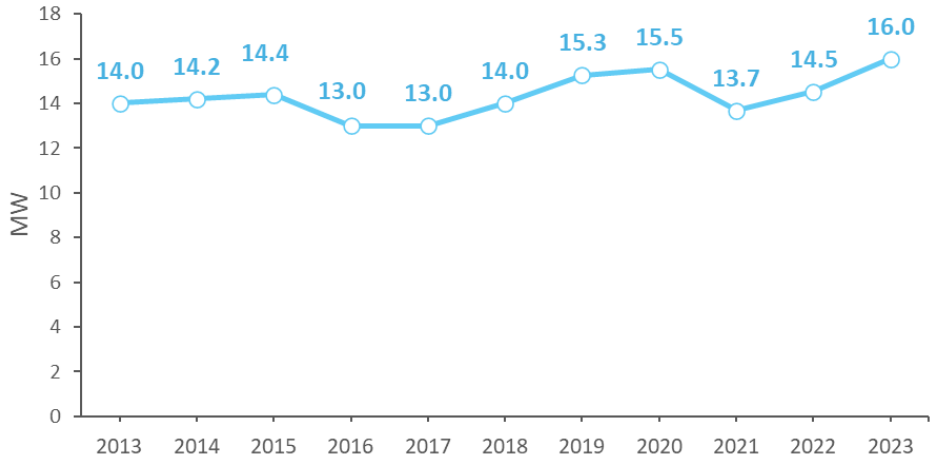
ENIC's network runs at 12kV and 33kV. Five feeders connect at the 12kV bus of the Clarapolder on-site substation. Four (named Feeders A to D) distribute power at 12kV, while the fifth (connecting to the Van Pettenpolder substation) operates at 33kV. Two additional 12kV feeders connect to the 12kV bus at the Van Pettenpolder substation.

Demand

ENIC's peak demand is 16MW as of 2023, as shown in Figure 3.7.

[147] EBS. 2024. Excel file "Generation fleet_ENIC_2019-2023."

Figure 3.7: ENIC system peak demand, 2013-2023



Note: Data on ENIC's consumption was not provided. If this data is provided, the analysis on ENIC's energy balance can be updated.
Source: EBS[148]

ENIC serves 11,499 connections, most of which (86 percent) are households.[149] Table 3.10 shows ENIC's customer breakdown.

Table 3.10: ENIC customer breakdown

Type	Number of connections
Households	9,879
Non-households (primarily small businesses and shops)	1,106
Commercial	143
Industrial	24
Other	347
Total	**11,499**

Source: EBS[150]

3.2.3 Rural districts and village systems

There are two types of isolated systems in Suriname: the village systems and rural district systems. Village systems have an estimated cumulative capacity of 7MW spread out across more than 135

[148] EBS. 2024. Word file "ESP Information - EAS_ENIC."

[149] The share of consumption and/or sales by customer category needs to be confirmed with EBS, as the provided data contains significant discrepancies.

[150] EBS, 2024. Excel file "ESP Information Request_Sales in KWh_2018-2024." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

villages. These systems operate on small diesel generators, with the Government subsidizing both the installation and operational costs.[151]

There are six rural district systems: Albina, Apoera, Coronie, Moengo, Atjoni/Pokigron, and Wageningen. Rural districts vary in size, ranging from 0.7MW to 8.9MW in installed capacity. EBS owns RICE systems, burning premium diesel to supply most of the electricity in the rural districts.[152] Table 3.11 shows the main characteristics of the generation plants that supply the rural districts.

Table 3.11: Generation units in the rural district systems, 2023

Generation Station	Fuel	Installed capacity (MW)	Effective capacity (MW)	Annual generation (GWh)
Albina Station	Diesel	8.9	4.3	11.2
Apoera Station	Diesel	2.0	1.2	2.2
Coronie Station	Diesel	4.3	2.7	5.3
Moengo Station	Diesel	8.8	4.2	12.1
Atjoni/Pokigron	Diesel	0.7	0.3	1.3
Wageningen Station	Diesel	5.6	2.8	3.8
Total		**30.3**	**15.6**	**36.1**

Source: EBS[153]

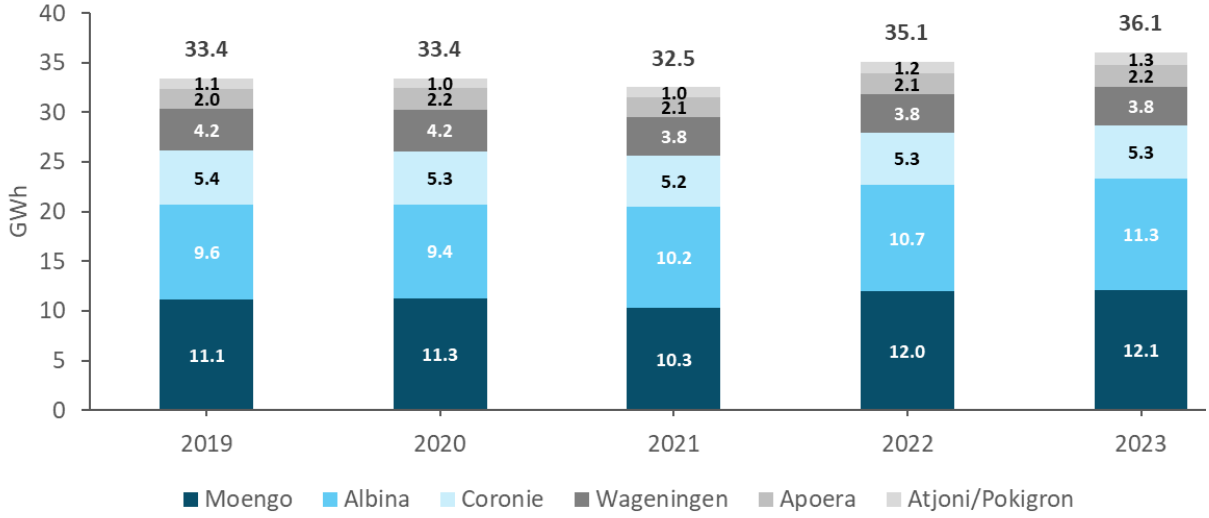
Generation in the rural districts has remained relatively stable in the past 5 years, averaging 34MWh per year (see Figure 3.8). Since 2019, cumulative generation in rural district systems has increased by 8 percent.

[151] IDB, 2024. "Suriname: Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 10.

[152] EBS, 2024. Excel file "Albina_Apoera_Coronie_Moengo_wageningen_Atjoni-Pokigron_Generation capacity." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

[153] EBS, 2024. Excel file "Albina_Apoera_Coronie_Moengo_wageningen_Atjoni-Pokigron_Generation capacity." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

Figure 3.8: Generation in rural district systems, 2019-2023



Source: EBS[154]

About 90 percent of customers in rural districts are households. Moengo, Albina, and Coronie are the largest systems in terms of connections, as shown in Table 3.12.[155]

Table 3.12: Rural systems connections by district

Type	Number of connections
Albina	1,553
Apoera	593
Coronie	1,398
Moengo	2,687
Atjoni/Pokigron	403
Wageningen	873
Total	**7,507**

Source: EBS[156]

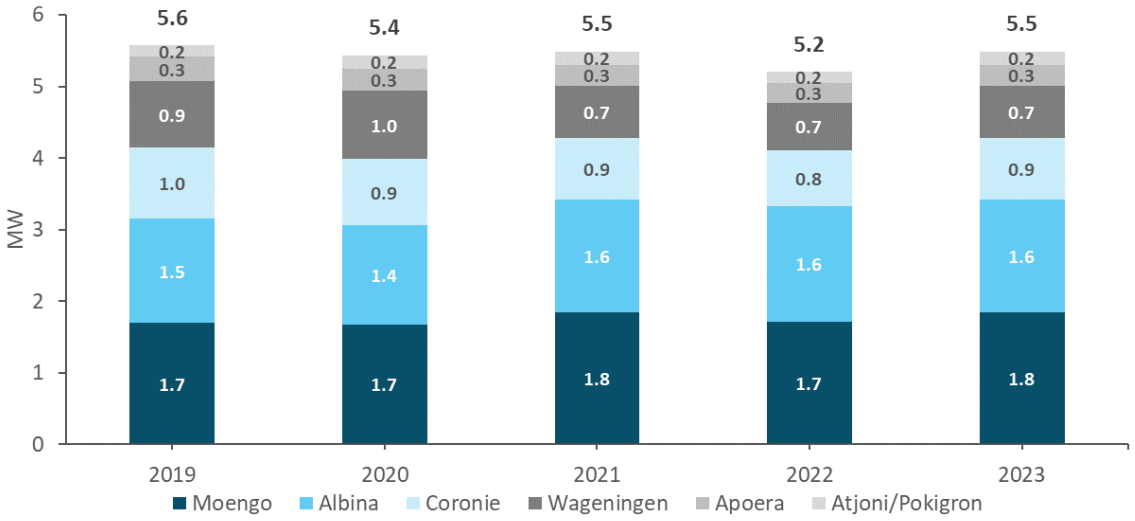
[154] EBS, 2024. Excel file "Albina_Apoera_Coronie_Moengo_wageningen_Atjoni-Pokigron_Generation capacity." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

[155] EBS, 2024. Excel file "ESP Information Request_Sales in KWh_2018-2024." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

[156] EBS, 2024. Excel file "ESP Information Request_Sales in KWh_2018-2024." Shared with the Castalia-Grid Advisors team by EBS in May 2024.

Cumulative peak demand in the rural systems has remained stable over the past 5 years, averaging 5.4MW since 2019 (see Figure 3.9).

Figure 3.9: Peak demand in rural district systems, 2019-2023



Source: EBS[157]

3.3 Oil and gas discoveries and production

Prospects for Suriname's oil and gas industry are positive. Initial estimates indicate that Suriname may have 30 billion barrels of recoverable oil reserves and more than 12.5 trillion cubic feet of gas.[158,159] Overall, Suriname's oil production is expected to go from an average of 17,200 barrels per day in 2023[160] to 650,000 barrels per day by 2032.[161]

Suriname currently produces an average of about 17,200 barrels per day.[162] Oil production has steadily increased since Suriname began producing in 1982, growing at an at a compound annual growth rate of 7.8 percent in this period (see Figure 3.10). In the next 10 years, oil production is forecasted to increase by almost 40 times, reaching 650,000 barrels per day by 2032.[163]

[157] EBS, 2024. Excel file "Albina_Apoera_Coronie_Moengo_wageningen_Atjoni-Pokigron_Generation capacity."

[158] Oil Now, 2022. "Massive 30 billion barrels of oil now estimated offshore Suriname – Staatsolie VP." Link

[159] BNN Bloomberg, 2024. "Suriname's Oil Resources Seen Totaling 2.4 Barrels." Link

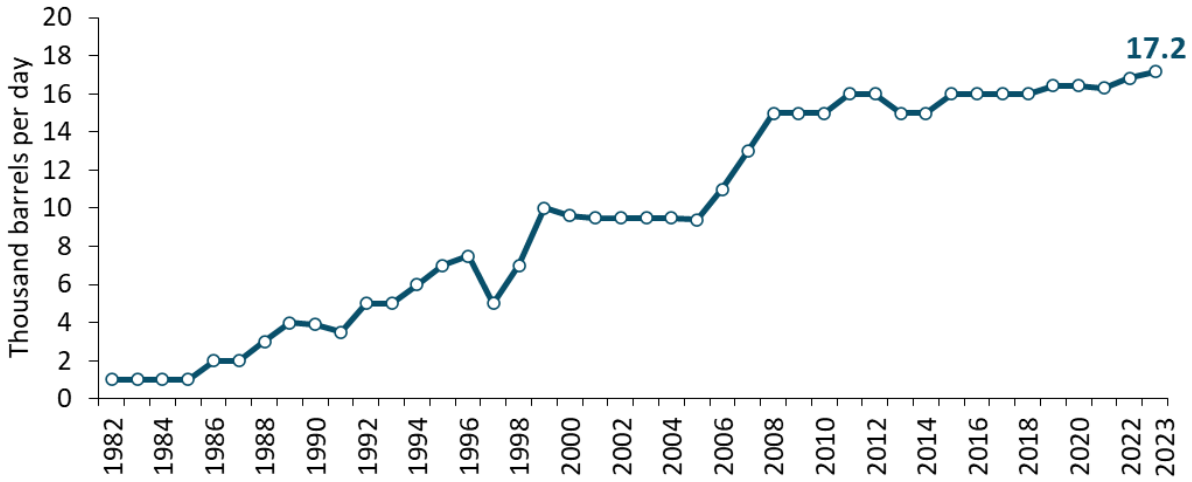
[160] EIA. "Petroleum and other liquids." Link

[161] OilPrice, 2023. "Suriname's oil boom finally get the green light." Link

[162] EIA. "Petroleum and other liquids." Link

[163] OilPrice, 2023. "Suriname's oil boom finally get the green light." Available at:Link

Figure 3.10: Oil production, 1982-2023



Source: Data for 1985-2018: Energy Information Administration (EIA);[164] Data for 2019-2023: Staatsolie[165]

Other proven discoveries include Block 52.[166] Petronas and ExxonMobil signed a Letter of Agreement with Staatsolie in March 2024 to further explore its potential. The companies will determine whether a commercial gas field is feasible, which could begin production as early as 2031.[167,168]

4 International energy outlook

Recent oil and gas discoveries (Section 3.3) have the potential to transform Suriname's economy and its energy sector. Staatsolie estimates that Suriname has around 30 billion barrels of recoverable oil reserves and initial estimates indicate that Suriname may have more than 12.5 trillion cubic feet of gas.[169,170]

Suriname's expansion plan is likely to continue to include HFO generation in the near term. Natural gas is expected to play an increasingly larger role in the generation mix as it becomes a cheaper alternative fuel. When this happens depends on policy decisions, how long it takes to

[164] EIA. "Petroleum and other liquids." Link

[165] Staatsolie Annual Reports. Link

[166] Petronas, 2020. "Petronas Makes Hydrocarbon Discovery in Block 52, Offshore Suriname." Link. Petronas Suriname E&P is the operator of Block 52. It and ExxonMobil Exploration and Production Suriname B.C. each own 50 percent participating interest.

[167] Reuters, 2024. "Suriname's Staatsolie signs gas exploration deal with Petronas, Exxon." Link

[168] Reuters, 2024. "PETRONAS Makes Latest Oil and Gas Discovery in Suriname's Offshore Block 52." Link

[169] Oil Now, 2022. "Massive 30 billion barrels of oil now estimated offshore Suriname – Staatsolie VP." https://oilnow.gy/exploration/massive-30-billion-barrels-of-oil-now-estimated-offshore-suriname-staatsolie-vp/

[170] BNN Bloomberg, 2024. "Suriname's Oil Resources Seen Totaling 2.4 Barrels." https://www.bnnbloomberg.ca/suriname-s-oil-resources-seen-totaling-2-4-billion-barrels-1.2074185

build the necessary infrastructure, and the relative prices of natural gas and crude oil. This section describes the short and long-term projections for international oil and gas prices, which will inform how Suriname's energy sector and economy will evolve.

The optimal generation options for Suriname will be determined, in part, on fuel prices. Currently, more than half of Suriname's generation comes from HFO and diesel, leaving generation costs closely linked to crude oil prices.[171] Moving forward, natural gas prices will become an important driver of generation costs as Suriname adds gas-fired plant capacity.

Forecasts estimate that the breakeven price for oil production in Suriname is around US$40 per barrel,[172] making it a competitive jurisdiction for oil companies. Breakeven points for other jurisdictions in South America range from US$20 to US$45 per barrel.[173] Suriname's breakeven price can drop further if more discoveries are made, and crucial industry infrastructure is built.

Global oil prices are expected to remain above the estimated breakeven point for oil production in Suriname, as described in Section 4.1. Projections from the United States Energy Information Administration (EIA) suggest that WTI will average about US$82 per barrel over the next 2 years and US$92 through 2050.[174]

The projected spread (Section 4.3) between crude oil prices and natural gas indicates that natural gas may soon be cheaper to generate electricity from compared to crude oil (subject to the technical feasibility of delivering natural gas).[175] Natural gas prices, as indicated by Henry Hub, are expected to average U$2.6 per MMBtu in the short-term (through 2025) and US$3.6 per MMBtu through 2050, as described in Section 4.2.

Although WTI and Henry Hub are useful benchmarks for natural gas and crude oil prices, other considerations, such as regional variations, fuel qualities, and transportation costs will need to be considered for an accurate comparison of generation costs. Notably, benchmark prices do not include the cost of transportation, liquefaction (in the case of natural gas), and distribution.

4.1 International prices of crude oil

WTI prices serve as a relevant benchmark for Suriname, given the country's geographical proximity to the United States market.[176] WTI prices have been volatile in the past 20 years (as illustrated in

[171] Information gathered from meetings with EAS and key stakeholders during the inception visits during the week of 8 April 2024.

[172] New York Times, 2021. "Suriname Could Be Latest Big Oil Find as Industry Cuts Costs." https://www.nytimes.com/2021/01/20/business/energy-environment/suriname-oil-discovery.html

[173] Rystad Energy, 2022. "Guyana Upstream: Industry and Country Benchmarking Update." p 26. https://cpccaribbean.org/guyana-upstream-a-rystad-energy-june-2022-industry-and-country-benchmarking-update/

[174] EIA, 2024. "Short Term Energy Outlook 2024."

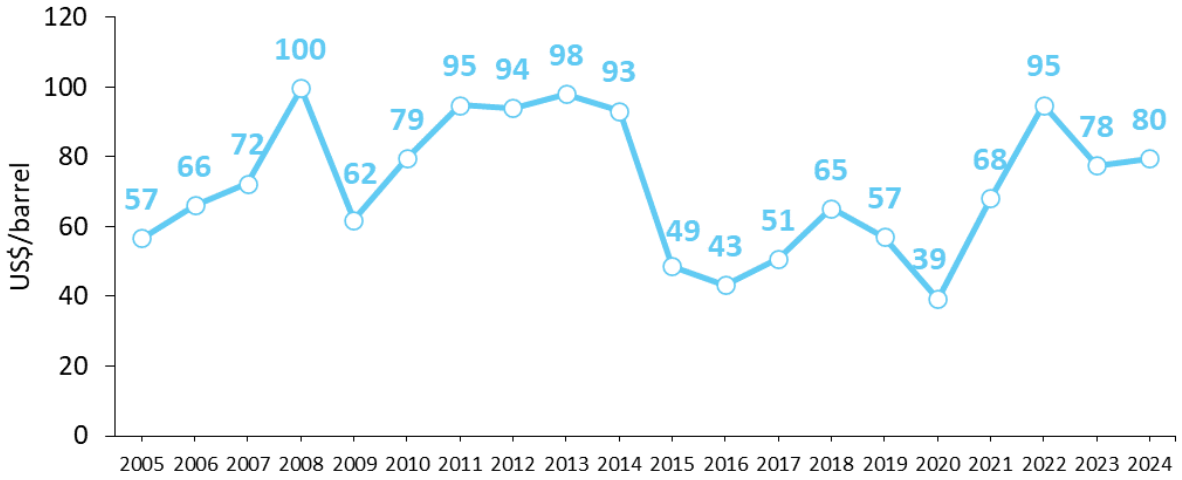
[175] The EIA Annual Energy Outlook (AEO) 2023 provides projections of global energy prices through 2050. It takes into account different scenarios using an integrated model that captures changes in energy supply, demand, prices, and technology developments.

EIA, 2023. "Annual Energy Outlook 2023." https://www.eia.gov/outlooks/aeo/

[176] West Texas Intermediate (WTI) and Brent serve as pricing references for international sellers and buyers to determine prices for the varieties of crude oil and blends. WTI is a blend of several streams of light sweet crude oils produced in the United States used as a price benchmark primarily in the Americas. Brent Crude is a mix of crude oil from the North Sea. Brent is the crude oil price benchmark primarily used in Europe.

Figure 4.1), with a standard deviation of US$20 per barrel, equal to US$3.4 per MMBtu.[177] In this period, average annual WTI peaked at US$100 per barrel (in 2008) and reached its lowest in 2020 at US$39 per barrel.

Figure 4.1: Yearly average spot prices of WTI crude oil, 2005-2024



Note: Prices for 2024 cover the period January-April 2024.

Source: EIA[178]

Short-term outlook for WTI prices

Crude oil prices are expected to decline between 9 and 16 percent from US$85 per barrel in April 2024 through 2025. These Short-term forecasts, based on EIA projections and futures contracts, are shown in Figure 4.2.

[177] The standard deviation was converted to US$ per MMBtu by converting barrels to MMBtu, assuming an energy content of 5.6MMBtu per barrel for crude oil.

EIA. "Energy conversion calculators." https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php

[178] EIA. "Spot Prices for Crude Oil." https://www.eia.gov/dnav/pet/PET_PRI_SPT_S1_D

Figure 4.2: Projected WTI monthly prices, 2024-2025

Sources: EIA[179] for projections; OILPRICE[180] for futures contracts.

Long-term outlook for WTI prices

Long-term crude oil projections vary widely. Depending on the scenario, the EIA projects WTI to be between US$50 and US$185 per barrel over the next 25 years. Under the reference case,[181] WTI is expected to average at US$92 per barrel over the next 25 years. Figure 4.3 shows the EIA's long-term WTI projections under three scenarios.

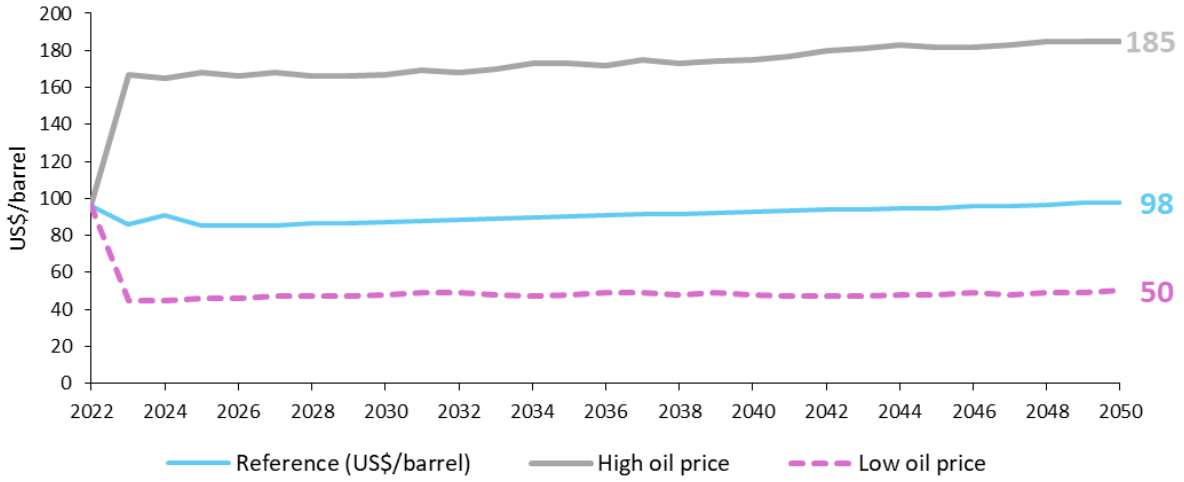
[179] EIA, 2024. "Short Term Energy Outlook 2024." https://www.eia.gov/outlooks/steo/data.php?type=figures

[180] OILPRICE, 2024. "WTI Crude Oil Futures And News" https://oilprice.com/futures/wti/#CLU24

[181] The reference case assumes energy markets will operate through 2050 under current laws and regulations as of November 2022 under evolutionary technological growth assumptions. The low and high oil price scenarios depend on the assumption that global market balances, primarily international supply and demand factors, drive future crude oil prices. To account for these factors, oil prices are an exogenous assumption in this scenario.

Energy Information Administration, 2023. "Annual Energy Outlook," p. 33. https://www.eia.gov/outlooks/aeo/pdf/AEO2023_Narrative.pdf

Figure 4.3: Projected prices of WTI in different scenarios, 2022-2050



Note: Values are expressed in 2022 dollars per barrel. Figures for 2022 and 2023 are projections based on the EIA's most recent available Annual Energy Outlook from 2023.
Source: EIA[182]

4.2 International prices of natural gas

Landed natural gas is expected to replace HFO to make up half of power generation by 2040.[183] In addition to technical considerations, the international price of natural gas will determine whether natural gas will be an economic fuel option for thermal generation in Suriname. This section presents price projections for Henry Hub as the most relevant benchmark of the price of natural gas in Suriname.[184]

Henry Hub's average annual price was US$4.3 per MMBtu (see Figure 4.4) and the standard deviation was US$2.1 per MMBtu between 2005 and 2024. Comparing this standard deviation to the standard deviation of WTI in the same period (US$3.4 per MMBtu)[185] indicates that crude oil prices are notably more volatile.

[182] EIA, 2023. "Annual Energy Outlook 2023." Reference scenario: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=12-AEO2023&region=0-0&cases=ref2023&start=2021&end=2050&f=A&linechart=ref2023-d020623a.3-12-AEO2023&sid=ref2023-d020623a.4-12-AEO2023&sourcekey=0 Side scenarios: https://www.eia.gov/outlooks/aeo/tables_side_xls.php

[183] Information gathered from meetings with EAS and key stakeholders during the inception visits during the week of 8 April 2024.

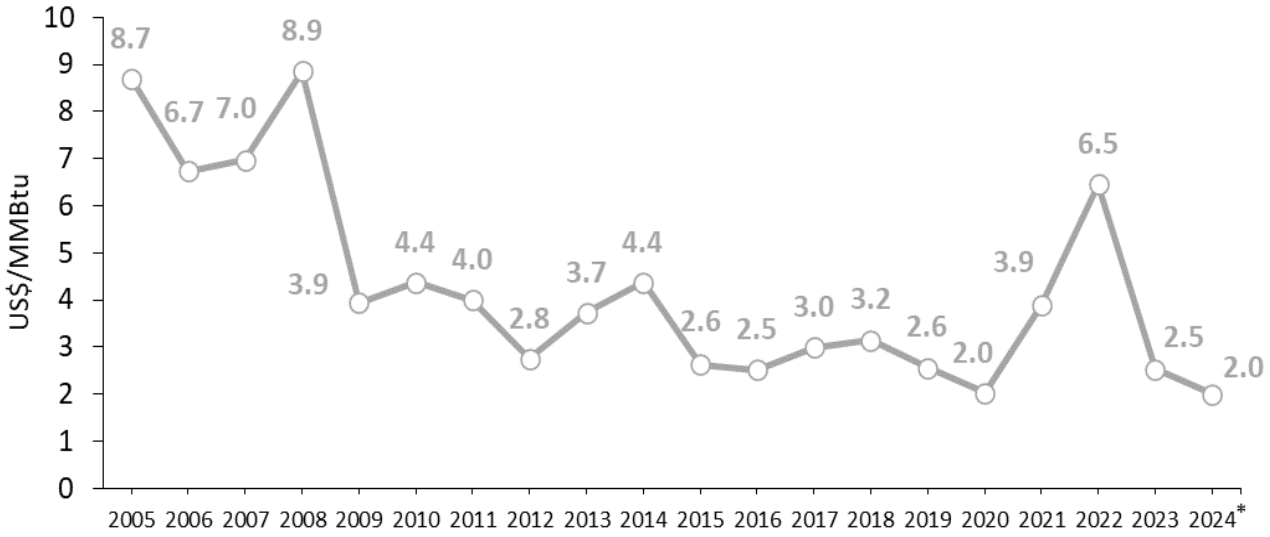
[184] The Henry Hub price is used as a global price benchmark for natural gas. It is the pricing point used for the trading of natural gas futures on the New York Mercantile Exchange (NYMEX). Henry Hub is often used as a source of spot natural gas pricing because of its high liquidity, clear pricing transparency, and large trading volume.

[185] The standard deviation was converted to US$ per MMBtu by converting barrels to MMBtu, assuming an energy content of 5.6MMBtu per barrel for crude oil.

EIA. "Energy conversion calculators." https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php

Higher price volatility means more uncertainty in fuel costs. This can lead to a greater need for hedging and other financial instruments to manage risk, potentially adding to overall operational costs. Further, crude oil prices have historically been sensitive to geopolitical events and macroeconomic trends, as recently seen with WTI peaking at US$124[186] per barrel in March 2022 following Russia's invasion of Ukraine. Such external factors can create significant disruptions and price swings in generation costs, leading to financial strain and operational challenges for utilities.

Figure 4.4: Yearly average for natural gas prices at Henry Hub, 2005-2024



**Note: Prices for 2024 cover the period January-April 2024.*
Source: EIA[187]

Short-term outlook for Henry Hub prices

Henry Hub is expected to increase between 120 percent and 170 percent from April 2024 through 2025 following a decline in US natural gas production in 2024, which will put upward pressure on the spot price.[188] Figure 4.5 shows the short-term outlook for Henry Hub prices.

The EIA projects Henry Hubs to average US$2.2 per MMBtu in 2024 and slightly higher at US$3.1 per MMBtu in 2025.[189] Futures traded in May 2024 suggest that Henry Hub will follow a similar trend, averaging US$2.6 per MMBtu in 2024 and US$3.5 per MMBtu in 2025.[190]

[186] FRED. "Crude Oil Prices: West Texas Intermediate (WTI)." https://fred.stlouisfed.org/series/DCOILWTICO/

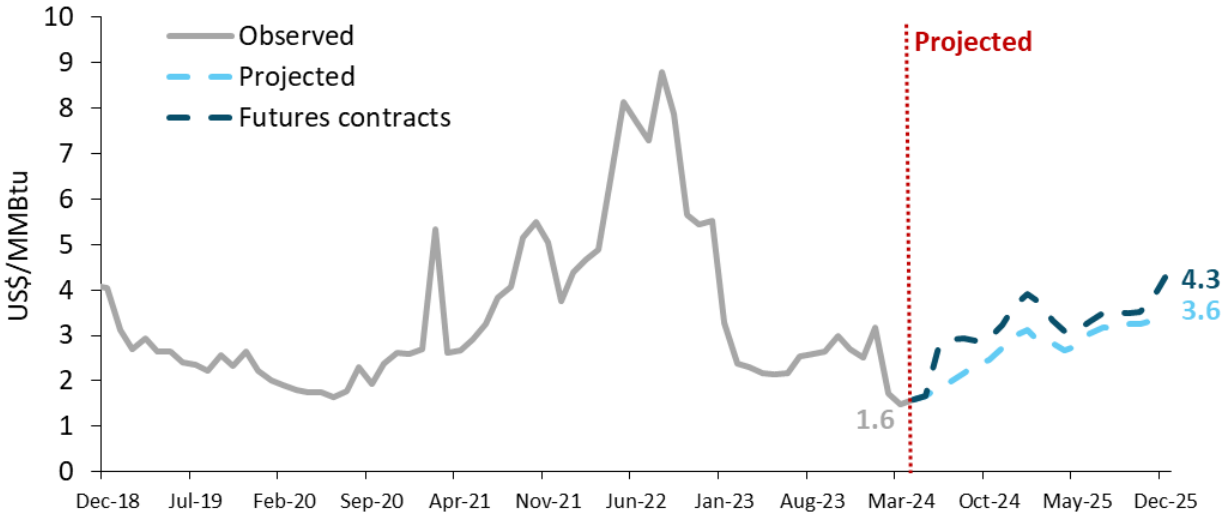
[187] EIA, "Spot Prices for Crude Oil." Accessed on 21 May 2024 https://www.eia.gov/dnav/pet/PET_PRI_SPT_S1_D.htm

[188] EIA, 2024. "Short-Term Energy Outlook June 2024." https://www.eia.gov/outlooks/steo/pdf/steo_full.pdf

[189] EIA, 2024. "Short Term Energy Outlook 2024." https://www.eia.gov/outlooks/steo/data.php?type=figures

[190] CME Group. "MICRO WTI CRUDE OIL FUTURES - SETTLEMENTS." Accessed on 21 May 2024. https://www.cmegroup.com/markets/energy/crude-oil/micro-wti-crude-oil.settlements.html

Figure 4.5: Historical and projected Henry Hub natural gas prices, 2018-2025



Sources: EIA[191] for projections; CME Group[192] for futures contracts.

Long-term outlook for Henry Hub prices

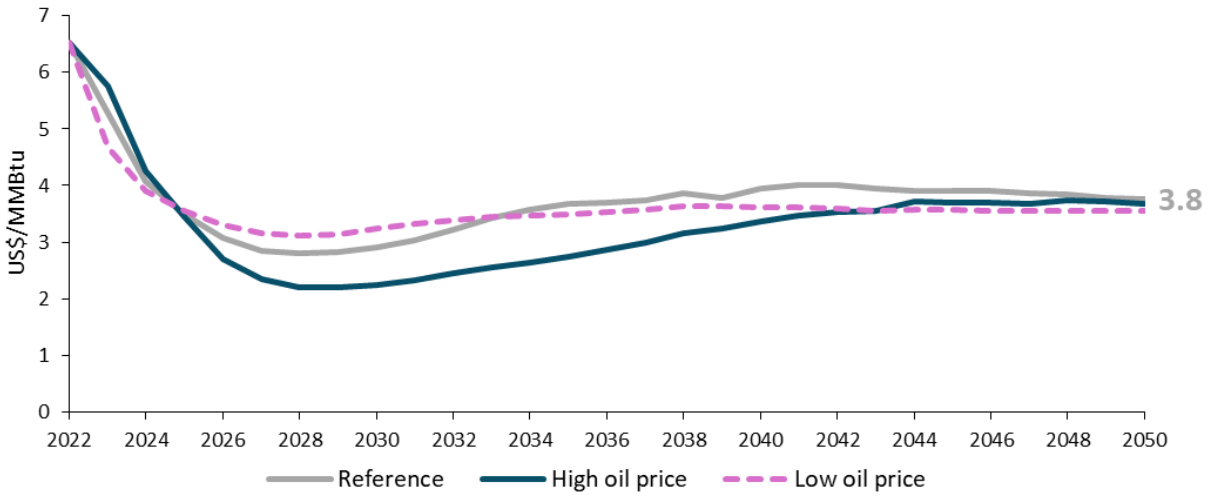
Henry Hub is expected to average at about US$3.7 per MMBtu over the next 25 years, more than doubling from its current level of US$1.6 per barrel as of April 2024.[193] Figure 4.6 shows the EIA's long-term price projections for Henry Hub through 2050.

[191] EIA, 2024. "Short Term Energy Outlook 2024." https://www.eia.gov/outlooks/steo/data.php?type=figures

[192] CME Group. "MICRO WTI CRUDE OIL FUTURES - SETTLEMENTS." Accessed on 21 May 2024. https://www.cmegroup.com/markets/energy/crude-oil/micro-wti-crude-oil.settlements.html

[193] EIA, 2024. "Short Term Energy Outlook 2024." https://www.eia.gov/outlooks/steo/data.php?type=figures

Figure 4.6: Projected Henry Hub prices, 2022-2050



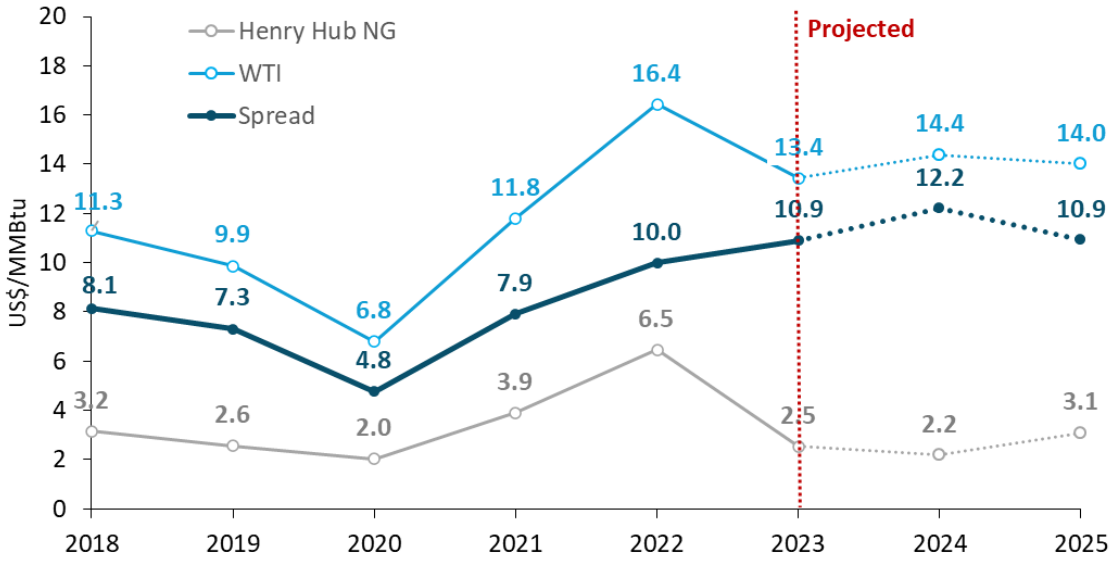
Note: Values are expressed in 2022 dollars per MMBtu. Figures for 2022 and 2023 are projections based on the EIA's most recent available Annual Energy Outlook from 2023.
Source: EIA[194]

4.3 Spreads between projected prices of crude oil and natural gas

Spreads between the international prices of crude oil and natural gas create an opportunity for electricity generated with natural gas to be cheaper than that generated with HFO. If the spread between crude oil and natural gas prices is sufficient, generating electricity with natural gas in Suriname could be cheaper than doing so with diesel or HFO. Figure 4.7 shows the historical and projected spread between Henry Hub and WTI from 2018 to 2025.

[194] EIA, 2023. "Annual Energy Outlook 2023." Reference scenario: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=13-AEO2023&region=0-0&cases=ref2023&start=2021&end=2050&f=A&linechart=ref2023-d020623a.3-13-AEO2023~ref2023-d020623a.31-13-AEO2023&ctype=linechart&sourcekey=0 Other scenarios: https://www.eia.gov/outlooks/aeo/tables_side_xls.php

Figure 4.7: Projected spread between WTI crude oil and Henry Hub natural gas prices, 2018-2025

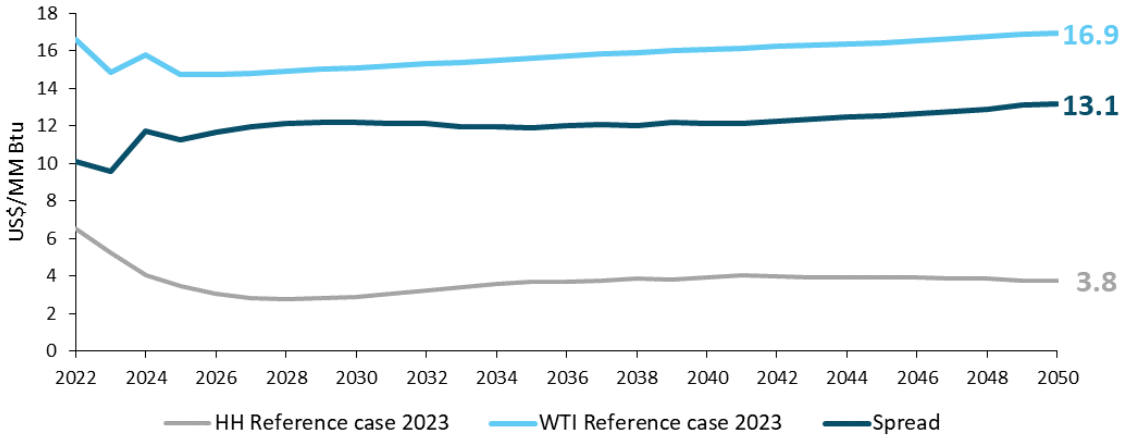


Note: WTI prices have been converted to US$/MMBtu from US$/barrel, using the conversion factor of 1 barrel to 5.6MMBtu.
Source: EIA[195]

The spread increased by 34 percent between 2018 and 2023 and is not expected to change significantly in the short term. Based on long-term projections through 2050, the spread between WTI and Henry Hub will continue to widen, as shown in Figure 4.8.

[195] EIA, 2024. "Short Term Energy Outlook 2024." https://www.eia.gov/outlooks/steo/data.php?type=figures

Figure 4.8: Projected spread between WTI and Henry Hub prices, 2022-2050



Note: WTI prices have been converted to US$/MMBtu from US$/barrel, using the conversion factor of 1 barrel to 5.6MMBtu. Figures for 2022 and 2023 are projections based on the EIA's most recent available Annual Energy Outlook from 2023. Projections are based on the EIA's reference case scenario.
Source: EIA[196]

5 Energy targets and strategies

This section covers Suriname's targets in renewable energy (Section 5.1), energy efficiency (Section 5.2), and energy access (Section 5.3).

5.1 Renewable energy

As part of its NDC, Suriname aims to maintain over 35 percent of electricity generation from renewable sources by 2030.[197] Although the current generation matrix is dependent on oil and hydroelectric resources, preliminary assessments indicate that Suriname has more renewable energy potential that could help diversify the generation matrix. This section assesses the potential of renewable technologies, including:

- Solar in Section 5.1.1;
- Wind in Section 5.1.2;
- Hydropower in Section 5.1.3; and

[196] EIA. 2023. "Annual Energy Outlook 2023-Reference scenario." https://www.eia.gov/outlooks/aeo/data/browser/#/?id=12-AEO2023&region=0-0&cases=ref2023&start=2021&end=2050&f=A&linechart=ref2023-d020623a.3-12-AEO2023&sid=ref2023-d020623a.4-12-AEO2023&sourcekey=0

[197] Government of the Republic of Suriname, 2020. "Nationally Determined Contribution." p 15. https://unfccc.int/sites/default/files/NDC/2022-06/Suriname%20Second%20NDC.pdf

- Biomass in Section 5.1.4.

5.1.1 Solar

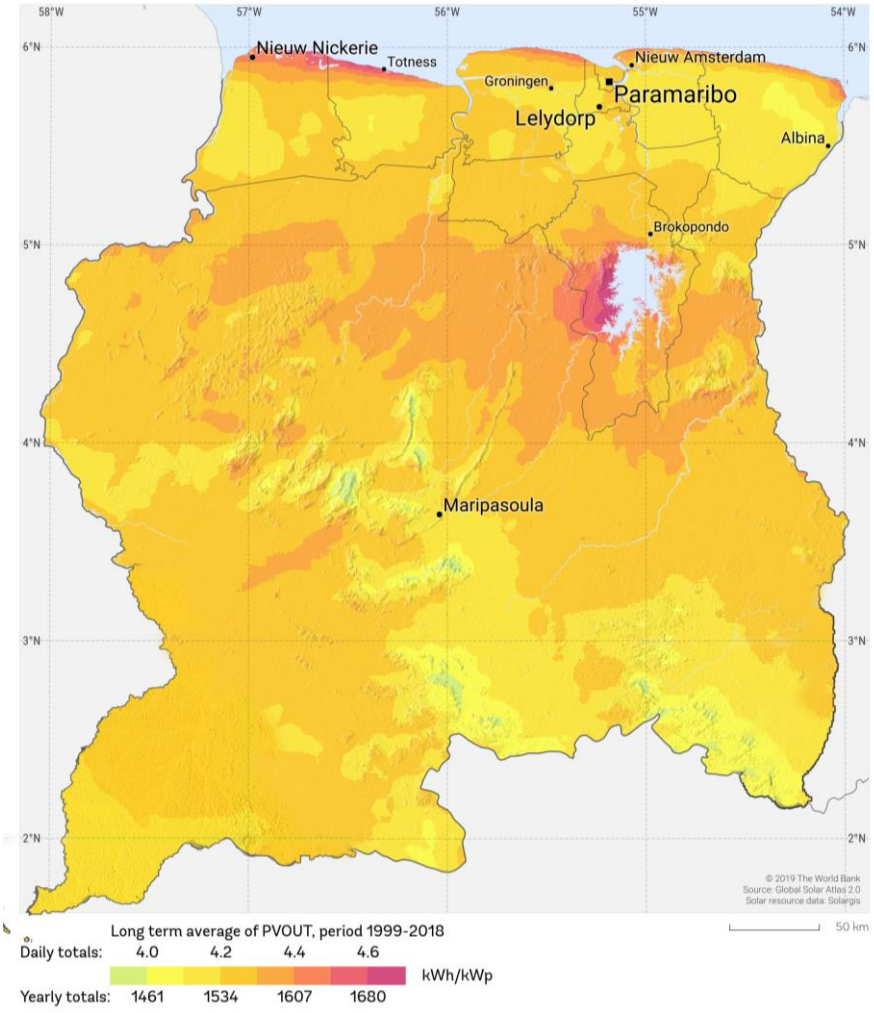
By 2040, the Government anticipates that solar will make up 25 percent of the generation matrix.[198] Despite ambitious policy targets, Suriname's solar potential is relatively low, as shown in the map in Figure 5.1.[199] The coastal strip has an average daily solar yield of 4.1kWh/kWp except for a small stretch of land near Nieuw Nickerie and Brokopondo,[200] which has a daily solar yield higher than 4.5kWh/kWp.

[198] IDB. 2024. "Electricity Sector Regulatory Review & Minimum Regulatory Function Strategy." p 15.

[199] EAS. 2022. "Report on regulation for SDG 7 in Suriname." p 20.

[200] EAS. 2022. "Report on regulation for SDG 7 in Suriname." p 20.

Figure 5.1: Photovoltaic power potential in Suriname



Source: Global Solar Atlas[201]

There are plans to increase solar PV capacity. In rural areas, ongoing projects include:

- A 500kWp solar PV plant in Brownsweg, part of Brokopondo;
- A 200kWp solar PV plant in the Alliance plantation; and
- Solar PV mini-grids in the upper Suriname River area to supply electricity to villages that currently lack access.[202]

[201] Global Solar Atlas. "Photovoltaic Power Potential in Suriname." https://globalsolaratlas.info/download/suriname

[202] EAS. 2022. "Report on regulation for SDG 7 in Suriname." p 24.

There is also potential for floating solar PV. A recent study concluded that a floating solar PV plant on the Brokopondo reservoir is cost-effective. The potential project could be sized at about 48MWe (60MWp) with an annual energy production of an estimated 101GWh. The project is expected to require a capital investment of US$44 million.[203]

As part of its efforts to incentivize investment in solar, the Government introduced a tax exemption on solar import duties in 2022. The exemption represents 90 percent of the import duties and covers solar systems, components, and accessories. The exemption, however, excludes batteries.[204]

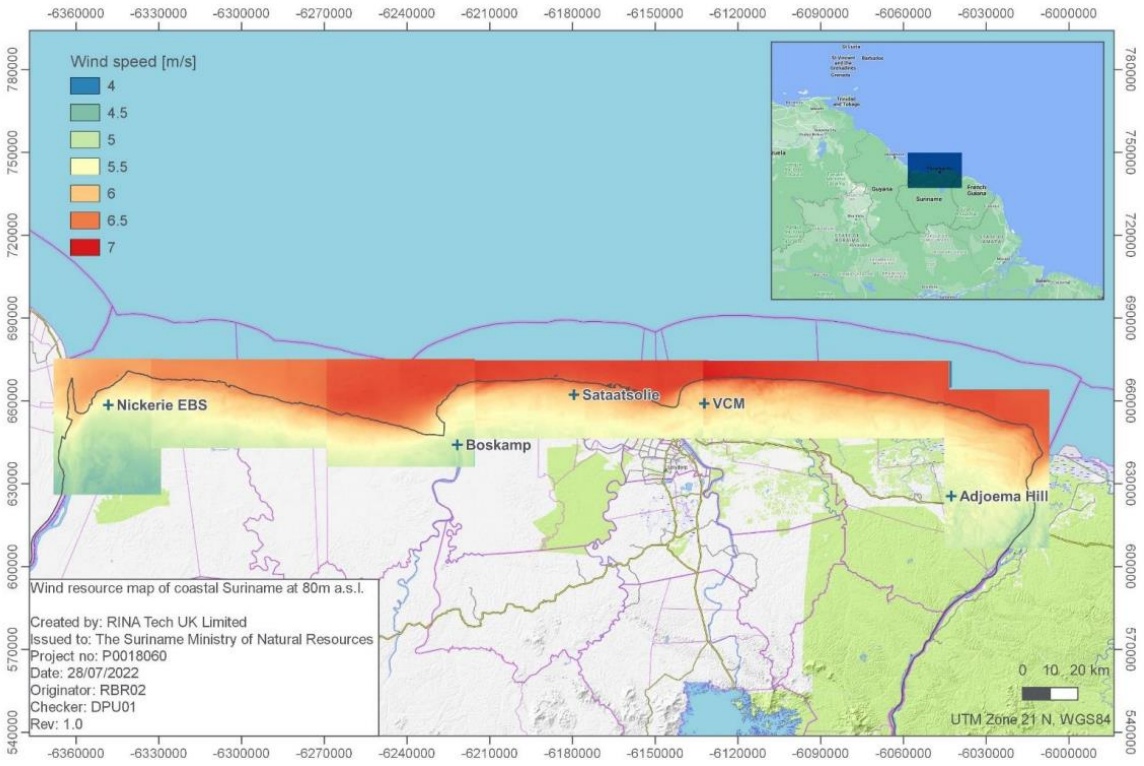
5.1.2 Wind

Although wind does not contribute to Suriname's generation mix as of 2024, studies indicate that Suriname could integrate wind power in the future. Suriname's northern coast has the highest wind potential, as shown by the map in Figure 5.2.

[203] Dornier Suntrace GmbH. 2022. "*Floating PV in Suriname*." Report sponsored by the IDB.

[204] Government of Suriname. "Government grants partial exemption from duties on import of solar energy systems." Link

Figure 5.2: On-shore wind resource assessment



Source: Warsodikromo[205]

Wind turbines are not considered at the scale of large wind farms using multiple megawatt-class units, due to the Class 1 wind power rating of the onshore resource. However, this does not mean wind power is not an option—several studies have pointed to the potential for generation using smaller wind turbine units. These possibilities warrant further exploration, particularly through pilot projects. Additionally, the offshore wind potential has yet to be determined and remains an open area for assessment.

Assessments indicate that average wind speeds in Suriname are suitable for small turbines, but insufficient for utility-scale projects. Favorable locations for wind turbines are those with an annual average wind speed of least 4.0m/s for small turbines and 5.8m/s for utility-scale turbines.[206]

[205] Warsodikromo, S. 2022. "On-Shore Wind Resource Assessment of the Coast of Suriname"

[206] EIA. 2024. "Wind explained: Where wind power is harnessed." https://www.eia.gov/energyexplained/wind/where-wind-power-is-harnessed.php

As part of a 2022 study, MNH assessed the onshore wind resource along the coast of Suriname by installing five measurement stations: Nickerie EBS, Boskamp, Staatsolie, VCM-Commewijne, and Adjoema Hill. The average wind speed across these five sites was 4.9m/s, as Table 5.1 shows.

Each station exhibited stable wind conditions with a narrower range of wind speeds. This is measured by the Weibull form parameter (k),[207] which was greater than 1.5 at all stations. Table 5.1 shows the Weibull distribution components in the Suriname wind stations assessed.

Table 5.1: Wind characteristics in Suriname wind stations across Suriname

Station	A (m/s)	K	Mean wind speed (m/s)
Adjoema Hill	4.4	2.3	3.9
VCM-Commewijne	5.9	2.6	5.2
Staatsolie	6.3	2.8	5.6
Boskamp	4.8	2.8	4.3
Nickerie EBS	5.9	2.7	5.3

Source: Warsodikromo[208]

Suriname stations recorded their maximum wind speeds between January and March,[209] suggesting wind generation could peak during these months. VCM, Staatsolie, and Nickerie reached maximum wind speeds exceeding 7.0m/s during that period. Figure 5.3 shows how recorded wind speeds at each station compare to the minimum wind speeds required.

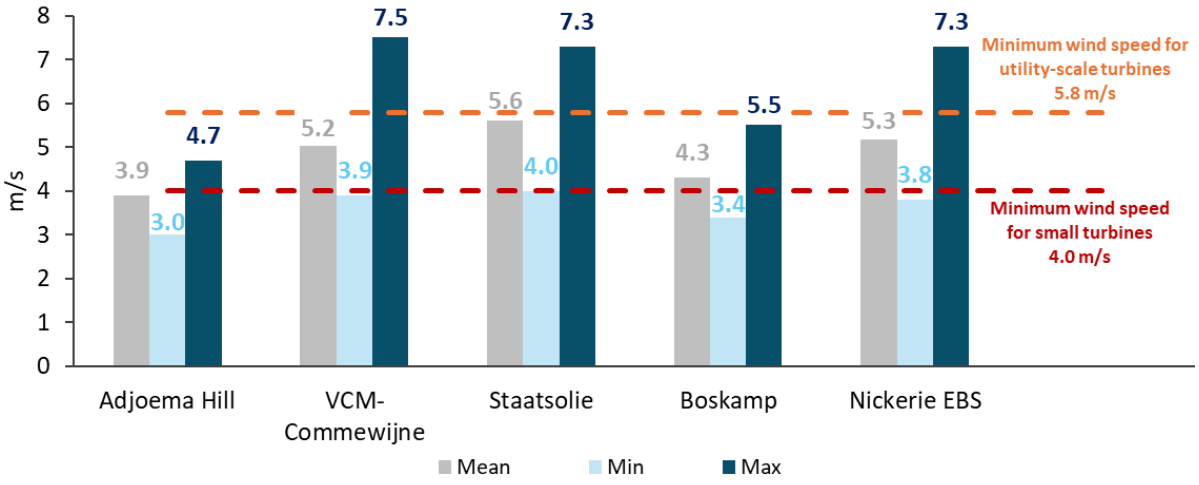
[207] The Weibull distribution is a statistical metric used for assessing the distribution of wind speeds. The Weibull distribution has two parameters: A, which is proportional to the mean wind speed, and k, the form parameter. The value of k ranges from 1 to 3, with a lower k indicating more variable winds and a broader range of wind speeds, while a higher k signifies more consistent winds and a narrower speed distribution. For instance, a very gusty location may have a Weibull k value as low as 1.5, whereas a location with steady winds, like tropical trade wind environments, will typically have a higher k value.

Warsodikromo, S. 2022. "On-Shore Wind Resource Assessment of the Coast of Suriname." p 13.

[208] Warsodikromo, S. 2022. "On-Shore Wind Resource Assessment of the Coast of Suriname"

[209] Warsodikromo, S. 2022. "On-Shore Wind Resource Assessment of the Coast of Suriname"

Figure 5.3: Wind speed in Suriname wind stations and the minimum for small and utility-scale turbines.



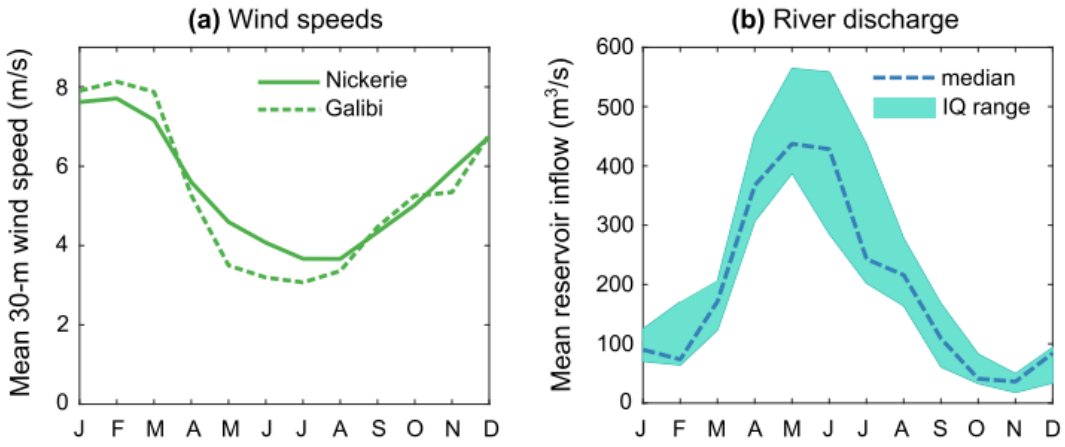
Source: Suriname wind speeda: Warsodikromo;[210] Data on wind speeds: IEA[211]

Wind and hydro generation (see Section 5.1.3) could complement each other well due to their opposite seasonal patterns, as illustrated in Figure 5.4. River discharge peaks during the rainy season, between April and August, while wind speeds are highest between November and March.

[210] Warsodikromo, S. 2022. "On-Shore Wind Resource Assessment of the Coast of Suriname"

[211] EIA. 2024. "Wind explained: Where wind power is harnessed." https://www.eia.gov/energyexplained/wind/where-wind-power-is-harnessed.php

Figure 5.4: Seasonal wind-hydro complementarity in Suriname



Source: Sterl et. al.[212]

5.1.3 Hydro

Suriname depends on hydropower, with 189MW (roughly 35 percent) of its installed being the Afobaka hydropower plant. As of 2024, SPCS plans to upgrade three of its six turbines (30MW each) from fixed to adjustable blades. This is estimated to increase the capacity of each unit by an average of 10MW, for a total increase of about 30MW.[213,214]

In addition to Afobaka, the Government identified at least 680kW of feasible mini-hydro projects in rural areas.[215] The assessment included the Marowijne, Upper Tapanahony, Suriname, and Silpawini rivers. Table 5.2 shows the estimated hydro capacity potential for each project assessed.

Table 5.2: Hydro potential for each project

Project	Output (kW)
Granolo Sula	130
Tapawatra	200
Nieuw Aurora	120
Atjoni	50
Pulugudu	80
Tepu	50

[212] Sterl et. al. 2020. "Turbines of the Caribbean: Decarbonising Suriname's electricity mix through hydro-supported integration of wind power." p 3. https://www.sciencedirect.com/science/article/pii/S1364032120306407

[213] The remaining three turbines already have adjustable blades.

[214] EAS. 2022. "Report on regulation for SDG 7 in Suriname." p 34.

[215] Naipal, S. 2012. "Mini-micro hydropower – a solution to sustainable development in the interior of Suriname." p 72.

Project	Output (kW)
Kwamalasamutu	50
Total	**680**

Source: Naipal, S.[216]

The TapaJai project could increase hydropower capacity by 182MW, nearly doubling the current 189MW capacity.[217] However, the impact on the environment would be substantial and likely lead to political and social resistance as:

- Upstream river flows would need to be diverted;
- Some forested areas near riverbanks would be flooded;
- Several villages along the rivers would face significant changes in water levels, permanently altering living conditions;[218] and
- Previous efforts to gain local community support have encountered strong resistance.[219]

Similarly, the Kabalebo Hydro Project in the southwest part of the country could increase hydro capacity by up to 800MW but is likely to be met with political and social resistance.

5.1.4 Biomass

Recent studies have evaluated Suriname's biomass potential, focusing on the viability of rice husk disposal, municipal solid waste, and elephant grass as sources of biofuel.

Rice husks could be a viable fuel source for a biomass combustion plant in the Nickerie district. In 2018, EBS estimated that a 5MW biomass combustion plant using rice husk disposals could be feasible. The plant would consist of two steam turbines, each with a capacity of 2.5MW, and cost an estimated US$16 million. The estimated average generation cost would be US$0.085/kWh, and without the rice husk transportation cost, it would be US$0.079/kWh.[220]

Additionally, there have also been studies to assess the feasibility of developing a waste-to-energy plant in the Ornamibo landfill. The most viable methods identified were grate combustion and fluidized bed combustion, both of which involve burning waste in a furnace to generate steam. The potential plant's annual energy output was projected to be 6MWh with an annual waste input of 90,000 tons and 7.8MWh with an annual waste input of 125,000 tons.[221]

The Government has also assessed the viability of a 20MW power plant burning elephant grass as biofuel. The proposed plant would feature a two-steam Rankine cycle system and would require

[216] Naipal, S. 2012. “Mini-micro hydropower – a solution to sustainable development in the interior of Suriname.” p 72.

[217] Staatsolie. 2017. “TapaJai Hydropower Project.” p 6.

[218] EAS. 2022. “Report on regulation for SDG 7 in Suriname.” p 34.

[219] EAS. 2022. “Report on regulation for SDG 7 in Suriname.” p 34.

[220] EBS. 2018. “Electric Power Generation from Rice Husk.” p 10.

[221] EBS. 2019. “Waste to energy.” p 7.

between 306,600 and 308,600 tons of elephant grass annually to operate. The project is estimated to cost US$44 million.[222]

5.2 Energy efficiency

Energy efficiency and energy conservation measures help use less energy to perform the same task or achieve the same output level. Further, reducing energy consumption is the easiest and most cost-effective way to reduce consumers' GHG emissions and energy costs.

- *Energy efficiency* typically refers to using technologies and practices to improve the technical performance of devices, systems, and building materials that consume energy.
- *Energy conservation* refers to behavioral changes and actions to reduce energy consumption. For example, replacing traditional incandescent bulbs with more efficient LED lights is an energy efficiency measure. Meanwhile, turning lights off when they are not needed, whether manually or through automation like timers or motion sensors, is an example of conservation.[223]

This section provides a high-level explanation of Suriname's energy efficiency targets. Volume II—Technical Plan of the ESP contains a detailed energy efficiency plan. Volume III—Regulatory Plan covers energy efficiency policy measures.

Setting energy efficiency targets allows the Government to define a trajectory and assess the country's performance against these targets. The Government may set targets for:

- Supply side, that is, electricity generation, transmission, and distribution (Section 5.2.1); and
- Demand side, that is, electricity consumption (5.2.2).

5.2.1 Supply-side energy efficiency targets

Supply-side energy efficiency targets aim to improve efficiency in:

- **Generating power**: Heat rate is an effective indicator to assess efficiency improvement in generating power, as a reduction in heat rate means less fuel is needed to produce a unit of electricity.
- **Delivering power to consumers**: Technical losses are an effective indicator of efficiency improvement in delivering power. Reducing technical losses means that less electricity needs to be generated to meet the same level of demand.

However, the relevance of these indicators depends on Suriname's baseline performance. If Suriname already has a heat rate and technical losses close to maximum efficiency, there might not be much room for further reduction so that benefits exceed costs. If the indicators are

[222] EBS. "Elephant grass as biofuel for a 20 MW power plant." p 8.

[223] Energy Information Administration. 2024. "Use of energy explained: Energy efficiency and conservation." https://www.eia.gov/energyexplained/use-of-energy/efficiency-and-conservation.php

relevant, setting the targets will also depend on Suriname's baseline performance, as the targets have to be realistically attainable.

The relevance of these indicators cannot be assessed due to the lack of data on Suriname's baseline performance. When this data becomes available, the Government can determine the relevance of using these indicators and, if relevant, set the targets.[224]

5.2.2 Demand-side energy efficiency targets

Demand-side energy efficiency targets aim at the reduction in consumers' use of electricity. Demand-side targets can be quantitative or qualitative:

- **Quantitative targets** refer to achieving a target performance on defined indicators. Such indicators measure the reduction in consumers' electricity use in absolute or unit terms. However, achieving the targets is not entirely in the control of the Government and EBS, as it ultimately depends on consumers' choices.
- **Qualitative targets** refer to implementing defined regulations and programs by a certain date to develop the energy efficiency market. The Government and EBS have control over implementing such regulations and programs, which ultimately support achieving quantitative targets.

Quantitative energy efficiency targets

The following quantitative targets are commonly used in the Caribbean and other regions:

- **Energy intensity**. This indicator measures the energy required to produce a unit of GDP. This indicator is used, for example, in Antigua and Barbuda, Belize, and Jamaica. However, the Caribbean Electric Utility Services Corporation (CARILEC) indicated that using such energy intensity may be detrimental to Caribbean countries[225] because performance on this indicator depends not only on efficiency but also on climate and the sectoral composition of a country's economy.[226] For example, an economy with a significant share of mining, like Suriname, would have a relatively high energy intensity because mining is structurally highly energy-intensive.
- **Final energy consumption**. This indicator is used in Barbados, Dominica, and Saint Lucia but has the same disadvantage for Caribbean countries regarding energy intensity.

[224] When baseline data is provided, all targets defined in Volume II of the Performance Standards and Monitoring Report, including heat rate and technical losses, will be revisited and updated in that report, if needed.

[225] CARILEC. 2021. "Position Paper on Policies for Energy Transition." p 13. https://www.carilec.org/assets/docs/CARILEC%20Position%20Paper%20on%20Policies%20for%20Energy%20Transition-%20June%202021.pdf

[226] ECLAC. 2022, "Energy in Latin America and the Caribbean: access, renewability and efficiency." P 8. https://repositorio.cepal.org/server/api/core/bitstreams/cfde21e2-8d17-48f1-8f30-429984e09715/content

- **Annual energy savings**. This indicator is used, for example, in the European Union, which has set targets of 1.3 percent per year between 2024-2025, 1.5 percent per year between 2026-2027, and 1.9 percent per year between 2028-2030.[227]

Qualitative energy efficiency targets

Qualitative targets refer to regulations and incentives the Government commits to implementing by a certain date to develop the energy efficiency market.

Regulations apply to the supply side of energy efficiency: manufacturers, importers, and retailers of equipment and appliances. The most efficient regulatory instruments for energy efficiency are MEPS, energy labeling systems, and building codes that suppliers and industries must comply with. MEPS are the minimum level of energy performance that electrical equipment, appliances, and lighting products must meet or exceed before they can be imported, offered for sale, or used for commercial purposes. The Suriname Bureau of Standards (*Surinaams Standaarden Bureau*, SSB) defines three types of standards:

- International standards: Those developed by the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the International Telecommunication Union (ITU);
- Regional standards: Those developed by regional bodies such as the CARICOM Regional Organization for Standards and Quality (CROSQ), which develops CARICOM standards; and
- National standards: Those developed by the SSB.[228]

Energy labeling involves placing a label on a product to indicate its energy performance. Energy labeling and MEPS are the most common energy efficiency measures in Latin America and the Caribbean.[229]

Building codes define mandatory minimum requirements for energy efficiency in new and renovated buildings. CROSQ has developed a CARICOM Regional Energy Efficiency Building Code (CREEBC) for CARICOM Member States to adapt to their national legislation. The CREEBC defines efficiency requirements for all aspects of energy use in commercial and residential buildings, including heating and ventilating, lighting, water heating, and power usage for appliances and building systems. In the EU, all new buildings are to be "nearly-zero energy buildings" (high energy performance and very low-energy needs, mainly covered by onsite and nearby renewable energy sources) between 2020 and 2028 and "zero-emissions buildings" (no on-site carbon emissions from fossil fuels and very high energy performance) from 2028 for public buildings and from 2030 for all other buildings.[230]

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[227] European Commission. "Energy Efficiency Directive." https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en

[228] Surinaams Standaarden Bureau. "Standards development." https://www.ssb.sr/services/standards-development/

[229] World Bank. 2022. "Realizing the Potential of Energy Efficiency in Latin America and the Caribbean." p 22. https://documents1.worldbank.org/curated/en/099854005092338445/pdf/IDU0541d1c4104cfd0449a089b90f7882cb769c0.pdf

[230] European Comission. "Nearly-zero energy and zero-emission buildings." https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/nearly-zero-energy-and-zero-emission-buildings_en

Incentives apply to the demand side of energy efficiency: consumers. The following incentives are efficient in promoting energy efficiency:

- **Financing mechanisms and fiscal incentives** enable consumers to upgrade conventional equipment and appliances to energy-efficient models. For example, Barbados' Energy Smart Fund has provided debt financing for the tourism sector and small and medium enterprises to implement energy efficiency measures and a 50 percent instant rebate on energy-efficient ACs for households and businesses.[231]
- **Implement an awareness-raising campaign** to inform consumers of the benefits of energy efficiency.

Volume II – Technical plan of the ESP describes these incentives in detail and provides a roadmap for their implementation by 2030.

5.3 Energy access

Suriname's NDC states that achieving full electricity access is one of Government's goals.[232] As of 2024, the national electricity access rate was 98.2 percent. However, in rural areas, particularly villages, it drops below 90 percent, leaving around 20,000 households without access or relying on small diesel generators.[233]

To address these challenges, the Government is expanding electricity access by financing disaster-resilient solar mini-grids and improving distribution networks. To support this, the IDB approved a US$135 million credit line, with an initial US$45 million for infrastructure and a US$1.5 million grant for low-emission energy initiatives.[234,235]

[231] Barbados Government. "Sustainable Energy Investment Programme."Link

[232] The Republic of Suriname. 2020. "Nationally Determined Contribution." P 14.

[233] IDB. 2024 . "Suriname to Increase Access to Electricity, Drinking Water, and Telecommunications for Amazonian Indigenous Communities." Link

[234] These resources will also finance water and telecommunications projects.

[235] IDB. 2024 . "Suriname to Increase Access to Electricity, Drinking Water, and Telecommunications for Amazonian Indigenous Communities." Link

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