

Commonwealth of the Northern Mariana Islands

Energy Baseline Report



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Commonwealth of the Northern Mariana Islands **2023 Energy Baseline Report**

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List of Acronyms

BESS	battery energy storage system
CHCC	Commonwealth Healthcare Corporation
CNMI	Commonwealth of the Northern Mariana Islands
CUC	Commonwealth Utilities Corporation
DER	distributed energy resources
DOE	U.S. Department of Energy
EEMC	Energy Emergency Management Center
EIA	U.S. Energy Information Administration
EMC	Emergency Management Coordinator
EOC	Emergency Operations Center
EP	Emergency Preparedness
EPA	Environmental Protection Agency
ESF	Emergency Support Function
SESP	State Energy Security Plan
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
GWh	gigawatt-hours
HOS	Hours of Service
IJA	Investment Infrastructure and Jobs Act
IRP	Integrated Resources Plan
ISO	Independent System Operator
kV	kilovolt
kWh	kilowatt-hours
LPG	liquefied petroleum gas
MW	megawatt
MWh	megawatt-hours
NASEO	National Association of State Energy Officials
NERC	North American Electric Reliability Corporation
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
O&M	operations and maintenance
OSCCO	Office of Cybersecurity Compliance
PV	photovoltaic
RPS	renewable portfolio standard
RTO	Regional Transmission Operator
TESP	Territory Energy Security Plan
SCADA	system control and data acquisition
SEO	State Energy Office
SOP	Standard Operating Procedure
ULSD	ultra-low-sulfur diesel

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Executive Summary

The Commonwealth of the Northern Mariana Islands (CNMI), situated in the Pacific's Philippine Sea, is home to 47,000 residents, with an economy that is heavily dependent on tourism. The energy landscape in CNMI is challenging given its near-total reliance on imported petroleum products for both electricity generation and transportation. The territory does not have domestic crude oil reserves. This dependence makes CNMI sensitive to regional oil market fluctuations. The most pressing concern, however, is the aging electricity infrastructure and its vulnerability to natural disasters, emphasizing the need for a more resilient power system.

As a state government corporation of CNMI, the Commonwealth Utilities Corporation (CUC) oversees the power sector in the entire territory, and both power and water sectors on the main islands of Saipan, Tinian, and Rota. CUC's priority is addressing challenges with its aged infrastructure, focusing on modernizing electric generation facilities. Their efforts are directed towards enhancing grid reliability, reducing carbon footprints, and integrating renewable energy. Their commitment to these goals is reflected in the Power Infrastructure Priority Project, which is geared towards maximizing renewable energy utilization. The power generation system, though designed for 120 MW, only provides 40 MW as of April 2023. A slowing economy has created financial strains on CUC, as reduced electricity sales and fixed costs impact their operations. The utility also grapples with substantial overdue payments from its commercial and government clients, further deteriorating CUC's credit standing and limiting the ability for CNMI to seek funding to upgrade its aging infrastructure and increase renewable energy across the territory.

To better position the territory towards a sustainable energy future, CNMI has formulated an energy policy focused on local energy sources and reduced reliance on fossil fuels. Established in 2010, the Energy Task Force emphasized renewable energy and established a net energy metering program, which supports residential solar installations. Laws were amended to prioritize renewable energy for essential public services and institutions. With the aim of boosting energy efficiency, CNMI adopted internationally recognized building codes and introduced various programs to encourage sustainable energy habits among its residents. CNMI's renewable energy ambitions have shifted, with an initial stretch goal of 80% renewable electricity by 2014 reduced to 20% by 2016. Several renewable energy projects are under consideration, including solar installations on Tinian and Rota. CNMI's resilience strategy, after the devastation resulting from Super Typhoon Yutu in 2018, focuses on bolstering infrastructure against weather threats. The power infrastructure is seeing strategic upgrades, with a notable \$40 million investment focused on enhancing renewable energy integration and efficiency.

From infrastructure modernization to financial hurdles, a multi-pronged approach is essential to supporting CNMI's economy and energy security goals. Through fuel diversification, renewable energy systems integration, and advancing a strategic policy environment that promotes distributed energy resources and utility-customer-driven approaches for energy conservation and efficiency, the Commonwealth has laid the groundwork for future actions to ensure its energy security, territorial resilience, and progress towards a more sustainable energy system.

1 Introduction

This report summarizes the currently available energy sector data for the Commonwealth of the Northern Mariana Islands as of December 2023. It describes primary energy consumption, end uses, energy production, relevant policies, and key challenges, including details on the electric power and transportation sectors. The report serves as a baseline of understanding to assess CNMI’s island-wide energy needs and priorities.

Situated in the western Pacific Ocean, and with a population of 47,000 per the most recent census, CNMI was historically defined by its tourism and garment industries, both of which brought significant revenue to the territory (“Census Bureau releases,” 2023; “Northern Mariana Islands,” 2021). Given its remote location (Figure 1) and absence of domestic crude oil production and reserves, the territory is highly dependent on imported petroleum products to satisfy the majority of its energy needs. This reliance makes CNMI particularly sensitive to price volatility occurring in regional oil markets.



Figure 1- Map of the Commonwealth of Northern Mariana Islands, adapted by Encyclopædia Britannica, inc. (n.d.). Northern Mariana Islands: Media. Encyclopædia Britannica. <https://www.britannica.com/place/Northern-Mariana-Islands/images-videos#Images>

The rest of this report is organized into five sections: the first section provides an overview of the CNMI energy sector, and the second section outlines the current energy policy landscape in the

territory. Goals and progress toward them are addressed in the third section and while challenges are addressed throughout the report they are summarized in section four. The report concludes with key takeaways, limitations, and areas for future study.

The absence of data for the transportation sector is a major limitation with this report. Unfortunately, the CNMI Bureau of Motor Vehicles (BMV) lost all of its historical data in an IT systems crash during the Covid crisis. While a new IT system is being developed, BMV started collecting some transportation data manually in 2023. However, there is not yet a complete year of data. A future update to this report will address transportation.

2 Energy Sector Overview

This chapter provides a high-level overview of primary energy consumption, power sector generation capacity, transportation sector fuel use, key energy entities, major end users, and significant energy challenges.

As CNMI's top import, refined petroleum products are brought through the harbors of Saipan, Tinian and Rota – three of the most populous islands comprising the Commonwealth – to satisfy nearly all the territory's energy needs (“Northern Mariana Islands Territory Energy Profile,” 2023). Per the Energy Information Administration, the territory does not have any proven crude oil reserves, products, or petroleum refineries, thus increasing dependence on already refined imports. In addition, natural gas and coal are neither produced, imported, or consumed nor are there any reserves. Among imported products, diesel fuel is directed towards electricity generation while both diesel fuel and motor gasoline are purposed for marine and land transportation. Jet fuel and aviation gasoline are received by the territory for their three international airports at Saipan, Tinian, and Rota. Butane and propane are imported for restaurants and household cooking.

While much of the existing infrastructure has supported the energy sector, its age and deterioration from prior natural disasters requires special attention and urgency in accelerating modernization of the generation, transmission, and distribution system to meet future load growth. The Commonwealth Utilities Corporation's 2015 Integrated Resources Plan (IRP) identifies threats associated with climate change, including elevated threats of typhoons, floods, wildfires, and rising sea levels, and also notes that the territory's proximity to the Pacific tectonic plate's subduction zone is likely to further amplify the severity of tsunamis and earthquakes. With such severe weather events as well as economic and political disruptions to be anticipated with time, the power infrastructure for CNMI will continue to be vulnerable to these external threats, requiring special care and attention to ensure a more resilient, reliable power system that better serves the needs of the entire territory and not just the most populous islands of Saipan, Tinian, and Rota. Investments in improving energy security and fuel diversification are needed.

2.1 Power Sector

Regulated by CNMI's Commonwealth Public Utilities Commission and with oversight by the Bureau of Environmental and Coastal Quality and the US Environmental Protection Agency in Region 9, the Commonwealth Utilities Corporation (CUC) serves as the operator and manager of

the power sector for CNMI. As a state government corporation, CUC exists as a semi-autonomous agency with an independent Board of Directors, appointed by the Governor, whose members serve a concurrent four-year term (“About CUC,” n.d.). CUC works with Mobil to transfer imported fuel to CUC power plants. It should be noted that CUC has very limited local fuel storage capabilities for power generation: 18 days of supply for Saipan, 28 days on Rota, and 33 days on Tinian.

As reflected in their recent strategic plans, CUC is acutely aware of the growing risks and challenges associated with aging infrastructure and is working to modernize current electric generation facilities through energy efficiency upgrades and potentially renewable energy integration. The motivation for plant modernization and the development of solar farms is to increase grid reliability and resolve performance issues associated with older technologies and hard-to-source parts. Modernization will also help meet current environmental standards and reduce the utility’s carbon footprint. Per CUC’s Multi-Source and Renewable Power Supply System Development (MRPSSD) presentation at the U.S. Department of the Interior’s (DOI) Territorial Climate and Infrastructure Workshop in 2022, CUC’s Power Infrastructure Priority Project aims to fulfill these goals by constructing a new power plant to increase the use of renewable energy in the territory (Commonwealth Utilities Corporation 2022). Additionally, their Multi-Source Power Supply Goal seeks to achieve cost containment and emission control to maximize the availability of multiple clean energy options, better comply with federal regulatory requirements (e.g., the Clean Air and Clean Water Acts), reduce carbon emissions, reduce the rate per kilowatt-hour (kWh) to improve overall cost-effectiveness of power generation, improve safety, reliability, and availability of territorial energy, support electric vehicle policy, transition away from fossil fuels, support economic growth, and secure a more sustainable future, resilient to environmental and geopolitical threats.

2.1.1 Utility Infrastructure: Overview

CNMI has its power generation and distribution system spread across Saipan, Tinian, and Rota, where five generation facilities combine to yield approximately 120 MW in design capacity but only 40 MW in available power as of April 2023. All facilities run on ultra-low-sulfur fuel or No. 2 fuel oil. For every existing diesel generating unit that produces power for CUC, lubricating oil is also consumed per unit. An Independent Power Producer (IPP) helps oversee the Tinian power plant and helps provide operations and maintenance for that segment of the power distribution system. Detailed diagrams featuring the territory’s power system assets and distribution network can be found in Appendices A and B.

A point of emphasis in CUC’s 2015 IRP is that a slowing territorial economy has placed pressure on CUC to operate with less electricity sales. In the intervening years, the tourism industry has continued to contract. Fuel costs are passed on to CUC’s customers via fuel surcharges, to help insulate CUC from the price volatility of imported fuels. The operation and maintenance (O&M) expenses related to CUC’s generation and distribution are covered by CUC’s standard rates. These rates are determined based on anticipated sales volumes. When sales fall short, CUC doesn’t fully recover its fixed costs. Additionally, CUC has numerous commercial and government clients with significant overdue payments, resulting in millions of dollars in outstanding receivables. These issues have led to a decline in CUC’s creditworthiness, making it challenging and costly for the territory to secure financing for new power generation facilities..

Total Energy Consumption (by end use)

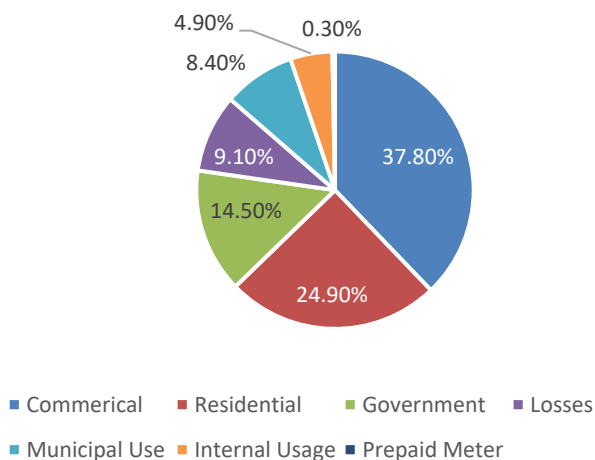


Figure 2- Energy Consumption Profile for CNMI, adapted by Commonwealth of Northern Mariana Islands (2023, April 21). 2023 CNMI Strategic Energy Plan. CNMI Office of The Governor, Energy Task Force

2.1.2 Electricity Production and Consumption

The Commonwealth’s power system is dependent almost entirely on petroleum fuel products for electricity production. Over 99-percent of CUC's power generation is diesel-powered.

Furthermore, the cost of energy production encompasses various elements such as unit cost of fuel, total fuel costs, O&M costs, and the load factor, which is the ratio of average demand and maximum demand. Using fuel data from June 2020 to May 2021, the cost was determined to be \$0.13/kWh, not accounting for extra charges. Such evaluations have affected energy pricing in places like Saipan, with the general average expected to be between \$0.18 and \$0.20/kWh based on CNMI’s Energy Task Force’s analysis from CUC-provided data. The COVID-19 pandemic altered global fuel consumption, initially lowering fuel costs. However, post-pandemic, prices rose due to heightened demand and factors like dwindling oil reserves and geopolitical events. Historically, residential fuel surcharge rates varied, with figures such as 8 cents per kWh in May 2020 and 28 cents in January 2023. Using renewable energy and alternative fuels could mitigate the variability in residential electricity bills.

In terms of total end user electricity consumption, 88.9% is from diesel resources and 11.1% is attributed to customer self-generation using solar systems (Multi-Source and Renewable Power, 2022). Electricity consumption is driven predominantly by commercial and residential customers as shown in Figure 2. Across the three main populous islands of Saipan, Tinian, and Rota, critical loads comprise community infrastructure including Commonwealth Healthcare facilities, Commonwealth Ports Authority including Seaport and Tinian International Airport, and drinking-water supply wells and wastewater treatment plants (“CUC Energy Security,” 2023).

With a stagnant tourism sector and uncertainties regarding other future commercial developments, CUC is planning for flat electricity consumption for the foreseeable future. Demand for grid electricity could potentially decline with increased uptake of rooftop PV

systems, interest in demand side management from the utility, and use of energy efficient appliances by a greater number of customers (“2023 CNMI Strategic Energy Plan”, 2023).

A high-level overview of the territory’s power system and assets is provided in Tables 1 and 2. Note that CUC provided fuel data for one month only (June 2023). Annual fuel usage is a simple multiple of 12 times the monthly usage. This is a reasonable analytical approach given that CNMI is tropical and there is little seasonal variation in the utility’s load.

Table 1- Power System Overview by Island

Saipan					
Power Generation	Generation Facilities & Units	Fuel Usage	Peak Demand	Electric Customers	Net Metering
93 MW design capacity	3 generation facilities	19,482,948 gallons of ULSD fuel oil	30.6 MW	13,555	5 MW or 12% of net metering systems
34.5 MW available	13 generation units				
Tinian					
Power Generation	Generation Facilities & Units	Fuel Usage (Ultra-Low)	Peak Demand	Electric Customers	Net Metering
20 MW design capacity	1 generation facility	1,113,780 gallons of ULSD fuel oil	2.2 MW	867	N/A
3 MW available	6 generation units				
Rota					
Power Generation	Generation Facilities & Units	Fuel Usage	Peak Demand	Electric Customers	Net Metering
5 MW design capacity	1 generation facility	784,632 gallons of ULSD fuel oil	1.5 MW	1024	N/A
2 MW available	3 generation units				

Source: CUC (2023, April 19). CUC Energy Security [Presentation Slides]. Meeting with NREL, System Planning and Renewable Energy Department; Resident Managers for CUC Saipan, Tinian, and Rota. Personal Communication (Memorandums for Monthly Reports), July, 2023; Commonwealth of Northern Mariana Islands (2023, April 21). 2023 CNMI Strategic Energy Plan. CNMI Office of The Governor, Energy Task Force

Table 2- Distribution and Transmission Profile by Island

Distribution & Transmission Assets	Saipan	Tinian	Rota
Overhead distribution lines	200 miles	40 miles	35 miles
Power poles	11,494	1849	1379
Distribution transformers	4,312	1379	335
Distribution voltage	13.8 kV	13.8 kV & 4.16 kV	13.8 kV
Sub-transmission cable	5.6 miles	N/A	N/A
Sub-transmission line voltage	34.5 kV	N/A	N/A

Source: CUC (2023, April 19). CUC Energy Security [Presentation Slides]. Meeting with NREL, System Planning and Renewable Energy Department

Table 3 compares CNMI's energy rates with U.S. averages, in absolute dollar terms. The fuel surcharge that CUC is required to assess on occasion is highly variable in nature. The base rate and fuel surcharge ("fuel adjustment charge"), are provided based on June 2023 rates. That fuel surcharge is at times twice the electricity base rate, effectively tripling the de facto electricity rates. The table is accurate but be aware that the difference in the relative energy burden is, at times, considerably higher than that represented here for CNMI.

Table 3- Comparative Energy Rates

	US average as of 2023 (EIA, 2023)	CNMI base rates (CUC Website, 2023)	CNMI Fuel Adjustment Charge (CUC Website, 2023)
Residential	16.11 cents/kWh	2.1-15.80 cents/kWh (depending on kWh level)	22.09 cents/kWh
Commercial	12.81 cents/kWh	11.30 cents/kWh	22.09 cents/kWh
Industrial/Government (for CNMI)	8.21 cents/kWh	12.40 cents/kWh	22.09 cents/kWh
Transportation	12.45 cents/kWh	N/A	

Source: U.S. Energy Information Administration. (2023, August 24). US Electricity Monthly Update. Electricity Reports. <https://www.eia.gov/electricity/monthly/update/end-use.php>; Commonwealth Utilities Corporation. (2023, September 1). Rates and tariffs. <https://www.cucgov.org/rates-and-tariffs/>

Residents in all the U.S. Territories are spending a disproportionate amount of their income on electricity. As Table 4 indicates, people in the Territories have more than double the electricity

burden of the average American, slightly higher than that in CNMI. This is partly a consequence of the lower household incomes in the Territories.

Table 4- Approximate Baseline Home Electricity Burden for U.S. Territories (2019)¹

Geography	Median Household Income (USD) (2019)	Average Residential Electricity Rate (cents per kWh) (2019)	Residential Electricity Sales (MWh) (2019)	Number of Residential Customers (2019)	Estimated Average Annual Residential Electricity Consumption (MWh) (2019)	Estimated Average Annual Residential Electricity Spending (USD) (2019)	Approximate Baseline Home Electricity Burden (%) (2019)
American Samoa	\$28,352	35.26	47,127	10,762	4.38	\$1,544	5.45%
Commonwealth of the Northern Mariana Islands	\$31,362	25.28	76,795	11,525	6.66	\$1,684	5.37%
Guam	\$58,289*	24.99***	514,829	44,226	11.64	\$2,909	4.99%
Puerto Rico	\$20,474	21.43	6,205,152	1,341,424	4.63	\$992	4.85%
U.S. Virgin Islands	\$40,408	38.75	217,003	46,283	4.69	\$1,817	4.50%
Hawaii	\$83,102	32.06	2,760,000	438,352	6.30	\$2,020	2.43%
U.S. Average	\$65,712**	13.01	1,440,288,909	135,249,616	10.65	\$1,386	2.11%

Data from U.S. Census Bureau (2020a, 2020b, 2020c, 2020d), U.S. EIA (2021)

* Median household income for Guam excludes people in military housing units.

** U.S. average does not include the Territories of American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, and the U.S. Virgin Islands.

Renewable Power Systems

In 2014, CNMI set a target of 20% of the territory’s electricity consumption coming from renewable sources (“Northern Mariana Islands Territory Energy Profile,” 2023). The government is currently reevaluating that commitment with the intention of replacing it with an economy-wide decarbonization goal.

Plans to bring utility-scale renewable assets online in the near future are under consideration, with one project designated to Saipan and two options for Tinian (*Saipan and Tinian PV*, 2023). Plans for Saipan include a \$69.6 million 20MW grid-tied PV farm with a battery energy storage system (BESS). Two sites are under consideration near Saipan International Airport. There are

¹ This table is meant to illustrate approximate baseline home electricity burdens for relative comparison purposes. 2019 data are used due to limited data availability for median household income in the U.S. Territories. Estimated burden calculations apply only to home electricity use. See Appendix C for additional notes on table methodology and data limitations.

two projects under consideration on Tinian: an 8 MW solar farm with BESS for the International Broadcasting Bureau (IBB) at a cost of \$26.6 million and an 18.6 MW PV array serving the IBB, Divert Airfield, and a portion of Tinian’s overall base load at a cost of \$60.83 million. As of April 2023, funding for all three major projects is still being sought with \$946,700 already covered for the Saipan investment.

A generic PV farm with BESS project is expected to be completed within a 640-day timeline from the start of feasibility and system impact studies and through design, permitting, engineering, installation, testing, and commissioning (*Saipan and Tinian PV*, 2023). Procurement and equipment installation comprise the largest periods of the project’s duration at 240 and 200 days, respectively. The earliest completion date for these projects is roughly two years from the start of development, contingent on funding timelines, and could vary based on anticipated power production and facility size.

CUC proposed two PV power plants in 2019: one 3 MW facility for Tinian and another 2 MW facility for Rota (“Northern Mariana Islands Territory Energy Profile,” 2023). Both sites were meant to support additional loads and complement baseline generation from their respective island’s diesel-fueled plants. Per the Commonwealth’s Strategic Energy Plan (SEP) from 2023, these solar energy projects are under development.

2.1.3 Customer-sited DER

CNMI's legal structure surrounding the generation of customer-sourced electricity has undergone modifications to reflect the evolving energy dynamics in the region. Public Law 15-87 was instituted to make amendments to Public Law 15-23, which was enacted as the Energy Conservation Act to incentivize alternative energy and establish early requirements for the use of renewable energy, energy efficiency, and other energy- and cost-saving measures. This amendment provides customer-generators and private power producers the ability to generate electricity using renewable resources and sell this energy to CUC. Additionally, it offers incentives to further boost the production of renewable energy within the Commonwealth.

PV systems are installed on CNMI's three main islands. This energy source has the opportunity for substantial expansion through a combination of rooftop solar and larger, utility-scale solar initiatives. Thorough power network evaluations will be needed to determine the feasible extent of PV penetration, considering scenarios with and without energy storage. There is a preference for fixed tilt solar arrays, which are more resilient in cyclone-prone regions like the CNMI (“2023 CNMI Strategic Energy Plan,” 2023). As penetration levels increase, a robust management system for distributed energy resources (DER) dispatch and power flows is essential to ensure system stability.

3 Current Energy and Security Policy Frameworks

CNMI is implementing an energy policy framework to promote renewable energy, reduce reliance on fossil fuels, and ensure affordable, sustainable energy for all households. This framework prioritizes the security and sustainability of CNMI’s energy supply. The specifics of the energy policy legislation are detailed in this section. Established by executive order in 2010,

the Energy Task Force was tasked with devising a strategic energy plan; developed in 2013, the plan emphasized renewable energy and demand-side management.

The Commonwealth's energy goals are progressing through specific policy strategies as demonstrated here.

3.1 Grid-Related Policies

CNMI's 2023 Strategic Energy Plan highlights the significance of the Net Energy Metering program, which promotes residential renewable energy installations, particularly PV. It allows users to feed excess solar energy into the grid during periods of surplus production and to draw electricity from the grid when called for. The term "net metering," as defined in 4 CMC §8112, pertains to the measurement of the difference in electricity fed into the grid by renewable sources versus what's consumed from the grid over a monthly billing period.

In 2015, Public Law 18-75 was instituted, amending the renewable legislation to encourage net metering especially for health- and education-based renewable energy installations. This was a strategic decision, arising from the economic constraints faced by the Commonwealth Healthcare Corporation (CHCC) and the territory's public school system in their struggle with high utility costs. Further legislative advancements include Public Law 23-02, which encompasses public libraries within the net metering legislation, granting them priority in interconnection. This adjustment also positions libraries to qualify for federal grants endorsing CNMI's commitment to clean energy. The sole public utility in CNMI, the CUC, offers net metering for commercial and residential consumers using renewable energy systems. CUC's policy permits net metering for systems below 100 kW, up to 30% of CUC's peak demand. It's essential to note that the combined capacity of net-metered systems on individual islands like Saipan, Tinian, or Rota cannot surpass 30% of the peak demand for that specific island.

In 2019 alone, 2.5% of CUC customers participated in net metering, compared to just 1.6% in the U.S ("Northern Mariana Islands Territory Energy Profile," 2023).

3.2 Energy Efficiency and Conservation

For demand-side management, CNMI showed foresight by adopting energy-efficiency-focused construction codes like the International Building Code (IBC) and the CNMI Tropical Energy Code in 2010. Presently, CNMI enforces the 2019 IBC, with its tropical energy code having undergone revisions in 2014. The Department of Public Work's Energy Division spearheads energy efficiency rebate programs and upholds building and energy code requirements which provide the minimum requirements for energy efficiency design of residential and non-residential buildings in CNMI, addressing the building envelope, air conditioning and ventilation, water heating and lighting. Initiatives supported by CUC for energy efficiency and conservation efforts include an Energy Awareness Campaign, Income-based Weatherization Assistance Program, Cool Roof Program, and EnergyStar rebate program.

3.3 Renewable Energy

The CNMI government initially set an ambitious renewable portfolio standard (RPS) in 2006, aiming for 80% of electricity sales to be sourced from renewables by 2014. A crucial component of the RPS is the mandate on government departments to collaborate with the CUC and

developers to identify potential renewable energy sites. These departments also play a role in streamlining the planning and permitting process, with an obligation to regularly publish a list of prospective renewable energy development sites. In September 2014, Public Law 18-62 was established to update standards for the renewable energy portfolio of electrical power producers. It also authorized net energy metering for all eligible residential consumers, enabling them to capitalize on renewable energy alternatives. This decision was driven by the Legislature's observation of the increasing accessibility of renewable energy sources and the growing interest of residents in finding alternatives to mitigate high utility costs.

By 2016, the initial target of 80% was revised to a more conservative 20%. Despite the territory not meeting their original goals, various small-scale renewable projects, especially solar and wind, have been initiated across private homes, public establishments, and schools. Several prominent solar energy initiatives are under development, notably the 3-MW PV facility on Tinian and the 2-MW counterpart on Rota, as initially proposed by CUC in 2019. Other larger-scale projects include two solar farms with BESS across Saipan and Tinian which are under consideration with funding still being secured.

CUC established its Renewable Energy Division to ensure 50% of CNMI's electricity is sourced from renewables by 2030. One of the major initiatives under consideration is the development of a utility-owned 20 MW solar photovoltaic system. Per the latest update from the CNMI SEP, a 26% federal Investment Tax Credit (ITC) is available for rooftop PV systems, inclusive of battery storage. At the time of this report, there is no differential tariff structure for peak and off-peak solar energy consumption.

3.4 Resilience

CNMI revamped its economic development strategy in 2019 to fortify its infrastructure against typhoons and earthquakes. To support these efforts, CUC secured a \$36 million federal grant in 2020, targeting the restoration and reinforcement of infrastructure damaged by recent storms. Moreover, additional funds from FEMA's Hazard Mitigation Grant Program (HMGP) and Public Assistance (PA) programs are being sourced to enhance resilience across Saipan, Tinian, and Rota, especially after the impact of Super Typhoon Yutu in 2018. With these resources, CUC is planning power plant upgrades, transitioning from wooden to concrete power poles, and undergrounding some overhead power lines to safeguard against future climatic events.

4 Energy Goals and Progress

Territorial goals surrounding power generation and transmission and distribution are highlighted in the following subsections as described in CUC's Citizen Centric Report from 2022.

4.1 Power Generation

In collaboration with the U.S. Environmental Protection Agency (EPA), U.S. Department of Justice (DOJ), and other federal and local entities, CNMI and CUC were successful in their bid to complete projects from a settlement with the Stipulated Order Number Two (SO2) court order that required CUC to have its power plant facilities achieve compliance with the Clean Water Act. This effort, spanning over a decade, was orchestrated to protect the environment adjacent to the CUC power plants, mitigating potential oil spills through the implementation of state-of-the-art oil-water separators, and advanced oil recovery and monitoring systems. To enhance power

reliability for the community, a new generator has been procured for Power Plant No. 1, marking the first such acquisition since the inception of the plant. The installation process is ongoing, with testing and commissioning projected for Spring 2024. Preliminary plans for a utility-owned 20 MW PV system are currently in progress.

4.2 Power Transmission & Distribution

CUC has undertaken strategic measures to enhance system resilience and efficiency. In partnership with the State Hazard Mitigation Grant Program, initiatives have been launched to strengthen power poles and to install underground power cables connecting Power Plant No. 1 to the Commonwealth Healthcare Corporation (CHCC) hospital. Recognizing the criticality of uninterrupted service, personnel have been onboarded for a comprehensive vegetation maintenance program. This endeavor, facilitated by funding from the American Rescue Plan Act (ARPA) allocated by CNMI, aims to diligently manage vegetation proximate to power lines, ensuring consistent electrical services to essential facilities and the wider community.

4.3 Progress on CUC Goals

In its commitment to ensuring reliable power provision to CNMI, CUC has initiated and completed a series of strategic projects. Notable undertakings include the replacement of one outdated engine at Power Plant 1 with a contemporary 8.8 MW unit, a foundational step towards establishing a 100MW power plant on Saipan, and the inception of a new CUC headquarters and customer care center on the same island. In diversifying its energy portfolio, CUC has introduced a renewable energy and system planning division, procured an electric vehicle for its operational fleet, and is in the initial phases of developing a 20 MW utility-owned grid solar system project. Comprehensive grid stability studies are being conducted across all three islands. Infrastructure enhancement projects include underground power supply channels for Power Plant 1 to CHCC, and from the CUC Tinian Power Plant to essential facilities on Tinian. Additional projects encompass a battery backup feasibility study for Rota, the System Control and Data Acquisition (SCADA) initiative for the CUC Power Plant, and a wooden power pole replacement endeavor covering Saipan, Tinian, and Rota.

5 Challenges

CNMI currently faces significant energy challenges, with most of its power generation heavily dependent on imported petroleum products. This reliance leaves the region vulnerable to unpredictable fuel prices and supply concerns, posing risks to security, the environment, and the economy. One primary concern is CNMI's remote location, making fuel importation and project development daunting. Therefore, CNMI has been prioritizing reduction of fossil fuel dependence and exploring alternative energy sources.

To navigate this transition, thorough technical studies are required to integrate renewable energy sources. These studies must consider the technical aspects of maintaining frequency and voltage stability. Attention must also be paid to energy and procedural justice, which are necessary to place the territory in a successful position to participate in the energy transition. To ensure all voices are heard, public outreach was carried out between December 9, 2022, and March 31, 2023 (“2023 CNMI Strategic Energy Plan,” 2023). Various mediums, including newspaper advertisements and the digital platform Social Pinpoint, were utilized. The latter, known for

fostering public engagement, facilitated a comprehensive review of the SEP, enabling the public to provide input and voice concerns.

A significant hurdle is integrating renewable energy into the existing power grid. The ideal locations for commercial-scale renewable energy generation, especially wind, lack the necessary electrical infrastructure. Whereas PV installations can be closer to populated regions, wind turbines necessitate more remote placement to minimize noise and visual disturbances. Implementing renewable sources in these areas requires comprehensive studies and infrastructural investments. With the increasing role of DER, it is important to incorporate control systems that can manage generators as well as other distributed assets such as energy storage systems that can help to stabilize the grid, allowing for efficient energy utilization during peak demand times.

Compounding these challenges is CNMI's aging power infrastructure, which not only impedes renewable energy integration but has also been damaged by environmental threats, such as major typhoons. Efforts are underway to modernize these facilities, exemplified by a \$40 million project aimed at enhancing energy efficiency and renewable integration. Per CUC's MRPSSD presentation, this initiative includes:

- Acquisition of two dual fuel hybrid 10 MW generators, complete with engineering, delivery, installation, and commissioning.
- Comprehensive foundation assessment and upgrades.
- System enhancements for better solar integration.
- Development of a 2-5 MW PV farm complemented by a 2 MW battery storage system.
- Investment in human resources infrastructure, with plans for a new renewable division and associated training ("Multi-Source and Renewable Power Supply System Development" 2022)

6 Conclusion

CNMI and CUC have made strides in advancing their energy goals and infrastructure in recent years. Key accomplishments like the completion of the Stipulated Order Number Two (SO2) projects, procurement of a new generator, and establishment of a dedicated Renewable Energy Division underscore the region's commitment to providing clean, reliable power. Moreover, the proactive shift towards the integration of renewable energy sources, such as the 20 MW PV system, signifies the region's intention to transition away from fossil fuels.

However, certain challenges, like CNMI's geographical position, reliance on petroleum, and the integration of renewable energy into the existing power system, are still present. The region's exposure to fluctuating fuel prices, environmental threats, and aging infrastructure necessitates immediate action. Public outreach conducted by CUC from December 2022 to March 2023 revealed important considerations identified for a balanced strategy to ensure the territory's clean energy goals are achievable.

These key considerations include:

- **Renewable Energy Integration:** Focusing on integrating renewable sources, such as solar and wind, into the energy grid, would allow CNMI to determine which infrastructure

investments would be needed for higher penetrations of renewable energy. Infrastructure investments in these areas are vital given the associated challenges.

- **Infrastructure Improvement:** Prioritize modernizing the region's power infrastructure to be more resilient against external threats. Continuous monitoring and upgrades should complement projects like the \$40 million initiative.
- **Continued Stakeholder Engagement:** Maintain active engagement with the community, ensuring all voices are considered in the energy planning process.
- **DER Strategy:** Recognize the increasing role of DERs and introduce control systems to manage their grid contributions. The inclusion of energy storage systems will assist in grid stability during peak demands.

In summary, CNMI and CUC have set a path towards an improved energy future. While challenges remain, strategic investment, consistent engagement, and energy system innovations will aid the territory in reaching their long-term energy security and sustainability goals.

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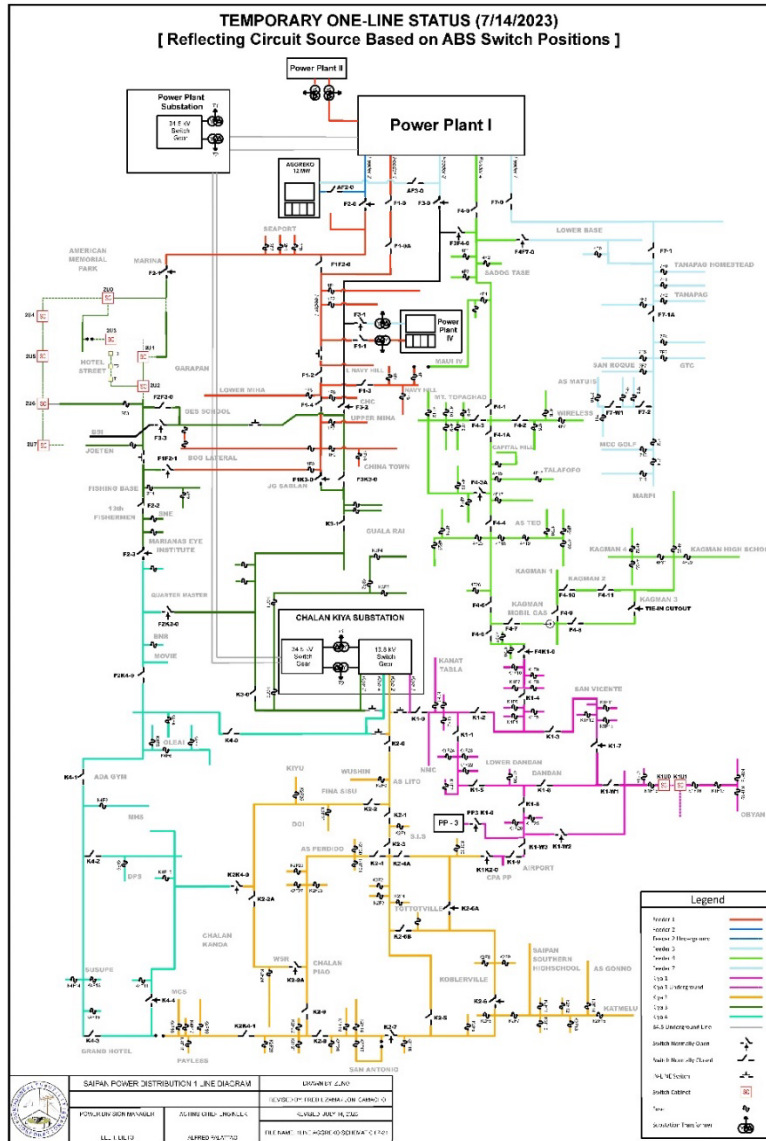
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Appendix A- CNMI Power System Asset Diagrams

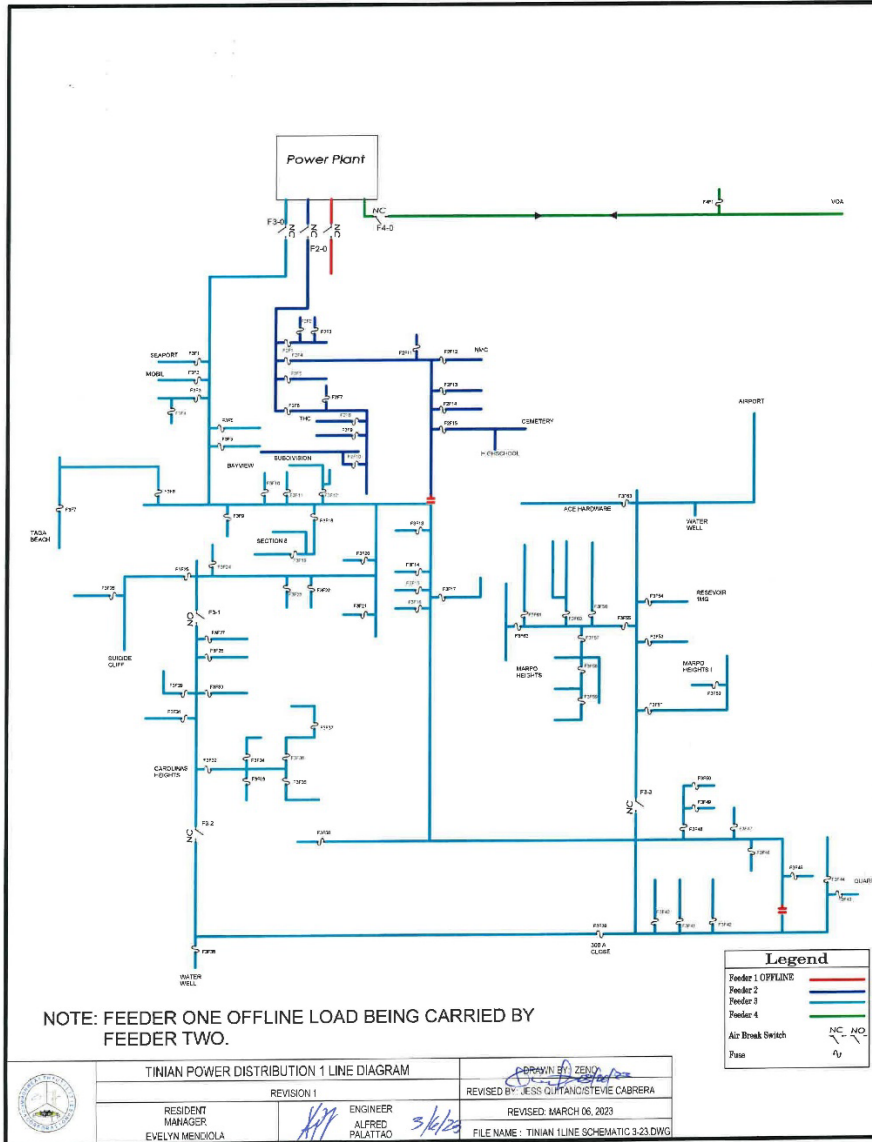
A.1 Saipan

Contained within this appendix is a detailed line diagram representing the power assets for Saipan. The diagram below showcases the distribution layout and interconnections that comprise the island's power system. As shown in the accompanying legend, each segment has been color-coded based on their corresponding feeder and other components.



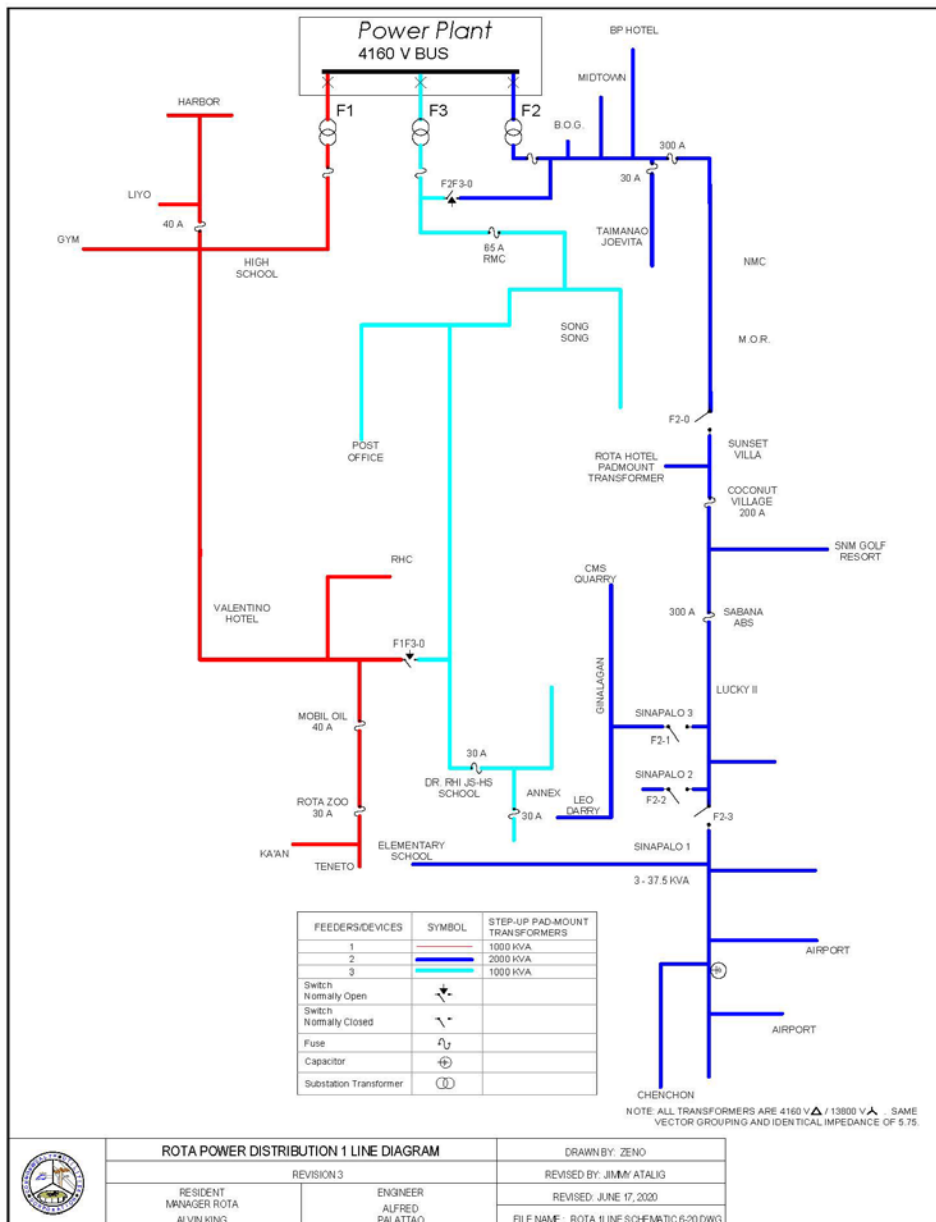
A.2 Tinian

Contained within this appendix is a detailed line diagram representing the power assets for Tinian. The diagram below showcases the distribution layout and interconnections that comprise the island's power system. As shown in the accompanying legend, each segment has been color-coded based on their corresponding feeder and other components.



A.3 Rota

Contained within this appendix is a detailed line diagram representing the power assets for Rota. The diagram below showcases the distribution layout and interconnections that comprise the island's power system. As shown in the accompanying legend, each segment has been color-coded based on their corresponding feeder and other components.

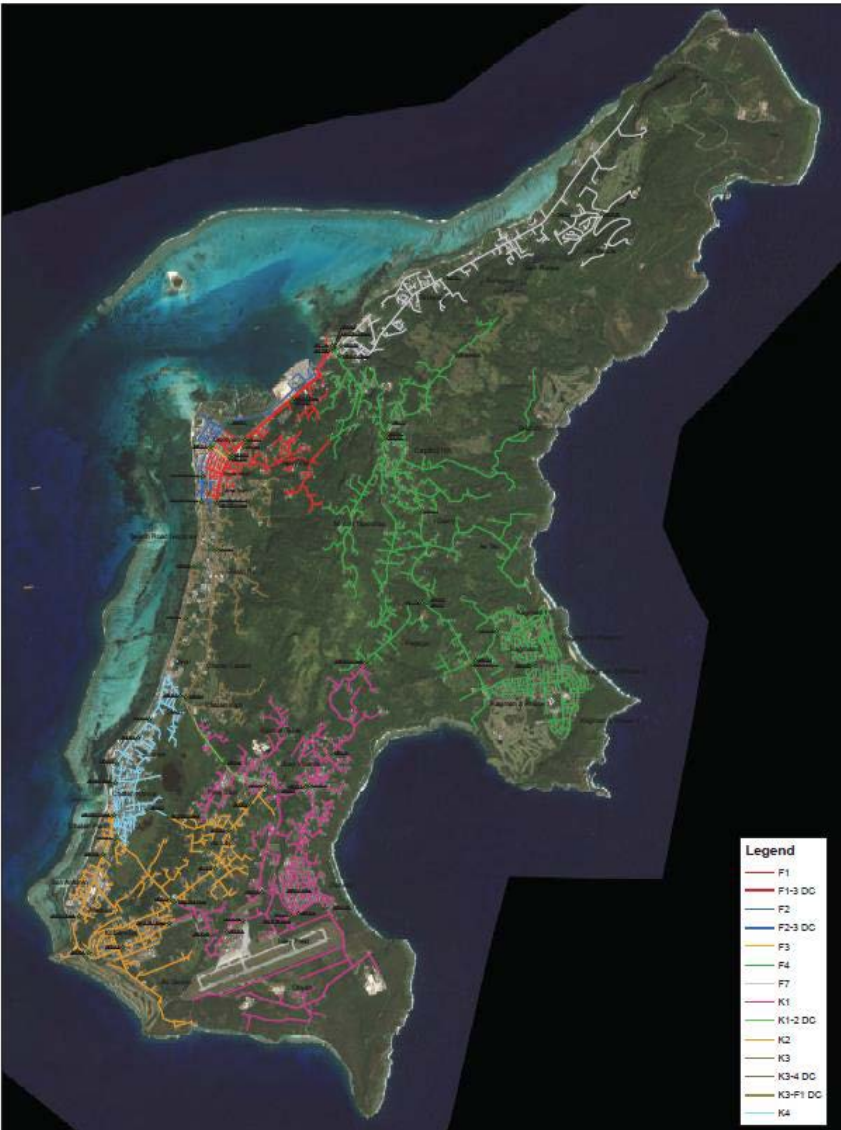


Appendix B- CNMI Distribution Maps

B.1 Saipan

To supplement the information provided in the previous power asset maps, this map features the distribution layout and interconnections for Saipan overlaid over satellite imagery of the island. As shown in the accompanying legend, each segment has been color-coded based on their corresponding feeders.

Saipan: Geographic One-Line Diagram



B.2 Tinian

To supplement the information provided in the previous power system asset maps, this map features the distribution layout and interconnections for Tinian overlaid over satellite imagery of the island. As shown in the accompanying legend, each segment has been color-coded based on their corresponding feeders.

Tinian: Geographic One-Line Diagram



B.3 Rota

To supplement the information provided in the previous power asset maps, this map features the distribution layout and interconnections for Rota overlaid over satellite imagery of the island. As shown in the accompanying legend, each segment has been color-coded based on their corresponding feeders.

