

## Energy Snapshot Federated States of Micronesia

This profile provides a snapshot of the energy landscape of the Federated States of Micronesia, a sovereign nation and U.S.-associated state in the western Pacific Ocean. The Federated States of Micronesia’s electricity rates for residential customers exceed \$0.48 U.S. dollars (USD)/per kilowatt-hour (kWh), nearly four times the average U.S. residential rate of \$0.13 USD/kWh.<sup>1</sup> These high rates are in part driven by the dispersed geography of the country’s 607 islands, which makes electricity infrastructure development and maintenance relatively expensive. In addition, the Federated States of Micronesia are highly dependent on imported fossil fuels for transportation and electricity generation, leaving them vulnerable to global oil price fluctuations that directly impact the cost of electricity.

Population <sup>2</sup>	105,681
Total Area	702 sq. km
Gross Domestic Product (GDP)	\$331 million USD
Share of GDP Spent on Fuel and Imports	Electricity – 6.9% Total – 17.1% <sup>3</sup>
GDP Per Capita	\$3,200 USD
Urban Population Share	22.4%

### Electricity Sector Data

The Federated States of Micronesia is made up of four semi-autonomous states, each of which is served by its own



### Federated States of Micronesia’s Renewable Energy Goals:<sup>4</sup>

- Increase energy efficiency 20% by 2015
- Increase energy efficiency 50% by 2020
- Increase generation of electricity from renewable sources to 30% by 2020.

### Government and Utility Overview

Government Authority	<b>Ministry:</b> Division of Energy, Department of Resources and Development	
	<b>Key Figure:</b> Assistant Secretary Hubert Yamada	
Designated Institution for Renewable Energy	Division of Energy, Department of Resources and Development	
Regulator	None	
Utilities	<b>Name:</b> Chuuk Public Utility Corporation Kosrae Utility Authority Pohnpei Utilities Corporation Yap Public Service Corporation	State-owned

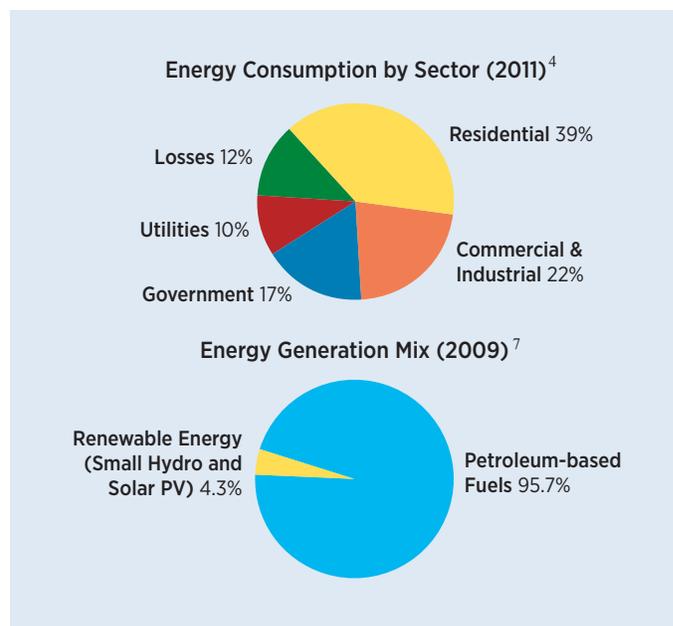
state-owned electric utility company. Because the Federated States of Micronesia is so geographically dispersed, three of the four utilities must serve a populous core island or group of islands as well as numerous remote islands; the Kosrae Utility Authority is the only utility that serves a single island. Often, the large distances and small populations on the outer

## Electricity Sector Overview

<b>Total Installed Capacity (2011)<sup>4</sup></b>	6.6 megawatts (MW) (Yap) 4.6 MW (Kosrae) 13.4 MW (Pohnpei) 5.2 MW (Chuuk)	
<b>Peak Demand<sup>4</sup></b>	2.3 MW (Yap) 1.1 MW (Kosrae) 6.7 MW (Pohnpei) 4 MW (Chuuk)	
<b>Total Generation (2011)<sup>4</sup></b>	75 gigawatt-hours	
<b>Renewable Share (2009)<sup>8</sup></b>	4.3%	
<b>Transmission &amp; Distribution Losses (2011)<sup>4</sup></b>	12%	
<b>Electrification Rate<sup>9</sup></b>	55%	
<b>Average Electricity Tariffs (USD/kWh)<sup>10</sup></b>	<b>Residential</b>	\$0.48
	<b>Commercial</b>	\$0.50
	<b>Industrial</b>	\$0.57
	<b>Public Authorities</b>	\$0.67

islands mean electrical interconnection is not cost effective, driving the electric utilities to operate multiple independent grids where necessary. In the case of the smallest outlying areas, even localized electricity generation and distribution infrastructure is too costly, which often results in a complete lack of access to electricity for inhabitants. For this reason, the electrification rate varies widely between states. The single island of Kosrae has an electrification rate of 98%, while Chuuk, spread across seven major island groups, achieves a rate of 26%.<sup>5</sup>

Aside from limiting access to electricity, the geography of the Federated States of Micronesia has several other adverse effects on utility operations. One outcome is that the economies of scale typically enjoyed by electric utilities in power generation, fuel storage, and procurement of equipment are extremely limited. This leads to high electricity rates on the central islands and even higher charges in more distant areas. For example, the residential rates for the Yap State Public Service Corporation peak at \$0.45/kWh on Yap proper, but

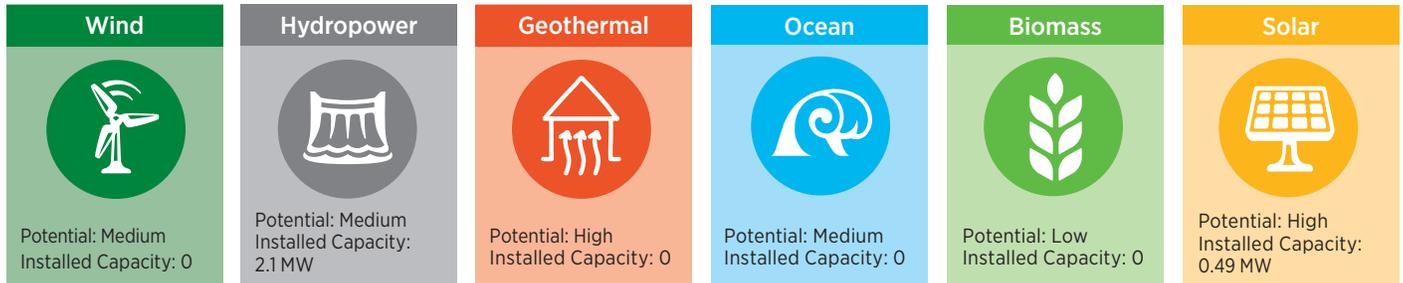


## Existing Policy and Regulatory Framework<sup>11</sup>

Renewable Energy	
Feed-in Tariff	■
Net Metering/Billing	
Interconnection Standards	
Renewables Portfolio Standard/Quota	
Tax Credits	
Tax Reduction/Exemption	
Public Loans/Grants	
Green Public Procurement	■
Energy Efficiency	
Energy Efficiency Standards	■
Tax Credits	
Tax Reduction/Exemption	
Public Demonstration	■
Restrictions on Incandescent Bulbs	
Appliance Labeling Standards	■
Targets <sup>4</sup>	
Renewable Energy	●
Energy Efficiency	●

● In Place ■ In Development

## Renewable Energy Status and Potential<sup>8</sup>



reach \$1.09/kWh on the outlying islands of Falalop Ulithi and Falalop Woleai.<sup>6</sup> Another result of the dispersed geography and the general remoteness of the nation as a whole is that it becomes difficult to maintain generating equipment and obtain replacement parts. To avoid service disruptions, the local utilities therefore maintain high reserve margins (more than 100% on Yap, Kosrae, and Pohnpei). However, this surplus capacity experiences low utilization rates, increasing its cost on a per-kWh basis and further driving up electricity rates for customers.

### Clean Energy Policy Environment

The first National Energy Policy for the Federated States of Micronesia was developed in 1999, with the second and most recent version published in 2012. This latter document is divided into two volumes, the first of which contains the country's major renewable energy and energy efficiency goals, including increasing the share of electricity generated from renewable sources to 30% by 2020 while also increasing energy efficiency by 50%. It also outlines several other targets, such as raising the average energy generation efficiency of conventional generating units 20% by 2015 and increasing the rural electrification rate to 90% by 2020. In addition, the policy establishes the following guiding principles for energy development in the Federated States of Micronesia: (1) the spread of benefits to disadvantaged communities, (2) increased public awareness and local capacity, (3) private sector involvement, and (4) community solutions.

The second volume of the National Energy Policy presents the national- and state-level energy action plans necessary to achieve the overall national energy targets. These plans present a high level of detail related to the execution of specific energy development actions. For example, each action listed in the state plans designates the lead and supporting organizations, specifies metrics for success, estimates a budget, suggests potential sources of funding, and sets a deadline for completion. The national-level energy actions focus on energy efficiency in public facilities, energy standards for all

buildings, and energy awareness campaigns. The state-level actions are much more specific and encompass 20 to 30 specific renewable energy and energy efficiency projects. Chuuk is the only state to propose additional policies, committing to investigate a feed-in tariff for renewable energy by 2015.<sup>11</sup>

### Energy Efficiency and Renewable Energy Projects

To date, a large number of small-scale solar installations have been deployed in the Federated States of Micronesia, with a total installed capacity of almost 500 kW.<sup>5</sup> Reflecting the geographic constraints of the nation, roughly one-third of this capacity is deployed in off-grid or stand-alone applications while the remaining two-thirds is grid-tied. In addition, the state of Pohnpei has a 2.1-MW small hydroelectric facility. Constructed by the U.S. Army Corps of Engineers in the 1980s, the facility has water intake limitations that reduce its operational capacity to 1.8 MW.<sup>4</sup> The potential to substitute coconut oil for diesel fuel in electricity generation has been discussed, but this concept has not been developed to date.<sup>4</sup>

### Opportunities for Clean Energy Transformation

The Federated States of Micronesia face a significant challenge in improving their energy infrastructure due to the wide area of the territory across the western Pacific. This increases costs for electricity throughout the four states, as conventional generation and distribution infrastructure is poorly suited to serve small population centers. However, these high costs create an avenue to realize significant cost savings through the adoption of renewable technologies. Even relatively expensive pairings of solar and wind systems with energy storage devices may be competitive when compared with electricity tariffs that can exceed \$1/kWh. The strong uptake of off-grid solar photovoltaic systems to date indicates that this is a viable option for future clean energy capacity expansion.

## Energy Transition Initiative

This energy snapshot was prepared to support the Energy Transition Initiative, which leverages the experiences of islands, states, and cities that have established a long-term vision for energy transformation and are successfully implementing energy efficiency and renewable energy projects to achieve established clean energy goals.

Through the initiative, the U.S. Department of Energy and its partners provide government entities and other stakeholders with a proven framework, objective guidance, and technical tools and resources for transitioning to a clean energy system/economy that relies on local resources to substantially reduce reliance on fossil fuels.



<sup>1</sup> [http://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.cfm?t=epmt\\_5\\_03](http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_03).

<sup>2</sup> All information in this table is from the CIA World Factbook, unless otherwise noted. <https://www.cia.gov/library/publications/the-world-factbook/geos/fm.html>.

<sup>3</sup> <http://comtrade.un.org/data/>.

<sup>4</sup> <http://www.fsmrd.fm/wp-content/uploads/2015/01/Energy-Policy-volume-I-Updated-SK08232011-Copy.pdf>.

<sup>5</sup> [https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Federated%20States%20of%20Micronesia\\_EOI.pdf](https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Federated%20States%20of%20Micronesia_EOI.pdf).

<sup>6</sup> <http://yspsc.able-soft.com/Rates/>.

<sup>7</sup> [http://www.smallhydroworld.org/fileadmin/user\\_upload/pdf/Oceania\\_PICT/WSHPDR\\_2013\\_Federated\\_States\\_of\\_Micronesia.pdf](http://www.smallhydroworld.org/fileadmin/user_upload/pdf/Oceania_PICT/WSHPDR_2013_Federated_States_of_Micronesia.pdf).

<sup>8</sup> [http://www.irena.org/documentdownloads/publications/\\_pacificcomplete.pdf](http://www.irena.org/documentdownloads/publications/_pacificcomplete.pdf).

<sup>9</sup> <http://www.worldbank.org/en/news/press-release/2014/05/29/world-bank-announces-support-to-improving-electricity-services-in-the-federated-states-of-micronesia>.

<sup>10</sup> <http://www.irena.org/DocumentDownloads/Publications/FS-Micronesia.pdf>.

<sup>11</sup> <http://www.fsmrd.fm/wp-content/uploads/2015/01/Energy-Policy-Volume-II-Action-Plans-Updated-SK08232011.pdf>.

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