

## Energy Snapshot

### Guam

This profile provides a snapshot of the energy landscape of Guam, an island territory of the United States located in the western Pacific Ocean. Guam’s electricity rates for residential customers start at \$0.21 U.S. dollars (USD) per kilowatt-hour (kWh), above the average U.S. rate of \$0.13 USD/kWh.<sup>1,2</sup> Like many island nations, Guam is highly dependent on imported fossil fuels—nearly all the island’s electricity is generated using imported petroleum products. This leaves it vulnerable to global oil price fluctuations that can directly impact the cost of electricity.

<b>Population</b>	161,000 <sup>3</sup>
<b>Total Area</b>	544 sq. km
<b>Gross Domestic Product (GDP)</b>	\$4,882 billion USD <sup>4</sup>
<b>Share of GDP Spent on Fuel and Imports</b>	Electricity – 6.1% <sup>5</sup> Total – 14% <sup>6</sup>
<b>GDP Per Capita</b>	\$30,300 USD
<b>Urban Population Share</b>	94.4%

### Electricity Sector Data

Guam’s electric utility is the Guam Power Authority (GPA), a government-owned entity responsible for the transmission and distribution of electricity on the island. GPA also owns a significant portion of the island’s generation capacity; it operates some of that capacity directly and administers another 210 megawatts (MW) through performance management contracts.<sup>7</sup> In addition, GPA has entered into energy conversion agreements (ECAs) with three Independent Power Producers (IPPs) for 181 MW of capacity. Under the provisions



### Guam’s Renewable Energy Goals:

- 5% of electricity from renewable resources by 2015<sup>7</sup>
- 8% of electricity from renewable resources by 2020
- 10% of electricity from renewable resources by 2025
- 15% of electricity from renewable resources by 2030
- 25% of electricity from renewable resources by 2035
- Reduce fossil fuel energy consumption 20% by 2020.

### Government and Utility Overview

<b>Government Authority</b>	<b>Ministry:</b> Guam Energy Office	
	<b>Key Figure:</b> Director Peter Calvo	
<b>Designated Institution for Renewable Energy</b>	Guam Energy Office	
<b>Regulator</b>	Guam Public Utilities Commission	
<b>Utility</b>	<b>Name:</b> Guam Power Authority	Government-owned

of an ECA (also known as a tolling agreement), GPA supplies all necessary fuel to the IPPs at its own cost and buys all electricity produced by converting the chemical energy from the fuel into electrical energy.<sup>7</sup> GPA has stated that it pursues these contractual structures because of the small size of the local technically-qualified workforce.

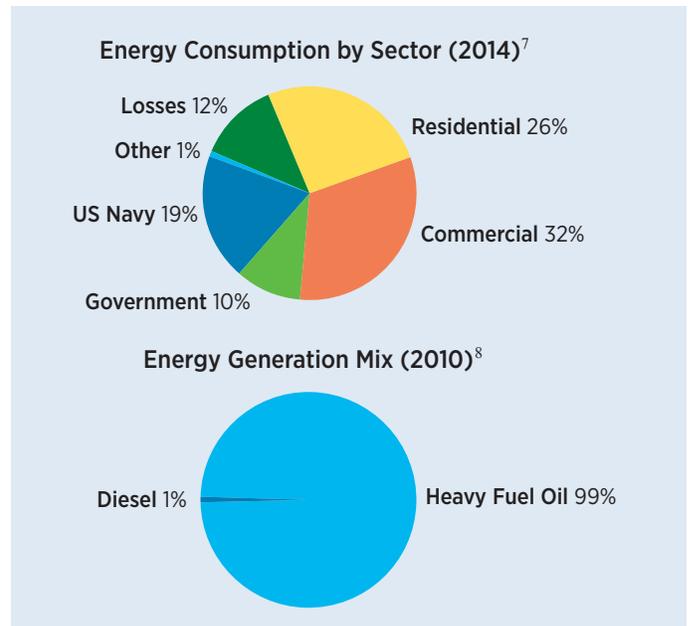
## Electricity Sector Overview

<b>Total Installed Capacity (2013)<sup>7</sup></b>	552 MW (Total) 371 MW (GPA) 181 MW (IPPs)	
<b>Peak Demand<sup>7</sup></b>	281.5 MW	
<b>Total Generation (2012)<sup>9</sup></b>	1,684 gigawatt-hours	
<b>Renewable Share (2010)<sup>8</sup></b>	0%	
<b>Transmission &amp; Distribution Losses (2010)<sup>8</sup></b>	12%	
<b>Electrification Rate (2010)<sup>10</sup></b>	55.8%	
<b>Average Electricity Tariffs (USD/kWh)<sup>11,12</sup></b>	<b>Residential</b>	\$0.21
	<b>Commercial</b>	\$0.35
	<b>Industrial</b>	\$0.29
	<b>Public Authorities</b>	\$0.33
	<b>Public Lighting</b>	\$0.23

The majority of Guam's electricity is generated by four base-load steam turbine generators that burn heavy fuel oil and are roughly 40 years old.<sup>7</sup> Recent studies suggest that these units may not meet the standards set in recent U.S. Environmental Protection Agency regulations, and that retrofits to achieve compliance to maintain operation of these four units could total between \$220 million and \$363 million. Alternatively, the retirement of these units would reduce the island's available generating capacity by 171 MW, dropping the reserve margin from above 100% to below the 54% mandated by the Guam Public Utilities Commission (GPUC).<sup>7</sup> To address these environmental, reliability, and regulatory issues, GPA's most recent integrated resource plan (IRP) recommended developing liquefied natural gas infrastructure by 2018 to displace residual fuel oil use and soliciting an additional 40 MW of wind and solar generation.

## Clean Energy Policy Environment

In July 2013, Guam released two major energy policy documents, a Strategic Energy Plan and an Energy Action

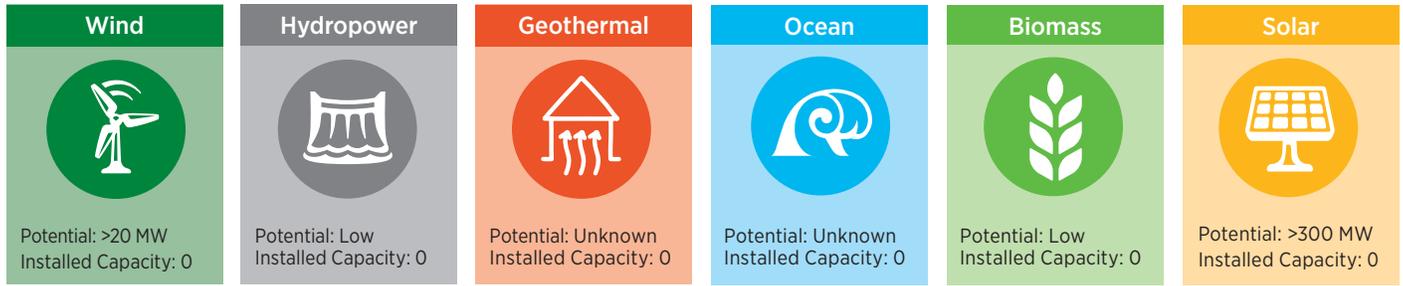


## Existing Policy and Regulatory Framework

Renewable Energy	
Feed-in Tariff	
Net Metering/Billing <sup>14</sup>	●
Interconnection Standards <sup>15</sup>	●
Renewables Portfolio Standard/Quota <sup>16</sup>	●
Tax Credits	
Tax Reduction/Exemption	
Public Loans/Grants	
Green Public Procurement	
Energy Efficiency	
Energy Efficiency Standards <sup>17</sup>	●
Tax Credits	
Tax Reduction/Exemption	
Public Demonstration	
Restrictions on Incandescent Bulbs	
Appliance Labeling Standards <sup>8</sup>	■
Targets	
Renewable Energy <sup>7</sup>	●
Energy Efficiency	

● In Place ■ In Development

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



Plan. The former document is intended to provide a high-level summary of policy options, while the latter describes four concrete short-term strategies to advance the island's goal of reducing fossil fuel consumption 20% by 2020.<sup>13</sup> These strategies focused on increasing public awareness of energy efficiency, establishing an energy efficiency loan program, exploring waste-to-energy generation possibilities, and reducing energy consumption in the transportation sector. In addition to these potential future directions, Guam has already adopted several renewable energy policies, passing a renewable portfolio standard law in 2008 and approving GPA's interconnection standards and net metering program in 2009.

In April 2013, GPA sought to reform Guam's net metering policy through its rate case filings, arguing that the program structure resulted in a cost shift from customers with distributed solar installations to those without.<sup>14</sup> It also argued that the appropriate compensation for a customer's excess generation was not the full retail rate but instead the avoided fuel costs as specified by the Levelized Energy Adjustment Clause. However, in September 2013, the GPUC rejected this request, noting that program uptake had been very slow and that such a change to the program might further hamper the development of a solar market on Guam. The GPUC also pointed out that the net metering program already included a trigger for review of compensation mechanisms once the program's enrollment approached 1,000 customers.

### Energy Efficiency and Renewable Energy Projects

Large-scale renewable energy development on Guam has been limited to date, with no operational utility-scale facilities. However, two projects are currently in development to provide 35 MW of renewable energy under Phase I of GPA's Renewable Energy Acquisition Program. The first project to be developed under this program is a 25.65-MW solar farm, which was originally awarded as two separate contracts to Quantum Guam Power Holdings and Pacific Green

Resources, but was later consolidated into a single project under the current developer NRG Energy.<sup>18,19</sup> The second is a 9.35-MW wind facility to be developed by Pacific Green Resources.<sup>18</sup> The solar farm is expected to come online in 2015, with the wind farm reaching commercial operation in 2016.<sup>18</sup> In its 2013 IRP, GPA committed to soliciting an additional 40 MW of renewable generation under Phase II of the Renewable Energy Acquisition Program.<sup>18</sup>

Outside of these larger installations, distributed solar installations have recently seen a high rate of growth, with the number of net-metered installations doubling each year between 2011 and 2014.<sup>1</sup> However, the magnitude of the program remains small, as the total program subscription was roughly 160 customers in 2014.

In 2013, GPA evaluated demand-side management (DSM) measures to reduce electricity consumption in the territory, including increased use of energy-efficient equipment, but determined that the cost of implementing DSM measures was greater than the anticipated reduction in GPA's operating costs, and would therefore increase retail electricity rates. GPA stated it would reevaluate the viability of DSM measures in the future and would continue to provide information to consumers on energy efficiency and conservation measures.<sup>7</sup>

### Opportunities for Clean Energy Transformation

Guam has set aggressive renewable energy targets through its renewable portfolio standard and has taken concrete steps toward achieving them by preserving a net metering policy and issuing requests for proposals for up to 75 MW of utility-scale renewable resources. Building on these experiences with even more investments in renewable energy capacity and energy efficiency could allow Guam to diversify its fuel portfolio, replace aging units, and reduce the cost of energy. Executing a transition from petroleum-based fuels to natural gas liquids could also improve local air quality while simultaneously reducing the island's greenhouse gas emissions.

## 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://guampowerauthority.com/gpa\\_authority/investors/documents/GPA\\_fs14\\_FINAL033115.pdf](http://guampowerauthority.com/gpa_authority/investors/documents/GPA_fs14_FINAL033115.pdf).

<sup>2</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>3</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/gq.html>.

<sup>4</sup> [http://www.bea.gov/newsreleases/general/terr/2014/guamgdp\\_111914.pdf](http://www.bea.gov/newsreleases/general/terr/2014/guamgdp_111914.pdf).

<sup>5</sup> [http://guampowerauthority.com/gpa\\_authority/investors/documents/gpa\\_ar\\_2013.pdf](http://guampowerauthority.com/gpa_authority/investors/documents/gpa_ar_2013.pdf).

<sup>6</sup> <http://wits.worldbank.org/CountryProfile/Country/WLD/Year/2012/TradeFlow/Export/Partner/GUM/Product/all-groups>.

<sup>7</sup> [http://guampowerauthority.com/gpa\\_authority/strategicplanning/documents/2013IRPReportFINAL.pdf](http://guampowerauthority.com/gpa_authority/strategicplanning/documents/2013IRPReportFINAL.pdf).

<sup>8</sup> <http://www.guamenergy.com/wp-content/uploads/2013/09/Guam-Initial-Technical-Assessment-Report.pdf>.

<sup>9</sup> <http://www.eia.gov/countries/country-data.cfm?fips=GQ>.

<sup>10</sup> <http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>.

<sup>11</sup> [http://guampowerauthority.com/gpa\\_authority/rates/documents/20141001-Docket11-09-AllSchedules.pdf](http://guampowerauthority.com/gpa_authority/rates/documents/20141001-Docket11-09-AllSchedules.pdf).

<sup>12</sup> [http://guampowerauthority.com/gpa\\_authority/rates/documents/2014-11-06GPADocket14-12OrderLEAC.pdf](http://guampowerauthority.com/gpa_authority/rates/documents/2014-11-06GPADocket14-12OrderLEAC.pdf).

<sup>13</sup> <http://www.doi.gov/oia/reports/oia-nrelterritorialguam.cfm>.

<sup>14</sup> <http://www.guampuc.com/dockets/puc20131025001821.PDF>.

<sup>15</sup> [http://guampowerauthority.com/gpa\\_authority/engineering/gpa\\_engineering\\_standards.php](http://guampowerauthority.com/gpa_authority/engineering/gpa_engineering_standards.php).

<sup>16</sup> [http://www.guamlegislature.com/Public\\_Laws\\_29th/P.L.%2029-62%20\(Bill%20No.%20166%20EC\).pdf](http://www.guamlegislature.com/Public_Laws_29th/P.L.%2029-62%20(Bill%20No.%20166%20EC).pdf).

<sup>17</sup> <http://www.guamenergy.com/wp-content/uploads/2010/07/Guam-Building-Energy-Code.pdf>.

<sup>18</sup> <http://guampowerauthority.com/special/renew1.php>.

<sup>19</sup> [http://www.nrg.com/documents/renew/factsheet\\_dandan.pdf](http://www.nrg.com/documents/renew/factsheet_dandan.pdf).