

## Energy Snapshot Republic of the Marshall Islands

This profile provides a snapshot of the energy landscape of the Republic of the Marshall Islands (RMI), located in the central Pacific. RMI is an independent nation consisting of five islands and 29 atolls across 750,000 square miles of ocean. RMI's residential utility rates are approximately \$0.35 per kilowatt-hour (kWh), more than twice the average U.S. residential rate of \$0.13 USD/kWh.<sup>1</sup> Like many island nations, RMI is highly dependent on imported fossil fuels, leaving it vulnerable to global oil price fluctuations that directly impact the cost of electricity.

Population (2011) <sup>2</sup>	53,158
Total Area <sup>3</sup>	181 square kilometers
Gross Domestic Product (GDP) (2011) <sup>4</sup>	\$170.7 million U.S. dollars (USD)
Share of GDP Spent on Fuel and Imports (2011) <sup>a</sup>	Electricity – 10.5% Total – 29.9%
GDP Per Capita (2011)	\$3,211 USD
Urban Population Share <sup>2</sup>	72.7%

<sup>a</sup>Calculated using a blended fuel cost from Majuro and Ebeye of \$0.91/L,<sup>5</sup> and NEP consumption data.<sup>6</sup>

### Electricity Sector Data

The Marshall Islands are served by two government-owned electric utilities, MEC and KAJUR. MEC coordinates power generation and distribution services for the majority of RMI, while KAJUR, a subsidiary of MEC, services RMI's second largest population center, Ebeye.<sup>8</sup> Uniform electric rates are applied across all RMI islands and atolls and range from \$0.35/kWh for residential customers to a government rate of \$0.42/kWh.<sup>9</sup> A "lifeline" rate of \$0.33 per kWh is also



### RMI's Renewable Energy Goal:

20% of electricity from renewable resources by 2020.<sup>5</sup>

### Government and Utility Overview<sup>4</sup>

Government Authority	Ministry: Ministry of Resources and Development	
	Key Figure: Honorable Michael Konelios, Minister of Resources and Development	
Designated Institution for Renewable Energy	Energy Planning Division, Ministry of Resources and Development; Office of Environment, Planning, and Policy Coordination	
Regulator	President and cabinet	
Utilities <sup>7</sup>	Name: Marshalls Energy Company (MEC); Kwajalein Joint Utilities Resources (KAJUR)	Government owned
	MEC operates six districts while KAJUR serves only Ebeye. More than 75% of the population lives within these service territories.	

available for customers who consume less than 500 kWh per month. Certain policy measures have made cost recovery for RMI's utilities more difficult than typical rate structures. For example, the landowner's electricity concession program provides more than 600 landowners who have distribution

## Electricity Sector Overview

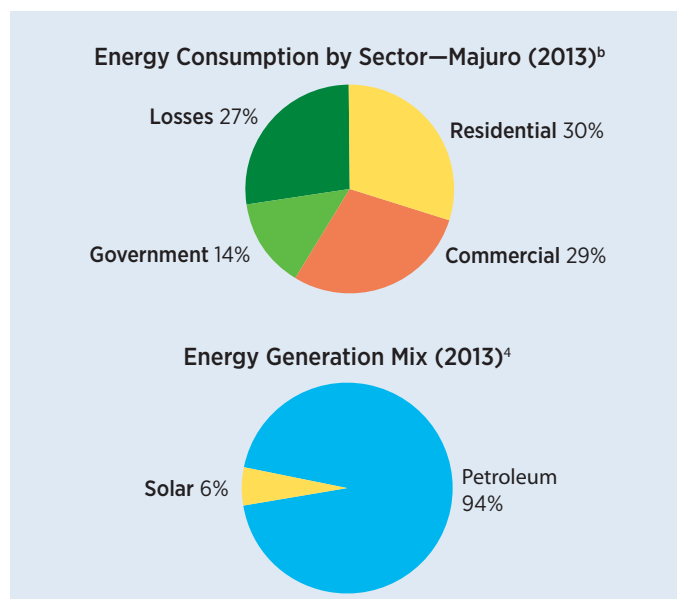
Total Installed Capacity (2014) <sup>6</sup>	33.5 MW	
Peak Demand (2010) <sup>4</sup>	10.9 MW	
Total Generation (2011) <sup>5</sup>	78.2 gigawatt-hours	
Renewable Share (2013) <sup>4</sup>	6%	
Transmission & Distribution Losses (2010) <sup>5</sup>	26.9%	
Electrification Rate <sup>6</sup>	75%	
Average Electricity Tariffs (USD/kWh) <sup>8</sup>	Residential	\$0.35
	Commercial	\$0.41
	Public Authorities	\$0.42

poles on their property with 1,000 kWh of free electricity each month.<sup>6</sup> For context, the average electricity consumption for an RMI household was 531 kWh/month in 2011.<sup>5</sup>

Diesel-powered generators, which continue to provide the vast majority of electricity to customers in RMI, supplied 94% of electricity in 2013, while solar photovoltaic (PV) systems provided the remaining 6%.<sup>4</sup> The average loads across the electric districts range from 15 kilowatts (kW) to 7 megawatts (MW), with RMI commanding a total installed capacity of 33.5 MW (2014).<sup>6</sup> In 2014, 75% of the total population in RMI had access to electricity.<sup>6</sup> Within the country's main urban areas of Majuro and Kwajalein, which comprise 74% of RMI's population, the electrification rate was 92%. While only 32% of the population of the outer rural islands had access to electricity in 2014, RMI established targets to increase this to 95% by 2015.

## Clean Energy Policy Environment

RMI's clean energy transition was sparked by the oil price spike in 2008 and the subsequent "State of Economic Emergency" declared by the government.<sup>10</sup> RMI's National Energy Policy (NEP) was developed and endorsed by the Government of the Republic of the Marshall Islands in 2009 in response to these events. The NEP, which was updated in 2015, identified several goals and targets for this transition, as well as a framework for achieving them.



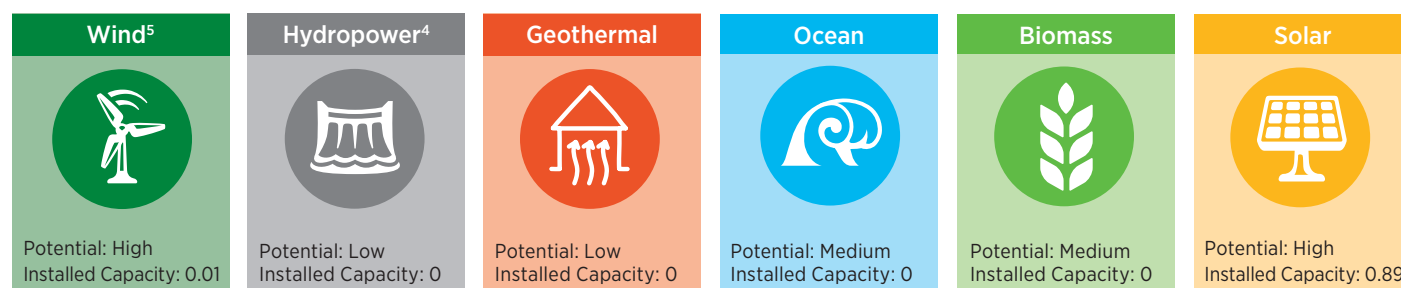
<sup>b</sup> Majuro customers make up more than 70% of RMI's average electric load.<sup>4</sup>

## Existing Policy and Regulatory Framework

Renewable Energy	
Feed-in Tariff	In Discussion
Net Metering/Billing	
Interconnection Standards	In Discussion
Renewables Portfolio Standard/Quota	
Tax Credits	
Tax Reduction/Exemption	In Place
Public Loans/Grants	
Green Public Procurement	
Energy Efficiency	
Energy Efficiency Standards	In Discussion
Tax Credits	
Tax Reduction/Exemption	In Place
Public Demonstration	
Restrictions on Incandescent Bulbs	
Appliance Labeling Standards	In Discussion
Targets	
Renewable Energy	In Place
Energy Efficiency	In Place

● In Place ■ In Discussion

## Renewable Energy Status and Potential (MW)



The goals RMI set for reforming its electric power sector included generating 20% of electricity using renewable resources by 2020 and providing 100% of urban households and 95% of rural outer atoll households with access to electricity by 2015. These goals paired well, as RMI planned to rely heavily on off-grid solar PV to meet the electrification target for remote rural households. To reach its 20% renewable goal, RMI recognized the need to improve the energy regulatory environment as well. The government is considering policy measures such as feed-in tariffs, interconnection standards, and power purchase agreement guidelines to assist with increasing renewable energy penetration.

The NEP outlined plans to reduce overall energy consumption throughout RMI as well. One goal included improving residential and business energy efficiency by 50% and government building energy efficiency by 75% by 2020. To aid in this process, regulatory policies, including establishing building energy codes and standards, as well as appliance standards and labeling programs, are being discussed among stakeholders. In addition, RMI established a goal to reduce supply-side energy losses from MEC 20% by 2017. The NEP includes plans to reform the transportation sector as well, with the goal of improving transportation sector fuel use efficiency 20% by 2020.

The policy measures identified in the NEP also seek to clarify the regulations, obligations, and authorities of the various entities within the electric power sector.<sup>5</sup> Because data plays a key role in energy transition at any scale, the NEP outlined plans to improve data transparency and energy use record keeping. Opportunities for future studies that provide clarity on grid stability issues that could arise from high penetration of renewable energy were also discussed.

## Energy Efficiency and Renewable Energy Projects

The first grid-tied renewable energy project was not developed until the impacts of the fuel price spike of 2008 were felt in RMI. Since then, 359 kW of grid-connected solar PV has been installed through five projects on Majuro. By September 2013, renewable energy made up approximately 6% of the electricity generated in RMI. As of 2014, 2,790 off-grid solar systems totaling more than 526 kW have also been installed in rural communities across RMI.<sup>4</sup> While solar development has increased since 2008, an off-grid 10-kW wind turbine installed in 2011 stands as RMI's first and only wind power project.

In general, RMI has high potential for solar and wind resources and medium potential for ocean and biomass energy sources, including waste-to-energy (WTE). In addition to the existing solar installations, several solar projects have been proposed, including an 800-kW grid-connected system in Majuro, a 500-kW system at the Majuro airport, and two 200-kW installations on Ebeye.<sup>4</sup> Due to concerns about the fragility of RMI's electric grid, MEC is evaluating new solar projects such as these cautiously. The NEP outlined plans for feasibility studies to gather more precise information on grid impacts related to renewable energy expansion, as well as renewable potential, particularly for wind.

Biomass, primarily coconut oil, shows promise as a fuel for transportation applications as well as power generation in RMI. An electric power generation pilot project set to begin in 2015 will use coconut oil as fuel in generators that previously utilized diesel fuel.<sup>4</sup> WTE has also been considered as a potential baseload technology to increase renewable penetration. A prefeasibility study conducted by SCS Engineers in 2010 found that a 1.2-MW WTE facility may be possible based on estimates of waste content, energy content, and power plant production.<sup>6</sup>

## 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.



## Opportunities for Clean Energy Transformation

The high energy costs resulting from dependence on imported fossil fuel make the prospect of transitioning to clean energy very attractive to RMI. Achieving its goal of 20% renewables by 2020 will require upgrades to infrastructure and updates to policy that enable new technology options. Building on its existing solar capacity with additional solar PV, wind, and/or WTE projects shows the greatest potential for meeting the 2020 renewable energy goal. In addition, pursuing opportunities to reduce total energy consumption by implementing energy efficiency programs and decreasing power system losses will aid in the transition. The NEP has identified distributed generation and policy improvement opportunities for clean energy transformation and established a solid framework for achieving the related objectives and goals.

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

<sup>2</sup> [http://prism.spc.int/images/census\\_reports/Marshall\\_Islands\\_Census\\_2011-Full.pdf](http://prism.spc.int/images/census_reports/Marshall_Islands_Census_2011-Full.pdf)

<sup>3</sup> <https://www.cia.gov/library/publications/the-world-factbook/geos/rm.html>

<sup>4</sup> <http://www.imf.org/external/np/ms/2012/110712.htm>

<sup>5</sup> [http://www.irena.org/DocumentDownloads/Publications/IRENA\\_RRA\\_Marshall%20Islands\\_2015.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_RRA_Marshall%20Islands_2015.pdf)

<sup>6</sup> [http://prdrse4all.spc.int/sites/default/files/neap\\_rmi\\_endorsed\\_2016.pdf](http://prdrse4all.spc.int/sites/default/files/neap_rmi_endorsed_2016.pdf)

<sup>7</sup> <http://www.nrel.gov/docs/fy15osti/60555.pdf>

<sup>8</sup> [http://open\\_jicareport.jica.go.jp/pdf/12229043\\_01.pdf](http://open_jicareport.jica.go.jp/pdf/12229043_01.pdf)

<sup>9</sup> <http://www.mecrmi.net/tariffs.htm>

<sup>10</sup> [http://prdrse4all.spc.int/system/files/rmi\\_energy\\_sector\\_review\\_and\\_action\\_plan\\_-\\_260613.pdf](http://prdrse4all.spc.int/system/files/rmi_energy_sector_review_and_action_plan_-_260613.pdf)