CADMUS

Baseline Report for Cayman Islands National Energy Policy Review

April 2023

Prepared by:

Cadmus Group

Acknowledgements

The Cadmus Group developed this resource in collaboration with the Ministry of Sustainability and Climate Resiliency and the Energy Policy Council. Project participants are listed below:

Ministry of Sustainability and Climate Resiliency Key Members:

Kristen Smith, Senior Policy Advisor

Lisa Hurlston-Mckenzie, Senior Policy Advisor

Karen Ford, Policy Advisor

Hannah Ford, Communications Specialist

Jennifer Ahearn, Chief Officer

Jacob Troy, Acting Deputy Chief Officer

Energy Policy Council Members:

Richard Hew, Caribbean Utilities Company

James Whittaker, GreenTech Solar

Gina Ebanks-Petrie, Department of Environment

Alan Neesome, Retired Consultant

Andrew Small, DART

Gregg Anderson, Utility Regulation and Competition Office

Ralston Henry, Economics and Statistics Office

Winston Connolly, Chancery ESG, Ltd.

Richard Mileham, Dept. of Planning

Haroon Pandohie, Dept. of Planning

Roxann Burrell, Dept. of Planning

Charles Farrington, Retired Consultant

Eden Hurlston, Civil Society

Kenny Ryan, Cayman Brac Power & Light

Louis Boucher, Electricity Regulatory Authority

Kevon Thompson, Dept. of Planning

The Cadmus Group Authors:

Andrew Whiteman

Christina Becker-Birck

Michael Whittaker

Othman Refai

Katharine Witty

Elyssa Dalaker

Table of Contents

1. Introduction

The Cayman Islands Government developed an **updated National Energy Policy ("NEP")** in 2017 that proposed a target of 70% electric generation from renewable sources by 2037 and total peak GHG emissions by 2020 while not exceeding 2014 per capita emissions levels (approximately 12.3 tCO2e). The Policy aims to achieve the aspirational goal of the 2015 Paris Agreement of 4.8 tCO2e of GHG emissions per capita by 2030.

To measure progress against its goals and factor for opportunities in the evolving technological landscape, the Policy was intended to be reviewed every five years. In this context, the Cayman Islands Government has requested the Policy to be updated to reflect the current state of the energy market and the country's vision statement for the energy sector:

- "Enhancing and embracing a sustainable lifestyle through responsible and innovative energy supply and consumption"[1]

The NEP provides a platform to meet targets through four overarching goals:[2]

- Public awareness raising through Knowledge & Education
- Cayman Islands as a Destination of Excellence
- Energy Security
- Socioeconomic & Environmental Sustainability

The Baseline Report herein serves as the first step in the process towards developing an updated NEP and Implementation Plan by synthesizing the global and regional contexts that influence the Cayman Islands' energy sector, summarizing the policy context of the country's energy sector, and providing an overview of energy use. It also benchmarks Cayman Islands' NEP and Implementation Plan against four island nations, Hawaii, Barbados, Bahamas, and Republic of Marshall Islands (RMI). Lastly, the Baseline Report presents a quantitative analysis of progress towards meeting NEP targets.

Overall, the NEP's core elements and its supporting documents show alignment with goals and actions of peer countries. The benchmarking analysis in Section 4 of this document also provides innovative ideas and insights from other countries for consideration in the updated NEP.

Through the NEP review process, Cadmus will recommend additional strategies to account for 2022 market conditions and feedback from Cayman Islands stakeholders. Cayman Islands has taken the right step in its first actions to implement this policy. Furthermore, results from ongoing studies on renewable energy potential and other measures to reduce emissions will allow Cayman Islands to better assess progress towards meeting targets. The review of Cayman Islands NEP implementation and monitoring framework will also present opportunities to better assess and track progress.

This report has been developed by The Cadmus Group in consultation with the Ministry of Sustainability and Climate Resiliency, and the Energy Policy Council.

[1] Cayman Islands Government. "National Energy Policy 2017-2037" 2017. http://www.dlp.gov.ky/portal/pls/portal/docs/1/12374582.PDF

[2] Cayman Islands National Energy Policy Unit. website

2. Global and Regional Energy Contexts and Their Influence on the Cayman Islands

2.1. Global Energy Context

Global drivers of change in the energy sector present new dynamics that can impact the Cayman Islands' energy sector. Some global changes since the Cayman Islands' first NEP in 2017 – particularly those that influence its renewable energy and climate-related targets – include:

- **Declining costs of renewable energy technologies**: Since 2010, the global average cost of electricity from solar PV and onshore wind energy has fallen by 82% and 29% respectively.[3]
- **Renewable energy generation increasingly out-competes fossil fuels**: Not only have costs continued to decline for solar and wind power technologies, but new projects are increasingly being commissioned at very low-cost levels. In 2019, 56% of all newly commissioned utility-scale renewable power generation capacity provided electricity at a lower cost than the cheapest new fossil fuel-fired option.[4]
- **Global oil markets continue to fluctuate with high volatility**: Since the early 2000s, oil prices have witnessed significant volatility. This results in high vulnerability to price shocks for countries highly dependent on oil as a source of energy, such as the Caribbean region.[5]
- **Fossil fuel impacts.** The negative impacts of fossil fuels are increasingly well-known and well-documented, from the global impacts on climate change[6] and to local impacts such as air pollution.[7]
- **Battery energy storage opens new possibilities for renewable energy, and decreasing costs make this increasingly more affordable**. The variability of energy supply from sources such as solar and wind power present challenges for integrating renewable energy into the electric grid. Battery energy storage can play a critical role in enabling a higher share of renewable energy on the electric grid, enabling electricity to be stored until it needs to be used. With costs of battery energy storage systems declining (and projected to continue to decline), this technology is increasingly becoming a viable and affordable solution.[8]
- **Renewable energy and energy storage are increasingly recognized as a viable strategy to support energy resilience.** The role of renewable energy in enhancing resiliency is increasingly documented, with further opportunities under exploration. The use of renewable energy, particularly distributed renewable energy, can reduce the vulnerability of island nations to disasters and system shocks such as hurricanes.[9]
- **Renewable power generation is now growing faster than overall power demand**. In 2019, a new global milestone was reached when electricity generation from renewable sources outpaced the increase in electricity demand, while fossil-fuel electricity generation decreased. This is the first time in decades that fossil-fuel-based generation declined with overall electricity generation increased.[10]
- **Global increase in ambition on decarbonizing the energy sector**. Strengthened by the renewable energy business case and the need to decarbonize the energy sector, governments have increased their ambitions and taken steps to accelerate their deployment of renewable energy. In the lead-up to the UNFCCC COP 2021, more than 75 countries have come forward with strengthened national climate plans, including increased ambition and plans for transitions to renewable energy. Climate vulnerable countries such as island nations states are at the forefront of action in setting ambitious targets towards climate-neutrality and laying out details on a transition to renewable energy.[11]

---

3 International Renewable Energy Agency. "Renewable Energy Power Generation Costs - 2019." IRENA, June 1, 2020. https://www.irena.org/publications/2020/Jun/Renewable-Power-Costs-in-2019.

4 Ibid

5 Marchan, Estefania, Ramon Espinasa, and Ariel Yepez-Garcia. "The Other Side of the Boom Energy Prices and Subsidies in Latin America ." Inter-American Development Bank, 2017. https://publications.iadb.org/publications/english/document/The-Other-Side-of-the-Boom-Energy-Prices-and-Subsidies-in-Latin-America-and-the-Caribbean-during-the-Super-Cycle.pdf.

6 Allen, Myles et al. "Summary for Policy Makers - Special report on Global Warming of 1.5 degrees C". IPCC, 2018. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf

7 International Finance Corporation. "The Dirty Footprint of the Broken Grid". IFC, 2019. website

8 International Renewable Energy Agency. "Electricity Storage and Renewables: Costs and markets to 2030". IRENA, 2017. https://www.irena.org/publications/2017/Oct/Electricity-storage-and-renewables-costs-and-markets

9 Weir, Tony. "Renewable energy can enhance resilience of small islands". Natural Hazards, 2020. https://link.springer.com/article/10.1007/s11069-020-04266-4

10 International Renewable Energy Agency. "Global Renewables Outlook: Energy Transformation 2050". IRENA, 2020. https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020

11 UNFCC. "Climate Ambition Summit Builds Momentum for COP26. UNFCC, 2020. https://unfccc.int/news/climate-ambition-summit-builds-momentum-for-cop26

2.2. Caribbean Regional Energy Context

The Cayman Islands shares a regional energy context with other nations in the Caribbean. Some of the key similarities include:

- **Caribbean countries continue to rely heavily on imported oil for energy**. Excluding Trinidad and Tobago and Suriname, Caribbean countries rely on petroleum products as the source of approximately 87% of primary energy consumption. [12] As a result, oil importer countries in the Caribbean have reported spending up to 15% of annual GDP on fuel imports. [13] This reliance on imported fuels is also one of the most significant factors driving high electricity costs in the region.[14]
- **Caribbean island nations are particularly susceptible to the impacts of climate change.** As developing economies relying on sectors vulnerable to climate patterns such as tourism, agriculture and fishing, Caribbean nations stand to be greatly affected by the ongoing rise in sea levels, changes in rain patterns and temperatures, and increasing intensity of natural disasters.[15]

2.3. Influence on the Cayman Islands

These global and regional contexts emphasize needs and new opportunities for the Cayman Islands' energy sector. The lack of energy security and heavy reliance on imported energy has impacts on all communities, households, and businesses in the region. At the same time, the declining costs of renewable energy strengthens the business case of renewable energy and has spurred new demands for renewable energy in the Cayman Islands at the household and commercial level. These trends frame a new context for the next chapter of the country's energy sector, one in which the Cayman Islands' overarching goals to reduce greenhouse gas emissions in the energy sector and increase the share of renewable energy offer the potential to curtail the country's vulnerability to the volatility of oil markets, reduce the cost of electricity and enhance the resiliency of the energy sector.

[12] Caribbean Council. "New Opportunities to Address Energy Security in the Caribbean". 2020 https://www.caribbean-council.org/new-opportunities-address-energy-security-caribbean/

[13] Ibid.

[14] Ibid.

[15] Inter-American Development Bank. "Small Island States". IDB, 2022. https://www.iadb.org/en/ove/climate-change-caribbean-small-island-states

3. The Cayman Islands' Energy Sector

This section provides an overview of the Cayman Islands' energy sector, offering a baseline from which to develop an updated National Energy Policy. The subsequent benchmarking and quantitative analysis sections will frame Cayman Islands NEP and Implementation Plan within a global context and show its progress towards meeting targets.

3.1. Policy Context of the Cayman Islands' Energy Sector and the forthcoming National Energy Policy

Since the development of the first National Energy Policy in 2017, the Cayman Islands has adopted several policies and regulations that frame the context for the Cayman Islands' energy sector. Table 1 provides an overview as follows:

Table 1. Cayman Islands' Energy-Related Policies and Regulations

Year	Policy or Regulation Adopted and Key Implications
2017	Cayman Islands adopts its first **National Energy Policy** in 2017, which establishes targets of achieving 70% electricity from renewable energy by 2037, and 4.82 tons CO2e emissions per capita by 2030. The NEP goals are defined as follows: to educate residents on the impact of energy demand on the environment; lead in development of sustainable energy opportunities; have a modern, reliable, and secure energy infrastructure; promote the development of sustainable energy technologies and solutions that reflect commitment to the socioeconomic wellbeing of residents.
2017	**NEP Implementation Plan** outlines strategies for achieving each of the four NEP goals. Each strategy is relevant to a particular sector, such as electricity, fuel, and land use, among others.
2019	Cayman Islands revises the **Electricity Sector Regulation Law**, which details regulations around licensing, competitive practices, the authority of relevant government offices, and other aspects of electricity regulation.
2021	Cayman Islands revises the **Development Planning and Act**. The act outlines development requirements, such as approval of development plans, application for planning permission, modification of planning permissions, enforcement, and other regulatory rules and processes pertaining to development.
2021	Cayman Islands revises the **Utility Regulation and Competition Act**, which includes provisions pertaining to mergers, customer protection, holding of significant market power, anti-competition, and economic development.
2022	Cayman Islands revises the **Development and Planning Regulations**. The Regulations outline general development requirements (such as parking, height setbacks, etc.), requirements for various land use zones and related planning, and infrastructure fees.
2022	**Draft National Planning Framework** creates a comprehensive land use policy in the Cayman Islands, which describes vision and goals, detailed policy, and guidance for specific areas, and includes a zoning map, regulations, and general plan. With a vision to "enhance the quality of life for residents and visitors to the Cayman Islands, by ensuring that development promotes the most desirable balance of economic, social, and environmental outcomes," the draft framework focuses on eight key areas: land use and zoning, housing, transportation, climate resiliency, environment, economic development, infrastructure, and community facilities.

Building upon this policy and regulatory context, the Cayman Islands Government seeks to develop an updated NEP that supports a path for the Cayman Islands to achieve or exceed its existing international, regional, and national-level energy sector commitments. The Cayman Islands' existing energy sector targets and obligations from the above policies are summarized in Table 2. These updated targets will be informed by this Baseline Report and forthcoming scenario modelling as part of the process in developing a draft National Energy Policy.

Table 2. Existing Targets for Cayman Islands' Energy Sector

Existing Energy-Related Targets	Source: Legal or Policy Document
Achieve 70% of total electricity coming from renewable energy sources by 2037	NEP 2017
Achieve 4.82 tons of CO2e emissions per capita by 2030	NEP 2017

3.2. Governance of the Energy Sector

The Cayman Islands' energy sector is governed by the 2019 Electricity Sector Regulation Law, and the 2021 Utility Regulation and Competition Act, along with associated legislation.

Key stakeholders responsible for the governance of the energy sector in the Cayman Islands include:

- The **Ministry of Sustainability and Climate Resiliency** was established by the Cabinet of the Cayman Islands Government to optimize benefits of environmental, social, and economic goals. In this capacity, they are responsible for developing programs and policies to ensure sustainability for present and future generations. The Ministry also houses the National Energy Policy Unit, which is responsible for updating the National Energy Policy.[16]
- The **Utility Regulation and Competition Office** (OfReg) is an independent regulatory office established by the Utility Regulation and Competition Act of 2016. OfReg's purview includes regulating competition, consumer protection, fostering innovation in the sector, contributing to social, economic and sustainability goals of the Cayman Islands, and streamlining efficient regulatory processes. [17]
- The **Department of the Environment** is responsible for natural resources conservation and management. In addition to direct conservation and management activities, the Department of the Environment also works to develop environmental citizenship through education.[18]
- The **Caribbean Utilities Company** is the sole public utilities company serving Grand Cayman.[19]

Other stakeholders involved in the governance of the energy sector and the Energy Policy Council include:

- Department of Planning
- Economics and Statistics Office
- DART

[16] Ministry of Sustainability and Climate Resiliency, Cayman Islands. http://www.gov.ky/sustainability/#key-people-block-slot

[17] OfReg, Cayman Islands. http://www.ofreg.ky/about-us

[18] Department of the Environment, Cayman Islands. http://doe.ky/about-us/about-us/

[19] Caribbean Utilities Company, Cayman Islands. https://www.cuc-cayman.com/

3.3. Energy Use

The following section provides an overview of energy use in the Cayman Islands and summarizes data in three main areas:

1. Energy imports and demand
2. Electricity generation
3. Transportation

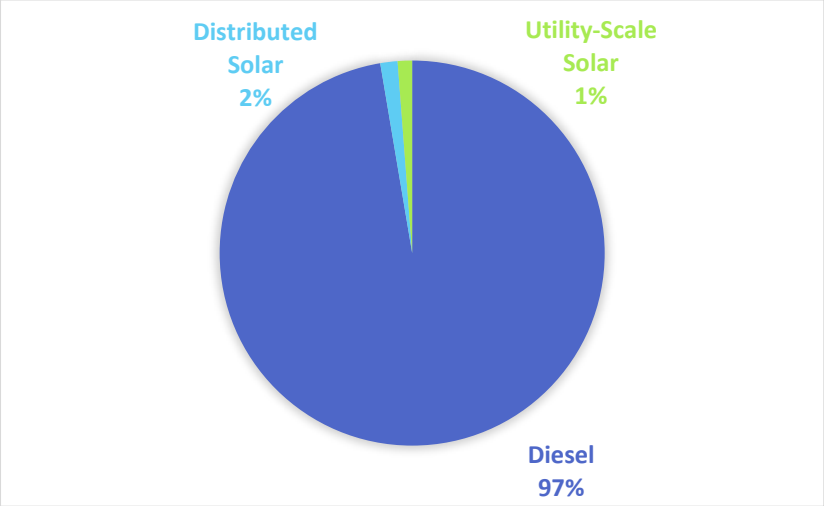
The data on energy use presented in this section draws from a variety of primary and secondary sources. This includes key governmental agencies like the Ministry of Tourism & Transport, IRENA, U.S. Department of Energy Island Energy Snapshots, and the Caribbean Utilities Company (CUC) and Cayman Brac Power & Light Company.

This analysis below focuses on a broad assessment of the energy system to highlight key trends and ultimately support the identification of strategies pivotal to meeting the Cayman Islands' goals.

Energy Imports and Demand[20]

Cayman Islands imported 37 Million imperial gallons of diesel in 2021 for electricity consumption. This total comprises 34 Million imperial gallons for Grand Cayman, 1.2 Million imperial gallons for Cayman Brac, and 250,000 imperial gallons for Little Cayman. During 2021, CUC total electricity sales were 660,000 MWh and Cayman Brac Power & Light total sales were 20,000 MWh in Cayman Brac and 3,330 MWh in Little Cayman. Figure 1 shows the source of electricity consumption in 2021. 97% from diesel, 1% from utility-scale solar, and 2% from distributed solar.

Figure 1. 2021 Electricity consumption (MWh)[21]



Electricity Generation[22]

Electricity in the Cayman Islands is primarily generated by diesel generators. As of 2021, total generation was 198.05 MW across the three islands. This total includes 182.35 MW of capacity in Grand Cayman, 12.4 MW

[20] Data shared directly by CUC and Cayman Brac Power & Light

[21] Ibid

[22] Ibid

in Cayman Brac, and 3.3 MW in Little Cayman. Grand Cayman has 5 MW of operational utility-scale solar at Bodden Town and 6 MW of distributed solar capacity on Grand Cayman. Table 3 summarizes electricity generation by power plant in the country. Figure 2 shows the percent breakdown by generation capacity. 94% of capacity is diesel, with 3% distributed solar and 3% utility-scale solar.

Table 3. 2021 Electricity generation by power plant[23]

Existing Generation	Tech	MW	MWh	Location
Unit 1	Diesel	9	40,351	Grand Cayman
Unit 2	Diesel	9	43,700	Grand Cayman
Unit 3	Diesel	4.4	11,947	Grand Cayman
Unit 4	Diesel	4.4	13,436	Grand Cayman
Unit 15	Diesel	10.3	850	Grand Cayman
Unit 19	Diesel	4	12,095	Grand Cayman
Unit 20	Diesel	4	10,016	Grand Cayman
Unit GT25	Diesel	3.5	3,486	Grand Cayman
Unit GT26	Diesel	8.4	6,807	Grand Cayman
Unit 28	Diesel	2.7	13,300	Grand Cayman
Unit 30	Diesel	18.5	117,098	Grand Cayman
Unit 31	Diesel	18.5	97,722	Grand Cayman
Unit 32	Diesel	16	70,909	Grand Cayman
Unit 33	Diesel	16	56,853	Grand Cayman
Unit 34	Diesel	12.25	69,355	Grand Cayman
Unit 35	Diesel	12.25	63,550	Grand Cayman
Unit 36	Diesel	12.25	48,830	Grand Cayman
Unit 41	Diesel	1.45	1,064	Grand Cayman
Unit 42	Diesel	1.45	692	Grand Cayman
Unit 43	Diesel	1.5	712	Grand Cayman
Unit 44	Diesel	1.5	126	Grand Cayman
DG	Distributed solar	6	10,512	Grand Cayman
Bodden Town	Utility-scale solar	5	8,760	Grand Cayman
	Diesel	12.4	20,053	Cayman Brac
	Diesel	3.3	3,338	Little Cayman
Total		**198.05**	**725,561**	

[23] Ibid

Figure 2. 2021 Total Generation Capacity (MW)[24]

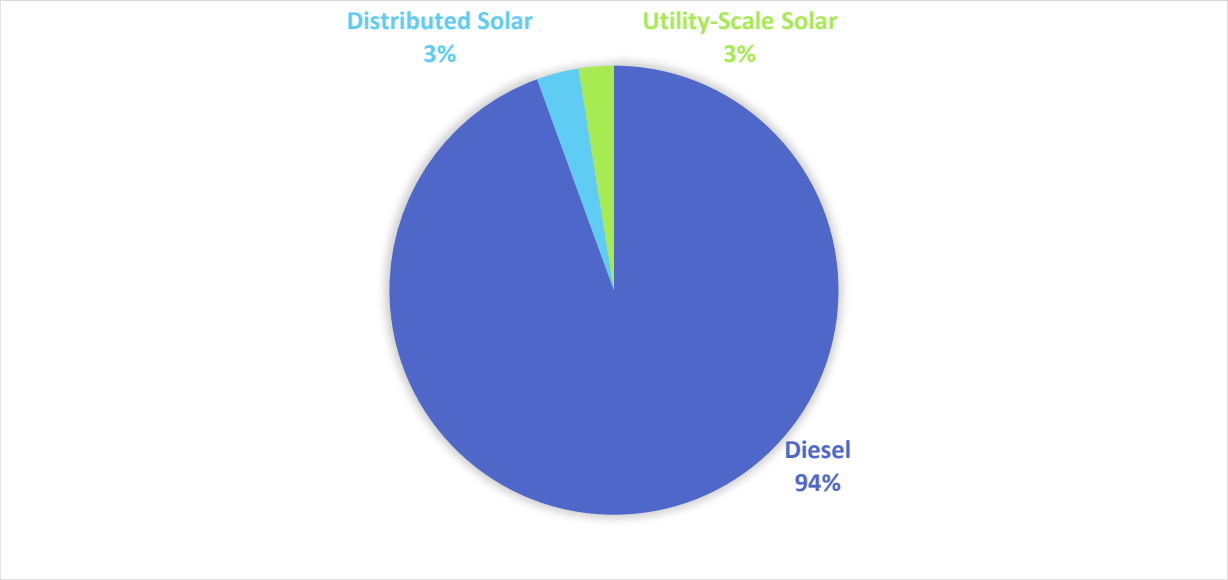


Table 4 and 5 show total CUC electricity sales and losses in 2021. Residential customers made up most electricity sales and most electricity losses came from transmission & distribution.

Table. Table 4. Electricity sales in 2021[25]

Electricity Sales (2021)	MWh	Percent of total
Residential	361,605	55%
Large Commercial	142,038	22%
Small Commercial	151,807	22%
Streetlights	5,019	1%
Total Sales	**660,469**	

Table 5. Electricity losses in 2021[26]

Electricity Losses (2021)	MWh	Percent of total
Plant Use (Auxiliary Loads)	17,526	41%
Generation (Station Losses)	4,177	10%
T&D Losses	21,547	50%
Total Losses	**43,249**	

[24] Ibid

[25] Ibid

[26] Ibid

Transportation

Table 6 shows the transportation fleet by fuel type. There is a total of 61,741 registered in the country and most vehicles, 98.69%, are gasoline, diesel, or propane. As of 2022, there are 347 hybrid in-country and 459 Electric vehicles.

Table 6. Transportation fleet by fuel type (2022).[27]

Vehicle Type	Number of Vehicles	Percent Total
Diesel	4,149	6.72%
Gasoline	56,589	91.66%
Propane	27	0.04%
Hybrid	347	0.56%
Electric	459	0.74%
Other	170	0.28%
Total	**61,741**	**100%**

Of the vehicles in the country, 962 vehicles are estimated to be government owned, with 828 vehicles in Grand Cayman and 127 in Cayman Brac and Little Cayman. Table 7 shows a breakdown of vehicles in Grand Cayman by fuel-type, with slightly more gasoline than diesel vehicles.

Table 7. Government-owned vehicles by fuel type (2022).[28]

Fuel Type	Number	% of Total
Diesel	381	46%
Electric	5	1%
Gas	441	53%
Propane	1	0.12%
Total	**828**	**100%**

3.4. Electricity Costs

Electricity prices in the Cayman Islands are generally high because of the country's high dependence on imported fuel for electricity generation. This trend is likely to continue in the aftermath of the COVID-19 pandemic as inflation impacts the price of imported fuel from the U.S.[29] With the reliance on imported fuel,

[27] Department of Vehicle & Equipment Services, Cayman Islands

[28] Ibid

[29] Cayman Compass. "Cayman to face unrelenting price pressure for the foreseeable future". 2022. Website.

current high prices, and the vulnerability to international price fluctuation, Cayman Islands' residents are likely to feel the financial impact.

A similar challenge affects nearly all island jurisdictions in the Caribbean relying on imported fossil fuels for electricity generation. Table 8 provides an overview of average costs of electricity for island jurisdictions in the Caribbean. By comparison, Cayman Islands' energy costs are on the high end of island jurisdictions in the Caribbean.

Table 8. Electricity rates for CARICOM Member States (island jurisdictions), listed as an average USD per kWh for residential, commercial, and industrial customers[30]

CARICOM Member State	Residential Electricity Rate	Commercial Electricity Rate	Industrial Electricity Rate (if separate from Commercial)
Antigua and Barbuda	$0.14 – $0.15	$0.14 – $0.17	-
Bahamas	$0.316	$0.374	-
Barbados	$0.25	$0.28	$0.25
Cayman Islands	$0.30	$0.31-$0.33	
Dominica	$0.21-$0.46	$0.26	$0.22
Grenada	$0.32	$0.32	$0.28
Jamaica	$0.28	$0.21	$0.20
St. Kitts & Nevis	$0.26	$0.28	$0.28
St. Lucia	$0.28	$0.32-$0.34	$0.34
St. Vincent and the Grenadines	$0.19	$0.20	$0.16

3.5. Energy Resources and Renewable Energy Potential

The Cayman Islands has no indigenous fossil fuel resources, but rather relies on imports for fossil-fuel based energy uses. The Cayman Islands does benefit from indigenous renewable energy resources potential, primarily solar PV, and wind. It should be noted that the actual potential for renewable energy deployment will depend not only on the theoretical potential of renewable energy resources, but also various technological and financial considerations to integrating renewable energy in the energy system.

Existing and Planned Renewable Energy Projects

The existing National Energy Policy includes strategies to encourage the use of renewable energy sources, including updating the policy and regulatory framework, tariff reform, and encouraging private sector financing and competitive procurement. By partnering with the two major utility providers in the nation, Caribbean Utilities Company (CUC) and Cayman Brac Power & Light (CBP&L), the government can effectively

[30] U.S. Department of Energy. "Island Energy Snapshots. 2022. https://www.energy.gov/eere/island-energy-snapshots

implement initiatives to move overall energy usage towards those targets while continuing to provide cost-efficient and accessible electricity to residents.

The CUC 2017 Integrated Resource Plan shows that building infrastructure to support approximately 100 MW of renewable energy sources within the seven years will generate enough savings to offset their capital and operational costs.[31] In 2022, CUC issued two Request for Proposals (RFPs) for 1) up to 100 MW of solar PV (up to 60 MW of battery storage) by 2025[32] and 2) 23 MW of solar PV with collocated storage by 2024.[33] An additional 12 MW of available capacity for distributed generation will be made available after the commissioning of a 20 MW utility-scale battery.[34]

Solar Energy

The Cayman Islands benefits from year-round solar irradiance values that are more than sufficient for the solar energy technologies such as solar water heating and solar PV systems. The current installed capacity of solar PV consists of approximately 5 MW of utility-scale and 6 MW of distributed PV.[35] This total accounts for approximately 3% of the country's total electricity generation and 6% of its total capacity.[36]

In 2021, OfReg issued a draft determined to approve a renewable energy auction to encourage and procure renewable energy investment.[37]

Energy Storage

OfReg approved a 20MW utility scale battery installation in 2021. Once installed, the battery will enable CUC to store renewable energy for backup power and make available an additional 12 MW of capacity for distributed generation programmes.

Wind Energy

The Caribbean region also benefits from high wind speeds that present a viable resource for wind power. While this capacity does exist, the Cayman Islands does not currently utilize wind power as a source of renewable energy. On Grand Cayman, CUC has identified two wind sites, Mastic and Quarry on the East side of the island.[38] With the sites' proximity to the airport, the Cayman Islands Airports Authority (CIAA) is currently investigating the installation of a new radar system for air traffic control and will take into consideration the impact of renewable energy. This will be supported by an assessment of Doppler radar on wind farms.[39]

Ocean Thermal Energy Conversion (OTEC)

CUC is assessing the potential for OTEC to determine its suitability and economics in Cayman Islands. Ocean thermal energy is generated by harnessing thermal energy from beneath the ocean and converting it to

[31] Caribbean Utilities Company "2017 Integrated Resource Plan" https://www.cuc-cayman.com/renewable-energy/integrated-resource-plan-irp/

[32] Shared by Ministry of Sustainability and Climate Resiliency

[33] Ofreg, "Request for Statement of Qualifications – Solar DPV". https://cnslibrary.com/wp-content/uploads/OfReg-Request-for-Statement-of-Qualifications-Dispatchable-Solar-Photovoltaic-Capacity-for-Grand-Cayman-19-April-2022.pdf

[34] Ofreg, "Renewable Energy". 2022. https://www.ofreg.ky/energy/renewable-energy

[35] Caribbean Utilities Company "2017 Integrated Resource Plan" https://www.cuc-cayman.com/renewable-energy/integrated-resource-plan-irp/

[36] Cayman Islands Government, "National Energy Policy 2017-2037 2021 Progress Report" https://www.energy.gov.ky/documents/NEP---2021-Progress-Report-20211209175504.pdf

[37] Ibid

[38] Caribbean Utilities Company "2017 Integrated Resource Plan" https://www.cuc-cayman.com/renewable-energy/integrated-resource-plan-irp/

[39] Cayman Islands Government, "National Energy Policy 2017-2037 2021 Progress Report" https://www.energy.gov.ky/documents/NEP---2021-Progress-Report-20211209175504.pdf

electricity. This type of renewable energy is most effective in tropical regions where the water is warmer and requires less land mass than other renewable sources.

Natural Gas

CUC is currently exploring the option to convert some of their diesel generators to use compressed or liquefied natural gas ("CNG" or "LNG"). LNG is discussed in the NEP and CUC's 2017 Integrated Resource Plan ("IRP") as a transitional fuel to meet the 2030 emissions target, while still pursuing a long-term renewable energy goals. Natural gas has a lower emissions factor than diesel and would thus help CUC reduce emissions and meet NDC targets.

Municipal Solid Waste and Landfill Gas

To address limited space for landfills on Grand Cayman, CUC is also assessing potential for a 5 MW municipal solid waste plant and a 1 MW landfill gas plant.

3.6. Other Energy Sector Developments[40]

Transportation

The transportation sector makes a significant impact on emissions as almost all vehicles are fuelled by gasoline or diesel. Electric vehicles options are available for virtually all vehicle classes and cost competitiveness continues to grow. Electric vehicles can reduce emissions when charged from the electricity grid, as the emissions factor for gasoline is lower than that of diesel-fired power plants. As additional renewable energy resources come online, electric vehicles offer greater potential for emissions reduction.

Cayman Islands has reduced import duties for electric vehicles and is assessing opportunities to promote electric vehicle conversions, conduct trainings on electric vehicle maintenance, and introduce lower GHG-emitting ethanol into gasoline and biodiesel blends.

Energy Efficiency

Energy efficiency is often a 'low hanging fruit' to reduce electricity consumption and GHG emissions. Many utility-run programs in the United States can offer over 1% energy demand savings per year[41].

The ReSEMBid Programme provides funding and technical support from the EU, approved a concept note for the creation of a Cayman Islands Government programme to conduct energy audits and retrofits to public sector and residential buildings, and training opportunities.[42]

---

[40] Ibid

[41] 2019 Cadmus study for Consumers Energy (not public).

[42] Cayman Islands Government, "National Energy Policy 2017-2037 2021 Progress Report" https://www.energy.gov.ky/documents/NEP---2021-Progress-Report-20211209175504.pdf

4. Benchmarking Analysis

Many countries are committed to renewable energy adoption and GHG emission reductions. 175 countries, including the United Kingdom, signed the 2015 Paris Climate Accords, implemented by the United Nation Framework Convention on Climate Change (UNFCC) which requires signatories to establish, maintain, and report on a nationally determined contribution (NDC) to greenhouse gas reductions every five years.[43] National energy policies around the world account for cutting-edge interventions to reduce GHG emissions, including renewable energy generation.

This section highlights the experience of Hawaii, Bahamas, Barbados, and RMI in developing national energy policies and implementation strategies. Overall, Cayman Islands' targets and goals are largely in line with those of its peer countries. As shown in Table 9, Cayman Islands' 2037 renewable energy target it is more ambitious than Bahamas, largely comparable to Barbados, and less ambitious than RMI. Hawaii's target is the only binding renewable energy target. A comparison of energy policy goals shows that Cayman Islands' goals are comparable as well. Table 9 presents a comparison of goals across thematic areas that reveal a lot of similarities: energy efficiency, renewable energy, regulatory reform, electric vehicles, public education, and innovation. One highlight of Barbados' goals worth considering is its emphasis on opportunities for those most vulnerable to the impacts of climate change (Visionary Goal 10).[44] Comparing percent reductions, Cayman Islands' 2030 emissions target is similar to Barbados' and Hawaii's and more ambitious than RMI's and Bahamas'.

Table 9. Comparison of NEP Targets and Goals by Country

	Cayman Islands[45]	Hawaii	Barbados[46]	Republic of Marshall Islands[47]	Bahamas[48]
Emissions Target	4.8 tCO2e per capita by 2030 (60% reduction over 2014 levels)	70% below 2005 levels by 2030	70% reduction by 2030 over 2008 levels	45% below 2010 levels by 2030; Net zero carbon emissions by 2050	30% emissions reduction over 2010 levels
Renewable Energy Target	100% renewable energy by 2050	100% renewable energy standard by 2045	100% renewable energy by 2030	100% renewable energy by 2050	30% renewable energy by 2030
Energy Efficiency Target	No quantitative target: Priorities included in goals below	No quantitative target	20% improvement in energy efficiency by 2030 compared to 2019	No quantitative target: Priorities included in goals below	Target exists but is not publicly available
Electric Vehicle Target	No quantitative target: Priorities included in goals below	No quantitative target	Zero diesel and gasoline vehicles by 2030	No quantitative target: Priorities included in goals below	Target exists but is not publicly available
Goals	Knowledge & Education	Infrastructure for a clean energy economy	Energy efficiency	Public awareness campaigns	Energy efficiency

[43] UNFCC. "Key Aspects of the Paris Agreement". 2015. https://unfccc.int/most-requested/key-aspects-of-the-paris-agreement

[44] Government of Barbados "2019 National Energy Policy" https://energy.gov.bb/download/national-energy-policy-2019-2030/?wpdmdl=3330&refresh=636928924885016678360 50

[45] Cayman Islands Government, "National Energy Policy 2017-2037 2021 Progress Report" https://www.energy.gov.ky/documents/NEP---2021-Progress-Report-20211209175504.pdf

[46] Government of Barbados "2019 National Energy Policy" https://energy.gov.bb/download/national-energy-policy-2019-2030/?wpdmdl=3330&refresh=636928924885016678360 50

[47] RMI's latest NEP (2016) ended in 2020. This table references its 2050 Climate Strategy, which informed its updated NDC targets and 2019 Electricity Roadmap. Government of the Marshall Islands. "2050 Climate Strategy". 2018. https://unfccc.int/sites/default/files/resource/180924%20rmi%202050%20climate%20strategy%20final.pdf

[48] Government of the Bahamas. "National Energy Policy 2013-2033". 2013. https://www.climate-laws.org/geographies/bahamas-the/policies/national-energy-policy-2013-2033#:~:text='The%20National%20Energy%20Policy%20aims,presents%20a%20long%2Dterm%20vision.

	Energy Security	Foster and demonstrate innovation	Energy efficiency, renewable energy, reliability; clear legal, regulatory frameworks	Solar & wind penetration, battery storage, vehicle electricity storage; energy efficiency	Modern, secure, reliable, safe energy infrastructure
	Destination of Excellence	Economic opportunity by developing and diversifying Hawaii's economy	Local entrepreneurship, human capacity development, and innovation	Public transportation, electric vehicle uptake	Leadership in sustainable energy innovation opportunities and programmes
	Socioeconomic and environmental sustainability	Workforce development	Affordable energy products: opportunities for all to participate and benefit from energy transformation	Novel tariff structures and incentives (feed-in tariffs)	Governance (legal, regulatory frameworks)

Each country's implementation and monitoring plans provides ideas for Cayman Islands to consider to further improve its approach to prioritizing projects, developing indicators and sub targets, and creating a monitoring plan. Table 10 shows a comparison of implementation and monitoring across countries. All countries, except Hawaii which does not have a published implementation or monitoring plan, assigns stakeholder roles, budgets, timeline, and indicators to NEP goals and strategies. However, Cayman Islands' plan could improve with sub targets for sectors like energy efficiency and electric vehicles, as each of the other three countries includes. Cadmus also recommends developing a methodology for project prioritization in upcoming stakeholder engagements, like those of RMI and Barbados. Lastly, Cayman Islands' monitoring, and evaluation framework could include additional structure, similar to those of RMI and Barbados.

Table 10. Comparison of Implementation & Monitoring Plans by Country

Category	Cayman Islands[49]	Hawaii	Barbados[50]	Republic of Marshall Islands[51]	Bahamas[52]
Indicators	Yes	Not Public	Yes	Yes	Yes
Implementation Plan with stakeholder responsibilities, budgets, timelines	Yes		Yes	Yes	Yes

[49] Cayman Islands Government, "National Energy Policy Implementation Plan" https://www.energy.gov.ky/documents/NEP-Implementation-Plan-February-2021-20210218003954.pdf

[50] Harewood, Lorenzo, "Implementation Plan for Barbados National Energy Policy" https://www.smartenergybarbados.com/wp-content/uploads/2021/03/Implementation-Plan-for-Barbados-National-Energy-Policy-VIEW.pdf

[51] Government of the Marshall Islands. "National Energy Policy and Energy Action Plan". 2016. https://prdrse4all.spc.int/sites/default/files/neap_rmi_endorsed_2016.pdf

[52] Government of the Bahamas. "National Energy Policy 2013-2033". 2013. https://www.climate-laws.org/geographies/bahamas-the/policies/national-energy-policy-2013-2033#:~:text=The%20National%20Energy%20Policy%20aims,presents%20a%20long%2Dterm%20vision.

Sub targets	No		Yes	Yes	Yes
Methodology for project prioritization	No		Yes	Yes	No
Monitoring/Evaluation Plan	Yes - NEP and Implementation Plans are subject to five-year reviews		Yes - inception workshop, quarterly assessments, annual reviews, midterm review, final evaluation	Yes - risk assumptions and ownership, annual monitoring report, mid-point review, final evaluation	No - only indicators are publicly available

The below case studies for each country highlight best practices in specific emissions reduction strategies and implementation, monitoring & evaluation that Cayman Islands should consider in its updated NEP planning process, as shared below.

4.1. Bahamas[53]

Background / Targets

In 2013, the Bahamas published its first NEP to build a more affordable, sustainable, and independent energy grid by 2033. Like Cayman Islands, Bahamas' electricity sector is dominated by imported fuels. Its 20-year plan sets the following target that informed its 2016 NDC submission to UNFCC:[54] 30% renewable energy by 2030.

Energy Policy Highlight: Solar Microgrids

While still heavily dependent on imported oil and fossil fuels, Bahamas has shown leadership in installing solar, particularly microgrids on outer islands. 6.5 MW of solar microgrids have been installed, with a new 390 kW microgrid expected to come online this year.[55] Rocky Mountain Institute collaborated with the Government of Bahamas, and Bahamas Power and Light to identify several opportunities for cost-effective solar plus storage microgrids to replace diesel generation.[56] Solar microgrids offer the dual benefit of reducing emissions as well as developing energy resiliency against storms. With the constant threat of hurricanes, Cayman Islands should consider commissioning further analysis on microgrid potential to further incorporate energy resiliency into policy planning.

[53] Ibid

[54] Government of the Bahamas. "Intended National Determined Contribution (INDC)", 2015. https://unfccc.int/sites/default/files/NDC/2022-06/Bahamas_COP-22%20UNFCCC.pdf

[55] Wood, Elisa. "Microgrids already on their way to the Bahamas". Microgrid Knowledge. 2019. https://www.microgridknowledge.com/distributed-energy/article/11429437/microgrids-already-on-their-way-to-the-bahamas8230just-not-fast-enough

[56] Wood, Elisa. "Microgrids already on their way to the Bahamas". Microgrid Knowledge. 2019. https://www.microgridknowledge.com/distributed-energy/article/11429437/microgrids-already-on-their-way-to-the-bahamas8230just-not-fast-enough

Implementation, Monitoring & Evaluation Highlight: Sub targets

Bahamas NEP's Implementation, Monitoring, and Evaluation Framework includes indicators and targets to track renewable energy penetration, electric vehicle growth, energy efficiency and other associated metrics by sector (energy, transport, hotels, industries, and households). Further analyses to assess potential for energy efficiency, and electric vehicles in the Cayman Islands, for example, would present opportunities to develop sub targets beyond those of the current NEP.

4.2. Republic of Marshall Islands

Background / Targets

Like Cayman Islands, Republic of Marshall Islands (RMI) is almost exclusively reliant on diesel fuel. RMI established its first national energy policy in 2009 and published its current policy in 2016.[57] The plan (2015-2019) aims to establish a resilient, effective, and sustainable energy system in the Marshall Islands, a target of 20% renewable energy target by 2020. Given that current policies do not look past 2020, the NEP is due for renewal.

RMI's 2050 Climate Strategy, which informed RMI's second Nationally Determined Contribution, submitted in 2020, provides updated GHG reduction and renewable energy goals:[58]

1. Net zero carbon emissions by 2050 and 100% renewable energy.
2. Reduce GHG emissions to at least 32% below 2010 levels by 2025; 45% below 2010 levels by 2030; 58% below 2010 levels by 2035.
3. Reduce GHG emissions from domestic shipping by 40% below 2010 levels by 2030 and full decarbonization of the sector by 2050.

Energy Policy Highlights: Floating Solar and Vehicle-to-Grid Storage

In 2018, Cadmus supported the Government of RMI to create its 2050 Climate Strategy. As a low lying, remote coral atoll with limited land, this strategy stressed the need for innovative approaches to reducing emissions. The Strategy proposes floating PV arrays and microgrids on outer islands, having identified only 7 MW of available rooftop space compared to 40 MW needed for grid decarbonization. It also recommends that RMI conduct a feasibility assessment to on vehicle to grid electricity storage, which would reduce transportation emissions and provide grid stability.[59] While these are nascent technologies, Cayman Islands may benefit from commissioning further analyses on floating solar and vehicle to grid storage or other innovative ideas for GHG emission reduction.

Implementation, Monitoring & Evaluation Highlights: Project Prioritization Process

RMI's three-year Energy Action Plan includes a process to rank NEP interventions based on set criteria. This process involves government, civil society, and private sector stakeholders, who agree upon criteria and their associated weight. Such criteria include "Meeting NEP Outcomes", "Has Revenue Generation or Employment Creation Potential", and "Positive Impact on Women and Poor Communities". Projects are ranked by sector and organized in annual plans.

---

[57] Government of the Marshall Islands. "National Energy Policy and Energy Action Plan". 2016. https://prdrse4all.spc.int/sites/default/files/neap_rmi_endorsed_2016.pdf

[58] Government of the Marshall Islands. "Update Communication on the Marshall Islands Paris Agreement NDC" 2020. https://policy.asiapacificenergy.org/sites/default/files/RMI%20NDC-Update.pdf

[59] Government of the Marshall Islands. "2050 Climate Strategy". 2018. https://unfccc.int/sites/default/files/resource/180924%20rmi%202050%20climate%20strategy%20final.pdf

Cadmus has experience leading stakeholder engagement activities to prioritize emissions reduction. In upcoming stakeholder consultations, Cadmus seeks to better understand Cayman Islands' past methods of project prioritization and offer additional guidelines based on its expertise in this area.

4.3. Barbados

Background / Targets

Barbados is a regional leader in energy sector reform. Almost entirely reliant on fuel oil and kerosene for power generation, its 2019-2030 NEP[60] sets some of the most ambitious renewable energy, electric vehicle, and energy efficient targets in the Caribbean. The targets include:

1. 100% renewable energy by 2030
2. Zero diesel and gasoline vehicles by 2030
3. 20% improvement in energy efficiency by 2030 compared to 2019

Highlight: Solar Water Heaters

Barbados is a leader in this area, with one of the largest supplies of solar water heaters per capita in the world and a growing export industry. Starting in the 1970s, the Government supported the industry through a series of incentives and tax write-offs.[61] According to the 2021 NEP Progress Report, OfReg see potential for solar water heaters in Cayman Brac and Little Cayman, both of which have virtually no solar penetration.[62] Further emphasis on solar water heaters in the updated NEP could help Cayman Brac and Little Cayman further contribute to emission reduction goals.

Implementation, Monitoring & Evaluation Highlight: Monitoring Framework

Barbados' Monitoring Plan offers an example of a framework to monitor the NEP's progress throughout the five-year planning cycle. This process includes launching an inception workshop, and conducting quarterly assessments, annual reviews, and midterm review and final evaluation all with clearly defined stakeholder roles. A clear monitoring structure such as Barbados' would help Cayman Islands monitor progress effectively.

4.4. Hawaii

Background / Targets

In 2022, Hawaii utility Hawaiian Electric (HECO) reached 40% renewable energy penetration. Its 2015 Clean Energy Initiative and additional state legislation established the following targets:

4. The United States' first ever 100% renewable energy portfolio standard by 2045. 100% renewable energy by 2030[63]
5. Carbon negative by 2045[64]
6. State-wide emissions to be 70% of 2005 levels by 2030[65]

Highlight: Renewable Portfolio Standard and Distributed Generation

---

[60] Government of Barbados. "National Energy Policy – 2019". website

[61] Government of the Marshall Islands. "National Energy Policy and Energy Action Plan". 2016. https://prdrse4all.spc.int/sites/default/files/neap_rmi_endorsed_2016.pdf

[62] Cayman Islands Government, "National Energy Policy 2017-2037 2021 Progress Report" https://www.energy.gov.ky/documents/NEP---2021-Progress-Report-20211209175504.pdf

[63] Hawai'i Clean Energy Initiative - Hawai'i State Energy Office (hawaii.gov)

[64] Decarbonization - Hawai'i State Energy Office (hawaii.gov)

[65] Ibid.

Hawaii serves as a model to promote distributed solar in an island context. In 2015, Hawaii's state legislature adopted the Hawaii Clean Energy Initiative that established a Renewable Portfolio Standard (RPS) of 100% renewable energy by 2045.

This standard, enforceable by law, has empowered the utility and regulator to action. Distributed generation stands out as a success story. Like Cayman Islands, land constraints in Hawaii cause upward pressure on land costs, requiring a commitment to developing innovative policies and regulations to meet renewable energy targets. Half of Hawaii's current 40% renewable energy penetration comes from rooftop solar[66] and over 20% of HECO's customers have systems connected to the grid.[67]

Following the establishment of the RPS, HECO has expanded grid capacity to support distributed generation. In 2016, HECO created a Power Supply Improvement Plan that greatly increased the scope of planning studies to account for distributed generation impacts and paved the way to sizable allocation of distributed generation capacity.[68] Hawaii received further support on this effort from the US Federal Government, receiving $15 million from the US Infrastructure Investment Jobs Act to support grid infrastructure upgrades, climate resilience, green jobs, and decarbonization solutions.[69]

The Hawaii Public Utilities Commission (PUC) has played a crucial decision-making role on distributed generation as well. Since 2015, it has approved tariffs for microgrids, and community solar and time of use rates.[70] In 2022, the PUC has also put in place a structure to ensure that distributed generation supports the HECO grid, adopting a program to incentivize distributed generation producers to sell power to the grid at times of greatest need.[71]

Using Hawaii as an example, Cayman Islands Government could expand its renewable energy target into an RPS with clear enforcement guidelines. It should also consider opportunities for Cayman Islands Government funding to support renewable energy penetration, such as Hawaii's grant from the US Government for grid planning, as relevant.

Implementation, Monitoring & Evaluation

Hawaii does not have a published implementation, monitoring or evaluation framework. However, insights from Hawaii's experience with energy reform can be found in the next section.

4.5. Energy Governance and Funding Sources

Table 11 shows a comparison of energy governance structures and budgets across peer countries. Notably, both Hawaii and Barbados have senior government positions devoted specifically to energy (apart from government ministers). Given that Cayman Islands' targets are largely in line with those of Barbados, as shown in Table 9, an additional government position devoted to implementation of the National Energy Policy is recommended.

Beyond the contents of Table 11, there is very little available information on other countries' budgets, organizational charts, or energy units to provide further guidance on NEP Implementation. Cadmus recommends that the NEP Implementation Plan priorities and the above recommendation for an additional staff person guide such determinations for additional hirings or structures to manage energy policies.

[66] Hawai'i Continues to Light The Way For Rooftop Solar - Earthjustice

[67] https://www.hawaiianelectric.com/hawaiian-electric-speeds-up-rooftop-solar-interconnections

[68] Grid Modernization Strategy (hawaiianelectric.com), page 8

[69] Resilience Project Funding - IIJA Section 40101(d) - Hawai'i State Energy Office (hawaii.gov)

[70] Hawai'i Continues to Light The Way For Rooftop Solar - Earthjustice

[71] Ibid

Table 11. Comparison of Energy Governance Structures and Budgets

	Cayman Islands	Hawaii	Barbados	Republic of Marshall Islands	Bahamas
Energy Governance Structure	National Energy Policy Unit under the Ministry of Sustainability and Climate Resiliency	State Energy Office under the Department for Business, Economic Development, and Tourism	Energy Conservation and Renewable Energy Unit under the Ministry of Energy and Business	National Energy Office under the Ministry of Environment	Ministry of Environment and Housing and Ministry of Works and Urban Development
Year Energy Unit Established	2021	2008	Not published	2018	NA
Key Energy Positions	Chief Officer; Senior Policy Advisor	Chief Energy Officer and numerous others	Chief Energy Conservation Officer	Not published	Not published
2022 Budget for Energy	Not defined. Part of Ministry of Sustainability and Climate Resiliency Budget	KYD 8.3 million from state and Federal funding sources (State Energy Office - KYD 4.15 million from state, KYD 4.15 million from Federal)[72]	KYD 500,000 (Department of Energy Conservation and Renewable Energy)[73]	Not published	Not published

[72] https://budget.hawaii.gov/wp-content/uploads/2022/12/FB-23-25-BIB-12-16-22.Lk0_.pdf

[73] https://www.barbadosparliament.com/uploads/quick_link/cd08d687157be78c8f798dcf50a56d1b.pdf

5. Qualitative Analysis of Socioeconomic Considerations, Energy Reliability, and Energy Resiliency

This section provides a qualitative analysis of the Cayman Islands NEP's socioeconomic considerations – public awareness campaigns, energy access, employment & capacity building – and energy reliability and energy resilience. Public awareness campaigns encourage adoption of energy efficient technologies, electric vehicles, and renewable energy. Policies to promote capacity building for professionals and employment opportunities help develop a qualified workforce to implement energy sector reforms. Energy access refers to policies designed to expand energy technology and services to all citizens.

Energy system reliability and resilience are related, but also distinct in how they are defined. Power sector reliability refers to the ability of a power system to maintain the delivery of electric services to customers in the face of routine uncertainty in operating conditions.[74] Energy system resilience refers to the system's ability to withstand, and recovery quickly from, a major disruption. In the Caribbean, hurricanes, floods, and earthquakes are among the greatest disruption risks.

The Cayman Islands NEP identifies numerous strategies in these areas and emphasizes the importance of public awareness campaigns. Table 11 shows that Cayman Islands' NEP, in comparison to Hawaii, Barbados, RMI, and Bahamas, has the most specific and greatest number of identified actions for socioeconomic considerations: public awareness, energy access, and employment & capacity buildings. In addition, Cadmus recommends prioritizing strategies for low-income households, disadvantaged communities, and women-owned businesses in energy sector reform, like strategies identified by Hawaii, Barbados and Republic of Marshall Islands.

Cayman Islands' NEP is in line with its peer countries energy reliability strategies, each with an emphasis on generation planning, energy storage, and upgrades to transmission & distribution lines. As discussed in Section 4, Cadmus also recommends considering vehicle-to-grid storage, like RMI. Each NEP provides limited details on energy resiliency strategies. Cadmus recommends exploring additional opportunities to address resiliency in the updated NEP and Implementation Plan, in line with its forthcoming climate change policy. The Energy Policy Council has expressed an interest in opportunities to promote energy resiliency at critical infrastructure such as hospitals, airports, and emergency service centres.[75] As specified above, Cayman Islands can learn from the experience of Hawaii, Barbados, Bahamas, and RMI in installing microgrids and solar water heaters.

[74] NARUC. "The Value of Resilience for Distributed Energy Resources". https://pubs.naruc.org/pub/531AD059-9CC0-BAF6-127B-99BCB5F02198

[75] Project kick-off meeting with Energy Policy Council, September 2022

Table 12. Comparison of Socioeconomic Considerations and Climate Risks & Energy Resiliency by Country

Category	Cayman Islands	Hawaii	Barbados	Republic of Marshall Islands	Bahamas
Public Awareness	Energy efficiency; renewable energy; disposal of waste; public transportation & healthy lifestyles; water consumption; land use and building policies	Campaign to share benefits of distributed generation	Awareness of energy production and consumption; NGO engagement in public awareness campaigns	Public awareness campaigns designed in collaboration with media, communities, and civil society	Campaigns to increase awareness of costs and benefits of renewables; renewable energy assessments listed in a single database
Energy Reliability	Guidelines, standards, codes, for transmission & distribution; planning for infrastructure investments, energy storage	2016 Power Supply Improvement Plan[76]	Transparent rules for dispatch of generation; standards for generation and dispatch; vehicle-to-grid storage	Grid network upgrades and maintenance; standards for PV installation	Development of transmission and distribution infrastructure
Energy Access	Emphasis on cost-effectiveness of renewables; regulator determination of rates; review fee/tax structures duties, and incentives; submetering; grid-connected consumer-owned programmes; green financing	Community Solar projects for Low and Middle Income subscribers[77]	Tariff regime review; financing; tax incentives; low-income households to benefit from renewables; equity for customers unable to pay for renewables; distributed generation	Metering projects; gender-responsive actions and investments (climate change policy); assessment of socioeconomic costs for disadvantaged communities (climate change policy); distributed generation	Low-cost development funds for energy projects; emphasis on cost-effectiveness of renewable energy; electricity metering; distributed generation
Energy Resiliency	EPC priorities for resiliency for critical infrastructure (hospitals, airports, and emergency services); energy storage		Solar water heaters; energy storage; microgrids	Financing pathways for resiliency; microgrids	Microgrids; energy storage
Employment & Capacity Building	International exchanges of thought leadership; professional trainings	Free training for 3,000 state residents with career advancement in clean energy and other industries.[78]	Training opportunities, research & development; programme for job creation	Capacity building for teachers and education planners; Integration of climate change and sustainable energy into education curriculums	Renewable energy in education curriculums; renewable energy training initiatives; international exchange of best practices; research & development

[76] https://www.hawaiianelectric.com/clean-energy-hawaii/integrated-grid-planning/power-supply-improvement-plan

[77] Community Based Renewable Energy - Hawai'i State Energy Office (hawaii.gov)

[78] https://www.governing.com/work/hawaii-to-offer-free-skills-training-job-placement-support

In addition to examples provided in the above analysis, Cadmus proposes additional interventions for further consideration:

Public Awareness

Cadmus sees an opportunity for further knowledge sharing between solar installers and financial institutions on the topic of renewable energy lending products. This will support NEP goals to expand distributed generation and access to green finance. Energy Sage is a U.S. Department of Energy-funded platform that includes reputable solar installers and financial institutions.[79] Interested customers can enter their residential or commercial location and receive quotes and contact information for service providers. Cayman Islands could consider developing a similar resource.

Energy Reliability

The 2017 CUC IRP conducted a reliability assessment to understand the impact of solar and wind and other generation on grid stability.[80] Viable pathways for renewable energy penetration will need to consider CUC's reliability considerations in the upcoming IRP process. Furthermore, any goals to expand renewable energy generation to Cayman Brac and Little Cayman will also need to consider grid impacts.

Energy Access

Financing options are essential for customers to access to distributed solar and storage technologies. Cayman Islands could consider working with civil society stakeholders to develop resources for the financial sector on solar and storage technologies and project development, to encourage development of financing mechansims.

Energy Resiliency

Other ideas for energy resiliency include hardening of infrastructure, such as undergrounding distribution lines. Energy storage paired with distributed generation can serve to both reduce GHG emissions and offer backup power solutions in case of outages. The Rocky Mountain Institute publication series "Solar Under Storm" provides guidance on developing resilient solar PV systems for small island developing states.[81]

Employment & Capacity Building

Cadmus recommends exploring opportunities for certification programs through the North American Board of Certified Energy Practioners (NABCEP), one of the leading renewable energy professional certification organizations. NABCEP offers courses on PV technology, energy modeling, battery storage, and PV inspections, to name a few.[82] Many courses are available online and NABCEP courses can also be implemented locally. In Jamaica, Cadmus supported the University of the West Indies (UWI) to implement two NABCEP trainings for solar installers.[83] The implementation plan review will provide a chance to consider implementing NABCEP courses through University College or other institutions.

---

[79] U.S. Department of Energy. "Energy Sage" 2022 https://www.energysage.com/

[80] [80] Caribbean Utilities Company "2017 Integrated Resource Plan" https://www.cuc-cayman.com/renewable-energy/integrated-resource-plan-irp/

[81] RMI, "Solar Under Storm" https://rmi.org/insight/solar-under-storm/

[82] NABCEP. "Certifications" https://www.nabcep.org/certifications/

[83] USAID-funded Strengthening Energy Sector Resilience in Jamaica project. https://cadmusgroup.com/cp/jamaicaenergy/

6. Progress Towards Targets

Renewable Energy Target

The 2017 National Energy Policy set a target of 70% renewable energy generation by 2037. Cadmus built a quantitative model to assess progress towards this target.

Cadmus proposes the below target for consideration:

1. 100% renewable energy penetration by 2050; 30% renewable energy penetration by 2030

These renewable energy targets are in line with targets of peer countries, including Hawaii and the Republic of Marshall Islands. The 2017 CUC IRP (and likely that of the next planning cycle) and global trends point to the viability of utility-scale and distributed solar, as well as wind energy, and other innovative technologies throughout the next two decades.[84] Achieving these targets requires timely action on Implementation Plan priorities, including policy discussions around distributed solar, innovative technologies, and the utility-scale RFP process.

Cadmus recommends establishing a Renewable Portfolio Standards for both 2030 and 2050.

Electric Vehicle Target

The 2017 National Energy Policy does not establish an electric vehicle target but does include several impact policy interventions. Cadmus proposed the below targets for consideration:

1. 100% new sales and imports of light-duty vehicles (LDVs) to come from electric vehicles by 2045; 30% by 2030
2. 100% new sales and imports of medium and heavy-duty vehicles (MHDVs) to come from electric vehicles by 2050; 30% by 2030

Many US states have made commitments to achieve a full transition to zero emission vehicle sales in all vehicle categories by 2050.[85] These commitments are generally met with a Government mandate. Cadmus recommends and a slightly longer timeframe to achieve 100% new EV sales to allow time to develop a vehicle mandate around these targets.

Emissions Target

As outlined above, the 2017 National Energy Policy includes an aspirational target of 4.8 tCO2e emissions per capita by 2030 - a reduction of 60% emissions relative to 2014 levels (12.1 tCO2e per capita). This is an economy-wide target and is currently under review with the Department of the Environment and it prepares a Climate Change Policy.

Cadmus recommends the below inputs to overall emissions reduction targets to be included in the Climate Change Policy:

3. Electricity supply emissions: 100% reduction by 2050; 40% reduction by 2030 over 2019 levels.
4. Emissions for ground transportation (motorcycles, cars and trucks): 35% emission reduction by 2030, 80% by 2045 and 90% by 2050 over 2019 levels, accounting for the above targets for EV sales. Cadmus did not analyse other transportation emissions from other categories such as aviation and ocean shipping.

[84] https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035

[85] https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035

Quantitative Model Assumptions

Electricity Baseline Assumptions:

- Electricity load growth assumption:
  - CUC : 1.76% from 2017 CUC IRP[86]
  - Cayman Brac and Little Cayman: 1% (assumption)
- Historic electricity sales figures from CUC and Island Energy

Renewable Energy

- Includes operating DG, utility-scale solar and 123 MW in 2022 RFQs.
- Remaining renewable energy projections include annual increments of solar capacity (MW) to reach 100% renewables by 2050. The model projects an additional 415 MW are needed, in additional to the 150 MW (approximate) of solar currently in operation or planned, to reach 100% renewable energy by 2050. The role of distributed generation vs. utility-scale solar in reaching this target depends on addressing the Implementation Plan action items on these topics.
- The model does not project any wind, OTEC, or other technologies, due to lack of firm commitments.

Natural Gas

- CUC has expressed that it has identified opportunities for natural gas retrofits of diesel generators. While CUC continues to explore renewable baseload power (solar + storage), Cadmus assumes that natural gas will play a role as a transitional, cleaner-burning fuel. The model assumes 40 MW of diesel generation is retrofitted for natural gas by 2027, as identified by Portfolio 5 in the CUC's 2017 IRP.[87] Given the NEP's emphasis on exploring opportunities energy storage in utility-scale generation, it is assumed that natural gas (and diesel) is phased out over the course of the 2030s.

Energy Efficiency:

- Assumes that both CUC and Island Energy will adopt energy efficiency programmes as recommended by the 2017 CUC IRP and Cadmus energy efficiency experts. The model assumes 1.32% per year of energy savings for each island starting in 2028. The 1.32% is an average of energy savings as a percent of MWh sales for US utility energy efficiency programmes in 2018.[88]
- The model does not make any assumptions for energy efficiency as a result of building codes, standards, and duty reductions. Further studies on government retrofits, and projections for the effects of standards and building codes will provide more insights into potential savings.

Electric vehicles

- The model includes projections for 1) light-duty and 2) medium and heavy duty vehicles. For purposes of this model, light-duty vehicles are less than 3,500 kg and medium and heavy duty vehicles are greater than 3,500 kg.
- Data was gathered from vehicle registrations in Cayman Islands.

[86] 2017 IRP, page 64

[87] 2017 IRP Portfolio 5, page 11

[88] Cadmus study, not public.

7. Conclusion

As outlined above, Cayman Islands' NEP provides a comprehensive set of goals and strategies to meet targets that are in line with the global and regional context. It includes policies to foster greater penetration of renewable energy, electric vehicles, and energy efficiency measures. It also addresses socioeconomic considerations, energy resiliency, and energy resiliency, all of which are essential to meeting targets in a safe, cost-effective, reliable, and equitable way. Cayman Islands has also made progress in policy implementation. Notably, it has released RFPs for renewable energy, identified government vehicles suitable for electrification, and begun analyses to assess potential for energy efficiency (ReSEMBid programme), natural gas retrofits, wind energy, and value for solar. The NEP review process will allow opportunity for Cadmus and Cayman Island stakeholders to prioritize additional cutting-edge policies and implementation actions based on the current market context.

Hawaii, Barbados, RMI, and Bahamas provide examples for strategies that promote innovation, grid capacity planning, equity in the energy industry as well as energy reliability and resilience. Best practices in prioritizing projects, and developing quantifiable indicators, sub targets, and a monitoring framework will inform the NEP Implementation Plan review.

Cadmus sees that its recommended targets for greenhouse gas emission reductions and penetration of renewable energy and electric vehicles are realistic based on market forces and NEP policy priorities. Achieving these targets will depend on effective dialogue, decision-making, and monitoring of the NEP implementation plan.