

CLIMATE CHANGE

27/2018

Implementation of Nationally Determined Contributions

Republic of Marshall Islands Country Report

CLIMATE CHANGE 27/2018

Environmental Research of the
Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

Project No. (FKZ) 3716 4111 80

Implementation of Nationally Determined Contributions

Republic of Marshall Islands Country Report

by

Florian Mersmann

Wuppertal Institute for Climate, Environment and Energy, Wuppertal

International data and graphs: Hanna Fekete, Lisa Luna
NewClimate Institute, Cologne

Country specific support and review: Dr. Herbert Wade
Bangkok, Thailand

On behalf of the German Environment Agency

Imprint

Publisher:

Umweltbundesamt
Wörlitzer Platz 1
06844 Dessau-Roßlau
Tel: +49 340-2103-0
Fax: +49 340-2103-2285
info@umweltbundesamt.de
Internet: www.umweltbundesamt.de

 /umweltbundesamt.de

 /umweltbundesamt

Study performed by:

Wuppertal Institute for Climate, Environment and Energy
Döppersberg 19
42103 Wuppertal

NewClimate Institute
Am Hof 20 – 26
50667 Cologne

Dr. Herbert Wade
90/40 Bangkapi Condo 'D'
Soi 121 Lad Phrao Road
Bangkok 10240 THAILAND
Country specific support and review

Study completed in:

January 2018

Edited by:

Section I 2.1 Climate Protection
Juliane Berger

Publication as pdf:

<http://www.umweltbundesamt.de/publikationen>

ISSN 1862-4359

Dessau-Roßlau, November 2018

The responsibility for the content of this publication lies with the author(s).

Environmental Research of the
Federal Ministry for the
Environment, Nature Conservation,
Building and Nuclear Safety

Project number: FKZ 3716 4111 80

Report number: [entered by the UBA library]

Implementation of Nationally Determined Contributions:

Republic of Marshall Islands Country Report

by

Wuppertal Institute for Climate, Environment and Energy
Döppersberg 19, 42103 Wuppertal

Authors: Florian Mersmann

In cooperation with:

NewClimate Institute
Am Hof 20–26, 50667 Cologne

International data and graphs: Hanna Fekete, Lisa Luna

and

Dr. Herbert Wade

90/40 Bangkapi Condo 'D'
Soi 121 Lad Phrao Road

Bangkok 10240 THAILAND

Country specific support and review

On behalf of the German Environment Agency

Completion date: January 2018

Introduction to the project

This country report is part of the “Implementation of Nationally Determined Contributions” (NDCs) project (FKZ 3716 4111 80), which considers NDC implementation in 10 countries: Colombia, Ethiopia, Georgia, Indonesia, Iran, Kenya, Marshall Islands, Morocco, Peru, and Viet Nam. This project places a special emphasis on identifying potential barriers to NDC implementation and mitigation potentials which could go beyond the current NDCs.

The country reports analyze the NDCs in terms of their robustness and coherence with other national or sectoral plans and targets, and put them into the context of additional mitigation potentials and other national circumstances. For countries where coal plays a critical role in consumption or national production, the analysis covers further details on this sector, including the economic relevance and local impacts of coal production or consumption. The content is based on available literature from research and public sector information on policies and institutions.

To be able to analyze the content in more detail, the authors focus the research on a number of relevant fields of action. The fields of action were selected based on historic and projected sectoral emissions development, comprehensive literature on GHG mitigation potentials, identified barriers and emissions reductions as well as feasibility, costs, and co-benefits.

The project was suggested and is financed by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, supervised by the German Environment Agency and carried out by independent think tanks - NewClimate Institute and Wuppertal Institute. The country reports are a continuation of similar previous efforts (project numbers 3713 41 102, 3711 41 120, 360 16 022, 364 01 003 and 363 01 128) and aim to inform policy makers and the interested public about the implementation of NDCs in individual countries. The choice of countries is based on developing countries with which Germany works closely on climate change topics.

The country reports are scientific in nature, and all suggestions are derived by the authors from careful analysis, having in mind the individual backgrounds of countries. They aim to increase knowledge about implementation of mitigation potentials to meet the globally agreed goal of staying within a temperature increase of 1.5°C or well below 2°C above preindustrial levels, without intending to prescribe specific policies.

Overview

Overview.....	5
List of figures	6
List of tables.....	7
List of abbreviations	8
1 Part I: Summary	10
1.1 Country background	10
1.2 Emissions and energy use	11
1.3 NDC and ongoing activities	12
1.4 Mitigation potential and barriers	12
2 Part II: Full country analysis	15
2.1 Country background	15
2.2 Institutional set up.....	20
2.3 MRV of GHG emissions	23
2.4 Description and evaluation of the (I)NDC.....	23
2.5 Climate change mitigation policies and strategies	25
2.5.1 National Strategic Plan 2015-2017 (NSP) and Vision 2018	25
2.5.2 National Climate Change Policy Framework (NCCPF)	25
2.5.3 Joint National Action Plan (JNAP).....	26
2.5.4 Majuro Declaration (non-binding)	26
2.6 Additional mitigation potential.....	27
2.6.1 Selection of proposed fields of action.....	28
2.6.2 Field of action I: Transport: Low-carbon domestic shipping.....	29
2.6.2.1 Barriers to implementation of low-carbon domestic shipping	30
2.6.2.2 Ongoing activities	30
2.6.3 Field of action II: Waste reduction, disposal and processing.....	31
2.6.3.1 Barriers to implementation of field of action II	32
2.6.3.2 Ongoing activities	32
2.7 Conclusions	33
References.....	35

List of figures

Figure 1:	Marshall Islands' emissions profile.....	11
Figure 2:	RMI's primary energy supply profile, 2011.....	11
Figure 3:	RMI baseline projection and NDC targets	12
Figure 4:	Selection process for proposed fields of action in RMI	13
Figure 5:	Map of the Republic of Marshall Islands	15
Figure 6:	Marshall Islands' emissions profile.....	17
Figure 7:	Emissions and energy use intensity over time	19
Figure 8:	RMI's primary energy supply profile, 2011.....	20
Figure 9:	Institutional set up for climate action in RMI	22
Figure 10:	RMI baseline projection and NDC targets	24
Figure 11:	Selection process for proposed fields of action in RMI	28

List of tables

Table 1:	Key socio-economic figures	16
Table 2:	2014 emissions data from PRIMAP	18
Table 3:	2010 emissions data from UNFCCC	18
Table 4:	Key emissions, energy and environmental data.....	19

List of abbreviations

ADB	Asian Development Bank
AOSIS	Alliance of Small Island States
BAU	Business as Usual
CDM	Clean Development Mechanism
EPA	Environmental Protection Agency
EPPSO	Economic Policy, Planning and Statistics Office
GDP	Gross Domestic Product
GHG	Greenhouse gas
GIZ	Gesellschaft für Internationale Zusammenarbeit
HDI	Human Development Index
IKI	International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
JNAP	Joint National Action Plan
MoF	Ministry of Finance
MoFA	Ministry of Foreign Affairs
MRV	Monitoring, Reporting, and Verification System
MtCO₂e	Megatonnes carbon dioxide equivalent
NAMA	Nationally Appropriate Mitigation Actions
NCCC	National Climate Change Committee
NCCPF	National Climate Change Policy Framework
NDC	Nationally Determined Contribution
NREL	National Renewable Energy Laboratory
NSP	National Strategic Plan
OCS	Office of the Chief Secretary
OEPPC	Office of Environmental Planning and Policy Coordination
OTEC	Ocean Thermal Energy Conversion
RMI	Republic of Marshall Islands
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US, USA	United States of America
WTE	Waste-to-Energy

1 Part I: Summary

1.1 Country background

The Republic of Marshall Islands (RMI) is a small island state. It is home to a **population** of about 53,000 people, mostly in the two large cities of Majuro (its capital) and Ebeye, which is home to a large US military base. Due to its very low elevation the country is **highly vulnerable** to the effects of climate change, in particular sea level rise.

The country has **almost no domestic resources**, and therefore has to import almost everything. Its remote location makes this costly. Domestic production includes goods from fisheries, coconut oil, and handicrafts.

RMI's **political system** is a mixed parliamentary-presidential system. Current president Hilda Heine came into office in January 2016, after the former president Casten Nemra lost a vote of confidence only two weeks into his presidential term. Legislation lies with the Nitijela, a unicameral parliament advised by a council of twelve high chiefs. The Nitijela itself has 33 members (one for each municipality) elected every four years.

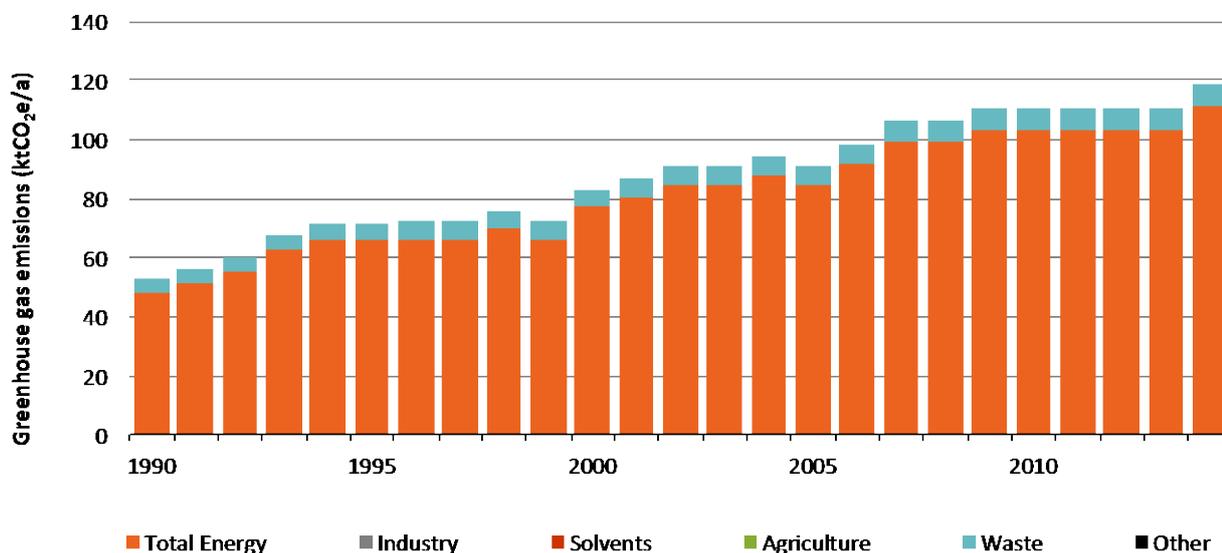
Climate change is one of the most prominent policy areas in RMI, not least due to the country's high vulnerability. This is reflected in the country's **legislation** that integrates climate change topics in most if not all high-level strategies and policies, including the National Strategic Plan, the country's overarching development strategy. Climate policy is coordinated through the Office of Environmental Planning and Policy Coordination (OEPPC), which advises the Marshallese government on environmental planning, and also houses the National Climate Change Committee, a body comprised of representatives of nearly all national ministries.

Climate change strategy	✓
Energy strategy aligned with CC/GG strategy	✓
Institutional coordination on climate change	✓
Renewable energy targets	✓
Level of NDC ambition (CAT rating)	n.a.

1.2 Emissions and energy use

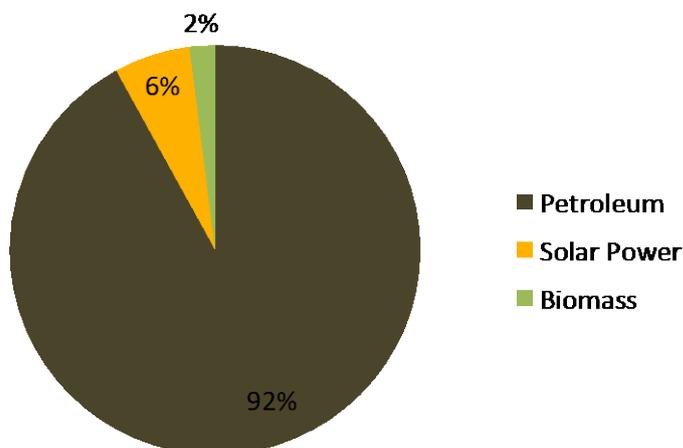
Figure 1: Marshall Islands' emissions profile

Historical emissions by sector



Data sources: Gütschow et al. (2016); UNFCCC (2016)

Figure 2: RMI's primary energy supply profile, 2011



Data sources: IEA (2016a, 2016b); RMI (2016)

RMI's emissions have more than doubled since 1990, but are still at an extremely low level at less than 120 ktCO₂e/a, and even in terms of per-capita emissions (2.25 tCO₂e/cap) are well below industrialised country levels. RMI expects that under a business-as-usual scenario emissions could rise by up to 77.5% between 2000 and 2025 (RMI 2015a).

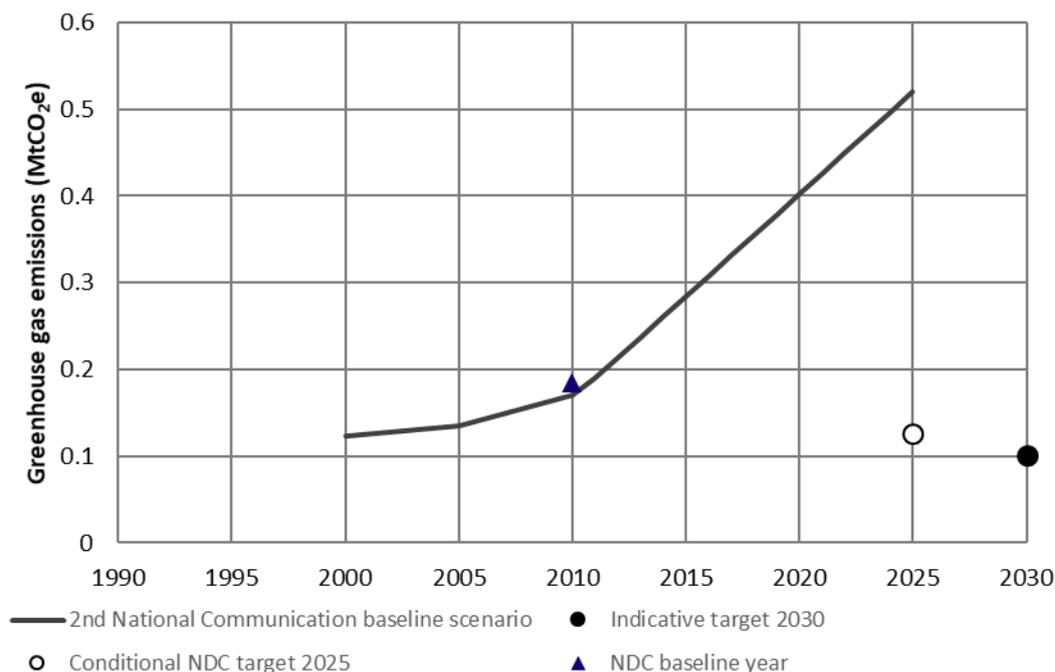
By far the largest share of emissions stems from the energy sector, to the largest extent from electricity generation (54% of total emissions), as RMI currently relies strongly on diesel generators. Petroleum products constitute 92% of RMI's primary energy mix. Until 2020 RMI plans to increase the share of renewable energy from 3.5% (2012) to 20% in 2020 (RMI 2016b). Transport and emissions

from cooking and lighting contribute significantly less to emissions from the energy sector. Apart from the energy sector, only emissions generated from waste play a sizeable role in the emissions composition of the country (RMI 2015b). However, it should be noted that historical emission figures are not completely certain. RMI is still in the process of developing its emissions inventory system.

1.3 NDC and ongoing activities

Figure 3: RMI baseline projection and NDC targets

Nationally Determined Contribution



Data sources: RMI (2015a, 2015b)

Through its NDC, RMI commits to a quantified economy wide target of a 32% reduction in greenhouse gases versus 2010 levels. Furthermore, RMI set itself an indicative target of a 45% reduction versus 2010 emission levels by 2030, and intends to achieve net zero emissions by 2050.

In particular, RMI plans to reduce emissions from

- ▶ electricity generation: 55% in 2025, 66% in 2030;
- ▶ transport, including domestic shipping: 16% in 2025, 27% in 2030;
- ▶ waste: 20% by 2030 (no specification for 2025);
- ▶ cooking and lighting: 15% by 2030 (no specification for 2025).

According to the NDC, the base year had emissions of about 0.185 MtCO₂e (a slightly higher value than indicated in RMI's second National Communication of the same year), leading to an economy-wide emissions target of 0.126 MtCO₂e by 2025, and 0.101 MtCO₂e by 2030. The NDC further indicates possible interventions to reach the intended reduction target.

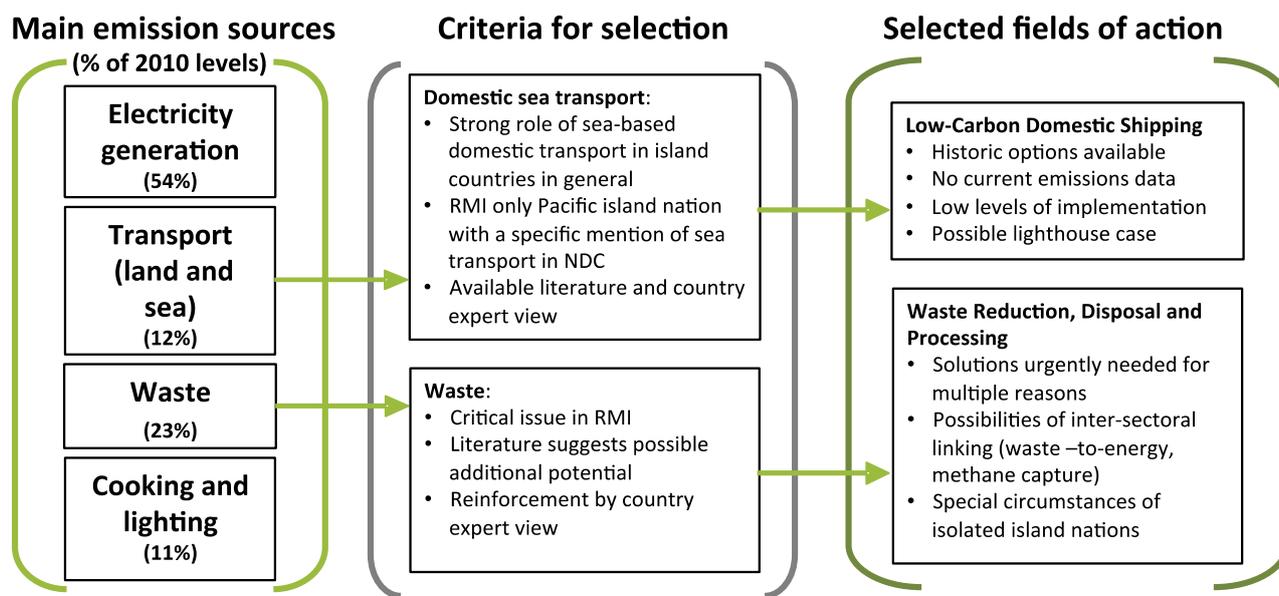
1.4 Mitigation potential and barriers

RMI's NDC covers all emission sources in the country. Through a number of policies and strategies, RMI is already targeting most if not all of potential reduction in the country. By far the largest source

of emissions, electricity generation, is a priority for the country. Plans to increase the share of renewable energy from currently still low numbers are already in place and are starting to be implemented. The Energy Action Plan 2016-2019 introduces improved monitoring of implementation progress (RMI 2016).

This report identifies two fields of action where implementation could be strengthened: Low-carbon domestic shipping, and waste.

Figure 4: Selection process for proposed fields of action in RMI



Source: authors

Low-carbon domestic shipping has so far not often been subject to increased mitigation actions anywhere. RMI however has explicitly included domestic shipping as a sector subject to emissions reductions. Unfortunately, there is currently still a distinct gap in the emissions inventory for this sector, so the actual emissions of the sector could not be determined. Based on studies from neighbouring country Fiji, it can be surmised that emissions from sea transport could actually be higher than those of land transport on an island state.

During the oil crisis in the late 1970s, a number of highly promising solutions for retrofitting existing vessels with sails, as well as completely new designs were developed that yielded fuel savings of up to 30%. As fuel prices dropped again, these innovations were discarded because they were not economically competitive anymore.

A (re-)introduction of such designs would yield a number of additional benefits for the country, e.g. alleviating RMI's import dependencies, or reduced environmental hazards.

An increased uptake of such options currently faces a number of barriers, not least of which a regulative vacuum on the government level, but to the largest extent financial, as the development and fitting of ships requires high upfront investments. A recently approved new project financed through Germany's International Climate Initiative (IKI) to pilot low-carbon shipping options in RMI will go a long way in alleviating these barriers, but RMI may also consider to strengthen the political framework to create a stronger enabling environment for low-carbon shipping options.

Another promising field of action is **waste reduction and removal**. RMI's second National Communication indicates that 30% of the country's emissions in 2000 were from methane and other GHGs

stemming from waste. The country still faces serious challenges due to non-optimal waste handling, and a sheer lack of space for waste disposal facilities.

A possible part of the solution may be a waste-to-energy plant, but plans for such a facility have not yet come to fruition, most likely again because investment and running costs are currently still higher than electricity generation using diesel generators. The expanding challenges of waste disposal together with rising oil prices may level the playing field, but the economic barrier is still high.

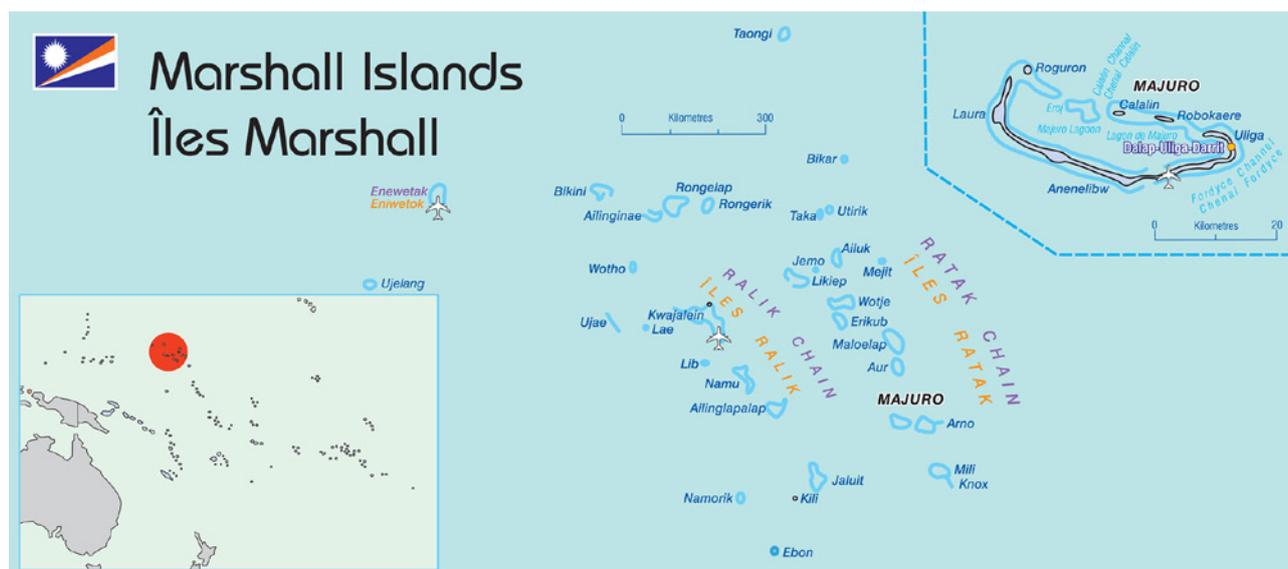
In the meantime, it is clear that the best way to reduce emissions from waste will be to reduce the amount of waste overall. RMI, supported by the Secretariat of the Pacific Regional Environment Programme, is therefore developing options for sustainable waste management. It has already laid important groundwork for waste reduction through introducing a ban on cutlery and containers for food and beverages made from plastic and styrofoam, a step that in our view is worth every country's consideration.

2 Part II: Full country analysis

2.1 Country background

The Republic of Marshall Islands (RMI) is an archipelago of 29 atolls and 5 islands located in the Central Northern Pacific. 22 atolls and 4 islands are inhabited. The land has very low elevation, with an average height above sea level of not more than two metres, and is therefore especially vulnerable to sea level rise (RMI 2015a).¹

Figure 5: Map of the Republic of Marshall Islands



Source: Secretariat of the Pacific Community, RMI member page (SPC n.d.)

According to its second National Communication in 2015 (ibid.), RMI is home to a population of 53,000 people, mainly concentrated in the two main cities of Majuro, the country's capital (27,800 inhabitants), and Ebeye (11,400 inhabitants). The atolls Arno, Jlauit, and Ailinglaplap are each inhabited by about 1,700 people. Ebeye, the second-largest city, is located on the Kwajalein atoll, which also serves as a US military base and missile test range. The islands of Bikini and Enewetak were used as large-scale nuclear test sites by the USA in the past (ibid.).

RMI is closely tied to the USA through a Compact of Free Association signed in 1986, which gave the country political independence after almost 40 years under US administration. Under the Compact, RMI citizens may emigrate to and work in the USA. There are large enclaves of Marshallese in Hawaii and Arkansas. The USA also provides annual payments of 62.7 million USD, which form a large part of the country's economic foundation. The financial agreement will continue until 2023, when a common trust fund of US and RMI contributions is to be formed. RMI's GDP was about 186.3 million USD in 2012. Since independence, external grants (both through the Compact and other foreign aid) have made up 60% on average of RMI's GDP (Chen et al. 2015).

RMI has not been mentioned in UNDP's annual Human Development Reports since 2009. In that year, the country was ranked as having a relatively high human development value, at 0.738. However, this

¹ We would like to thank our reviewer Dr Herbert Wade for insightful and constructive input to this report. Dr Wade assisted in the development of the INDC and participated in the development of the first RMI national energy policy in 2008, and was thus able to provide us with insights that we could not easily have obtained otherwise.

value was calculated using a methodology that has since been changed, so RMI's HDI is not easily comparable to the newer figures of other countries, but would likely still fall in the classification of high human development, similarly to other countries in the region such as Fiji, Tonga, or Samoa.

RMI has very scarce natural resources, necessitating the import of almost everything other than basic locally produced food (largely coconuts, taro and seafood), at mostly high prices. The largest exporting industrial sectors are fisheries and production and processing of copra, the dried kernel of the coconut, from which coconut oil is extracted. The rest of the economy largely relies on sales and services. The government is the largest employer in the country, and the US army base on Kwajalein with its about 1.000 mostly US citizens is the basis for most of Ebeye's urban economy. The outer islands have an agrarian-based subsistence economy, with incomes generated mostly through smaller-scale copra production and handicrafts (RMI 2015a).

Climate change is one of the most prominent policy areas in RMI, not least due to the country's high vulnerability. The former foreign minister of RMI, Tony de Brum, who passed away in August 2017, was internationally renowned for his leadership in international climate negotiations. He is commonly seen as one of the champions of the Paris Agreement, and lead the so-called High Ambition Coalition of progressive countries that was pivotal in securing the agreement.

Within the international climate negotiations, RMI is part of the Alliance of Small Island States (AOSIS). Before the prominent role played by the High Ambition Coalition, RMI had not been highly visible within the international climate negotiations.

RMI's emissions have more than doubled since 1990, but are still at an extremely low level at less than 120 ktCO₂e/a, and even in terms of per-capita emissions are well below industrialised country levels (2.25 tCO₂e/cap, about 1/8 of Germany's per capita levels). RMI expects that under a business-as-usual scenario emissions could rise by up to 77.5% between 2000 and 2025 (RMI 2015a).

In its NDC, the country has set itself ambitious goals for greenhouse gas (GHG) reductions of 32% below 2010 levels by 2025, striving for 45% below 2010 levels by 2030 - despite their very low total GHG emissions. The country's National Energy Policy outlines an integrated strategy for RMI's energy sector, including a 20% energy efficiency improvement in transport sector fuel use, and a 20% share of renewable energy in power generation by 2020 (RMI 2015b), which would be a sizeable increase from single digit levels in past years (Chen et al. 2015).

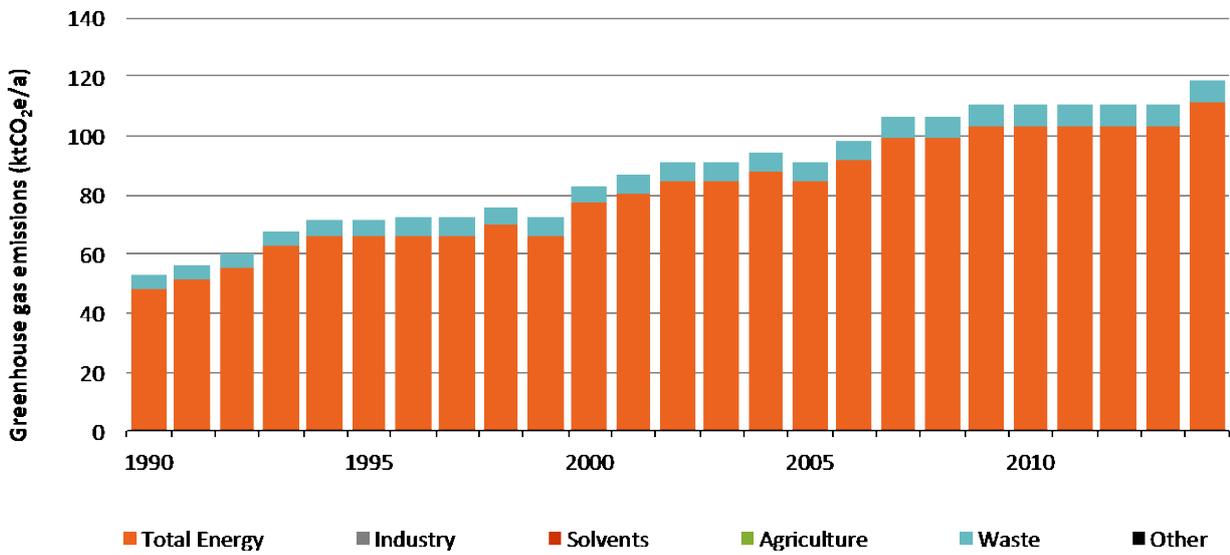
Table 1: Key socio-economic figures

Indicator	Marshall Islands	% change since 1990	World	Germany	Year
Population [million]	0.053	12	7261	81	2014
GDP [2017 billion USD]	0.183	133	78630	3,879	2014
GDP/Cap [2017 USD/cap]	3462	109	10829	47903	2014
HDI [0 – 1]	0.738 (2009)	n.a.	0.702 (2014)	0.92	2014
Electrification rate [%]	89 (2013)	81	85	100	2012
GINI index [0 – 100]	n.a.	n.a.	n.a.	30.1	2014
Corruption index [1 – 6]	n.a.	n.a.	2.9		2014
Urbanization [% of total]	72	7	53	75	2014

Data sources: ND-GAIN (2017); UNDP (2015); United Nations (2014); World Bank (2017), GDP per capita calculated based on World Bank (2017)

Figure 6: Marshall Islands' emissions profile

Historical emissions by sector



Data sources: Gütschow et al. (2016); UNFCCC (2016)

Table 2: 2014 emissions data from PRIMAP

Sector	Value	Unit	Share in 2014
Total (excluding LULUCF)	119	ktCO ₂ e	100%
Total energy	110	ktCO ₂ e	93.3%
Industry	n.a.	ktCO ₂ e	
Solvents	0.09	ktCO ₂ e	0.1%
Agriculture	n.a.	ktCO ₂ e	
Waste	7.88	ktCO ₂ e	6.6
Other	n.a.	ktCO ₂ e	

Data sources: PRIMAP database (Gütschow et al. 2016)

Table 3: 2010 emissions data from UNFCCC

Sector	Value	Unit	
Total (excluding LULUCF)	170	ktCO ₂ e	
Total energy	134	ktCO ₂ e	
Industry	n.a.	ktCO ₂ e	
Solvents	n.a.	ktCO ₂ e	
Agriculture	n.a.	ktCO ₂ e	
Waste	36	ktCO ₂ e	
Other	n.a.	ktCO ₂ e	

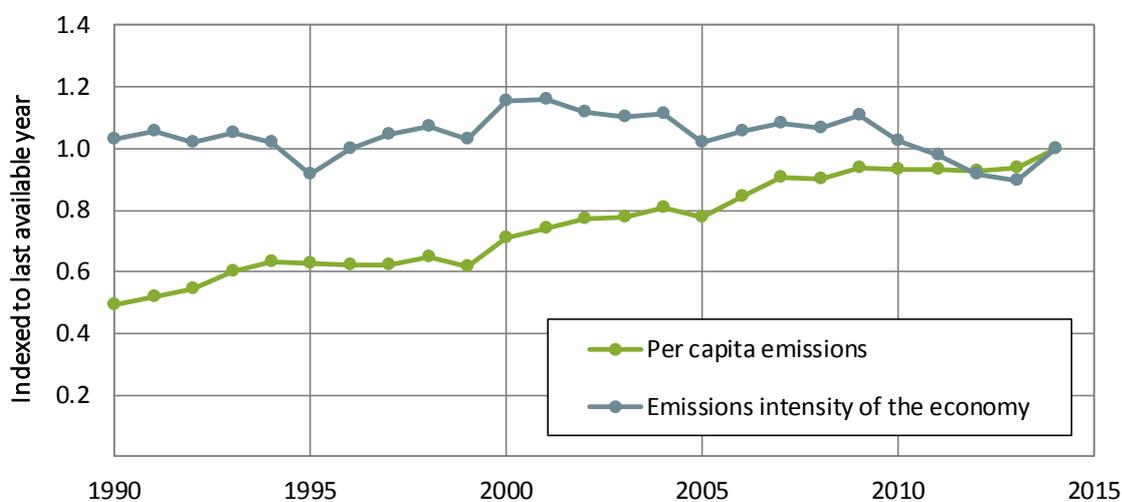
Data sources: RMI (2015a)

PRIMAP data was only available for the period 1990-2014. Emissions according to this source were lower than those on the National Communication throughout the overlap between 2000 and 2014. However, PRIMAP data is not completely accurate at this low resolution, representing an average of regional data rather than "real" emissions of the country.² The data provided by PRIMAP was included here for comparative purposes.

² It should be noted that PRIMAP data in its newest iteration (1.2. now will include national emissions data of RMI, which closes the apparent gap between datasets. however, this project uses the current PRIMAP 1.1. database for all country analyses, as 1.2 is not yet publicly available.

Figure 7: Emissions and energy use intensity over time

Emissions and energy use indicators



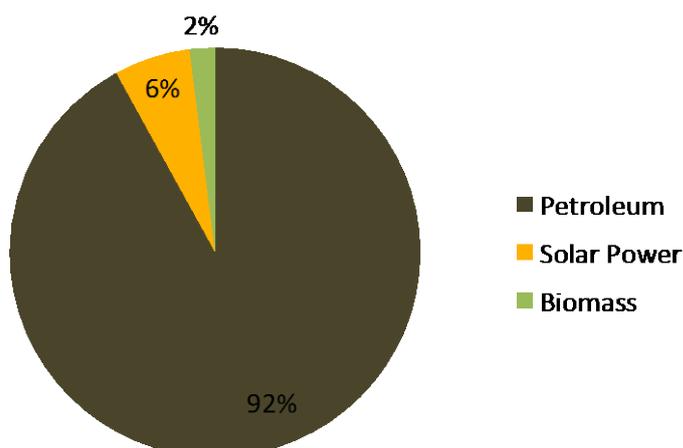
Energy intensity is calculated as total primary energy supply/GDP, emissions intensity is calculated as emissions/GDP. Data sources: Gütschow et al. (2016); IEA (2016b); ND-GAIN (2017); World Bank (2017)

Table 4: Key emissions, energy and environmental data

Indicator	RMI	% change since 1990	World	Germany	Year
GHG/cap [tCO ₂ e/cap]	2.25	+51%	6.42	10.76	2014
GHG/GDP [tCO ₂ e/mIn 2017 USD]	650	-3%	592.6	224.5	2014
Energy/GDP [ktoe/mIn 2017 USD]	n.a.	<i>n.a.</i>	0.174	0.08	2014
Global share of emissions [%]	0.00001	0%	100%	1.8	2012
Air pollution index (P2.5)	9	-10%	42	14	2014
Vulnerability index [0 – 1]	n.a.	<i>n.a.</i>	n.a.	0.23	2014

Data sources: Gütschow et al. (2016); IEA (2016b); ND-GAIN (2017); World Bank (2017)

Figure 8: RMI's primary energy supply profile, 2011



Data sources: RMI (2016)

2.2 Institutional set up

RMI's political system is a mixed parliamentary-presidential system. Current president Hilda Heine came into office in January 2016, after the former president Casten Nemra lost a vote of confidence only two weeks into his presidential term.

Legislation lies with the Nitijela, a unicameral parliament advised by a council of twelve high chiefs. The Nitijela itself has 33 members (one for each municipality) elected every four years. While members of the Nitijela are officially nonpartisan, most elected members belong to one of the four political parties currently active in the country.

The judicial branch in RMI consists of a Supreme Court, a High Court, district and community courts, and a traditional rights court that handles disputes from customary law and traditional practice.

For climate change governance, roles and responsibilities are spread across a number of different governmental entities with different roles and responsibilities. Figure 9 below provides an overview of the general institutional set up for climate action within the Republic of Marshall Islands.

The **Office of Environmental Planning and Policy Coordination (OEPPC)** acts as advisory body in matters of environmental planning and policies, including on climate change, to the Office of the President, the RMI Cabinet, the Ministries and other government agencies. It is the focal point for coordinating, managing and implementing international environment projects and programmes with various implementing agencies, and also leads negotiations with external partners and financing organisations. The OEPPC is also involved in strategy development both for mitigation and adaptation. It supports the Ministry of Foreign Affairs in international climate negotiations, and acts as the Secretariat to the National Climate Change Committee domestically.

The **National Climate Change Committee (NCCC)** oversees the progress of RMI's Joint National Action Plan (JNAP), and coordinates the integration of new climate change initiatives into the priorities set by the JNAP. The NCCC is comprised of Secretaries from almost all Ministries, with the Director of the OEPPC holding the Vice-Chair of the NCCC. It is chaired by the Chief Secretary. The members of the NCCC also serve as the National Disaster Committee in times of emergency.

The **Office of the Chief Secretary (OCS)** oversees the functioning of all ministries, and is responsible to the President. It houses the National Disaster Committee, and the Disaster Office. OCS also serves as the administrative home to the OEPPC and the Economic Policy, Planning and Statistics Office.

The **Economic Policy, Planning and Statistics Office (EPPSO)** is responsible for RMI's economic policy planning, and oversees the implementation of the National Strategic Plan.

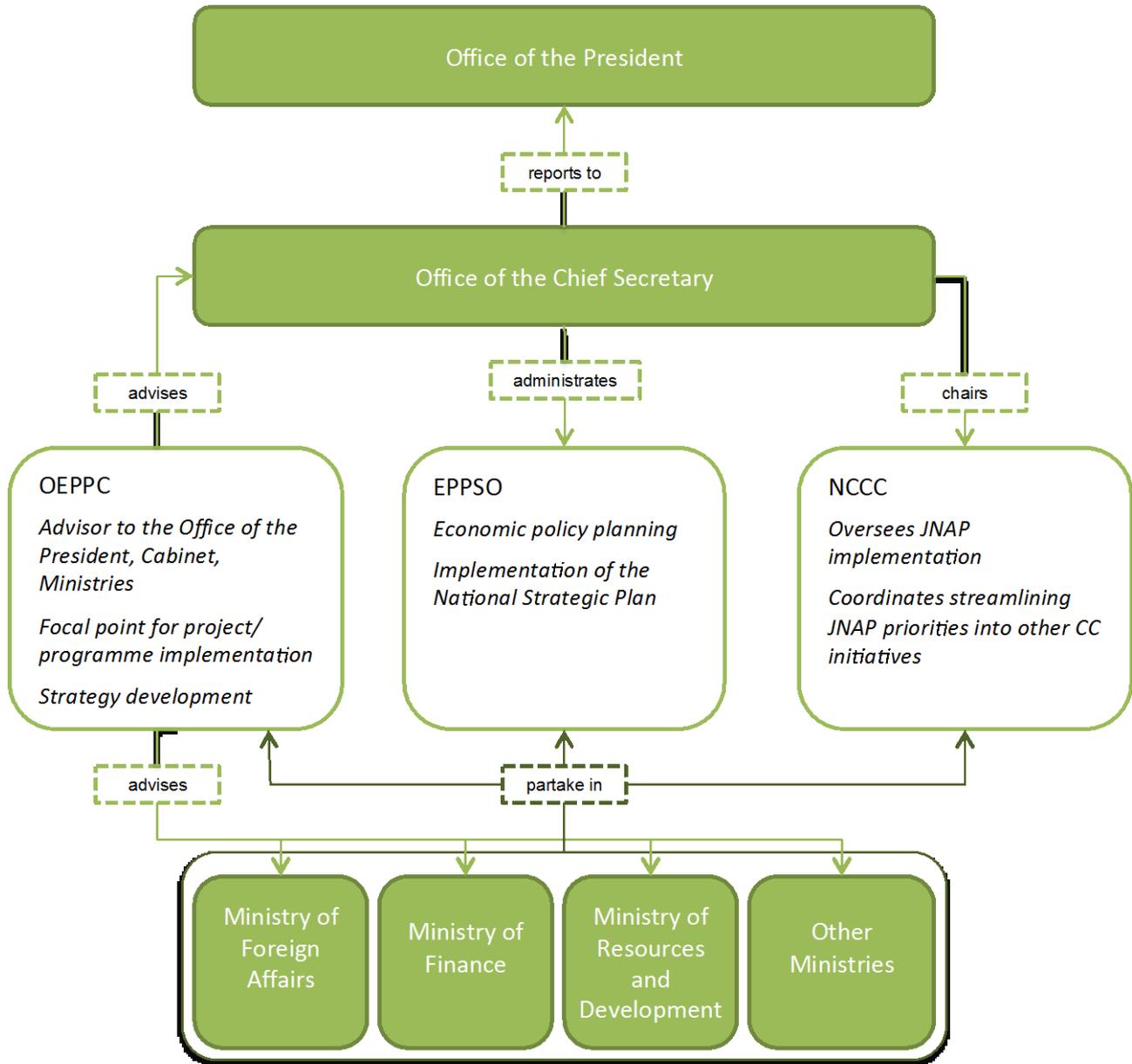
The **Ministry of Foreign Affairs (MoFA)** represents RMI in the international climate negotiations, supported through OEPPC. Most bilateral grants are negotiated by MoFA.

The **Ministry of Finance (MoF)** is responsible for multilateral finance, as well as bilateral finance of the European Union. However, the MoF does not currently have special staff for climate change topics.

Other important ministries in the climate change context include the **Ministry of Resources and Development (MRD)**, and the **Ministry of Public Works (MPW)** (RMI 2015a).

According to SPC 2014, RMI's institutional setup faces challenges in coordinating climate change activities across different institutions, and in fostering information exchange and knowledge management between governmental entities. Furthermore the report sees large opportunities for strengthening RMI's approach to climate change mitigation by fostering cross-sectoral programmes, as current activities often focus on single sectors, thus foregoing possibilities for synergies in different actions.

Figure 9: Institutional set up for climate action in RMI



Source: authors

2.3 MRV of GHG emissions

RMI submitted its second National Communication in 2015. No Biennial Update Report has been submitted at the time of writing.

The National Greenhouse Gas Inventory included in the second National Communication reports GHG emissions for the year 2000, and provides estimates for the years 2005 and 2010 for comparison purposes.

The inventory was prepared using the 1996 IPCC guidelines. Data used was compiled by the Office for Environmental Planning and Policy Coordination, from the National and Regional Energy Database, the RMI statistics office, available data from ministries and government departments, as well as private companies. Calculations were made using the IPCC Tier 1 approach. Because no national conversion and emission factors were available, IPCC default values were used (RMI 2015a).

As the National Communication admits, there are significant data gaps in the inventory. Fuel import and consumption data is inconsistent and was in some cases not provided by private companies due to confidentiality reasons (*ibid.*). The country's emissions inventory system is continuing to develop.

2.4 Description and evaluation of the (I)NDC

RMI communicated its INDC to the UNFCCC in July 2015. The INDC has been resubmitted as an NDC in April 2016. The country commits to a quantified economy wide target of a 32% reduction in greenhouse gases versus 2010 levels. Furthermore, RMI set itself an indicative target of a 45% reduction versus 2010 emission levels by 2030, and intends to achieve net zero emissions by 2050. While the targets are not explicitly marked as conditional, the NDC does mention that, while the NDC is considered a "full national commitment", their achievement will only be possible through continued international support. As previously mentioned the country is currently strongly reliant on external budget support in order to maintain its economy. The intended GHG reductions can therefore be seen as conditional on international support.

According to the NDC, all national emissions are covered. The NDC applies to the waste and energy sectors; the energy sector is specified as covering electricity generation, transport (land and shipping), and other (cooking and lighting). According to the document, emissions from all other sectors are negligible. As reference points, the NDC specifies the sectoral mix of emissions as 54% electricity generation, 12% land and sea transport, 23% waste, and 11% other (i.e. cooking and lighting) in 2010.

RMI plans to reduce emissions from

- ▶ electricity generation: 55% in 2025, 66% in 2030;
- ▶ transport, including domestic shipping: 16% in 2025, 27% in 2030;
- ▶ waste: 20% by 2030 (no specification for 2025);
- ▶ cooking and lighting: 15% by 2030 (no specification for 2025).

According to the NDC, the base year had emissions of about 0.185 MtCO_{2e}. Therefore, the economy-wide emissions target for 2025 would be 0.126 MtCO_{2e}, and 0.101 MtCO_{2e} by 2030. It is unclear where the base year emissions level is taken from, as RMI's Second National Communication which was published in the same year as the NDC provides a lower figure, 0.169 MtCO_{2e}.

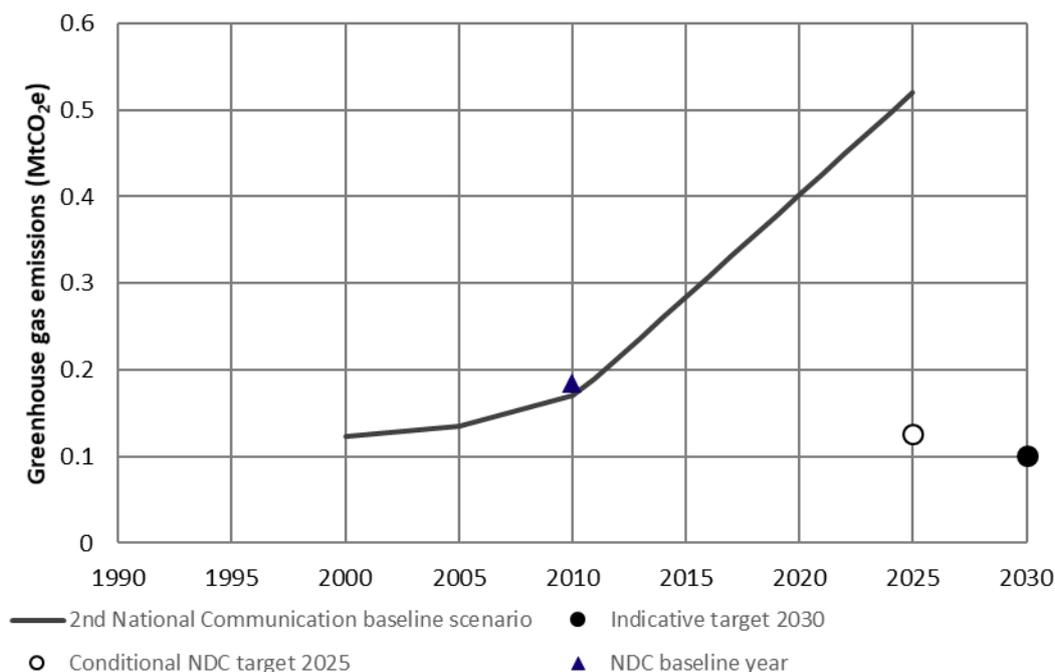
It should be noted that, since these figures are all extremely low, error margins which would not be significant in countries with higher emissions will appear much more significant here. Still, given that RMI does not specify an absolute figure for the intended reduction, a potentially inflated baseline figure does have implications for the targeted reductions. Applying the emissions levels provided by RMI's National Communication would lead to 0.115 MtCO_{2e} in 2025, and 0.093 MtCO_{2e} in 2030. The

PRIMAP figure for 2010 is already lower than the reduction implied through the provided baseline in the NDC, but is likely not accurate in this particular case.

The graph below was generated using a data from the National Communication for the reference scenario between 2000 and 2026, and the 2010 emission reference provided in the NDC, as a basis for the emission reduction points for 2025 and 2030.

Figure 10: RMI baseline projection and NDC targets

Nationally Determined Contribution



Data sources: RMI (2015a, 2015b)

The baseline scenario as communicated by the second National Communication supposes an emissions increase of 77.5% between 2000 and 2025, which may be not completely realistic given the moderate increase of emissions in the previous years. On the other hand, due to the very low emission count of the country, even singular infrastructure changes such as a new governmental or factory building may have strong effects on energy demand, and may cause a significant increase in emissions if that demand is met with fossil fuels.

Note that the data points in the years 2000, 2005, and 2010 represent historic data taken from the National Communication, while the timeline in between represents our own interpolation. Starting from 2011, the data points represent a projection of data by RMI. Since RMI uses a base year for the calculation of its NDC target, the baseline projection contained in its National Communication does not have a bearing on the target formulated in the country's NDC.

Again, we want to stress the point that in absolute terms RMI's emissions are extremely low, representing an almost invisible fraction of the global total. Even though the absolute emission figures may show some inconsistencies, RMI's commitment to reducing its GHG output by a good margin shows the seriousness of the country in combating climate change. It goes far beyond what would be expected from a least developed small island state in its ambition and specificity.

The NDC as a whole is a prime example for a clear and easy-to-understand strategy document. While short, it provides a wealth of information, and makes reference to other documents if necessary. The

planned actions are clear-cut and logical. They appear to be well-integrated into the country's strategic framework, and, according to the NDC itself, have been developed in an inclusive stakeholder process that included "the country's first National Climate Change Dialogue and three rounds of stakeholder consultations" (RMI 2015b).

2.5 Climate change mitigation policies and strategies

RMI has a number of overarching strategies (cf. RMI 2015a) that are aimed at mainstreaming climate change aspects into all aspects of policy making. As a low-lying island state, RMI is mostly concerned with adaptation strategy and disaster risk management. However, GHG reduction plays an increasingly prominent role, and is reflected in the country's development strategies. In the following, we outline the country's two most important strategies, as well as the non-binding Majuro Declaration of the Pacific Islands Forum because of its importance for both international climate policy and national low-carbon development.

2.5.1 National Strategic Plan 2015-2017 (NSP) and Vision 2018

The National Strategic Plan forms the foundation of RMI's development planning. Based on the country's Vision 2018 strategy endorsed in 2001, it expresses the objective to ensure:

"Sustainable, Equitable and Measurable Development Reflecting the Priorities and Culture of the Marshallese People" (RMI 2014)."

The NSP outlines an overarching development strategy encompassing social development, human resource capacity development, infrastructure development, sustainable economic development, good governance as well as environment, climate change and resiliency.

The latter focuses on vulnerability assessment and disaster risk reduction, disaster management and response, and conservation resource management. These three strategic areas are used to coordinate different aspects of RMI's response and resiliency to climate change, which are identified as two of the most important challenges the country faces. The NSP highlights the specific policies and strategies RMI has developed to deal with climate change, in particular the National Climate Change Policy Framework adopted in 2011 (see below).

The NSP is mainly concerned with questions of adaptation, resilience and disaster risk reduction/management, and less so with mitigation objectives. This reflects the country's priorities as a vulnerable island nation with low current GHG emissions.

2.5.2 National Climate Change Policy Framework (NCCPF)

The National Climate Change Policy Framework (NCCPF), adopted in 2011, formulates RMI's overarching approach to climate change. Through it, RMI commits itself to "achieving a low-carbon future" (RMI NCCPF 2011), and to "implement measures to build resilience, reduce disaster risk, and support renewable energy and energy efficiency" (ibid.).

The NCCPF formulates five strategic goals for the integration of climate change into governmental policies:

1. Strengthen the enabling environment for climate change adaptation and mitigation, including sustainable financing
2. Adaptation and reducing risks for a climate resilient future
3. Energy security and low-carbon future
4. Disaster Preparedness, response and recovery
5. Building education and awareness, community mobilization, whilst being mindful of culture, gender and youth (ibid.)

Each of the five strategic goals is underpinned by specific objectives and outcomes for the achievement of both the specific goals and the overarching vision expressed through its Vision 2018 strategy. As an example, the third goal, concerned with low-carbon development of energy, is to be pursued through the National Energy Policy 2009, which was updated in 2016. The objective under this goal is the improvement of the Marshallese people's quality of life through the provision of "clean, reliable, affordable, accessible, environmentally appropriate and sustainable energy services" (ibid.); the outcomes include an effective implementation of the Energy Policy's targets, and support through international financing for emission reduction, technology transfer and capacity development.

The NCCPF puts in place a National Climate Change Committee as an oversight body to ensure that these goals are met, and to develop a Climate Change and Disaster Risk Management National Action Plan (Joint National Action Plan, or JNAP).

2.5.3 Joint National Action Plan (JNAP)

The JNAP builds upon RMI's Disaster Risk Management National Action Plan, incorporating that plan's approach to disaster risk management in the country and the NCCPF's approach to climate change for an integrated risk management approach (RMI 2015a).

2.5.4 Majuro Declaration (non-binding)

At the 44th Pacific Islands Forum in Majuro in 2013, 15 Pacific island states endorsed the Majuro Declaration, a call to action on climate change and an expression of political will to lead on climate change issues nationally and internationally (Pacific Islands Forum 2013). Through the Majuro Declaration, Pacific island state signees committed to strengthen their approaches to climate protection, and to transition to renewable, clean and sustainable energy sources. Signatory states submitted their current approaches to GHG reduction with a view to strengthen and resubmit them in a scaling-up effort, similarly to what has now been adopted as the Global Stocktake process under the Paris Agreement.

2.6 Additional mitigation potential

RMI committed to a number of concrete mitigation goals in its 2009 National Energy Policy, the NCCPF, and the JNAP, and explicitly stated them in the Majuro Declaration, as quoted below:

- ▶ A 40% reduction in CO₂ emissions below 2009 levels by 2020;
- ▶ Electrification of 100% of urban households and 95% of rural atoll households by 2015;
- ▶ Improved efficiency of energy use in 50% of households and businesses, and 75% of government buildings by 2020;
- ▶ A 20% improvement in transportation sector fuel use by 2020;
- ▶ Feasibility studies and internationally supported financing plans for innovative 'game-changing' renewable energy and sustainable development opportunities including Majuro atoll waste-to-energy and Kwajalein/Ebeye atoll OTEC (Ocean Thermal Energy Conversion) plants undertaken by 2015 (Pacific Islands Forum 2013).

According to IRENA's renewables readiness assessment for RMI (Chen et al. 2015), the electrification goal has been almost completely achieved. However, almost all electricity generated is derived from diesel generators, many of them outdated and highly inefficient. Apart from the larger grids in Majuro and Ebeye with a combined load of 8.8MW, there are a number of small local grids on other islands, as well as off-grid diesel generators. Especially the generators in the larger grids are heavily derated, but cannot easily be taken down because there is little extra capacity to prevent blackouts. The Marshalls Energy Company (MEC), one of the two semi-autonomous energy providers, generated 6% of its provided on-grid electricity from solar installations in 2013. On the outer islands, residents already mostly rely on off-grid solar installations from various electrification projects since 2006. Electricity generation through renewable energy remains a high priority for the RMI government. To this effect, the NCCPF sets a goal to increase the share of renewable energy from about 3.5% in 2012 to 20% in 2020. (RMI 2016).

Energy efficiency measures have been introduced in the form of appliance ratings and labelling, as well as favourable duty rates for energy-efficient appliances, but, according to the updated Energy Policy only had limited success (ibid.). The Ministry of Finance has proposed an innovative scheme under which government departments could keep the savings earned from decreased cost for energy in order to incentivise energy efficiency improvements, but the scheme has not yet been put in place (ibid.)

In the transport sector, an uptake of energy efficiency or fuel switching has been very slow, according to the Energy Policy, not least due to the lack of a dedicated regulatory body or other types of enforcement of testing and maintenance processes for cars and vessels (ibid.).

Other innovative project developments for renewable energy are sparse. According to the analysis, there is currently one copra mill that provides a 50/50 coconut oil/diesel mix at a lower price than regular diesel, but otherwise progress has been slow (ibid.).

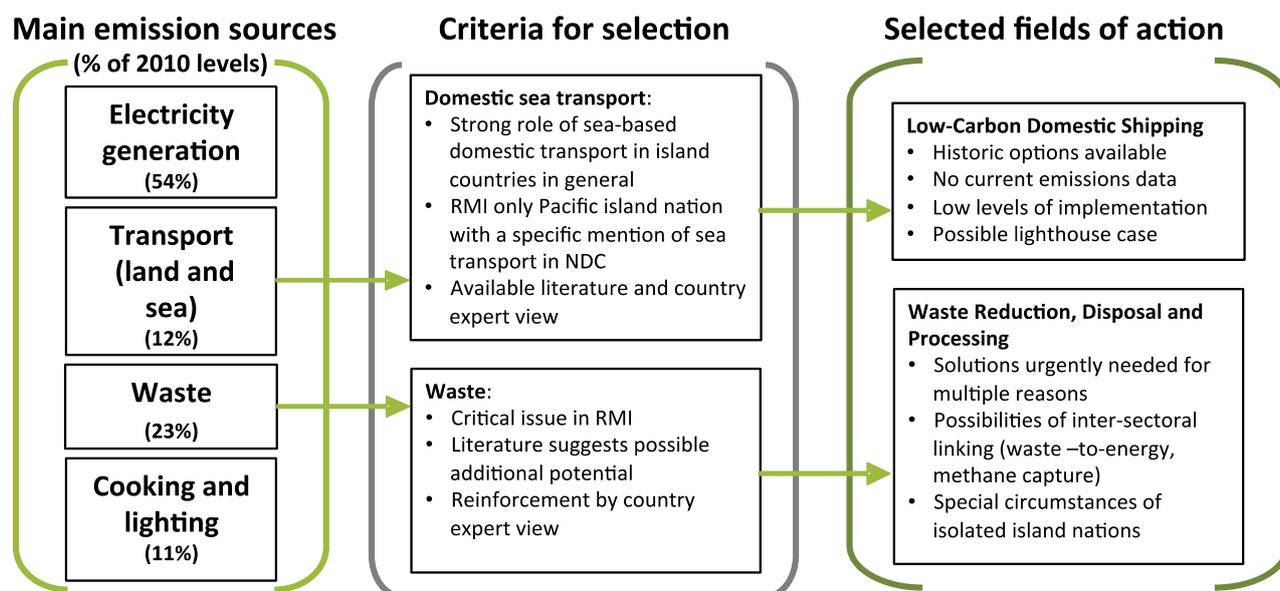
The Energy Action Plan 2016-2019 takes up the activities outlined in the previous plan that have not yet been implemented, and adds a monitoring plan to evaluate progress towards its goals (ibid.).

A major step will be the development of an improved data collection system for energy statistics. According to the monitoring plan (ibid.), this should already have taken place, but no information could be obtained in this as of the writing of this report. Without this data, it is impossible to determine actual mitigation successes in the country, as a quantification from existing sources is not possible.

2.6.1 Selection of proposed fields of action

Through its policies, strategies, and its NDC, RMI in our view covers most if not all promising avenues for further mitigation of greenhouse gases within the country. Nevertheless, we see two promising fields of action where implementation could be strengthened: Low-carbon domestic shipping, and waste.

Figure 11: Selection process for proposed fields of action in RMI



Source: authors

For RMI, the screening of its NDC, its second National Communication and its various climate related strategies did reveal that all emission-relevant sectors are covered by the country's own GHG reduction plans: energy, transport (sea and land), waste, and cooking and lighting.

Transitioning away from diesel generated electricity towards renewable energies is one of the main pillars of RMI's energy and climate strategies, and seems to already be on its way through a number of initiatives, even if current levels are still low. We therefore did not consider renewable energy as a field that has considerable additional potential beyond what is already planned.

There is, however, a cross-sectoral link between energy and waste through waste-to energy technologies. Waste is a critical issue for multiple reasons. It is also strongly under-represented in terms of emissions data, and is only represented though a long-term indicative goal in the NDC. Literature screening reinforced our view that the waste sector may yield additional potential. Consultation with an expert on pacific island states confirmed this selection.

Transport in island countries is different from many other, larger countries in that domestic sea transport plays a much stronger role here. RMI's NDC does contain a sea transport goal, and further research confirmed that it is indeed the only country in the region to have done so. However, judging from available literature there seemed to be a distinct lack of implementation as well as basic emissions data on current sea transport. Land transport, on the other hand, is well-covered. Sea transport therefore may potentially have a stronger bearing on future emission reduction options. Again this was confirmed by an expert.

Cooking and lighting we did not consider because additional mitigation potential beyond planned interventions in this sector is possibly very low, but there is not enough data available to analyse this

further. Most potential for emissions reduction is most probably generated through a cross-sectoral link with the energy sector, as electricity generation by renewable energies in conjunction with a high rate of electrification will mean less wood and propane-fuelled cook stoves as well as a stronger uptake with electric lighting. However, the geographic situation as a dispersed island state puts limits on how strong this will be.

2.6.2 Field of action I: Transport: Low-carbon domestic shipping

According to RMI's Second National Communication (RMI NatCom 2015), the transport sector was the second largest source of GHG emissions in the country, at 19%. However, this only covers land-based transport; emissions from sea-going vessels were excluded due to unavailability of data. This leaves a potentially large section of emissions uncovered, as it can be surmised that a large portion of transportation in a dispersed atoll and island state such as RMI will be by sea.

Because of the lack of viable fuel consumption data for most other Pacific countries, Goundar et al. (2017) point to Fiji as a reference. The country used 67% of its fuel imports for transportation purposes. 23% of the total fuel consumption were used for shipping, 27% for aviation, and 17% for vehicular use (no reference year was given) (Goundar et al. 2017). Thus, it is very much possible that maritime transport accounts for more emissions than land-based transport in RMI.

RMI is the only Pacific island state that actually has included domestic shipping in its NDC. The country has included a possible introduction of solar-charged electric lagoon transport as a mitigation option in the NDC, and specifically includes domestic shipping in its sub-sectoral target of a 16% reduction by 2025 vs. its 2010 baseline in its target. However, no further specification of GHG levels for the sub-sector is provided, so it is not entirely clear how this is going to be calculated (RMI 2015b).

RMI's National Energy Policy of 2016 specifies two further activities pertaining to domestic shipping. The Ministry of Resources and Development and the Ministry of Transport and Communications are to develop standards or codes on fuel efficient vessels, possibly to be regulated under the Domestic Water Craft Act. The status of this activity could not be ascertained. Furthermore, the Ministry of Internal Affairs is to "develop programs to encourage the use of wind supplementation for intra-atoll transport and lagoon fishing" (RMI National Energy Policy and Energy Action Plan 2016). This is to be an ongoing process until 2019.

Goundar et al. (2017) point out that Pacific Island countries in general have historically had much experience with low-carbon shipping options. During the oil crisis in the 1970s a number of pioneering projects were developed that relied on both retrofitting existing diesel-fuelled ships with sails and rigging, as well as completely new designs especially for smaller freight and passenger ships. Trials of the designs yielded fuel savings of 20-30%, depending on make (Nuttal et al 2014). After oil prices dropped again in the mid-1980s, these projects were universally dropped because they were not economically competitive anymore, and much of the knowledge is in danger of being lost (ibid.).

However, the continuously high oil price of the last years could render these designs competitive once again. Given the high dependency on petroleum fuels of the region, it might be argued that a pilot wharf designated to such designs might even represent a business case for a Marshallese maritime industry if oil prices continue to rise.³

The introduction of low-carbon domestic shipping in RMI yields a number of important additional benefits:

³ A further possibility for lowering emissions from the maritime transport sector is fuel blending with coconut oil, a practice already tested in RMI's diesel-fuelled electricity generators. However, coconut oil is a high value export product of RMI, and according to expert review was not considered a viable option for the sector.

- ▶ Any relief from high fuel dependencies will strongly benefit RMI's economic situation, and can potentially lessen the country's dependence on donor finance.
- ▶ On a more local level, low-carbon domestic shipping may alleviate environmental hazards arising from fuel leakage on ships as well as from oil drums used to store fuel in the outer islands (Newadra and Gilbert 2002).
- ▶ For shorter distances and smaller vessels, a stronger reliance on pure sailing instead of engine/sailing hybrids would get rid of emissions from these vessels altogether, and would fit well with the cultural heritage of the Pacific islands, as Nuttall et al. (2014) point out, warning that sailing culture is lost rapidly in the Pacific. Furthermore, sailing would allow continued inter-island transport even in case of fuel rationing due to price hikes or shortages.

2.6.2.1 Barriers to implementation of low-carbon domestic shipping

A stronger uptake of low-carbon domestic shipping options are currently hindered by a number of different barriers that need to be overcome in order to realise full potential.

In terms of institutional and political barriers, there is currently a regulative vacuum, with unclear mandates as to which agency or ministry is responsible for implementation. The National Energy Policy has defined some responsibilities, but many remain to be defined.

A key barrier for a stronger uptake is financial. International climate financing has so far concentrated on land transport options to a large extent, omitting the special circumstances that island states face (Nuttall et al. 2014). Sea transport options were mostly concentrated on harbour infrastructure in the Pacific region as an ADB evaluation report found (ADB 2011). Nuttall et al. (2014) report that in many discussions with potential donors presented options for a larger efficiency of domestic vessels were deemed interesting, but were ultimately not funded. Multilateral climate finance tends to favour 'safe' project options that are already tested elsewhere, which is currently not the case for low-carbon shipping, as Goundar et al. (2017) lament.

On the technical side, no real barrier exists. However, while concepts and designs for efficient vessels exist in abundance, many have not been actually built and tested, and if so, only in small numbers until the mid-1980s with most such vessels now out of service (Nuttall et al. 2014). Therefore, existing designs would need to be revisited and adapted to current technologies and local circumstances. Goundar et al. (2017) note that the option of electrified lagoon transport mentioned in RMI's NDC is not evaluated yet in terms of usability in RMI waters (Goundar et al. 2017).

In terms of information, RMI needs to quickly build up a reliable database for fuel use and emissions from the domestic maritime sector. Since there is currently no sub-sectoral data at all, there is also no baseline to track efficiency improvements and GHG reductions as they are implemented. The introduction of sound energy statistics using up-to-date data is therefore a much needed requirement for this sector, but also for the country in general.

2.6.2.2 Ongoing activities

Very recently, a new project funded through the Germany's International Climate Initiative (IKI) named "Low Carbon Sea Transport" has taken up the issue. In a multi-year programme, the German Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) will assist RMI to explore low-carbon options for domestic shipping. The project will analyse emissions and economic conditions of the sector, and subsequently develop a new intra-lagoon vessel as well as retrofit an inter-island vessel. Thus, the project addresses almost all key barriers to the introduction of low-emission shipping options in RMI (BMUB 2017).

This project thus offers a promising avenue for RMI to pursue low-carbon options in the domestic shipping sector more strongly. A singular project, however, will likely not suffice to transform the sector. RMI may therefore also consider options to encourage low-carbon shipping options through policies and incentives in order to bring more actors into this field.

2.6.3 Field of action II: Waste reduction, disposal and processing

Waste reduction, disposal and processing is one of the top priorities of RMI, according to its Second National Communication. Institutionally, waste is covered under the Environmental Protection Act of 1984. The Act created RMI's Environmental Protection Agency (EPA), which is the responsible agency for waste issues in RMI.

In 2000, emissions from waste represented about 30% of the country's total emissions. While emissions from waste have dropped by about 3.5% between 2000 and 2010 to a level of 36.3 MtCO_{2e} according to RMI's inventory data, it can be expected that they at least stay constant, or may even rise due to rising amounts of generated waste if no strong actions are taken. The main GHG produced is methane. Emissions represent estimates based on actual waste generation and waste composition (RMI 2015a). While waste is considered one of the main sources of emissions in RMI's NDC, there is only an indicative 2030 target; a target for 2025 is not specified.

RMI lacks available space to build larger facilities for waste disposal, but current landfill facilities are already at capacity. The Majuro landfill site is subject to flooding, and there is no control of leakage of potentially environmentally harmful materials from the site into the sea. While only limited evidence exists, the RMI government believes that some chemical and hazardous materials are dumped illegally. A large amount of solid waste is being dumped or burned on private grounds as well. (ibid.). There is currently no waste segregation/recycling regulation, but RMI has a composting center, a paper fuel plant (producing bricks from paper), an aluminium collection centre and a metal-recovering facility at the Majuro landfill (Woodruff 2014).

RMI reports that the most important waste types to be addressed are organic wastes, diapers, plastics, paper, and metals, but that the composition of wastes is likely going to change to include more and more potentially toxic waste from electrics and electronics, chemicals, and oil (RMI 2015a).

RMI's NDC identifies a reduction of methane generation from landfills through pre-sorting of waste and methane entrapment. No concrete reduction potential could be identified, but such an activity is probably only possible for newly-built waste disposal facilities. The process of identification of new potential landfill sites is ongoing. A new facility should certainly be planned in a manner to accommodate methane capture. Methane thus captured could be used e.g. as supplement to current fossil-based LPG gas for cooking and lighting, or for electricity generation (Themelis and Ulloa 2005).

Options for waste-to-energy facilities have long been proposed by the RMI government (see e.g. Majuro Declaration 2013), and a feasibility study for implementing a waste-to-energy facility in Majuro was to be conducted by 2015 (Majuro Declaration 2013). The country's second National Communication estimates a GHG reduction potential of about 6.5 MtCO_{2e}/a through waste-to-energy technology, about a sixth of 2010 waste emissions (RMI 2015a).

While there is no further information on the study planned by the RMI government mentioned in the Majuro Declaration, a study by the US-based National Renewable Laboratory (NREL) (Conrad et al. 2015) on energy project development options in RMI evaluated waste-to-energy (WTE) as one energy activity option for the country. Based on a pre-feasibility study by the Asian Development Bank (ADB) dated 2010, the authors find that purely from an economical standpoint, WTE is not competitive with diesel generators, and would incite high upfront capital costs. However, a plant of the assumed size could reduce emissions of nearly 11% versus a business-as-usual diesel generation case. The NREL study warns that further benefits have not been taken aboard by the ADB study, and argues that a

"wider systems view of WTE in the context of waste disposal, energy needs, and impact on the local economy in terms of not just energy costs but the net benefits of local expenditures versus export of money, creation of local jobs, and improvement of the local environment may improve its effectiveness" (Conrad et al. 2015).

In order to reduce GHG emissions from waste, it is paramount that less waste is produced in RMI in the first place. While there are some efforts to recycle waste material dumped at the disposal site in Majuro (Woodruff 2014), these schemes need to be expanded, and segregated waste collection needs to be improved. Another aspect could be to introduce packaging standards for imported products that minimise waste creation, or incentive schemes to buy less-packaged goods. This would also alleviate the currently dire situation RMI faces in terms of limited space for waste disposal sites.

2.6.3.1 Barriers to implementation of field of action II

The main barriers towards a less GHG-intensive waste system in RMI seem to be high upfront costs and limited capacities of authorities, together information gaps on the side of the population.

The development of methane capture and WTE systems requires a large-scale overhaul of RMI's waste infrastructure that will likely not be fully captured financially by operating revenues for waste collection or energy sales, or at least will have an extremely long period until break-even. However, at least in the case of WTE this may change in the light of continuously high prices for petroleum products.

A quick development of low-carbon waste solutions is further aggravated by limited capacities of local authorities to discourage illegal dumping of waste, and communicating the need for an organised waste disposal system in RMI, as Woodruff (2014) concludes: "There is a need for improved community engagement, particularly the involvement of traditional leaders and landowners..." (Woodruff 2014).

Furthermore, RMI faces a territorial challenge as a dispersed island state. While centralised waste disposal is technically feasible, it requires ferrying waste over long distances. Decentralised waste disposal, on the other hand, can be potentially hazardous, as waste disposal regulations may be very hard to enforce. However, this may not be a central issue, as the most pressing issues of waste disposal occur on Majuro due to its much larger population than the other islands of RMI.

Finally the sheer lack of available space for larger-scale waste disposal in RMI presents a serious challenge. While a number of new dump site locations have been identified, waste dumping is not a long-term sustainable solution. Enhanced recycling and waste reduction is therefore a much-needed basic requirement.

2.6.3.2 Ongoing activities

Funded through the European Union, and implemented through the Secretariat of the Pacific Regional Environment Programme (SPREP), RMI is piloting a region-wide programme for sustainable waste management, PacWaste. The programme seeks to include all key stakeholders, including donors, government agencies, the private sector, and community members. The programme covers improved garbage collection, battery recycling, community education and awareness-raising, but also legislative action. In the beginning of 2017, a bill was passed in the RMI that prohibits the import, manufacture, sale and distribution of plastic cutlery, and disposable plastic and styrofoam food and beverage containers. The ban will be phased in over the year 2017 (SPREP 2017).

This will be an important step towards waste reduction in the country and the whole region. It will likely have a significant impact on greenhouse gas emissions, especially if less plastic material is burned legally or illegally. If the programme is able to address the country's issues arising from landfills and heighten recycling rates, it can be a very promising way forward.

2.7 Conclusions

The Republic of the Marshall Islands is a small island nation intent on doing its share in combatting climate change. Though on a global scale its emissions are negligible, the country's activities send an important political signal to the world. That aside, sunsetting petroleum as a main energy source makes economic sense as well, as the country does not have any liquid fuel resources of its own, necessitating costly imports. With petroleum having a 92% share of primary energy in 2011, there is certainly scope for renewable energy to play an important part in the country's future energy mix.

Policies and institutions aligned

Climate change pervades most of RMI's policies and institutions, as the country faces very real dangers from extreme weather and rising sea levels. Consequently, the country has streamlined climate issues into its political workings through its National Strategic Plan and Vision 2018 which form the basis for RMI's strategic planning and which are referenced in all strategies we have analysed.

The National Climate Change Committee and other bodies work towards horizontal integration of mitigation, adaptation and disaster risk reduction in RMI. However, there may still be scope to strengthen the coordination of efforts on the ground through cross-sectoral cooperation, as was noted by the Secretariat of the Pacific Community (SPC 2014).

Ambitious NDC

RMI's NDC is remarkable in its reduction target: it foresees emissions reductions against the base year of 2010, not against a business-as-usual scenario, which is more commonly found in developing countries' NDCs. The NDC claims to cover all emissions in the country, and sets targets for electricity generation, land and sea transport, waste, and cooking and lighting. There is some disparity between the figures provided by RMI itself in its NDC and its second National Communication, even though they were both published in 2015, the reasons for which are not clear. The country's NDC as a whole is, though short, concise and clear, and in our view quite ambitious.

With policies and measures towards greater energy efficiency and an uptake of renewable energy already in place and under implementation, the Marshall Islands are already taking large strides towards their mitigation goals. We have identified sea transport and waste as two possible areas to take up more strongly in the future. There are already activities in both fields, underlining our notion that RMI covers most, if not all, promising areas for greenhouse gas reduction.

Options to strengthen low-carbon domestic shipping

Low-carbon domestic shipping in our view is interesting because inter-island naval transport has presumably a large carbon footprint - however, there is no concrete emissions data for the sector in the country. Regardless of actual emissions data, technical options to reduce fuel consumption of smaller vessels by up to 20-30% were developed in the region as early as the late 70s during the global oil crisis. Low-carbon shipping can therefore be considered a viable option for greenhouse gas reduction that has an extremely good fit for RMI. There are a number of barriers to overcome, not least of which is financial, because the introduction of new technology always comes at high upfront costs. A very recent (June 2017) project of the International Climate Initiative is tailor-made to this promising field of action in focusing first on expanding the informational base for actual emissions and fuel consumption of domestic vessels, and in a second phase on developing pilot projects for low-carbon vessels in RMI. The RMI government may want to broaden the base laid by this project through special policies and incentives to bring a larger number of actors into this new sector.

Waste reduction is essential

Another promising field of action is waste reduction and removal. RMI's second National Communication indicates that 30% of the country's emissions in 2000 were from methane and other GHGs stemming from waste. While that percentage has dropped somewhat since, the country still faces serious challenges due to non-optimal waste handling, and a sheer lack of space for waste disposal facilities. In consequence, RMI's government suspects that significant amounts of waste are dumped illegally, or burned on private grounds. A possible part of the solution may be a waste-to-energy plant, but plans for such a facility have not yet come to fruition, most likely again because investment and running costs are currently still higher than electricity generation using diesel generators. The expanding challenges of waste disposal together with rising oil prices may level the playing field. In the meantime, it is clear that the best way to reduce emissions from waste will be to reduce the amount of waste overall. RMI, supported by the Secretariat of the Pacific Regional Environment Programme, is therefore developing options for sustainable waste management. It has already laid important groundwork for waste reduction through introducing a ban on cutlery and containers for food and beverages made from plastic and styrofoam, a step that in our view is worth every country's consideration.

In summary, it may be said that within the confines of its size, location and capacity, the Marshall Islands can be considered at the forefront of countries in efforts to reduce its emissions. With the support of its country partners, hopefully the barriers to fulfilling RMI's ambitious NDC pledge can be overcome, and allow the country to meet and even surpass its emission reduction targets on the way to its stated goal of zero emissions by 2050.

References

- BMUB (2017): Sustainable Mobility as the Heartbeat of Climate-Friendly Economic Growth and Social Development. Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) Division KI II7. https://www.international-climate-initiative.com/fileadmin/Dokumente/2017/171109_IKI_FS_Mobility.pdf
- Chen, Y.; Gönül, G.; Wade, H. (2015): The Republic of Marshall Islands. Renewables Readiness Assessment. Abu Dhabi (UAE): IRENA. http://www.irena.org/DocumentDownloads/Publications/IRENA_RRA_Marshall%20Islands_2015.pdf
- Conrad, M. D.; Olis, D.; Ness, J. E.; Esterly, S. (2015): Republic of the Marshall Islands Energy Project Development Options and Technical Assessment (2013). Denver (USA): National Renewable Energy Laboratory (NREL). <https://www.doi.gov/sites/doi.gov/files/uploads/RMI-Energy-Project-Development-Options-September-2015.pdf>
- Goundar, A.; Newell, A.; Nuttall, P.; Rojon, I.; Samuwai, J. (2017): King Canute muses in the South Seas: Why aren't Pacific Islands transitioning to low carbon sea transport futures? *Marine Policy* 8180–90. doi: 10.1016/j.marpol.2017.02.012.
- Gütschow, J.; Jeffery, M. L.; Gieseke, R.; Gebel, R.; Stevens, D.; Krapp, M.; Rocha, M. (2016): The PRIMAP-hist national historical emissions time series. *Earth System Science Data* 8(2)571–603. doi: 10.5194/essd-8-571-2016.
- IEA (2016a): Energy Balances. 2016 edition. Paris, France: International Energy Agency.
- IEA (2016b): Energy Statistics and Balances. Paris, France.
- ND-GAIN (2017): Notre Dame Global Adaptation Index.
- Newadra, S.; Gilbert, T. (2002): Risk of Marine Spills in the Pacific Islands Region and its Evolving Response Arrangements. SPILLCON 2002. SPREP. http://archive.iwlearn.net/www.sprep.org/www.sprep.org/publication/webpage/004ship_waste_ww2/WWII_Strategy/_private/newadra_gilbert_spillcon.pdf
- Nuttall, P. R.; Newell, A.; Bola, A.; Kaitu'u, J.; Prasad, B. (2014): Policy and financing - why is sea transport currently invisible in the search for a low carbon future for Pacific Island Countries? *Frontiers in Marine Science* 1. doi: 10.3389/fmars.2014.00020.
- Pacific Islands Forum (2013): Majuro Declaration for Climate Leadership. <http://www.daghammarskjold.se/wp-content/uploads/2014/12/44th-PIFS-Majuro-Outcome.pdf>
- RMI (2014): Republic of the Marshall Islands. National Strategic Plan 2015-2017. <https://www.adb.org/sites/default/files/linked-documents/cobp-rmi-2016-2018-ld-04.pdf>
- RMI (2015a): Republic of Marshall Islands. Second National Communication. http://unfccc.int/files/national_reports/non-annex_i_parties/application/zip/mhInc2.zip
- RMI (2015b): Republic of the Marshall Islands. Intended Nationally Determined Contribution. Communicated to the UNFCCC on 21 July 2015. <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Marshall%20Islands%20First/150721%20RMI%20INDC%20JULY%202015%20FINAL%20SUBMITTED.pdf>
- RMI (2016): Republic of the Marshall Islands. National Energy Policy and Energy Action Plan. April 2016. http://prdrse4all.spc.int/sites/default/files/nea_p_rmi_endorsed_2016.pdf
- SPC (2014): Pacific Climate Change Finance Assessment. Republic of the Marshall Islands. National Assessment. Final Report, August 2014. Secretariat of the Pacific Community. https://www.pacificclimatechange.net/sites/default/files/documents/RMI%20CCF%20Assessment_Final%20Report%20August%202014.pdf
- SPC (n.d.): Map of the Republic of Marshall Islands. <http://www.spc.int/our-members/marshall-islands/>
- SPREP (2017): Turning the tide on the war against waste. Secretariat of the Pacific Regional Environment Programme. <http://www.sprep.org/waste-management-pollution-control/turning-the-tide-on-the-war-against-waste>
- Themelis, N.; Ulloa, P. (2005): Capture and Utilisation of Landfill Gas.
- UNDP (2015): Human Development Reports: Human Development Index. Human Development Index.
- UNFCCC (2016): Greenhouse Gas Inventory Data: Detailed data by party. Detailed data by party. Bonn, Germany: United Nations Framework Convention on Climate Change.
- United Nations (2014): World Urbanisation Prospects. doi: 978-92-1-151517-6.
- Woodruff, A. (2014): Solid Waste Management in the Pacific. The Marshall Islands Country Snapshot. Asian Development Bank. <https://www.adb.org/sites/default/files/publication/42669/solid-waste-management-marshall-islands.pdf>
- World Bank (2017): World Development Indicators. The World Bank Group.