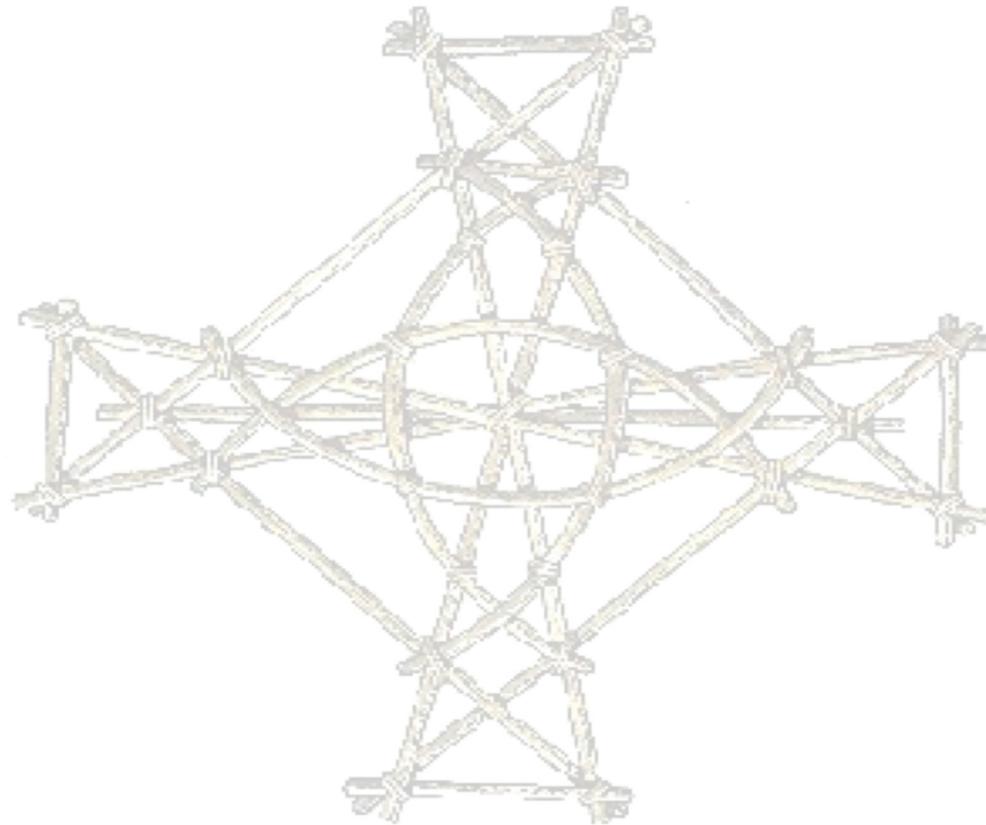


# **Rebbelib 2050:** A Catalyst for Change

**MARSHALL ISLANDS NATIONAL TRANSPORT DECARBONISATION FRAMEWORK**



**MICRONESIAN CENTER  
FOR SUSTAINABLE  
TRANSPORT**

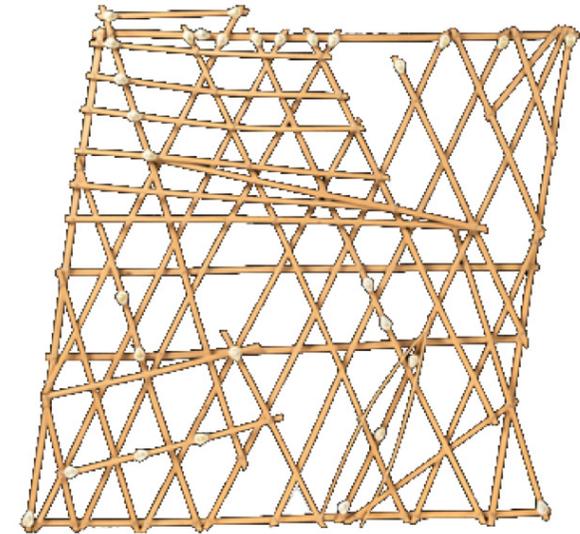


# Rebbelib 2050: A Catalyst for Change

## MARSHALL ISLANDS NATIONAL TRANSPORT DECARBONISATION FRAMEWORK

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*Rebbelib of the Marshall Islands*

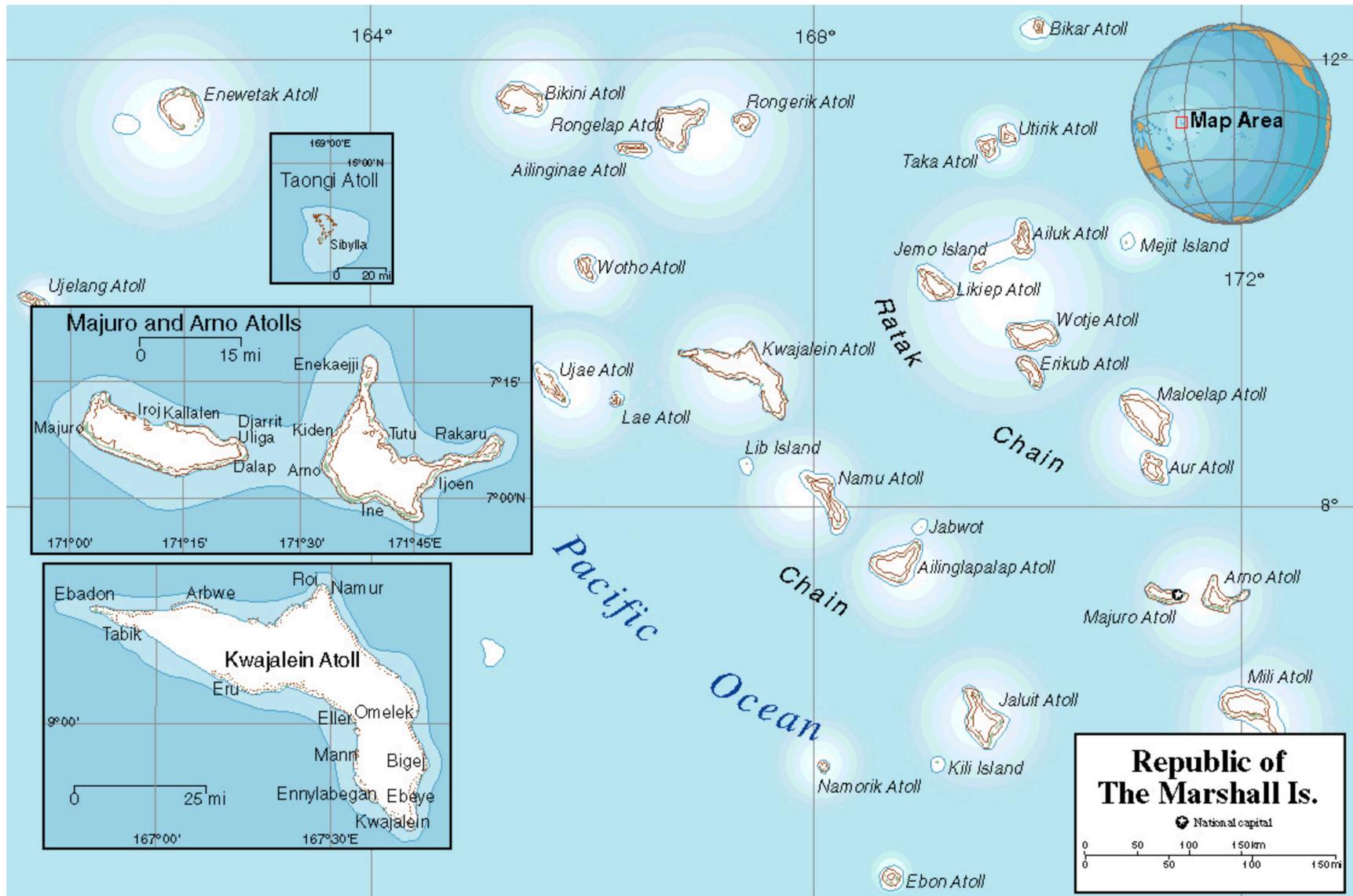
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Kommol Tata!

*Produced by: Micronesia Center for Sustainable Transport March, 2022®*



**MESSAGE FROM THE PRESIDENT**, H.E. David Kabua

*Yokwe and warm greetings from the Republic of the Marshall Islands.*

*I commend to you this **Rebbelib 2050**, our revised National Transport Decarbonisation Framework.*

Our ancestors were renowned for their ability to navigate over a vast ocean with fast, appropriate, and efficient vessels. A **rebberlib** is what our ancestors called the charts they made from pandanus and shells to teach our collective learned experience in navigation and wayfinding. **Rebberlib 2050** is our framework for the needed transition that RMI and our neighbors must collectively undertake to decarbonize our transport and maintain our essential connectivity.

*Rebberlib 2050* is designed to support our National Strategic Plan NPS2030 and integrate our transport planning within the overall national climate crisis response.

New technologies and approaches to green transport have long been a missing link in our energy strategies across the Pacific. RMI is proud to have been providing leadership for this sector and we are trying to lead by example. In 2013, we were the first, and only, country to address transport in our commitments under the Majuro Declaration for Climate Leadership. We were proud to sponsor, alongside Fiji, the Solomon Islands, and Tuvalu, shipping decarbonization as a regional priority in the inaugural PIDF Declaration in 2013, and again in the Suva Declaration on Climate Change in 2015. We have been a committed member of the Pacific high ambition

coalition calling for urgent decarbonization of the sector internationally, both at IMO and UNFCCC.

Sustainable transport transition for RMI, indeed for all island states, at the speed and scale dictated by the growing climate emergency is an enormous and unprecedented challenge. It assumes a paradigm shift in technologies and fuels, but it also demands a corresponding paradigm shift in how we undertake this change. RMI determined that we needed our own rebberlib and we needed our own research center, unashamedly country-owned and focused, capable of building a network with world-leading research partners while strengthening our peoples' capacity to drive our own long-term program of change.

*Rebberlib 2050* is also designed as a national coordinating facility for multiple partnerships and projects. We cannot follow the path prescribed by this rebberlib unaided. To set a course for full decarbonization we will need the support of many national and international actors.

*Rebberlib 2050* provides a clear forward-facing national structure to guide the participation of all under a single mandated process. Otherwise the national capacity of our small administration is quickly overwhelmed and at risk of losing national oversight.

There has been enormous progress internationally across the transport sector in the six years since the MCST Framework was first endorsed by RMI and the 15th Micronesians Presidents Summit. We are no longer the only Pacific country calling for transport to be prioritized in our development, adaptation and resilience planning, and there are

now multiple conversations happening across our ocean in this space with multiple actors. Given the leadership of RMI in this space and the progress made since the establishment of the MCST, the opportunity to strengthen the collaboration amongst the nations of Micronesia and the Pacific is a key priority. The Pacific Blue Shipping Partnership is our vehicle for achieving this.

Our *Rebberlib 2050* is only the start of a long journey. I extend our appreciation to those who have already come to join us under this framework, in particular our academic partners from around the world and bilateral partners like the German Federal Government funded LCST project and Korea's project to explore new energy technologies. Our path forwards is ambitious and will need the support of many willing partners.

Kommol tata



H.E. David Kabua, President.  
March 2022.

**FORWARD** Hon. Kitlang Kabua – Chair, MCST Board

***A Rebbelib for navigating our transport decarbonization transition***

*Rebbelib 2050* is our revised National Transport Decarbonisation Framework. It provides a clear pathway forward, building on the work that has been achieved since the Majuro Declaration on Climate Leadership in 2013. On behalf of the MCST Board I applaud and congratulate all those that have contributed to this revised Framework.

When we first began to look carefully at the transport challenge ahead of us, it was quickly apparent we were the first canoe to sail these waters, to navigate the reefs of change and to plot a course toward a decarbonized transport future at the scale of our Pacific island states. It was also obvious the solutions then being considered for large and continental-based countries and economies were unlikely to be compatible to our unique maritime countries. At the time, agencies such as ADB and the WB were focused on priorities like meta-urban networks, rapid rail, and inland waterways. The existing regional processes were focused on fisheries management, electricity transformation, and maritime safety and security. Our high ambition led us into uncharted waters.

With this in mind, the late Tony de Brum reached out to our own regional university, USP, to establish the MCST and to develop its initial Framework in 2015. De Brum envisaged a center of excellence in Majuro to prepare and implement a whole of country *rebbelib* for RMI to transition to low carbon transport solutions. He anticipated

this would serve as a model for a sub-regional program to cascade to other Micronesian countries, and then to the wider region and other SIDS globally. The response from the global academy has been outstanding, with working partnerships from universities around the world contributing to different aspects of the needed theory of change for the Pacific.

The MCST Framework is designed from a Pacific country perspective. Due to its centrality to all facets of well-being and connectivity for our country, sea transport is the first and most logical priority, but the MCST has been built to address all transport sub-sectors. It encompasses both domestic transition, as signaled in our updated 2020 NDC, and the necessary international advocacy in multiple fora including UNFCCC, IMO, ILO, UNCTAD, and others.

Increasingly, the physical survival of RMI and other low-lying island states is dependent on immediate and complete mitigation of climate change globally. The COVID pandemic has only reinforced how central transport is to all facets of our society, our development and our survival.

Shipping is absolutely essential for connectivity within and between island states. Transport continues to be insufficiently addressed in initiatives to decarbonize both global and national economies. Numerous practical solutions have emerged for the low carbon transport transition. Many of these will have the greatest benefit at the local level, especially small-scale shipping used by island countries. The roster of leading international research centers and bilateral partners

offering assistance with cutting edge technological development, economic analysis, and knowledge exchange has grown substantially since establishment of the MCST. Micronesia is poised to serve as the proving ground for such technologies.

The release of the International Panel on Climate Change AR6 report has provided a timely reference point to revisit our initial planning, review our progress, to learn from the lessons of the work RMI and our partners have undertaken to date, and re-calibrate our *rebbelib* for the next stage in our transition voyage. Cabinet has reconfirmed the MCST Framework as our national strategy for transition, the task of the MCST Board is to oversee its successful implementation. I invite you all to join us on this journey.

Kommoltata



Hon. Kitlang Kabua  
Minister for Education, Sports and Training

## ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank	FAESP	Framework for Action on Energy Security in the Pacific	IRENA	International Renewable Energy Agency
AMI	Air Marshall Islands	FATS	Framework of Action on Transport Services	IRENA RRA	IRENA Renewable Readiness Assessment
AOSIS	Alliance of Small Island States	GCF	Green Climate Fund	IUCN	International Union for Conservation of Nature
ATM	Air Traffic Management	GDP	Gross Domestic Product	IWSA	International Wingship Association
BAU	Business-As-Usual	GHG	Green House Gas	JICA	Japan International Cooperation Agency
CAD	Civil Aviation Directorate	GHG ISWG	Intersessional Working Group on Reduction of GHG Emissions from Ships	KMI	Korea Maritime Institute
CANCC	Coalition of Low Lying Atoll Nations on Climate Change	GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	KOICA	Korean International Cooperation Agency
CCCL	Center for Climate Change Law, Columbia Law School	GMF	Global Maritime Forum	KRISO	Korea Research Institute of Ships and Ocean Engineering
CCD	Climate Change Directorate	GPS	Global Positioning System	LCST	Low Carbon Sea Transport Project
CMAC	Coastal Management Advisory Council	GSN	Green Shipping Niedersachsen	LEDS	Low Emissions Development Strategy
CMI	College of the Marshall Islands	HAC	High Ambition Coalition	LNG	Liquefied Natural Gas
COP	Conference of the Parties	HEL	Hochschule Emden Leer	LPG	Liquefied Petroleum Gas
CPLC	Carbon Pricing Leadership Coalition	ICAO	International Civil Aviation Organisation	LR	Lloyds Register
CROP	Council of Regional Organisations of the Pacific	ICCT	International Council on Clean Transportation	MCST	Micronesia Center for Sustainable Transport
CVF	Climate Vulnerable Forum	ICE	Internal Combustion Engine	MEC	Marshall Energy Company
DFAT	Australian Department of Foreign Affairs and Trade	ID	Independent Diplomats	MEL	Monitoring, Evaluation and Learning
EC	European Commission	ILO	International Labor Organisation	MEPC	Marine Environment Protection Committee
ECF	European Climate Fund	IP	Intellectual Property	MFAT	New Zealand Ministry of Foreign Affairs and Trade
EEDI	Energy Efficiency Design Index	IPCC AR6	Intergovernmental Panel on Climate Change Sixth Assessment Report		
EEZ	Exclusive Economic Zone	IMI	Investment Marshall Islands		
EPPSO	Economic Policy, Planning and Statistics Office	IMO	International Maritime Organisation		
EVs	Electric Vehicles				

MICS	Marshall Islands Conservation Society	PIDF	Pacific Islands Development Forum	Tyndall	Tyndall Centre for Climate Change Research Manchester
MIMA	Marshall Islands Mayors Association	PIFS	Pacific Islands Forum Secretariat	UCL	Energy Institute, University College London
MIMRA	Marshall Islands Marine Resources Authority	PNA	Parties to the Nauru Agreement	UKHC	United Kingdom High Commission
MISC	Marshall Islands Shipping Corporation	PPP	Private Public Partnership	UKMoT	United Kingdom Ministry of Transport
MOFAT	Ministry of Foreign Affairs and Trade	PRIF	Pacific Regional Infrastructure Facility	UNCTAD	UN Conference on Trade and Development
MOEST	Ministry of Education, Sports and Training	PSIS	Pacific Smaller Island States	UNDP	UN Development Program
MOTCIT	Ministry of Transport, Communication and Information Technology	R&D	Research & Development	UNEP	UN Environment Program
MNRC	Ministry of Natural Resources and Commerce	RD&D	Research, Development and Deployment	UNESCAP	UN Economic and Social Commission for Asia and the Pacific
MPS	Micronesian President's Summit	RMIPA	Republic of Marshall Islands Ports Authority	UNF	United Nations Foundation
NAP	National Adaptation Plan	RRES	Regional Research and Education Strategy	UNFCCC	UN Framework Convention on Climate Change
NCCC	National Climate Change Committee	SAF	Sustainable Aviation Fuel	UNSW	University of New South Wales
NDC	Nationally Determined Contribution	S.A.M.O.A.	Small Island Developing States Accelerated Modalities of Action	USAID	United States Agency for International Development
NEO	National Energy Office	SFT	Sustainable Freight Transport	USP	The University of the South Pacific
NEP	National Energy Plan	SHAC	Shipping High Ambition Coalition	USP MI	USP Marshall Islands Campus
NER	National Energy Roadmap	SIDS	Small Island Developing States	WAM	Waan Aelon in Majel
NSP	National Strategic Plan 2020-2030	SIS	Smaller Island States	WASP	Wind Assisted Ship Propulsion
NTC	National Training Council	SLOCAT	Sustainable Low Carbon Transport	WB	World Bank
OECD	Organisation for Economic Co-operation and Development	SPC	The Pacific Community	WFP	World Food Program
OTEC	Ocean Thermal Energy Conversion	SPREP	South Pacific Regional Environment Program	WIG	Wind-in-Ground
PBSP	Pacific Blue Shipping Partnership	SSTRP	Sustainable Sea Transport Research Program	VTOLs	Vehicle Takeoff and Landings

# VISION STATEMENT

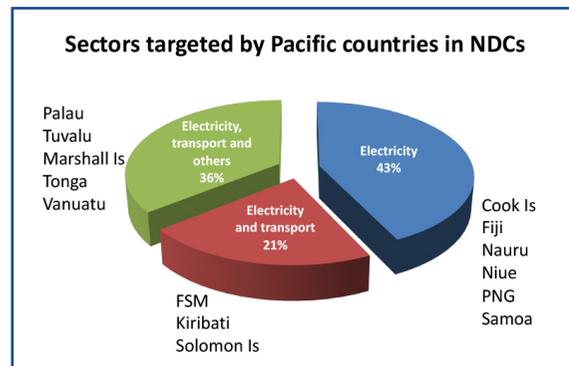
To develop sustainable, appropriate, affordable and accessible transport connectivity for the Marshall Islands, within a decarbonizing world, which can serve as a model for other climate vulnerable states.

## PURPOSE OF FRAMEWORK

The primary purpose of *Rebbelib 2050* is to implement the transport related provisions of the updated 2nd NDC (2020).

In 2013, RMI's target of reducing transport emissions by 16% by 2025 was the first Pacific country commitment. We were working largely in a vacuum of research, policy, data and partnerships.

The 2015 MCST Framework was the first country-owned attempt to set a strategic pathway for the paradigm shift required for full decarbonization by 2050. This will require change at rate and cost greater than ever attempted in our history. It was designed as a national strategy that can provide a catalyst to multi-country transition within the Pacific.



We are still only at the outset. As with any new voyage into uncharted waters, there has been both success and set-backs and we are still adjusting both course and sail-trim. Due to its relevance to the domestic economy, sea transport has the first priority, but the MCST has been built to address all transport sub-sectors and the revised framework sets new priorities beyond shipping.



Transport is a cross-cutting, affects all aspects of society and is essential for connectivity within and between island states. Decarbonizing this sector continues to be insufficiently addressed in both global and national economies. It will be increasingly important in national resilience and adaptation planning. The [IPCC AR6](#) report confirms that the physical survival of RMI and other low-lying island states is dependent on immediate and complete mitigation of GHG emissions globally and the transport sector is increasingly critical. The pressure for RMI to match-step or be left behind in the global transition is increasing.

A coordinated strategic approach to managing the transition across the sector is essential, including government, community and private sector. As transport planning has lagged behind other energy sectors, it is essential that *Rebbelib 2050* integrates carefully with existing policy and frameworks, in particular the National Energy Plan and National Adaptation Plan. This will be coordinated with *Rebbelib 2050* under *Tile Til Eo*, the National Climate Change Committee with oversight of NDC implementation and the long-term climate strategy. Investment in the transition needs to be coordinated through the Climate Change Directorate.

*Rebbelib 2050* provides a revised and updated framework for building upon the work and lessons learnt since 2015. The landscape has developed considerably, the need to address the transport challenge is now widely recognized and multiple new actors have entered the field. Meeting the transport challenge will require ever increasing collaboration and multi-agency approaches.

Our unique island transport scenarios require bespoke solutions. It is not just a case of downscaling international models or templates. Appropriate and affordable transport solutions are increasingly available, and essential for improved economic performance, trade, sustainable development and government service delivery to our island-based communities.

For shipping in particular, many of these will have the greatest benefit at the local level, especially small-scale shipping used by island countries. We have partnered with international research

centers offering assistance with cutting-edge technological development, economic analysis and knowledge exchange. We are well situated to serve as the proving ground for such technologies and continue leading this development for other SIDS and climate vulnerable.



**Transition also provides opportunities**, for new technologies and new career pathways. People will always be our greatest resource and investment in long term in-country capacity development through education and training remains our highest priority.

**Our international work** has proven catalytic to the accelerating change in shipping decarbonization policy. Working with international partners, we are creating new career pathways for Marshallese and Pacific researchers, scientists, lawyers and diplomats.

**A fully sustainable transition is beyond any domestic Pacific economic capacity**, whether state or private sector and lack of appropriate financing mechanisms have always existed for this sector. The cost of maintaining basic essential connectivity services for an atoll nation can only be predicted to increase.

The multi-country **Pacific Blue Shipping Partnership** (PBSP) call for USD500m in blended finance investment is designed as a first step to address this barrier over the next decade.

**Pacific-centric Research and Proof of Concept is essential.** RMI has increasing knowledge and capacity and a number of successful pilots underway, most notably the WAM-led intra-lagoon vessels, the MOTCIT/GIZ wind hybrid ship and the Swire funded Cerulean cargo freighter. Much more is needed. A networked program of country trials is envisioned under PBSP. Research into the next generation of fuels is an emerging new MCST priority.

**The challenge is greater than any one country. RMI works collaboratively with other high ambition Pacific states.**



**We are using our expertise to assist our neighbors** develop their own domestic policy frameworks and programs, in Fiji, Tonga, Tuvalu, Kiribati, Palau and Solomon Islands. PBSP is a multi-country designed program open to all willing states.

**At IMO and UNFCCC, MCST and partners have maintained full support for RMI and Pacific high ambition delegations' negotiations since 2015. RMI has committed to maintaining its strongest possible advocacy with other climate vulnerable voices for an equitable decarbonization transition that truly leaves none behind.**

#### RMI Updated NDC – 30 December 2020

Transportation and mobility are cross-cutting issues central to the sustainable development of RMI and the broader Pacific region. The importance of sustainable transport cannot be overstated. Transport is essential for connectivity for many communities and the most vulnerable, sea transport is the only physical connector, vital for trade and economic development.

As a member of the Pacific Blue Partnership for Shipping, RMI is committed to reducing its emissions from domestic shipping by 40% below 2010 levels by 2030 and full decarbonisation of the sector by 2050 ... RMI also encourages other Pacific countries to adopt this target.

RMI has already developed, with the assistance of MCST, a Framework outlining a whole of country strategy to achieve its transport-wide target of reducing total domestic transport GHG emissions 27% below 2010 levels and transitioning RMI to a low carbon transport future.

# MCST HISTOGRAM 2012 – 2021

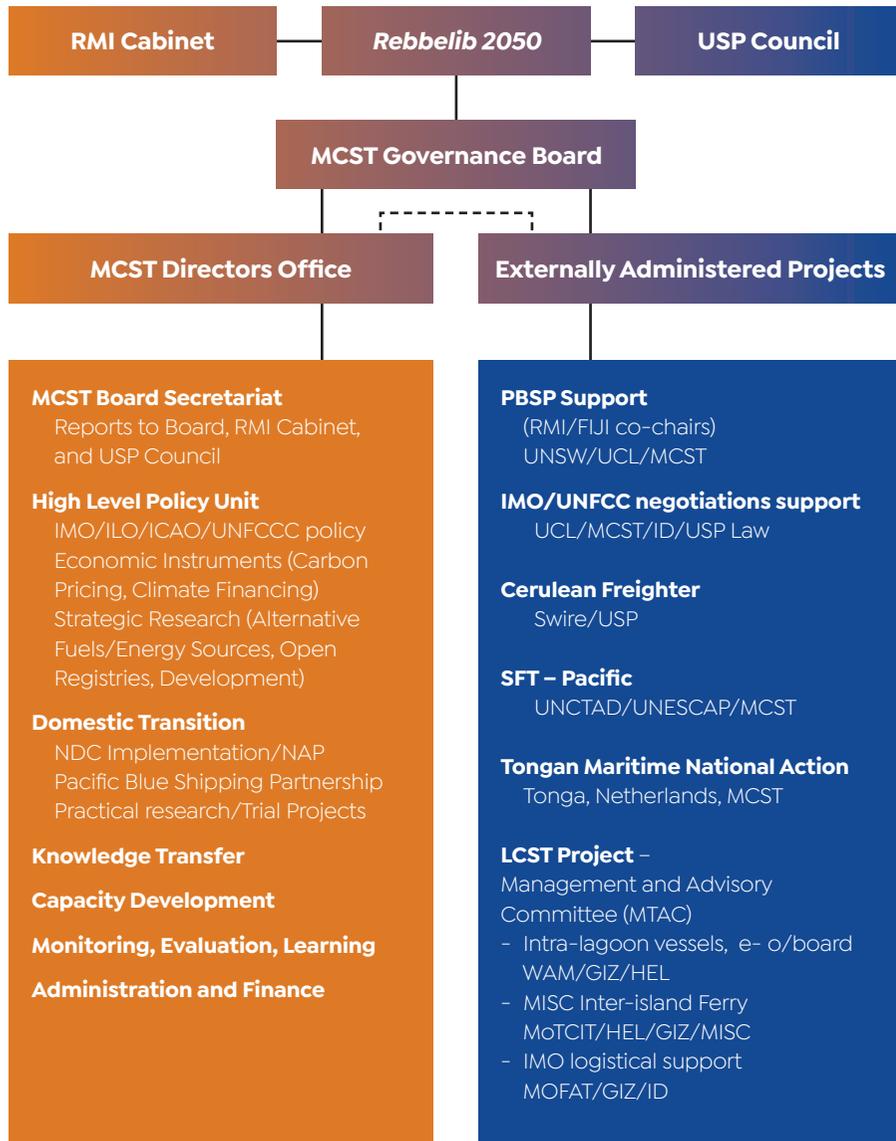
*Rebbelib 2050 is the product of a decade-long Pacific research program. The 2012 Sustainable Sea Transport Talanoa in Suva was the first regional conference to address transport decarbonization in the Pacific since 1984. At that time a vacuum existed, with all regional and international investment focused on renewable electricity generation. RMI has continued to champion this issue since the Majuro Declaration on Climate Leadership, calling for establishment of MCST in 2014 as a unique country-owned Center of Excellence to empower a timetable for transition at country and international level with high quality research and technical support. The MCST Framework was the first National Action Plan for*

*any Small Island State and the first NAP submitted to IMO.*

*In 2012, there was no published research on Pacific transport decarbonization, and it was not a focus of any regional program. Since then, MCST has built a peer-reviewed knowledge portal of resources to underpin Pacific planning and decision making. Transport decarbonization is now a priority focus across our Ocean with increasing government and international actors entering the field. Through our partnerships, MCST continues to drive change with new research in policy, economics and technology.*

2012	<p><b>1<sup>st</sup> Sustainable Sea Transport Talanoa</b></p> <p><b>Majuro Declaration on Climate Leadership</b></p>	<p>USP and Fiji host first Pacific regional conference to address transport decarbonisation since 1984 USP commits to 6-year Sustainable Sea Transport Research Program (SSTRP).</p> <p>Initial research partnerships with UCL, HEL, Manchester Tyndall</p> <p>Pacific Leaders commit to be climate champions 9 Pacific states commit to reducing fossil fuel energy – only RMI sets transport target</p>	2017	<p><b>Framework endorsed SIS COP23</b></p> <p><b>Framework endorsed 3<sup>rd</sup> Regional Ministers Forum</b></p> <p><b>German/RMI LCST project signed</b></p>	<p>The Smaller Island States Leaders endorsed the Framework</p> <p>RMI organize first COP High Level Low Carbon Shipping event. Industry brands RMI as “irresponsible”. Germany announces €9.5m project to support MCST development.</p> <p>Regional Transport Ministers agree to support MCST approach and RMI application to GCF for \$250m multi-country transition program.</p> <p>Germany confirms funding for GIZ administered bilateral project working on intra-atoll and MISC inter-island ship prototype designs.</p>
2013	<p><b>Inaugural PIDF Leaders Summit</b></p> <p><b>2nd Sustainable Sea Transport Talanoa</b></p>	<p>RMI/SOL/FIJ/TUV champion low carbon shipping as core regional priority.</p> <p>150+ regional and international participants RMI calls for a national program of transport decarbonisation – Minister Foreign Affairs requests USP to design a whole country transition program.</p>	2018	<p><b>MCST join WB-led CPLC</b></p> <p><b>MEPC72 IMO Initial Strategy agreed</b></p> <p><b>Fiji LEDS Maritime</b></p>	<p>MCST facilitate the Maritime chapter of Fiji’s Low Emission Development Strategy</p> <p>IMO agree an initial Strategy (2018-2023). Pacific compromises on at least 50% overall emissions reduction target by 2050.</p> <p>MCST facilitate the Maritime chapter of Fiji’s Low Emission Development Strategy</p>
2014	<p><b>Sea Transport - Regional Research and Education Strategy</b></p> <p><b>UN SIDS – S.A.M.O.A. Pathway</b></p>	<p>USP Council endorse RRES</p> <p>Sustainable transport recognized for first time as a regional priority by UN</p> <p>UNCTAD commissions USP to develop interactive knowledge portal for SIDS shipping decarbonisation.</p>	2019	<p><b>Project Cerulean - Swire/USP</b></p> <p><b>MCST joins Global Maritime Forum</b></p> <p><b>RMI/Fiji announce Pacific Blue Shipping Partnership</b></p>	<p>RMI/Fiji/USP hosted. Call for development of the Pacific Blue Ship Partnership. Results in Laucala Declaration on Sustainable Transport</p> <p>A first Public Private Partnership with Swire Shipping to design a Wind hybrid freighter for outer island routes RMI-Fiji</p> <p>First SIDS knowledge partner to the Global Maritime Forum and the Getting to Zero Coalition – committed to zero emissions vessel being commercially demonstrated by 2030</p> <p>Country led call for \$500m blended finance investment in 6-8 country domestic shipping transition.</p>
2015	<p><b>MCST Framework endorsed RMI</b></p> <p><b>RMI submission to MEPC 68</b></p> <p><b>Framework endorsed MPS</b></p> <p><b>Suva Declaration on Climate Change</b></p> <p><b>Paris Agreement</b></p>	<p>MCST Framework National Consultation. Cabinet endorse as government transport decarbonisation policy.</p> <p>De Brum leads Pacific diplomatic mission to IMO calling for 1.5 shipping emission target</p> <p>15<sup>th</sup> Micronesian Presidents Summit endorses MCST Framework</p> <p>PIDF leaders include shipping decarbonisation as regional priority</p> <p>HAC leads call for 1.5<sup>th</sup> target. International shipping remains with IMO. NDCs become primary tool. RMI only SIDS to set transport target of 27% by 2030.</p>	2020	<p><b>MEPC 74/MEPC75</b></p> <p><b>Transport priority pipelines FIJ, KIR, TUV</b></p> <p><b>RMI 2<sup>nd</sup> updated NDC target.</b></p> <p><b>Tonga/Holland support project</b></p>	<p>EC fund MCST ongoing backstopping of Pacific high ambition delegations. Pacific presses for increased ambition and SIDS participation, recognition of Pacific issues in impact assessments.</p> <p>MCST design transport pipeline priority projects for Fiji, Kiribati, Tuvalu under PBSP</p> <p>RMI confirm enhanced shipping emissions targets of 40% by 2030 and 100% by 2050 and nominate MCST Framework as the national strategy for transport decarbonisation implementation</p> <p>MCST facilitate Netherlands support to Tonga to prepare National Maritime Reduction Strategy</p>
2016	<p><b>USP Council endorses Framework</b></p> <p><b>MEPC 70 - IMO Emissions Reduction Roadmap</b></p> <p><b>Framework endorsed by CANCC</b></p>	<p>USP Council (12 PIC Education Ministers)</p> <p>IMO commits to 2-stage process. MCST/PIDF establishes Shipping High Ambition Coalition (SHAC) as a talanoa space for high ambition states (RMI, SOL, FIJ, TUV, TON, KIR, EUR, UK, US, NZ, MEX, CAN)</p> <p>Coalition of Atoll Nations endorse MCST Framework</p>	2021	<p><b>MEPC76 GHG levy proposal</b></p> <p><b>COP26</b></p> <p><b>MEPC77 resolution 100%&gt;2050</b></p>	<p>RMI/SOL sponsor proposal for a universal mandatory GHG levy on shipping, with revenue of \$1.1-2.6 trillion (World Bank estimates).</p> <p>RMI, FIJ, PAL sign Clydebank Declaration. CVF, AOSIS, HAC declarations echo RMI call for IMO ambition. US, DEN, RMI sponsor Declaration on Zero Emission Shipping by 2050</p> <p>RMI/SOL sponsor proposal for IMO resolution on increasing overall reduction target to 100% by no later than 2050.</p> <p>RMI cabinet direct a review of the MCST Framework</p>
2017	<p><b>RMI request German support MCST</b></p> <p><b>MEPC71 /GHG-ISWG1 and ISWG2 inconclusive</b></p> <p><b>MCST facilitates bi-lateral support to RMI, Fiji, Tonga and Solomon Islands</b></p>	<p>MCST design Low Carbon Sea Transport project with MoFA, HEL, GIZ</p> <p>SHAC increases in membership, presses for increased ambition at IMO. Ensures 1.5 remains on the table. MCST continue to provide full logistical, technical support for 6 Pacific MS (with funding from USP, EC, MFAT, UKHC, UCL, ECF, CSC, UKMoT).</p> <p>MCST facilitates bilateral partnerships: Germany-RMI, Netherlands-Tonga, Belgium-Solomon Is, France-Fiji for IMO delegation and domestic transition planning.</p>	2022	<p><b>Rebbelib 2050: A Catalyst for Change</b></p>	

# MCST STRUCTURE



# MCST GOVERNANCE BOARD (2021)

(appointed by Cabinet)

## CHAIR

Hon Kitlang Kabua  
*Minister Education, Sports & Training*



## VICE CHAIR

Prof. Pal Ahluwalia  
*V. Chancellor/President USP*



Hon. Donald Capelle  
*Minister Transport, Communication & IT*



Dr. Brad Carte  
*Acting Director MCST  
Director USP-MI*



Mr. Clarence Samuel  
*Director, Climate Change Directorate*



Dr. Irene Taafaki  
*President - College of the Marshall Islands*



Mr. Alson Kelen  
*Director  
Waan Aelōñ in Majel*



Cpt. Prof. M. Vahs  
*Hochschule Emden-Leer*



Attorney General  
*(tbc)*



Dr. Tristan Smith  
*A. Professor UCL  
Director UMAS*



Mr. Jerry Kramer  
*Private Sector Representative*



Dr. Ben Milligan  
*Scientia Fellow  
UNSW*



H.E. Albon Ishoda  
*Ambassador, Advisor to the Board*



Prof. Sushil Kumar  
*Director of Research and Innovation, USP*



Dr Peter Nuttall  
*Scientific & Technical Advisor*



Mr Domonik Borowski  
*GIZ Director - LCST  
(Advisor to Board on LCST project)*



## WHY DO WE NEED REBBELIB 2050?



Pacific Leaders have consistently identified two critical barriers to sustainable development:

### **i. Climate Crisis**

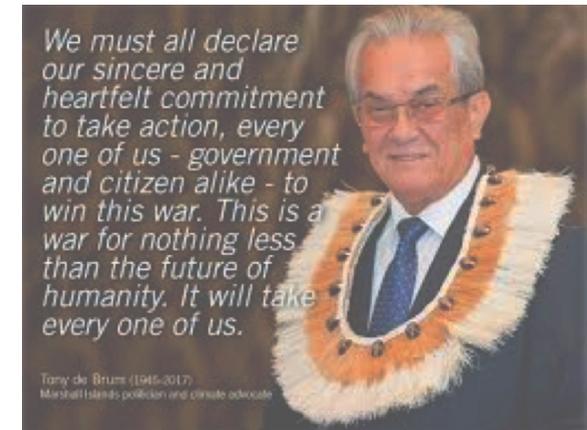
Already amongst the most threatened states by natural disasters, Pacific Island countries are the most vulnerable to the increasing effects of anthropogenically caused climate crisis with atoll nations most exposed to existential threat. The [2013 Majuro Declaration](#), the [2015 Suva Declaration on Climate Change](#), the [2015 Paris Agreement](#), the [2018 Laucala Declaration](#), the [2018 Boe Declaration](#)

[on Regional Security](#) and the [2019 Kainaki II Declaration](#) have called on all parties to do all they can to mitigate climate change.

Pacific Island countries' contributions to climate change are negligible and yet likely will be the first and hardest hit. Successive [IPCC reports](#) confirm that exceeding 1.5°C of global warming now threatens future survival of many Micronesian communities.

A 1.5 °C agenda assumes:

- Rapid decarbonization of the global economy must start now. 2020 has passed, and emissions continue to rise. All sectors, including transport, should already have peaked and have firm pathways to agreed targets. If these pathways cannot be established on accelerated implementation trajectories, it will require greater and increasing expense in the imminent future.
- For the transport sector this must include international and national fuel reserves and energy resources, assuming a principle that all sectors must contribute their “fair share”. If some sectors do not fully contribute, the excess would need to be taken up by greater contributions from other sectors.
- Transition must be equitable and available to all. We must leave no state behind. RMI and other climate vulnerable states need to be adequately resourced to achieve this.



## ii. Imported fossil-fuel dependency

RMI, like its neighbors, is almost completely reliant on imported fuel, constituting the most fuel dependent region in the world. The micro-scale of the region in terms of population, economies, landmass, length of transportation routes and distance from markets makes Pacific fuel and transport costs the highest in the world.

We have the lowest score of any region in [UNCTAD's connectivity index](#). Transport is a major fuel user for Pacific countries. Such dependency is crippling for national economies and a major barrier to all socio-economic development and adaptation strategies.

**Transition to low/zero carbon transport is an opportunity that must be taken now.**

**The transition to a fully decarbonized transport future is a critical step in addressing both these agendas.** To fail in this guarantees ongoing and increasing dependency and cost, especially as carbon-based technologies become increasingly penalized. The unique characteristics and challenges of the Pacific transport scenario means appropriate Pacific solutions need to be developed locally. If addressed proactively, the decarbonization transition can provide long-term solutions to transportation issues for Pacific countries and communities by providing options that are cleaner, more affordable, appropriate and accessible to our communities.

**The importance of sustainable transport for Pacific countries cannot be understated.**

Inversely to the continental world, shipping



followed by aviation are higher priorities for us than land transport. Shipping moves the vast majority of Pacific goods. It is essential for connectivity.

For many communities and for the most vulnerable, sea transport is the only physical connector. In the wake of the COVID-19 pandemic and the severe restrictions on aviation, the critical role of maritime activities for trade and economic development have become even more apparent, and the level of service provided has transformative impacts upon virtually every sustainability and adaptation initiative.

Land transport activities are fast growing, especially in expanding urban areas, reflecting increased private motor vehicle ownership and

commercial vehicle use. A public expectation exists for ever increasing availability and higher standards of transport service across all sectors.

**Even in times of relatively low fuel costs, the Pacific faces unique transport challenges.**

Pacific Island Countries must decarbonize and ensure they are not left behind. Long routes, small economies with limited diversity, imbalance in inward and outward loadings, financing/insurance barriers, high risks, and high infrastructure costs means Pacific countries have struggled to find long-term, sustainable, and cost-viable solutions for transport. Sea and air transport underpin all economic opportunities. Domestic connectivity is the most critical sector to address; many routes are unviable and uneconomical.

**Ever increasing policy, regulatory and technical complexity places increasing and unrealistic strains on Pacific capacities and resources to operate and administer the sector.** Climate change will magnify these barriers and costs to governments, industry and communities. All aspects of the transport sector are highly vulnerable to climate change effects and natural disasters.

**Addressing transition to a fully decarbonized future requires a range of solutions.** All stakeholders across government, industry and civil society must be engaged. Policy, economic analysis, technology, climate proofing of existing and future assets, training and education aspects are all important.



**Rebbelib 2050 must be backed by a strong, integrated support program** of dedicated research, technical assistance, capacity development, economic analysis and tool development, and knowledge exchange both within and across sectors involved in transport activities. Robust data acquisition, management, and analysis is an essential building block for well-structured and considered planning.

**Achieving a transition to a decarbonized transport sector will require an integrated program.** There is no 'one size fits all' solution. While technological advances for vessels, vehicles, and aircraft – and their associated fuels – is of critical importance, technical solutions cannot be effected in isolation, and this is being increasingly highlighted in all research of this sector. Advancing technologies, whether for assets, fuel, or infrastructure, is insufficient unless the policy and economic context is provided to allow private sector or PPP uptake of these technologies.

**The targets set in the NDC for transport decarbonization are the most ambitious for any climate vulnerable state.** They will require an investment of finance and political priority far greater than any invested in the sector previously. They demand collaboration with neighbors and partners. However, the alternative to taking this action is to continue an ever-increasing financial penalty for our fossil fuel dependency while continuing to be reliant on technologies the rest of the world is quickly moving away from. As global carbon pricing increases, BAU options will only become ever more expensive.



**For a transition to decarbonized transport to occur at any significant scale, multiple priorities must be met.** The scale of change needed is unprecedented. Priorities include introduction of renewable energy technologies, operational and technological energy efficiency initiatives, fuel substitution, and market-based measures and incentives, all of which need to be driven by trade facilitation with partners at an intergovernmental and private investment level.

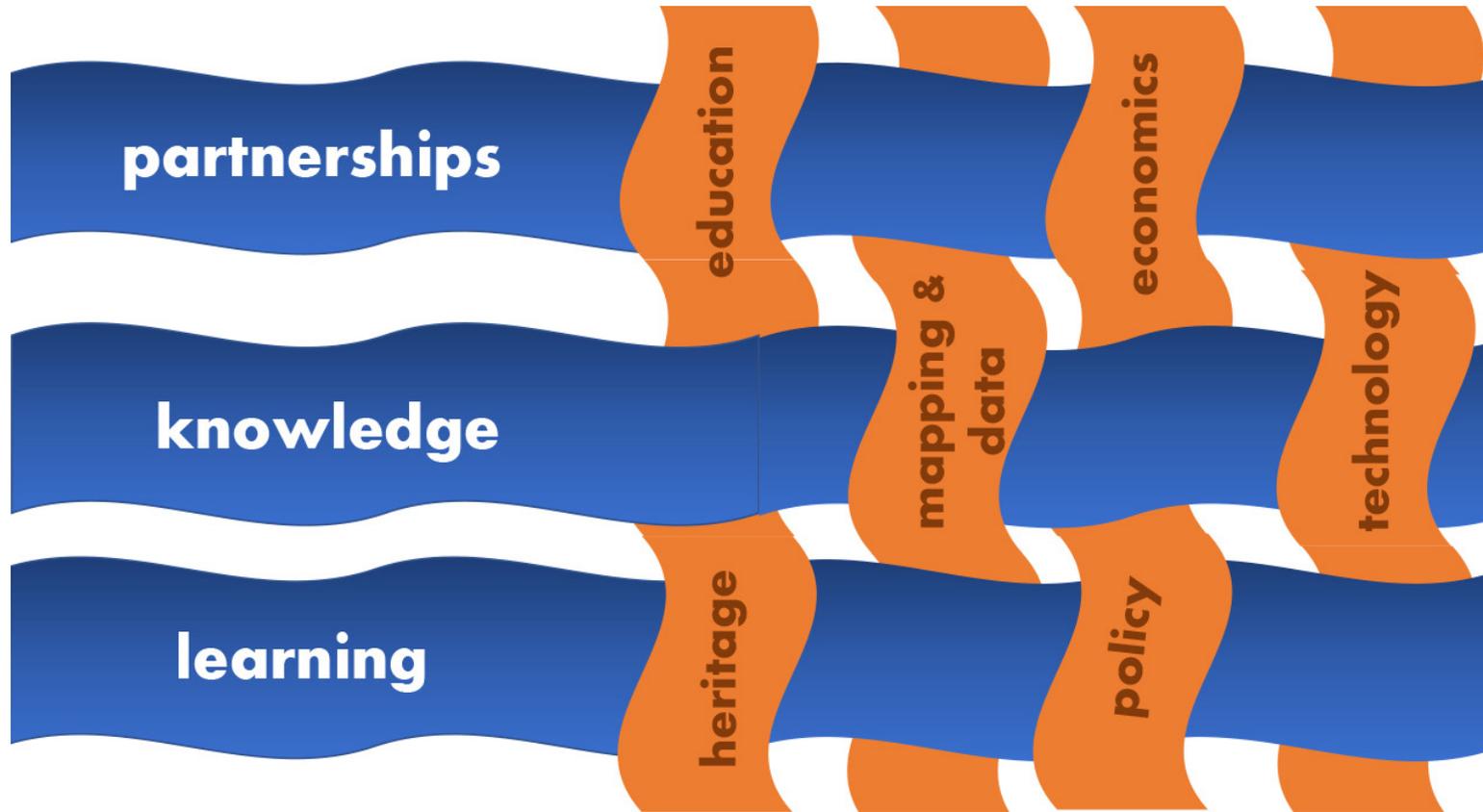
The need for establishing stable supply chains for next-generation decarbonization technology and the recurring training required to provide service for this technology cannot be ignored.

All must be underpinned by strong economic analysis appropriate to Marshallese (and broader Pacific) scenarios and not simply extrapolated from the global discourse. Investment in research and development and capacity enabling across the sector must be supported through both domestic policy and financing decisions, and through international resourcing arrangements.

**Rebbelib 2050** is organized in nine work streams:

- 1 **Partnerships**
- 2 **Education and Training**
- 3 **Mapping and Data**
- 4 **Heritage & History**
- 5 **Economic Analysis**
- 6 **Policy Review & Development**
- 7 **Technology**
- 8 **Knowledge Transfer**
- 9 **Monitoring, Evaluation & Learning**

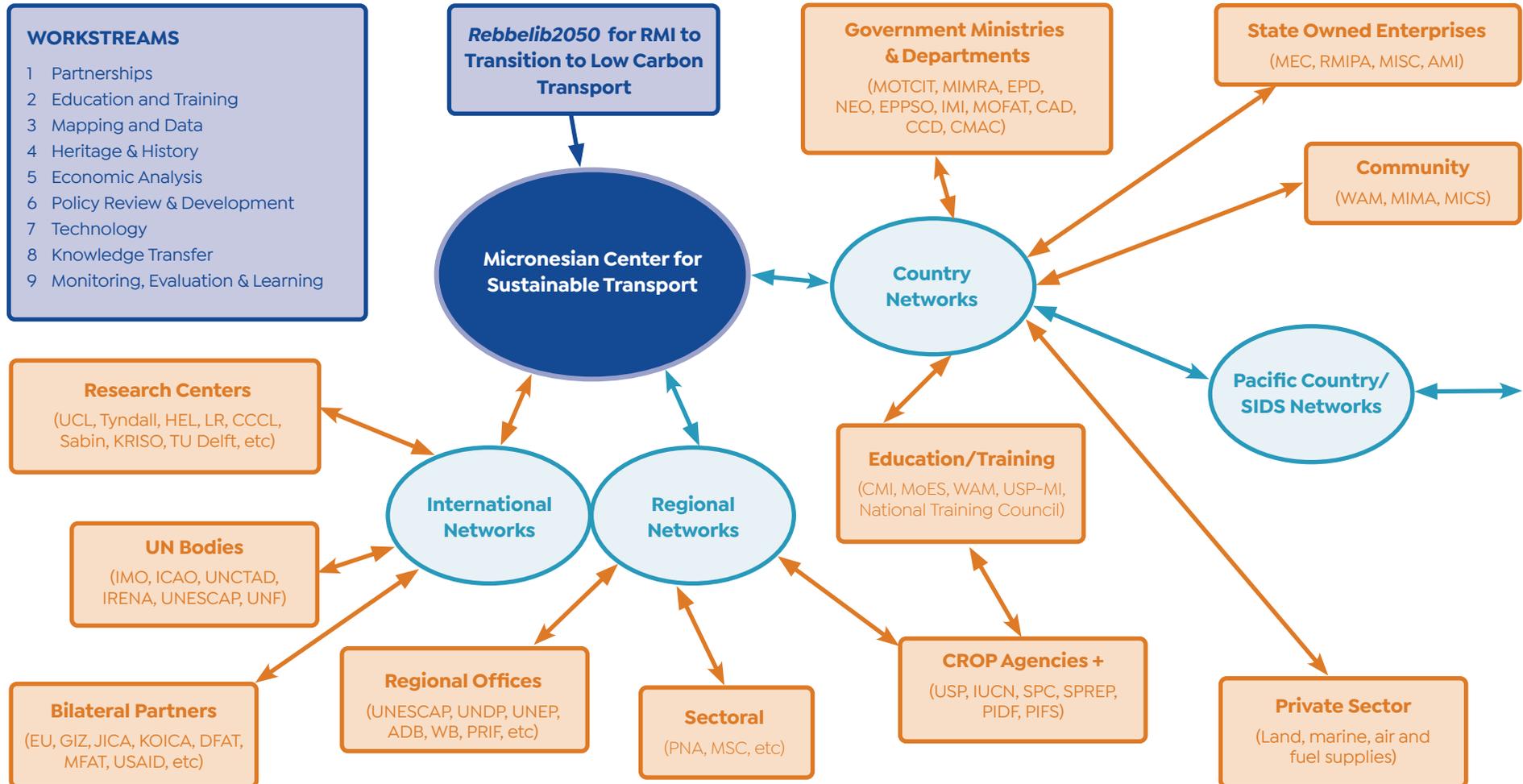
# Rebbelib 2050: workstreams



# WORK STREAM 1: PARTNERSHIPS

For a whole-of-country decarbonization transition strategy to be successful, it requires engagement and participation of all stakeholders. The objective is a collaborative national Rebbelib (navigation chart) supported by regional and international actors.

MCST is a hub and coordinating body for a national program that brings together government, industry and civil society supported by regional and international actors. MCST will continue to build quality long-term partnerships with all willing participants who can assist in achieving RMI's national targets.



## WORK STREAM 2: EDUCATION AND TRAINING

**Human capital is our greatest resource.** This is recognized by the Rebbelib through the priority of boosting the current in-country capacity and building long-term ability of future transport planners, operators and decision-makers in government and industry at all levels to meet domestic needs. Wherever possible, MCST seeks to build upon, and collaborate with, existing education and training initiatives by supporting training providers, such as CMI, USP-MI, and WAM, and dovetailing with existing initiatives for up-skilling across the renewable energy training sector.

Achieving a transition to a fully decarbonized future requires more than presenting technological 'fixes.' Ensuring the sector has the appropriate skills and training base across the spectrum needed, ranging from ships' crews to taxi mechanics, fleet managers to port operators, and policy writers to international negotiators, is critical to success.

**The capacity embedded over the past few years in IMO-facing work demonstrates what a small group of people can accomplish** when mobilized and provided experience to assert national-level positions with confidence. The research needed to underpin a transition requires a strong base across various disciplines including economics and statistical analysis, policy development, technology and engineering, transport logistics, etc. In some cases, this will require modification and adaptation of existing courses and qualifications, in other cases completely new skill sets and concepts.

**Given the country's small population base, close coordination between education and training providers and the Ministry of Education** to maximize synergies with existing programs has proven essential.

It is also essential the development and funding priorities under the purview of other ministries both emphasize and align with the educational institutions supported by MCST. Joint research and teaching projects and programs with international Centers and universities are a primary means of providing knowledge transfer and up-skilling, through provision of both short-term training courses and longer term post-graduate and staff exchange programs, which must be developed further to enable Marshallese careers in decarbonizing the economy.

In collaboration with national and international partners MCST will:

- Support the training and education requirements for government, industry, and communities to successfully transition to a decarbonized economy. This includes present and future projects serving national priorities.
- Coordinate with existing education and training providers to ensure appropriate and adequate education and training capacity is available to support a low carbon transition, and to work with these providers to meet identified gaps in capacity, including developing linkages with international supporting partners to develop education and training solutions.

- Prioritize building in-country capacity of local people to own and manage local solutions, inclusive of establishing mechanisms to encourage repatriation of Marshallese professionals to support the decarbonization agenda.
- Ensure adequate and appropriate training and education is built into all aspects of research and project development by the Center.

The development of short-term training courses and long-term research projects in partnership with leading international research centers must prioritize involvement of Marshallese students directly.

Postgraduate exchange is a critical component for building long-term in-country capacity across the policy spectrum. Enrolment and preparation for the range of employment opportunities required to shift the paradigm in the period between now, 2030 and 2050 should be emphasized through educational and employment policies and initiatives.

### Priority Actions:

1. Provide stocktake of training in-country for operations, support, and regulation of each transport sub-sector.
  - a. Consolidate information on current and future education and training needs.
  - b. Identify what gaps exist in training opportunities domestically.
  - c. Develop programs to eliminate these gaps.
2. Strengthen linkages with international partners.
  - a. Establish pipeline for Marshallese students to pursue graduate-level work with partner academic institutions.
  - b. Enlist students from partner institutions to dedicate graduate-level research towards meeting RMI's transport mapping needs.
3. Build capacity of existing education and training providers. Support recruitment and repatriation of qualified Marshallese to strengthen national capacity.
4. Consider education and training in all Rebbelib 2050 workstreams. Integrate local capacity strengthening into other priority actions.

## WORK STREAM 3: MAPPING AND DATA

**Quality data is required**, both to plan and monitor RMI's domestic transport transition and to inform and support RMI's international negotiations in various development and climate crisis fora. Mapping the national transition requires:

- **Understanding the current transport use** and projected need through data collection and analysis;
- *Jepilpilin ke ejukaan* (accomplishment through joint effort) - building a coordinated in-country network of all relevant actors;
- **Coordination with international partners** poised to support the transition through knowledge transfer, targeted research, training and appropriate resourcing;
- **Understanding the technology, policy, and financing options** available to the Marshall Islands and internationally.

Data collection and analysis is an ongoing process and requires ongoing maintenance and dedicated capacity. It needs to be accessible across all national planning processes. The first step is to know what is:

- **The in-country capacity** needed to collect, analyze and maintain RMI's transport data
- **Current transport cost**, supply, need and demand (all sub-sectors/all users)
- **The current carbon footprint** of each transport sector and sub-sectors the projected change over time (focusing on 2030 and 2050 decarbonization targets)

- **The relationship between national transport data and other relevant databases** such as trade and import/export statistics, fuel and carbon pricing, international connectivity indexes, census data, etc.

**There is a range of data available nationally** from various sources and emerging from the various proof of concept trials that needs to be centrally collated. Data collection at the national level for the maritime transport sub-sector has been prioritized to feed into development of the Pacific Blue Shipping Partnership. Similar databases will need to be adopted for land and aviation.

Internationally we work with UNCTAD and UNESCAP to improve access to and quality of data for international transport and trade. This includes Pacific national case studies under the Sustainable Freight Transport program and the UNCTAD connectivity Index. A specialist area of data is understanding the GHG footprint of RMI's maritime open registry.

**Completion of the Marshall Islands Electricity Roadmap** in 2018 marked a significant achievement for the nation in planning its decarbonization pathway. *Rebbelib2050* will build upon the lessons learned from this process to create a complementary implementation strategy in the Transport Roadmap it is tasked with developing in order to respond to national needs as communicated by the national stakeholders to be actively involved in, or impacted by, its implementation.

RMI has also received additional support to improve its domestic capacity to manage [Monitoring, Reporting, and Verification](#) of GHG emissions that now needs to be embedded in *Rebbelib 2050*.

### Priority Actions:

1. Support collection of baseline data and historic data sets across each transport sub-sector. Identify, collect, manage, and analyze data already collected by statutory authorities for maritime, land, and aviation activities.
2. Identify remaining data gaps, preparing and executing methodologies and processes to manage gaps in response.
3. Coordinate current GIS efforts in-country to integrate data collection and storage efforts.
  - a. Strengthen local capacity to collect, manage and analyze this data.
  - b. Coordinate with stakeholders in RMI to consolidate GIS data reflecting any information with sub-sectoral relevance since 2010.
  - c. Manage and update GIS/information database over time.
4. Prepare training program to meet identified remaining capacity gaps.
5. Share and archive all data collected and associated research outputs on MCST's Knowledge Portal.

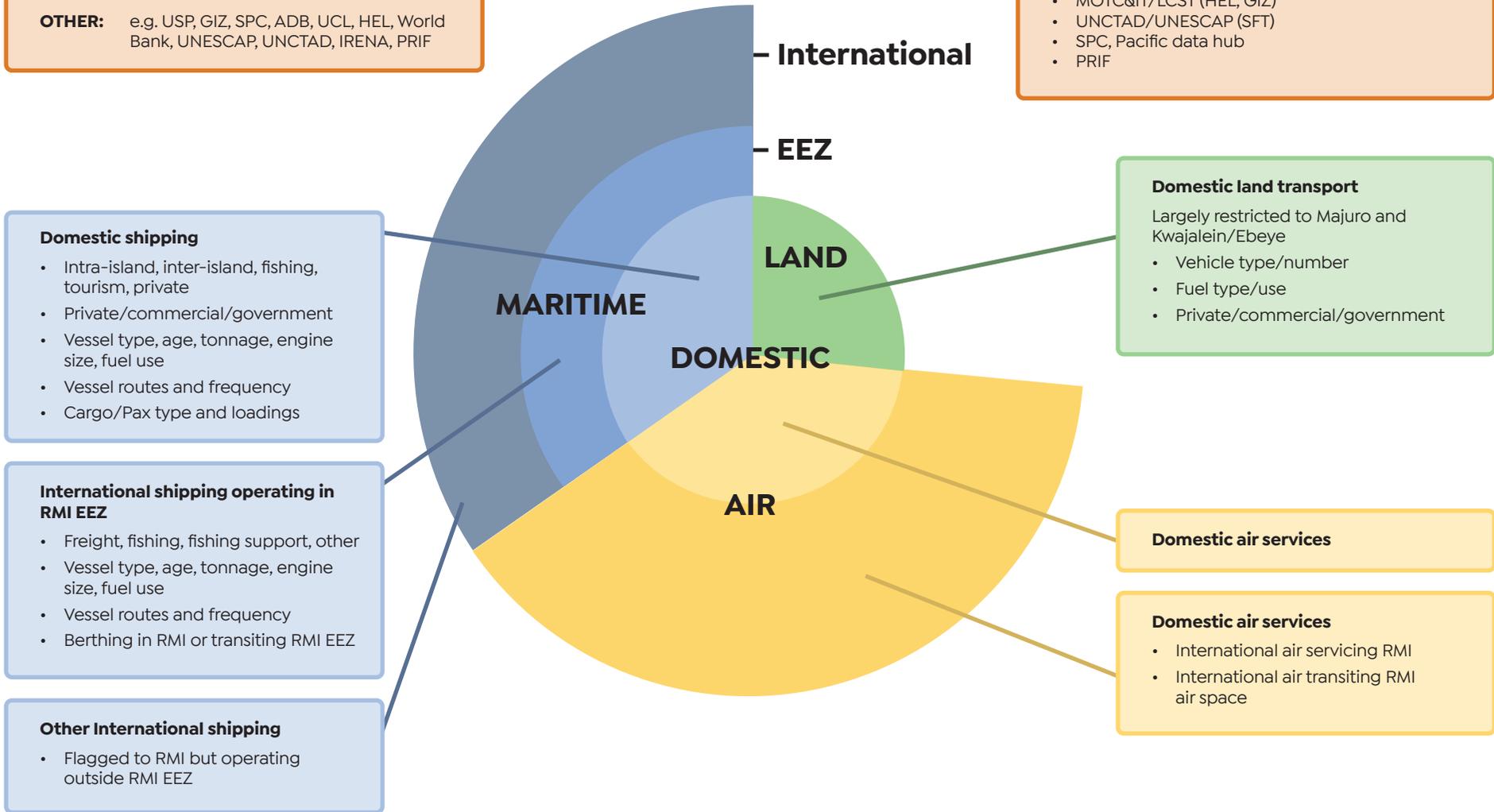
**KEY ACTORS**

**RMI:** e.g. USP-MI, RMIPA, Fuel Companies, MEC, CCD, EPPSO, MOTCIT, CAD, NEO, AMI, MISC

**OTHER:** e.g. USP, GIZ, SPC, ADB, UCL, HEL, World Bank, UNESCAP, UNCTAD, IRENA, PRIF

**EXISTING DATA COLLECTION INITIATIVES**

- National Data (e.g. Energy, Census, Reimaanlok socio-economic survey, NDC)
- World Bank/PBSP (USP, UNSW, UCL)
- MOTC&IT/LCST (HEL, GIZ)
- UNCTAD/UNESCAP (SFT)
- SPC, Pacific data hub
- PRIF

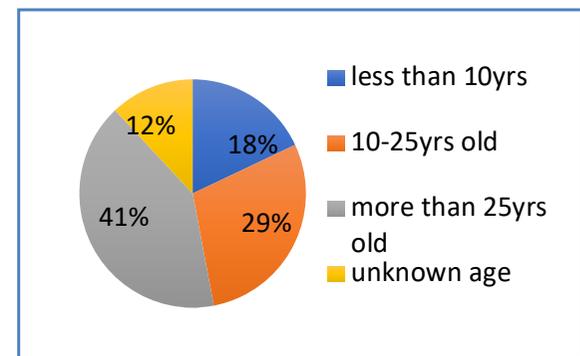
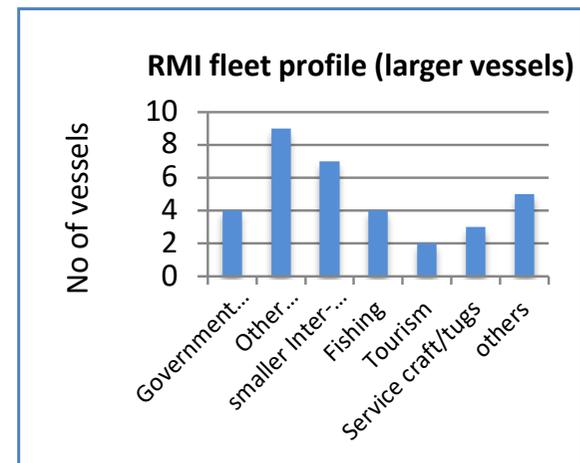


## Country Statistics

Marshall Islands	Population	Land area (km <sup>2</sup> )	Sea area (km <sup>2</sup> )	Islands/atolls #	Inhabited #	Boats #	GDP USD (million)	GDP/Capita USD
	55,000	181	2,131,000	29 atolls & 5 islands	24	Total: 34 >15m: 25 <15m: 1,100+ (582 outboard)	200	3,800

Name	Owner/Operator	Vessel Type	Main use in FY2017	Year Built	Gross Tonnage	LOA (m)	Number of engines each at Rated Power (kW)	Rated RPM	Service Speed (kts)	Consumption at Service Speed (l/h)	Main Engines/Comments	
<b>MISC Ships</b>												
mv Kwajalein	MISC	Landing Craft	Field trips	2013	583	45.6	1	478	1500	9.6	95	Yanmar 6RY17W
mv Majuro	MISC	Cargo/ Pax	Charters	2013	416	40.4	2	478	1500	9.5	144	Yanmar 6RY17W
mv Aemman	MISC	Cargo/ Pax	Field trips	2004	409	45.0	1	441	900	8.5	96	Yanmar 6N18A-DV
mv Ribuk Ae	MISC	Cargo/ Pax	Field trips	1996	175	33.5	2	317	1800	8.5	46	Cummins KT19-M
<b>Other Commercial Trading Ships</b>												
LCT Resslerinn	Ms. Resslerinn Latak	Landing Craft	Fuel & Cargo	2007	450	36.5		333		7	95	Cummins NT855 8cyl
mv Lady E	E.U.L.G.	Cargo/ Pax		1966	698	50.3	2	888		9		Caterpillar 2-D398 12 cyl
mv Tobolar	TCPA			1980	315	32.4						One trip only in FY2017
mv Mata	Kaitol Reimers	Cargo/ Pax	Cargo & Pax	1976	60	19.5	2	333		8.5		Detroit 671 V1271
Melissa K	Pil	Cargo/ Pax	Cargo & Pax	1992	36	16.2		238		8	44	Caterpillar
LC Jerbal	Pil	Landing Craft	Cargo & Pax; projects	1969	108	22.6	2	622		8	61	12v71 Detroit
LC Michelle K	Pil		Cargo & Pax; projects	1994		61.6	2	400		8	113	Caterpillar Cat D3412
mv Jejnica	Takao Domnick	Fishing/ Cargo		1980	34	17.1						
LCM Chase D	Takao Domnick	Landing Craft		2012	240	28.0						
<b>Small Inter-Atoll Ships</b>												
mv Kuban	Pil	Cargo/ Ferry	Cargo & Pax	2000	5	12.2		260		8	24	Cummins 1/6 inline
mv Lele	Pil	Cargo/ Pax	Charters- Cargo & Pax	1999	7	15.2		260		9	27	Yanmar
Four X	RRE		Cargo & Pax	1972		11.8		407		14.5	55	John Deere inline
lju in Rak	Mayor Joel Jitiam		Cargo & Pax			14.6		370		10.5	30	GM Detroit 8cyl inline
LC Christina	Robert Pinho	Mini landing craft	Cargo & Pax			9.8	2	111		13		Outboard Yamaha 4
Miko	Mayor Bernard ChongGum		Cargo & Pax			9.8	2	111		17		Outboard Yamaha 4
Tobwe Mili	Kilang Jitiam	LGC boat; cargo & pax				10.7		185		16		Yamaha; only 1 trip in 2017
<b>Fishing Support</b>												
FV Timur	MIMRA	Fishing/ Cargo	Servicing Fish bases	2010	12	13.9		266		14	45	
FV Jebro	MIMRA	Fishing/ Cargo	Servicing Fish bases	2010	12	13.9	1	265		14	45	Sister of Timur
FV Laintok	MIMRA	Fishing/ Cargo		1999	14	16.0						Based in Ebeye
FV Lentanur	MIMRA	Fishing/ Cargo		1999	14	16.6						Based in Ebeye
<b>Tourism</b>												
mv Indies Traders	RRE	Diving/ Survey	Tourism	1978	95	21.3		148		8		
mv Windward	RRE	Diving/ Survey	Tourism; Cargo	1992	202	23.0		222		8		Cummins; Diving Chamber
<b>Service craft/ Tugs</b>												
Tarlan 04	KALGOVT	Search & Rescue		2015	9	16.6						
MT Ratak II	Pil	TugBoat		1971	282	33.2						
MT Ralik II	Pil	TugBoat		1970	334	33.2						

(Detailed voyage data sets including fuel and emission accounting are also available for most vessel types).



Commercial vessel by type and age (excluding small craft).

## WORK STREAM 4: HERITAGE & HISTORY

**Transport is Micronesia's greatest heritage legacy.** Since their exploration and settlement of the Pacific over the course of millennia, Micronesians excelled in developing and refining sustainable, cutting-edge transport solutions tailored to their unique ocean environment and from a highly limited resource base. The ocean was a bridge, a conduit to connectivity – not a barrier, as it is so often viewed today. The canoe was linked to the divine – a gift from those figures within Marshallese myth who held a discreet and powerful form of knowledge to be stewarded with caution and care.



**Micronesians have long displayed excellence in technological innovation** and operational practice, developing vessel designs, effective and efficient navigation systems, and systems of knowledge transfer and training that were the most advanced in the world.

Transport solutions were largely sustainable, though the value of the labor and material required for constructing canoes was recognized

and prized. Despite the resources dedicated to each canoe, their construction and operation remained entirely free of carbon emissions, exploiting extensive knowledge of available renewable energy sources. Sea transport was one of the highest priorities and greatest pre-occupations of traditional leaders and societies and enabled a nuanced social and ecological system to develop across far flung islands and their various unique features and natural resources.

**Much traditional maritime knowledge has been lost** throughout the Pacific and Micronesia is one of the last reservoirs. In RMI, [Waan Aelōñ in Majel](#) (WAM) has successfully led a strong program targeted at retention of such knowledge, celebration of its success and revitalization of crucially important heritage icons.

**There are many lessons to be learned from the past** as we seek innovative solutions for the future. The role of heritage and culture is central to this work program. Valorization of this heritage prowess is a key vector for assisting in a paradigm shift to decarbonization and renewable energy use among transport users and operators alike.

**WAM's motto is *Wa Kuk Wa Jimor – Canoes Bring People Together*.** Its heritage program and its strong track record with youth training and education has been greatly expanded under the LCST project and expansion to commercial trials for locally produced intra- atoll transport solutions.

It is also essential that RMI's more recent transport history is recorded and understood. The written record since contact with European and Japanese

cultures is largely based upon external actors documenting recounted stories from oral tradition. This includes periods when the local shipping fleet was often small-scale, locally owned and operated, consisting of sail-assisted vessels.

MCST works closely with other Pacific heritage researchers and networks across the Ocean and in related universities and will continue to provide monitoring, research and knowledge support to the growing renaissance and revitalization of Pacific seafaring and naval architecture knowledge.

### Priority Actions:

1. Support ongoing empowerment of WAM program on traditional voyaging, vessel construction, and navigation and its extension to all Marshallese youth.
2. Continue to develop MCST's online database of heritage and history resources.
3. Develop opportunities for those matriculating from the WAM program to transfer their skills to other PICs and embed them in other programs/institutions.
4. Continue to build and strengthen our networks with other researchers and practitioners across the Ocean and support high quality research and empowerment programs for all aspects of revitalizing voyaging and canoe culture.
5. Collect, document, and record oral history resources of RMI shipping and trade over the past 100 years and support strengthening the national archives to preserve RMI's historical record of RMI shipping.
6. Embed seafaring and voyaging heritage at all levels of the education curriculum.

## WORK STREAM 5: ECONOMIC ANALYSIS

**Pacific island states have the highest per capita transport costs globally.** Pacific-centric transport economics have been poorly studied and understood. The transition to decarbonized transport is primarily an economic, not a technological, challenge. It will require significant external investment to achieve. MCST, with our research partners, will continue to develop our capacity to deliver high-quality economic analysis and research tools to RMI and other climate vulnerable states.

**Transport costs and availability of services are linked to social and economic activity.** It is important stakeholders understand the interface between transport, trade, and ramifications on all aspects of Marshallese well-being, resilience, and development. Access to adequate and appropriate financing is the primary barrier to establishing and maintaining transport connectivity. Climate financing provides a unique opportunity to resource climate vulnerable states to transition their domestic transport systems away from fossil fuel dependency. RMI is leading, with other high ambition Pacific states, development of market-based measures at IMO and negotiations on the use of the significant revenues which may be generated.

**Even in times of cheap and plentiful fossil fuel supplies, most Marshallese transport services are marginal commercial ventures,** often economically unviable without subsidization.

The post-COVID supply chain volatility and introduction of carbon pricing underscores RMI's vulnerability to fuel costs and highlights RMI's

critical dependency on shipping connectivity, especially as almost all air transport ceased.

**Government and communities subsidize transport services directly or indirectly** in order to maintain connectivity for basic social, political, and economic needs. The increasing effects of the climate crisis will inevitably result in increased costs for maintaining all transport infrastructure and assets, with outer island populations being the most vulnerable. Strong economic analysis is essential for RMI in decision-making and prioritizing future transport investment.

**There is very limited transport economic expertise available** at national or regional level. We continue to work with partners to close the large gaps identified in the region's collective understanding of the role of transport in Pacific Island economies. MCST and partners are providing the design support for the IMO GHG levy on international shipping proposed by RMI and Solomon Islands, and is heavily involved with leading research on carbon pricing. This measure, the most ambitious for any sector globally, has strong potential to generate significant revenues for national adaptation and mitigation processes in climate vulnerable states. RMI is now well established as a world leader in these negotiations.

**All trade and economic development is inherently tied to the availability, security, and cost of transport.** With a narrow and limited natural resource base, RMI's domestic economic diversity and export options are highly limited. Food security, disaster response capacity, and

climate adaptation planning are all heavily constrained by the availability of adequate, affordable and appropriate transport.

While detailed analysis is available for global trade, the unique economic profile of small island states, means very little analysis is available at Pacific country scale. We work closely with agencies such as UNCTAD, WFP, and UNESCAP as they develop tools and economic understanding around connectivity and logistics supply networks at the scale of climate vulnerable states like RMI.

**RMI and other states continue to negotiate how any disproportionate negative impact from international transport decarbonization measures on states will be addressed.** While it is agreed that climate vulnerable states will be the most affected states by such measures, true economic cost and compensation formulae requires far better data and analysis than currently available.

**At national and regional levels, sustainable transport investment has lagged well behind other energy sectors,** particularly electricity generation. Achieving RMI's NDC targets means investment in transport must now be accelerated, well above current spending. Such investment is beyond RMI's (or any Pacific state's) economic capacity to deliver. The speed of transition means a full coordinated program of work is needed at scale, requiring a range of international and country partnerships to achieve, with support from regional agencies. Coordinating such efforts to ensure maximum efficiency in delivering national benefit and ensuring clear cost-benefit

analysis is built into all RMI programming is the only way to determine the effectiveness of RMI's overall transition program.

**RMI cannot undertake its planned transport transition without adequate investment or in isolation from its neighbors.** RMI and Fiji co-chair the **Pacific Blue Shipping Partnership**, a multi-country call for an initial US\$500 million blended finance investment in domestic shipping transition over the next decade. PBSP is expected to provide grant funding for research and proof of concept trialing in government fleets while securing low interest loans for private sector uptake. RMI, a leading ship registry, and Fiji, the transshipment hub for much of the Pacific, are the logical leaders in this country-owned and driven initiative. A multi-country approach allows for lessons learnt, skills, and expertise to be exchanged between the countries.

**While we can achieve short-term targets for initial transport decarbonization using existing technologies, full decarbonization will require new fuels.** At international scale, there is accelerating research and commercial development of battery-stored electricity, electro-fuels such as hydrogen, methane and ammonia, and biofuels. No work has been done to identify what future fuels choices might be for RMI, whether these can be produced in region or whether our current fossil fuel dependency will be simply switched to new fuel imports. Cost implications for any future bunkering infrastructure have not yet been considered. MCST works with leading research centers to initiate research to inform RMI and Pacific transport planners.

**Building our capacity to undertake the economic analysis at island scale is our highest priority. While the government can provide the enabling policy framework and lead by example with its own transport assets, ultimately a full transition program requires the private sector** to make strategic investment decisions.

**Public-Private Partnerships are key to initiating change**, but are poorly characterized and understood in the operating context of RMI or other Pacific states. Ensuring potential solutions are affordable and appropriate requires a robust understanding of the role of transport in the economic and development nexus of Pacific islands.

**Financing constraints are a major barrier to the transport decarbonization**, including insurance. Atoll states with high-risk operating environments, carbon-free technologies will only gain full uptake when backed by sound economic assessment and enabling mechanisms. Governments, communities, and the private sector will not adopt new technologies and operational measures until they are demonstrated to deliver economic benefit.

**Transition must be situated within a broader economic paradigm shift.** RMI and other Pacific Leaders have identified blue-green economies as the preferred future development option. The PBSP provides the vehicle for empowering investment in domestic shipping as the highest national transport priority. Transition for land and aviation will require additional island-centric investment pathways.

**Government financial instruments to incentivize the transition are critical** and need to be backed by economic advice designed for domestic realities informed by local stakeholders.

#### Priority Actions:

1. Work with national and international academies to develop specialist training and education options for strengthening and retaining long-term economic research capacity.
2. Ensure a consistent national program for assessing the cost-benefits of the various projects contributing to RMI's transport decarbonization agenda.
3. Support to RMI and Fiji as co-chairs in the implementation of the Pacific Blue Shipping Partnership through collaborative research with specialist economist experts.
4. Provide high-quality economic research and analysis to support RMI's negotiations of market-based measures in International fora, including IMO and ICAO.
5. Build research relationships with specialist UN agencies (e.g. UNCTAD, UNESCAP, OECD) and industry (e.g. GMF, ICCT) to increase understanding of the economic implications of transport decarbonization on RMI and Pacific economies, trade and connectivity.
6. Develop a specialist research program in partnership with alternative fuel researchers to communicate to Pacific transport and energy planners and policy makers the economic implications of a fuel transition in the context of Pacific states.
7. Build collaborative partnerships with other climate vulnerable states to share and enhance understanding of the nexus between climate emergency response, adaptation and transport economics.
8. Incorporate economic analysis results into the Knowledge Portal for broader reference and archival storage.

## WORK STREAM 6: POLICY

**Transport transition requires strong policy support** to RMI government, industry, and civil society through high quality relevant analysis, drafting, development, and monitoring of transport-related policy from domestic to international levels.

**The research shows the absence of an enabling policy and financing environment has been the primary barrier to transport being prioritized** in national and international decarbonization agendas. Both must be addressed if transition at the speed and scale required by the agenda to limit temperature increases to under 1.5°C is to be achieved.

**Development of new fuels and technologies is progressing at speed internationally.** Strong diplomatic advocacy is needed to ensure the global transition pathways are designed around equitable transition that leaves none behind. RMI has been increasingly active, especially in shaping international shipping policy, and is continually working through knowledge partnerships with leading industry researchers and innovators in all transport sectors to further international policy.

### NATIONAL POLICY

**The international advocacy needs to be followed with strong bespoke national policy to drive appropriate domestic change.** High fuel and freight costs have always meant ensuring adequate connectivity in our island nations has come at high cost to the national budget under a business-as-usual scenario. The increasing climate crisis will only heighten the risk to and raise the costs of maintaining all

transport infrastructure and assets. The additional cost of domestic transition to decarbonized transport alternatives at speed and scale will be beyond the capacity of the national economy to provide. However, appropriate climate financing investment, in recognition of the essential role of transport in all future national resilience programming, provides a unique opportunity to address this economic barrier with sufficient resources.

**Realizing this opportunity requires the appropriate policy framework to guide such investment.** Transport policy needs to be aligned and integrated with national policy for energy, climate finance investment, infrastructure, and the education/training requirements previously outlined.

**RMI's NDC sets the highest level of national policy.** Domestic maritime emission reduction is the highest priority sector. Land and aviation have lower initial ambition targets, reflecting the dependency on internationally delivered technology and the constraints on national electricity generation capabilities.

**At the domestic level, any full decarbonization transition and blue-green economy development requires a paradigm shift in how to view and plan energy use across all sectors.** The IRENA Renewable Readiness Assessment (RRA) for RMI recommended a review of the 2009 RMI Energy Plan. This led to the development and completion of the Marshall Islands Electricity Roadmap, published in 2018.

With the MCST Framework acknowledged

in the enhanced NDC as the mechanism for decarbonizing the transport sector, a strong base is established to review transport's role and future policy needs. Transport policy needs to be developed compatible with the measures and objectives laid out in the Marshall Islands Electricity Roadmap and contribute to the National Adaptation Plan.

### REGIONAL POLICY

RMI has endorsed a series of relevant high-level instruments since the [2013 Majuro Declaration on Climate Leadership](#), including the [UN's S.A.M.O.A. Pathway](#), [PIDF's Suva Declaration](#), the [PSIS Port Moresby Declaration on Climate Change](#), the [Laucala Declaration on the Decarbonization of Pacific Islands Transportation and the Boe Declaration on Regional Security](#).

**Decarbonizing our Pacific transport requires much more than a paradigm shift in our technologies. It requires a paradigm shift in our overall programming.** It is not something RMI can achieve in isolation. The [Pacific Blue Shipping Partnership](#) is an example of this, a country-owned and driven program for multi-country change built around the successful template of the PNA for fisheries management.

MCST has continued to provide policy support to various Pacific governments in regard transport decarbonization including the Fiji LEDS, priority project pipelines for aviation, land, and maritime transport in Fiji, Kiribati, and Tuvalu, as well as Tonga's National Action Strategy for maritime decarbonization.

## WORK STREAM 6: POLICY

### INTERNATIONAL POLICY

**At the international policy level, RMI's role changes from sovereign policymaker to highest ambition advocate.** Since 2015, RMI and other Pacific island high ambition partners have been increasingly involved in developing and negotiating international policy on all aspects of shipping decarbonization, particularly policy on carbon pricing and revenue sharing.

**RMI has now led the most successful program for empowering SIDS participation in IMO's history,** with MCST's partnerships providing full research, logistical, legal, and technical support to a growing Pacific island coalition.

**RMI is increasingly sharing its policy expertise with other climate vulnerable states.** As work at this level will be ongoing, MCST will continue to strengthen and expand its capacity to support Pacific high ambition diplomatic efforts at IMO, UNFCCC, and related fora.

MCST has built strong networks with leading research institutions, broadening its academic partnerships to include leading programs in Australia, Europe, Asia and the United Kingdom. MCST will seek to expand its research capacity to provide full policy support beyond RMI to encompass other Micronesian nations and Pacific island states.

### CAPACITY STRENGTHENING

**Policy development to support a transition to full decarbonization is essential** to construct an enabling environment, both domestically and for international development partner support.

For Pacific island states such as RMI, with small populations and enormous territories to regulate, the risk of overburdening in-country policy capacity is high. This risk is likely to increase as international compliance requirements continue to mount.

Expanded engagement in international climate-related policy will only increase this workload and will likely require continual specialization and cultivation of expertise capable of understanding the nuances of domestic issues. This will require policy that establishes appropriate support structures and standards for education and training of additional Marshallese professionals to accommodate these expected obligations.



### Priority Actions:

- 1. At the level of domestic policy** provide support to Pacific and SIDS national transport, energy and finance policy makers to implement Rebbelib 2050 through national action plans by transport sub-sector inclusive of both infrastructure and assets.
- 2. At the level of international policy:**
  - a. Continue research, logistical, legal and technical support and backstopping to Pacific high ambition delegations negotiating shipping decarbonization at IMO, UNFCCC and related fora. Broaden this support to other SIDS and climate vulnerable nations.
  - b. Undertake policy analysis and research to support RMI/other Pacific high ambition negotiators at ICAO in regard aviation emissions.
  - c. Expand knowledge partnerships with leading transport researchers in industry and academy. Coordinate policy research on cutting edge issues, including carbon pricing/economic instruments, climate financing, carbon policy and international legal principles/governance frameworks.
  - d. Continue to provide and expand training and capacity strengthening for current and future country negotiators to carry on the Pacific's legacy of High Ambition representation and leadership.
- 3. Broaden support to RMI government by:**
  - a. Ensuring an enabling policy environment for low carbon transition through integration and review of existing transport policy.
  - b. Analyzing integrating transport policy with other national development policies across all sectors.
  - c. Providing an enabling policy for training and education at all levels
- 4. Include all policy development and research in MCST Knowledge Portal**

## WORK STREAM 7: TECHNOLOGY

**The transport technologies we use in 2050 will be markedly different to those available today.** While transport has lagged behind other energy sectors, there is now a rapidly growing and evolving global industry with an increasing range of proven options. Investment in new technologies, particularly alternative fuels, is now accelerating in most major economies.

However, very little research is available for what this transition will look like for island states such as RMI. Due to our unique geographic and economic scenarios, **it is crucial that the selection of new technologies is ultimately appropriate, accessible and affordable** at island scale. It is unlikely that it is simple case of downscaling the solutions being developed for the large and continental economies. A bespoke technology transition pathway is demanded.

**Air, land and maritime sectors face different technological challenges** and there is no 'one size fits all solution'.

**Maritime offers the greatest potential** for developing appropriate full design solutions and there are now proof of concept trials in progress for vessels at atoll, inter-island and inter-state scale in RMI and other Pacific sites. We have a clear picture of what the most likely candidate technologies are and are working with leading researchers to understand the practical and economic applicability of these. Under the PBSP, we will continue to use MISC fleet replacement as the proving ground for private sector uptake.

While there is potential for small scale maritime transport production capacity in-country,

**for larger vessels, and land air solutions RMI lacks any largescale or high-tech development capacity.** It will therefore be reliant on importation of technologies for both land and air transport. Opportunities here are more limited without the introduction of new fuels. Battery stored electricity may provide a partial solution in selected cases but must be approached with caution given national electricity supply constraints and competition.

**The interface between electricity transition and transport transition must be carefully considered and aligned.** Vessels, vehicles, and aircraft must be selected to operate in challenging conditions with limited infrastructure. Robust, reliable, and easily maintained technology should be selected to reduce inefficiencies associated with both maintenance service/labor and equipment/ parts.

**Rebberlib 2050 is focused on the means of transport,** boats, vehicles and cars. It is important that this is developed in tandem with planning for the various related infrastructure – wharves, ports, roads, bridges, airports, etc. – all of which is heavily exposed to the effects of the climate crisis.

**Transport infrastructure** is a prominent aspect of socio-economic investment with broad impacts generally realized over decades-long lifespans. This infrastructure has often proven highly vulnerable to extreme weather and sea events.

**To reach full decarbonization, alternative fuels will be needed.** The optimal fuel solutions are not yet clear, but we know both LNG and nuclear power are not options. What works for developed nations may not meet the needs of RMI.

Any deployment of green electro-fuels (ammonia, methane, hydrogen) will require a surplus renewable energy source to generate domestically, or a cost-effective means of importation. The cost of bunkering infrastructure for any new option at RMI scale will be considerable.

**Research into the most appropriate Pacific-scale fuel or fuels must begin now.** MCST will continue to work closely with leading researchers, such as UCL, GMF and KRISO, to ensure RMI and Pacific planners have the best available knowledge and analysis.

**PPP's, (partnerships with public and private sector) can support R&D, technology transfer, and trade facilitation** with leading innovators in each transport sub-sector. For shipping-related renewable energy technologies, The Pacific offers a testing ground for technologies aimed at the small-scale needs of SIDS. The Cerulean Project with Swire Shipping is a leading example.

**Training and capacity development of our human resource** to use, develop, service and maintain the new technologies must be our highest priority. It is essential we work in tandem with our neighbors in developing this capacity.



# MARITIME TECHNOLOGIES

**Shipping is RMI's lifeline** with the world and an essential service for any atoll nation.

**Candidate technologies have been identified.**

A solid research base has been established by MCST, PRIF, Hochschule Emden-Leer and GIZ researchers. Research is ongoing in collaboration with multiple partners and we have networked closely with leading innovators through our partnership with academies, IWSA, GMF and others to track global development.

**Full decarbonization will require alternative fuels which are not available at commercial scale today.** Mature technology, including innovative designs for retrofit and new builds, including wind-

assisted ship propulsion (WASP)

options and renewable energy axillary power are available across different vessel types with operational profiles ranging from lagoon to international applications.

**These technologies are capable of achieving RMI's initial NDC target of 40% by 2030 with appropriate investment now.** Under the pilot projects so far established, Proof of Concept trials are progressing with vessels at intra-lagoon, inter-island and interstate routes, while the SV Kwai is already in service as a working training model. MCST is assisting in developing compatible parallel project pipelines in Fiji, Kiribati, Tonga,

Palau and the Solomon Islands.

**Identifying transport work and operating scenarios for each island will be necessary** to match technology to purpose. Using MISC shipping fleet to demonstrate a range of proof-of-concept options, financed through the PBSP to improve private sector uptake of these technologies, is the best strategy.

For larger government vessels, **RMI has traditionally been reliant on donated vessels** from bilateral partners. Under *Rebbelib 2050*, such partners will be requested to use energy efficiency as a key selection criterion for future vessel design selection in keeping with RMI's NDC targets.

## EXISTING RESEARCH PROJECTS:

### 1. WAM Intra-lagoon and Electric Outboard trials

Trials of intra-lagoon double hull 8meters catamaran prowess for sail powered intra-lagoon transport.



### 2. Project Cerulean

Project Cerulean trialing 300 gross tonne wind-hybrid cargo freighter on various routes between Fiji and RMI.



### 3. MTCIT/LCST Project

Inter-island MISC vessel developed under LCST project for trialing multi-purpose WASP vessel for outer island servicing within Majuro.



### 4. Okeanos Vaka Project

Okeanos Marshall Islands is part of the Okeanos Foundations's Pan-Pacific vaka network and located in Majuro, RMI.



## INVESTIGATIVE RESEARCH PROJECTS

### 5. Wing-in-Ground 'Wingship' Research

WIG technology is an example of a potential game changing technology for atolls. We continue to work with KRISO/KMI on potential investigative research for atoll deployment.



### 6. Flettner Rotor Research

Hochschule Emden-Leer continues to lead rotor technology research and MCST is monitoring its effectiveness for Pacific deployment.



# MARITIME PRIORITY PROJECTS

**In addition to the project work already underway, the following priorities for technological solutions have been identified for the maritime transport sub-sector:**

## 1. MISC 15-Year Fleet Refit and Replacement Strategy

The Marshall Islands Shipping Corporation operates a fleet of five vessels providing government



services throughout the country. For most outer island communities this is their main source of connectivity. It is essential for Government service delivery, and disaster response in particular. With the introduction of the SV Kwai and delivery of the LCST vessel, this project will assess how the rest of the fleet can be replaced over its operating life cycle with more efficient, decarbonized vessels. Also, completing assessment of technology retrofits and operational changes to be effected within the current fleet may enable substantive reduction in fuel use by the MISC fleet over a 15-year period.

## 2. Flettner Rotor Trials

Flettner rotor research undertaken by leading German innovators through Green Shipping Niedersachsen (GSN) at Hochschule Emden-Leer has demonstrated



<http://www.seamercy.org/SBGlobal>

potential for numerous applications, including new builds and retrofits of existing vessels.

Identifying the best application of this technology in the 15-year Fleet Refit and Replacement Strategy will enable trial and evaluation of Flettner rotor technology in the Marshall Islands.

## 3. International Fishing Ship Efficiency Research

As a major fisheries sector transshipment hub, understanding the decarbonization opportunities for the international fisheries fleet operating in Marshall Islands waters will provide insight into appropriate policies and regulations to ensure emissions originating in RMI's EEZ are eliminated.



## 4. Medical Service and Disaster Response

The Sea Mercy Sea Bridge program proposed a model to provide regular medical service and targeted disaster relief efforts throughout RMI.



Development of this vessel may be aligned under the 15-year Fleet Refit and Replacement Strategy to address existing needs currently being insufficiently met.

## 5. Energy Efficiency Design Index Maximization

In the interest of ensuring compliance of the domestic fleet with the most stringent criteria possible under the international EEDI methodology, policy must be developed to ensure any externally produced vessels are designed to minimize emissions.



## 6. Marine Based/Sourced Biofuel

Biofuels have often been cited as a potential fossil fuel replacement for transport. Atolls pose the difficulty of a lack of land for source material. Coconut oil processing is one possibility. Recent research indicates that marine biota; especially seaweeds and algae may provide a solution.



Development of this project with MCST partners will investigate and evaluate the viability of cultivating and sustainably utilizing marine resources for maritime, land, and aviation fuel replacement.

# LAND TECHNOLOGIES

All land transport is domestic and relatively small in scale, mostly 4-wheeled diesel and petrol vehicles with the majority being small cars concentrated on two atolls (Majuro & Kwajalein). With 75 km of paved roads, there are a range of viable technological options

to meet different land transport needs. The appropriate decarbonization pathway requires validation. The limited travel distances and road infrastructure lend themselves towards high uptake of active transport modes to improve overall development outcomes. Establishing a

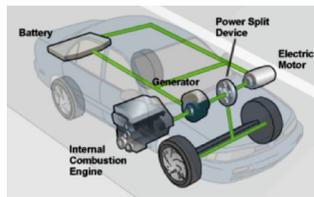
suitable baseline for distribution of vehicles, usage, and supporting infrastructure will be necessary to determine the most appropriate interventions for decarbonization of the land transport sub-sector.

## Land Priority Projects

**The following projects are designed to trial and test ‘proof of concept’ of differing technological solutions for key features of the land transport sub-sector:**

### 1. Hybrid Vehicle Transition

Without any shift in infrastructure, ICE vehicles can be supplanted by hybrid vehicles immediately through regulatory and fiscal policy instruments. Prohibitive penalties or bans may be instituted on ICE vehicles and hybrids can be used as a transition technology to bring down per vehicle emissions in the short-term while systems are put in place to accommodate other priority interventions.



### 2. Public Transport Network

Instituting a public transit system (while simultaneously enacting policy to favor public transport over private vehicle use) is the most effective action to maximize emission reductions on a basis of fuel consumed per kilometer, per capita (particularly on Majuro and Ebeye). The

most efficient form of public transport requires further feasibility assessment and cost-benefit analysis, but introducing hybrid mini-buses is a logical first step.



### 3. Active Transport Initiative

The opportunity for cross-cutting savings across the economy (fuel imports, vehicle/parts imports, healthcare, etc.) may be realized through individual trips being allocated to bicycle/e-bike usage. Encouraging bicycle usage will involve establishment of reliable supply chains for selected brands, inclusive of replacement parts and accessories. It will also necessitate a decentralized training program to ensure mechanics across each atoll have the technical skills and equipment to keep bicycles and e-bikes in working order. It may also be integrated into the primary/secondary school system for transport improvements on all islands, where children can build both the lifestyle and skills required to maintain cycling as a preferred mode of transport for short distances and urban travel into their adulthood.



### 4. Fleet Electrification

As the Marshall Islands Electricity Roadmap is implemented, new renewable energy capacity brought online should be considered in terms of ability to pair EVs with generation as an avenue for load balancing with the mobile storage capacity they provide. Identifying specific transport work which may be supplanted most effectively with individual EVs should yield targeted investment opportunities.

Hybrid and all-electric vehicles offer strong potential for cutting land vehicle fuel usage.



However, for plug-in vehicles to be of use in atoll situations, the issue of sourcing the electricity has to be resolved. This project will evaluate and trial leading candidates for powering recharging stations using renewables. Electrification should not be implemented at the expense of mobility improvements which can be undertaken with current infrastructure and technology.

# AVIATION TECHNOLOGIES

International aviation emissions are not accounted for under RMI's NDC. Current domestic emissions of Air Marshall Islands (AMI) are limited to the two De Havilland Canada DHC-8-100 aircraft servicing the 21 inter-island coral landing strips. Aviation is currently the hardest transport sub-sector to decarbonize, and will require new green fuel sources and propulsion systems to

achieve. Over the past five years, a range of options have become available in the hybrid/ electric aviation market and these developments require continued attention. Commercially viable solutions are still in a development phase. MCST is also monitoring research of two technologies, not deployed in the market, but with high potential to be 'game-changers' when proved viable.

Aforementioned WIGs offer one immediate substitute for some domestic air travel services. Lighter-than-Air vehicles are also possible in the medium future. The enormous advantages of both these technologies for an atoll nation is their independence from runway requirements, utilizing available atoll lagoons and permitting reallocation of land for other productive uses.

## AVIATION PRIORITY PROJECTS

**The following projects are designed to trial and test 'proof of concept' of differing technological solutions for key features of the aviation transport sub-sector:**

### 1. Aviation Sector Training Program

The process of re-training the AMI operational staff will be expected to yield minor (<5%) emissions reduction potential through improved on-the-ground and in-flight systems management, air traffic management (ATM), and associated operational efficiency measures.



Technology need not change, with behavior change and best practices prioritized to make additional contributions to the expected energy efficiency gains realized through other technological intervention options outlined from 2-4 in this section.

### 2. Aircraft Re-fleeting Program

Renewing the AMI fleet will provide an opportunity for the introduction of hybrid/ electric aircraft in the coming decade, as commercially available models have recently entered the market. Energy efficiency gains in conventional aircraft performance are also expected to be realized with iterative improvements upon previous aircraft designs and componentry (including aerodynamic efficiency, lighter weight construction, and improved taxiing and in-flight mechanical and electric systems).



### 3. Sustainable Aviation Fuel (SAF)

Integration of SAF into the AMI fuel supply provides an opportunity for immediate reductions in emissions for all flights utilizing



the fuel. Commercially available from various sources, having been incorporated into a range of commercial airlines, ranging in feedstock from Jatropha, residual forestry waste for alcohol-based fuels, to coconut oils used in blends, the cost of SAF is still at a premium and financing the disparity will require either subsidies or a significant shift in the market (both diversity and quantity of supply and price per litre).

### 4. Aerostatics and VTOLs

Lighter than air crafts Aerostatics are another potential ground breaking technology. Potential for cargo and passenger movement to locales with limited land available for airstrips, aerostatics (blimps, dirigibles, etc.), particularly in vertical takeoff and landing (VOTL) configurations. Not market readiness but has the potential for island communities with otherwise limited avenues of approach.



# FUEL PRODUCTION, ENERGY GENERATION/STORAGE

Initial transport decarbonization can achieve partial reductions using existing technologies (wind, solar, design improvements and operational efficiencies) alongside continued fossil fuel use (wind/diesel/electric hybrids for shipping, petrol/electric hybrids for land). Full decarbonization requires a transition to next generation non-GHG fuels. Fuel oil prices are predicted to increase sharply with the introduction of large-scale carbon pricing. RMI will either pay ever increasing penalties for imported fossil fuels or need to transition to new alternative fuels source(s) over the next 10-15 years.

It is not yet clear what such an RMI fuel source would be. At international scale, there is large scale and accelerating investment in commercial [electro-fuels](#) (ammonia, methane, hydrogen, etc.), [biofuels](#) and battery storage. It is predicted a range of options will become increasingly available. But which will provide affordable or accessible options for fueling RMI and our neighbors' ships, planes and cars? This is one of the most critical decisions for Pacific island states to make and will shape their development futures for the rest of this century. We are collaborating with leading [international researchers](#) to provide the best available knowledge and analysis to Pacific planners and decision-makers.

The linkages between energy production and storage will have a fundamental role in aligning the electricity and transport sectors of RMI. Ideally, it would be preferable to be able to manufacture the next generation of fuel domestically. Essentially this would require either large quantities of surplus biomass (to produce

ethanol or methanol) or surplus green electricity to produce electro-fuels (hydrogen, ammonia, methane) or battery storage.

Given land constraints, only marine solutions are possible for either [biomass](#) or electro-fuel pathways. Research, development and deployment of technologies for both at RMI scale are still in early stages. For marine biofuels, algal blooms, seaweeds and invasive species have highest potential.

For electro-fuels, significantly more green electricity is required than currently envisaged under the National Energy Roadmap. It is of critical importance that decarbonizing transport doesn't create a new competitor for RMI's electricity generation capacity. If domestic production of fuels for transport is required, it will need us to consider new technologies, with off-shore solar in lagoons, or ocean-side Ocean Thermal Energy Conversion (OTEC) installations the primary contenders. MCST has been collaborating with [KRISO on OTEC deployment in Kiribati](#) and is preparing an intensive research demonstration program to identify the potential for RMI.



If RMI cannot produce its own green fuels, it will need to import these. We are currently the most fuel import dependent region in the world. There is real risk we will simply have to trade a fossil fuel dependency for a green fuel one.



## Priority Actions:

1. Support techno-economic feasibility analyses of various technology interventions to determine which are appropriate to the identified transport work demands.
2. Integrate electricity and transport sector planning to ensure coordination of technological compatibility and generation capacity to sufficiently and sustainably address transport sector demands.
3. Coordinate with various trade partners, both through bilateral trade facilitation and private sector engagement with technology producers, to establish supply chains and support networks for maintenance, service, and repair of technology.
4. Ensure project implementation updates and relevant research pertaining to each technology sub-sector are shared and archived in MCST's Knowledge Portal.

## WORK STREAM 8: KNOWLEDGE TRANSFER

***Scientia potential est – knowledge unlocks ambition.*** We require access to the best data, knowledge and analysis to effect a transport decarbonization transition at RMI and Pacific scale. We build online specialist teaching and teaching tools for Pacific transport decarbonisation.

**Such knowledge needs to be readily and freely available** to our researchers, planners, policy-writers, managers, and decision-makers across the sector.

**Empowering local decision-making and community ownership** through increasing the information and understanding of our own transport actors and stakeholders is essential.

**Transition will not happen in silos, knowledge transfer needs to be multi-directional** – across the sector in-country and shared openly between Pacific high ambition states. We need to understand and assess the changes and advances being made internationally, our global partners need to understand the unique constraints and barriers we face. Clear and transparent communication is the key to change.

**Our first priority is ensuring delivery of the best quality advice to Pacific decision-making.** We provide regular reports to the MCST Board on all aspects of *Rebbellib 2050* and specialist reports to RMI Cabinet and other Pacific governments as directed.

**Mentoring.** This transition challenge is a long-term process. Success is dependent on empowering the next generation. We facilitate mentoring between our students and researchers with international experts.

The [MCST knowledge portal](#) provides information tools, all require ongoing maintenance.

**[Online resource library](#)** – a growing searchable repository of relevant papers, articles, books, reports, studies, designs, etc

**[Latest news, science and presentations\\*](#)** – a fast-moving field, with new science and information breaking daily. On our website and social media we keep a constant flow of new knowledge.

**[E-bwebwenato](#)** – hosting a series of regular, culturally appropriate on-line fora to discuss key issues with global and local partners to build trust and exchange knowledge.

**[Project outputs](#)** – we transparently update all knowledge outputs for our projects online so they can benefit all Pacific communities.

**[On-line tools/teaching resources](#)** – we make available online specialist teaching and teaching tools for Pacific transport decarbonisation.

**[Other databases/resources](#)** – we link the Pacific with global databases and knowledge portals.

**[Other partners](#)** – our website is used to disseminate results of regular collaboration.

**[Media and communication support](#)** – working with partners, we maintain specialist media and communication support at all levels.

**[Conferences, workshops](#)** – we facilitate country and regional conferences and workshops, and present widely in international events.

**[Our Blog](#)** – our researchers and partners maintain a running blog site with insightful articles on current relevant transport issues.



**IMO deliberations open with debate over net-zero resolution**

## WORK STREAM 9: MONITORING, EVALUATION AND LEARNING

*Rebbelib 2050* is our attempt to chart a course through unfamiliar reefs in increasingly heavy weather and across a new ocean under different stars.

**To date RMI and some of our neighbors are the only island states to commit** to full transport decarbonization commensurate with a 1.5 agenda. The fast-approaching cyclone is of greater strength than any we have ever faced. Our canoe is small. There are few waypoints.

**How will we know how fast and far we have still to go?** Are our hulls watertight, our sail strong enough? Is our course true? Are our captains adequately informed and our crew sufficiently equipped and trained? Do we rely on a GPS or a *rebberlib*?

When we departed on this voyage of discovery in 2015, we only had a few strands of our *rebberlib*. With new partners and tools arriving, we are steadily increasing our data, knowledge and human capacity.

Multiple country stakeholders from varying sectors have received support from a range of regional and international partners for both domestic transition and international advocacy and negotiations.

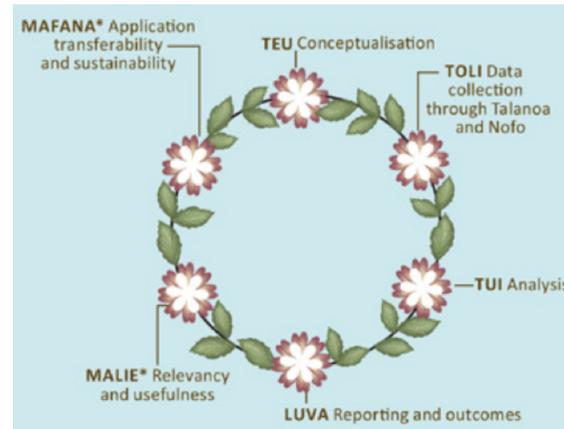
The lessons learnt from this initiative have demonstrated the critical role RMI is increasingly playing in this sector, and in particular, demanding equity in the global transport decarbonization process for the climate vulnerable.

**There is a fast-increasing global prioritization of transport transition** and with it our partnership

network continues to expand. The MCST Board has been expanded to include world-leading academic institutions, providing increased support to RMI's governance of *Rebberlib 2050* as the Pacific increases its participation in international negotiations.

**Domestically, there are now a range of projects and initiatives at varying stages in RMI and related projects emerging with our neighbors.**

These need to be coordinated under the Pacific Blue Shipping Partnership for maximum effect and efficiency.



**We need a commonly agreed MEL framework across all components to measure progress against the NDC targets.** To achieve the RMI NDC transport targets will need an ever-increasing investment across the sector with multiple partners.

Appropriate MEL is a long-standing issue in the Pacific.

[The Pacific MEL strengthening project](#) began from a shared vision to improve the quality of evidence-informed decision-making, ultimately to strengthen governance and sustainable development in the Pacific. It recognized existing capacities and systems and the shortage of people with the competencies, skills and experience to undertake contextually appropriate and culturally responsive monitoring, evaluation, research and learning in the Pacific.

### MEL for *Rebberlib 2050*

- **Wherever possible, knowledge and data will be openly shared. (Some research data is restricted by being politically or commercially sensitive).**
- **The products of all RMI-based research (data, modeling tools, IP created, etc.) belong to RMI and used for our common good.**
- **We adopt a Kakala approach to monitoring, evaluation and learning**

### *Rebberlib 2050*: VISION STATEMENT

To develop sustainable, appropriate, affordable and accessible transport connectivity for the Marshall Islands, within a decarbonizing world, which can serve as a model for other climate vulnerable states.

### National Strategic Plan 2020-30

#### 3.1 Transportation

**GOAL: Sound and Efficient Transport Infrastructure that Supports Social and Economic Development**