MICRONESIAN SUSTAINABLE TRANSPORT CENTER

A Catalyst for Change

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1. Purpose of Paper

The Republic of the Marshall Islands has set a policy target of reducing its transport emissions by 16% by 2025. It is the first Pacific country to make such a commitment. This paper provides background and a framework for establishing the **Micronesian Sustainable Transport Center** as a sub-regional initiative and a catalyst for change in Majuro, RMI.

"Seventy percent of the RMI's national energy expenditure is on transportation, in common with most island countries. Vulnerability to energy shocks – especially in transportation – is amongst the greatest economic hazards for Marshall Islands. Increasing fuel efficiency and gradually substituting renewable biofuels and energies in transportation would reduce the Marshall Islands socio-economic vulnerability to external oil price rises, and also move the nation toward energy independence" (RMI 2013 National Report).

RMI has requested USP coordinate establishment of a center of excellence in Majuro to prepare and implement a whole of country *Rebbelib* (navigation chart) for RMI to transition to low carbon transport solutions. This will be a pilot for a sub-regional program to cascade to other Micronesian countries and then to the wider region and other SIDS globally. Sea transport is the first priority but the MSTC will address all transport sub-sectors.

For RMI and other low lying island states, physical survival is dependent on global mitigation of climate change. Transport has been largely missing from initiatives to de-carbonize both global and national economies. Transport is absolutely essential for connectivity within and between island states. Numerous practical solutions are available or emerging for low carbon transport transition. It is clear that many of these will have greatest benefit at the local level, especially small-scale shipping used by island countries. A growing number of leading international research centers are offering to assist with cutting edge technological development, economic analysis and knowledge exchange. There is no reason why Micronesia cannot be the proving ground for such technologies and approaches for other SIDS and LDCs.

For such a transition to be sustainable long term it is critical that we begin preparing and training the current and future generations of transport operators, planners and decision-makers in industry and government. The MSTC will partner with regional organizations and leading research centers and universities to achieve this. Appropriate and affordable transport solutions are essential for improved economic performance, trade, sustainable development and government service delivery to our island based communities. Our task is to prepare a pathway that achieves these needs using low carbon technologies and methods.

The initiative to establish the MSTC was considered and formally endorsed by the 15th Micronesian Presidents Summit as reported in the Boknake Haus Communiqué, July 2015. It is consistent with the **Pacific Forum Leaders Majuro Declaration 2013, UN S.A.M.O.A Pathway 2014**, **PIDF Suva Declaration on Climate Change 2015** and **the Pacific Small Islands States Moresby Declaration on Climate Change 2015**. It is compatible with existing regional policy such as the Framework on Pacific Regionalism and the FATS and FAESP and designed to build off and incorporate existing related transport initiatives and programs.

2. The Case for Transition to Low Carbon Transport for RMI and other Pacific Countries

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

i. Climate Change

Pacific Island countries are the most vulnerable to the increasing effects of anthropocentrically caused climate change. The 2013 Majuro Declaration and the 2015 Suva Declaration on Climate Change have called on all parties to do all they can to mitigate climate change. Pacific island countries' contribution to climate change is negligible. Maintaining a guardrail of no more than a 1.5° threshold for global warming is essential for the future survival of many Micronesian communities. Achieving this assumes that:

- Rapid de-carbonization of the global economy must start now. By 2020 all sectors, including transport, need to have peaked and have firm pathways to agreed targets. If these pathways cannot be maintained it will require greater effort and expense to be made in the future.
- For the transport sector this must include international and national bunkers, assuming that 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 others.

ii. Fuel dependency

Transport is the majority fuel user for Pacific countries burning 70%+ of regional fuel imports. Such dependency is crippling for national economies and a major barrier to all socio-economic development. Our small scale and length of transportation routes makes Pacific fuel and transport costs the highest in the world.

Transition to low carbon is an opportunity that must be taken now.

A transition to a low carbon transport future is a critical step in addressing both these agendas. To not do so risks ongoing and increasing dependency, 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, low carbon transition can provide long-term solutions to transportation issues for Pacific countries and communities by providing options that are cleaner, more affordable and appropriate to our communities.

The importance of sustainable transport for Pacific countries cannot be understated. Inversely to the continental world, sea followed by air are higher fuel users than land transport. Shipping moves the vast majority of Pacific goods. Sea and air are essential for connectivity for many communities and for the most vulnerable, sea transport is the only physical connector. It is crucial for trade and economic development and impacts upon virtually every sustainability and adaptation initiative. Land transport, although the smallest sector, is fast growing, especially in expanding urban areas reflecting increased private motor vehicle ownership and commercial vehicle use. Public expectation is of 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. Long routes, minute narrow economies, imbalance in inward and outward loadings, financing 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 opportunity. Domestic connectivity is the most critical sector to address; many routes are unviable and uneconomic.

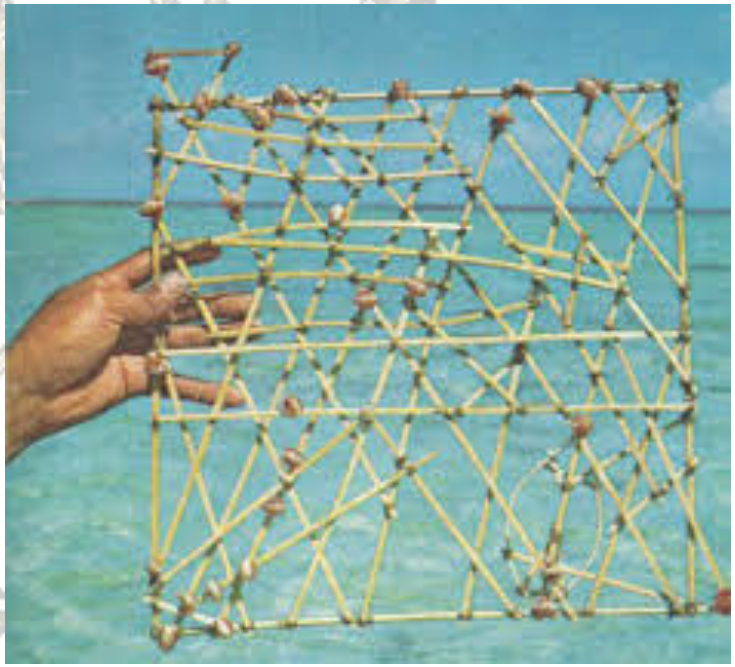
Ever increasing policy, regulatory and technical complexity places increasing and unrealistic strains on Pacific capacities and resources to operate and administer the sector. Climate change will magnify these barriers and costs to governments, industry and communities. All aspects of the transport sector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

Addressing transition to a low carbon 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. The national *Rebbelib* must be backed by a strong integrated support programme of technical assistance, capacity building, economic analysis and tool development and knowledge exchange. Robust data acquisition and analysis is an essential building block.

Achieving a transition to low carbon transport will require an integrated programme. There is no 'one size fits all' solution. While technology advances for both vessels/vehicles 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 technology, whether for asset, fuel or infrastructure, is insufficient unless the policy and economic context is provided to allow private sector or PPP uptake. The introduction of hybrid cars in Fiji is a classic example. Despite the proved advantages and savings of the technology, initial introduction failed to achieve any market penetration. It took an enabling policy environment through the Fiji Green Growth Framework and financial tools in the form of reduced import levies to herald a change. The private sector responded by ensuring introduction of the technology was backed by service and maintenance capacity. The resulting uptake by consumers speaks for itself.

For a transition to low carbon transport to occur at any significant scale, multiple priorities must be met. These include introduction of renewable energy technologies, energy efficiency operational and technological change, fuel substitution, and market based measures and incentives. All must be underpinned by strong economic analysis (appropriate to Pacific scenarios and not simply extrapolated from the global discourse) and investment in research and development and capacity building across the sector.



3. MSTC Framework

Vision/Goal: **A center of excellence to prepare and implement a whole of country strategy to transition the Marshall Islands to a low carbon transport future as a pilot and catalyst for other Micronesian and small island states.**

Target: **16% emission reduction from transport by 2025 and 27% in 2030** (2015 RMI INDC)

Achieving this target requires:

- **A whole of sector approach**:
  - maritime, air and land transport; and
  - workstreams focused on data, policy, economic analysis and financing mechanisms, technology, training, research.
  - A coordinated program of pilot projects across all aspects of the transport sector
- **A whole of country approach:**

  Must include government, industry, community, NGOs, research and education providers.

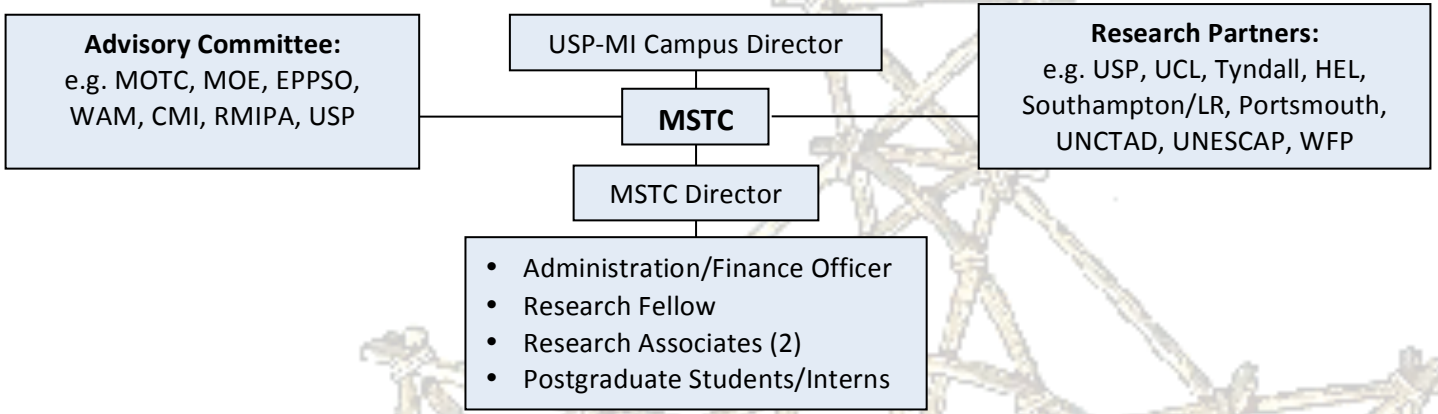
  A national strategy that priorities long term in-country capacity building backstopped by the highest quality technical and research support.
- **A dual focus:**
  - Plan and implement local solutions that provide clean, affordable, reliable and appropriate low carbon transport for the future; and
  - Influence international policy and strategies that promote policy appropriate to Micronesian ambitions and ensure recognition of the uniqueness of Micronesian transport issues.
- **Partnerships**

  Strong knowledge exchange and research partnerships with leading regional and international partners.

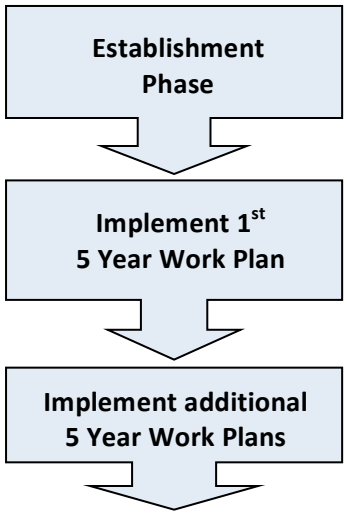
  A commitment to seeking the highest available level of excellence in research

4. MSTC Structure

MSTC will be established as a small research team at USP-MI campus that coordinates and collaborates with all relevant stakeholders.



5. MSTC Work Program



- Establish Advisory Committee.
- Recruit MSTC Director and set up office.
- Confirm 15-year RMI Transition Strategy (including 1st 5 Years Work Plan and budget and Funding Strategy).
- Initiate data mapping across all transport sub sectors to establish current and historic baselines.

WORKSTREAMS

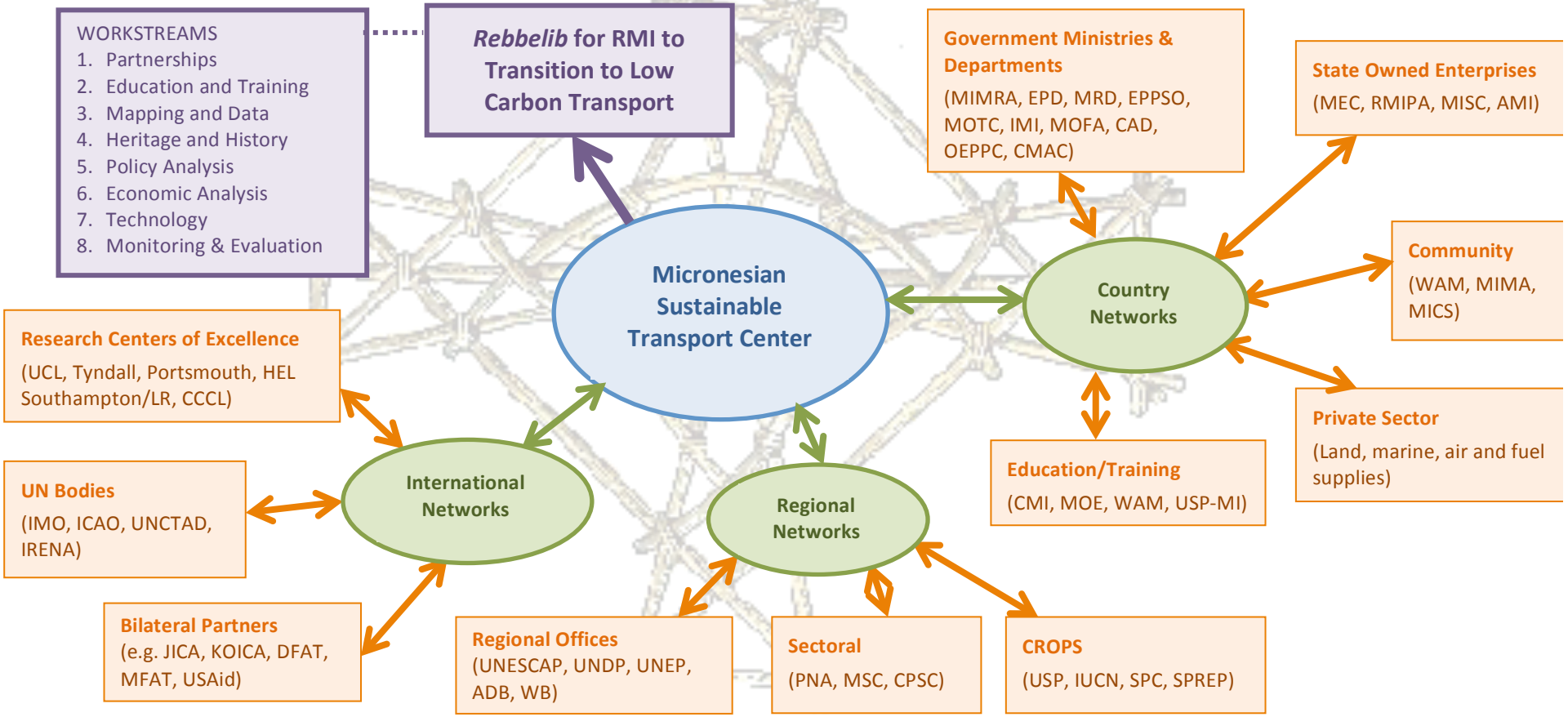
1. Partnerships	2. Training & Capacity Building
3. Mapping & Data	4. Heritage and History
5. Economic Analysis	6. Policy Analysis
7. Technology	8. Monitoring & Evaluation

- Maintain the RMI work program
- Establish Advisory Committees for FSM, Palau, Kiribati and Tuvalu.
- Assist each to prepare and implement country transition roadmaps.

6. WORKSTREAM 1: Partnerships

For a whole of country low carbon transport 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.

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



7. WORKSTREAM 2: Education and Training

Human capital is our greatest resource. This is recognized in this *Rebbelib* by the priority given to boosting the current capacity and building long-term in-country capacity of future transport planners, operators and decision-makers in government and industry at all levels. Wherever possible, MSTC will seek to build on and collaborate with existing education and training initiatives by supporting existing training providers, such as CMI, USP-MI and WAM and dovetailing with existing initiatives, such as the EU PacTEVT program for up-skilling across the renewable energy training sector.

Achieving a transition to a low carbon future requires more than presenting technological 'fixes'. Ensuring that the sector has the appropriate skills and training base across the spectrum needed, ranging from: ships crews and taxi mechanics, fleet managers and port operators, to policy writers and international negotiators; is going to be critical to success. 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 in-country coordination between education and training providers and the Ministry of Education to maximize synergies with existing programs is essential. These institutions have a strong track record of collaboration and partnership in this regard. Joint research and teaching projects and programs with international Centers of Excellence and universities is a primary means of providing knowledge transfer and up-skilling, through provision of short term training courses and longer term post graduate and staff exchange programs.

In collaboration with national and international partners MSTC will:

- Identify the training and education requirements for government, industry and community to successfully transition to a low carbon transport future. This includes all current and projected future needs across the sector.
- Coordinate with existing education and training providers to ensure that 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.
- Ensure adequate and appropriate training and education is built into all aspects of research and project development by the Center.

Priority Actions:

1. Identify current and future education and training needs.
2. Identify what gaps exist and develop education and training programs to meet these.
3. Identify and establish linkages with international partners.
4. Build capacity of existing education and training providers.
5. Include consideration of education and training in all MSTC workstreams.

8. WORKSTREAM 3: Mapping the Transport Sector

Before we can begin a transition we must first:

- understand the current transport use and current and projected need through data collection and analysis;
- establish an in-country network of all relevant stakeholders and actors - “Jepilpilin ke ejukaan" (accomplishment through joint effort);
- build an international partnership to support the transition through knowledge transfer, targeted research, training and appropriate resourcing; and
- know what options are available.

Data collection and analysis is the critical first step to progress on achieving RMI’s policy targets. The first step is to know what is:

- the current transport supply, need and demand (for all sub-sectors and all transport users);
- the current carbon footprint of each transport sector and sub-sectors; and
- the projected change over time.

How will we:

- Collect this data?
- Store it?
- Analyze it?

Priority Actions:

1. Identify existing current and historical data sets.
2. Identify what data gaps exist, prepare and execute methodologies and processes to manage gaps.
3. Identify current GIS platforms in-country that this data can be stored and integrated with.
4. Identify current capacity to store, manage and analyse this data.
5. Prepare training programme to meet gaps identified.
6. Build and populate GIS and related database to store, manage and analyse data.
7. Manage and update GIS and related database over time.

KEY ACTORS

RMI: e.g. USP-MI, RMIPA, Fuel Companies, MEC, EPD, EPPSO, MOTC, CAD, OEPPC, AMI, MISC

OTHER: e.g. USP, SPC, ADB, UCL, TYNDALL, UNESCAP, UNCTAD, IRENA

EXISTING DATA COLLECTION INITIATIVES

- ADB
- SPC
- INDCs, Census, Reimaanlok socio-economic survey
- IRENA
- USP

Domestic shipping

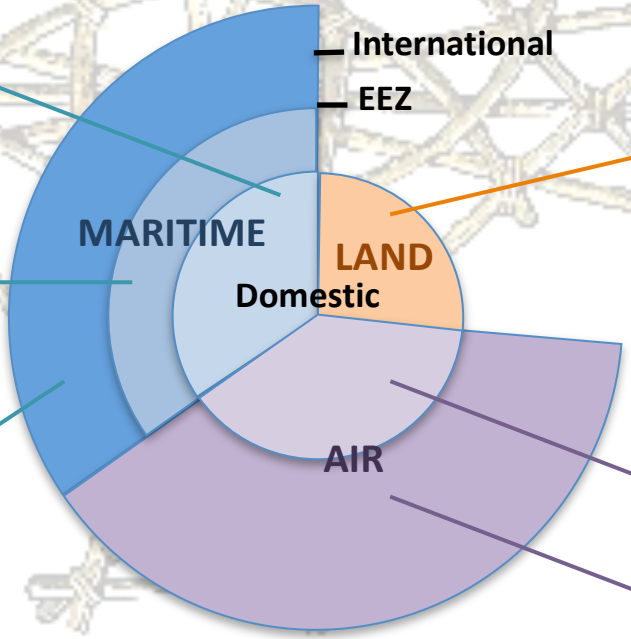
- Intra-island, inter-island, fishing, tourism, private
- Private/commercial/government
- Vessel type, age, tonnage, engine size, fuel use
- Vessel routes and frequency
- Cargo/Pax type and loadings

International shipping operating in RMI EEZ

- Freight, fishing, fishing support, other
- Vessel type, age, tonnage, engine size, fuel use
- Vessel routes and frequency
- Berthing in RMI or transiting RMI EEZ

Other International shipping

- flagged to RMI but operating outside RMI EEZ



Domestic land transport

Largely restricted to Majuro and Kwajalein/Ebeye

- Vehicle type/number
- Fuel type/use
- Private/commercial/government

Domestic air services

International air services

- International air servicing RMI
- International air transiting RMI air space

9. WORKSTREAM 4: Heritage and History

Transport is Micronesia's greatest heritage legacy. Since their colonization of the Pacific over millennia, Micronesians excelled in developing and perfecting sustainable and 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. Micronesians displayed excellence in technological innovation and operational practice, developing vessel designs, effective and efficient navigation systems, operation practices and knowledge transfer and training that were the most advanced in the world. Given that this evolution occurred in a development environment that was devoid of metals and only a marginal range of materials, the advances achieved were all the more remarkable. Transport solutions were largely sustainable and certainly low carbon, 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.

Much traditional maritime knowledge has been lost throughout the Pacific and Micronesia is one of the last reservoirs. In RMI, Waan Aelon in Majel has successfully led a strong program targeted at retention of such knowledge, celebration of its success and revitalization of this heritage icon. There are many lessons to be learnt from the past as we seek innovative solutions for the future and the role of heritage and culture are central to this work program. Valorization of this heritage prowess is a key vector for assisting in a paradigm shift to low carbon and renewable energy use among transport users and operators alike. WAM's heritage program and its strong track record with youth training and education provides strong potential to expand to commercial trials for locally produced intra and inter-atoll transport solutions. WAM's motto is *Wa Kuk Wa Jimor – Canoes Bring People Together.*

It is also essential that RMI's more recent transport history is recorded and understood. There is little written record but ample oral knowledge of the past half century of RMI shipping and air services. This includes periods when the local shipping fleet was often small scale, locally owned and operated sail assist vessels. Such records need to be recorded for prosperity and distilled for relevant lessons applicable to developing new low carbon solutions and pathways.

Priority Actions:

1. Extension of existing WAM program on traditional voyaging construction and navigation.
2. Oral history collection of RMI shipping over the past 100 years (with focus on the copra trade).

10. WORKSTREAM 5: Policy Review and Development

This workstream will provide policy support to RMI and Micronesian governments, industry and civil society through high quality relevant analysis, development and monitoring of transport related policy from domestic to international levels.

Inadequate policy infrastructure has been identified in all research as a major barrier to transition to low carbon transport futures.

RMI has led the Pacific in setting policy for transport fuel and carbon reduction though the Majuro Declaration and now its INDC. RMI has endorsed a series of relevant high-level instruments such as the S.A.M.O.A. Pathway, the PIDF Suva Declaration and the PSIS Port Moresby Declaration on Climate Change. RMI's unique position as the world's third largest independent shipping registry gives it a unique role at the international level in regard to influencing global policy on transport emissions.

At the domestic level, any transition to low carbon or blue/green economies requires a paradigm shift in how we view and plan energy use. It must include a far greater integration of transport in future energy policy, planning and analysis. The recent IRENA RRA for RMI has recommended a review of the 2009 RMI Energy Plan and this would appear the ideal opportunity to review transport's role and future policy needs.

Policy development to support a transition to low carbon transport is essential to constructing an enabling environment, both domestically and for international development partner support. For Pacific states such as RMI with small populations and enormous territories to regulate, monitor and enforce, the risk of over burdening in-country capacity is high and likely to increase with ever increasing international regulation. Progress in international climate related policy will only increase this workload and will likely require ever increasing expertise specialisation.

The Policy work stream will develop short-term training courses and long-term research projects in partnership with leading international research centres. Postgraduate exchange is a critical component for building long term in-country capacity across the policy spectrum.

Priority Actions:

1. At the UNFCCC/IMO/ICAO Policy interface:
   a. Provide policy analysis and advice support to RMI and other Pacific UNFCCC and IMO/ICAO negotiators on relevant international instruments and processes.
   b. Provide training for current and future country negotiators in this sector.
2. Analysis and support to RMI government and industry to:
   a. Ensure an enabling policy environment for low carbon transition through integration and review of existing transport policy.
   b. Better integrate transport policy with other national energy sector and development policy.
   c. Provide an enabling policy for training and education of current and future transport sector actors including government and industry.

11. WORKSTREAM 6: Economic Analysis

The interface between transport and trade cannot be overstated. Transport cost and availability is linked to all aspects of social and economic development. Access to adequate and appropriate financing has always been a large barrier to establishing and maintaining transport connectivity. Even in times of cheap and plentiful supplies of fossil fuels, most transport services are at best marginal commercial ventures and often economically unviable. In many instances, governments and communities end up subsidizing transport services directly or indirectly in order to maintain connectivity for social, political and economic rationale.

There are large gaps in our current understanding of the role of transport in PSIS' economies. While PPPs are heralded as key to initiating change in the transport sector, they are poorly characterized and understood in the unique operating context of PSIS such as RMI. Ensuring potential solutions are affordable and appropriate requires a robust understanding of the role of transport in the island economic and development nexus and analysis of the costs and benefits of transition. Financing constraints are a major barrier to low carbon transport transition, particularly for PSIS with minute and narrow economies, inward/outward loading imbalances and high risk operating environments. Low carbon technologies will only gain full uptake when backed by sound economic assessment. Governments, communities and the private sector will not adopt new technologies and operational measures until they are demonstrated to deliver economic benefit.

A transition to low carbon transport must be situated within an economic paradigm shift more generally. Leaders have identified blue green economies as the preferred development option. This provides opportunities for transport solutions that are cleaner, more affordable and appropriate. Maximizing benefits of low carbon transport transition requires excellent economic modeling and analysis. Financial instruments used by governments to incentivize such transition are critical and need to be backed by quality economic advice.

MSTC will work with leading researchers to provide quality economic analysis and consideration of financing mechanisms and market based measures/instruments for RMI planners and decisions makers in government, civil society and industry. This will include training courses for current planners, manager and decision makers. Postgraduate exchange programs will build long-term in-country capacity.

Priority Actions:

1. Low carbon transport's role in revitalisation of the copra trade for Micronesia.
2. CBA analysis of low carbon transport transition (comparative analysis with Fiji and Tuvalu).
3. MACC for 2 outer islands and Majuro case study analysis.
4. IRR and MACC of MISC conversion to low carbon technologies (over a full fleet replacement cycle and including retrofit and new build).
5. Issues and options for use of MBMs and MBIs. Should transition to low carbon transport be public and/or private sector driven?
6. Economic analysis of hybrid vehicle potential.
7. Economic instrument analysis and capacity building.

12. WORKSTREAM 7: Technology

Low carbon transport technology is a greenfield industry, especially in SIDS, but with a wide range of available or proven options. In addition to technological options, operational measures show strong potential for efficiencies in the transport sector.

Air, land and marine sectors face different technological challenges and there is no 'one size fits all solution'. Transport infrastructure is a prominent feature and land use competitor, often highly vulnerable to extreme weather and sea events. Solutions need to be appropriate to the physical and human operating environments and each potential solution needs to be evaluated through this lens. Most development internationally is not targeted at an island market. For example, super capacitor powered ferries are unlikely to have future benefit in RMI unless a parallel technology (e.g. OTEC) makes the electricity available.

RMI lacks any large scale or high tech development capacity and is reliant on importation of technologies for land and air. R&D partnerships with leading centres are required. For shipping-related renewable energy technologies, RMI offers an ideal testing ground for technologies aimed at the small scale needs of SIDS and has its rich seafaring heritage to draw on. Training and capacity building to ensure all new technologies are serviceable to the greatest extent locally is essential.

Land

All land transport is domestic and small scale, mostly wheeled diesel and petrol vehicles with the majority being small cars concentrated on 2 atolls. There are 75 km of paved roads. Hybrids are a logical first step. Electric vehicle and biofuel options also have potential but require economic and technological validation.

Maritime

Increasing numbers of designs for retrofit and new builds, several to commercial deployment or proof of concept stage, are available across vessel and operational profiles from lagoon to international applications. RE options include alternative fuel (including biofuels and gases); wind and solar in various deployments and combinations; energy efficient propellers, hull coatings, and waste heat recovery. Technology options include WIGs, Flettner Rotors, Suction Wings, proa and other multi-hull designs and electric motors and ancillary systems, but these all need to be assessed against an island country operating scenario. Waste heat recovery, propeller upgrades, better hull coatings etc. and operational efficiency measures are available to the existing fleet from village to inter-regional trading vessels, fishing and tourism.

Air

Fewer options are available although WIGs offer one immediate substitute for some domestic air travel services. Longer routes will have to follow international technology advances. Lighter than Air is also possible in the medium future.

Priority Projects

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

1. Intra and Inter-Island Sailing Multi-Hulls

Historically, Marshallese developed fast, versatile multi-hull sailing vessels for local sea transport within and between its scattered atoll archipelagoes. Using the base built by WAM over the past two decades, this project will develop and trail designs for 2 classes of locally-built multi-hull sailing vessels for intra-lagoon and inter-atoll transport of passengers and cargo.

2. Wing in Ground 'Wingships'

Working with industry leaders from Korea, this project will undertake a full feasibility study and field trials of 'Wingships' capable of carrying 50 passengers or 10 ton of cargo on routes up to 500km as an alternative to small aircraft and high-speed craft. This evaluation phase with include full consideration of training, infrastructure, operations and maintenance requirements necessary to support uptake of this technology in a Micronesian operating environment.

3. MISC 15-Year Fleet Efficiency Strategy

The Marshall Islands Shipping Corporation operates a fleet of 5 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, disaster response in particular. Vessels include conventional ships and landing craft aged from 3 to 30 years old. This project will plan how this fleet can be replaced over its operating life cycle with more efficient, low carbon based vessels and what operational and technology retrofits and changes can be effected within the current fleet to substantively reduce fuel use by the MISC fleet over a 15-year period.

4. Flettner Rotors

Flettner rotors offer strong potential for numerous applications including new builds and retrofits of existing vessels. Working with leading German innovators through Green Shipping Niedersachsen (GSN) at the HEL this project will identify and trial the use of Flettner rotors within a RMI context.

5. Wind Powered Interisland Freighter

Copra is an important economic commodity for Micronesian economies and was once traded using small sail-assisted shipping. This project will evaluate the best design option for a small wind powered island trader to support rejuvenation of the outer islands copra trade within RMI and with its neighboring States.

6. RE Options for Electric Vehicle Recharging

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 resolved. This project will evaluate and trial leading candidates for powering recharging stations using renewables.

7. 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. This project will investigate, evaluate and trial these sources for land and maritime fuel replacement.

13. WORKSTREAM 8: Monitoring and Evaluation

This is the first attempt by an island country to attempt a national transition to a low carbon transport future. It is a bold experiment. It will be bring together multiple country stakeholders from varying sectors supported by a range of regional and international partners. The lessons learnt from this initiative will have critical information and results for other Micronesian and Small Island Developing States globally. It is essential that from the outset the MSTC establishes a robust monitoring and evaluation regime and is regular and transparent in its reporting.

Consequently the MSTC will:

- Build comprehensive monitoring and evaluation frameworks into all work it undertakes and encourage our partners to do likewise. Where resourcing allows this will include independent review of all work undertaken.
- Establish a repository of past and future projects and related analysis and evaluation concerning low carbon transport from both Pacific and international experience.
- Establish best practice in monitoring and evaluation for this sector, including use of postgraduate research and exchange with leading international institutions to monitor and evaluate initiatives under this *Rebbelib*. Evaluation of costs and benefits will use a quadruple bottom line approach (economic, environmental, cultural and social).
- Publish peer-reviewed results of all projects undertaken under this *Rebbelib*.

14. Energy

RMI's 2008 National Energy Policy focuses on:

- Petroleum and liquid fuels
- Electric power
- Transport and transport energy use
- Energy efficiency
- Renewable energy

National Energy Policy Targets:

- 100% Urban and 95% rural household electrification by 2015
- 20% of electrical energy generated in the RMI from renewables by end of 2020
- 20% Reduction in imported petroleum use for transport by 2020
- MEC 20% supply side energy loss reduction by 2015 compared to 2009, consistent with sound technical and financial criteria
- Measurable and substantial improvement of energy efficiency by 2020 in at least 50% of households and businesses and 75% of government buildings
- Mandate for locally produced biofuel in diesel powered government vehicles by 2015

ENERGY

- 90% of RMI's primary energy supply comes from petroleum
- Biomass used for cooking accounts for nearly all the rest
- Solar electricity generation made up less than 1% in 2014
- Use of biofuel from coconut oil is minute
- Northern Marshall Islands have the best wind resource in Pacific with limited influence of tropical storms but wind is seasonal

COCONUT OIL AS A BIOFUEL

- Coconut oil as a biofuel is a significant renewable energy resource
- It takes around 6,000 coconuts to produce a tonne of copra
- With a production ratio of about 380 liters of oil/tonne of copra, 5,555 tonnes of copra can be converted to roughly 2.1 mega liters of coconut oil
- Coconut oil and copra export prices have been unstable which makes local availability and pricing unstable
- For coconut oil to be a viable biofuel its price must be stable so customers can predict future costs and must be consistently less than price of diesel - these conditions have yet to be met

Progress made toward reaching renewable energy targets:

- By 2015, 100% of households wanting electrical service will be connected to either a grid or a stand-alone SHS.
- The target for generating 20% of electrical energy from renewables is likely to be reached by 2020 if planned solar and biofuel additions to grid generation are put in place.
- Programs for increased biofuel use in transport and improvements in transport energy efficiency have not yet begun.
- Progress in residential and government energy efficiency has been slow.

Intended National Determined Contributions Targets

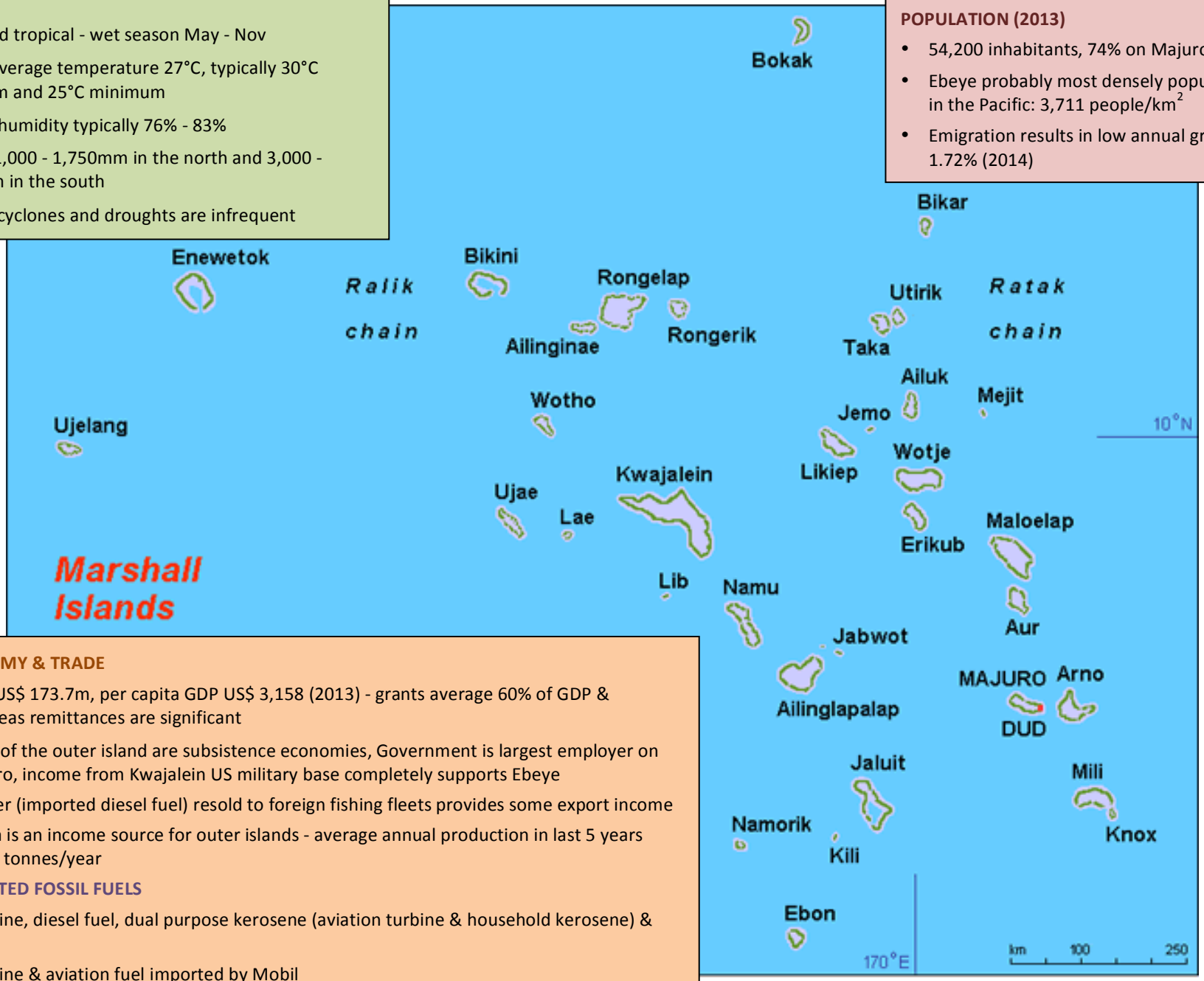
- Reduce GHG emissions to 32% below 2010 levels by 2025
- Reduce GHG emissions to 45% below 2010 levels by 2030

CLIMATE

- Moist and tropical - wet season May - Nov
- Annual average temperature 27°C, typically 30°C maximum and 25°C minimum
- Relative humidity typically 76% - 83%
- Rainfall 1,000 - 1,750mm in the north and 3,000 - 4,300mm in the south
- Tropical cyclones and droughts are infrequent

POPULATION (2013)

- 54,200 inhabitants, 74% on Majuro & Kwajalein
- Ebeye probably most densely populated island in the Pacific: 3,711 people/km^2
- Emigration results in low annual growth rate 1.72% (2014)



ECONOMY & TRADE

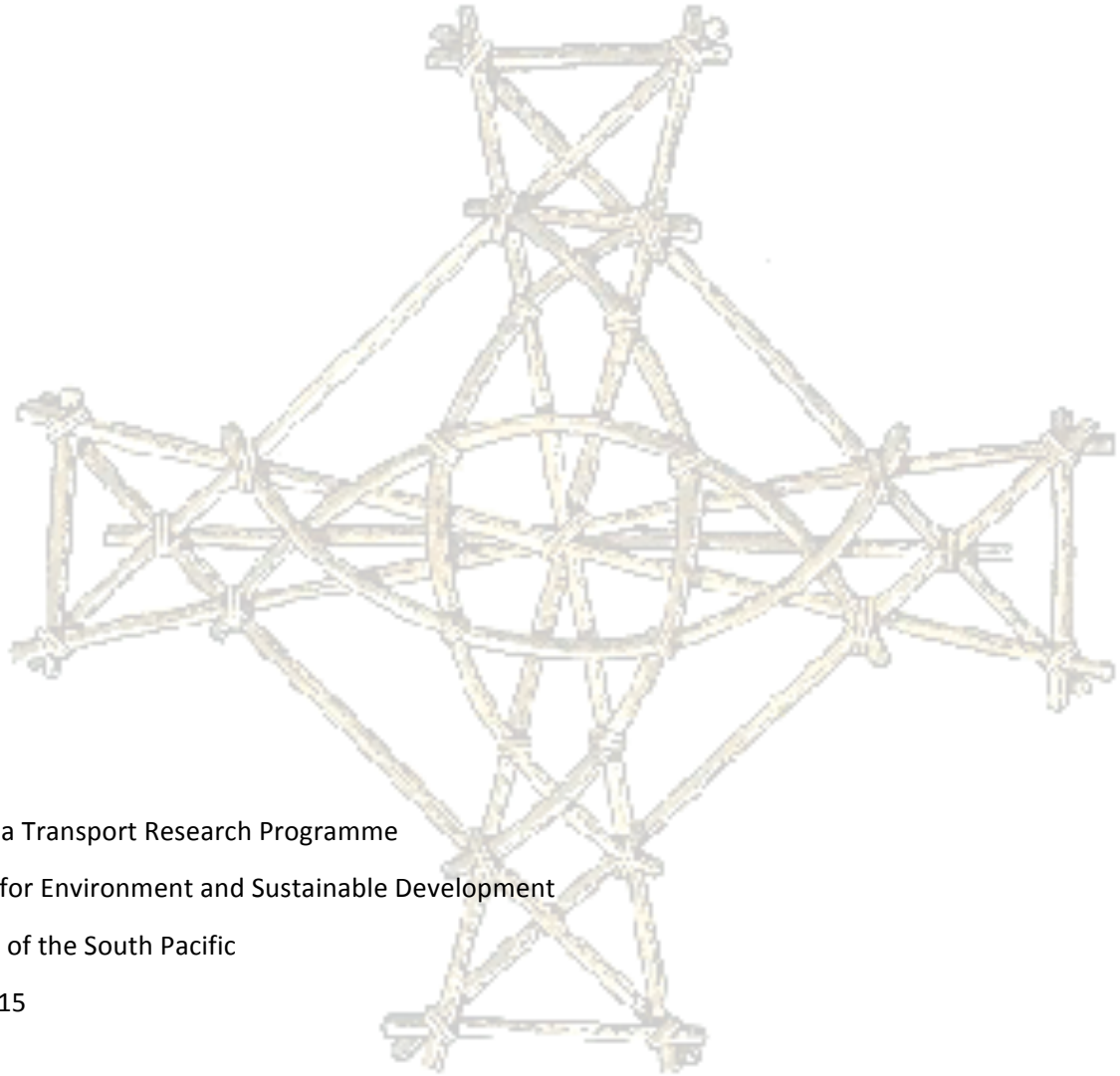
- GDP US$ 173.7m, per capita GDP US$ 3,158 (2013) - grants average 60% of GDP & overseas remittances are significant
- Most of the outer island are subsistence economies, Government is largest employer on Majuro, income from Kwajalein US military base completely supports Ebeye
- Bunker (imported diesel fuel) resold to foreign fishing fleets provides some export income
- Copra is an income source for outer islands - average annual production in last 5 years 5,555 tonnes/year

IMPORTED FOSSIL FUELS

- Gasoline, diesel fuel, dual purpose kerosene (aviation turbine & household kerosene) & LPG
- Gasoline & aviation fuel imported by Mobil
- MEC import & distribute automotive diesel oil & LPG (180,719kgs of LPG in 2013)

15. Acronyms

ADB	Asian Development Bank
AMI	Air Marshall Islands
CAD	Civil Aviation Directorate
CCCL	Center for Climate Change Law, Columbia Law School
CMAC	Coastal Management Advisory Council
CMI	College of the Marshall Islands
CPSC	Central Pacific Shipping Commission
DFAT	Australian Department of Foreign Affairs and Trade
EPD	Energy Planning Department
EPPSO	Economic Policy, Planning and Statistics Office
HEL	Hocshchule Emden Leer
ICAO	International Civil Aviation Organisation
IMI	Investment Marshall Islands
IMO	International Maritime Organisation
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
KOICA	Korean International Cooperation Agency
LR	Lloyds Register
MEC	Marshalls Energy Company
MFAT	New Zealand Ministry of Foreign Affairs and Trade
MICS	Marshall Islands Conservation Society
MIMA	Marshall Islands Mayors Association
MIMRA	Marshall Islands Marine Resources Authority
MISC	Marshall Islands Shipping Corporation
MOFA	Ministry of Foreign Affairs
MOE	Ministry of Education
MOTC	Ministry of Transport and Communications
MRD	Ministry of Resources and Development
MSTC	Micronesian Sustainable Transport Center
OEPPC	Office of Environmental Planning and Policy Coordination
PNA	Parties to Nauru Agreement
Portsmouth	Business School, Portsmouth University
PSIS	Pacific Smaller Island States
RMIPA	Republic of Marshall Islands Ports Authority
Southampton	University of Southampton
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environment Program
Tyndall	Tyndall Centre for Climate Change Research
UCL	Energy Institute, University College London
UNCTAD	UN Conference on Trade and Development
UNDP	UN Development Program
UNEP	UN Environment Program
UNESCAP	UN Economic and Social Commission for Asia and the Pacific
USAid	United States Agency for International Development
USP	University of the South Pacific
USP-MI	USP Marshall Islands Campus
WAM	Waan Aelon in Majel
WB	World Bank



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