Republic of the Marshall Islands
National Energy Policy and Energy Action Plan

VOLUME 2: ENERGY ACTION PLAN
(September 2009 – August 2012)

Majuro, September 2009

Introduction

The Republic of the Marshall Islands National Energy Policy of 2009 provides an overall framework for a shift toward more sustainable national use of energy. It emphasizes the procurement of petroleum fuel on better terms to reduce its financial cost and the reduction in the use of petroleum fuels through investments in renewal energy and increased energy efficiency. The policy begins with the following background chapters:

1. National Context and Economic Overview,
2. Overview of the Energy Sector, and
3. A Framework for National Energy Policy and Its Implementation

These are followed by six chapters covering sub-sectors of energy in which action is required. Each chapter includes a statement of Government policy, key issues or obstacles that hinder more rational energy use, specific objectives, and strategies to achieve the objectives.

4. Energy Policy Administration and Implementation,
5. Petroleum and Liquid Fuels,
6. Electric Power,
7. Transport and Energy Use,
8. Energy Efficiency, and
9. Renewable Energy

This Action Plan provides details of actions necessary to implement the national energy policies and strategies of chapter 4 through 9 of the policy. It includes specific activities, priorities, time required, possible funding sources, and a monitoring and evaluation (M&E) mechanism. Although this plan covers a period of 3 years, priorities, opportunities and constraints will inevitably change over time, sometimes quickly. The policy issues are likely to remain unchanged for some years but the Action Plan must be adjusted regularly to reflect current needs.

MRD and the ETF will review and amend as necessary this action plan during the third quarter of 2010. An action plan cannot be rigid. After one year, and every following year, the specific actions and timing will be reviewed through the ETF and updated as required. This will also form the basis for the annual work program of the Energy Planning Division of the Ministry of Resources and Development.

Explanatory Notes:

Prioritization of activities. In the following tables, activities are prioritized as follows:

Immediate	To be completed within four weeks of approval of the action plan
Very High	Activity which is very important and/or there is an opportunity for very significant gain; complete as soon as possible
High	Activity which is important and/or there is an opportunity for significant gain; complete as soon as practicable
Medium	To be completed during the time frame indicated

Time frame of activities. It is difficult to judge the timing of activities. Some may begin later than expected as MRD or external resources are delayed or unavailable. In many cases, an activity with preparatory work in 2009 or 2010 may not be complete for 3 or 4 years or more. In general, the timeframes are indicative and will be regularly revised as required. Time frames referred to are in Calendar Years, not Fiscal Years.

Monitoring and Evaluation. The action plan is an outline table summarizing what needs to be done, by whom and when. It does not specify a mechanism for monitoring and evaluation (M&E), which will differ according to the activity. Donor-supported activities generally have an M&E requirement specific to that donor. Regardless of the type of activity and source of funding, effective M&E requires the same sort of information. It is important that MRD specify and quantify as far as possible from the beginning the following information for each activity, so that MRD and the ETF can later judge progress, obstacles, the extent of success, and remedial actions, if required:

- A clear description of the baseline situation, against which to judge progress.
  (For example: There are 800 old street lights which use 250 watts each for an average of 6 hours daily. *****
- The objective(s) of the activity.
  (e.g. replace 75% of street lights within 12 months with energy efficient models that provide similar lighting levels.
- The outcomes of the activity.
  (e.g. a reduction of at least 67% in the use of electricity for street lighting in Majuro and Ebeye with overall net savings to MEC and KAJUR (initial costs and operating costs).
- The specific person and organization with prime responsibility; others who will support the activity.

***** These examples are illustrative only; they are not based on actual numbers.

The Annex. The annex to this action plan is a list of project proposals that have been prepared for a number of specific follow-up actions. These are available from MRD for comment. Although they will require some modification to meet the requirements of individual funding agencies, they provide the basic information donors will require before considering requests for assistance.

Acronyms and Abbreviations

ACP	African, Caribbean and Pacific countries
ADB	Asian Development Bank
ADMIRE	Action for the Development of Marshall Islands Renewable Energies (GEF/UNDP)
AG	Attorney General
AusAID	Australian Agency for International Development
CFL	Compact Fluorescent Light
CMI	College of the Marshall Islands
CNMI	Commonwealth of the Northern Mariana Islands
CROP	Council of Regional Organisations of the Pacific
DBEDT	Dept. of Business, Econ. Development & Tourism (Hawaii)
DSM	Demand Side Management (EE)
EC	European Commission
EC TCF	EC Technical Cooperation Fund under EDF envelope A
EDF10	10th European Development Fund (EC)
EDIN	International Partnership for Energy Development in Island Nations (USA, New Zealand, Iceland)
EE	Energy Efficiency
EIB	European Investment Bank
EPD	Energy Planning Division of MRD
EPPSO	Economic Policy, Planning and Statistics Office
ETF	Energy Task Force
FY	Fiscal Year (ends September 30th)
GEF	Global Environment Facility
IFC	International Finance Corporation
IUCN	International Union for the Conservation of Nature (World Conservation Union)
JICA	Japan International Cooperation Agency
KAJUR	Kwajalein Atoll Joint Utility Resource
LPG	Liquid Petroleum Gas (propane)
M&E	Monitoring and Evaluation
MEC	Marshalls Energy Company
MEPS	minimum energy performance standards
MFA	Ministry of Foreign Affairs
MIA	Ministry of Internal Affairs
MICS	Marshall Islands Conservation Society
MIDB	Marshall Islands Development Bank
MIJ	Marshall Islands Journal
MOE	Ministry of Education
MOF	Ministry of Finance
MPW	Ministry of Public Works
MRD	Ministry of Resources and Development
MTC	Ministry of Transportation & Communications

MAWC	Majuro Atoll Waste Company, Inc.
NGO	Non Governmental Organization(s)
NOAA	National Oceanic & Atmospheric Administration (USA)
NREL	National Renewable Energy Laboratory (USA)
O&M	Operations and Maintenance
OEPPC	Office of Environmental Planning and Policy Coordination
OTEC	Ocean Thermal Energy Conversion
PIFS	Pacific Islands Forum Secretariat
PPA	Pacific Power Association
PSC	Public Service Commission
PV	photovoltaic(s) = Solar Electric
RE	Renewable Energy
REEEP	Renewable Energy & Energy Efficiency Partnership
RMI EPA	RMI Environmental Protection Authority
SEFP	Sustainable Energy Financing Project (IFC)
SOPAC	South Pacific Applied Geosciences Commission
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
SSM	Supply Side Management (EE)
TA	Technical Assistance
TCF	Technical Cooperation Facility
UNDP	United Nations Development Program
UNIDO	UN Industrial Development Organization
USDOE	United States Department of Energy
USDOI /OIA	United States Department of Interior /Office of Insular Affairs
WB	World Bank

Energy Policy Administration and Implementation

Policy Statement

The Government of the Marshall Islands recognizes weaknesses in administering past energy policies and will:

develop and enforce laws and regulations necessary to provide MRD with the authority required for effective and transparent implementation of this policy, including electric power legislation, clear guidelines for the MEC board and management, and a consistent management system for all government renewable energy programs.

The table below, taken from the RMI 'Pacific Islands Renewable Energy Program' (PIREP) report summarized the main responsibilities for energy within government in 2004, particularly those related to policy. This remains reasonably valid in 2009 but omits a number of important links: 1) the role of the Ministry of Foreign Affairs in overall aid coordination; 2) the subsequent formation of the national Energy Task Force as a key advisory body reporting indirectly to Cabinet; 3) the power of the Ministry of Internal Affairs to set maximum retail margins for some products, including outer island petroleum fuels, and 4) the roles of the Ministry of Finance in the allocation of funds and as the formal link to development agencies active in the energy sector, including the Asian Development Bank and the World Bank. Other government agencies are of course also involved in energy.

Key RMI Government Energy Sector Responsibilities in 2009

Ministry of Resources and Development (MRD)	**Marshalls Energy Company** (MEC)	**Office of the President**	
Energy Planning Division (EPD)		**Economic Policy, Planning and Statistics Office** (EPPSO)	**Office of Environmental Planning and Policy Coordination** (OEPPC)
• Energy planning and coordination • Energy policy review & implementation • Public-private energy program partnership promotion • Investigation of energy service funding opportunities • Ensure standards, especially for solar equipment • Establish national energy database	• Electricity generation and distribution • Petroleum fuel purchase, storage and sales • RE installation, operation and maintenance	• Overall development policy • Energy sector finance • Donor liaison	• Environmental aspects of energy • Focal point for Kyoto protocol (GHGs) and GEF

Notes: A separate power utility (KAJUR) serves the second main urban center of Ebeye
The telecommunications, fisheries, education and health ministries are also involved in solar PV.

Because energy is an input to all government and private development efforts, there is inevitably a range of overlapping, fragmented and sometimes unclear energy sector responsibilities, and these responsibilities will change over time. In the Action Plan, there is therefore no attempt to provide one definitive organization chart showing responsibilities and linkages among key players. Instead, there are a series of charts which attempt to show these linkages within specific types of energy activities. Some of these will be *ad hoc*, some will change as activities are implemented, and some may be more-or-less permanent.

Although energy matters important to all sectors of the economy and all agencies of government, the human resources of RMI are modest; it is important that duplication of effort in the supply, distribution and regulation of energy be minimized. To achieve better coordination of energy-related activities, some legislation

needs amending or creation, regulatory activities clearly assigned and responsibilities for the several forms of government energy activities specified. The numerous detailed objectives and related strategies of chapter 4 of the national energy policy have been summarized as several broader objectives below, followed by specific actions to implement them.

Objective 1: To provide the necessary management, legal and regulatory structure for efficient and responsible management of energy supplies and services in the RMI.

Objective 2: To develop the information and capacity necessary to provide efficient and responsible management of energy supplies and services in the RMI.

Objective 1: To provide necessary management, legal & regulatory structure for efficient and responsible management of energy supplies and services in the RMI						
Activity * **(brief description &any links to other activities)**	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
1.1 Detailed review of all legislation, bylaws and regulations relating to energy activities in the RMI specifically including those relating to: a) Petroleum supply, storage, transport and distribution b) RMI electricity utilities and their activities c) Land, sea and domestic air transport d) Land use for renewable energy development and energy distribution e) Import duties, taxes and import regulations relating to fuels, renewable energy components, appliances, vehicles, boats, large pumps and other equipment that are major energy providers or users on the national scale.	**MRD**	**AG** **MOF** **MEC** **KAJUR** **RMI EPA** **MIA**	High	2009 Q4 to 2010 Q1	Preparation of a report with findings of legislation, regulations or bylaws that now have or may have in the future an effect on consistent and effective energy management.	estimated $85,000 World Bank TA
1.2 Based on the 1.1 Review, prepare amendments or new legislation, regulations and bylaws to clearly delineate responsibilities and structures for energy supply, distribution and their management (continuation of 1.1. under the same project)	**MRD**	**AG** **Nitijela** **MEC** **MIA**	High	2010 Q2	Completion of draft regulations, legislation and bylaws as noted by the review	Continuation of 1.1
1.3 Confirm ETF membership to include at least one representative from each Ministry as well as the existing membership. Prepare clear terms of reference for the ETF to include coordination of energy related efforts and improving energy efficiency within government	**MRD**	**ETF** **All Ministries**	Immediate	2009 Q4	Participation in the expanded ETF	No additional budget required
1.4 Determine the human resources needed to effectively implement the revised legislation, regulations and bylaws.	**MRD**	**MEC/KAJUR** **ETF PSC** **MOF MIA**	High	2010 Q3	Recruitment and training of personnel needed to perform the tasks required under the new legislation, regulations and bylaws	ADMIRE Internal Budget
1.5 Create and fill the positions needed. Develop a capacity building program where needed, prepare project document (if needed) for capacity building.	**as above**	**as above**	High	2010 Q4	Positions filled	as above

Objective 1: To provide necessary management, legal & regulatory structure for efficient and responsible management of energy supplies and services in the RMI						
Activity * **(brief description &any links to other activities)**	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
1.6 Develop energy related performance measures for government ministries and agencies, internally or with technical assistance if needed. Participate in the budget reform process, advocating performance-based budgeting with energy criteria as performance measures for each government ministry and agency	**MRD**	**MOF** **All departments involved in the budget reform process**	depends on timing of, and progress with, overall govt. budget reform	2010 Q1	Development of clear & easy to implement guidelines; incorporation of these into the budget process	Internal with possible ADB assistance

Note: The activities necessary to implement some the strategies listed in chapter 4 of the Energy Policy are dealt with in later sections of this action plan. Many activities relate to more than one aspect of energy – administration, power, fuel, renewable, etc. –. and can logically fit within various headings.

Objective 2: To develop the information and capacity necessary to provide efficient and responsible management of energy supplies and services in the RMI						
Activity (brief description & any links to other activities)	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
2.1 Develop MRD Energy Planning Division Annual Work Plan, based on this action plan, with clear objectives, priorities, persons responsible, and timeframe. If necessary, review and amend Action Plan according to resources available.	**MRD**	**ETF** **All Ministries** **MEC**	Very High	2009 Q4	Completion of work plan. Implementation of work plan.	Internal
2.2 Develop an energy sector database (or databases) suitable for comprehensive planning and implementation of energy activities, with regular updates. [See Project Proposal 5 in Annex]	**MRD**	**MEC/KAJUR** **EPPSO** **fuel importers** **MOF MFA**	Very high	Begin 2009 Q4; initial database in 2009	Existence of database with fuel imports by product, volume & value; MEC / KAJUR production, sales and costs & other info to be determined	Budget unknown Probably SPC/SOPAC and possibly others
2.3 Maintain database/matrix of funding opportunities from donors and development agencies	**MFA with MRD**	**ETF**	Ongoing	quarterly	Continued production of the MFA matrix	none required

Objective 2: To develop the information and capacity necessary to provide efficient and responsible management of energy supplies and services in the RMI						
Activity (brief description & any links to other activities)	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
2.4 Independent assessment of organizational changes (MRD, possibly other ministries, MEC) that may be necessary to implement the energy policy	**PSC** **MEC board**	**MRD** **MOF** **KAJUR**	High	2010 Q1	Assessment reports	Budget unknown MRD: SPC/SOPAC MEC: World Bank TA
2.5 a) Preparation of a concept paper by MRD on the functions and priorities of the proposed Micronesia Energy Challenge; and b) Inputs to revisions to the Pacific Islands Regional Energy Policy and Plan to incorporate sub-regional perspective for Micronesia	**MRD**	**AG** **Nitijela** **MEC** **MIA** **SPC**	Medium	a) 2009 Q3 b) to be determined	a) Completion of the concept paper b) input to Micronesia Energy Challenge on sub-regional issues for submission to SPC for revised regional policy	Only staff time required; no additional budget
2.6 Informal training of Energy Division staff through Energy Adviser, their inclusions in RE/EE training, and possible diploma or degree level training in energy	**MRD**	**CMI and AusAID Adviser**	Immediate and Ongoing	from 2009 Q3	Training completed and brief reports provided to Sec of MRD	No added budget required

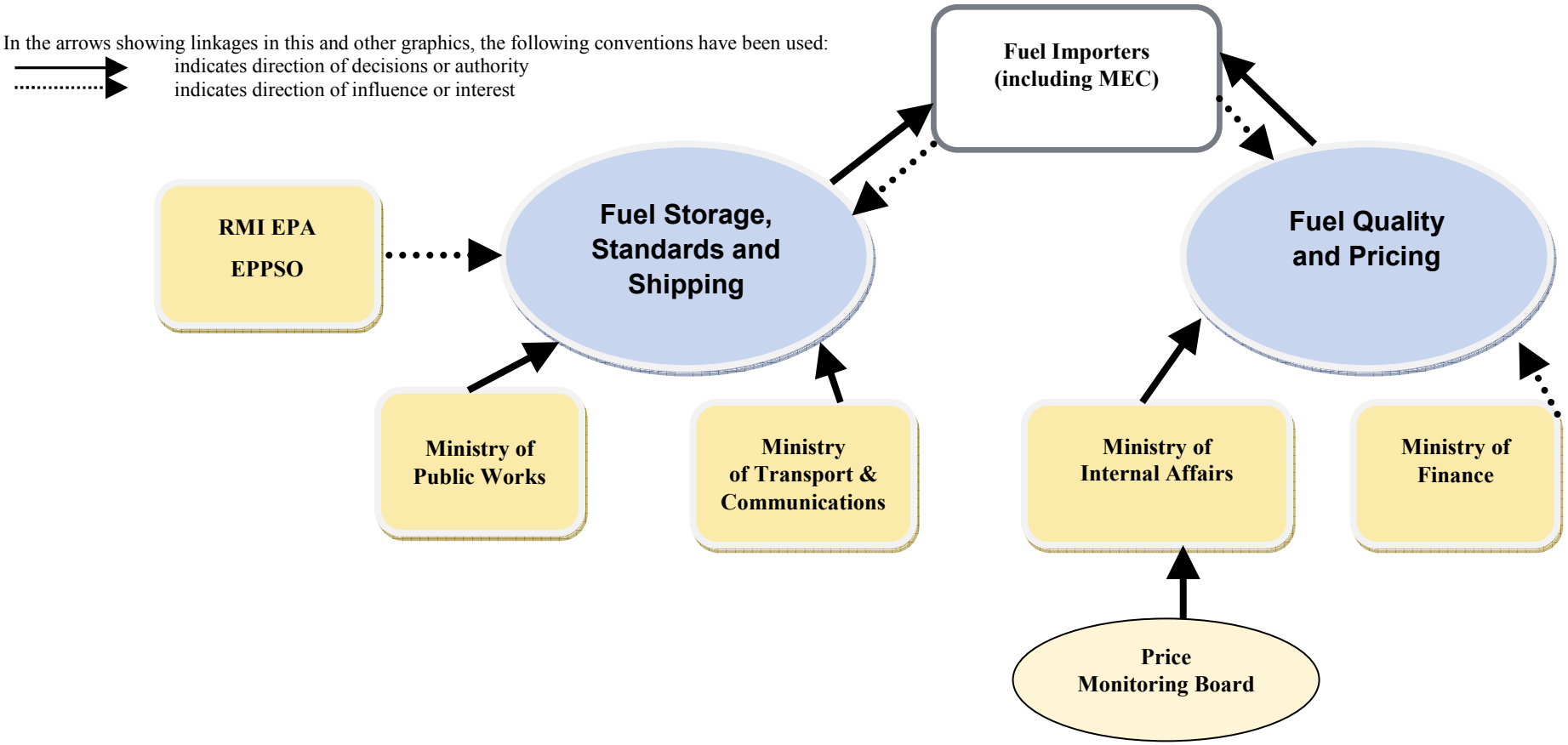
Petroleum and Liquid Fuels

Policy Statement

The Government of the Marshall Islands recognizes that nearly total national dependence on imported petroleum fuels results in great social and economic vulnerability. It will:

develop and enforce international standards for the storage, handling and transport of petroleum products; develop a mechanism for obtaining competitive fuel prices and monitor results; ensure that there are fair wholesale and retail fuel prices; require suppliers as a part of the supply contract to provide monthly data on imports and sales by product; and place high priority on developing the infrastructure and capacity to process coconut oil for use as a petroleum fuel replacement.

The responsibilities regarding petroleum standards and pricing are summarized below. However, some existing legislation and regulations have not always been adequately enforced and some need to be assessed and revised so that enforcement becomes practical.



As the text and diagram on the previous page suggest, there are two key objectives for petroleum fuels:

Objective 1: To develop to assure high quality fuel products, their storage and their transportation within the RMI

Objective 2: To develop effective mechanisms for fair import prices of petroleum fuels and equitable pricing of fuel products throughout the RMI

Objective 1: To develop to assure high quality fuel products, their storage and their transportation within the RMI						
Activity * (brief description &any links to other activities)	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
1.1 Arrange an independent valuation of the MEC tank farm and MEC's bunkering operations	**MOF with MRD**	**MEC**	High	Immediate	Completion of report with costs & benefits to RMI & MEC of the tank farm	Budget unknown Requested from WB
1.2 Develop mechanism (including associated legal tools) for inspection and certification of storage, handling and safety procedures and licensing of petroleum storage and distribution facilities	**MPW**	**MEC/KAJUR** **MRD** **MOF** **RMI EPA**	Medium	2010	Completion and adoption of the standards and legal tools; clear responsibility for enforcement	Possibly SPC with WB support
1.3 Obtain professional advice on the quality and suitability of fuels imported into RMI and any biofuels produced locally. Develop standards if required.	**MIA**	**MEC** **RMI EPA**	Medium	2010	Paper assessing the quality of fuels imported or produced locally; Production and enforcement of any standards developed	Budget unknown Probably SPC &/or SOPAC

Note: * By mid 2009, TOR had been completed for several aspects of petroleum supply studies including MEC supply contracts and general RMI supply, (independent MEC and Government consultancies), and MEC storage issues (for WB). Project proposal 2 in the Annex is the proposed WB study. Details are available from MRD.
The PIFS currently (mid 2009) retains CROP agency responsibility for petroleum fuel matters (bulk fuel purchase) but the SPC is expected to assume responsibility for all aspects of petroleum policy from early 2010. In late 2009, SOPAC may produce the regional quarterly petroleum pricing monitor formerly done by PIFS.
In the event of local production of biofuels, this will be included in all fuel data and in any fuel pricing mechanism developed.

Objective 2: To develop effective mechanisms for fair import prices of petroleum fuels and equitable pricing of fuel products						
Activity * (brief description &any links to other activities)	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
2.1 Obtain independent advice on tendering, negotiating and monitoring of petroleum supply contracts, including likely costs and benefits of participation in the proposed bulk fuel purchase scheme	**Cabinet Office MEC**	**MIA MRD Fuel Importers**	High	2009 Q4	Production of report and implementation of an improved pricing structure	Internal
2.2 Arrange training of RMI personnel in petroleum supply contracting and monitoring	**MIA**	**MEC**	Medium	2010-2011	Govt. staff trained in fuel contracting and price monitoring	PIFS / SPC Possibly others
2.3 Arrange an independent study to evaluate gasoline, diesel fuel, kerosene and propane pricing on Majuro, Ebeye and outer atolls to determine the fairness of current arrangements, the effectiveness of price control legislation, and the benefits and costs of a mechanism to establish maximum wholesale and retail price margins. Amend legislation as required to provide transparent and equitable fuel pricing and price monitoring for RMI	**Cabinet Office MIA**	**MEC Fuel Importers MRD**	Very High	2009 Q4	Completion of study; amendment of legislation as required; implementation of new mechanisms	Unknown Initially WB, Govt of RMI & MEC Probably SPC later
2.4 Develop regulations requiring all petroleum importers to provide quarterly reports (to MRD & EPPSO (in addition to Customs reporting requirements) on volumes of each type of fuel imported and sold. Enforce the regulations.	**MRD with EPPSO**	**MOF all Fuel Importers**	High	2010 Q1	Regulations developed and used; information regularly being provided by importers	Internal
2.5 Provide information quarterly to EPPSO on landed, wholesale, and retail prices of each type of fuel and to SOPAC/SPC * for incorporation into the quarterly regional fuel price monitor.	**MRD with MIA**	**MOF Fuel Importers**	Ongoing	as soon as fuel price monitor is produced	Provision of data to SOPAC or the relevant CROP agency	None
2.6 Arrange independent study of the technical, economic, environmental (including GHG implications) and financial practicality of developing local coconut based biofuels with varying assumptions regarding the landed cost of petroleum fuels	**MRD**	**MEC, MOF MTC RMI EPA TOBOLAR OEPPC Fuel importers**	Medium	2010	Study completed. If viable funds allocated for trials	ADMIRE SOPAC/SPC or possibly UNIDO support

Notes: * See note under Objective 5.1. In addition, it is expected that changes to the price control legislation will be required.

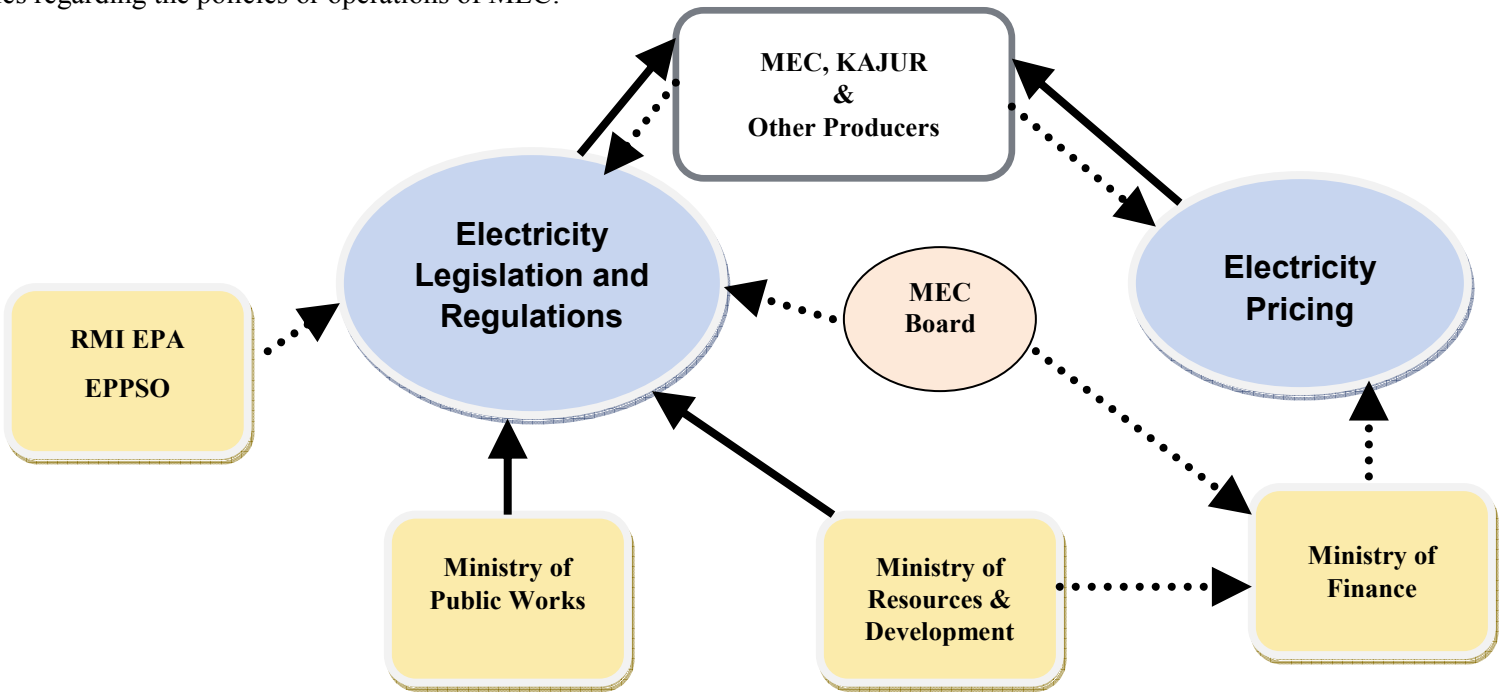
Electric Power

Policy statement

The Government of the Marshall Islands recognizes the importance of electrifying all households on all islands with sustainable and environmentally appropriate energy supplies. The Government will develop and enforce:

clear and equitable electricity tariffs, laws and regulations necessary to provide MRD with the authority required for effective and transparent implementation of this policy including electric power legislation, clear guidelines for the MEC board, mechanisms for allowing renewable energy to feed into the grid, and a consistent management system for all government renewable energy programs

The broad relationships indicating grid-connected electric power responsibility are shown below. MRD, despite responsibility for energy overall, has no direct responsibilities regarding the policies or operations of MEC:



The RMI has had a reasonable quality of power supply for many years in Majuro and a substantially improved service recently in Ebeye. However there has been some concern, whether fairly or not, within Cabinet about the management of MEC and the costs of electric power supply. Therefore, an independent and transparent review will be carried out of MEC's management and financial operations as a high priority. This review is implicitly included within the broader actions to be undertaken under chapter 4 "Energy Policy Administration and Implementation" but is spelled out further in this chapter. The findings are expected to form the basis for any necessary changes to legislation, regulations and guidelines.

There has been an increase in recent years in electrification in outer islands through solar PV, with household systems managed by MEC and others by various ministries, but without out any consistent management and financial framework for sustainability. A better management framework is necessary to improve operations of both existing systems and the new systems required to complete the electrification of 100% of all households desiring service. Therefore the management of solar PV in the RMI will also be reviewed, but this is covered in chapter 9, Renewable Energy.

The electric power sector objectives of the energy policy are summarized as follows for the purposes of follow-up actions:

Objective 1: To reduce MEC supply side energy losses by 20% of 2009 levels by 2015, consistent with sound technical and financial criteria.

Objective 2: Clear mechanisms and responsibilities for effective urban power supply

Objective 1: Reduction of MEC supply side losses by 20% of 2009 levels by 2015, consistent with sound technical & financial criteria						
Activity (brief description &any links to other activities)	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
1.1 Arrange independent study of actual MEC and KAJUR supply-side losses, and set a reasonable target and timeframe to reduce losses	**MEC Board**	**MRD MOF**	High	2009 Q4 *	Completion of measurements and the study	Unknown cost PPA, ADB
1.2 Carry out a supply-side loss reduction program within MEC and, if it is financially and economically practical, KAJUR	**MEC KAJUR**	**MOF**	High	2010-2012	Actual loss reductions in per cent	Cannot accurately estimate costs until studies completed. Some internal MEC funds; Possibly USDOI/OIA and others

Note: * Timing is dependent on PPA/ADB

Objective 2: Clear mechanism and responsibilities for effective urban power supply						
Activity (brief description &any links to other activities)	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
2.1 Develop legislation, regulations, etc. that clearly define the authority, obligations and responsibilities for electric power supply in Majuro and throughout the RMI [See Project Proposal 2 in the Annex]*	**Cabinet Office & MEC Board**	**MOF MPW MRD**	High	2009 Q4 to 2010 Q1	Legislation developed and adopted	Possibly WB as follow up to proposed 2009 study *
2.2 Develop clear rules and guidelines for the MEC board including membership and a staff handbook	**MPW with MRD**	**MEC Board Cabinet Office**	High	2009 Q4 to 2010 Q1	Board and staff rules etc developed and disseminated to members. MRD represented on MEC board.	Minimal cost Possibly WB as follow-up to 1.1 above.
2.3 Regular and timely production of MEC annual technical and operational reports	**MEC**	**MRD ETF**	Medium - High	2009 report by 2010 Q2	Production of informative, timely reports	internal budget Possibly PPA assistance
2.4 Development of technical guidelines and regulations for grid connected self-generation through renewable energy sources, pre-paid metering, and feed-in tariffs	**MEC Board**	**MRD ETF**	High	2010 Q2	Practical guidelines produced & implemented	EC UNDP Consultancy through SPC
2.5 Study to develop new tariff formula for MEC and utilities it manages based on actual costs on each island and incorporating a lifeline tariff that genuinely assists the bottom 20% of MEC consumers	**MRD with MEC**	**Finance Business Community**	High	2009 Q4	An appropriate new tariff system developed and put into operation	Low cost. WB follow-up to study
2.6 Production of RMI's national greenhouse gas inventory and report, including coverage of benefits and costs of energy efficiency and renewable energy	**OEPPC**	**MRD MEC**	Medium	dependent on OEPPC priorities	Completion of report	Unknown ADMIRE or other GEF support

Note: * Submitted to the WB for consideration. Details are available from the MOF or MRD.

It is expected that MRD will have a place on the MEC board as a result of board membership will change with MRD as a member.

Transport and Energy Use

Policy Statement

The Government of the Marshall Islands recognizes that land, sea and air transport is the largest user of imported energy in the country and measures to improve the energy efficiency of transport are at the core of an energy policy that focuses on reducing foreign energy dependence. It will:

take the lead in the procurement of more efficient vehicles, ships and boats, and establish rules for improved maintenance and operations with the goal of improving transport efficiency and lowering imported transport fuels by 20% by 2020

adjust tax structures to encourage the import and sale of energy efficient forms of transport; and

mandate the use of locally produced biofuel in diesel powered government vehicles by 2015.

The goal of the energy policy is to lower the amount of fuel imported for transport by 20% by 2020 relative to a 2009 baseline. Three types of efforts can help meet this goal: (1) improved average vehicle fuel efficiency in miles per gallon (mpg) of fuel used; (2) improved efficiency of management of vehicles through increased average passenger mpg of fuel or, for freight carrying vehicles, increased average ton mpg; and (3) replacement of imported fuel by locally produced biofuel.

Land, sea and domestic air transport is the largest user of imported fuel in the RMI. The quality of life and the economic survival of outer island residents is tied strongly to the cost of transporting goods and people to and from Majuro, Ebeye and other islands. It is especially important that the fuel efficiency of sea transport be improved both through technical means and through improved management of the available facilities.

Land transport fuel is mostly used for transporting people from place to place with efficiency gains both through improved vehicular efficiencies and through higher occupancy of transport vehicles.

Some of the improvement can come from better fuel efficiency brought about by improved maintenance of the existing vehicle stock. A project is proposed to develop private sector vehicle testing and basic car maintenance facilities, with equipment and personnel training provided under donor funding. Initially, testing and maintenance would be voluntary, with vehicle owners participating because they expect lowered operating costs. The testing process will later be extended to include emissions testing and become mandatory no later than 2015. The testing and maintenance process will be mandatory for government vehicles, and vehicles owned by government-owned corporations, from the time of initiation of the program.

Much of the improvement will have to come from replacing existing vehicles with more fuel efficient models which is a slow process. Thus the goal cannot be reached immediately. In particular, 100 per cent of vehicles used in public transport, mainly private taxis and mini-buses, should be mandated to be high fuel efficiency models within 10 years. If this goal is to be reached, all regulations and actions encouraging replacement of gasoline powered low efficiency vehicles with high efficiency hybrids and diesel powered vehicles and mandating improvement in the public transport fleet must come into force immediately (i.e. during 2009) so people can plan for vehicle replacement.

For improving sea transport efficiency, improved management of existing ships to optimize fuel use can provide a reduction in fuel import requirements. The ultimate replacement of existing shipping with high fuel efficiency vessels specifically designed for the type of transport service needed in RMI can dramatically improve sea transport efficiency. For personal and local transport the replacement of low efficiency outboard motors with higher efficiency outboards and inboards is practical provided users have access to a seller of the equipment and finance for its purchase. Where diesel engines are used, the use of island produced biofuel for local sea transport and the addition of sail supplementation for fishing and lagoon transport can further reduce the need for imported fuel for sea transport.

The numerous detailed objectives of chapter 7 of the national energy policy have been summarized as a single objective below, with the strategies rephrased, followed by specific actions to implement each strategy:

Objective: To lower the amount of fuel imported for transport use by 20% from the 2009 baseline by 2020

Objective: By 2020 to lower the amount of fuel imported for transport use by 20% from the 2009 baseline level						
Strategy 1: Improve the basic fuel efficiency of the government fleet						
Activity (brief description &any links to other activities)	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
1.1 Where available for the type of service required, all vehicles purchased by the RMI government and government-owned companies must have diesel engines or be highly efficient hybrids.	**MPW**	**All ministries MEC/KAJUR other state-owned enterprises**	High	Immediate through Executive Order	Issuance of and compliance with the EO	Internal
Strategy 2 Encourage the private sector to purchase fuel efficient vehicles when replacing existing vehicles						
2.1 Adjust transport fuel duties and taxation so that gasoline is always significantly more expensive than diesel fuel for vehicle use (as it is now) to encourage the purchase of diesel vehicles in the private sector	**MOF**	**MRD**	High	Immediately when gasoline consumer price falls below diesel	Relative wholesale and retail price of gasoline and diesel fuel	Internal
2.2 Mandate that by 2019 all public transport vehicles (buses, boats and taxis) be diesel powered or comparably high fuel efficiency gasoline powered models	**MTC**		Medium	Immediate issuance of regulation	Issuance and compliance	Internal
Strategy 3. Improve transport fuel efficiency through improved maintenance						
3.1 Develop a program for gasoline powered vehicle testing and maintenance in cooperation with Ministry of Public Works and private sector vehicle repair facilities. Program to utilize standard testing procedures, and includes the provision of testing equipment and training of personnel in the testing and repair process. Testing and maintenance to be voluntary for private vehicles until 2015 when annual testing will become mandatory	**MTC**	**MPW OEPPC RMI EPA**	Medium	2010 Q3	Number of vehicles per month tested and scheduled for maintenance	to be determined

Objective: By 2020, to lower the amount of fuel imported for transport use by 20% from the 2009 baseline level						
Strategy 4 Reduce imported fuel through substitution with biofuels						
Activity (brief description &any links to other activities)	**Organization(s) Responsible**		**Activity Priority**	**Time Frame for Initiation**	**Performance Indicators**	**Budget and Potential Source**
	Lead Agency	**Participating or Supporting**				
4.1 Where available for the type of service required, all vehicles purchased by the RMI government and government-owned companies must have diesel engines or be highly efficient hybrids.	**MPW**	**All ministries MEC/KAJUR other state-owned enterprises**	High	Immediate through Executive Order	Issuance of and compliance with the EO	Internal
4.2 Mandate that all diesel powered government vehicles will use locally made coconut based biofuel (to the extent it is available) by 2015. Must be linked to the renewable energy project for the increased production of locally sourced biofuel	**MTC**	**MOF MPW MRD**	Medium	Immediate through Executive Order	Issuance of and compliance with the EO	Internal
Strategy 5 Reduce sea transport fuel use						
5.1 Engage shipping consultants to determine the process to be followed for scheduling and managing outer island shipping in a manner that minimizes fuel use while maintaining adequate transport activity. Included would be recommendations for the type and characteristics of ships to replace the existing fleet when retiring existing ships. Implement the recommendations.	**MTC**	**MOF MIA**	Medium	2010 Q2	Receipt of useable scheduling and management procedures to follow. Implementation of recommendations	ADB/WB
5.2 Investigate the feasibility of utilizing diesel powered outboard and inboard engines that can run on locally produced biofuel to replace existing gasoline powered units for fishing and short haul transport. If technically feasible the consultants would prepare a project that can encourage diesels for replacement of existing gasoline engines through favorable term financing and incentives.	**MTC**	**MIA MOF USDA MIDB**	Medium	2010	Feasibility study report. Preparation of project documents.	ADMIRE
5.3 Develop programs to encourage the use of wind supplementation for intra-atoll transport and lagoon fishing	**MTC**	**OEPPC**	Medium	2010	Number of sail assisted vessels operating in the lagoons	ADMIRE

Energy Efficiency

Policy Statement

The Government of the Marshall Islands recognizes that improving the efficiency of energy use has greater short term value for reducing dependence on foreign sources of energy than any other action. The MRD will develop an energy management plan for government, including processes for its implementation and monitoring. Government will:

- ***revise taxes to encourage the import and sale of appliances, vehicles and boats having the highest energy efficiency;***
- ***develop energy efficiency standards for new buildings and renovations including homes, businesses and government premises, with financing on subsidized terms for designs and construction meeting the standards;***
- ***carry out energy audits on government facilities, with the responsible departments each developing and submitting an investment plan for the capitalization of energy efficiency improvements for the facilities; and***
- ***require government departments to each name an energy manager who will develop and implement an energy management plan. Monitoring will be by MRD and annual reports detailing energy usage will be submitted.***

Energy efficiency improvements are the first and most effective actions to take for reducing fossil fuel use. Every sector can save 15% or more of electricity use without any major investment, degradation of quality of life or lower effectiveness of services. Attention to detail, the use of energy efficient equipment and an understanding of the actions needed are the main paths to successful reduction in energy use by households, businesses and government. This initial action plan focuses on determining where waste occurs, practical measures to improve efficiency, acceptable terms financing for any investment needed, education and management of electrical energy use.

In the RMI a particularly inefficient use of energy is for air-conditioning. Much, and in some cases all, of the energy used for air-conditioning can be saved if simple measures are carried out. These include adding relatively inexpensive heat transfer barriers under building roofs, decreasing the absorption of solar energy through white and reflective building surface coatings, shading air-conditioner condenser units, adding shading or reflective films for east and west facing windows, adding ceiling fans to increase personal comfort and replacing inefficient air-conditioners with high efficiency units. Buildings constructed using designs that provide a high level of energy efficiency can provide comfortable living with no air-conditioning at all. The action plan therefore has a strong focus on reducing air-conditioning loads and on providing affordable finance for the investments needed to make those actions work. For long term improvement in building energy efficiency, building codes and standards that promote energy efficiency are listed actions. Likewise, for new homebuilders and renovators actions include a financing program that can provide housing with improved energy efficiency at a monthly cost that is no greater than the reduced expenditure on energy thereby maintaining a constant cash flow for energy related expenditures.

Appliances in general, in particular air-conditioners, refrigerators and freezers, are available in RMI in a wide range of efficiencies with cheap Chinese made units very poor in efficiency as well as high quality, brand name Energy Star rated units available at typically a higher purchase price. Attempts have been made in numerous countries to mandate the energy efficiency of consumer appliances but without a substantial local infrastructure for testing, regulation and inspection those measures are not likely to succeed. For small island countries, raising import duties and taxes of inefficient equipment to a level that makes high efficiency equipment competitive in the market place probably has a better chance of success than mandatory labeling. Taxation of lower efficiency appliances also makes good economic sense since their import costs the nation in a number of ways and the taxes help recover some of those costs. A program to provide favorable finance for the efficient appliances is an important incentive to consumers and is included as an action. Voluntary labeling indicating appliance efficiency clearly is useful for consumer choice but only if the label is accurate and relates to the conditions of use in the RMI. The labeling schemes used in the various countries likely to export appliances to the RMI are not appropriate. If labeling is to be used, a local stick-on label that "translates" the label provided by the country of

origin needs to be used. For example, US energy efficiency tags show an expected annual energy cost for the appliance that send a very incorrect message to the RMI buyer. The US cost estimate of energy use is based on a much lower cost of electricity than the cost in the RMI. The annual energy cost to the RMI consumer may be four or more times larger than the number shown on the US label and to be useful to the consumer in decision making that needs to be corrected. With the relatively small turnover of major appliances in the RMI, the addition of local labels when new inventory is received should not be a major problem.

Government is a major but not a very efficient energy user. It is important that Government set an example for businesses and households by reducing the demand for imported fuel both directly as a user of petroleum products and indirectly through the reduced use of diesel-generated electricity. This action plan focuses on initiating in the short term the processes needed to reach the policy goal of 40% reduction of fossil fuels used by Government by 2020. The renewable energy section of the action plan provides for offsetting fossil fuel imports through solar and other renewable energies, the transport section provides for reducing the dependence on fossil fuels for land and sea transport and this energy efficiency section provides for reducing Government's fossil fuel use through increased efficiency of energy use in Government. The primary approach used is to make each Government Department individually responsible for its energy use and for improving energy efficiency. This approach has been used in other Pacific Islands with varying levels of success depending on how serious the Finance Ministry and other Ministry heads are regarding energy efficiency and how budgets are managed. The effectiveness of this approach is reduced if individual departments must return funds to the Treasury that were budgeted for energy and were not expended due to efficiency improvements. This is a disincentive for energy efficiency. For the process to be effective departments that come in under-budget on energy expenditures should be allowed to shift the left over funds to other areas within the departmental budget rather than penalizing the department for lowering energy expenditures below those budgeted.

Because of the complexity of government energy usage, actions to increase the efficiency of government energy use will be based on a government-wide energy audit carried out by a professional auditing firm familiar with tropical island systems.

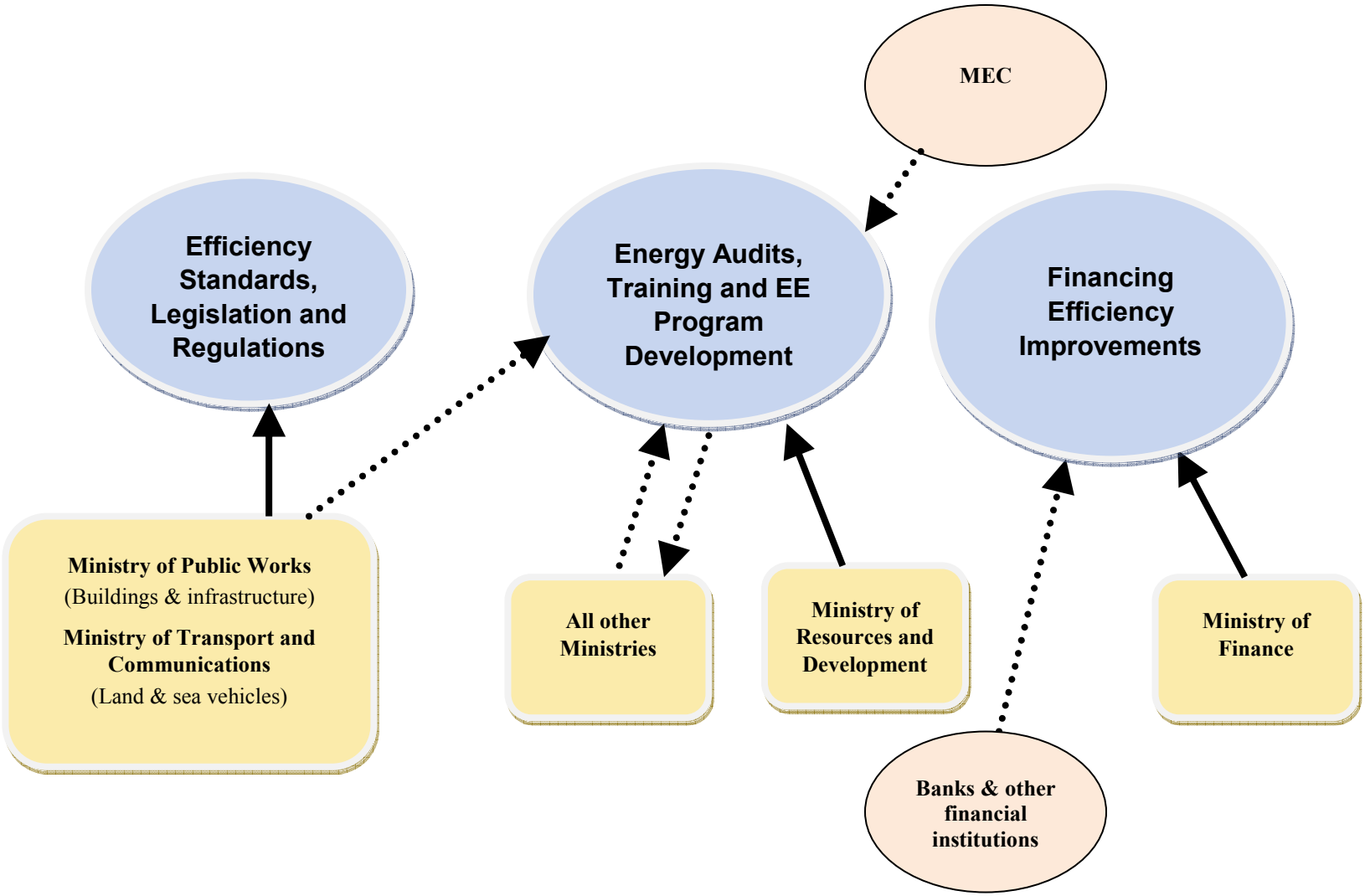
At the core of all programs for general improvement of national energy efficiency is increasing public awareness of both the value that energy efficiency provides individuals and the opportunities that exist for personal action. However, these actions should not be carried out in isolation. The process of gaining public attention is vital but once the attention is focused on energy efficiency, there needs to be a process available to guide and support individuals and businesses in taking the appropriate actions.

Effective public awareness programs are multifaceted. It has been shown elsewhere that public information effectiveness increases with the increasing number of channels used for distributing information; so all forms of public media available in RMI need to be used. Also public awareness fades rapidly if awareness programs are not continued for the long term making it necessary to create a semi-permanent work structure for the preparation and distribution of public awareness information. News articles, particularly those showing some local activity or experience that relates to improved energy efficiency, are generally more effective than paid advertisements, posters or flyers – although those are useful for maintaining the public's attention. So attention should be given to keeping the news media informed of actions or events relating to energy. Finally, including kiosks focusing on energy efficiency at fairs and special public events are another effective approach for keeping public attention on energy efficiency actions particularly if low cost free items are offered to those who stop by the kiosk (e.g. posters, stickers for light switches, key chains, etc.).

Since the students of today are the decision makers of tomorrow, the action plan includes educational programs for middle school, high school and tertiary school students. Besides the long term benefits of the student exposure to energy efficiency issues and actions, student bring those ideas home with them and provide family education through school homework that includes home energy audits, interviews with family members about energy and personal actions by the student to improve home energy efficiency.

The actions focus on improved efficiency rather than conservation. Conservation has a connotation of making do with less or accepting increased discomfort whereas efficiency means doing more and often doing better with less energy and money.

Currently, there is no clear responsibility for energy efficiency activities in the RMI. Experience elsewhere suggests that power utilities can be supportive but are unlikely to initiate and carry out a substantive program, because of other priorities and the impact on revenue. The government should take the lead.



Activity (brief description &any links to other activities)	Organization(s) Responsible		Activity Priority	Time Frame for Initiation	Performance Indicators	Budget and Source
	Lead Agency	Participating or Supporting				
Strategy 1: Revise taxation system to encourage the import of energy efficient air-conditioners / major household appliances & introduce mandatory standards and labelling system						
1.1 Survey retailers to determine source of air-conditioners, refrigerators and freezers by country imported for sale to the public, the standards followed for efficiency labelling (if any), and the price variations for varying efficiency.	**MRD**	**MOF** **EPPSO** **Importers and Retailers**	High	Q1-2010	A report showing: 1) relative numbers of different types of air-conditioners, refrigerators and freezers that are available for purchase, their relative energy efficiency, country of origin and relative price. 2) retail price variation according to energy efficiency of air-conditioners, refrigerators and freezers for equipment available for import by local retailers 3) Efficiency labelling system used (if any) for imported appliances	ADMIRE and Internal
1.2 Amend sales and/or import taxes as appropriate to raise the selling price of low efficiency air-conditioners, refrigerators and freezers to become relatively equal to those of comparable models of appliances that have high efficiency ratings	**MOF**	**MRD** **EPPSO** **Importers and Retailers**	High	2010 Q3	Relative change (improvement) in percentage of appliances sold that are energy efficient	Internal
Strategy 2: Develop energy efficiency standards for new buildings and renovations including homes, businesses and government premises, with financing on subsidized terms for designs and construction/renovation meeting the standards						
2.1 Research energy codes and standards for buildings currently used by other tropical island nations specifically including those used by the Development Bank of Palau and the Government of CNMI and those being promoted by Hawaii state energy officials for US Pacific territories	**MRD**	**MPW** **MIDB** **USDA** **Hawaii DBEDT**	High	Immediate	Report on tropical energy codes for island buildings as currently implemented and appropriateness for the RMI	ADMIRE and Internal
5.2.2 Form a building codes task force and engage a consultant to prepare draft energy codes/guidelines for new building construction and building renovation appropriate to the type of building construction used in RMI	**MRD**	**MPW** **Private Contractors** **MIA**	High	2010 Q2	Completion of draft energy code/standards/guidelines for construction and renovation of buildings	ADMIRE UNDP Internal
5.2.3 Develop and implement construction finance program that provides incentives for the construction of energy efficient buildings and for the renovation of buildings to include improved energy efficiency (incentives may be lower interest rates, partial payment of the cost of including energy efficiency features, longer terms for finance, etc.)	**RMI Banks**	**MRD**	High	2011 Q1	Percentage of buildings constructed and renovated that meet the energy efficiency codes/standards/guidelines	WB (Commercial Banks) EIB (MIDB) EC

Activity (brief description &any links to other activities)	Organization(s) Responsible		Activity Priority	Time Frame for Initiation	Performance Indicators	Budget and Source
	Lead Agency	Participating or Supporting				
Strategy 3: Carry out energy audits on government facilities, with the responsible departments each developing and submitting an investment plan for the capitalization of energy efficiency improvements for the facilities [See Project Proposal 7 in the Annex]						
3.1 Engage a professional energy audit firm experienced in tropical facility energy audits to carry out a detailed energy audit of all government buildings, water system and sewage system facilities and recommend changes including priorities, investment required and payback periods for each recommended action	**MRD/MPW**	**All Government Agencies**	High	2009 Q4	Completion report	WB/ADB $150,000
3.2 Arrange a low interest loan to government to carry out the investments that have a payback time of seven years or less	**MOF**	**MRD**	High	2010 Q4	Percentage of recommended investments in the auditor's report that have 7 years or less payback time that are actually completed	Depends on audit findings but probably millions of $ WB/ADB
Strategy 4: require each government department to appoint an energy manager who will develop and implement an energy management plan.						
4.1: Develop an energy management plan for national government that includes the following points: 1. Each department has a person designated as responsible for maintaining and improving energy efficiency in departmental facilities and transport 2. Provide training for departmental energy managers and require periodic reporting and training upgrades 3. Require departments to directly pay energy bills from their own budgets but if a surplus is left in the energy budget allow that surplus to be used by the department, not sent back to Treasury. 4. Showcase a different department every month in the newspaper (MIJ) showing the public how that department is upgrading its efficiency	**MRD**	**All Government Departments**	High	2009 Q4	1. Participation by departments in trainings and meetings 2. Reductions in energy used relative to the baseline (as adjusted for the addition or retirement of facilities). Baseline refigured at the beginning of each fiscal year Monitoring will be by MRD and annual reports detailing energy usage and changes in energy usage from the last baseline will be prepared and circulated**.**	Internal

Activity (brief description &any links to other activities)	Organization(s) Responsible		Activity Priority	Time Frame for Initiation	Performance Indicators	Budget and Source
	Lead Agency	Participating or Supporting				
Strategy 5: Carry out training, energy audits and efficiency improvements within households [See Project Proposals 6 and 9 in the Annex]						
5.1 Arrange training for contractors and importers in low cost energy efficiency improvements in air-conditioned homes and implement retrofits in five homes	**MRD**	**Contractors** **Importers** **General Public** **Media**	High	2010 Q4	Training completed and five homes renovated with improved energy efficiency	$10,000 Possibly EC or REEEP
5.2 Based on results of 5.1 above, develop and implement a program to improve energy efficiency in 25% of all Majuro and Ebeye homes	**MRD**	**As above plus RMI banks**	High	2010 Q2	During this plan period, program developed and well underway, with demonstrated energy efficiency improvements in homes	About $0.8 m
Strategy 6: Engage the public in energy efficiency improvement [See Project Proposal 10 in the Annex]						
6.1 Public events and information services 1. Continue organizing events highlighting energy efficiency and regularly include energy efficiency kiosks at general holiday and other special events (e.g. Earth Day). Arrange news coverage for the events in all media 2. Arrange special short term sales of energy efficiency related equipment (e.g. CFLs, timers, etc.) with retailers with publicity costs paid under the program 3. Short media spots aired and published frequently that relate to energy efficiency 4. Provide media releases (including photos and short videos) of actions by members of the public that relate to energy efficiency and renewable energy use (e.g. new home built to energy codes, somebody puts solar on their business or home, etc.)	**MRD**	**General Public** **Media** **MICS** **OEPPC** **MEC**	Medium	Immediate	Participation of media and retailers in energy related events by the general public	ADMIRE and Internal
6.2 Student participation in energy efficiency 1. Through middle and high school participation, provide one day's training to selected teachers in home energy efficiency and home energy audits and provide them with support texts and materials for use in the classroom. 2. Trained teachers deliver a short module on home energy efficiency & home energy auditing to students. 3. Provide good media coverage including student interviews, parent interviews, etc. 4. Students take home energy audit forms and	**MRD**	**DOE** **Media**	Medium	2010 Q3	Percentage of students participating that return signed audit forms (multiple students from one home would be a team with one form but would count as the number of students on the team in the percentage calculation)	$12,000 (preparation of training materials, course module materials and carrying out teacher training) ADMIRE

Activity (brief description &any links to other activities)	Organization(s) Responsible		Activity Priority	Time Frame for Initiation	Performance Indicators	Budget and Source
	Lead Agency	Participating or Supporting				
carryout a home energy audit signed off by parents. 5. Provide CFL or other energy efficiency related gift to students bringing back a signed audit form and reporting on their audit.						UNDP
6.3 Work with CMI to develop and include energy efficiency modules for inclusion in elective courses in sub-degree and degree programs. Develop project to assist with course design, preparation of texts and support materials, provide laboratory materials, train instructors	**MRD** **CMI**		Medium	2011 Q1	Inclusion of energy efficiency module in courses offered at CMI	$15,000
6.4 Continue MEC's earlier program of free provision of CFLs to households to demonstrate their effectiveness and encourage their continuing use for high efficiency lighting. Expand the program throughout Majuro and Ebeye. *	**MRD**		Immediate	2009 Q4	Remaining bulb inventory distributed to households	Internal; Expanded program through EC or Italy

* Several thousand CFLs are in stock and ready for distribution; more are to be provided from either EC or Italian support)

Renewable Energy

Policy statement

The Government of the Marshall Islands recognizes that socio-economic development will require an increased level of energy production and that only through the development of local renewable energy resources can there be a reduction in long-term dependence on imported petroleum. The government will:

aggressively support the development of all environmentally appropriate, practical and economic Indigenous energy resources so that local renewable energy will provide 20% of electrical energy generated in the Marshall Islands by the end of 2020;

mandate that Imported energy for land transport will be replaced where practical by locally produced biofuel and for sea transport both wind energy and biofuel will be increasingly used;

take the lead in the use of indigenous energy to replace imported petroleum with a goal of a 40% total reduction in energy from petroleum fuels within government by the end of 2020

ensure that all outer island energy development will be through the use of indigenous energy sources where technically practical; and

require that all renewable energy technologies accepted by government for use in the Marshall Islands shall be commercially proven and shall have more than five years of successful service in remote, tropical islands through installations of a similar type and size as those needed in the Marshall Islands.

Solar energy, wind energy and biofuel production use renewable energy technologies available to RMI that are well developed technically and can be developed rapidly. Each poses different types of problems that need to be overcome for large scale energy production and this action plan is intended to provide progress and direction in overcoming those problems. Of the three technologies, only biofuel has the potential for base load electricity generation. The RMI's solar and wind resource is too variable and seasonal to be developable as a reliable large scale source of energy that can operate alone without adding excessively costly energy storage. Solar PV and water heaters can be roof mounted but large scale wind energy development is hampered by land access issues and the nearly universal presence of tall trees on Majuro. For Majuro and certainly for Ebeye, large scale wind power will most likely have to be developed in the lagoon or on the reef. One unanswered but important question is how the local reef/lagoon life will react to the undersea noise and vibrations generated by the wind machines. As part of the action plan, there will be a study of the proposed CMI wind machine site on the Majuro reef, including a survey before and after the wind system installation of the surrounding reef ecosystem, to better understand the environmental effects.

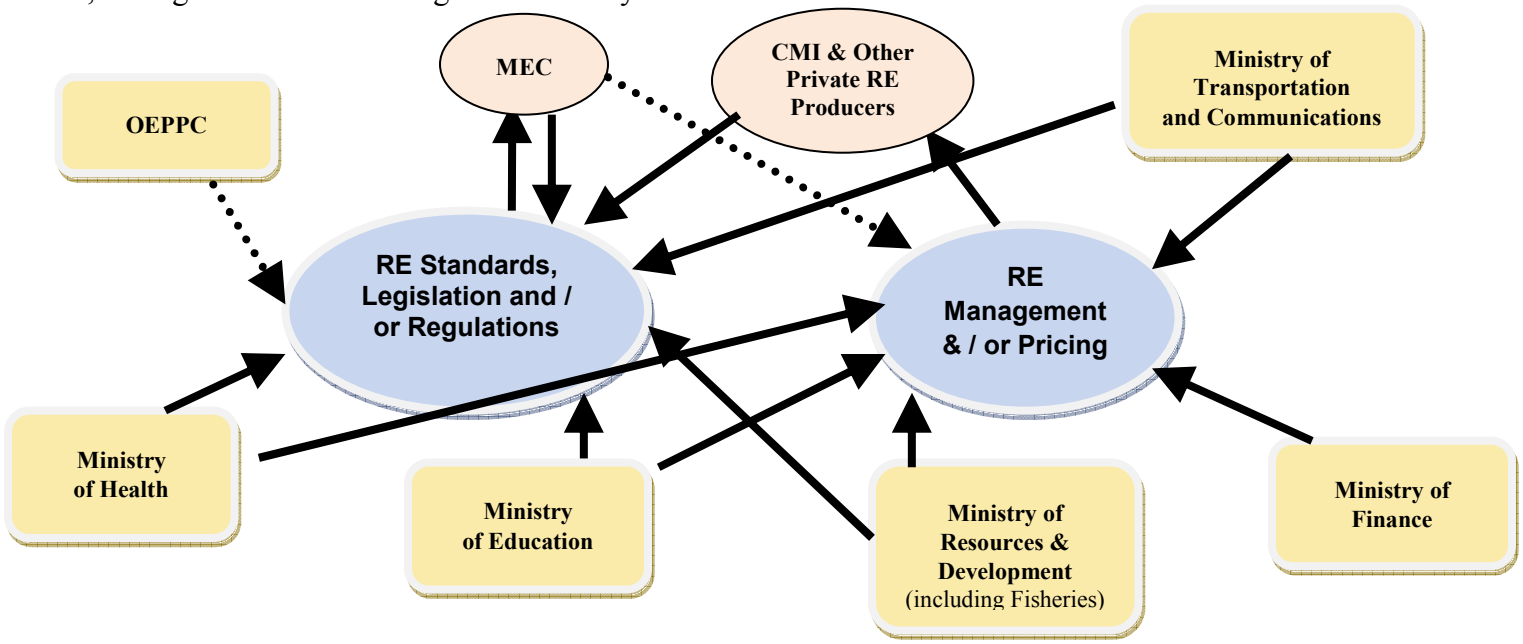
Until the technical and economic problems of large electrical energy storage are solved, solar and wind can only supplement other energy sources and reduce imports of fossil fuel, not provide base load generation. Biofuel on the other hand can directly replace fossil fuel for base load generation and, in combination with wind and solar, can be developed sufficiently in Majuro to reach the difficult but achievable goal of 20% of all electric generation from indigenous energy sources.

The goal for Government to reduce the use of petroleum fuels by 40% relative to the 2009 baseline is also achievable. At least half can be through improved energy efficiency. The rest will mostly be through solar PV on government buildings to offset their air-conditioning load and through the use of locally produced biofuel for diesel vehicle operation. Also, a significant reduction of government petroleum fuel use can be achieved by operating Majuro and Ebeye water pumps directly from solar energy.

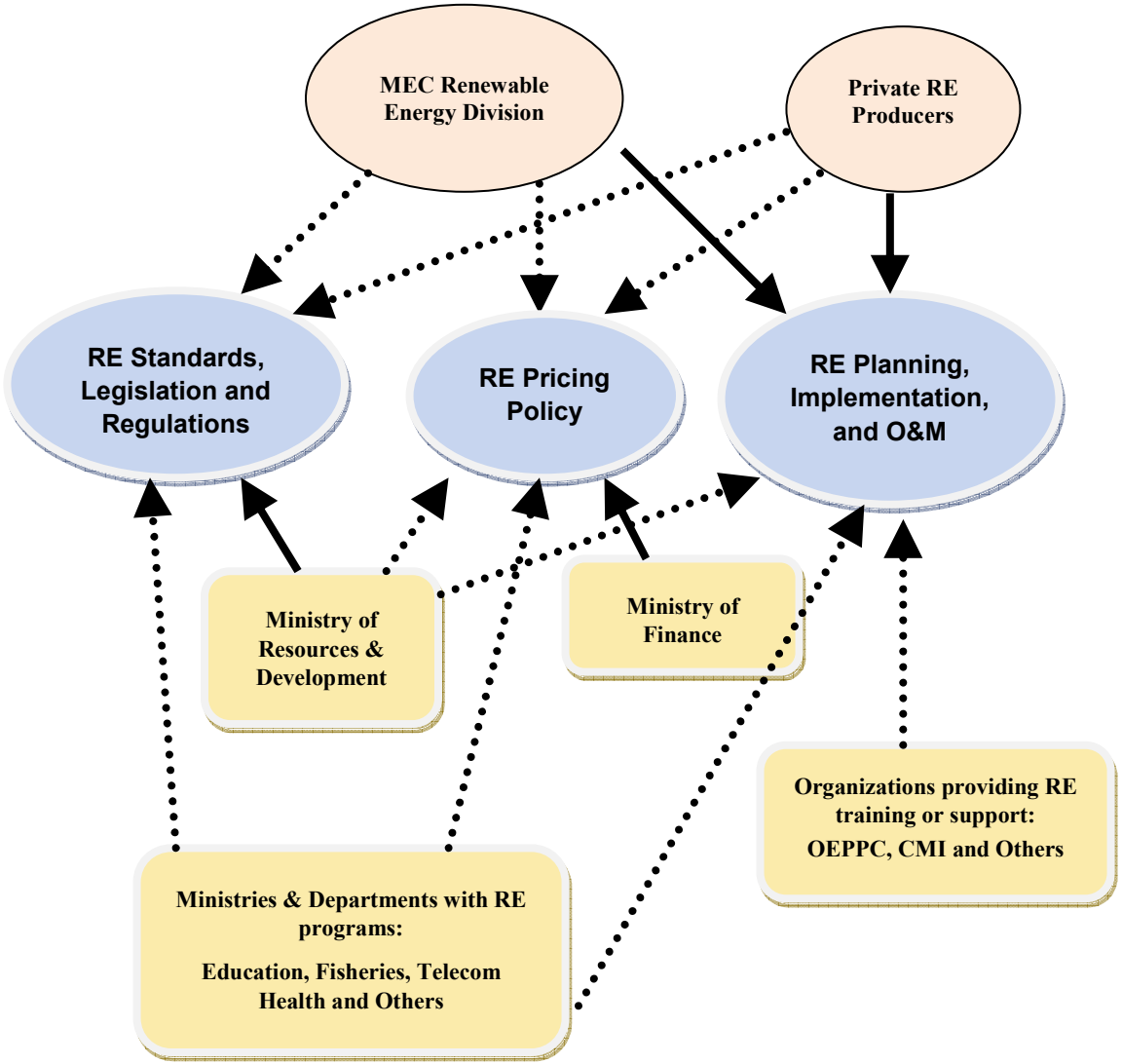
By the end of 2013 and the completion of the EC EDF10 project, most of the outer island population and public facilities should be electrified with solar energy. The next step can be the gradual conversion of existing diesel grid power systems – both local government-operated and MEC operated – to solar photovoltaics and battery storage. Conceptually, solar PV will provide the off-peak power with diesel engines providing peak power and topping off the solar batteries on days with insufficient solar for charging. As the action plan does not include hybrid systems with PV and diesel operating simultaneously and sharing the load for two reasons: (1) for most of these small outer island diesel systems, the peak occurs outside of the time when the solar is a maximum and solar could not be well utilized; and (2) the diesel engines will operate at much better efficiency if loading is controlled so that it always ranges between about 70% and 80% of the engine rating, and that can be achieved through operation only at peak load times plus controlled use of diesel power for battery charging.

The largest energy resource for the RMI is the ocean but as of 2009, the technical systems for harvesting that energy through OTEC, wave power, tidal power or ocean current power are not commercially proven for utility use and not yet ready for use in the RMI. When they become commercially available, which is expected to be well before OTEC, wave power systems may provide a small base load capacity when the ocean is not flat calm, but for RMI they would mostly provide varying power to supplement other base load generation as it the case with wind and solar. No data has been collected concerning the wave energy or OTEC resource in the RMI and these assessments are included as a part of this first action plan so their potential can be assessed relative to other indigenous energy sources.

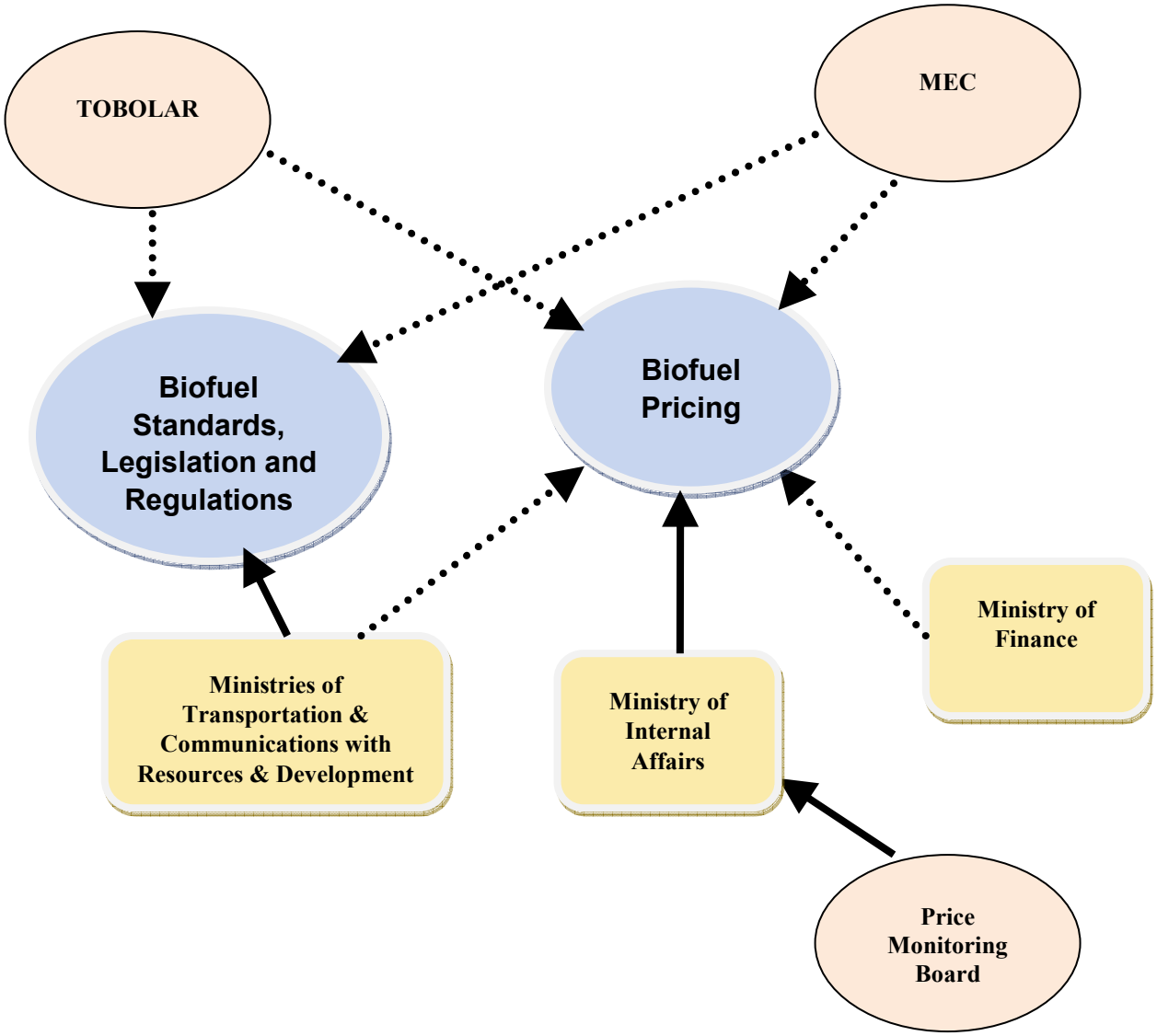
As shown in the following diagram for solar PV systems, the current management of renewable energy in the RMI is confusing with unclear and overlapping standards, responsibilities and inconsistent operations, maintenance and their financing. There must be clear responsibilities and a consistent approach to standards, management and financing if these RE systems are to become sustainable.



Details need to be resolved but for electrification through renewable energy, there should be a single ministry responsible for RE standards for government and government-owned enterprises (MRD) and a single entity for operations and maintenance (logically MEC, with a division dedicated to RE operating on a cost recover basis). There are actions to address this.



For biofuels, there are of course no current arrangements. However, responsibilities will differ from those of RE-based electrification.



Activity (brief description &any links to other activities)	Organization(s) Responsible		Activity Priority	Time Frame for Initiation	Performance Indicators	Budget and Possible Source
	Lead Agency	Participating or Supporting				
Strategy 1: Determine the indigenous energy resources that are available for development [See Project proposal 3 in Annex]						
1.1 Review existing data and carry out a proper wind energy resource survey for Majuro utilizing two widely separated masts each with two wind measuring instruments, one at 15 meters and the other at either 30 or preferably 50 meters with data logging as needed for proper modeling of the island wind regime. Placement should be in an open area with no trees more than 5 meters tall within a 50 meter radius. Data will need to be taken continuously for at least one full year.	**MRD**	**NOAA** **DPW**	High	2010 Q1	Percent of time data actually was collected over the measurement period (goal at least 98% which is equivalent to one week of lost data over the year).	$25,000 EC ADMIRE UNDP
1.2 Engage a firm to analyze the wind data and prepare a wind energy assessment report including a wind map for Majuro and recommendations for the specifications of the wind turbine types that are most appropriate for Majuro. Provide an estimate of the kWh that could be produced each year per installed kW of wind turbine.	**MRD**	**NOAA** **DPW**	High	2011 Q1	Wind map produced. Estimate of kWh per kW of turbine provided by consulting firm. Specifications of appropriate turbine type received.	$15,000 DOI; NREL Possibly EC TCF EC; UNDP
1.3 Using the masts and dataloggers installed for wind measurements, install two good quality solarimeters (pyranometers) and log readings for at least one full year. Ensure that the instruments are located such that at no time of the year can the shadow of the pole fall on the solarimeter.)	**MRD**	**NOAA** **DPW**	Medium	2010 Q1	Percentage of the one year data collection period during which the data are actually collected and logged (Goal 98%)	$2,500 EC ADMIRE
1.4 Review the prior work done by SOPAC, EC and others in determining the present and potential coconut oil resource of RMI. Update those reports using more recent information and, where needed, visit outer islands and do on site surveys of the existing and potential resource that can be made available for biodiesel production (total production less production needed for human or animal food).	**MRD**	**MIA**	Medium	2010 Q2	Completion of survey including all islands with significant coconut resource. Estimate of actual tons of oil that could be produced from currently available coconut production on each atoll and possible production should aggressive rehabilitation and planting programs be put into effect	$18,000 UNDP French Embassy Taiwan
1.5 Using data available within SOPAC,* estimate the monthly wave energy potential for Majuro and Ebeye	**MRD**		Low	2010 Q3	Wave energy estimate completed and received for Majuro and Ebeye	SOPAC/SPC

Activity (brief description &any links to other activities)	Organization(s) Responsible		Activity Priority	Time Frame for Initiation	Performance Indicators	Budget and Possible Source
	Lead Agency	Participating or Supporting				
1.6 Using data available to SOPAC,* determine the areas around Majuro and Kwajalein most suitable for OTEC development (depth of water, slope to reach deep water, temperature gradient, etc.)	**MRD**		Low	2010 Q3	OTEC siting map completed and received for Majuro and Kwajalein	SOPAC/SPC

* By the time of this activity, SOPAC may no longer exist. Technical assistance and data should be available from SPC

Strategy 2: Expand outer island solar electrification for off-grid areas [See Project Proposals 4 and 8 in the Annex]						
2.1 Complete electrification of outer island homes	**MEC**	**MRD** **MOF**	High	2011 Q2	All outer island homes that desire electricity have either grid or solar electrification	EC EDF Taiwan ADMIRE (training component)
2.2 Continue with solar based electrification of outer island schools and other public facilities	**MEC**	**MRD** **MOE** **MOF**	High	2011 Q2	Schools selected by MOE for electrification receive sufficient solar capacity for the operation of the intended programs	EC EDF Taiwan ADMIRE (training component)
Strategy 3: Expand Majuro grid connected solar capacity						
3.1 Install at least 160 kWp of grid connected solar equipment on the Majuro hospital (or at an appropriate location)l	**MEC**	**MRD** **MOF** **MOH**	High	2010 Q2	Completion and proper operation of JICA funded project for grid connected solar	JICA
3.2 Prepare a feasibility study and project proposal for an additional 400 kWp of grid connected solar for Majuro schools and government offices with draft designs for each selected site showing a matching air conditioning or other load.	**MRD**	**MEC** **DPW** **MOE**	Medium	2010 Q4	Suitable sites found that offset air conditioning loads utilizing the full capacity of the 400 kWp of installed solar.	EC JICA UNDP
3.3 Develop a consistent framework among all government agencies for the development and implementation of solar projects (standardization of design procedures, standardization of components where practical, elimination of duplicative efforts, etc.)	**ETF**	**MRD** All ministries implementing solar energy projects	Medium	2010 Q4	Agreement among ministries for the framework for development and implementation of solar energy projects	Internal
Strategy 4: Initial trials of outer island biofuel production and village electrification and transport based on that production						
4.1 Based on the results of the resource study and the population distribution, select an atoll as a pilot area for local biofuel production and its use as their energy source for electrification and lagoon transport. Prepare a detailed project proposal for implementation	**MRD**	**MEC** **MIA**	Medium	2011 Q1	Completion of a project proposal suitable for donor submission	ADMIRE UNDP EC

Activity (brief description &any links to other activities)	Organization(s) Responsible		Activity Priority	Time Frame for Initiation	Performance Indicators	Budget and Possible Source
	Lead Agency	Participating or Supporting				
4.2 Implement the project proposed in 4.1	**MRD**	**MEC** **MIA**	Medium	2011 Q4	Acceptance of the project by a donor and initiation of work	EC Taiwan JICA
Strategy 5: Project monitoring and evaluation of CMI installations						
5.1 Through site visits and analysis of project records, evaluate the performance of solar energy systems on the outer islands relative to the professed needs of the residents and agencies receiving services and the requirements of the project management for cost coverage through collected fees. Prepare recommendations as needed for technical and institutional changes to improve the match of needs and services and to improve cost recovery.	**MEC**	**MRD** **MIA** **MOE** **MOH**	High	2010 Q1	Provision of survey report and acceptance of recommendations for project improvements	ADMIRE UNDP
5.2 Monitoring and evaluation of CMI solar and wind installations. Add any needed data logging and instrumentation to the CMI solar and (soon to be installed) wind systems to measure: 1. Solar received at each site using PV type solarimeters set at the same tilt as the associated panels measured at no more than 10 minute intervals 2. Energy output from the panels at each site measured on the same time parameter as solar energy 3. Operating parameters of each installed wind machine including energy production measured at no more than 10 minute intervals 4. If reef mounted are to be installed, prior to installation carry out a detailed survey of life forms and their populations within a 1 km segment of the reef having the wind machine sites at the center. A second but smaller control area should also be surveyed at the same time. 5. Re survey the same areas of reef at the same time of the year for each of 5 years following installation or more often if deemed appropriate by the researchers. 6. Analyze the results of the surveys and report on the changes, if any, of the ecosystem in the area of the wind turbine installations.	**CMI**	**MRD** possibly MICS or other NGOs	High	Immediate for solar Within 6 months before wind turbine installation	Successful collection of data and its analysis for each installed solar array and each installed wind turbine at CMI	ADMIRE CMI
Strategy 6: Replacement of electric water heaters with solar water heaters in existing buildings and use of solar water heaters for new buildings. [See Project Proposal 11}						
6.1 Provide finance for the installation of solar water heaters on existing homes and businesses presently	**MEC**	**MRD**	Medium	2010 Q3	Percentage of electric water heaters replaced by solar	EIB

Activity (brief description &any links to other activities)	Organization(s) Responsible		Activity Priority	Time Frame for Initiation	Performance Indicators	Budget and Possible Source
	Lead Agency	Participating or Supporting				
using electricity for water heating using finance terms that allow the home owner to install and operate the solar water heater at a monthly cost of finance equivalent to the approximate monthly cost of electricity for the operation of the electric water heater being replaced. May be managed through renting the solar water heater from MEC with rental payments equal or lower than the cost of electric water heating for the household at the time of installation. Payments to be included in the electric bill.		**Local Commercial Banks** **MIDB**				WB/ADB possibly IFC's SEFP
6.2 Provide incentives for the installation of solar water heaters in lieu of electric water heating on new homes and commercial buildings. Incentives may include rebate of the purchase cost, reduced interest financing, and/or tax based incentives for businesses.	**MOF**	**MRD** **Local Commercial Banks** **MIDB**	Medium	2010 Q3 (associated with 6.5.1)	Percentage of new homes and commercial buildings installing solar over electric water heating	EIB WB/ADB possibly IFC's SEFP
Strategy 7: Feasibility study and project design for biofuel development. [See Project Proposal 12 in Annex]						
6.1 Independent assessment, feasibility study and project design for the production and use of biofuels on outer islands as a fuel for transport and electricity generation. Study to consider: 1. Requirements for and cost of replacement of senile coconut trees 2. Existing requirement for coconuts for human and animal food 3. Land tenure arrangements on outer islands 4. Human resource requirements for collection, transport and processing of coconuts 5. Economic and local use of oil production waste products 6. Local requirement for biofuel produced 7. Feasibility of generating surplus biofuel for sale to urban areas 8, Sensitivity of findings to fossil fuel price changes If technically and economically feasible, prepare a pilot project design for one atoll that is accessible by air for monitoring.	**MRD**	**MIA** **MTC**	High	2010 Q2	Completion of feasibility study with recommendation for pilot project atoll. Completion of pilot project document for implementation	French Embassy UNDP EC Estimated cost $125,000

Annex - Initial List of RMI Energy Project Proposals Prepared

(EC REP-5 Project EP/RMI4/5/NPE1: Energy Policy and Planning)

The following project proposals for energy sector support to the RMI have been prepared as part of the European Commission's support for the RMI's energy policy development. These are expected to be revised by MRD and the ETF according to the criteria of the development agency approached to finance the activity. Draft proposals are available from MRD for comment.

Energy Project Proposals Completed

1. EDF10 Project Identification Fiche (PIF)

Status: Completed and submitted to EC, Suva. Edited and expanded version of a draft PIF for the RMI solar PV expansion program in the RMI under the EC's EDF10 national assistance from 2010.

Estimated cost: Not applicable (completed)

Filename: "PIF RMI EDF10 PV final v1.doc" (6 March 2009)

2. World Bank Assistance to the Republic of the Marshall Islands: Terms of Reference (TOR) for a Management and Financial Review of the Marshalls Energy Company (MEC)

Status: Draft completed & submitted to ETF. TOR for October or November 2009 World Bank Assessment of MEC/KAJUR Management and Financial Operations including urban power, petroleum arrangements and possibly outer island solar PV program.

Estimated cost: Not applicable. Proposed WB technical assistance at no cost to the RMI

Filename: "TOR for WB energy assistance for RMI.doc" (23 May 2009)

3. Wind Resource Assessment for Majuro

Status: Draft completed. Goal is to determine the wind energy available for conversion to electricity on Majuro into the MEC grid. This would not provide direct information on the costs of electricity production but is essential before his can be done. There may be potential for some support from the US National Renewable Energy Laboratory (NREL).

Estimated cost: Approximately $50,000

Filename: "Project-Wind energy resource assessment for Majuro (final draft June09).doc"

4. Training of Trainers for Outer Island Photovoltaic Electrification

Status: Draft completed. Goal is group of people with skills to go to outer islands and train local technicians, PV system users and village leadership in the proper O&M of solar home systems and PV powered stand-alone electricity systems for schools, health centers and other government facilities

Estimated cost: Approximately $70,000

Filename: "Project-Training of PV trainers (final draft June09).doc"

5. Development of an Energy Sector Database for the RMI

Status: Draft completed. There is no reliable time series of data on petroleum supply by product and end-use, which are necessary for evaluating opportunities to reduce oil use. This project would develop a database mechanism for petroleum, electricity and other commercial energy.

Estimated cost: Unknown but proposed as technical assistance from the SPC with help of the AusAID energy adviser

Filename: "RMI Energy database development June09.doc"

6. Training of Contractors and Importers in Household Energy Efficiency Improvement

Status: Draft completed. The goal is locally-available materials to reduce solar heat gain and provide skills for local installation. This is an initial activity in support of programs to finance upgrading of homes in Majuro and Ebeye to reduce heat gain with reduce air conditioning loads and electricity use. Five homes will receive free energy efficiency retrofits as a part of the training program.

Estimated cost: Roughly $10,000

Filename: "Project-Training of contractors & importers in household EE (final draft June09).doc"

7. Energy Auditing of Commercial and Government Facilities

Status: Draft completed. Project is to provide facility owners with detailed technical and financial information about practical actions that can be carried out to improve efficiency of electrical energy use.

Estimated cost: Very approximately $150,000

Filename: "Project-Energy Auditing of commercial and govt facilities (final draft June09).doc"

8. Training on Outer Islands for the Maintenance, Operation and Management of Solar PV Electrification

Status: Draft completed. The goal is for outer island communities to be able to operate, manage and maintain solar PV installations with a minimum of support from MEC.

Estimated cost: $50,000 ($5,000 each for 10 atolls)

Filename: "Project-PV training for outer islands (final draft June09).doc"

9. Upgrading Housing to improve the Energy Efficiency of Air Conditioning (AC)

Status: Draft completed. This project seeks finance for soft energy efficiency retrofitting of initially about 25% of all homes on Majuro and Ebeye.

Estimated cost: Approximately $0.77 million (possibly through EIB, IFC, etc.) to subsidize loans

Filename: "Project-AC Energy Efficiency in Housing (final draft June09).doc"

10. Middle School Program for Student Facilitated Home Energy Audits

Status: Draft completed. The goal is to teach middle school students about home energy efficiency and for them to carry out energy audits in their homes

Estimated cost: $12,000 for development of training materials, teacher orientation, student "prizes", support materials

11. Replacement of Electric Water Heaters with Solar Water Heaters

Status: Draft completed. The project provides incentives for the replacement of existing electric water heaters by solar units

Estimated cost: $45,000 for training of project personnel, development of standards for installation and maintenance, payment of rebates of initial cost or reduced interest rates, maintenance during the first five years of operation of the solar units

12. Feasibility Study and Project Design for Outer Island Production of Biofuel from Coconut Oil and its use for Transport and electrification

Status: Draft under preparation. The goal is to determine the feasibility of coconut oil production on outer islands, its' used as a biofuel for intra-island transport and for the electrification of villages on outer islands. Prepare a project document for implementation of a pilot project.

Estimated cost: $125,000