Republic of Palau

Strategic Action Plan Energy Sector

A Framework for the Implementation of Palau's National Energy Policy

Palau Energy Policy Development Working Group

Koror, Republic of Palau

October 2009

Palau Energy Office

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List of Acronyms

AC	*Alternating Current*
ACP	*African, Caribbean, Pacific countries (associated with EU)*
ADB	*Asian Development Bank*
ADO	*Automotive diesel oil*
BPW	*Bureau of Public Works*
CIF	*Cost+insurance+freight*
COFA	*Compact of Free Association*
CPI	*Consumer Price Index*
CROP	*Council of Regional Organisations of the Pacific*
CTF	*Compact Trust Fund*
DC	*Direct Current*
DSM	*Demand Side Management*
EDF	*European Development Fund*
EEZ	*Exclusive Economic Zone*
EIA	*Environmental Impact Assessment*
EIRR	*Economic Internal Rate of Return*
ENSO	*El Niño/El Niña oceanic climate cycle*
EQPB	*Environmental Quality Protection Board*
EU	*European Union*
FY	*Fiscal Year*
FSM	*Federated States of Micronesia*
GDP	*Gross Domestic Product*
GEF	*Global Environment Facility*
GHG	*Greenhouse Gas*
GEM	*Green Energy Micronesia*
GWh	*Giga watt hours*
IFC	*International Financial Center*
IPP	*Independent Power Producer*

IUCN	*International Union for the Conservation of Nature*
JICA	*Japan International Cooperation Agency*
kV	*Kilo-Volts (thousands of volts)*
kVA	*Kilo-Volt-Amperes (Thousands of Volt Amperes of power)*
kW	*Kilo-Watt (Thousands of Watts of power)*
kWh	*Kilo-Watt-Hour (Thousands of Watt Hours of energy)*
kWp	*Kilo-Watts peak power (at standard conditions) from PV panels*
LPG	*Liquefied Petroleum Gas*
MNRET	*Ministry of Natural Resources, Environment and Tourism*
MPIIC	*Ministry of Public Infrastructure, Industries and Commerce*
MDG	*Millennium Development Goals*
MoE	*Ministry of Education*
MoF	*Ministry of Finance*
MOPS	*Mean of Platts Singapore Published Price*
MoS	*Ministry of State*
MSC	*Micronesian Shipping Commission*
NEP	*National Energy Plan*
NEC	*National Energy Committee*
NDBP	*National Development Bank of Palau*
NGO	*Non-Governmental Organization*
OEK	*Olbiil Era Kelulau (legislature)*
OERC	*Office of Environmental Response and Coordination*
OGTF	*Oil & Gas Taskforce*
OP	*Office of the President*
OPS	*Office of Planning & Statistics*
PALARIS	*Palau Automated Land and Resource Information Systems Office*
PCC	*Palau Community College*
PCAA	*Palau Community Action Agency*
PEO	*Palau Energy Office*
PHA	*Palau Housing Authority*
PIC	*Pacific Island Country*
PICTA	*Pacific Island Countries Trade Agreement*
PIEPSAP	*Pacific Islands Energy Policies and Strategic Action Planning*
PIFS	*Pacific Islands Forum Secretariat*
PPA	*Power Purchase Agreement*
PPUC	*Palau Public Utilities Corporation*
PV	*Photovoltaic*
RMI	*Republic of the Marshall Islands*
ROP	*Republic of Palau*
SEDREA	*Social and Economic Development through Renewable Energy Applications*
SGP	*GEF Small Grants Programme*
SPPA	*Small Power Purchase Agreement*
USDA	*United States Department of Agriculture*
UNDP	*United Nations Development Programme*

1.0 Foreword

Palau, like the rest of the world, faces two major energy challenges. The first is to deliver clean, secure, affordable energy for all citizens of Palau while treating the environment responsibly. The second is to respond to the risks of climate change by adaptation to changes and by mitigation through reducing the greenhouse gases caused by the production and use of energy. In addition Palau faces a challenge that it shares with other small island countries, namely it's extremely high dependence from imported fuels.

This Strategic Action Plan for our Energy Sector has been developed in an inclusive and participatory process involving more than 30 public and private sector agencies. It forms the basis for our strategic actions which will ensure that the policy vision becomes a reality. The National Energy Policy and this Strategic Action Plan should also provide road map towards a greener and less vulnerable energy future for Palau. The vision is for a reliable and resilient energy sector delivering Palau sustainable, low emissions energy services, through:

- Providing clear direction on the future of Palau's energy sector
- Appropriate regulation to securely deliver energy services at competitive prices
- Maximizing cost-effective energy efficiency and renewable energy resources and conservation of energy while safeguarding our environment
- Promoting environmentally sustainable energy technologies with the aim to substitute imported fossil fuels
- Supporting consumers through the transition towards a new energy sector.

Adjustments have to be introduced at multiple policy levels to effectively promote clean, reliable, efficient and sustainable energy for all citizens of Palau. The National Energy Policy and its Strategic Action Plan will guide the public and private sectors of Palau in cooperation and our regional and international development partners to establish a sustainable energy sector. Through implementation of this policy Palau will become an international leader in creating a green and renewable energy society.

2.0 Introduction

2.1 Background

Energy is a vital resource underpinning all aspects of our society and fundamentally influencing Palau's environmental sustainability. Being almost 100 % dependent on imported energy, Palau is highly vulnerable to international energy market movements and price volatility. Palau's energy security is not guaranteed and energy supply interruptions undermine economic growth and social development. Palau is a small country lacking significant economies of scale and has dispersed outer islands' populations that are difficult to serve. This Energy Sector Strategic Action Plan (SAP) is a dynamic document based on the National Energy Policy of Palau. It reflects the reality of market uncertainty and will be regularly updated and reviewed to consider past successes, failures and lessons learned. Actions and strategies will be adjusted accordingly.

Addressing energy sector issues requires collaborative leadership, smart planning, adequate institutional arrangements, common goals, political will, and a shared national vision. It is necessary to incorporate data collection efforts, including market assessment and market potential studies to enhance the technical processes of the energy sector long-term procurement planning. The Strategic Plan presented here summarizes the efforts of the Energy Working Group which has compiled the plan in a collaborative and inclusive exercise stretching from April to October 2009.

Energy Sector strategic planning exercises have to maintain a high level of flexibility in order to react to fluctuations in international markets. The following graph shows price volatility on the international crude oil market that the world has experienced in the last 12 months. It is clear that under such market conditions a high level of responsiveness and flexibility is an absolute must. The chart below showing the development of the world market price for crude oil illustrates the market volatility that energy planners have to deal with.

Moreover, technology may also change rapidly and planning efforts have to consider these changes in the areas of both conventional and renewable energy. Considerable benefits can be achieved through early adoption of new technologies.

2.2 Palau's Energy Sector

The Republic of Palau relies heavily on imported fuels for commercial energy needs including 100% of transport and electricity generation (the chief uses), and a majority of household use including cooking, transport, refrigeration, and lighting. Petroleum products are supplied in small quantities via coastal tankers (5,000 - 6,000 tons) from Guam by Mobil and Shell. Current annual import is estimated around 12 million gallons. Petroleum product pricing is not regulated. Oil companies build their retail prices based on Singapore MOPS prices (Mean of Platts Singapore Published Price) plus cost of supply plus profit. According to the Shell representative target rate of return on investment is 15%- 20%. Diesel and gasoline are both moderately taxed at a rate of $0.05/gal.

In the last two years, price volatility for petroleum has been high with an upward trend until mid 2008 and a sharp drop as a result of the global recession. International crude oil prices increased from US$50/bbl in mid June 2005 to above US$140/bbl in June 2008. Reasons for these price developments are complex but despite the significant drop in world market prices due to weakening demand, it does appear that an era of 'cheap oil' (less than US$ 50/bbl) is over. After hitting a bottom of less than 40 US$ towards the end of 2008, crude and product prices have been on the rise again and are currently around US$ 70. At these price levels fuel imports will remain a major component of the country's import bill. Petroleum storage capacity in Palau is approximately 10 million gallons of product, PPUC has 6 million gallon of storage, most of which is in need of rehabilitation.

There is a high probability that Palau has exploitable hydrocarbon reserves. The first petroleum exploration license was signed in 1977. Since then, there has been continued interest in exploring Palau's territorial waters for the potential of oil and gas. Currently, one company has petroleum licenses with the States of Kayangel, Hatahobei, and Angaur respectively. However, to date, no exploratory drilling has occurred. Taking into account Palau's need to develop an oil and gas sector that conforms to international standards and regulations as well as its socioeconomic reality, the Executive Branch requested the assistance of the World Bank (WB) Oil, Gas, and Mining Policy Division.

Electricity is supplied by the Palau Public Utilities Corporation (PPUC). The utility was established under the PUC act of February 1994 and is owned by the Government but operated as a commercial enterprise. PPUC is required to break even on operating and maintenance costs. PPUC is currently led by a CEO and consists of six departments headed by six managers (Generation, Distribution, System Control, Business Office, Accounting and Finance, Auxiliary Services. Total staff of PPUC is currently 130. PPUC is supervised by a board of directors who are appointed by the President. In the past, it was observed that the board repeatedly acted outside its supervisory role and interfered with day to day operations.

PPUC has a current installed capacity of a little over 35 MWs, with power plants located at Malakal, Aimeliik, Peleliu, Angaur, and Kayangel. The Malakal and Aimeliik plants supply power to a central grid on the islands of Koror and Babeldaob. The two 13.8 kV distribution grids are interconnected by a 34.5 kV undersea cable. In addition to PPUC's generators there are approximately 5 MW installed at Hotels, large stores and two fish processing plants. These facilities generate their own power when PPUC cannot supply total demand of the grid.

PPUC has been continuously unable to supply the total demand for electric power and has often had to resort to power rationing. The economic cost of un-served demand is significant, considering the disruptions that affect the household, public and commercial sectors. The cause for the continued power interruptions is inadequate maintenance of the utility's generation assets resulting in a shortfall of approximately 1.5 MW during peak hours. The situation is exacerbated by the lack of standardization and related high O&M cost. Power disruptions reduce PPUC's revenues and undermine their financial position. The utility has recently gone through a change in management and board and the new management has taken immediate action to address the crisis. Although the crisis has been mitigated in the meantime, PPUC is still extremely vulnerable to generator break-downs.

Electricity demand as recorded and billed by PPUC has not grown significantly over the last 10 years. It has been more or less stagnant at 80 GWh per annum. Peak load is about 15 MW and occurs in the evening hours. In contrast to energy demand, the number of accounts has shown significant growth at an average rate of 4.5% per annum between 2001 and 2007 with the commercial sector showing the largest growth of 7.5%. It should be noted that growth in energy demand may be disguised as in recent years more and more power has been generated by large users in the tourism and commercial sectors.

The Palau Energy Office (PEO) located at the Ministry of Infrastructure, Industry and Commerce is the government agency dealing with some energy sector issues. It acts as an international contact point and represents Palau in overseas energy meetings. It also acts as a project management unit for some renewable energy and energy efficiency projects. The PEO initiated the Palau Energy Conservation Strategy (PECS) in response to Executive Order 234 of 2005.

A number of studies have noted that the institutional arrangements for energy sector are inadequate. With no operational budget, no clear legal mandate and only one full time officer the Energy Office has limited capacity to influence the energy sector management The PEO has no regulatory function. The PEO requires strengthening through the establishment of a clear mandate, appropriate resource allocation and adequate capacity building. The PEO should focus on policy, sector planning, regulation and knowledge management and delegate project implementation activities to technical agencies such as PPUC.

The Office of the President has appointed an Advisor to the President on Energy matters and the Acting Director for the Office of Environmental Response and Coordination (OERC) acts as focal point for energy in Palau. The role of the focal point is screening projects and policies in the sector.

3.0 Policy and Strategic Plan

3.1 Targets

The National Energy Policy states the Government's policies for the planning and management of the nation's energy sector over the next 10 years. The rationale for this time horizon is the 20:30:30 policy target that has been formulated. This policy target envisions a 20 % contribution of renewable energy to the energy mix by 2020 and a 30 % reduction in energy consumption though energy efficiency and conservation efforts. Currently, renewable energy only makes a small contribution of less than 1 % towards Palau's total energy supply and experiences are limited to solar PV and solar hot water units.

Achieving a target of 20% by 2020 will require expansion into other forms of renewable energy such as wind, waste (landfill gas), hydropower and perhaps marine energy (wave energy and currents). At current world market prices for fuel and local tariffs for electricity, only solar water heaters can be considered financially viable options. I.e. an increased renewable energy contribution will require subsidies or increases in electricity tariffs. Financing a transition towards a greener energy through tariff increases is not considered feasible, given the state of Palau's economy and it is hoped that development partners will assist closing the gap between supply cost for renewable energy and conventional energy. In the field of energy conservation, numerous efforts under way to improve energy efficiency both on the supply and demand side. Achieving a 30 % reduction in primary energy consumption by 2020 is feasible but will require more efforts in demand and supply side management, improvements in transport sector efficiency and the introduction of regulations that curb wasteful practices.

3.2 Relation between Policy and Strategic Action Plan

The National Energy Policy (NEP) provides explicit framework within which public and private energy sector participants can make informed planning and investment decision. The policies also define the nature and extent of Government's control and management of the energy sector.

The purpose of the Strategic Action Plan (ESSAP) is to restate Palau's energy policies in the form of a more detailed action program including specific targets and guidelines. It will provide the blueprint for Government's in planning and management of energy programs over the life of the policy statement. It also provides indicators to measure progress in the implementation of the NEP and the SAP. The SAP does not override existing strategic plans such as the Palau Energy Conservation Strategy (PECS) the Energy Efficiency Action Plan or PPUC's Strategic Plan. These initiatives are seen as an integral part of this SAP and their progress and achievements will be monitored under the framework of the overall plan.

While some of the targets may take longer to achieve than others, it is important that Government remain committed to its National Energy Policy as a whole and, most

importantly, provide the institutional and administrative resources necessary to achieve its policies.

In many cases, these policies, strategies and guidelines will appear self-evident. However, it remains essential for Government to have them committed to paper and adopted at the most senior level if they are to become, and to remain, the focus of Government's longer term planning and management of Palau's energy sector. Aligning this planning effort with related statewide long-term resource plans, such as those associated with water, environment, land use, and greenhouse gas mitigation is considered a prerequisite for its successful implementation.

Moreover, strategic success demands a parallel approach of planning and doing. It is obvious that strategic implementation is much more important than strategic planning. Implementation requires the work of the entire nation, whereas strategic planning only requires the planning team. Part of the challenge of planning often stems from the failure to link the plans with ongoing implementation. Regularly evaluating performance with respect to the goals and strategies established in the current Plan is a necessary prerequisite for the success of the project.

3.3 Project Development

The development of the project pipeline is fully integrated with the policy and strategic planning described above. Activities follow the guidelines and assumptions provided and include a review of all data and information on energy sector projects that have been implemented or are under implementation. Broad consultations have been undertaken in order to establish a preliminary list of project ideas for further assessment and ranking. Focus was given to renewable energy and energy efficiency projects. Conventional projects in the area of power generation/distribution and petroleum products have been included if justified (urgency, good economic performance, significant contribution to energy security).

Project priorities have been developed using a transparent ranking method that includes criteria such as:

- technical feasibility
- economic performance (least cost supply)
- social impacts
- environmental characteristics
- probability to attract finance.

Project development will also include an assessment of risks associated with the proposed actions and projects.

As with the policy and strategic planning we expect several feedback loops during stakeholder consultations and we will aim at integrating these with the consultations on policy as the two aspects are closely linked.

4.0 Planning Assumptions

Energy Planning takes place under a great deal of uncertainty and has to rely on a set of assumptions. This set of assumptions has to be reviewed on a regular basis and adjusted when required. It will be an important task for the NEC and PEO to regularly review the assumptions discussed in the following and ensure that these assumptions are valid:

4.1 Institutional Arrangements

The Working Group noted that past institutional arrangements for energy sector have been inadequate. Ultimately the consensus has been that the Energy office would be best positioned to implement energy related policies and regulations as an independent authority. At the minimum, it is necessary to establish the PEO as a Division or Bureau with a regular budget allocation. It should be noted that effective institutional arrangements are a precondition for maximizing Palau's benefits from funding opportunities that are available to Palau from a number of resources. Donors have also shown willingness to support the Government with technical assistance and temporary funding of staff.

4.2 Energy Demand Forecast

Energy demand will only see moderate growth rates of about 5% annually in both the fuel and the electricity sector. This is due to:

- Current per capita consumption in Palau is considerably higher than in all other Pacific Island Nations.
- Electrification rates are near 100 % and no significant incremental growth can be expected from new customers.
- The policy of cost covering tariffs and the widespread introduction of prepaid meters will reduce demand growth.
- Energy conservation programs will show impact from 2012 onwards
- Petroleum prices are unlikely to fall drastically and for the next 2 years an average world market price of 100 – 120 US$ per barrel of oil seems to be a reasonable guess.
- Even if lower oil prices are going to materialize, this is likely to be associated with continued recession and perhaps depression of the world economy, which in turn will have a dampening effect on energy demand in Palau and elsewhere.

Forecasting electricity demand development in the main grid is however, uncertain. Demand increases will be mostly driven be developments in the tourism industry and therefore tend to be shown in lumpy increments. Whether or not a new hotel will have a major impact on demand also depends on the choice of the developers who can either opt for their own generation (as is currently the case with some existing larger hotels). It is therefore prudent to also consider a low and a high case scenario with respect to demand for peak power and energy.

A high case scenario would entail growth rates of 7.5 % p.a. and a low case scenario would be in the vicinity of 1 %. In this context it should be noted that at current electricity rates and fuel cost, self-generation is more expensive than connecting to PPUC. I.e. enterprises that have resorted to this solution have

done so purely for energy security purposes. The following chart displays the band of developments with respect to peak power demand in PPUC's system. A low case scenario of very low growth could materialize in case of a prolonged recession of the global economy. Serious conservation efforts could reduce demand growth further and result in negative growth. This is in fact intended in as a policy target. The high case would be associated with rapid global recovery and a significant improvement of Palau's competitive position as a tourist destination.

Maximum renewable energy contribution is determined by the systems minimum demand and system stability considerations. The higher the contribution from erratic renewable energy resources, namely wind and solar, the more planning and system integration efforts are required. Current system parameter suggests that the main system in Koror and Babeldaob can absorb approximately 9 – 12 GWh per annum without major system integration efforts such as short term storage. This represents an installed capacity of renewable energies in the order of 4 - 5 MW in case solar and wind are used as the main sources. Hydropower and landfill gas use have higher capacity factors than solar and wind and are easier to integrate. It should be noted that any serious conservation effort in the electricity sector towards the target of 30% will make renewable energy integration more difficult as the load profile will be reduced.

4.3 Political Risk

Current government and its successors will maintain cornerstones of the current energy policy such as the 'user pays principle' or the principle of cost covering tariffs. This is due to the facts that:

- Continued subsidies further strain the already difficult fiscal position of the Government.
- Consumption subsidies will reduce likelihood of obtaining grants and concessionary loans from development partners.

- Tariffs below cost recovery levels undermine the already difficult financial position of PPUC.

The above may not hold if Palau becomes a major producer of hydrocarbons. Experience in other countries has shown that the general public expects to participate in the wealth created by hydrocarbon production through low energy prices.

Current and successive Governments will continue to adhere to good governance in the area of procurement and contract awards. Transparency, order, timeliness, even-handedness and, where practicable, competition to the process of awarding contracts to developers, energy service companies (ESCOs) and fuels suppliers will prevail. The following guidelines and procedures are recommended:

Transparency: A feature of successful implementation models has been transparency. It allows open demonstration of the project's consistency with the national interest, and also encourages participation by more reputable and serious developers and suppliers. Transparent processes require an independent scrutiny of unsolicited proposals. All unsolicited proposals should be first checked by the Energy Administration. In case of doubt, regional organisations such as Pacific Power Association have the competence and capacity to assist the Government in assessing unsolicited proposals.

Competition vs. Negotiation: Competitive award of contracts should be the rule for all energy sector procurement processes. Competitive process ensures transparency and a fair price. It also serves to discourage less reputable operators. The negotiation process tends to have open-ended timelines giving it a high degree of uncertainty for developer, purchaser and government. Unstructured negotiations are also time-consuming for all participants and often cause expenditure of resources. Competitive procurement of projects using the Independent Power Producer (IPP) modality should be awarded on the basis of competition using a Standard Power Purchase Agreement as a basis for international tenders[1]. This approach normally results in the best outcome for the economy of a country.

Policy over Politics; Policies, once adopted and legislated should take priority over day-to-day politics. Politicians are assumed to support the principle that long term economic and social benefits derived form well planned strategies and actions are more valuable than short term political gains.

4.4 Technological Development

It is assumed that technological development will continue at a historical pace, both in the areas of conventional and renewable energy technologies. It is assumed that prices for photovoltaic equipment will fall moderately as new production capacities will remove the supply constraints experienced over the last

[1] PPUC has been provided with a Standard Power Purchase Agreement by the consultant

three years. (Capital cost of US$ 7,000 per kW installed grid connected PV and supply cost below 0.40 US$/kWh are considered achievable within the next 10 years). Resource assessments and data collection will be necessary to determine technical feasibility and economic performance of hydropower, wind and waste to energy option. It is assumed, however, that these technologies have the potential to deliver energy at lower cost than solar. If for instance wind energy can supply electricity at a modest capacity factor of 16% supply cost (at US$ 3,000 per kW installed) would be in the order of 0.25 US$/kWh and thus competitive with diesel generation. Landfill gas based generation (assuming the old landfill in Koror can be fitted out with a unit of 100 – 150 kW) would supply electricity at cost in the order of 0.16 US$/kWh. It is also assumed that ocean energy technology such as wave and tidal generators will become commercial technologies within a decade.

4.5 Climate Change

Extreme weather events such as hurricanes and typhoons have damaged and destroyed wind generators, photovoltaic equipment, transmission systems and other energy technology in the Pacific region and elsewhere. Given the likelihood of an increase in frequency of such events in the future, energy technology employed in Palau has to be cyclone proof and withstand winds up to 70 m/s.

4.6 Continued Availability of Funding from Development Partners

It is assumed that current development partners of Palau will continue to support the country with grant aid and concessionary loans. While funding levels after the U.S. Compact agreement are likely to fall, new opportunities may emerge from green energy initiatives and carbon trading under the Kyoto Protocol and its successor. It is also assumed that development partners will respond positively to the suggestions and priority actions contained in this plan.

4.7 Monitoring and Evaluation

For all actions listed in the following strategic plan, lead agencies and participating agencies have been identified. The lead agency is responsible for the implementation of the respective actions. In addition, implementation timelines have been determined for each action.

It is assumed that the implementation of this Strategic Plan is regularly monitored by the National Energy Committee (NEC). At the minimum this committee consisting of representatives of the Office of the President, the Senate, the House, the Chamber of Commerce, PPUC, PEO, and PCC convenes every six months to review progress made in the implementation of the ESSAP. The progress review should also include amendments and adaptations to the plan.

5.0 Strategies and Actions

In the following, strategies and actions will be listed together with performance indicators, implementation arrangements, timeframes and budgets. Funding sources may be indicative.

5.1 Improved Institutional Arrangements for Energy Sector Management

Policy Summary: Provide the Energy Office with the authority and support required for effective and transparent implementation of the National Energy Policy and the related Strategic Action Plan.

Strategy 1.1	**Establish a fully functional, adequately resourced energy administration**				
A new energy policy for GoP will induce change and trigger a re-balancing of stakeholders' positions and will require a re-organization of institutional roles and responsibilities. This offers the opportunity to review and reformulate its mandate. At the same time its resources need to be improved and a budget needs to be allocated.					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
1.1.1 Submit final energy policy providing a clear mandate to the Palau Energy Office	Executive Committee for NEP	OEK, PEO, OP	Energy policy passed, signed into law, participation in energy sector decision making, participation of Head of PEO in oversight of PPUC as member of the PPUC board	Dec 2009	European Union EDF 9
1.1.2 Create a Bureau or Division of Energy	MoF	OEK, MPIIC, PEO	Bureau or Division created and $ Line Item Budget allocated	Jan 2010	Ministry of Infrastructure and Existing Petroleum tax (.05) RPPL Potential Development Partners

1.1.3 Establish mandate to limit energy administration responsibilities to policy, planning and regulatory functions and establish appropriate mechanisms to delegate project implementation and participation in training activities to technical organizations, the private sector and NGOs	NEC	PEO, NDBP, PPUC, OP, NGOs	Regulations issues, projects outsourced, energy sector operators licensed	Dec 2010	$ 5,000 Regular PEO budget, EDF 10, SEDERA
1.1.4 Establish a free-standing energy committee or Commission, or Advisory Group through Executive Order	Office of the President	PEO, MPIIC	Free-standing	Jan 2010	Regular budget
1.1.5 Energy office takes a lead role in regional and international cooperation	PEO	NEC, OP	Promulgation of legislations and policies and MOUS and joint venture with private sector & NGOs	Continuos task starting Jan 2010	$ 25,000 p.a. Regular PEO budget, EDF 10, SEDREA
1.1.6 Design and implement a sector-wide capacity building program	NEC	PEO, PPUC, PCC, MoS, MPIIC, PCAA, AGs Office	Number of individuals trained, certificates obtained	Continuous task starting Jan 2010	$200,000 EDF 10 / SEDREA
1.1.7 Align energy policies with other resource policies and strategic plans and translate into performance-based budget	PEO	NEC, OP, PPUC	Cross references in other policies MoUs and joint declarations	Continuos task starting Jan 2010	$ 30,000 p.a. Regular PEO budget

Strategy 1.2	**Ensure that all projects, investments and activities in the energy sector produce the maximum economic, social and environmental benefits for Palau**
In order to ensure economic efficiency in the energy sector there is a need to constantly review energy supply, delivery, and distribution methods and make recommendations for efficient operation and reliability. The strategy will address procurement regulations, economics,	

technological innovations, supplier relationships, reliability and any other factors directly related to optimizing energy sector investments.					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
1.2.1 Develop, regularly update and manage national energy database to support effective analysis and project development	PEO / PPUC – collocate PPUC database w. PEO	Oil companies, Statistics office, PALARIS	Information accessible on internet and in publications,	Dec 2010	$ 100,000 Regular PEO budget, SEDREA project
1.2.2 Coordinate donor initiatives in the energy sector and ensure compatibility of donor funded projects with the National Energy Policy and its related Strategic Action Plan	Grants Clearinghouse Office	PEO, PPUC, OP, MoF, MoS	Donors fund projects including in the SAP project pipeline	Continuous task starting Jan 2010	Regular PEO budget
1.2.3 Scrutinize all unsolicited energy sector proposals offered to GoP	PEO, Coordination with Office of the President and the Ministry of State	PPUC,		Continuos task starting Jan 2010	Regular PEO budget, developers budgets

Strategy 1.3	**Encourage private sector participation and competition in the supply of fuels, electricity and energy sector services**				
An enabling framework for private sector participation in all aspects of energy production and supply will allow a broad range of stakeholders including households and businesses to become active participants and investors in the energy sector Building capacity in Palau's private sector					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***

1.3.1 Allow and encourage private sector and community rep participation in training and capacity building activities organised by the energy office	PEO	PPUC, Oil companies, Energy Service Company, CoC, EQPB, BTA, etc.	# of private sector representatives participation in capacity building	Dec 2012	$ 10,000, Regular PEO budget, SEDERA project
1.3.2 Study opportunities and options for private sector participation and public private partnerships in electricity supply	PEO	NEC, OP, MoF, MoS	Study on PPP options published and accepted by NEC and OEK.	Dec 2010	$ 75,000 Special budget allocation
1.3.3 Develop a Standard Power Purchase Agreement for small, independent power producers and project developers	PEO	NEC, PPUC, Attorney General, OGTF	PPA triggers private sector investment in power supply	Continuos task starting Jan 2010	Regular PEO budget, developers budgets

5.2 Energy Efficiency and Energy Conservation

Policy: Recognizing that improving the efficiency of energy use has greater short term impact on reducing fossil fuel consumption of fossil energy than any other action, taxes and policies will be revised 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. The policy target is set at a 30 % reduction in overall energy consumption by 2020.

Strategy 2.1	**Ensure constant improvement of energy efficient equipment, appliances, vehicles and housing**				
Monitoring of utility bills and examination of load profiles, tariff incentives, load factors, energy-use patterns, and specific energy consumption figured will present opportunities to reduce consumption or shift loads to off peak periods.					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
2.1.1 Review current transport systems with respect to efficiency reliability, and affordability	PEO	NEC, MPIIC, Customs, OPS, Division of Transportation, Bureau of Public Safety, Shipping Agents, MoF	Study published, recommendations for policy and legislation regarding vehicle importation	Dec 2010	$ 50,000 SEDREA project
2.1.2 Continue Implementation of the Palau Energy Efficiency Action Plan and the Palau Energy Conservation Strategy	PEO	MRD, PPUC, NGOs, MPIIC, PCAA, promotion by Executive Branch	Energy savings against 2008 baseline	Dec 2010	$ 500,000 EU/EDF 9/EDF 10, SEDREA, IUCN
2.1.3 Promote energy efficient housing through concessionary finance for efficient building features and appliances	NDBP	PEO, NGOs, SGP, USDA, Palau Housing, OEK, Grant Office	Number of loans Total loan portfolio (US$)	Continuous task starting June 2009	$ 500,000 IUCN Italian Government

2.1.4 Design and implement and enforce a mandatory energy labelling program for major equipment and appliances (fridges, freezers, aircons, lights, washing machines etc)	PEO	NEC, Private, Customs, Tax, OEK, PPUC	All energy equipment sold in Palau rated and labelled	Dec 2011	$ 80,000 possibly SEDREA and/or EDF 10
2.1.5 Adopt an Energy Code for inclusion into National Building code	PEO	NDBP, PPUC, Private, SLM MPIIC, OERC, OEK – CIP Committee	Energy code incorporated into building code, licensed inspectors appointed	Dec 2010	Regular PEO Budget

Strategy 2.2	**Constantly educate general public, government and private sectors on energy efficiency and energy conservation opportunities**				
Public awareness and information campaigns aimed at educating the general public, the private sector and decision makers and public servants about energy conservation and energy efficiency will reduce wasteful practices and change consumer behaviour. Special training for energy conservation personnel will enhance implementation of conservation measures					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
2.2.1 Design energy conservation curricula and training material for all educational institutions in Palau starting with primary school	PEO	NEC, MoE, PCC, Media, PCAA, Private Schools, NGOs	Energy conservation has become a regular subject in Palau's educational system	Dec 2013	$ 120,000 Possibly EDF 10 and SEDERA project
2.2.2 Continue training of Government ECOs and expand training to include private sector and NGO representatives	PEO	PPUC, NGOs	Results of skill survey to be performed in 2012	Dec 2012	$ 50,000 EDF 10, SEDREA, IUCN
2.2.3 Develop a comprehensive set of educational material related to energy	PEO	PEO, NGOs, MOE, NDBP, PPUC, CROP	Materials developed and distributed	Ongoing	$50,000 SEDREA & EDF 10

conservation and energy efficiency in co-operation with regional and subregional partners		agencies, media			
2.2.4 Establish an energy conservation web site allowing the public to retrieve relevant data and information on energy efficient equipment, incentive programs (concessionary loans) and conservation tips	PEO	Energy offices Guam Saipan, CROP agencies, SPC, SOPAC, US DoE, Grants Office, SBDC, MoS	Quality information and material accessible on internet	Dec 2011	$ 20,000 possibly SEDREA and/or EDF 10

5.3 Renewable Energy

Policy:
Renewable energies have the potential to reduce dependency on imported fuels and to reduce the country's vulnerability towards price shocks. Renewable energies will therefore be promoted so that such energy will provide a minimum of 20% of electrical energy generated in Palau the end of 2020. Promotion of renewable energy use will continue with the aim to completely substitute all fossil fuel use on the long term, reducing Palau's carbon footprint to a minimum.

Strategy 3.1	**Compile and assess all data and information necessary to embark upon a widespread program of renewable energy promotion and investment**				
In order to prepare the a nationwide renewable energy promotion the national potential for all renewable energy sources is fully understood based upon current and reliable data and information that will be made available to Government, households, businesses and investors. In addition, technologies need to be rated and prioritized					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
3.1.1 Assess in detail the national potential of renewable energies (solar, wind, hydro, ocean, waste, biomass) and compile national resource database	PEO	NEC, PPUC, development partners, PALARIS,	Database developed and accessible for general public, data published	Dec 2012	$ 350,000 EDF 10, SEDERA project
3.1.2 Develop standards for approved and recommended renewable energy technologies and compile list of certified technologies eligible for concessionary finance	PEO	MPIIC, private sector, NDBP, PPUC, PCC	List of recommended RE equipment published Training & Certification on RE Technology	Dec 2011	$ 100,000 EDF 10, SEDERA, IUCN
3.1.3 Keep current on renewable energy technology development and update list of recommended technologies accordingly	PEO	PPUC, MPIIC, Private, NDBP, PCC	New entries in list of recommended technologies, seminars and conferences attended	Continuos task starting Jan 2010	$ 50,000 PEO regular budget

Strategy 3.2	**Create effective enabling framework for large scale promotion of renewable energy investments**				
Investment in renewable energy is important to reduce the negative economic, social and environmental impacts of energy production and consumption in Palau. Currently, renewable energy contributes relatively little to primary energy and even less to the consumption of commercial energy. A comprehensive enabling framework will create the basis for significant investment in RE.					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
3.2.1 Establish legal and regulatory framework for small scale household sector investment in renewable energy (net metering, grid access)	PEO	PPUC, NDBP, Palau Housing Authority	Net metering bill signed into law (should not be detrimental to PPUCs economic viability and should maintain fair market prices for customers)	Dec 2009	$ 0
3.2.2 Develop Standard Power Purchase Agreement for medium scale renewable energy investments	PPUC	PEO, MPIIC, private sector, PPUC, NDBP	SPPA drafted and published Promotion campaign Signed agreement Private developers investing in IPP projects	Dec 2011	$ 100,000 PPUC Regular Budget
3.2.3 Identify and develop medium scale projects conducive for IPP investment (hydro, wind) and tender projects competitively	PPUC	PEO, NGOs, PCC	Approved Project identified & tendered	Continuos task starting Jan 2010	$ 50,000 PPUC regular budget
3.2.4 Establish innovative financing mechanisms and subsidy schemes to facilitate high up-front investments necessary for renewable energy	NDBP	PEO, NEC	Loan volume disbursed for renewable energy finance	Dec 2015	$ 1,000,000 SEDERA

projects			Number of loans		NDBP
3.2.5 Explore all carbon finance opportunities for renewable energies	PEO, OP	NDBP, MoF, MoS	Study on carbon finance opportunities published	Dec 2011	$ 20,000 Possibly SEDERA
3.2.6 Educate general public on renewable energy opportunities	PEO	CROP agencies, NGOs, NDBP	Quality information and material accessible on internet	Dec 2011	$ 100,000 SEDERA or EDF 10

Strategy 3.3	**Prepare and implement a project pipeline of priority renewable energy projects and seek funding for priorities**				
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
3.3.1 Convert outer island power supply systems to hybrid configuration and operate systems in efficient mode	PPUC	PEO, Resp. St. Govts	Fuel consumption reduced to 50 % of 2009 baseline	Dec 2016	$ 3,000,000 EDF 10, other donors
3.3.2 Explore opportunities for waste to energy project on Koror Babeldaob	PEO	PPUC, PW Koror State Govt.	Study published	Dec 2012	$ 80,000 EDF 10, SEDERA, IUCN
3.3.3 Promote solar hot water systems for all new high cost residential and commercial buildings	NDBP	Private sector, NDBP, Palau Housing Authority	Number of solar water heaters installed	Continuous task starting Jan 2010	PEO regular budget
3.3.4 Design and implement pilot projects for small and medium scale wind energy generation (2 - 100 kW) once study proves feasible for wind	PEO	NEC, PPUC, Palau Housing Authority	kW of wind energy connected to the grid	Dec 2014	$ 300,000 EDF 10
3.3.5 Develop and apply a standard	PEO & PPUC	NEC, regional organizations,	Study on carbon finance	Dec 2011	$ 20,000

scrutinizing procedure for all unsolicited renewable energy proposals offered to the government		PPUC	opportunities published Standard procedures published		Possibly SEDERA
3.3.6 Implement a grid connected solar project on Koror with a high educational impact	Palau Olympic Committee	PEO, PPUC, MCCA	Power consumption of POC reduced by 90%	Dec 2010	$800,000 Possibly EDF 10
3.3.7 Engage with all development partners in order to promote priority projects of the SAP	PPUC	PPUC, NEC, MoF, OP, MPIIC, MCCA	Donors accept projects from pipeline	Continuous task starting Jan 2010	$ 0

5.4 Imported Fuels and Hydrocarbons

Policy: Recognizing the cost of total national dependence on imported petroleum fuels, international standards will be developed and enforced for any storage, handling and transport of petroleum products. Opportunities and mechanisms for obtaining competitive fuel prices will be pursued. Further the Government will ensure that there are fair wholesale and retail fuel prices and it will require suppliers to regularly provide data on imports and sales by product. A high priority will be given on developing the legal framework and capacity to ensure that Palau's benefits from hydrocarbon exploration and production are maximized.

Strategy 4.1	**Ensure that both continued reliance imported fuels and any eventual production of hydrocarbons within Palau's territory support cultural, economic, social and environmental development throughout the Republic of Palau**				
A hydrocarbon code, model agreements, and related environmental, operational, and tax regulation, taking into account any existing or proposed legislation will be prepared. This legal framework will be developed under OERC and will also cover other aspects of petroleum supply					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***

4.1.1 Establish adequate framework for hydrocarbon development	OERC / OGTF	OGTF, World Bank, EQPB, PCS, Petroleum Suppliers	Regulations, model agreements, codes etc, Private sector engaged in exploration activities	Dec 2010	World Bank / ROP / OERC $423,000
4.1.2 Monitor and pursue sub-regional bulk procurement initiative between FSM, RMI & ROP	MSC	OTGF, PPUC, Petroleum Suppliers	Regional procurement initiative established	June 2010	IFC
4.1.3 Establish a supply and demand information for all class, grades and categories of petroleum products for integration into National Energy Sector database	MPIIC / PEO	OPS, Petroleum suppliers, PPUC, MoF, Shipping Agencies, Port Operators	Information accessible on internet and in publications	Dec 2011	PPUC / SEDREA
4.1.4 Provide training opportunities for appropriate representatives on petroleum production and contract negotiations for emerging countries	NEC	PPUC, PEO Petroleum Suppliers, MoS, MPIIC, UNDP, OGTF	Number of people trained and certificates obtained	Continuous task starting Jan 2010	$200,000 World Bank and development partners

Strategy 4.2	**Encourage competition in the supply and distribution of fuel and ensure that products quality and storage facilities meet the required minimum national and international standards**				
International oil companies have up until now ensured that product and safety standards be maintained. The emergence of new players in the fuel supply area requires actions aimed to maintain these standards in the presence of local and/or regional suppliers					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***

4.2.1 Monitor retail fuel prices against Guam benchmarks and MOPS prices	OPS / NEC	PEO, OP, PPUC, MoF	6 monthly publication of national fuel price monitor statistics	Continuos task starting Jan 2010	$ 1000 Regular PEO budget
4.2.2 Develop oil spill/accident response procedures for all major handlers/users of petroleum products	NEMO / EQPB	PPUC, oil companies, BMR, PEO, Marine Law, MoJ, MoH, OERC	Petroleum and Environmental Safety Regulations established Response procedures published Quarterly Ongoing trainings/drills Inventory of spill equip	Dec 2011	$ 15,000 Regular PEO budget
4.2.3 Conduct awareness training on safety issues pertaining to handling, transportation, storage, quality and use of petroleum products	EQPB	Oil companies, PPUC, NGOs, NEMO, Customs, MPIIC, MoJ	Awareness campaign conducted	Every 6 months starting 2010	$25,000 OEK / Development Partners
4.2.4 Rehabilitate PPUC tank farm and conduct study on maximising economic benefits from its use	PPUC	PEO, oil companies, EQPB, Aimeliik St. Govt., MSC, World Bank, JICA	Schedule of Rehab. Fuel Contracts/MOU	Dec 2011	$ 1,000,000, PPUC, possibly private investors

5.5 Electric Power

Policy Summary: Laws and regulations will be introduced to ensure security, reliability and efficiency of electricity supply. PPUC will be allowed to recover all cost associated with the supply of electricity. Private sector participation in electricity supply will be encouraged through a transparent enabling framework.

Strategy 5.1	**Establish a regulatory framework and tariff regime that underpins PPUC's commercial viability and ability to effectively plan and implement necessary upgrading of its assets**				
On the basis of PPUC's revised strategic plan developed with JICA assistance, the regulatory framework needs to be improved and strategic planning of PPUC performed in an integrated manner. All means to ensure timely collection of adequate revenues need to be explored					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
5.1.1 Conduct an independent tariff review for PPUC including its outer island operations as well as Independent Power Producers (IPPs)	PEO	NEC, PPUC, UNDP, IPPs	Tariff regime including adjustment formula approved by OEK	December 2009 / ongoing	$ 100,000 SEDREA project
5.1.2 Regularly and automatically implement tariff adjustments as recommended in tariff study and also explore fuel price hedging	PPUC	NEC, PEO	Response procedures published	Semi-annual adjustment / monthly tracking beginning Jan 2010	$ 0
5.1.3 Install pre-paid meters for all PPUC customers and conduct awareness campaign on benefits of pre-paid metering	PPUC	PEO, Pacfic Power Associations	Number of pre-paid meters installed Arrears reduced Appropriate prepaid meter specs available	Dec 2010	$ 500,000 Regular PPUC budget, SEDREA for awareness
5.1.4 Develop and up-date an integrated system management and expansion plan for PPUC	PPUC	PEO, NEC, JICA	Revised Plan approved	Annually every July	$ 150,000 JICA

Strategy 5.2	Ensure that operational performance and efficiency of PPUC within acceptable industry standards by end of 2013				
Operational parameters include quality of power supply, reduction of un-scheduled outages, reduction of technical and non-technical losses, and appropriate staffing levels					
Actions	***Leading Agency***	***Participating Agency(ies)***	***Performance Indicators***	***Time Frame***	***Budget/ Source***
5.2.1 Procure and install more efficient generation equipment for power systems on Peleliu, Angaur and Kayangel	PPUC	PEO	Equipment commissioned, specific fuel consumption improved to 11 kWh per gallon of diesel	Dec 2009	$ 200,000 PPUC budget
5.2.2 Procure and install two 2 MW emergency capacity to increase reserve margin of main system	PPUC	PEO	Equipment installed, planned and un-planned generation outages reduced to less than 3 %	Feb 2010	$ 2,000,000 (second-hand) PPUC budget
5.2.3 Rehabilitate generation equipment and perform deferred maintenance on all generator sets	PPUC	PEO	Available capacity increased to 20 MW	Dec 2012	$ 7,000,000 Regular PPUC budget
5.2.4 Systematically upgrade PPUC's generation assets in line with PPUC expansion strategy	PPUC	PEO, NEC, JICA	20 MW new generation	Two Phases @10MW: Dec 2012 Dec 2015	$ 40,000,000 PPUC, possibly JICA
5.2.5 Upgrade PPUCs distribution system	PPUC	PEO, NEC, JICA	Improved and stable power grid for Babeldaob	2015	100,000,000 PPUC, multi-lateral lenders
5.2.6 Promote and enhance academic, professional, and apprentice training and develop/exchange of technologies and technological information	PPUC	PPA, PCC, Equipment Suppliers, Palau National Scholarship Board	Trained and qualified local mechanical and electrical engineers Improvement in	Ongoing	$ 500,000 PNSB, DOI, PPUC, PPA, SEDREA

			performance of distribution system		(Regional initiative)
5.2.7 Create strong incentives and compensation to attract local employment	PPUC/ PPA	PPUC Board, Regional: FSM, RMI, GUAM (Power Co.)	Retain local skills and expertise	Ongoing	100,000,000 ND
5.2.8 Analyse in detail reasons for technical losses and implement loss reduction program	PPUC / PPA	PEO	Losses reduced by replacement of inefficient power equipment Priority list of equipment published PPA Study (DOI) completed / results	Ongoing internally Jan 2010	PPA/DOI (Regional Initiative)
5.2.9 Move to Renewable Energy Platforms	PPUC/ PEO	PPA	30% by 2020	2020	100,000,000 PPUC / multi-lateral lenders

6.0 Project Pipeline

The following data sheets summarize priority projects that are currently under consideration in Palau's energy sector. Hydrocarbon sector projects have not been included in the project pipeline as the legal framework for such projects has not yet been finalized. The level of formation on individual projects may vary as the projects are in different stages of development. Most projects sheets listed in the following pipeline require further refinement.

Typical implementation arrangements include resource assessments, feasibility and engineering studies to determine the final design of the project. It is intended to follow the least cost supply principle as far as donor preferences and other constraints allow this. Then a competitive procurement of equipment and services will follow. This Strategic Plan fully subscribes to the principle of competitive procurement at all levels.

Unsolicited proposals require scrutiny by independent experts followed by price tests (competitive tenders) once technical feasibility and economic performance has been established.

6.1 Energy Conservation

PROJECT TITLE

Koror Wastewater Systems Improvements

PROBLEM (What are the compelling reasons that this project should go ahead?)

- High cost of energy due to outdated sewer pumps
- Excessive and costly maintenance and repair due to aging and old pump systems
- Raw sewer spilling into the mangrove areas and surrounding water
- Potential source for spreading of diseases

OBJECTIVES (What are the principal objectives that address the problem?)

- Reduce fuel consumption and lower cost of energy for ROP Government
- Clean environment and clean water to support ocean based sustainable livelihood
- Healthy community

PROJECT DESCRIPTION (How will these objectives be met?)

Replacement of 12 sewer pumps and 3 backup power generators in various locations throughout communities in Koror State. The project will eliminate occasional raw sewage spill to the mangrove areas and the surrounding ocean; with the location of the sewer pumps located directly in the communities, with some sites that are only few meters away from private homes, break down or malfunctioning of the sewer pump would cause direct spillage of the raw sewer in the driveways and walkways. These spillage or overflow of contaminated water and raw sewage can cause health issues, contaminate fishing grounds and close swimming areas that could have negative impact in our tourism industry.

PREREQUISITES What must happen before this can proceed?

Securing funding for implementation
Installation of new sewer pumps
Installation of new power generator backup

BENEFITS (What are the social and economic benefits to Palau of doing this?)

Lower energy consumption and reduction of billing cost to the ROP Government
Healthy community
Cleaner environment

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Verify demand increase on wastewater system	M	M
Equipment maintenance (capacity building)	H	M
Purchasing of wrong pumps and back-up generators	H	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Survey location / Design	1
Procurement and delivery of equipment	6
Installation / Operational / Lifetime	Continuous

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
TBD	1,500,000.00

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

Ministry of Public Infrastructure, Industries and Commerce / Bureau of Public Works

STATUS (Where is the project in its implementation cycle?

No funding, looking for interested donor / development partner

Priority (High, Medium Low?)

High

PROJECT TITLE

Education and Public Relation Program Energy Efficiency and Renewable Energy

PROBLEM (What are the compelling reasons that this project should go ahead?)

Wasteful enrgy use and inefficient energy consumption

OBJECTIVES (What are the principal objectives that address the problem?)

Reduce wasteful practices
Change consumer behavior
Enhance implementation of conservation

PROJECT DESCRIPTION (How will these objectives be met?)

Design energy conservation curricula & training programs
Develop a comprehensive set of educational materials
Establish an energy conservation website/ programs

PREREQUISITES What must happen before this can proceed?

- Secure funding
- Establish partnerships
- Collect data

BENEFITS (What are the social and economic benefits to Palau of doing this?)

Energy conservation valued
Investments in RE technologies & energy efficient equipment
Reduction of fossil fuel consumption

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Unreliable information sources	High	Medium
Lack of appropriate funding	High	Medium
Lack of collaboration with agency cooperation	High	Medium

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	12-36 months
Construction and delivery?	12-36 months
Operation/Lifetime	Ongoing

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
TBD	
Total	700,000

BRESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC

STATUS (Where is the project in its implementation cycle?
Concept moving towards implementation (design)

Priority (High, Medium Low?)

Medium - High

6.2 Renewable Energies

PROJECT TITLE

PV System for Koror Airport

PROBLEM (What are the compelling reasons that this project should go ahead?)

- Carbon footprint
- Cost of energy
- High dependency from fossil fuels

OBJECTIVES (What are the principal objectives that address the problem?)

Install PV system for Koror airport connected to the grid to reduce reliance on fossil fuels and reduce carbon footprint

PROJECT DESCRIPTION (How will these objectives be met?)

Pilot project of grid connection, a PV system of 160KW to interconnect with main grid with greatest potential for population growth.

PREREQUISITES What must happen before this can proceed?

Feasibility has been done, funding has been provided with implementation to follow shortly

BENEFITS (What are the social and economic benefits to Palau of doing this?)

1. Greatest potential for population growth w. less dependency on fossil fuels
2. High visibility

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Maintenance	H	H
Vandalism	M	L
Natural disaster	H	L

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	3
Construction and delivery?	6
Operation/Lifetime	180

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
JICA	4,000,000

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PEO / PPUC

STATUS (Where is the project in its implementation cycle?

Funded through JICA, awaiting implementation

Priority (High, Medium Low?)

High

PROJECT No and TITLE

Peleliu Renewable Energy Hybrid Systems

PROBLEM (What are the compelling reasons that this project should go ahead?)

- High Cost of electricity supply for Outer Island systems (PPUC looses $ 600,000 each year in Outer Island systems
- High environmental vulnerability of Outer Island eco-systems (risk of fuel spills)

OBJECTIVES (What are the principal objectives that address the problem?)

Reduce fuel consumption and operating cost of Peleliu power system
Optimize load management and decrease specific fuel consumption
Introduce demand side management and increase awareness amongst consumers

PROJECT DESCRIPTION (How will these objectives be met?)

A solar-diesel hybrid system including a 125 kW PV system and dispatchable short term storage (batteries) will be installed. Technicians will be trained in system operation and maintenance, particularly in optimizing dispatch of the battery unit in order to ensure operation of the diesel units at low specific fuel consumption points. An education campaign for the consumers will raise awareness regarding demand management and potential for energy conservation on the demand side. Monitoring of the project will allow to quantify impact of the intervention against the pre-project baseline and provide input for planning of similar measures

PREREQUISITES What must happen before this can proceed?

1. Design study and tender documents for international competitive bidding for supply and installation
2. Installation of smaller diesel units by PPUC (under way)
3. Securing of funding for operation

BENEFITS (What are the social and economic benefits to Palau of doing this?)

1. Security of Peleliu power supply enhanced through renewable energy utilization
2. Reduction of specific fuel consumption for power generation by 35%
3. Reduction of electricity cost for consumers

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Unchecked demand increase may outstrip renewable capacity	M	M
Technical failure through poor choice of hardware and or contractor	H	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	1
Construction and delivery?	12
Operation/Lifetime	180

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
Not determined, possible project for EU Energy Facility	2,000,000
TOTAL	2,000,000

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC in cooperation with PEO

STATUS (Where is the project in its implementation cycle?

Project concept only, no design, no funding

Priority (High, Medium Low?)

High

PROJECT No and TITLE

Angaur Renewable Energy Hybrid Systems

PROBLEM (What are the compelling reasons that this project should go ahead?)

- High Cost of electricity supply for Outer Island systems (PPUC looses $ 600,000 each year in Outer Island systems
- High environmental vulnerability of Outer Island eco-systems (risk of fuel spills)

OBJECTIVES (What are the principal objectives that address the problem?)

Reduce fuel consumption and operating cost of Angaur power system
Optimize load management and decrease specific fuel consumption
Introduce demand side management and increase awareness amongst consumers

PROJECT DESCRIPTION (How will these objectives be met?)

A solar-diesel hybrid system including a 50 kW PV system and dispatchable short term storage (batteries) will be installed. Technicians will be trained in system operation and maintenance, particularly in optimizing dispatch of the battery unit in order to ensure operation of the diesel units at low specific fuel consumption points. An education campaign for the consumers will raise awareness regarding demand management and potential for energy conservation on the demand side. Monitoring of the project will allow to quantify impact of the intervention against the pre-project baseline and provide input for planning of similar measures

PREREQUISITES What must happen before this can proceed?

Design study and tender documents for international competitive bidding for supply and installation
Installation of smaller diesel units by PPUC (under way)
Securing of funding for operation

BENEFITS (What are the social and economic benefits to Palau of doing this?)

Security of Angaur power supply enhanced through renewable energy utilization
Reduction of specific fuel consumption for power generation by 35%
Reduction of electricity cost for consumers

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Unchecked demand increase may outstrip renewable capacity	M	M
Technical failure through poor choice of hardware and or contractor	H	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	1
Construction and delivery?	12
Operation/Lifetime	180

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
Not determined	800,000
TOTAL	800,000

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC in cooperation with PEO

STATUS (Where is the project in its implementation cycle?

Project concept only, no design, no funding

Priority (High, Medium Low?)

High

PROJECT No and TITLE

Kayangel Renewable Energy Hybrid Systems

PROBLEM (What are the compelling reasons that this project should go ahead?)

- High Cost of electricity supply for Outer Island systems (PPUC looses $ 600,000 each year in Outer Island systems
- High environmental vulnerability of Outer Island eco-systems (risk of fuel spills)

OBJECTIVES (What are the principal objectives that address the problem?)

Reduce fuel consumption and operating cost of Kayangel power system
Optimize load management and decrease specific fuel consumption
Introduce demand side management and increase awareness amongst consumers

PROJECT DESCRIPTION (How will these objectives be met?)

A solar-diesel hybrid system including a 30 kW PV system and dispatchable short term storage (batteries) will be installed. Technicians will be trained in system operation and maintenance, particularly in optimizing dispatch of the battery unit in order to ensure operation of the diesel units at low specific fuel consumption points. An education campaign for the consumers will raise awareness regarding demand management and potential for energy conservation on the demand side. Monitoring of the project will allow to quantify impact of the intervention against the pre-project baseline and provide input for planning of similar measures

PREREQUISITES What must happen before this can proceed?

4. Design study and tender documents for international competitive bidding for supply and installation
5. Installation of smaller diesel units by PPUC
6. Securing of funding for implementation

BENEFITS (What are the social and economic benefits to Palau of doing this?)

Security of Kayangel power supply enhanced through renewable energy utilization
Reduction of specific fuel consumption for power generation by 35%
Reduction of electricity cost for consumers

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Unchecked demand increase may outstrip renewable capacity	M	M
Technical failure through poor choice of hardware and/or contractor	H	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	1
Construction and delivery?	12
Operation/Lifetime	180

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
Not determined	450,000
TOTAL	450,000

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC in cooperation with PEO

STATUS (Where is the project in its implementation cycle?

Project concept only, no design, no funding

Priority (High, Medium Low?)

High

PROJECT No and TITLE

Energy conservation and Renewable Energy to Support Sport and Environment in Palau

PROBLEM (What are the compelling reasons that this project should go ahead?)

The Palau Olympic Committee as operator of Palau's sports facilities is financially burdened by high energy cost to operate sports facilities such as racetrack, swimming pool, gym and baseball field.

OBJECTIVES (What are the principal objectives that address the problem?)

1. To promote sustainable, green energy through an awareness campaign based on the theme 'Youth, Sport and Environment'.

2. To reduce PNOC's energy cost by 90% through energy conservation and renewable energy use.

3. To reduce PNOC's overall electricity consumption by 10 % through energy conservation measures

PROJECT DESCRIPTION (How will these objectives be met?)

The first technical component is reducing electricity consumption through conservation measures by 10 – 15 %. This can be achieved without any decline in the utility of the facilities. A full energy audit will be conducted for all PNOC facilities in co-operation with the Palau Energy Office in order to determine the exact nature of the most promising conservation measures. In order to compensate for the total average monthly consumption after energy conservation measures, a solar installation of 115 kW peak will be required.

PREREQUISITES What must happen before this can proceed?

Secure Funding under EDF 10 or other donor facility

BENEFITS (What are the social and economic benefits to Palau of doing this?)

1. Increased conservation awareness of amongst young people in Palau

2. Reduction of PNOC's fossil energy consumption to zero

3. Cost saving of US$ 80,000 – 100,000 p.a. for PNOC

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Shortfall in net energy supply*	M	L
Lack of capacity within PEO	M	H
* output estimates conservative		

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	2
Construction and delivery?	9
Operation/Lifetime	240

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
EDF 10	1,200,000
PNOC	80,000
Total	1,280,000

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PNOC in close cooperation with PPUC and PEO

STATUS (Where is the project in its implementation cycle?

Proposal developed and submitted to donor

Priority (High, Medium Low?)

High

PROJECT TITLE

Ngiwal State renewable energy pilot project Phase 1

PROBLEM (What are the compelling reasons that this project should go ahead?)

- Increasing fuel cost
- Increasing dependency on fossil fuel

OBJECTIVES (What are the principal objectives that address the problem?)

Decrease electricity bill for local government and the community
Reduce carbon footprint
Reduce fossil fuel dependency

PROJECT DESCRIPTION (How will these objectives be met?)

Convert 100% of the local government facilities into renewable energy (solar) and provide supplemental power supply to the elderly and persons with limited income.

PREREQUISITES What must happen before this can proceed?

Feasibility Study

BENEFITS (What are the social and economic benefits to Palau of doing this?)

1. Reduce electrical billing cost to the local government
2. Reduce electrical billing cost to the elderly and persons on limited income

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
New sub-division development (housing project)	High	High
Lack of technical expertise	High	High
Excessive cost due to import shipping cost	Medium	Medium

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	1
Construction and delivery	12
Operation / Lifetime	Ongoing

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
Donor / other sources to be determined	1,800,000.00

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

Palau Energy Office (Admin Agency) and PPUC (implementing)

STATUS (Where is the project in its implementation cycle?

Concept – No design – no funding

Priority (High, Medium Low?)

Medium

PROJECT TITLE

Assessment of Hydro Resources on Babeldaob

PROBLEM (What are the compelling reasons that this project should go ahead?)

- Inadequacy of power supply of Babeldaob
- High cost of power generation

OBJECTIVES (What are the principal objectives that address the problem?)

Reduce cost and align existing power supply
Provide efficient and reliable power source
Supplement to existing power supply and alternate to fossil fuel
Untapped resources can be used as alternative energy

PROJECT DESCRIPTION (How will these objectives be met?)

Hydro power system of 100 kW – 300 kW installed at primary locations and coordinated with PPUC for operation and maintenance. Training in place with developing partners in Hydro power system and transfer of technology. An education awareness program for the consumers regarding the power source of hydro as alternative energy should be launched. Necessary infrastructure would need to be constructed.

PREREQUISITES What must happen before this can proceed?

1. Conduct feasibility study
2. Adopt / design study and intended document for bidding process
3. Funding
4. Hydrological measurement and site surveys

BENEFITS (What are the social and economic benefits to Palau of doing this?)

1. Security of Babeldaob power supply enhanced for renewable energy utilization
2. Major consumer savings

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Drought	H	L
Acquisition of land	H	H
Limited specialized /technical manpower	H	M
Accessibility to site	M	M
Destruction of environmental and habitat surrounding	H	H

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	4
Construction and delivery?	36
Operation/Lifetime	Ongoing

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
EU	500,000.00
Development Partners/ Donor Organizations	

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC / MPIIC / PEO

STATUS (Where is the project in its implementation cycle?

Project Concept

Priority (High, Medium Low?)

High

PROJECT TITLE

Wind Resource Assessment

PROBLEM (What are the compelling reasons that this project should go ahead?)

- Palau is committed to reduce carbon footprint and lessen dependency from fossil fuels
- Wind is a resource available but its real feasibility has not been assessed

OBJECTIVES (What are the principal objectives that address the problem?)

Conduct wind study to identify if there are any feasible wind alleys in Palau and if there are then, then conduct a viability study for distribution.

PROJECT DESCRIPTION (How will these objectives be met?)

1st Phase: 2 year study with measuring towers in selected study sites. A minimum of 4 sites pre-determined in outlying states

2nd Phase: If wind alleys are feasible then comparative cost-benefit analysis considering distribution

PREREQUISITES What must happen before this can proceed?

Funding / Determine Sites

BENEFITS (What are the social and economic benefits to Palau of doing this?)

- Reduction of fuel consumption
- May reach where there is no grid
- Replenishes grid (overall energy production)

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
High maintenance cost (assess effect on marine environment)	M	H
Technical capacity	H	M
Volume needed to make cost effective	H	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	3
Construction and delivery?	3
Operation/Lifetime	24

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
EDF 10	250,00.00

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PEO

STATUS (Where is the project in its implementation cycle?

Pending funding and site assessments

Priority (High, Medium Low?)

High

6.3 *Electric Power*

PROJECT TITLE

Secure power supply in Korror trough intermediate increase in PPUC generation capacity

PROBLEM (What are the compelling reasons that this project should go ahead?)

Aging generators are prone to break downs, Insufficient reserve capacity to meet demand

OBJECTIVES (What are the principal objectives that address the problem?)

Bridge capacity until base load generators are replaced, Standby capacity

PROJECT DESCRIPTION (How will these objectives be met?)

Procurement and installation of 2x2 MW to 2x5 MW second hand generator sets in Malakal power plant

PREREQUISITES What must happen before this can proceed?

Selection of equipment and contractor

BENEFITS (What are the social and economic benefits to Palau of doing this?)

1. Provide necessary capacity for system stabilization and high quality power supply 2. Provision of reserves capacity will minimize system outage and reduce economic cost of unserved electricity demand

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Second hand generator can incur substantial maintenance cost	M	M
Breakdown of generators (can be mitigated through warrantee clauses in procurement contract)	M	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	0
Construction and delivery?	6
Operation/Lifetime	120

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
PPUC	2,000,000.00

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC

STATUS (Where is the project in its implementation cycle?

Project under way, funded through PPUC, installation expected in 2010

Priority (High, Medium Low?)

High

PROJECT TITLE

Replacement of Base Load Generators PPUC

PROBLEM (What are the compelling reasons that this project should go ahead?)

Aging generators – (26 years – 13 year, 10 years) have high specific fuel consumption which in turn forces PPUC to charge higher tariffs

OBJECTIVES (What are the principal objectives that address the problem?)

Decrease in average specific fuel consumption, Reduction of generation cost, Enhance reliability of power supply

PROJECT DESCRIPTION (How will these objectives be met?)

Replace 20 MW of capacity by 4x5 MW generators and ancillary equipment in two places.

PREREQUISITES What must happen before this can proceed?

System design study, Identification of funding source

BENEFITS (What are the social and economic benefits to Palau of doing this?)

1. More efficient electricity generaion will result in lower supply cost which will benefit all consumers of PPUC supply
2. Reduction
3. Reduction of energy consumption

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Capacity to maintain new technology	M	M
Introduction of different generator sets may induce higher level of complexity and higher cost of spare part management	H	H

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Design	6-12
Construction and delivery?	12-18
Operation/Lifetime	360

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
JICA -Phase one	20,000,000
PPUC –Phase two	
Palau Government	
Total	20,000,000

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC

STATUS (Where is the project in its implementation cycle?

Possibly JICA/Government of Japan

Priority (High, Medium Low?)

High

PROJECT TITLE

Airai to Ngechsar connection

PROBLEM (What are the compelling reasons that this project should go ahead?)

Single line connectivity only, high loss of load probability in Airai

OBJECTIVES (What are the principal objectives that address the problem?)

1. Loop grid connectivity
2. Allow secondary connection and redundancy

PROJECT DESCRIPTION (How will these objectives be met?)

Connect Airai Power distribution lines to Ngeschar system with a 10 Kilometers line

PREREQUISITES What must happen before this can proceed?

Field Study, engineering design

BENEFITS (What are the social and economic benefits to Palau of doing this?)

Grid stability, less outages, reduced economic loss due to unserved power demand

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Lack of funding	H	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Engineering study design	6
Construction	12
Lifetime	240

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
PPUC, MLA	6,000,000.00

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC

STATUS (Where is the project in its implementation cycle?

Concept

Priority (High, Medium Low?)

Medium

PROJECT TITLE

Upgrading of Koror Substation

PROBLEM (What are the compelling reasons that this project should go ahead?)

Koror Substation currently requires step down transformation from 34.5 KV to 13.8 KV for distribution from Aimeliik power plant. This incurs considerable distribution losses

OBJECTIVES (What are the principal objectives that address the problem?)

Decrease line loss and facilitate distribution from Aimeliik

Enhance system reliability and redundancy

PROJECT DESCRIPTION (How will these objectives be met?)

Procurement and installation of a 34.5 kV submarine cable and which connects Aimeliik with Koror

PREREQUISITES What must happen before this can proceed?

Engineering Study, Design

BENEFITS (What are the social and economic benefits to Palau of doing this?)

Reduced loss of load probability, reduction of transmission losses and lower supply cost within grid

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Lack of funding	H	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Engineering Design	12
Construction	15
Lifetime	360

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
PPUC, MLA	To be determined

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC

STATUS (Where is the project in its implementation cycle?

Project Concept

Priority (High, Medium Low?)

High

PROJECT TITLE

Power distribution – Ngiwal / Ngaraard

PROBLEM (What are the compelling reasons that this project should go ahead?)

Weak grid and high risk of load loss from single line power distribution system

OBJECTIVES (What are the principal objectives that address the problem?)

1. Enhance gird capacity 2. Reduce risk of load loss 3. Allow supply of Northern Babeldaob by Capitol generator during outages

PROJECT DESCRIPTION (How will these objectives be met?)

Connect Ngiwal to Ngaraard with 3 kM high voltage line

PREREQUISITES What must happen before this can proceed?

Engineering Study, Design

BENEFITS (What are the social and economic benefits to Palau of doing this?)

Enhanced grid stability, reduce loss of load probability in Northern Babeldaob

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)
Lack of funding	H	M

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)
Engineering, Design, Tender	6
Construction	9
Lifetime	240

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$
PPUC budget	$1,000,000.00

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC

STATUS (Where is the project in its implementation cycle?

Project concept

Priority (High, Medium Low?)

High

PROJECT TITLE

Submarine cable from Aimeliik to Koror (T-Dock)

PROBLEM (What are the compelling reasons that this project should go ahead?)

Single line power distribution system

OBJECTIVES (What are the principal objectives that address the problem?)

Stabilize power distribution system by having redundancy

PROJECT DESCRIPTION (How will these objectives be met?)

A 5KM submarine cable extending from Aimeliik Power plant substation to Koror substation at T-Dock.

PREREQUISITES What must happen before this can proceed?

Study

BENEFITS (What are the social and economic benefits to Palau of doing this?)

RISKS (What might prevent this from fixing the problem?)

Source of risk	Consequence (H/M/L)	Likelihood (H/M/L)

TIMING (What is the expected timeframe for the key deliverables?)

Description of deliverable / milestone / lead time	Time from funding (Months)

FUNDING (What will this project cost, and how accurate is that estimate?)

Source (budget, donor, private investor)	Cost US$

RESPONSIBILITY (Which agency will ultimately be responsible for delivering this?)

PPUC

STATUS (Where is the project in its implementation cycle?

Priority (High, Medium Low?)

Medium