

Sustainable Energy Policy: Report on an Advisory Mission to the Pacific Islands

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Introduction

Over the past thirty years, energy has been an increasingly important economic issue in the Pacific Island Countries (PICs). This has been mainly due to the increasing level of economic development in these countries that is dependent on electrical or petroleum energy availability. Petroleum products typically constitute a large portion of the foreign exchange costs of the PICs and therefore the island economies are very sensitive to changes in petroleum cost and its availability. In most PICs, much, if not all, electricity is produced using diesel engines. This makes electricity cost also sensitive to petroleum cost and availability. In the 1970's and early 1980's several "oil shocks" occurred. High prices of petroleum products caused serious economic problems and slowed development in the Pacific Region.

Unfortunately, the Pacific Island Countries are in most cases individually too small to be able to separately and comprehensively address the complex issues of energy strategy,

international energy economics, energy efficiency and the optimum use of indigenous energy resources. Since most of the PICs have similar energy problems, regional energy programmes have been developed to provide technical and policy assistance. The earliest was the UNDP funded and ESCAP administered Pacific Energy Development Programme (PEDP) which operated from 1983-1992. Other regional programmes have followed some of a general nature as was the Forum Secretariat Energy Division² (FSED) programme and some specialised as were the two European Union Pacific Regional Energy Programmes. Renewable energy in particular has been a strong focus of regional programmes over the past 15 years because of the fiscal and strategic problems associated with high dependence on fossil fuel imports for energy and the clear strategic, environmental and economic advantages of maximising the use of renewable energy resources. In general, the increased use of renewable energy is one of the cornerstones for the development of a sustainable energy future for all the PICs.

Although the internal capability of the Island Governments to address general energy issues has clearly been strengthened through national, regional and international assistance, there remains the basic problem that small island countries are usually unable to establish comprehensive energy programmes staffed by local experts and to be wholly funded from local resources. Therefore, it seems clear that for the foreseeable future there will need to be access to external expertise and financial resources on a broad range of subjects and activities.

Given that ESCAP is not a donor agency but a UN Commission, ESCAP itself will not fund regional projects or provide long term financial support to energy offices. Within the context of PIC sustainable energy development, ESCAP can assist the PICs directly through short term technical assistance consultancies, it can help co-ordinate development and implementation of international energy programmes, and ESCAP can independently or jointly with Pacific Regional Organizations (PROs) advise island energy offices on strategic issues.

ESCAP Resolution 56/4: "Promotion of Sustainable Energy Future for Small Island States" was adopted in June 2000. The resolution demonstrates the importance that island states attach to a sound development of their energy sectors, including the need for a coordinated approach to capacity building and programme development and evaluation for the support of sustainable energy development. The Resolution calls on ESCAP to facilitate exchange of experiences among PICs, provide advisory services and assist the PICs access the necessary resources to move toward a sustainable energy future.

In July 2001, ESCAP advised island governments and PROs, that ESCAP intended to send a mission to the Pacific Region and would entertain requests for specific technical assistance related to sustainable energy development. Requests for assistance were received from six countries, Cook Islands, Tonga, Fiji, Vanuatu, Tuvalu and Kiribati. The request from Vanuatu was for a technical consultancy on geothermal energy and will be fulfilled separately by a consultant contracted by ESCAP. In September and October, the remaining five countries were visited by a representative from the ESCAP Energy

² The Forum Secretariat Energy Division Programme shifted to the South Pacific Applied Geoscience Commission (SOPAC) in 1998. The South Pacific Forum Secretariat is now called the Pacific Islands Forum Secretariat (PIFS).

Resources Section and technical consultants. During that mission, an added objective of ESCAP was to assess the needs of the PICs for external assistance and to investigate options for future involvement in the Pacific sub-region by ESCAP.

Following the missions to the Pacific, a meeting was scheduled to be held in February, 2002, of PIC energy officers and PRO officers to discuss the needs of the Pacific for energy programme assistance, including how ESCAP can best assist in filling those needs.

Mission Summary

Cook Islands

A team from ESCAP visited the Cook Islands from 5 through 12 September, 2001, to respond to a request from the Government of the Cook Islands (GoCI) for ESCAP to advise it on sustainable energy development, in particular to review existing national energy policies including legal tools, energy sector institutions and pricing issues.

The Energy Office is staffed with experienced personnel, but the capacity for energy planning, administration and policy is weak. Around half of the human resources are spent on safety and inspection matters, and the office needs strengthening with regards to economic, policy and pricing matters.

Recommendations by the mission included:

- Strengthening lines of authority of the Energy office, improving co-ordination between agencies handling energy matters and moving the electrical inspection activities out of the energy office.
- Amending and editing the draft energy policy to make it more internally consistent, to include practical guidelines, and to clearly state the Government's intentions, energy pricing policies, and priorities within the energy sector.
- That the GoCI designate a specific point of contact within Government for petroleum matters, that it seriously consider adopting the regional petroleum storage standards developed by the Pacific Islands Forum Secretariat (PIFS) and that it provide practical training for persons responsible for safety and environmental aspects of petroleum storage.
- Revision of the Energy Act to specifically provide the energy office with the necessary authority to carry out its policy and regulatory functions.
- For Rarotonga electricity supply, that the electricity utility retain its implicit policy of a subsidised 'lifeline' tariff for low-income consumers but consumption above this level be at a flat rate for all customers high enough to fully cover all costs including the subsidisation of low income customers.
- For outer island electricity supply, the Office of the Minister of Island Administration should develop a standard spreadsheet for use by the Island Councils for calculating the actual, full cost of electricity supply to ensure that Island Councils are aware of the level of subsidies for electricity they are providing.
- That the GoCI should only consider renewable technologies that are robust, reliable, commercially available and proven to be practical for use in the Cook Islands.
- That when the GoCI determines whether conventional or renewable energy is to be used, that costs are calculated on a comparable basis so a rational economic choice can be made.
- Charges made for electricity from renewable sources should be sufficient to at least cover all operation and maintenance costs with collections managed from Rarotonga.

- When considering a new renewable energy source, the GoCI should seek external assistance from a neutral source to help evaluate project proposals.

In the near future, external assistance is expected to be needed by the Cook Islands for at least the following tasks:

- Energy policy advice.
- Petroleum pricing issues.
- Training for safe petroleum handling and storage
- Technical assistance for renewable energy applications.
- Assistance in developing spreadsheets for energy cost determinations and comparison of energy project methodologies.
- Management training for outer island electricity operation.

Tonga

In co-operation with the SPC, ESCAP was asked to advise the Government of Tonga on sustainable energy development and their current policies on sustainable energy, including technical advice on the prospects for privatising rural electrification in Tonga. A team from ESCAP visited Tonga from 17-21 September, 2001.

The Energy Planning Unit (EPU) in Tonga functions primarily as a renewable rural electrification project management unit. The staff of EPU has no expertise or involvement in monitoring the urban power or petroleum supply subsectors, and has little capacity on economic matters and policy formulation and monitoring issues.

The mission recommended that:

- The project operation functions of the EPU be shifted to the private sector and the EPU be restructured as a policy and regulatory agency.
- The Tonga Electric Power Board (TEPB) Act needs to be reviewed to reflect current developments. This review should be carried out jointly with the ESCAP-supported draft Energy Act.
- Tariffs charged and management procedures are inconsistent for the various outer island solar electrification projects and need to be rationalised with the intent of recovering all operation and maintenance costs.
- The government, in reviewing the TEPB Act, must also review its regulatory responsibilities for the energy sector review the draft Energy Act that specifies the responsibilities and authority of the EPU and establishes a regulatory process for the energy sector.
- The EPU's personnel structure be reviewed and staffing strengthened to fill a more policy and monitoring-oriented role.
- That the draft national energy policy for Tonga be reviewed for adoption.
- Electricity tariffs be reviewed and rationalised with the intent of eliminating operating and maintenance subsidies.
- The National Standing Committee on Energy (NSCE) be reinstated to act as a public/private co-ordinating body and policy forum.
- There be financial provision for management training and support in rural energy projects.

Tonga is expected to need external technical assistance in the near future for:

- Energy policy advice.
- Technical assistance for renewable energy applications.

- Assistance in developing spreadsheets for energy cost determinations and comparison of energy project methodologies.
- Management training for outer island electricity operation.
- A general review of the relationship between public and private energy providers and what strategy government should follow to optimise that relationship.

Tuvalu

The import of petroleum products dominates the economy of Tuvalu. Small changes in international petroleum prices have a much larger effect on Tuvalu than on most Pacific countries. Therefore, reducing petroleum dependency is an important policy issue. This can be accomplished by increasing the efficiency of energy use and by utilising indigenous energy resources as much as is practical. The Tuvalu Government has a strong interest in measuring the available renewable resources and in establishing programmes that would most efficiently use them.

The Tuvalu government requested ESCAP to assist in developing detailed terms of reference for a prefeasibility study on solar/hydrogen power potential in the islands of Tuvalu. It was determined early in the visit that solar/hydrogen power would not be appropriate for Tuvalu, therefore the development of terms of reference for studies to determine the appropriateness of other resources available in Tuvalu was changed to be the primary task for the mission. These terms of reference include:

- Wind power as a supplement to existing energy systems.
- Wave energy to supplement existing energy systems.
- The use of ocean thermal energy (OTEC) as a replacement for diesel generation
- Biofuels as a replacement for petroleum in Diesel engines.
- Solar energy for water heating and electricity generation both as a supplement to existing energy systems and as independent energy systems.

The end result of these studies would be for the Government of Tuvalu to be able to concentrate its limited resources on the renewable energy development technologies most suited to the needs of the country.

Though once dependent on resident expatriates for technical support, Tuvalu now has the local expertise necessary to operate and maintain its electricity, petroleum storage and petroleum delivery systems. Short term technical assistance will continue to be needed to address specific problems in both the electricity and petroleum sectors, however.

Due to its small size and limited resources, Tuvalu continues to need a broad range of external support in the energy sector, much of which can be in the form of short term consultancies and funding of activities and concrete projects. Tuvalu has expressed a need for external assistance in energy analysis, policy development and energy sector structuring particularly as relates to energy pricing, energy efficiency and the integration of renewable energy with existing energy systems.

In the near future, Tuvalu is expected to need external consultative assistance in the following areas:

- Energy policy advice.
- Petroleum pricing issues.
- Technical assistance for measuring and developing renewable energy resources.

- Assistance in developing spreadsheets for energy cost determinations and comparison of energy project methodologies.
- Development of hybrid systems (diesel + renewables) to reduce petroleum dependency.
- Assistance in developing a demand side management capability.
- Integration of renewable energy into electricity production through hybrid generation technologies.

Kiribati

The Kiribati government requested ESCAP assistance in developing detailed terms of reference for a prefeasibility study on solar/diesel hybrid power development for Island Council office areas on rural islands.

After discussions with the Energy Planning Unit, the mission prepared a terms of reference for the requested prefeasibility study. If the diesel component of the hybrid systems can be economically operated on the coconut oil soon to be produced by a new facility on Tarawa, this would provide energy development on the outer islands without increasing petroleum dependency. The successful development of hybrid systems for Kiribati would also provide a model for similar implementation in other Pacific countries with special relevance to the Cook Islands, the Marshall Islands, Tuvalu and the Federated States of Micronesia.

The mission met with representatives of all Ministries engaged in energy projects and the development of energy policy and found little need for major, long term technical support. The Energy Planning Unit is staffed with experienced, well trained personnel but is small, consisting of only three professional staff. Therefore it is reasonable to expect that not all aspects of energy policy can be covered with equal competence and some short term external technical assistance may be appropriate from time to time.

The Kiribati solar based rural electrification programme has been unusually successful and has attracted attention from around the world. As a part of regional sustainable energy development, it is appropriate that the Government of Kiribati (GOK) be supported by PRO's to provide study tours, internships and training for other PICs in solar energy based rural electrification.

The EU Outer Islands Electrification project is presently underway. That project will provide approximately 1400 solar home systems on all the islands of the Gilbert group and will provide extensive technical and management support to the Solar Energy Company and the Energy Planning Unit.

In the near future, Kiribati is expected to need external consultative assistance in the following areas:

- Development of hybrid PV/Diesel systems for island council use.
- Energy policy development assistance.
- The use of coconut oil as a diesel fuel supplement or substitute.
- Petroleum purchasing, transport, storage and safety.

Fiji

The Fiji Department of Energy (FDoE), Fiji, requested ESCAP to advise it on energy data collection including questionnaire design, data analysis and reporting. In response, an ESCAP staff member visited FDoE from 10 through 12 October 2001.

The FDoE is one of the largest energy offices in the Pacific as befits the second largest country in the region. It is staffed by experienced, qualified professionals with specialists in important energy areas. However, data collection and the creation of energy statistics has not been a priority activity. FDoE has decided that further progress in energy policy and planning will require good information and statistics and wishes to improve its data gathering and analysis capabilities. The mission provided the following recommendations:

- Create an Energy Information position for full time data management.
- Establish collaboration links with other government entities on energy data collection.
- Construct and maintain an annual energy balance to determine and monitor trends in overall energy supply, production and consumption in Fiji.
- Maintain a separate database on rural energy supply.
- Carry out energy consumption surveys for the calibration of the consumption side of the energy balance.
- Make energy sector data available to other government entities for their planning purposes.
- Make energy sector data available to the public by publishing energy statistics, rural electrification maps and pamphlets on recent developments.

Fiji presently has a UNDP/GEF project directed toward establishing a structure and incentives for private development of rural electrification using solar photovoltaics. That project will include rural energy legislation, institutional development and capacity building.

In the near future, Fiji is expected to need consultative assistance in specific technical issues concerning:

- Renewable energy resource assessment and development.
- Demand side management issues.
- Micro hydro development.
- Energy data analysis.
- Geothermal resource mapping and development.

Regional Observations

Although among PICs the physical and cultural conditions may differ significantly, the energy problem areas of the countries visited had a number of similarities.

- In all countries visited except Fiji, petroleum represents such a high level of import percentage that the stability of the national economy depends strongly on the stability of petroleum prices. There is a desire to reduce petroleum dependence even if the available options are not clearly economically superior.
- Petroleum product delivery to outer islands is costly, often inconsistent and is managed with little attention to environmental concerns.

- All countries visited had concerns about the development of rational energy policy. Although the Forum Secretariat Energy Division had an energy policy development programme in the mid 1990s, countries did not embrace the generic policy that was developed. They continue to struggle with the creation of their individual policy documents.
- All countries with the exception of Kiribati continue to have inconsistent results in renewable energy implementation with problems mostly of an institutional rather than a technical nature.
- Training in both conventional and renewable energy technology is expensive and rarely available locally when needed.
- Privatisation has created a need for business training for local organizations operating energy projects.
- Analysis skills in PIC energy offices need strengthening.
- Energy data collection and analysis needs strengthening.
- There remains a need for assistance in developing energy projects for external funding.
- Energy issues are often divided among many different ministries and energy offices often cannot address energy issues in a coherent way. Energy legislation is often out of date and often not adhered to and non-existent in some. Energy offices do not tend to be policy oriented and economic analysis and development skills are often weak.

Differences noted were generally related to the size of the country with the larger countries having a local capacity to address a broader range of energy issues than the smaller countries. Other differences relate to topography and individual island size. Atoll island countries have very limited resources relative to volcanic island countries. Fiji with its relatively large islands has specific problems of logistics and overland delivery of energy products not faced by the small countries. Of the countries visited, only Fiji has a significant industrial sector and must consider industrial energy supply and management. Urban concentration also varies widely with Tuvalu, Kiribati and Tonga having a larger percentage of their population in rural areas than is the case with the Cook Islands and Fiji.

Based on the countries visited, the mission considers it reasonable to address a number of energy problems on a regional basis but also notes that each country has individual problems that may require specific assistance not appropriate to address regionally.

Regional Organizations Providing Energy Sector Assistance

Currently, the Secretariat of the Pacific Community (SPC), the South Pacific Applied Geoscience Commission (SOPAC), the Pacific Power Association (PPA), The South Pacific Regional Environmental Programme (SPREP) and the Pacific Islands Forum Secretariat (PIFS) all provide assistance to their member countries on various issues pertaining to sustainable energy development. This includes promotion of sustainable renewable energy systems (solar PV and wind) as in the SPC's PREFACE programme, power sector efficiency issues as in PPA, petroleum pricing advice as provided by the PIFS, environmental issues as in SPREP and energy policy advice and database development through the SOPAC. Since these programmes often overlap and since they are interrelated, there is a strong need for interaction and co-ordination.

The CROP Energy Working Group (EWG), which meets on an ad-hoc basis, provides a common discussion forum and attempts to co-ordinate regional programmes. The development of the EWG shows that organizations recognise the need to co-operate and

co-ordinate efforts. However, the mission found that there is a need to strengthen programme co-operation and joint programmatic efforts.

None of these organizations provide comprehensive energy sector assistance making it necessary for PICs to interact with different organizations for different needs and to work with different programmes that address related issues but are not co-ordinated³.

The mission found that none of these programmes has significant financial allocations, which are intended to assist in arranging short term consultancies to assist on specific tasks requested by PICs although that is a common need.

The mission was also told that not all of the PRO's activities entirely reflect the needs of their member countries. In those cases there is a need on the part of the PICs to review the role of these organizations, to seek their modification to better meet the needs of the member countries and to improve co-operation and co-ordination among the different organizations⁴. Presently there is no mechanism where PIC energy officials directly influence a comprehensive energy programme and budget of the PROs, as was the case in the annual Regional Energy Committee meetings of the FSED and the annual tripartite review of the PEDP.

Meeting PIC Needs for Energy Assistance

Based on the information gathered during the ESCAP mission to the Pacific in 2001, regional programmes remain needed to support the efforts of the PICs in developing energy sustainability. To do this, regional assistance needs to be provided through a range of programmes. As the expertise and experience within the PICs increases, general programmes for assistance will become less important but given the small size of the PICs, specialist technical and other support will continue to be important.

Long term programmes with expertise based within the region

All the PICs have a continuing, long term requirement for assistance in areas that have broad relevance in most countries. They include energy policy development, energy institutional development, energy legislation development, training, petroleum purchasing and pricing, petroleum storage and safety, and energy data collection and analysis. These areas of expertise are unlikely to be adequately developed and sustained within the PIC energy offices, and having expertise available for assistance at a regional level appears appropriate. A regional programme of this type would have an administrative office and staff of experts in the region. The 1980s Pacific Energy Development Programme under ESCAP was a programme of this type as was the Forum Secretariat Energy Division programme of the mid 1990s.

³ EWG is in the process of developing a regional energy strategy and plan for PICs.

⁴ A *Regional Energy Programme – Planning and Design* study was prepared as a result of a joint SPC/SOPAC meeting in 1998 where 17 PIC's were represented. Also, a Regional Energy Meeting was held jointly by SPC and SOPAC in September 2000 to discuss Pacific energy programme priorities and issues.

Long term programmes with expertise based outside the region

A number of issues exist within the PICs that have a long term requirement for support but which require different approaches in different countries. Some examples of this class of assistance are renewable energy assessment and development, energy efficiency programme development, energy project design and rural electrification. It would be inefficient to retain experts on a regional basis when the problems tend to be country specific. Therefore this type of programme could best meet the needs of the countries by either engaging external consultants to assist through periodic visits for consultation or by placing a foreign expert in the country for an extended period of time for continuous consultation. The EU outer island electrification project in Kiribati and, to some extent, the JICA solar electrification project in Vanuatu are examples of this type of programme.

Short term assistance with expertise based outside the region

The PICs have frequent requirements for short term assistance on specific problems, usually for technical assistance or for project design and development. Each requirement for assistance tends to be short in term, typically a few weeks, and is unlikely to be repeated. It is difficult for the PICs to individually locate and contract with the persons having the needed expertise. A programme to facilitate matching expertise with needs would be of value.

Developing Financing for Energy Projects

Planning without execution is a useless exercise. Finance to carry out plans will be needed. Funding for projects in the form of grants, concessionary and commercial loans is available from international agencies and institutions, but the preparation of suitable project documents is complex and most PICs need assistance in their preparation and in negotiations with the financing agency.

Evaluation of Energy Projects

The monitoring and evaluation of projects can be complex and in any case is best carried out external to the implementing institution. In particular, pilot projects that are intended to set the stage for larger scale projects of a similar nature need careful evaluation and analysis to insure that follow up projects are optimised. Most PICs can benefit from short term external expertise and training in developing monitoring and analysis methods and in carrying out evaluations.

ESCAP and Sustainable Energy Development in the Pacific

ESCAP is not a donor organization. It primarily provides a forum for member countries to discuss problems and to develop requests for assistance that is of a regional nature. ESCAP has a small staff of energy specialists and has access to a much larger group of energy consultants. It also has the capability to provide management of regional programmes funded by international donors such as the Pacific Energy Development Programme, which was funded by UNDP.

Considering the requirements of the PICs for assistance in sustainable energy development, if requested by the PICs ESCAP may be able to:

- Locate and field short term consultants for specific tasks.
- Assist in locating project finance through its international linkages with donors and international finance agencies.
- Provide training support for PIC energy officers and project operators.
- Support regional meetings for programme development and co-ordination.
- Assist in co-ordination of regional energy programmes through its regional office in Vanuatu and by supporting the EWG in its co-ordination efforts.
- Locate donor finance for regional programmes.
- Locate and support interaction between Asian and Pacific ESCAP members in energy development through expert exchange programmes and training programmes.
- Support interaction between PICs in co-operative energy development through expert exchanges, study visits and the development of joint projects.

Obtaining ESCAP Assistance for Sustainable Energy Development

The limited budget available at ESCAP for energy programmes should be utilised in a manner most useful for the member countries. Therefore, member countries need to take an active part in the selection of programmes and activities that are most useful to the PICs. For ESCAP to take specific action in the region, formal requests for regional assistance need to be developed by the PICs and presented to ESCAP. Regional meeting of energy officers, such as that being held in Suva in February, and the annual ESCAP member country meetings should be considered as opportunities to interact with ESCAP energy officers and other PICs to establish ESCAP's programmatic relationships with the PICs.