

ENERGY AND POVERTY IN THE PACIFIC ISLAND COUNTRIES



Challenges and the Way Forward



United Nations Development Programme

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Regional Energy Programme for Poverty Reduction
UNDP Regional Centre in Bangkok

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More than a billion people in the Asia-Pacific region do not have access to electricity and 1.7 billion are dependent on traditional biomass fuels for their cooking and heating needs. Access to affordable modern energy services can improve their productivity and enhance living standards.

Even so, there are no specific targets for the energy sector in the Millennium Declaration, a historic document signed seven years ago by the world's leaders. Affordable and sustainable modern energy services are a necessity for countries to meet their Millennium Development Goals (MDGs). Efforts of countries in the Asia-Pacific region to meet these aims will be hindered unless adequate attention is given to the crucial role energy services play in the development process. This is particularly true for the economic, environmental and social well-being of the poor.

With fluctuating energy prices, the poor in many countries in the Asia and Pacific region face a daunting future. For them, access to affordable and essential modern energy services, which could improve their living conditions and ensure a means to earn a living, will fall outside their reach. Recognizing the urgency for countries to factor in access to modern energy services, particularly when shaping national poverty reduction initiatives, the United Nations Development Programme (UNDP) provided technical and financial support for national-level rapid energy assessments. The primary aim of this work, carried out through UNDP's Regional Energy Programme for Poverty Reduction (REP-PoR) and completed in 2006, was to identify gaps and priority needs in linking energy services provision with poverty reduction.

The framework for rapid gap assessments linking energy and poverty was developed as a joint effort of the UNDP Regional Centre in Bangkok (RCB) and UNDP country offices in the region, with the support of experts from the region. The draft framework was discussed at two sub-regional meetings, one held in Bangkok, Thailand (August 2005) and the other in Apia, Samoa (September 2005). The meetings were helpful in customizing the framework to suit specific needs and circumstances of the participating countries. The following 15 countries from the Pacific were involved in the consultative process prior to finalizing the recommendations of the assessment, viz Cook Islands, Federated States of Micronesia (FSM), Fiji, Kiribati, Republic of the Marshall Islands (RMI), Nauru, Niue, Palau, Papua

New Guinea (PNG), Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu.

This work benefited immensely from the support of government officials and representatives of civil society. Documented in individual country reports, this work serves as resource and reference material for programming and planning for access to modern energy services for the poor.

This document is a summary report on the Pacific Island Countries and is part of a series of REP-PoR's Asia-Pacific publications. It draws on the key findings of the Country summaries, a Pacific sub-regional synthesis report and a Pacific gender and energy assessment. It summarizes the challenges faced at the national level and provides priority recommendations. Specifically, critical issues related to energy policy, including institutional structures, regulatory frameworks, priority programmes, financing measures, gender concerns, as well as monitoring and evaluation support are highlighted. It offers a way forward, outlining issues and options for the country.

Our hope is that this document will be of relevance to national policy makers, development partners, energy service providers, civil society organizations and academia in implementing various measures to promote access to modern energy services for the poor.



Marcia V.J. Kran

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This summary report outlines the context, the key challenges and options with regard to the provision of affordable, accessible and reliable energy services in 15 Pacific Island Countries (PICs), so as to enable them to move towards achieving their Millennium Development Goals (MDGs) and the reduction of poverty/hardship.

The report highlights that access to affordable and sustainable sources of energy has strong linkages with the reduction of poverty/hardship, i.e. if poverty/hardship reduction is an objective, then the provision of energy is an essential prerequisite. In the PICs, where poverty/hardship is often viewed as the lack of access to basic services, opportunities and adequate resources, the case for energy provisioning and access is particularly strong. Provision of essential social services such as health and primary education require energy services. In addition, energy services have positive impacts on gender, the environment and provide an improved quality of life. Furthermore, in many cases the provision of modern energy sources increases the opportunities for income generation.

In the context of development, the report stresses the special and demanding situation that confronts the PICs. The issues that typify the energy sector arise substantially from the specific characteristics of island economies and cannot be separated from the wider development challenges that these economies face. PICs have traditionally contended with remoteness and geographical isolation. In the 21st century, they are faced with complex challenges including increasing globalization, the vulnerabilities of being economically peripheral and the threat from climate change. Rising oil prices have added another critical dimension. The PICs are amongst countries that are most vulnerable to increases in oil prices in the Asia-Pacific region. The negative impact of the extremely high exposure to international oil prices faced by PICs (both at the macro and micro level) has become clear over the last few years. The poor are being pushed further into poverty/hardship as a result of this situation.

The challenges that these countries face vary in form and intensity across countries; and some of the key challenges are outlined in this report. The most compelling challenge and an area where equitable and efficient access to energy services can make the most difference is poverty/hardship. Poverty and hardship are indisputable issues in PICs for many people, in

both urban and rural areas and on the outer islands. In this context the report makes a case for special attention to the ‘Melanesian three’ – the countries of Papua New Guinea (PNG), Solomon Islands and Vanuatu, which dominate the PICs in terms of land, population and in measures of poverty/hardship. These countries require urgent attention both for their own energy and development needs; and if any significant impact on poverty/hardship in the Pacific region is to be achieved.

Another key challenge is the very limited human and institutional capacities that not only constrain the delivery of energy and related services, but also impede the development of strategic and medium term interventions to address these issues. In addition, the lack of institutions that focus on rural energy access has kept the pace of rural development slow. Dependence on traditional fuels, inefficient technologies and inadequate availability of finance for energy are other key challenges.

The report also points out that in most countries energy is not a priority concern and therefore limited national resources and programmes are directed to address energy access issues. It is also clear that there is a blind spot as far as gender issues are concerned, in planning as well as in programme implementation. The critical need for key data and indicators to support proper analysis of issues and problems, monitoring and evaluation of energy access and its impact on areas and groups that are ‘least served’ are other aspects that merit attention. Limitations in the institutional structure of the energy sector and the policy and regulatory frameworks will also need to be addressed in the coming years.

The report points out that what may work for many countries in the rest of the developing world (including Asia) may not be applicable in the PICs, due to constraining factors such as location disadvantages, scattered islands, dispersed populations, high transportation costs and ‘missing markets’. In addition, the diversity of the region and the specific characteristics and nature of individual PIC precludes the possibility of across-the-board solutions.

Nevertheless, a useful starting point is regional and national programmes that investigate energy-poverty linkages in a specific PIC context, as there is a need to establish improved energy services in a manner which impacts positively on poverty/hardship. A key input to addressing poverty concerns is the enhancement of the reach of energy institutions to rural and remote areas. In this context, the private sector needs to be involved, particularly in providing decentralized energy based entrepreneurship; if large scale, rapid and widespread implementation is to be achieved.

With regard to external assistance, long-term donor commitments and support are required. Bilateral and multilateral agencies in the Pacific region should work together and ensure that the 'soft' and 'hard' components of programmes are balanced and implemented in a manner that is complementary. On the other hand, PICs need to scrutinize and choose only those projects that can benefit them in the long term. With regard to the provision of an enabling environment, policies to reduce poverty through energy access improvements should be considered and included where appropriate.



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Like any multi-stakeholder work, this report reflects the efforts of many people over the last few years. We would like to express our appreciation for the inputs, suggestions and support provided by them. We appreciate the excellent support provided by the UNDP offices in the Pacific. The staff there provided critical data and information, undertook a number of reviews and added comments to the original Pacific Rapid Assessment and Gap Analysis Report that this summary report is based on. In particular, the contributions of Easter Galuvao (UNDP MCO Samoa), Asenaca Ravuvu (UNDP MCO Fiji), Emma Mario (UNDP MCO Fiji), Alvin Chandra (UNDP MCO Fiji), Jonathan Mitchell (UNDP MCO Fiji), Tony Torea (UNDP PNG), Gwen Maru (UNDP PNG) and David Abbott (UNDP Pacific Centre) are acknowledged.

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Nandita Mongia, Thiyagarajan Velumail, Thomas Lynge Jensen and Sanna Salmela-Eckstein.

It should be noted that where appropriate, additional information and recommendations have been added from other policy research undertaken through REP-PoR, especially the REP-PoR's *Overcoming Vulnerability to Rising Oil Prices: Options for Asia and the Pacific* and *Regional Mapping of Options to Promote Private Investments in Alternative Energy Sources for the poor*.

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LIST OF ACRONYMS/ABBREVIATIONS

AC	alternating current
ADB	Asian Development Bank
BPfA	Beijing Platform for Action
CDM	Clean Development Mechanism
CEDAW	Convention for the Elimination of All Forms of Discrimination Against Women
CROP	Council of Regional Organisations in the Pacific
DC	direct current
DOE	Department of Energy
EIB	European Investment Bank
EU	European Union
FIC	Forum Island Countries
EWG	Energy Working Group
FSM	Federated States of Micronesia
GDP	gross domestic product
GEF	Global Environment Facility
HDI	Human Development Index
HDR	Human Development Report
HIES	Household Income and Expenditure Survey
HPI	Human Poverty Index
IPCC	Intergovernmental Panel on Climate Change
IPP	independent power producer
kWh	kilowatt hour
LPG	liquefied petroleum gas
M&E	monitoring and evaluation
MDG	Millennium Development Goals
MCO	Multi-Country Office
NGO	non-governmental organization
O&M	operation and maintenance
OIES	Outer Island Electrification Strategy
PC	Pacific Centre
PIC	Pacific Island Country
PIEPSAP	Pacific Islands Energy Policy and Strategic Action Planning

PIFS	Pacific Islands Forum Secretariat
PIREP	Pacific Island Renewable Energy Project
PNG	Papua New Guinea
PPA	Pacific Power Association
PPP	public private partnership
OPVI	Oil Price Vulnerability Index
PSFI	People of the South Pacific, International
PV	photovoltaic(s)
sq. kms	square kilometres
RCB	Regional Centre in Bangkok
REP-PoR	Regional Energy Programme for Poverty Reduction
RESCO	Renewable Energy Service Company
RMI	Republic of the Marshall Islands
SEC	Solar Energy Company
SME	small and medium enterprises
SOPAC	Secretariat of the Pacific Applied Geoscience Commission
SPREP	Secretariat of the Pacific Regional Environment Programme
UNCSD	United Nations Commission on Sustainable Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USA	United States of America
WB	World Bank
WTO	World Trade Organisation

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ENERGY AND POVERTY IN THE PACIFIC ISLAND COUNTRIES

Challenges and the Way Forward

Development context

The Pacific islands region encompasses about a third of the earth's surface, but less than a thousandth part of the world's population lives in this vast area, scattered over hundreds of islands. This report focuses on a sub-region of this immense area, consisting of 14 Forum Countries (excluding New Zealand and Australia) and the New Zealand dependency of Tokelau. These entities are in turn divided into three cultural groups: Melanesia – Papua New Guinea (PNG), Solomon Islands, Vanuatu and Fiji; Micronesia – Palau, Federated States of Micronesia (FSM), Marshall Islands, Nauru and Kiribati; and Polynesia – Tuvalu, Tokelau, Samoa, Tonga, Cook Islands and Niue. The term Pacific Island Countries (PICs) will be used to represent these 15 political entities.

The PICs represent a group that is marked by some similarities and significant heterogeneity. With one exception (PNG¹), the entities in this group are marked by the fact of small size and geographic remoteness. Their land area ranges from 12 square kilometres (sq. kms) of land (Tokelau) to 28,000 sq. kms (the Solomon Islands); the area of most countries is however between several hundred and several thousand square kilometres. Population size varies from fewer than 2,000 people (Tokelau) to 800,000 persons (Fiji).

The PICs vary significantly in terms of economic development, social indicators and the scale, diversity and complexity of their economies. For example PNG, with its 462,840 sq. kms of area is approximately a thousand times the size of Palau (487 sq. kms), which in turn is more than 20 times the size of Nauru (21.1 sq. kms). Both in terms of size and population, PNG is the largest country. Solomon Islands rank at second place in terms of size and Fiji ranks at second place in terms of population. With only 2,200

¹ PNG is unique in the Pacific region due to its large size and large population, when compared to the other PICs.

PICs face high import prices for petroleum products and have to contend with high energy costs in general.

people (1996) Niue has the smallest population among the 14 Forum countries.

Gross domestic product (GDP) per capita also varies from a high of US\$8,000 (1996) in Palau to US\$447(1993) in Kiribati. The principal exports are largely primary products (fish, copra, palm oil, coconut and coconut oil, sugar and molasses), and some manufactured items in some countries. Fiji, Samoa and Kiribati are the only three countries where the share of manufacturing in GDP is between 10 to 15 percent. The principal imports are petroleum products, machinery, transport equipment, chemicals and food items.

Scattered as the PICs are, throughout the vast region of the Pacific Ocean, the distances between the countries can be long; and distances within the countries can be equally daunting. Logistics and transportation entail severe challenges. The approximately 80,000 strong population of Kiribati, for example, lives on 33 widely scattered low atolls (800 sq. kms of land) that extend 4,200 kilometres from east to west and 2,000 kilometres from north to south. Kiribati exemplifies the severe development challenges that face a small, remote and resource-poor island state during a period of rapid global change. Even in relatively developed Fiji, transport services to its hundreds of outer islands are often intermittent; several months may go by between shipments of basic goods and fuel.

Despite these differences, the PICs share common development challenges, many of them structural in nature. The issues that typify the energy sector arise substantially from the specific characteristics of island economies and cannot be separated from the wider development challenges that these economies face (UNDP 2004).

PICs face high import prices for petroleum products and have to contend with high energy costs in general. In addition, they often receive low prices for their exports, and have to incur substantial expenses in taking their exports to distant markets. Inadequate and uncertain transportation networks and limited infrastructure compound the problems that governments face in making available basic services such as health, education, clean water, power and communications to the people, in particular to the majority of the population that lives in the outer islands or in the more remote areas of the larger islands.

Accelerating global economic, social and cultural change poses an unprecedented challenge to small, remote States who have to strive for an 'impossible trinity': i) securing the benefits of globalization; ii) maintaining national sovereignty and iii) retaining sufficient flexibility to formulate national economic and social policies.

Other challenges that confront the PICs are: how to protect traditional

values such as community sharing of resources and co-operative economic activity; protect land tenure (often threatened by resource investments), minimise the social costs of investments (e.g. increased inequality, less control over investment decisions and poorer working conditions); deal with the rapid erosion of preferential market access; afford the costs of joining (or not joining) the World Trade Organisation (WTO); carry out their commitments to the global community (for example those summarised in the MDGs); and capitalize on new information and communications technologies, which could reduce effective isolation. The challenges of adjusting to globalization are considerable and the local resources and experience for doing so are extremely limited. Within the energy sector, there may be excellent opportunities for foreign investments and partnerships that can benefit the local people, but the PICs need the legal and regulatory frameworks and incentive systems to make them work effectively. Similarly, while there are huge benefits that can result from the use of modern communications technologies, particularly in the more remote areas, inadequate and unreliable energy systems make these benefits ineffective.

Many PICs (especially the smaller countries) are dependent on donor assistance for developing and implementing social and economic policies. There is a strong perception that donor emphasis and priorities change frequently and that donor support is often too short-term to produce any lasting impact. Where aid is a small percentage of GDP, the volatility of aid flows and priorities may not be a serious concern, but for some PICs, it can arguably undermine development efforts. There was considerable assistance to the energy sector in the PICs during the 1980s, but this dropped off rapidly during the 1990s, as donor priorities changed and many energy programmes, particularly in renewable energy development failed to proceed beyond the pilot stage.

In all the PICs, people tend to migrate from the rural islands and from the more remote areas of the larger islands to the urban areas. This is most prevalent in the smaller countries where urban islands (only one or two urban islands in each country) have become overcrowded. The provision of public services, the non-availability of adequate employment opportunities and the environmental sustainability of these overcrowded islands have become major development concerns. Furthermore, in the smaller countries (especially those that have a special relationship with New Zealand or the United States of America (USA)) there is considerable migration from urban areas to these countries. While this out-migration has softened the impact of population growth, the people migrating are often those with the highest skill levels.

The challenges of adjusting to globalization are considerable and the local resources and experience for doing so are extremely limited.

It is clear that a good deal of assistance will be required for structural reform of the energy sector to proceed smoothly and in the interests of the people.

Over the past decade, a number of studies have highlighted the fact that population growth may impede development efforts in the region. The Asian Development Bank (ADB) recently warned of growing poverty in the PICs. The ADB states that the key issues that affect all its Pacific members are: weak governance; high rate of growth of population; declining educational performance; weakness of the private sector; breakdown of traditional support systems; and the urban elite capturing a high percentage of the benefits of modernization. With the growing pressure for structural reform of the energy sector, including privatization in many countries, (where the government has so far been the dominant economic force), it is clear that a good deal of assistance will be required for reforms to proceed smoothly and in the interests of the people.

Several studies have documented the susceptibility of small island states to external economic fluctuations and environmental shocks. A Commonwealth Secretariat vulnerability index ranks the PICs among the most highly vulnerable of the 111 developing countries it has studied. Climate change is another area of concern. The Intergovernmental Panel on Climate Change (IPCC) has warned of deteriorating coral reefs, mangrove habitats, sea-grass beds, major species loss, worsening water balance in atoll nations and declines in vital reef fisheries, all issues of particular concern for small island nations. Other possible impacts include reductions in agricultural output, declines in ground water (both quantity and quality), health impacts, extensive capital damage due to storm surges, and diminished fish production. Kiribati, the Marshall Islands, FSM and Tuvalu are among the countries that are likely to be impacted most due to climate change and some islands may even disappear. In the energy sector, where investments made today have a long-term impact over many decades, PICs need to consider very carefully issues like the location of oil terminals, the safe disposal of wastes, make proper plans for spills (where coastlines may erode) and investment decisions regarding the setting up hydropower units (because rainfall patterns may change).

Recent work undertaken as part of the UNDP Regional Energy Programme for Poverty Reduction (REP-PoR) has studied the impact of rising oil prices on developing countries of the Asia-Pacific region. An Oil Price Vulnerability Index (OPVI) has been constructed to measure the vulnerability of countries to increasing oil prices. Out of 24 Asia-Pacific countries studied, 13 countries are classified as 'most vulnerable', and four PICs (Vanuatu, Solomon Islands, Samoa and Fiji) are among the seven most vulnerable countries (see Box 1 – Oil Price Vulnerability and the Pacific Island Countries). From 2000 to 2004, the increase in fuel import costs for PICs (excluding PNG) is estimated to be US\$100 million per

annum – an increase of around 60 percent or US\$50 per capita per annum (UNDP 2007a). Higher fuel prices lead to increases in transport costs (land, sea and air), affecting the cost of living for islanders. Since most electricity generation is based on diesel, fuel price increases have put upward pressure on electricity costs. While not all PICs pass this on to consumers in the form of price increases, the cost has to be met either by government subsidies to power companies, or from reductions in the quality of supply² and investment. Higher petroleum prices also constrain households' ability to move from relying on biomass to more convenient cooking fuels such as kerosene and liquefied petroleum gas (LPG).

As is clear, of the 13 countries that are most vulnerable to soaring oil prices, four are PICs. The OPVI ranks Fiji, Samoa, Solomon Islands and Vanuatu as most vulnerable countries (in ascending order of vulnerability). Out of 24 Asia-Pacific countries included in the OPVI, Vanuatu is ranked as the second most vulnerable country, after the Maldives, also a Small Island Developing State (SIDS). Papua New Guinea (PNG) is ranked as a country with 'medium vulnerability' mainly because it is an oil producer.

This high vulnerability of the PICS is due to the high dependence on imported petroleum products for transportation and electricity production among other factors. The small markets and the added burden of higher shipping costs (for petroleum products) to scattered and distant markets means that there is a high impact of rising oil prices on the economic growth of these countries (UNDP 2007a).

The following points should be noted on the OPVI³:

- The reason only five PICs have been included initially is due to difficulties regarding access to comparable data, but it is the intention to include additional PICs as data becomes available. However, it is expected that these countries also will be clustered in the group of most vulnerable countries.
- The Index reflects the current positions of the 24 Asia-Pacific countries, based on a limited set of variables; and
- The Index is relative to this group of countries.

² The 'quality of power supply' is affected for example by the occurrence of brown-outs (lower than normal power line voltage) and black-outs (power disruptions).

³ Chapter 3 (pp. 41-51) of the report, *Overcoming Vulnerability to Rising Oil Prices – Options for Asia and the Pacific*, contains detailed information on the OPVI and Appendix C (pp. 125-139) includes background information on the methodology behind the index.

This high vulnerability of the PICS is due to the high dependence on imported petroleum products for transportation and electricity production.

Box 1: OIL PRICE VULNERABILITY AND THE PACIFIC ISLAND COUNTRIES

The Oil Price Vulnerability Index (OPVI) ranking for 24 Asia-Pacific countries is provided in the table below. The Maldives is ranked the most vulnerable and Iran the least vulnerable.

Rank	Country	Category
1.	Maldives	Most Vulnerable
2.	Vanuatu	
3.	Cambodia	
4.	Solomon Islands	
5.	Sri Lanka	
6.	Samoa	
7.	Fiji	
8.	Lao PDR	
9.	Pakistan	
10.	Bangladesh	
11.	Nepal	
12.	Afghanistan	
13.	Philippines	
14.	Myanmar	Medium
15.	Viet Nam	
16.	Mongolia	
17.	Thailand	
18.	Indonesia	
19.	Papua New Guinea	
20.	India	
21.	Bhutan	
22.	Malaysia	Least Vulnerable
23.	China	
24.	Iran	

The OPVI is constructed so as to capture the three commonly accepted aspects of vulnerability: hazards, resistance and damage. Hazards are international events not under the country's control, resistance represents the resilience and the fundamental strength of the economy and damage is measured through social vulnerability and is tracked by indicators of human development.

Poverty in the context of the Pacific Island Countries

The ADB and UNDP have led the efforts to define poverty in the context of the PIC, since it is clear that the conventional income based definition does not work well for the Pacific. A majority of the rural households in the PICs are a part of the informal economy, where barter and subsistence farming or fishing is dominant. In a barter economy, income is a poor indicator of community well being. In addition, the relatively strong social structures provide insurance and security to the old, infirm and the needy at least to some extent. Hence, definitions of poverty particularly those based on income alone are not relevant for many of the countries in the region.

In the period 2001-2004, ADB supported a series of poverty assessments in Fiji, FSM, Kiribati, PNG, Samoa, RMI, Tonga, Tuvalu and Vanuatu. The assessments included surveys of attitudes of urban and rural households regarding their own perceptions of poverty. The findings of the participatory assessments highlight that ‘...hardship and poverty are real issues in the lives of many people in both urban and rural areas and on outer islands. Poverty of opportunity is just as important as lack of income. In fact, in the Pacific, poverty is generally viewed as hardship due to inadequate services like transport, water, primary health care, and education’ (ADB 2004).

Based on the ADB supported poverty assessments poverty/hardship in the PIC context has been defined as an inadequate level of sustainable human development manifested by: i) a lack of access to basic services such as primary health care, education, and potable water; ii) a lack of opportunities to participate fully in the socio-economic life of the community; and iii) lack of adequate resources (including cash) to meet the basic needs of the household, the customary obligations to the extended family, village community, and/or the Church. The importance of family, kinship and customary obligations was a central feature in this definition.

The percentage of households living in poverty, according to a basic needs poverty line has been estimated for some PICs. These estimates show a high incidence of poverty in Kiribati (50 percent in 1996), Vanuatu (40 percent in 1998) and PNG (37 percent in 1998) and a much lower incidence of poverty in the Cook Islands (12 percent in 1998), Marshall Islands and Samoa (20 percent each in 1999 and 2002 respectively) and about 22 percent in Tonga and the Solomon Islands⁴ in the years 2001 and 2005/2006 respectively⁵. The poverty line is determined on the basis of

⁴ Preliminary figures.

⁵ Source: Abbot 2007.

In a barter economy, income is a poor indicator of community well being.

the income necessary to meet the level of expenditures required to provide basic needs. Where ever possible, information from Household Income and Expenditure Surveys (HIES) was used to estimate urban and rural poverty. However, some governments and many non-government organisations are not fully convinced of the validity of these assessments. There are also doubts regarding the extent to which meaningful comparisons can be made between different countries.

While there is still no agreed definition of poverty, the first regional MDG report has recommended mechanisms for poverty measurement and suggested the following steps (SPC 2004):

- develop official measures of national per capita consumption adjusted for purchasing power parity;
- develop poverty-related indicators specific to the region that will assist in measuring the prevalence of poverty as defined for the Pacific;
- recognize the sub-national differences in poverty across different countries; and disaggregate the indicators for the first MDG on poverty reduction, on the basis of rural and urban areas, islands and provinces etc.

BOX 2: KEY ISSUES WITH REGARD TO POVERTY IN THE PICs

- Despite the fact that poverty is a significant issue, it is not yet on the policy agenda of most PICs. Till 2001, only Fiji and PNG had attempted formal estimates of poverty.
- There is growing recognition that 'poverty of opportunity' is just as important as lack of income and consequently defining poverty by the level of income alone may not be appropriate. There is however still no commonly accepted definition of poverty in the PICs. Without an agreed definition of poverty or hardship, and consensus on the methodology of measuring poverty, it is likely to be difficult to demonstrate that specific energy sector interventions actually reduce poverty or hardship levels.
- Some argue that extreme poverty is rare in the region and that international definitions based on an income of US\$1/day are inappropriate. In this context, there are questions about the relevance of the goal of halving the proportion of people living in 'extreme poverty'. However, the attempt to achieve MDGs has brought into focus the issue of measurable indicators of a country's performance, particularly with regard to poverty reduction.
- Attempts to alleviate poverty based on income generation have not worked well in the Pacific region and approaches that improve the infrastructure, the quality of life, access to education and to opportunities for self-improvement are more likely to show immediate results.

Poverty and energy linkages

Although energy is not explicitly listed as a MDG, it is now recognized that the provision of energy services is critical to development – and for achieving the MDGs. Access to modern sources of energy helps in expanding choices for individuals and assists them in capability expansion (UNDP 2006b). Modern energy services are an essential element of developing the enabling conditions that can allow a country to meet the MDGs (Modi 2005). Energy is no doubt an enabler – an enabler not only of growth, but of opportunity as well. With the benefit of development experience, it is possible to unequivocally state that energy is essential not only for growth, but for the attainment of the key goals that have been set: the eradication of poverty and inequity and the provision of opportunity in equal measure to all. Energy need not however be seen only as an input to production and an ingredient for growth. Equitable, diversified and enlarged access to energy can in fact improve productivity and income at all levels, reduce inequities and substantially change the way people live, particularly the poor and the disadvantaged. It is for this reason that attention needs to be focused on minimum service provisioning and on issues of access, quality and supply (UNDP 2006b).

Internationally there seems to be a strong correlation (up to a point) between increased use, or at least access to, modern forms of energy and wealth (as measured by GDP per capita) or development (as measured by the Human Development Index (HDI)). However, though it is clear that increased wealth increases the use of modern energy forms, it is not yet clear that the provision of modern energy sources increases wealth. Though it is obvious that the provision of modern energy sources increases the opportunity for wealth generation, other factors such as poor market access, lack of available capital and low skill levels may prevent the development of income generating activities that can take advantage of the newly available energy sources.

In the PICs, overall access to energy can be considered to have strong links with poverty/hardship reduction. People want the services that energy can provide: improved and cleaner cooking, better lighting and longer hours of lighting, improved transport, water pumping, access to entertainment through radio or TV, cooling for food preservation, night-time emergency medical services etc. The reduction of hardship requires access to affordable, reliable, and productive energy services, which in turn provides access to better basic development services.

Poor market access, lack of available capital and low skill levels may prevent the development of income generating activities.

Box 3: HYDROPOWER IN IRIRI VILLAGE, SOLOMON ISLANDS: HIGH COST, LIMITED BENEFITS

In 1983, the first hydro-based village electrification scheme in the Solomon Islands was installed at the village of Iriri, a community located about 45 minutes by power boat from Gizo, the provincial centre of the Western Province. The design premise used for the Iriri and later village hydro installations in the Solomon Islands was that simple designs using local materials should be used as far as possible and community committees should be established for the operation and maintenance of the hydro systems. The project also included specific components which were intended to aid income generation, so as to improve the economic condition of the target village.

In 2006, a study funded by the Regional Energy Programme for Poverty Reduction (REP-PoR) was undertaken to ascertain the impact a typical village hydro installation on the village communities in the Solomon Islands, including changes if any in income-generation activities and lifestyles. It was found that though the Iriri and other similar installations in Vavanga and Ghatere saved on the initial cost through the use of locally available materials for the dam and for penstock supports and by the elimination of some design components such as a trash filter and intake structure, these savings led to lower system reliability and increased maintenance requirements. Even with the simplified design and local materials, the cost of the hydro- installations have been substantially greater (on a per house basis) than household solar lighting. The household survey showed that when the hydropower was functioning, almost all the power used was for lighting and/or radio and cassette player operations, a usage level that is easily achieved with solar power, at lower cost and with higher reliability. The justification for the high investment in the hydro installation over lower cost solar energy was the availability of more power to allow the use of larger appliances useful for powering tools and income generating projects.

However in the 20 years following the hydro installation, there has been almost no investment by the community either in larger appliances or in income-generating activities that depend on electricity. This appears to be due to factors other than energy access, including (but probably not limited to) market access problems, unreliability of the power supply, lack of business skills and lack of access to finance for income-generating activities. Some village leaders felt that the hydropower has meant additional costs due to the labour commitment that has had to be made for maintenance, the expense of repair of the electrical components and the general frustration that occurs due to each system failure. While the hydro-technician and some village leaders still hope to renovate the hydro system, it appears that there will need to be a complete replacement of all components, except possibly the turbine, and finding the necessary finance will be difficult. Although some households reported using electricity for income

generating activities when the hydro power unit worked, there is no evidence that the overall economic development of the village has benefited from the hydro installation over the 23 years since its installation. Indeed, some village elders consider the village to be worse-off today than before the hydro installation.

From a poverty alleviation standpoint, there is no evidence that the hydro installation has made any difference one way or the other. Today, most households have no access to clean water or proper sanitation and the general condition of the village and the lives of the villagers are perceived to have hardly changed. Merely having access to energy has not been a significant stimulus to either economic or social improvement for households in Iriri, though the perception of the villagers is that some benefits have accrued. If nothing else there seems to be at least a perception of progress that was not present before the installation of the hydro power unit.

Source: UNDP 2006

Given the large number of remote settlements, delivery of energy particularly electricity, is critical for the provision of basic services in the PICs. Many countries have their rural populations spread over numerous small islands and the dispersed nature of settlements makes it imperative to address constraints related to extending the grid. Absence of access to electricity is common in the PICs. For instance, the Solomon Islands has most of its population spread over more than 300 populated islands. In Kiribati, less than 80,000 people live on 33 widely scattered low atolls (800 sq. kms of land). The scattered habitations make a national grid impossible and the distribution of fossil fuels expensive and often unreliable. On large islands, such as PNG, access to some villages is often a problem due to the absence of roads through the dense jungles and rugged terrain. A study on new approaches to rural electrification in PNG estimates that 75 percent of the schools in the country (mostly rural boarding schools) are without electricity, as are a high percentage of health centres. Yet, the study notes, 'for most Papua New Guineans, the only benefit received from the government is access to certain critical services, including basic health care, children's inoculations and maternity care ... and primary school education. All of these services require electricity to be effective' (WB/UNDP 2004).

Often the poor pay more for energy services, especially for cooking and lighting.

Another critical issue related to access to modern energy and poverty is that the small market size in the PICs, combined with the dispersed habitations makes fossil fuels unusually costly and vulnerable to supply interruptions. Households that shift from kerosene to electricity for lighting and from wood to kerosene or LPG for cooking are considered to be less impoverished. Yet, many households may continue to use wood for cooking due to cost and cultural factors. In many cases, the poor pay more for energy services because using fuels such as wood and kerosene for cooking and lighting is less efficient than using modern fuels. In addition, the poor usually buy fuelwood in small amounts. When the transaction costs are taken into account, energy for cooking often ends up being more expensive for poor people than for the better-off (Saghir 2006). Unlike the rich, poor people find it hard to make even the smallest investments and may therefore end up using less-efficient equipment and/or fuel, often leading to high costs for the households, both in terms of time and money (Clancy et al. 2003).

It is important to stress that the provision of energy access to low income rural communities by itself is unlikely to result in a reduction in poverty, if measured by income alone. If the provision of energy is to result in increased income to the community through productive use then specific efforts are necessary to ensure that other critical factors such as access to markets, adequate management, financial and marketing skills, sufficient investment and working capital etc. are accounted for in a project and that the project is acceptable to the people from a cultural standpoint as well. These considerations will ensure that once the energy is available, any income-generating business that is set up has some hope of success.

The special case of Melanesia

The three poorest Melanesian countries, PNG, the Solomon Islands and Vanuatu, dominate the PICs in terms of land and population. The 'Melanesian three' as these countries are referred to, contain about 95 percent of all land area of the PICs and 82 percent of the population. The high levels of poverty are indicated by the low HDI ranks and the high Human Poverty Index (HPI) ranks of these three countries within the PICs (see Table 1).

TABLE 1
MELANESIA
 RELATIVE TO THE
 OTHER PICs

Country	Land Area		Population (in mid 2004)		Electri- fication	HPI* ranking	HDI** ranking	Biomass cooking
	'000 km ²	%	'000	%	% of hh	Pacific 1999	Global 2005	% of rural households
PNG	462.8	87.7	5695	72.9	< 10	15	137	87
Solomon Islands	28.4	5.4	460	5.9	~ 16	14	128	89
Vanuatu	12.2	2.3	216	2.8	~ 20	13	118	95
Melanesian Three	503.4	95.3	6371	81.6	~ 10-20	13-15	118-137	87-95
All other FICs	24.6	4.7	1436	18.4	~ 55 - 100	1-12	54-92 ^a	0-79
Total	528.0	100	7808	100	~ 19	1-15	54-137	-

* of 15 PICs

** of 177 countries

^a Only others ranked were Fiji (92),
 Samoa (74) and Tonga (54)

~ = approximately < = less than

FIC = Forum Island Countries

Source: UNDP 2005

In the Pacific Human Development Report 1999, these three countries held the three lowest HPI positions. In the 2005 global Human Development Report (HDR) also, the three ranked well below all other PICs considered. If the lack of household electrification and extent of cooking with biomass are considered proxies for relative rural hardship, the three countries are again ranked lower than all other PICs.

The 'Melanesian three' are characterised by other features that distinguish them from the rest of the PICs. These include:

- Most of the population lives in the rural areas and is not well integrated into the money economy. Though the subsistence/barter economy serves the basic needs adequately, there is little access to cash for purchasing services or goods.
- The isolation of different areas due to the remoteness and rugged terrain, has resulted in the highest density of languages in the world. with over 800 different languages spoken in PNG alone.⁶
- The Melanesian countries are among the least politically stable countries in the Pacific region. With their cultural fragmentation, they can be difficult to govern effectively and there is often little continuity in policies as new Cabinets or coalitions tend to form around personalities.
- Compared to other PICs, the transportation of goods, services, people and information can be more expensive and irregular.
- The 'Melanesian three' suffer from high rates of malaria infection, a scourge that is absent elsewhere in the region.

*The
 'Melanesian
 three' are
 characterised
 by other
 features that
 distinguish
 them from the
 rest of the
 PICs.*

⁶ <http://www.nvtc.gov/lotw/months/june/papuanLanguages.html>.

These characteristics make the effective delivery of energy services to rural areas very challenging. Hence, energy sector interventions that seek to make a discernible impact on hardship and poverty within the PIC region must specifically address the special case of the Melanesian countries, where both population and poverty are concentrated.

Inadequate access to modern energy in rural areas

Biomass access (used for cooking, lightning, copra drying, etc.) is not a problem in the PICs, although access is becoming a problem in urbanised atolls (e.g. the southern parts of South Tarawa and Funafuti atoll in Tuvalu) and in cities such as Port Moresby in PNG and Honiara in the Solomon Islands.

Nearly all the households in Niue, Nauru, Palau, Tokelau, Cook Islands, Samoa, Tonga and Tuvalu have both electricity and fossil fuel access, but significant energy access gaps exist in electricity and/or fossil fuel access in PNG, Solomon Islands, Vanuatu, Fiji, Marshall Islands, FSM and Kiribati (with the Melanesian countries having by far the largest gap). There are of course low income households in most PICs, who use little petroleum fuel or electricity because of their high costs, even though these are easily accessed.

Based on the rate of electrification, the PICs can be divided into three groups (see Table 2):

TABLE 2
ACCESS TO
ELECTRICITY IN
THE PICs

Rate of electrification	Countries
> 90%	Niue, Cook Islands, Nauru, Palau, Tonga, Samoa, Tuvalu and Tokelau.
50 - 80%	Fiji, RMI, Kiribati and FSM.
< 25%	PNG, Solomon Islands and Vanuatu.

Source: UNDP 2005

In all the PICs, urban and peri-urban areas are fully electrified. A few power utilities in some PICs have established 'lifeline tariffs' for an initial block of household electricity consumed per month. These are meant to subsidize basic needs for low-income consumers. However, some utilities have set the lifeline limit well above a basic needs level (e.g. 100 kilowatt hour (kWh)/month whereas 40 kWh/month might suffice) or have not assessed the impact of the tariff on the poor or the utility's finances. Except for the single-island countries of Niue and Nauru that have full coverage by a national grid, grids are broken up by the separation of the

islands, with urban grids usually extending for some distance into rural areas but remote islands having no access to the grid at all. Also, utilities are reluctant to extend further into rural areas since the return on investment is usually negative. Thus national utilities understandably accord rural electrification a low priority and typically extend the grid only where politically expedient or when an external agency pays the cost of the extension. In Fiji, the Solomon Islands and PNG, the policy of maintaining a national tariff that is far below the actual generation and distribution costs in rural areas, has effectively prevented or slowed the development of either State or private grid systems for the sale of electricity services to areas where the national utility or the Public Works Department (PWD) does not maintain a subsidized grid. Typically off-grid electricity supplies are met by diesel mini-grids that are expensive on an energy-unit-cost basis; and the supply is intermittent and unreliable.

With regard to fossil fuels, rural areas in all the PICs have open market access to petroleum products. There may be occasional shortages as storage reserves are usually small and the deliveries are not always made on time. In all PICs, there is a strong tendency for market-based pricing of landed petroleum products. Though several countries have price control laws, they are rarely, if ever, used to force the delivery of petroleum products below cost (in some cases, where fuel price control exists and is supposed to be nationwide, it is not effectively monitored or enforced and in remote areas prices well-above the control level are actually charged). The exceptions are subsidies for rural kerosene that exist in a few countries and subsidies towards the shipping cost of fuels to rural islands in others. This subsidy effectively forces the price to the same level for all islands. In the Solomon Islands and PNG, little petroleum fuel is available in the most remote islands or in the interior areas, and it can be extraordinarily expensive, since supplies may have to be flown in or may have to pass through many levels of distribution, each adding to the rural customer's final cost.

Bio-fuel, particularly from coconut oil, is a most promising energy source. Not only does this provide for local energy in rural areas, it also provides an opportunity for income-generation, through the sale of the bio-fuel to urban users. So far, there has been little comprehensive regional level analysis of the technical, financial, economic, social and environmental costs and benefits of large-scale bio-fuel programmes in the PICs. There has also been no comprehensive assessment of the different mechanisms which can help develop a bio-fuel industry, or of its benefits to the low-income rural people who will work to produce the feedstock. There is a fear (especially in the Melanesian countries) that bio-fuel

Little petroleum fuel is available in the most remote islands or in the interior areas, and it can be extraordinarily expensive.

The development of small-scale solar power has been ad hoc and generally donor driven.

production will become an industrial plantation operation (as is the case with palm oil today), which requires rural workers to leave their traditional homes and extended families to work on foreign-owned and operated plantations. This causes social disruption and only modest poverty reduction. On the other hand, there are numerous locally-owned coconut plantations (that have fallen into dis-use due to low international coconut oil prices) that could be rehabilitated for bio-fuel production and bio-fuel could be price competitive with imported fuels.

Solar energy has emerged as the primary rural electricity supply source in several countries (Kiribati and Tonga today and with long range plans for RMI, Fiji and Tokelau). Unfortunately with the exception of the Kiribati experience, the development of small-scale solar power has been ad hoc and generally donor driven, with little consistency in technical systems or among the project managing institutions. For example, in Fiji, there are at least five different physical arrangements for solar electrification and three different institutional structures operating them.

Box 4: KEY ISSUES IN RURAL ENERGY ACCESS

- Significant energy access gaps exist in electricity and/or fossil fuel access in PNG, Solomon Islands, Vanuatu, Fiji, Marshall Islands, FSM and Kiribati. The gap is particularly significant in the Melanesian countries.
- Across the PICs, cost and access issues deter low-income households from using petroleum fuels and/or electricity.
- The expansion of access to energy in rural areas in PNG, Solomon Islands, Vanuatu, RMI and FSM has been constrained by limited human capacity and financial resources. Further limiting access to energy in PNG and the Solomon Islands (and to a lesser extent in Vanuatu), is a relatively fragmented social structure, land tenure issues, political instability and the low priority accorded to energy access development relative to other services such as education, health, water and sanitation.
- In the larger PICs (Fiji, Vanuatu, Solomon Islands and PNG), many rural electrification projects have been implemented using a variety of technologies and sources – including diesel, micro-hydro and solar photovoltaic (PV). The lack of effective and adequate monitoring, and the gaps in knowledge relating to the real costs of operation and maintenance make it difficult to effectively plan and implement rural electrification programmes that are cost effective, sustainable and provide quality service to people in the lower income groups.

Lack of institutional focus for rural energy needs

The lack of institutions (except in Fiji) that focus on rural energy access has kept the pace of rural energy development slow. In addition, there is no specific institutional framework or arrangement that addresses poverty reduction through energy access in the PICs.

Most PICs have a national level government institution specifically focused on energy matters, typically a department of energy or energy planning unit. The exceptions are Niue, Nauru and FSM. Staffed inadequately, with dedicated personnel ranging from one person (Tokelau) to 25 people (Fiji), these institutions tend to have limited capacities and will continue to require external assistance for policy development, project design, comparative economic analysis, development of standards, etc. Only in Samoa and the Cook Islands, have national energy offices been established under defining legislation; in other countries they have evolved over time, primarily to act as an interface between the government and donors. As a result, the PIC energy offices have no significant regulatory authority and few have any formal relationship with either national power utilities or fossil fuel importing entities.

Utility companies/corporations in the PICs tend to provide electricity and energy services primarily to urban areas and to rural areas which are near by and can be economically served from the urban grid. Except for Niue and Nauru, where there is only central utility generation, rural areas where there is no grid supply typically manage energy on a community level through Island Councils, community committees or other local structures. Thus rural energy delivery is usually managed and maintained by local residents (except for larger government station power systems that are typically operated by government agency technicians).

In all the PICs, international oil companies operate in a largely market-based environment. PIC markets are too small to have any significant leverage with the oil companies and they are therefore unable to exercise any control over import prices. In Samoa, Tuvalu, Kiribati and Niue, the contract for the supply of fuel is given to a single international supplier. Niue and Kiribati distribute fuel through a local structure not directly affiliated with any oil company. Other PICs allow the oil companies to maintain their own wholesale distribution system within the country and usually retail distribution as well. FSM, PNG and the Solomon Islands have locally-owned distributors that supply a small part of the market. PNG is the only PIC with an oil refinery but it is controlled by major oil companies. Not a single PIC owns tankers that can transport oil from overseas, although Kosrae (in FSM) did own a tanker for a few years. LPG is generally imported and distributed privately on a free market basis.

There is no specific institutional framework or arrangement that addresses poverty reduction through energy access in the PICs.

Most PICs do not have an institutional focus on rural energy development⁷. In addition, none of the national energy agencies has formal responsibilities to ensure that the poverty-energy linkages are considered. As a result, most rural electrification is *ad hoc*. It is thus not uncommon to find multiple approaches to rural electrification existing within a single country, increasing the problems of maintenance and technical support. The responsibility for the conceptualization and implementation for the installation, operation and maintenance of rural electrification projects often falls on national energy offices that are typically understaffed and have budgets that cannot effectively provide the needed support.

At the regional level, the key regional intergovernmental agency that supports energy analysis and development in the PICs is the Secretariat of the Pacific Applied Geoscience Commission (SOPAC). It provides support for energy resource assessment, renewable energy technologies, energy efficiency efforts, policy development and national planning. In addition, the Pacific Power Association (PPA) assists island utilities in technical and business development, the Pacific Islands Forum Secretariat (PIFS) monitors fossil fuel prices and advises PICs regarding fossil fuel economics, purchasing and contract negotiations and the Secretariat of the Pacific Regional Environment Program (SPREP) deals with the environmental and climate change aspects of energy. None of the regional organizations have programmes specifically oriented towards poverty reduction through improved energy access.

Box 5: KEY ISSUES WITH REGARD TO INSTITUTIONAL FOCUS FOR RURAL ENERGY NEEDS

- In the PICs, there is no specific institutional framework or arrangement that addresses poverty/hardship reduction through energy access.
- Capacities within national energy offices and utilities to design and implement programmes vary widely, but are typically low.
- The lack of institutions that focus on rural energy access (except in Fiji) has kept the pace of rural energy development slow.
- The responsibility for energy development, particularly for rural energy, is generally split among several government departments and is not well coordinated.⁸
- Regional agencies are faced with a diversity of energy needs, corresponding to the great diversity of individual PICs.

⁷ Fiji is unusual in having a group within the Department of Energy (DOE) specifically responsible for rural electrification.

⁸ In the Marshall Islands for example, the power utility, the government energy office, the health agency, the education agency and the telecommunications agency all engage in the development of rural energy access and each has its own technical staff and its own support mechanism.

Policy and regulatory concerns

Few countries in the PICs have policies, mechanisms or institutions that work to reduce poverty through the provision of energy access. Much policy and planning work in the PICs has been valuable, but tends to emphasize improved services to those who already have adequate access to modern energy forms. For instance in some PICs, surveys suggest that rural low-income villagers pay more for substandard energy services (e.g. kerosene for lighting, batteries for radios, etc.) than it would cost to provide basic electrification. Most PICs do not have any formal regulation of the institutions providing rural energy services. Fees for rural energy services are rarely established in a manner that ensures sustainability, there are few enforced technical standards and technical personnel do not have to meet any requirements of experience or training.

Regional agencies have actively promoted the concept of national energy policies for about 20 years and today the majority of the PICs have formally adopted national energy policies. A decade ago, several countries (including Tuvalu, Kiribati and Niue) accepted a generic energy policy that was developed externally, but essentially ignored its application. The Pacific Islands Energy Policy and Strategic Action Planning (PIEPSAP) project, supported by SOPAC, UNDP and the Government of Denmark, which is currently underway has shifted the focus from proposing a generic policy to working with countries on policies specifically designed to fit their needs (see Box 6). As a result of this assistance, national energy policies have been prepared and endorsed at the Cabinet level in Niue, Tuvalu, Fiji, Samoa, Vanuatu and the Solomon Islands. One of the key challenges now is adhering to them in day-to-day decisions.

Fiji has a specific rural electrification policy established by the Cabinet in 1993 and RMI (with assistance from PIEPSAP) has developed an Outer Island Electrification Strategy (OIES). The Solomon Islands (also with assistance from PIEPSAP) has prepared a rural electrification framework. No PIC has an effective regulatory structure for electric power external to the national utility. Fiji has a Commerce Commission to regulate tariffs but it is not fully independent with the Cabinet still maintaining implicit control of tariff changes. PNG, Fiji, the Solomon Islands and Vanuatu all lack sufficient external regulation, which can ensure efficient operations and minimum cost deliveries.

Few countries in the PICs have policies that work to reduce poverty through the provision of energy access.

Energy departments and units often do not have regulatory power and remain weak in comparison with power utilities and oil suppliers.

Box 6: CHALLENGES IN THE PREPARATION OF NATIONAL ENERGY POLICIES AND STRATEGIES IN PICs⁹

Since August 2004, a dedicated UNDP-supported project has been under implementation in the PICs that has as its focus assistance in the preparation of national energy policies (including rural electrification policies), strategies and practical mechanisms to implement these. The project is executed by the Secretariat of the Pacific Applied Geoscience Commission (SOPAC) and is funded by the Government of Denmark. Based on three and a half years of work in these areas the following challenges have been identified in the context of the preparation of national energy policies and strategies in PICs:

- Development of effective national policies requires strong institutions and government commitment, which is not always in place. Government energy administrations (i.e. energy offices/energy departments) continue to be inadequately resourced and without very much power to influence government policies. This seems to reflect the comparatively low standing of the energy administrations and/or unwillingness of energy officials to push government decisions. In most PICs energy policy decisions, such as energy pricing, petroleum procurement, power system expansion planning and allocation of internal or donor budgets are still undertaken by other entities (such as power utilities, international oil companies etc.), rather than energy administrations (energy offices and energy departments) and often energy offices are not even consulted. Thus, energy departments and units often do not have regulatory power and remain weak in comparison with power utilities and oil suppliers.
- Policy development is a genuinely sovereign activity where international and regional agencies can only assist. There is clear tension between country ownership and the role a regional and external project can play in areas that touch upon sovereign issues, such as national energy policy development.
- Energy markets are changing rapidly and policies risk being outdated.
- PICs are mostly consensual societies where inclusiveness and consultation are highly valued, however time-consuming the process may be.
- There is overlapping of a multitude of activities in the area of energy in the PICs and as such there is the risk of conflicting or inconsistent advice, including with regard to energy policy development.

⁹ Sources: PIEPSAP Annual Report 2005 (SOPAC 2006) and different Quarterly Progress Reports (QPRs), available on SOPAC's homepage.

Objectives and approaches of different regional, international, bi-lateral organizations are not (automatically) fully compatible or well matched.

- As far as reasonably possible, the regional approach in the Pacific has been to use a model National Energy Policy as a base. In recognition of the limited success of previous attempts to use such models for national energy policy development, Pacific Island Energy Policy and Strategic Action Planning (PIEPSAP) aims at focusing on the specific situation of each respective country.
- It has become obvious that often the highest level of government decision-making has to be mobilized for national energy policies (including rural electrification policies) to be taken from the development of the policy paper stage to the implementation stage.
- The more concrete and action oriented activities and outputs become, the more they impinge upon the vested interests of some stakeholder groups. While generalized energy policy statements do not normally draw very much criticism, the idea that stated energy policy may be implemented and followed through, by the establishment of for example something like an effective electricity regulatory framework, seems to agitate those (e.g. power utilities) who see their interests as being adversely affected.

Further, there is little commitment by the governments to effect policies that give preference to the development of renewable energy, improved energy efficiency and environmental suitability. This is partly due to the low priority actually given by governments to rural energy development, despite rhetoric to the contrary and partly due to a lack of understanding by decision makers of the relative costs and benefits of various rural energy development options. As a result, there is generally no incentive, either supportive or punitive, for the power utility or a private developer to choose efficient and environmentally appropriate solutions.

Limited coordination and focus of donor-assisted programmes

In most PICs, infrastructure for rural development is often dependent on the availability of donor funds, usually provided as a grant to the smaller countries and as soft loans to the larger countries. The small size of most of the PICs makes donor assistance, both technical and financial, a more important component of energy development than in Asia. As a consequence, energy agendas and related actions are to a large extent influenced and/or driven by regional, multilateral and bilateral organizations.

The small size of most of the PICs makes donor assistance, both technical and financial, a critical component of energy development than in Asia.

There also has been little coordination of efforts by donors and multiple programmes that focus on the same issues.

Box 7: KEY ISSUES WITH RESPECT TO POLICY AND REGULATORY ISSUES

- PICs do not have policies that link energy and poverty. Few countries have policies and mechanisms that work to reduce poverty through the provision of energy access.
- Much policy and planning work in the PICs has been valuable, but tends to emphasise improved services to those who already have adequate access to modern energy sources.
- PNG, Fiji, the Solomon Islands and Vanuatu utilities lack sufficient external regulation to ensure efficient operations and minimum cost delivery of electrical power to all sectors.
- There is limited understanding of the impact that energy subsidies have on overall development or on poverty. There is also little awareness that energy cross-subsidies that appear to penalize industry, commerce and urban dwellers to benefit rural customers may actually enhance overall economic development for the country as a whole.
- There is little commitment by the governments to effect policies that give preference to renewable energy development, improved efficiency and environmental sustainability.

In the energy sector, there was considerable assistance to PICs during the 1980s, but this dropped off rapidly during the 1990s, as donor priorities changed. Though the various programmes of regional agencies, bilateral donors and multilateral agencies in the energy sector are vital to the PICs, they do need to have long term goals and improved consistency in their applications if they are to have any lasting impact. There also has been little coordination of efforts by donors and multiple programmes that focus on the same issues often coexist leading to waste, duplication of work and confusion.

The main concerns in donor-assisted energy interventions in PICs include (UNDP 2004):

- Donor-funded programmes cannot 'solve' the Pacific region's energy problems, but can only contribute to those solutions. Past initiatives have tended to spread their efforts thinly across the energy sector.
- There are examples over the preceding two decades where agencies and energy programmes have worked at cross-purposes, duplicated efforts and occasionally offered contradictory advice. This has led to confusion and sub-optimal implementation and generated country and beneficiary resentment in some cases.

- Flexible approaches that adjust to changing economic, environmental and political contexts are more likely to succeed. The needs and opportunities in the PICs differ considerably. An approach which may seem appropriate today may be impractical a year or two later, as circumstances change.
- Some energy initiatives in the past were based on specific technologies seeking an application and did not consider the interventions required to improve the quality of life of the people. For instance, some initiatives have promoted renewable technologies not tested elsewhere or in some cases completely unsuitable for the problems they were meant to address.

Box 8: KEY ISSUES IN DONOR-ASSISTED PROGRAMMES

- The small size of most PICs makes donor assistance, both technical and financial, a more important component of energy development than in other developing countries.
- The linkages between energy access and poverty in the PICs is not yet comprehensively analysed or understood, and consequently such linkages are not integrated in programme development. In fact, in most interventions supported by external donor organizations, the linkages between poverty and energy have not been considered, even though the concept is implicit in most rural electrification programmes.
- With a number of bilateral, regional and multilateral agencies working in energy, there is duplication of effort and repetition of work.
- There is a tendency for programmes (in particular renewable energy projects, financed by bilateral donors) to be donor driven, with PICs often playing a passive role in their preparation and design.
- In general, there is insufficient coordination among donor supported programmes both with regard to formulation and as well as implementation.
- Donor activities are dominated by 'soft' interventions such as support for meetings, studies, reports and plans; donor support for follow on hardware and field implementation is on a smaller scale. A balance of 'hard' and 'soft' programmes needs to be maintained for the interventions to be effective.
- Certain areas like utility based grid electrification receive a disproportionate share of external assistance. This emphasis has been at the cost of other important areas, including clean energy for cooking, which would benefit women and children in particular.

Some energy initiatives in the past have been primarily technology driven.

In some PICs, women may spend up to three hours collecting wood and an additional six hours in preparing food each day, with little change from 50 years ago.

In order to ensure that donor assistance is in synergy with government priorities, most PICs have created a committee or a department under the finance or foreign affairs ministry. However, the limited capacity of the PICs tends to result in PICs often submitting to donor influence and pressures to receive whatever programmes are being promoted by funding agencies without genuine coordination of programmes with national needs or poverty reduction efforts. This is worsened by the internal fragmentation of energy responsibility within the PICs themselves; with different donors supporting different agencies, without coordination of technical or institutional arrangements for long term energy project support. Due to the limited capacity available in the PICs, energy system designs are often carried out by donor- selected consultants. There is usually little coordination between donors or even technical continuity between energy projects from the same donor. As a result, one country may have many different types of rural energy systems operating at the same time, making maintenance and technical support difficult and expensive.

At the regional level, despite the existence of the Council of Regional Organisations in the Pacific (CROP) and Energy Working Group (EWG), regional programmes tend to be developed and implemented in isolation. Often they neither progress from earlier programmes nor interact meaningfully with existing programmes.

Energy, poverty and gender

The PICs have endorsed the Millennium Declaration, Convention for the Elimination of All Forms of Discrimination Against Women (CEDAW), Beijing Platform for Action (BPfA), the adoption of the Pacific Platform for Action and other international and regional conventions and agreements. These endorsements demonstrate the region's commitment to addressing the issues of gender equality, women's empowerment and poverty reduction.

On the ground, however, the picture is somewhat mixed. In some PICs, women may spend up to three hours collecting wood and an additional six hours in preparing food each day, with little change from 50 years ago. Even though fuel sources for domestic cooking are slowly shifting away from wood towards kerosene (and LPG in more affluent communities), wood and other biomass are still the predominant cooking fuel used by women in many PICs, especially in the remote and rural areas. The adverse impact of traditional fuels, measured in terms of the opportunity cost of time spent and the health risks is well known; the fact that these affect rural poor women more than any other group needs to be highlighted

and acted upon. Respiratory infections in infants are a major cause of infant mortality and debility. These are particularly acute in the highland areas of PNG, where women cook indoors in traditional and poorly ventilated structures. Nursing women carry children in ‘billums’, strapped to their back while they cook, exposing both mother and child to smoke and particulate matter. Women and children exposed for long hours to wood-smoke from cooking are liable to suffer far more than average from emphysema¹⁰ and eye diseases.

There is significant evidence to show that the perceptible shift from fuelwood to liquid fuel (i.e. kerosene and LPG) and to electricity in many of the PICs has provided women with cleaner and more efficient energy for cooking. This shift is however as yet partial, and has generally occurred amongst the relatively affluent and is limited to urban areas. Traditional biomass based cooking is still almost universal in the rural areas of Melanesia and parts of Micronesia. The use of LPG for cooking is gaining popularity among women in urban communities, as it is convenient and clean, but can be accessed only by those who have a regular household income.

Contributing to the declining use of biomass for fuel in urban areas is the fact that access is becoming difficult in urbanised atolls and in cities (for example in Port Moresby in PNG and Honiara in the Solomon Islands). However, biomass is still plentifully and cheaply available in rural areas. Where fuelwood must be purchased in urban markets, women may have more free time (as they are not out gathering wood), but they also must spread their limited household budgets further to pay for the fuel. Not surprisingly, it is the poorer households that are the main users of wood for cooking, in urban areas.

The use of liquid fuel for lighting is common in those PICs with largely un-electrified rural areas. Although these fuels are cleaner than biomass (which is still widely used for lighting in PNG and some other rural areas of Melanesia) they still pose health and safety risks for women, particularly in their role as caregivers for children and the elderly. Apart from exposure to the fumes from inefficient kerosene and benzine appliances, there have been many incidents of fires, mainly caused by wick-type kerosene lights.

Women’s access to energy is typically seen in the context of cooking fuel. As the study entitled, ‘*Addressing gender concerns in energy for poverty reduction in the Asia-Pacific region*’ points out, there is an implicit assumption that the benefits of electricity are gender neutral. This is not correct, as women perceive the need for and use of electricity quite differently from

Not surprisingly, it is the poorer households that are the main users of wood for cooking, in urban areas.

¹⁰ Emphysema is a lung disease that reduces the ability of the lungs to expel air.

It cannot be assumed a priori that energy interventions that benefit men will necessarily benefit women as well.

men. In general, women have less access to productivity-enhancing resources, such as labour, collateral, credit facilities, information and training. These inequalities often restrict women's ability to benefit from available opportunities. Hence, it cannot be assumed a priori that energy interventions that benefit men will necessarily benefit women as well. Special enabling conditions may need to be created to ensure that women are able to access modern energy services and benefit from them equitably (UNDP 2006b). The same study details an example from the Western Solomon Islands, where the management of a community-owned micro hydro system by women has meant substantial benefits in terms of lighting, education, increased incomes and empowerment.

Few energy-based rural entrepreneurs

Although there is little data regarding rural energy-based entrepreneurship, it is clear that the number of entrepreneurs is few. The most widespread forms of entrepreneurship are in the collection of fuelwood, for sale in

Box 9: KEY ISSUES RELATING TO ENERGY, POVERTY AND GENDER¹¹

- To reduce the time spent collecting fuelwood for cooking and on the cooking process, so as to help rural women free up time for income generating activities.
- Gender issues in the context of the provisioning of energy services are not a priority for PIC governments.
- Inadequate gender segregated information, and insufficient research on energy and gender linkages is an impediment to the development of gender sensitive approaches and policies. The absence of gender analysis of energy projects makes it difficult to design energy projects to fit gender needs.
- There are limited internal technical, human and institutional capacities to carry out gender analysis.
- Women in the Pacific are generally unaware or uninterested in energy and gender/energy linkages.
- There is limited representation of women in the energy sector.
- Cultural restrictions influence role assignation, to the detriment of women.
- There is unequal participation of men and women in decision-making.
- Government national budgets do not provide for energy and gender projects and initiatives adequately. This is a corollary to the fact that gender is not recognized as a national priority in development plans.

¹¹ Source: Extracted from 'Energy and Gender in the Pacific', Draft, p.6, ENERGIA, Regional Paper prepared for the 14th Session of the UN Commission on Sustainable Development (CSD), May 2006.

PICs, with a demand for biomass in urban areas the harvesting, bundling and sale of firewood to urban customers is a small scale energy business.¹²

In Fiji and PNG, there are a number of small businesses¹³ that sell and install solar PV systems, small hydro equipment and other rural energy technologies. Such enterprises are also found (though to a smaller extent) in RMI, Solomon Islands, Tonga and the Cook Islands. Insufficiently developed markets, low internal technical competencies and the inability of such enterprises to offer after sales service and to keep pace with changing technologies make it difficult for enterprises to remain viable for any length of time, and there is a high turnover; energy businesses focusing on rural markets typically last five years or less. In Tonga, Fiji and PNG, there are solar water heater assemblers or manufacturers that cater primarily to urban markets.

In the rural and largely unserved areas of Melanesia, owners of private generators provide electricity for a fee to neighbouring homes or businesses. In Melanesia, as well as in other PICs, rural businesses that use or operate electrical equipment (video parlours for example) tend to operate their own energy sources, using diesel generating sets or solar PV equipment.

There are clearly opportunities for energy entrepreneurship development in the rural areas, especially in the larger PICs. It is however not likely that the needed investments will come from rural entrepreneurs, at present. The experience of small rural energy development projects implemented through the private sector, as in PNG has however been encouraging and could serve as a model for other countries.

PICs do not have special programmes that provide finance, advisory services or other active support to rural small and medium enterprises (SMEs) and can assist the provision of energy access in rural areas through rural energy entrepreneurship. Most PICs have 'development banks', but few loans have been given for rural energy development or for financing productive uses of energy. A major problem for rural SME finance is the need for collateral. Typically land is the only significant asset held by rural residents and in most PICs there is no clear title for the individual

A major problem for rural SME finance is the need for collateral.

¹²These businesses exist in Tonga, Fiji, Samoa and the Cook Islands, where the traditional underground oven style of cooking is used for special occasions (including on Sundays), even in urban settings where modern fuels are in daily use. They also are present in PNG, Vanuatu, the Solomon Islands and Fiji, where there is significant use of wood for day-to-day cooking by the poorer urban families.

¹³These are not typically rural businesses; they are usually based in urban areas though their target market is rural.

ownership of land that can be transferred to a bank in the case of default on a land secured loan. Thus there is little capacity in the PICs for the development of poverty alleviation through energy entrepreneurship.

Some regional non-governmental organizations (NGOs), notably the Foundation for the People of the South Pacific, International (PSPI) have attempted rural business development but without great success and without any focus on energy entrepreneurship. The Women in Business NGO in Samoa has been developing a project proposal to develop cottage industries to make bio-fuel, which can be used as cooking fuel to replace kerosene. There is reportedly a similar women's NGO initiative in the Solomon Islands.

Box 10: PUBLIC PRIVATE PARTNERSHIP (PPP) IN RENEWABLE ENERGY – RESCO IN FIJI AND KIRIBATI

The UNDP/GEF-supported Renewable Energy Service Company (RESCO) pilot project in Fiji aims to contract private RESCOs to manage rural electrification projects that are capitalized by the government. The RESCO structure followed in Fiji remains a small pilot model covering about 700 households and has plans to reach 5,000 households over the next few years. The ultimate goal is to reach over 10,000 households. The success of the RESCO/public private partnership (PPP) concept in Fiji depends on the private sector's capacity to install, maintain and provide customer support for individual solar home systems in rural areas and the capacity and will on the part of the Department of Energy (DOE) to properly support and regulate RESCO operations. Some capacity has been developed, but for large scale implementation much more capacity will be needed. The Fiji Cabinet has approved the concept of RESCO, though enabling legislation has stalled. Unfortunately, no other PIC has specific policies promoting decentralised energy based entrepreneurship.

The Kiribati Solar Energy Company (SEC) is a government owned RESCO in operation since 1989 and currently operates and maintains over 2,000 solar home systems on rural islands and hopes to expand to over 4,000 rural homes (about 40 percent of rural households) over the next decade. RESCO based rural electrification not only provides electricity to households, it also creates approximately one new job for every hundred households it serves.

Box 11: KEY ISSUES IN ENERGY-BASED RURAL ENTREPRENEURSHIP

- There is little rural energy-based entrepreneurship in PICs and the enabling environment that can increase the number and coverage of entrepreneurs does not exist. There appears to be significant opportunity in Fiji, PNG and Vanuatu for rural energy access development through private sector involvement, but at present the market is poorly developed.
- Information on rural energy based SME is spread largely through word of mouth or personal observations. There is no institutionalized system that collates, analyzes, presents and disseminates the relevant information. Thus potential entrepreneurs are unable to make informed choices.
- The experience with private sector entry is nascent and insufficiently documented. Privately operated rural electrification is perceived to be a high-risk and insufficient return activity, in the absence of cross-subsidisation or other mechanisms.
- Small and dispersed markets limit the potential afforded by scale and concentration.
- PICs do not have special programmes for the provision of finance, advisory services or other active support for the development of energy access or energy entrepreneurship in rural areas.
- There is insufficient recognition of the advantages of promoting and encouraging decentralized energy-based entrepreneurship, for the entrepreneurs and to the rural economies, in the energy policies which are being developed or are already in place. Except for Fiji, no PIC has initiated specific programmes for developing decentralized energy based entrepreneurship.

Constraints to finance for rural energy interventions

National and local government budgets for rural energy development have been insufficient to provide full access to modern energy supplies, in particular in the Melanesian countries. For instance, in the case of PNG and the Solomon Islands, the rural population appears to be increasing faster than the increase in electricity access.

Despite the fact that most PICs have reasonably developed commercial banking facilities, none of these banks have any finance for energy activities that is based on loan-terms that are different from ordinary commercial loans. There are no financial institutions in the PICs that provide finance for energy activities at the local level except on a fully-secured basis.

None of the commercial banks have finance options for energy based on more favorable terms than commercial loans.

Subsidies for rural energy development are often provided at the national level, though rarely in a transparent and targeted manner.

With commercial banks typically absent in rural communities, micro-finance emerges as an important avenue of finance for rural energy development at the household level. Yet, none of the micro-finance schemes operating in the region include finance for energy systems or energy entrepreneurs specifically and there is little experience with such finance. By far the most effective micro-finance scheme is 'friend and family finance'. Loan and gift financing by family members for the purchase of appliances and even PV systems is common in most rural villages. It is not unusual for a family member located in an urban area to obtain credit on behalf of a family member in the rural area, or simply to pay the cost of the needed service or product directly.

Subsidies for rural energy development are often provided at the national level, though rarely in a transparent and targeted manner. Most PICs have sought to bring down the cost of access to energy by offering subsidies in the form of capital investment grants (e.g. Vanuatu), duty and tax-free fuel for electricity production (e.g. Tonga), exemption from corporate taxes for energy suppliers (e.g. Kiribati) or simply payments from the government treasury to cover energy supply losses (e.g. Tuvalu). In general, the level of subsidy for the supply of electricity has declined over the past two decades, though in many PICs it is still substantial. Direct subsidies for petroleum products are rare, though in some countries (e.g. Kiribati) the cost of delivery to remote areas is subsidized to make fuel prices essentially the same throughout the country.

The main international finance agencies operating in the Pacific region are the ADB and the World Bank (WB). In addition, the European Investment Bank (EIB), the French Development Bank (Caisse Française de Développement), the US Import/Export Bank and the Japan Bank for International Cooperation all have had operations in the region. These banks provide 'soft' loans and loans on relatively high risk capital investments generally to governments but also in some cases to private entities. Most also provide grant-based technical assistance to develop projects to the stage where a loan can be made. The high transaction costs for such loans limits their use to relatively large projects and few loans have been made in the Pacific for rural electrification. Most loans have been for grid extensions, not for off-grid power development in low income areas.

Japan, European Union (EU), Canada, France, Australia, USA, China, Taiwan and New Zealand have provided large bilateral grants for energy related projects in the PICs. The EU, USA and Japan are the largest donors. UNDP, the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the United Nations Economic and Social Commission

for Asia and the Pacific (UNESCAP), the Global Environment Facility (GEF), etc. have provided grant support for energy related projects to the region supporting mainly studies (including energy resource assessments), capacity building initiatives, enabling activities in the context of international environment conventions and project concept development. Small grants have been provided for energy hardware, mostly solar PV.

Box 12: BANKING AND FINANCIAL SERVICES IN THE PICs – ABSENCE OF CREDIT FOR ENERGY RELATED ACTIVITIES

Nearly all the PICs have incorporated a national development bank intended to provide loans that support national economic development. Usually the interest rate is not lower than normal but the bank is willing to give a loan with lower collateral and for activities with higher risk. Unfortunately the region's development banks have largely failed to maintain their focus on development oriented investments. In general, they have not been active in supporting energy-related investment though the Kiribati Development Bank has provided key working capital loans to the Solar Energy Company (SEC) and the Fiji Development Bank has shown strong interest in supporting a proposed hydro electric development in Namosi.

All PICs have full commercial banking facilities (except in Tokelau where the government provides basic banking services and in Nauru where services are limited by the financial state of the Bank of Nauru).

The smaller countries like Niue, Tuvalu, Kiribati have a single full service bank that is partly owned by government and partly by an international commercial bank, based in Australia or New Zealand. The larger countries typically have one or more locally owned banks and one or more international commercial banks (based in the USA, Australia, New Zealand, India or the Philippines). None of these banks have any finance for energy activities with loan terms that are any different from ordinary commercial loans. Typically there is a requirement of at least 75 percent collateral and good credit standing to secure a loan.

Credit unions based on employment or on association membership are uncommon but exist in several countries. They are savings institutions that provide small loans for members for consumer purchases and to get over short term cash shortfalls. Instalment-based payment plans and finance are offered by larger retailers for furniture, large appliances and high cost items in the more economically developed PICs. Interest rates are high and loan periods short. Solar water heaters can sometimes be purchased under these plans but in general no energy-related finance is available.

Box 13: KEY ISSUES IN CONSTRAINTS TO FINANCE FOR RURAL ENERGY INTERVENTIONS

- Insufficient national and local budgetary provisioning (in particular in the Melanesian countries) for rural energy development has slowed the growth of access to energy.
- None of the full commercial banks offer any long-term finance for energy activities on loan terms that are more favourable than ordinary commercial loans. Thus the option of resorting to commercial bank finance is expensive and often unavailable.
- Land is generally not available as collateral in the Pacific, since individual land titles either do not exist or are often of dubious legal validity.
- Soft-loans from international finance agencies have been limited to relatively large infra-structure projects focusing on utility power grids. Few soft-loans loans have been made in the PICs for rural or off-grid power development in low income areas.
- Micro-finance schemes operating in the region do not specifically include finance for energy systems or for energy entrepreneurs.

Lack of framework for poverty and energy monitoring

Project level monitoring and evaluation (M&E) systems to serve individual energy project requirements often focus on success parameters that are largely irrelevant to the issue of poverty reduction. In addition, M&E rarely continues beyond the closure of the project and therefore the longer term impact on people and communities including poverty reduction cannot be assessed and even information that would enable such assessment is unavailable.¹⁴

The periodic census provides the most comprehensive information regarding type of energy used, type of energy-use appliances owned and information regarding the composition of the household using the

¹⁴ An electrification survey co-funded by UNESCAP and UNESCO, carried out in Fiji, by the Department of Energy (DoE) at the end of 2005 is one of the few monitoring attempts for at least five years. The main objective of this survey was to investigate actual uses, impact and operation and maintenance problems of electrification in remote areas. With regard to productive uses, an assumption on how poverty reduction can be linked to the productive use of electricity in villages was an important factor under investigation. The survey included 70 villages in Fiji, 35 with grid electrification, 30 with diesel electrification and five with renewable energy-sourced electrification. Preliminary results indicate that there are few uses of electricity (beyond lighting and food storage in shops) that can be considered as income-generating activities in the rural areas of Fiji.

energy. In addition, at irregular intervals, most PICs carry out a Household Income and Expenditure Survey (HIES) that provides information on the affordability of energy and the sources of income for households¹⁵. At the PIC regional level, the Forum Secretariat used to publish petroleum wholesale prices (excluding taxes and import charges) for the PICs.

Tools, procedures and guidelines do not exist in the PICs for energy-poverty monitoring, and even general poverty indicators that are used are mainly based on MDGs guidelines and are not well aligned to the poverty issues in the Pacific. In general, there is little regular monitoring and evaluation of the performance of existing energy services (e.g. rural electrification, energy efficiency projects). Equipment installed years ago is often assumed to be still functioning as designed, though spot checks by independent observers indicate that many failures have in fact occurred and the number of households actually receiving project benefits is often much lower than claimed.

Limited collection, availability, access and dissemination of detailed energy information

In the PICs (as elsewhere) a wide range of accurate and consistently collected data is needed for a correct assessment of key development issues, the formulation of development policies, the practical implementation of policies and programmes, for monitoring results and impacts etc. In the energy sector, data is critical to determine energy imports and exports, for instance, as well as for electricity generation by location or consumption by sector.

Box 14: KEY ISSUES IN POVERTY AND ENERGY MONITORING

- A number of energy technologies for rural energy access have been deployed (diesel generators, micro-hydro, solar PV and grid extensions) in the larger PICs. There is however little objective information on actual performance, real costs of operation, quality of maintenance and operational status. This makes it difficult to effectively plan and implement technology expansion programmes that are cost-effective, sustainable and provide quality service to rural communities.
- There is no M&E system in the PICs to study energy-poverty linkages. M&E capacities are typically project related and tools, procedures and guidelines do not exist in the PICs for energy-poverty linkage monitoring and evaluation.

¹⁵ These surveys are typically based on a sample of households, not on all households as in the census.

Tools, procedures and guidelines do not exist in the PICs for energy-poverty monitoring.

Researchers have observed a decline in the availability of energy data in many PICs over the past decade.

Despite long term efforts to improve the quality of energy data in the PICs, data remains of poor quality. The data for most PICs is sufficient for ‘snapshots’ that indicate reasonably well the development situation at the national level at a given time. In general, however, there are few consistent time series datasets that allow accurate estimation of trends, and the availability of disaggregate data by gender, age, geographic location or income group is extremely limited. Social statistics are particularly hard to locate and difficult to use because they are often unreliable or outdated.

Researchers have observed a decline in the availability of energy data in many PICs over the past decade. This has been partly due to the increase in the privatization of utilities and other energy suppliers (that has resulted in loss of access to energy sales data) and partly due to the increasingly complex arrangements for energy supply that has accompanied growth.

Box 15: KEY ISSUES IN DATA AND INFORMATION REGARDING ENERGY

- There has been a decline in the quality and availability of energy data in many PICs over the past decade. For instance, with few exceptions (and these have been on a limited scale) there has apparently been no comprehensive household, commercial or industrial energy end-use survey in the region for about a decade, and in most countries for far longer.
- Energy data is spread over many organizations and sectors, making it hard to consolidate. Data reporting is often of poor quality with obvious inconsistencies, data often is not made available until long after collection, and private energy suppliers often refuse to provide energy production and sales information. Data received from different sources regarding the same transactions (e.g. from petroleum product importers and from customs) are often inconsistent.
- In general the staff of PIC energy offices, and often national planning offices, does not do a great deal of analysis and possibly therefore maybe be unconvinced of the practical value of good data.
- Poor data leads to poor analysis of issues and problems.

Facilitating access to modern energy

One of the key factors for addressing poverty concerns is to enhance the reach of energy institutions to rural and remote areas. The PICs can explore a variety of practices being developed in the region. For example, the PPP process formulated in Fiji under their RESCO concept can be replicated in other countries. RMI is developing an off-grid rural electrification mechanism that provides for technical support and general management through an urban utility and this model may also be appropriate for replication. Another example is allowing private independent power producers (IPPs) to establish new rural electrification grids or manage existing rural power plants at government centres (for example PNG's C centres or Fiji's PWD-managed provincial power systems). Such intervention in principle could result in both improved quality of existing rural electrification and significant expansion of rural electrification. However, the PICs must establish practical regulatory mechanisms to assure that these services are provided at an affordable and fair price to rural consumers while ensuring that the private operators make a profit.

In order that the PICs provide sustainable and affordable access to modern energy to the lower income groups, technology options based on indigenous energy sources need to be accorded a higher priority through increased budget allocations and increased staffing of implementing agencies. The private sector needs to be involved if large scale, rapid implementation is to be achieved. To encourage private sector participation, programmes that provide for rural finance, technical capacity building, business capacity building and PPPs can be developed. To help reduce poverty and hardship, the provision of energy services in the PICs should focus on the cost of providing an affordable basic service, not the cost of providing a kWh (the unit metered and sold) of electricity or a litre of kerosene.

Bio-fuel and solar energy are two indigenous energy sources that can improve the lives of the poor, if the interventions are well designed. A national bio-fuels programme to replace a significant proportion of imported diesel fuel or petrol can be justified in part because it creates rural employment. The restoration of degraded coconut plantations, for example, would create many new jobs and would help in the reduction of poverty. Solar energy can help to reduce hardship in the remote islands of the Pacific, by providing a small amount of low voltage direct current (DC) power (to meet basic lighting needs and radio access) for a few hours per day to a large number of households. This would be more effective than providing a smaller number of families with the higher installed cost but

The private sector needs to be involved if large scale, rapid implementation is to be achieved.

superior service of essentially unlimited, 24-hour grid-connected alternating current (AC) power or diesel generators powering a village or small area grid (see Box 16).

Box 16: BIO-FUEL AND SOLAR ENERGY – EMERGING OPTIONS FOR SOME PICs

Bio-fuel

Currently most PICs are interested in relatively large-scale local production of bio-fuels, primarily to reduce the volume and cost of importing refined petroleum fuels. The way in which bio-fuel industries are developed and structured has a large impact on long-term viability, rural employment and poverty reduction. However, locally produced fuels will not necessarily be cheaper than imported petroleum fuels for the public, due to higher costs than expected, government awarding a monopoly concession for local production or distribution or other reasons. Bio-fuel production could be financially and economically successful for the country, but may have a positive or negative impact on poverty depending on how production is organized or regulated. For poverty reduction, minimal social upheaval and lowest environmental impact, a production system relying on a large number of small rural producers instead of huge commercial plantations financed by foreign investors is likely to provide more benefits. Though the end cost of the product could be slightly higher, all the value added will be retained locally rather than most of it being distributed to the overseas investors.

Solar energy

The provision of solar energy can be a viable option in the more remote islands of the Pacific. Grid extensions into remote areas almost always cost much more per household than do home sized solar PV systems. Surveys of remote rural areas indicate that even with full grid electrification, few households use more energy than is provided by a much less-expensive PV installation and there are hardly any instances of the use of the extra capacity available from the grid supply to develop local income generating businesses. Diesel based mini-grids are even less likely to be cost-effective since they can rarely be operated for more than a few hours a day, due to the very high fuel and repair costs typical in remote areas of the Pacific. Thus financing mechanisms that allow rural households with money income (plantation workers, government employees, shop owners, etc.) suitable finance to obtain solar PV should be developed as an alternative to high cost subsidies for grid extensions and local mini-grid construction.

Another constraint in addressing poverty concerns by means of modern energy is that access to petroleum products on remote islands is often unreliable, due to poor management of local stocks. A programme to develop fuel management capacity in remote areas would be useful along with the development of an innovative financing scheme to finance improved fuel storage and distribution mechanisms.

The special case of Melanesia

Although expanding household access to electricity rapidly may be beyond the financial and management capacity of the Melanesian countries, rural hardship for many Melanesians could be appreciably reduced by programmes that expand the electricity supply to rural government stations and nearby facilities, especially health centres and schools. An area that donors, international development agencies and regional organizations could take up is to provide to the countries in Melanesia with up-to-date information, case studies and advisory services on effective policies, institutional arrangements, and financial arrangements for sustainable electricity services at remote government posts, health centres and schools. More specifically such assistance could include the following:

- Policy guidelines and examples of ‘best practices’ and success stories from the rest of the world to motivate central governments to act.
- Assistance to central governments in establishing clear rules regarding subsidies (both capital and operating subsidies, if any), technical standards and the support that the central government can provide to provincial and local authorities.
- Clear guidelines on the services which are appropriate for diesel generators, solar PV and micro-hydro and the relative capital and operating costs of each (although generic case studies may be misleading for micro-hydro which is quite location-specific).
- Guidelines (for central government agencies, local governments etc.) for setting tariffs that are transparent and cover true costs.
- Effective mechanisms for bill collections (including such things as pre-payment metering, local shopkeeper collections and community levies for services).
- Improved methods of training operators in operations and maintenance of the installed systems including a process for re-training when operators change or the technology is upgraded.
- Effective ways of reducing costs by more efficient uses of small amounts of electricity (including efficient compact fluorescent lamps, simple time switches, efficient refrigeration units, etc.).

Rural hardship for many Melanesians could be appreciably reduced by expanding the electricity supply to government stations and especially health centres and schools.

**Researching
the design and
cost
effectiveness
of safe
appliances
which use
coconut oil or
other local
fuels for
lighting and
cooking
should be
undertaken.**

Compared to other PICs, biomass in the form of wood and woody wastes is the main fuel used for cooking among rural households in Melanesia. 'Improved' household wood stoves have failed throughout the PICs, presumably due to inappropriate design and high costs. Not enough attention has been paid to simple means of keeping smoke away from indoor cooking locations, so as to reduce chronic chest and eye problems among women, who have been cooking with biomass for years. Interventions in the Melanesian context are required in the following critical areas:

- Case studies or examples that advocate simple ways of reducing smoke in areas, where the household continues to use biomass fuel would be useful. These should not require major changes in cooking styles or high investment in special stoves.
- Liquid petroleum fuels can be particularly expensive in parts of Melanesia, though costs are generally high in remote islands throughout the Pacific. With such high prices it will be useful to provide advice on how these fuels can be used more effectively and replaced, wherever practical, with local products for lighting and cooking.
- In rural Melanesia, wick-type kerosene lighting and cooking appliances have caused many household fires and resulted in serious injuries and burns. Women and children are the main sufferers. There are no easy or obvious solutions but two areas that need interventions are:
 - i) An attempt should be made to locate and distribute safer and more efficient, yet inexpensive, kerosene appliances. The availability of spare parts also needs attention.
 - ii) Research into the design of cost effective and safe appliances which use coconut oil or other local fuels for lighting and cooking should be undertaken.

In addition, it would be appropriate to demonstrate effective models for improving energy access in rural Melanesia, not as stand-alone projects, but integrated with NGO or government programmes. The effort could include broad ranging public awareness programmes engaging provincial and local politicians, linking with other community-based infrastructure, and other local programme initiatives in the areas of health, education, etc. Although such studies and guidelines will be especially appropriate for Melanesia, most will also be useful for other PICs.

Some recommendations concerning possible measures that can be taken in different areas to increase energy access are listed below. These recommendations have been prepared by key national and local stakeholders in the Solomon Islands, but they can be applied to the other

Melanesian states as well. The applicability of the recommendations to the smaller island states is more limited due to the different levels of rural development and experience with rural energy systems. However for those Micronesian states that still have a relatively large un-electrified rural population (like RMI and FSM), these recommendations are quite relevant. Specific recommendations include¹⁶:

- Complete the national energy policy that is being developed and put it into effect, so that there is a known basis for action that will be consistently followed.
- Revise enabling legislation for the national power authority, so as to make it possible for the private sector to generate its own power without penalty.
- Bio-fuel development offers an excellent opportunity for indigenous energy development and rural income generation and should therefore receive the highest priority from the government and the donor community. The government should provide incentives for the development of bio-fuels for transport and electricity generation, including cross subsidies through differential taxation of fuels, to keep bio-fuels competitive with imported fuels as imported fuel prices change. In addition there should be a move by the government to replace the use of diesel-fuel for land and sea transport with locally produced bio-fuels wherever technically practical and possible (as has been done in Vanuatu).
- The national power authority should be required to maintain a specific percentage of its generation from indigenous energy sources, and this percentage should increase over time at a realistic rate. Government and donors will need to assist the national power authority to access the finance and technical support required to provide the hydro and other renewable energy resource development necessary to meet this requirement.
- Develop and implement models for hydro and geothermal development that provide appropriate compensation to land owners, both initially and over the long term, e.g., partial ownership of energy projects by land holders so income is shared equitably despite inflation, currency revaluations and other changes in the economy.

¹⁶ Source: UNDP. 2006a. Vol. VII: Solomon Islands, Policy Study on Regional Mapping of Options to Promote Private Investments in Alternative Energy Sources for the Poor. Final Report (unpublished).

Capacity-building for energy technology applications and management is crucial for accelerating rural energy development.

- Prepare a plan for rural energy development that can be made available by the government and the donor community. The plan should emphasize the use of energy from local sources and support rural income generation through the tight integration of energy development with other rural development actions.
- The donor community and government need to support rural financial mechanisms through actions such as risk mitigation funds and accessible finance for rural SMEs and for urban businessmen, who wish to support rural energy development.
- Assess the financial support available through Clean Development Mechanism (CDM) processes, since it seems that the relevant processes are now becoming friendlier to small and dispersed projects.
- The lack of technical and management capacity, particularly in rural areas, is seen as a major constraint to widespread rural energy development. Specific programmes for long-term rural capacity-building for energy technology and management will be needed to support any programmes for accelerating rural energy development. This is a continuing need that must be addressed by the national education system. It cannot be addressed by individual projects.

Enabling policies and regulation

Since many of the PICs have been and are presently being assisted by the SOPAC/UNDP/Government of Denmark PIEPSAP project to establish energy policies, strategies and practical mechanisms, policies to reduce poverty through energy access improvements should be considered and included where appropriate. The PIEPSAP project is committed to assisting PICs develop their own energy policies and to help decision makers develop the necessary practical strategies and plans for policy implementation. In particular, assistance in energy access policy development, strategy and planning should be considered for the FSM, PNG, Solomon Islands and Vanuatu. Specifically, rural electrification policies need to address poverty issues and ensure that the benefits of rural electrification include poverty reduction.

Programmes at the regional level to develop capacity within the utilities, (perhaps through the PPA as they have specific experience in this area) to understand, analyse the economics of IPP and competently negotiate contracts with IPPs are needed. Practical generic legislation that requires utilities to accept IPP connections and to set rules for the terms of payment (e.g. relative to marginal cost of generation, type of power source, etc.) should be drafted and provided to PIC governments.

What is also needed is to develop guidelines for power purchases from IPPs, that consider marginal cost of power to the public utility, poverty alleviation impacts, power reliability effects, capacity offset for the public utility, cash flows for both partners and national development implications. Regulations and legislation should ensure that IPPs receive a fair power purchase contract from the national utility and also ensure that the financial condition of the utility will not be threatened by the acceptance of the IPP power. For instance in Fiji, PNG, Solomon Islands, Vanuatu and possibly other PICs, it may be appropriate to develop legislation and regulations which allow IPPs to provide energy using mini-grids to remote locations and government stations. Ensuring that an effective regulatory mechanism is in place is important in this context.

At the policy level, it would be useful to facilitate PIC governments and utilities with the development of tariff structures and connection policies, that have the effect of allowing low-income consumers to access grid supplied electricity. Through regional programmes, e.g. PIEPSAP, PIC governments should be advised of the effects of a national electricity tariff on the development of the private sector generation that is needed to improve electricity access outside the existing national utility system. Any advisory services on tariff reform should also assess the value to the utility of 'lifeline tariffs' including advice on tariff structures, which can meet a lifeline objective and at the same time be implemented at a 'least cost' to the utility.

Enabling programme framework

It is often assumed that the provision of electricity in the PICs, combined with micro-credit finance opportunities and basic business training will result in higher incomes in the rural areas. Some village based micro-hydro and bio-fuel initiatives in the PICs have assumed that improved energy sources will result in the production of more or better goods and services, in turn resulting in cash income for the community. This assumption is based in part on the Asian experience.

While initiatives like these have worked in some developing countries, there is evidence this may not be the case in the Pacific. Therefore before widespread programmes of improved energy provision to PICs are carried out, based on these expectations, it would be useful to assess past initiatives and apply any appropriate lessons. In general, PICs need to establish improved energy services in a manner that genuinely helps to alleviate poverty/hardship, and this will require a good deal of case-by-case analysis. Based as far as possible on existing studies, e.g. Household Income and Expenditure Survey (HEIS), recent household energy use

Regulations and legislation should ensure that IPPs receive a fair power purchase contract from the national utility.

It is important to integrate the energy supply project with other activities that support development of the capacity of the recipient community to use the energy for generating income.

surveys and census data, comprehensive studies are required that will document the relationship(s) between poverty and energy services (use, cost, availability) and household income an/or expenditure and energy services. The analysis should assess and determine whether there are 'cause and effect relationships' and if so how important they are.

If poverty alleviation is an objective, as it should be, it is important to integrate the energy supply project with other activities that support development of the capacity of the recipient community to use the energy for generating income. This income must necessarily be sufficient to at least offset the resources that are expended for obtaining and using the energy supply. Without increasing village net income, it is possible for the provision of electricity to increase the net outflow of cash from the community as a result of families purchasing electrical appliances and then paying for the energy; a process that may increase monetary poverty in the community which has access to electricity.

Thus in order to focus on the linkages between energy access and hardship/poverty reduction in the PICs, a key starting point is the development of regional, sub-regional or national programmes that enhance the understanding of such linkages. An important part of that understanding is through the review of earlier local, national and regional energy programmes and the impact on poverty that they have had, i.e., developing an understanding of the programme specific factors that determine whether poverty conditions have improved, remained unaffected or have worsened by energy interventions. There are many NGOs, government agencies and international agencies working in the PICs, in the area of poverty reduction. Their work, as it relates to energy linkages, needs to be compiled and shared among the PICs. It is important to understand the complementary programmes that may be needed to facilitate poverty reduction through energy access improvement, such as market development, entrepreneurial capacity development, infrastructure development, etc. It is also essential to separate cause and effect relationships.

Programmes directed primarily toward PNG, Solomon Islands, Vanuatu, Fiji, FSM, RMI and Kiribati should focus on developing those areas, where it has been shown that improving energy access will work to reduce poverty. Rural electrification programmes that tend to increase poverty due to increasing community obligations, without increasing access to ways to meet those obligations should be avoided.

Though there are significant linkages between energy service provisioning and hardship/poverty reduction in the PICs, in general they are not the focus of regional or international organizations active in the

Pacific. Poverty alleviation through energy access provision needs to be placed on the agenda of such entities. Bilateral and multilateral donor organisations in the Pacific and regional agencies should work together, for example, to develop a long-range donor assistance programme plan that includes planned development and coordination of major Pacific donor programmes. This will ensure that 'hard' and 'soft' components are balanced and implemented in a manner that is complementary rather than the implementation of programmes in isolation, as has been the case in the past. Duplication of effort needs to be minimised, national priorities require to be addressed and cross-sectoral conflicts in energy development must be avoided.

Regional as well as national programmes should be developed interactively with countries and not developed internally by bilateral and multilateral donor organisations and regional agencies. While this may mean considerable additional effort and cost for the donors, the long term benefits through fewer failed projects and more efficient use of project money should more than compensate. PICs need to more closely scrutinize donor projects and reject those that do not fit into their long term programme of energy development. PICs should insist that donor projects are technically appropriate, utilize components consistent with those already in use, genuinely meet the needs of the recipients and that programme delivery be customized to fit each country's needs in terms of timing, technology and type of implementation.

Countries should use the numerous meetings and forums to demand real cooperation among the donor organisations and regional agencies, information-sharing among regional energy organisations and refuse to take part in programmes that do not address their needs. Countries need to have well defined energy policies and be willing to allocate the needed resources for sustaining the donor projects they agree to accept. At the national level, continuation and expansion of the programmes for capacity building in PIC energy officers are required, but specific training relating to energy and poverty, and energy and gender linkages should be added.

A comprehensive regional study or a dedicated programme should be implemented to determine the viability of bio-fuel production in the PICs, emphasizing economic and financial viability and the development of mechanisms to assure decent conditions of employment for those who produce the feedstock and the fuels. This should address technical issues (e.g. the scale of production required to be viable; the suitability of various crops as fuels including coconut, oil palm, jatropha (*jatropha curcas*)), logistic concerns, likely impacts on the cost and the availability of vegetable oils at various petroleum price levels, the impact on employment

Regional as well as national programmes should be developed interactively with countries.

An analysis of the opportunities for rural energy based SMEs needs to be carried out.

creation and possible entrepreneurial activities. The programme will need to investigate warranty issues for generators and technical problems with various bio-fuels and mixtures, as diesel and petrol replacements for power and transport. As far as possible, the programme should incorporate findings of national bio-fuel studies currently underway including those implemented by SOPAC (some with funding from UNDP). The results should be publicized in the form of information guidelines and tool-kits, so as to enable the rational development of the bio-fuel industry in the PICs.

Identifying and enabling energy-based entrepreneurship opportunities in rural areas

The link between energy-based business opportunities and poverty reduction is obvious due to the income generation and employment avenues rural enterprises provide, as well as the life-style improvements that result from access to modern energy.

Rural energy surveys like the one carried out in Fiji at the end of 2005 should be carried out for all PICs so as to identify the areas that rural SMEs operate in and the activities undertaken by them to generate income. Augmenting these opportunities by the availability of modern forms of energy is the next challenge. Information needs to be gathered from NGOs and the government in each PIC regarding attempts at energy entrepreneurship for poverty alleviation, as a part of the effort to document and disseminate information about lessons learnt, best practices, problem areas and case studies of both successful and unsuccessful efforts. NGOs and government agencies that are promoting rural business development need to understand the opportunities for energy entrepreneurship and wherever applicable, include this information in their outreach programmes.

In addition, an analysis of the opportunities for rural energy based SMEs needs to be carried out. PIC governments, particularly the Melanesian countries, RMI and FSM, need to understand the benefits, opportunities and modalities available for decentralized energy-based entrepreneurship. For those opportunities that have a good chance of success, programmes should be considered and commercial banks should provide development finance through loan guarantee funds or other risk mitigation arrangements.

Further assistance needs to be made available to the Melanesian and RMI governments and the FSM state governments to develop policies that promote decentralized energy based entrepreneurship. For Fiji, RMI, Vanuatu, Solomon Islands and PNG there is little likelihood of large scale

rural electrification being carried out without government subsidy. The RESCO concept used in Kiribati, Tonga, Fiji and RMI provides for capital subsidy but does not subsidize the other components of rural electrification (i.e. operation, maintenance, repair, fee collection, etc.) and is particularly suited to private sector participation in the operation and maintenance of rural electrification systems, a process that typically requires only modest private capital investment. Since a major barrier to private sector entry is the lack of experience with privately operated rural electrification (usually perceived to have a high risk), the RESCO approach places the capital risk on the government and dramatically lowers the risk to the private sector. The experience of RESCO in Fiji should be disseminated throughout the Asia-Pacific region, as a possible approach to decentralized energy-based entrepreneurship based on the PPP concept. However, to retain its leadership position, Fiji should develop a 'proof of concept' project involving over 2,000 households for RESCO concept verification, and if appropriate, introduce modifications to reduce the risk.

In Fiji, PNG, Solomon Islands, Vanuatu and possibly other PICs, it may be appropriate to develop legislation and regulations, which allow IPPs to provide energy to remote locations and government stations, where currently mini-grids provide power to local communities. An effective regulatory mechanism is important and will need to be concurrently developed.

The increased use of coconut oil for fuel is expected to provide opportunities for rural entrepreneurs to grow and process coconuts for fuel production. Trial projects for rural production of coconut oil and the use of coconut oil for rural electrification are underway but have shown mixed results so far. A rural franchise structure has been proposed for coconut oil production in the Solomon Islands. Under this approach, a community can purchase a franchise to produce coconut oil. In return a mini-oil mill is installed by the parent company and the community is electrified by a diesel mini-grid using coconut oil for fuel. The parent company will provide maintenance support on a monthly basis and oil not used in the village will be purchased by the company at a guaranteed price. This approach allows rural dwellers to utilize their existing coconut resources – and any new resource they wish to create – and improve both their income and their access to energy, without the social problems that giant industrial plantations create for their workers.

The experience of RESCO in Fiji should be disseminated throughout the Asia-Pacific region.

Improved energy services to low-income PIC households have clear and positive gender impacts.

Incorporating gender concerns

National energy policies in the PICs should address women's energy use and study the impact on the lives of their families and the community.

Access to efficient and reliable sources of energy for modern household appliances affects the general well-being of the family. As primary caretakers of the family's welfare, women can have more time available for their personal development and for greater participation in the community, if their households have access to electrical appliances such as refrigerators for food preservation, electric irons, efficient stoves for cooking, sewing machines and other labour saving appliances. Where ever excessive time is spent to obtain fuel-wood, alternative cooking fuels or more efficient use of available fuel-wood should be actively pursued.

The availability of reliable electricity can open up opportunities for small scale cottage industries for women involving sewing, baking and handicrafts, although (as already stressed) factors other than access to energy can constrain such opportunities. Women's capacity to earn an income and be more economically independent can elevate their position in the family and community. Even access to television news can enhance women's capacity to make independent and better-informed decisions about community issues and be less dependent on the opinions and ideas of the men in the household.

Improved access to services, including that provided through better energy supply, can contribute towards gender equality and empowerment of women, reduce poverty and improve the overall development of impoverished areas. Improved energy services to low-income PIC households have clear and positive gender impacts.

Generic actions required to strengthen and mainstream gender considerations in PICs include (ENERGIA 2006):

- Mainstream gender into national energy policies and planning, including the provision of assistance on the implementation of existing policies at all levels; from government to community.
- The language used in energy and gender policy statements should be clear, gender sensitive and inclusive.
- Enhance and support data collection on gender and energy, including document gender impact of different energy types and technology choices.
- Promote productive use of energy in the rural areas, especially for income generating activities or small businesses for women.
- Increase awareness of energy and gender issues, especially at the rural community level through dissemination of information.

- Recognize the need for improved gender and energy training and capacity building at different levels, through a range of methods including gender awareness training for government officials (for energy officers for example) and other stakeholders; gender training at the community level; 'train the trainer' training within communities and seek training opportunities for women in energy technologies.
- Community participation (including men, women, youth and children) is critical for the success of rural electrification programmes.
- Relevant NGOs in the Pacific region need to be encouraged to include energy as one of their focus areas.
- Identify and provide financial support including micro-credit facilities for work in the energy and gender field, and the development of appropriate and client oriented technologies.

Promoting the financial viability of rural energy projects

Financial institutions need to fully understand the risks of finance for rural energy development. Workshops and training programmes are needed that are directed to helping financial institutions understand the real costs and benefits of rural energy development, particularly with regard to renewable energy. PIC financing institutions, in particular commercial and development banks should be assisted to develop methodologies to evaluate the risks for rural finance (for energy access and for energy efficiency) at all levels. Loan officials should be given training in the technology, application and financial aspects of energy investments.

Risk mitigation programmes should be established including partial loan guarantees (effectively increasing collateral), interest rebates (allowing banks to charge higher rates to offset risk) and soft loans to development banks (lowering the cost of money for loans and allowing a lower interest rate to the customer).

It is likely that subsidies will continue to remain an important part of rural energy development, but PIC governments usually have little understanding of the relationship between subsidies, poverty reduction and project sustainability. Simplified but useable models that show the relationship between energy subsidies, economic development and poverty for each PIC should be developed and training in the use of the model to analyse different subsidy strategies and policies should be provided. Text materials and training in economic and financial analysis of energy projects of various types should be provided to energy officers.

Micro-finance programmes are needed that focus on finance to support rural energy entrepreneurs and for consumers to purchase energy delivery systems and appliances. Micro-finance NGOs and

PIC financing institutions should be assisted to develop methodologies to evaluate the risks of finance for rural energy development.

The PICs need to design and implement an M&E system for energy-poverty linkages.

agencies should be assisted to better understand the need for finance for rural energy entrepreneurs as well as the demand from consumers to enable them to purchase energy delivery systems and appliances. Loan funds and risk mitigation programmes directed at micro-finance institutions lending for energy related activities should be provided. Simplified corporate models for PIC utilities that allow utilities to determine supply costs under different conditions of loading, fuel pricing and collection rates should also be developed and disseminated.

Developing tools and models for monitoring and evaluation of energy and poverty linkages

Since the impact of energy access on poverty reduction is to be assessed, there is a need to establish a base-line for the project target groups for both poverty/hardship (using the Pacific understanding of poverty) and energy access. Energy/poverty indicators appropriate to the Pacific that can be used to determine the improvement (or worsening) of poverty in areas provided with improved access should be developed. Such indicators should be included for long term monitoring of energy access projects. Poverty and energy linkages and monitoring and evaluation needs to be integrated in new projects and post project surveys, for those projects that focus on poverty, energy and gender. These links should extend well beyond the formal conclusion of the project.

The PICs need to design and implement an M&E system for energy-poverty linkages. Since the Pacific has a different definition of poverty from most other developing regions, a special set of tools and procedures will be needed in the Pacific sub-region that includes non monetary (health, education, nutrition etc.) as well as monetary indicators. Additionally, a policy framework needs to be developed for the incorporation of a decentralized M&E system, accompanied by tools that can assess the impact of energy services on poverty.

To aid in the efficient collection of data, regional efforts to increase capacity development activities for the PICs in this area should be initiated. Funding is also needed for the conduct of rural energy surveys in the PICs. This will enable policy-makers to ascertain the actual uses of energy in rural areas, understand the energy-poverty links and then focus on strategies that impact positively on poverty.

The Pacific Island Countries present development challenges that are not easy to address. Their isolation and remoteness combined with the limited infrastructure makes the provision of energy services both difficult and expensive. Despite a number of similarities, the requirements of these nations vary considerably and it is important to recognize this and design policies and projects keeping in mind the specific requirement of a country. A number of new initiatives have emerged in the recent past, in the Pacific region itself, which can be emulated and adapted, so as to expand the reach of energy services to the people. Increased access to energy will help to reduce poverty and hardship in the region. Initiatives related to energy provisioning and poverty reduction should be undertaken through a participatory process, with the close involvement of national governments and local stakeholders, if they are to be successful.

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5. Financing Options for Renewable Energy: The Asia-Pacific Experience

The UNDP Regional Energy Programme for Poverty Reduction (REP-PoR) aims to affect broad-based interventions in the energy sector, focusing on the countries in the Asia Pacific region. The emphasis is on harnessing energy effectively to meet developmental targets laid out in the Millennium Development Goals. As a first step to achieving the objectives of REP-PoR, this publication reports on the energy sector in the Pacific Island Countries and details its linkages to poverty, the gaps therein, and the modalities for overcoming these. It aims to facilitate the inclusion of a strong energy component in the socio-economic development programme of the Pacific Island Countries.

