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Pacific Perspectives on the Challenges to Energy Security and the Sustainable Use of Energy

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Abbreviations and Acronyms

ACP	Africa, Caribbean and Pacific
ADB	Asian Development Bank
ADMIRE	Acting for the Development of Marshall Islands Renewable Energies (UNDP/GEF)
APEC	Asia-Pacific Economic Cooperation
c.i.f.	Cost, insurance and freight
Compact	Compact(s) of Free Association between USA and FSM, RMI and Palau
CPI	Consumer Price Index
CROP	Council of Regional Organisations of the Pacific
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
DSM	Demand Side Management (in reference to energy efficiency)
EC	European Commission
EDF	European Development Fund
EDWG	Pacific Energy Donor/International Financial Institutions Working Group
EE	Energy Efficiency
EESCO	Energy Efficiency Service Company
EIB	European Investment Bank
EPO	ESCAP Pacific Office
ESMAP	Energy Sector Management Assistance Programme (WB)
EU	European Union
EUEI	European Union Energy Initiative
FAESP	Framework for Action on Energy Security in the Pacific
FIC	Forum Island Countries
GDP	Gross Domestic Product
GEF	Global Environment Facility
HDI	Human Development Index (UNDP)
HH	Households
HIES	Household Income and Expenditure Survey
IEA	International Energy Agency
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IRENA	International Renewable Energy Association
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
KTOE	Kilotonnes of Oil Equivalent
kW	kilowatt (thousand watts)
kWh	kilowatt hour
kWp	kilowatts peak (peak output of RE system)
MDG	Millennium Development Goals
MW	Megawatt (thousand kW)
NERM	National Energy Roadmap (Vanuatu)

North-REP	North Pacific ACP Renewable Energy &Energy Efficiency Project(EC/SPC)
ODA	Official Development Assistance
PACC	Pacific Adaptation to Climate Change
PDMC	Pacific Developing Member Country (of ADB)
PEAG	Pacific Energy Advisory Group
PEC	Pacific Environment Community Fund (PIFS/Japan)
PEEP2	Promoting Energy Efficiency in the Pacific (ADB, phase 2)
PEOG	Pacific Energy Oversight Group
PFTAC	Pacific Financial Technical Assistance Centre (of the IMF)
PIC	Pacific Island Country
PICT	Pacific Island Country or Territory
PIFS	Pacific Islands Forum Secretariat
PIGGAREP	Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project (SPREP/UNDP GEF
PIREP	Pacific Islands Renewable Energy Project (SPREP/UNDP GEF 2003-2005)
PPA	Pacific Power Association (or Power Purchase Agreement)
PV	Photovoltaic
RE	Renewable Energy
RESCO	Renewable Energy Service Company
SEDREA	Sustainable Economic Development through Renewable Energy Applications (UNDP/GEF; Palau)
SEIAPI	Sustainable Energy Industries Association of the Pacific Islands
SHS	Solar Home System(s)
SIDS	Small Island Developing States
SIDS-DOCK	Small Island Developing States Energy Docking
SMEC	Snowy Mountains Engineering Corporation (Australia)
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
TERM	Tonga Energy Road Map
TOE	Tonnes of Oil Equivalent
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations Office for Disaster Risk Reduction
USAID	United States Agency for International Development
USDOI	United States Department of the Interior
USP	The University of the South Pacific
WB	World Bank

Executive Summary

Background. This paper describes challenges and opportunities for enhancing energy security and more sustainable use of energy in the Pacific islands subregion of ESCAP. The Pacific is small in population but covers a huge geographical area: there are only 10 million people on thousands of islands in the fourteen ESCAP member and seven associate member states, widely scattered across a third of the earth's surface area. Nearly 80% of the households of Pacific Island Countries and Territories (PICTs) have no access to grid-connected electricity but this is misleading as energy and development statistics in the subregion are heavily skewed by Papua New Guinea (PNG) with nearly 70% of the islands' population, 84% of land area and the widest natural resource base. PNG, with much of its population in nearly inaccessible mountainous areas, has an electrification rate of only 12% whereas for most PICTs, 50-100% of households are electrified.

Pacific economies and energy use. In terms of economies, resources and social conditions, the PICTs vary tremendously. Of nine PICs included in UNDP's 2012 Human Development Index, two are ranked as high human development, five as medium and two as low. Per capita GNPs vary widely, averaging about $3000 in 2009. Poverty rates are estimated as 29-53% for most very small north Pacific states and 13-29% for the southern Pacific PICTs. In 2009, seven island economies were ranked by the Asian Development Bank (ADB) as among the ten most vulnerable in the Asia-Pacific region to oil price volatility. This is unsurprising as the subregion is overwhelmingly dependent on imported petroleum fuels for its commercial energy use: 95% overall and 99% if the larger economies of PNG and Fiji are excluded. Although the data are inconsistent, it also appears that the PICTs may be using far more energy per unit of GDP between 2000-2005 than from 1990-1995, diverging from the overall Asia-Pacific trend of decreasing energy intensity.

Energy resources. Only PNG has proven (and developed) oil and gas resources, most hydropower potential and development are in the larger Melanesian countries (PNG, Fiji, Solomon Islands, Vanuatu), perhaps half of the PICTs have geothermal potential (which has only been developed in PNG), and less than that have appreciable biomass energy potential. Nearly all PICTs have some potential for biofuel production based on coconut oil. The wind resource is limited and decreases towards the equator, with small wind farms operating only in Fiji and Vanuatu. Solar potential varies but is good throughout the subregion, with many thousands of small stand-alone solar PV systems and perhaps twenty or so grid-connected PV systems operating or nearing construction. There are huge potential ocean energy resources, particularly Ocean Thermal Energy Conversion but OTEC is extremely high-tech and many years, if not decades, away from commercial development, especially at the small PICT scales. Seawave energy is variable, increasing away from the equator. A seawave system is planned for the Federated States of Micronesia and being considered in Tonga.

Energy policies and plans. Most PICTs have very ambitious goals for replacing a high percentage of diesel-fueled electricity generation with renewable energy: hydropower in the few countries with a resource, and relatively small-scale biofuels in others, with solar as the most practical in most PICTs. Although electricity consumes considerably less petroleum fuel than transport, little has been done to address transport fuel use, and practical options are limited. Efforts to improve the efficiency of energy use have increased but most plans focus on expanding and extending energy supply. Nearly all PICTs have recent national energy policies, but very few have developed implementation plans with clear priorities, budgets, sources of funding, and responsibilities, although a few national energy roadmaps are being developed with the assistance of development and financing agencies.

Development challenges. There are numerous well-known challenges faced by the PICTs including weak economic growth coupled with inequality of growth, small populations, small physical size, limited resources, geographic dispersion and isolation from markets, high susceptibility to increases in food and energy prices and instability in global financial markets, environmental and ecological fragility, and high vulnerability to natural disasters and global climate change with low capacity to manage the resulting risks.

Energy challenges. Challenges to improving energy sustainability and security include: i) the limited range of indigenous energy resources; ii) the high cost of developing energy resources and extending service to remote populations; iii) poor quality of energy data and trends, particularly patterns of end-use; iv) a small base of skilled people to address the issues; v) weak bargaining positions with petroleum suppliers; vi) high past dependence on development agencies for most energy infrastructure finance; and vii) electricity charges which are often below actual cost, leaving inadequate resources for effective maintenance. Many of the institutions, laws, technical standards, and regulatory systems are out-dated. It will be a challenge to develop energy infrastructure which is both affordable and resilient to unknown but possibly severe climate change and other future impacts, such as natural disasters. Although considerable thought has been given by the SPC to suitable indicators of energy security, it is also a challenge to further develop these into quantifiable mechanisms to measure or estimate changes over time of short-term and longer-term energy security for the PICTs individually and the subregion.

Energy opportunities. Despite challenges, there are significant and practical opportunities to increase energy sustainability and security in the Pacific through regional / subregional cooperation. Governments, (sub)regional organisations, NGOs, and development partners are well aware of the high costs of petroleum dependency and in 2010, the Pacific leaders strongly endorsed a twenty-year *Framework for Action on Energy Security in the Pacific* (FAESP) and an associated implementation plan which were developed through wide consultation with governments, power utilities, donors and financial institutions and the private sector. There is a long history of cooperation among the PICTs and leaders have established mechanisms through the Secretariat of the Pacific Community (SPC), other Council of Regional Organisations of the Pacific (CROP) agencies and development partners for cooperation, coordination and dialogue for implementing the framework. There is a new private sector 'Sustainable Energy Industries Association of the Pacific Islands' which is working closely with CROP agencies on sustainable energy standards and training. In 2008, key development agencies active in the subregion established a Pacific Energy Donor / International Financial Institutions Working Group (EDWG), which meets as a group with PIC governments and CROP agencies to coordinate energy sector activities, many of which are financed through the Pacific Region Infrastructure Facility, with some of the same members. In brief, there is strong political commitment to address the Pacific's energy challenges and significant financial support from development partners.

Proposed actions in the Pacific. There is no need for new political commitments from Pacific leaders or additional actions beyond those already endorsed by leaders through the subregion's *Pacific Plan*, communiqués from the annual summit of Pacific leaders and the FAESP. Proposed actions are already explicit or implicit in the above documents. These include support for a range of Pacific regional initiatives and regional standards: i) energy sector training programmes at tertiary and technician level, ii) incentives and regulations to incorporate energy efficiency into utility investments where these are more cost effective than new generation, iii) more effective life-line tariffs and other practical