

Country Energy Security Indicator Profile 2009





SPC Secretariat of the Pacific Community





Papua New Guinea Country Energy Security Indicator Profile 2009

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Foreword



Solomone Fifita Deputy Director (Energy) Economic Development Division, SPC

In August 2010 at the 41st Pacific Islands' Forum at Port Vila. Vanuatu, the Forum Leaders endorsed the Framework for Action on Energy Security in the Pacific (FAESP): 2010-2020 as the regional blueprint for the provision of technical assistance to the energy sectors of Pacific Island countries and territories (PICTs). FAESP encompasses the Leaders' vision for an energy secure Pacific, where Pacific people at all times have access to sufficient sustainable sources of clean and affordable energy and services to enhance their social and economic well-being.

The Implementation Plan for Energy Security in the Pacific (IPESP) (2011–2015) is a five-year plan for pursuing the vision, goal and outcomes of FAESP. It reflects the priority regional activities that are to be collectively delivered by the participating members of the Council of Regional Organisations in the Pacific (CROP) to support, complement and add value to national efforts on energy security.

In order to better appreciate the impacts of FAESP and its implementation plan on the energy security status of PICTs, baseline energy security indicators must be established, against which performance in future years can be benchmarked.

The energy security indicators in this report derive from a consultative process involving representatives of PICTs, regional organisations, the private sector and development partners. The process culminated in the adoption of IPESP and its monitoring and evaluation framework, the energy security indicators, at the Inaugural Regional Meeting of Ministers of Energy, ICT and Transport in April 2011.

As a first attempt to improve the transparency and accountability in the energy sector, there is obvious room for improvement. Lack of access to reliable and sufficient data is a common problem and this monitoring and evaluation tool can only get better with the kind assistance of the custodians of the energy sector data.

Solomone Fifita Deputy Director (Energy) Economic Development Division, SPC

Abbreviations

ADB	Asian Development Bank
ADO	automotive diesel oil
APEC	Asia-Pacific Economic Cooperation
Ave.	average
CO2	carbon dioxide
CSIRO	Commonwealth Industrial and Scientific Research Organisation
DPK	dual purpose kerosene
DPE	Department of Petroleum and Energy
DHS	demographic and health survey
е.	estimate
EEZ	exclusive economic zone
FAESP	Framework for Action on Energy Security in the Pacific
FICs	(The 14) Forum Island countries (SIS and non-SIS)
GDP	gross domestic product
GHG	greenhouse gases

GJ	gigajoules
GoPNG	Government of PNG
HIES	household income and expenditure survey
HFO	heavy fuel oil
ICCC	Independent Consumer and Competition Commission
IPBC	Independent Public Business Corporation
IPP	independent power producer
JICA	Japan International Cooperation Agency
kWh	kilowatt hour
kWp	kilowatt peak
km	kilometre
LPG	liquefied petroleum gas
МЈ	megajoules
n.a	(data) not available
N/A	(indicator) not applicable

PNGSEL	PNG Sustainable Energy Limited
PICTs	Pacific Island countries and territories
РРА	Pacific Power Association
ppm	parts per million
PPL	PNG Power Limited
PRISM	Pacific Regional Information System (Statistics for Development, Secretariat of the Pacific Community)
PV	photovoltaic
RE	renewable energy
SHS	solar home systems
SIS	(Forum) smaller island states — Cook Islands, Kiribati, Nauru, Niue, Palau, Republic of Marshall Islands and Tuvalu. Non-SIS members are Fiji, Papua New Guinea, Samoa, Solomon islands, Tonga and Vanuatu.
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change



PNG Electricity Industry Policy 2011

'The strategic objectives of the government are: (i) improving access in the provision of electricity services; (ii) improving reliability of electricity supply; and (iii) ensuring that power is affordable for all consumers.'

Country	Papua New Guinea (PNG)
Capital	Port Moresby
Capital island	East New Guinea
Population	6,339,000 (2009 estimate)
Land area	462,243 km ²
Max height above sea-level	4,697 m (Mt Wilhelm)
Geography	Papua New Guinea, with over 600 islands, is the largest of the Pacific Island countries. Land mass is largely high volcanic islands. The land area covers the eastern half of the New Guinea mainland, the Bismark Archipelago, the northernmost Solomon Islands of Bougainville and Buka and the groups of islands off the easternmost part of the mainland. PNG has an extensive system of water bodies ranging from deltas, lagoons, rivers, marshes and over 5,000 lakes.
Location	6.00° S; 147. 00 ° E
EEZ	3,120,000 km ²



Papua New Guinea is the only country that produces crude oil and undertakes oil refining among the Pacific Island countries and territories. In 2009, around 1.7 million tonnes of crude oil were extracted by Oil Search and InterOil in PNG. Crude oil products extracted by Oil Search are mainly exported.

In 2009, around 95% of total crude oil products extracted were exported. Since 2004, InterOil has been the only company to undertake refining, converting crude oil into petroleum products. Most of the crude oil refined by InterOil is imported into the country from Singapore and Indonesia. In 2009, InterOil produced 786.6 million litres of petroleum fuel products, meeting around 70% (549.2 million litres) of the domestic market demand. The remaining 30% is reflected to fuel products imported by other petroleum companies in PNG such as Exxon Mobil. Recorded imports in 2009 (according to PNG National Statistical Office statistics) accounted for 204.4 million litres of diesel, 28.8 million litres of petrol, 4.3 million litres of kerosene and 685.6 kilotonnes of liquefied petroleum gas (LPG). LPG is mainly imported from Australia by Origin Gas. Fuel imports for 2009 stood in the vicinity of USD 444.17 million with the current gross domestic product (GDP) of USD 7.91 billion. In 2009, InterOil exported around 3.6 million litres of diesel and 0.55 million litres petrol to Nauru. Other petroleum fuel products such as heavy fuel oil, and natural gas are also consumed in PNG.

In the power sector, around 12% of households in PNG are connected to the electricity grid network. PNG Power Limited (PPL) is the main distributor of electricity and is granted exclusive retail licence for the generation and distribution of electricity in and around the Port Moresby area and 19 provincial centres. In 2009, PPL generated 895.7 GWh of electricity, of which 886.7 GWH was supplied to the electricity grid and 711.2 GWh was sold to the customers. This recorded an estimated 19.8% in distribution loss. Of the electricity generated in 2009 by PPL, around 589.4 GWh of electricity was contributed from renewable energy (RE) sources, mainly hydro.

In addition to PPL, there are other companies and organisations that generate and supply electricity in PNG. These include Western Power Ltd, a subsidiary of PNG's Sustainable Development Programme, which mostly supplies power to Western Province. Other mining companies, and palm oil, sugar and timber companies produce their own power in areas not accessed by PPL.

The 2009 baseline energy security indicators presented in this report are compiled and structured according to the four key energy security outcomes and the seven action themes of FAESP. Graphical comparison included in the analysis provides a snapshot of PNG's situation compared to other Forum non-SIS and Forum Island countries.

FAESP key energy security outcome 1 — access to energy

No.	FAESP indicators		Explanatory notes
1	Electrification rate (%)	12	<i>The indicator tracks the share of households actually connected to a utility grid.</i> Based on the Demographic and Health Survey (DHS) report, around 12.4% of households in PNG are estimated to be connected to the utility grid. Grid electrification access of households in urban areas stands at 61.3% and in rural areas it is 6.5%. Over 95% of the households in PNG are reported to be living in rural and remote areas.
2	Access to small scale power rural (%)	n.a	The indicator tracks the share of rural households with access to basic electrification (solar, pico hydro, small wind, community grid). No data available.
3	Access to modern energy rural (%)	29.4	The indicator tracks the share of rural households with access to modern cooking and lighting, which specifically covers all forms of energy other than traditional biomass. Estimated access to modern energy is based on household access to radios, given that radios need some basic form of modern energy (batteries and electricity) to operate. According to the DHS report, an estimated 29.4% of households have access to radios. This roughly points to the percentage of households with access to modern energy in the rural areas.
4	Access to modern energy urban (%)	63.9	The indicator tracks the share of urban households with access to modern cooking and lighting, which specifically covers all forms of energy other than traditional biomass. According to the DHS report, an estimated 63.9% of households have access to radios in PNG's urban areas. This roughly points to the percentage of household with access to modern energy in the urban areas of PNG.









FAESP key energy security outcome 2 — affordability

No.	FAESP indicators		Explanatory notes					
5	Macro-economic affordability (percentage)	5.6	The indicator tracks the fuel imports as a perce economy is to world market price volatility. The macro-economic affordability was calcul Statistics website for the total fuel imported o for PNG in 2009 (USD 447,171,622.34 / USD	ated fro ver GD	m reference data pro P, based on referenced	vided by th	e PNG Bu	ireau of
6	Electricity tariff	0.21	The indicator tracks the average tariffs for				\$0.21	
	(USD/kWh)		the year (all tariff categories, i.e. residential, commercial and industrial). Requires		Commercial block (general customers)	USD/kWh	\$0.28	
			averaging during the year as tariffs in most		Industrial block	USD/kWh	\$0.18	
			<i>PICs are adjusted several times a year.</i> Refer to the table on the right for reference calculation of the average tariff.		Residential block — Easy Pay	USD/kWh	\$0.20	
					Residential block — credit customers average	USD/kWh	\$0.19	
					1–30 kWh	USD/kWh	\$0.14	
					>30 kWh	USD/kWh	\$0.24	
7	El a statistas	((7	Deletion between even torif on differen		Lifeline	%	66.7%	
7	Electricity lifeline (%)66.7Relation between average tariff and lifeline tariff if a lifeline tariff exists. Refer to the table on the right for the reference calculation of the lifeline precentage.		Refer	enced electricity tariff ca Limite		ed on PNG	Power	
8	Household energy expenditure load (%)	n.a	<i>The indicator tracks the average household exhousehold income.</i> No data available.	xpenditı	ure for energy per yea	er as a perc	entage of	average







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FAESP key energy security outcome 3 — efficiency and productivity

No.	No. FAESP Explanatory notes indicators			
9	Energy intensity (MJ/USD)	6.2	<i>The indicator tracks the amount of energy utilised to produce 1 USD of GDP.</i> Calculated (49,000,000,000 MJ / \$7,914,594,203) Source: Asia-Pacific Economic Cooperation (APEC) 2009 report and PNG Bureau of Statistics.	
10	Productive power use (%)	80.7	<i>The indicator tracks the share of commercial and industrial use of electricity in total supply.</i> The calculation is based on PPL customers only.	





Provided below are energy intensity graphs that are presented in terms of electricity (kWh) and fuel (GJ) consumption against GDP when seen on a per capita comparison. Countries identified above the trend line are perceived to have higher than average energy consumption levels per person when compared to their corresponding economic wealth (GDP per capita). That is, countries above the trend line are considered to be relatively energy inefficient compared to countries below the trend line.



FAESP key energy security outcome 4 — environmental quality

No.	FAESP indicators		Explanatory notes
11	Carbon footprint (tonnes of CO_2)	3,994,933	<i>The indicator tracks total GHG emissions using embedded carbon as a measure (not UNFCCC method).</i> The following estimate is based on petroleum fuel consumption from diesel (IDO &ADO), motor gasoline, kerosene and cooking gas (LPG) only.
12	Diesel fuel quality (ppm S)	500	The indicator assesses the standard for sulphur (S) content of diesel fuel in parts per million (ppm) sulphur.



FAESP action theme 1 — Leadership, governance, coordination and partnership

No.	FAESP indicators		Explanatory notes
13	Status of energy administration (score)	2	The indicator assesses the status the energy administration has in the country. (Score system: Energy ministry = 3; Energy department = 2; Energy office = 1) The Department of Petroleum and Energy (DPE) was established to promote and regulate the development of petroleum and other sources of energy for the long-term benefit of the state. The department comprises of two core technical divisions. The Energy Division, which is involved in planning and policy development work, data collection and analysis. It also advises government on energy sector issues that are closely associated with the power sector and include rural electrification projects. The Petroleum Division is more concerned with crude oil and natural gas exploration and development, with the industry controlled by foreign companies; InterOil and Oil Search being two of the largest. In the power sector, PPL is a corporatised, state-owned enterprise, which has been granted exclusive retail licence for the generation and distribution of electricity in and around Port Moresby area and 19 provincial centres. The Independent Consumer and Competition Commission (ICCC) is responsible for regulating electricity, petroleum and their pricing. The Western Power Limited, mostly supplies power to Western Province. In the petroleum sector, Oil Search, in partnership with other companies, is involved in crude oil extraction and exports from PNG. InterOil, on the other hand, undertakes refining of crude oil extract into petroleum products which are then sold in PNG. Refined oil produced by InterOil meets roughly 70% of the domestic market demand. The remaining 30% is met by Exxon Mobil, which also imports fuel products into PNG.
14	Energy legislation (score)	1	 The indicator assesses the status of the energy sector legislation in the country. (Score system: Updated energy act = 3; Adopted energy policy = 2; Subsector act or policy = 1) There is no energy act for PNG. As of 2009, the Energy Division had drafted two policy documents – a draft Energy Policy and a draft Rural Electrification Policy. There are sub-sector acts governing the energy sector, which include the following: the Electricity Industry Act of 2002, which provides for the functions and powers of the Electricity Commission (now PNG Power Ltd) to 'plan and coordinate the supply of electricity throughout the country and determine the standards and inspect and control the application of all matters relating to the operations of the supply of electricity? the Independent Consumer and Competition Act of 2002, together with the Electricity Industry Act of 2009, empowers ICCC with the responsibility for regulating electricity, petroleum and their pricing. the Organic Law on Provincial and Local Level Government (1995). The Organic Law grants authority to the 19 provincial governments and 299 local (district/sub-district) governments to pass laws and develop regulations for electricity generation and distribution in their areas of jurisdiction.
15	Co-ordination and consultation (score)	1	The indicator aims to measure how decisions and directions given at regional or subregional events translate into practical action at national level. (Score system: Meetings lead to relevant national action = 1; No action = 0) PNG actively participates in regional activities and PPL is a utility member of the Pacific Power Association.

FAESP action theme 2 — Capacity development, planning, policy and regulatory frameworks

No.	FAESP indicators		Explanatory notes
16	Energy planning status (score)	1	The indicator assesses the state/quality of energy planning. It distinguishes between integrated planning and sub-sector (i.e. power, petroleum) planning. (Score system: Whole of energy sector plan/roadmap operational with M&E framework = 3; Sub-sector plan operational with M&E framework = 2; Energy sector plans in preparation = 1) In 2009, there was no endorsed national energy policy and action plan for PNG. However, PNG has a power sector development plan in place.
17	Energy sector regulation (score)	1	The indicator assesses the energy sector regulation. It measures the progress towards a regulator independent of government or regulated entities. (Score system: Independent whole of energy sector regulator established = 3; Whole of energy sector regulator established = 2; Sub-sector regulator established = 1) Sub-sector regulation existed in 2009, including ICCC for economic regulation covering fuel and electricity pricing. Electricity standard and compliance regulation is currently with PPL but will be transferred and taken on board by DPE as stated in the EIP by 2014. LPG prices are not fully regulated.
18	Enabling framework for private sector participation (score)	1	The indicator assesses the progress towards an enabling framework for private sector participation in selling electricity to the grid. (Score system: Standard power purchase and petroleum supply agreements operational = 3: Standard agreements for subsector operational = 2; Standard agreements in preparation = 1) No specific legislation was in place to support independent power producers' (IPP) participation in the grid in 2009. PPL has full authority over the inclusion of IPPs to supply into their grids. As of 2009, Hanjung Power Ltd was the only IPP that was selling electricity to PNG Power Limited.
19	Private sector contribution (%)	16.74	The indicator tracks the share of electricity produced by independent power producers under a power purchase agreement. The following arrangement accounts for IPPs selling to PPL only.

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FAESP action theme 3 — Energy production and supply

3.1 Petroleum and alternative fuels

No. FAESP Explanator indicators			Explanatory notes
20	Fuel supply security (days)	n.a	The indicator measures the number of days a country can keep operating in case of a petroleum product supply interruption. Calculation used if actual data are not available (size of total petroleum storage (m ³)/average petroleum product consumption per day). No data available.
21	Fuel supply diversity (%)	n.a	<i>The indicator measures the share of locally produced fuel (biofuel or fossil fuel) as a percentage of total supply.</i> No data available. However, vehicles and ships being trialed to run on coconut oil are mentioned in selected reports. Emirau Marine Products Ltd in New Ireland has been using coconut oil in one of its fishing vessels since 2007. Buka Metal Fabricator has also been using coconut oil in its vehicles. PNGSEL in 2009 was reported to be involved in the Pomio Biodiesel Project.
22	Fuel supply chain arrangements (score)	0	The indicator assesses the control of countries over the fuel supply chain. (Score system: Joint procurement scheme operational = 2; Participation in preparation of joint procurement arrangements = 1) No joint fuel procurement arrangement is applicable for PNG. Oil Search mines and exports crude oil from PNG. InterOil has a refinery in Port Moresby, where they refine crude oil to petroleum products and supply around 70% of the market in PNG. Exxon Mobil imports its fuel products from Singapore.

3.2 Renewable energy

No.	FAESP indicators	Explanatory notes		
23	Renewable energy share (%)	9.01	<i>The indicator measures the share of renewable energy as a percentage of total supply for a given year.</i> Referenced calculation takes into account only the RE supplied by hydro and geothermal. Data sourced from APEC.	
24	Renewable resource knowledge (score)	1	The indicator assesses the quality of knowledge of national renewable energy potential. (Score system: Comprehensive assessment of all RE resources including cost for each source = 3; Comprehensive physical assessment of all RE resources = 2; Resource assessments fragmentary, under way = 1) Resource data of renewable energy sources are fragmentary in PNG. Detailed hydro assessments were undertaken by Japan International Cooperation Agency in the early 1980s. Significant wind monitoring activities were undertaken by the Commonwealth Industrial and Scientific Research Organisation (CSIRO) in the late 1970s. Reconnaissance studies of the country's geothermal potential suggest that the most promising area for investigation is the northern coast of New Britain Islands.	
25	Least-cost RE development plan (score)	0	The indicator assesses if data and information on RE have been translated into a least-cost development plan that gives priority to the most economical RE resource or application. (Score system: Least-cost development plan operational = 2; Least-cost development plan in preparation = 1) No specific least-cost development plan was in place for PNG in 2009.	

FAESP action theme 4 — Energy conversion

4.1 Electric power

No.	FAESP indicators		Explanatory notes	
26	Generation efficiency (kWh/l)	3.69	<i>The indicator measures the annual average fuel conversion efficiency for diesel generation in power utilities.</i> Analysis is based on PPL data only.	
27	Distribution losses (%)	19.8	The indicator compares the amount of kWh sold with the amount of kWh sent out from the power station. Source: PPL	
28	Lost supply (SAIDI) – (hours)	n.a	The indicator tracks electricity outage time (hours of lost supply per customer per year).	
29	Clean electricity contribution (%)	65.81	<i>The indicator measures the share of renewable energies as a percentage of total electricity supply.</i> The analysis takes into account the power production and supply from PPL only. A significant percentage of power is produced in the mining areas, the palm oil factories, Ramu Sugar Limited, which is not taken into account in this analysis.	

FAESP action theme 5 — End-use energy consumption

5.1 Transport energy use | 5.2 Energy efficiency and conservation

No.	FAESP indicators				Explanatory notes
30	Retail fuel prices			The indicator tracks retail and wholesale fuel prices for petroleum products (diesel, petrol, MPK, LPG).	
			Retail price	Wholesale pri	ce
		ADO (USD/l)	0.91	n.a	Sourced from ICCC
		ULP (USD/l)	1.1	n.a	Sourced from ICCC
		DPK (USD/l)	0.87	n.a	Sourced from ICCC
		LPG (USD/kg)	n.a	n.a	Sourced from ICCC
31	Legislative framework (score)		0	for import of covering trans sub-sector ope No specific le	assesses progress towards a comprehensive legislative framework end-use devices. (Score system: Comprehensive framework port, appliances, buildings = 3; Legislative framework for one rational = 2; Preparation of frameworks under way = 1) gislative framework that regulates the importation of energy use devices was in place in 2009.
32	Appliance labelling	g (score)	0	<i>appliance labe</i> No compulso:	assesses the state of appliance labelling. (Score system: Compulsory lling operational = 2; Appliance labelling in preparation = 1) ry appliance labelling programme adopted for PNG in 2009. are of product imports to PNG come from Australia.

FAESP action theme 6 — Energy data and information

No.	FAESP indicators		Explanatory notes	
33	Availability of national energy balance (score)	1	The indicator assesses the availability of national key energy data to SPC data management unit and other regional stakeholders. (Score system: Comprehensive data sets covering energy input conversion and end-use available 6 months after end of reporting year = 3; Partial data set available within 6 months = 2; Partial data set available within 12 months = 1) Selected national energy balance has been developed by APEC and the Asian Development Bank. Energy datasets available are fragmented with irregular data reporting.	

FAESP action theme 7 — Financing, monitoring & evaluation

No.	FAESP indicators	Explanatory notes		
34	Energy portfolio (USD)	200,000,000	The indicator tracks the flow of funding into the country's energy sector. Grant aid commitments + loan commitments Indicative estimate from the Department of Petroleum and Energy.	
35	Availability of financing information (score)	1	The indicator assesses availability of national energy financing information to SPC and other regional stakeholders. (Score system: Comprehensive set of information covering petroleum, utility and government financing = 3; Partial information set available within 6 months = 2; Partial information set available within 12 months = 1) Financial data records of funded projects are available at the Energy Division where indicative estimates of the latest spending could be provided over 6 months. Detailed financial accounts from the Ministry of Finance will take longer.	
36	Monitoring framework (score)	0	The indicator assesses if there is a national energy sector M&E framework in place. (Scoresystem: M&E framework in place = 1, No M&E framework = 0)No specific monitoring and evaluation framework in place. Selected monitoring andevaluation activities are available on funded projects only.	

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