Tuvalu

Country Energy Security Indicator Profile 2009

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Tuvalu Country Energy Security Indicator Profile 2009

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The *Framework for Action on Energy Security in the Pacific* (FAESP) country energy security indicator report 2009 was prepared by the Energy Programme of the Economic Development Division of the Secretariat of the Pacific Community (SPC).

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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 for 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. 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
BP	British Petroleum
Ave.	average
CO_2	carbon dioxide
DPK	dual purpose kerosene
e.	estimate
ECC	Energy Coordinating Committee
EEZ	exclusive economic zone
FAESP	Framework for Action on Energy Security in the Pacific
14 FICs	(The 14) Forum Island countries (SIS and non-SIS)
GDP	gross domestic product
GHG	greenhouse gases
GJ	gigajoules
HIES	household income and expenditure survey
HFO	heavy fuel oil
IPP	independent power producer
IUCN	International Union for Conservation of Nature
kWh	kilowatt hour
kWp	kilowatt peak
km	kilometre
LPG	liquefied petroleum gas
MJ	megajoules
n.a	(data) not available
N/A	(indicator) not applicable
PE	Pacific Energy
PICTs	Pacific Island countries and territories
PPA	Pacific Power Association
ppm	parts per million
PRISM	Pacific Regional Information System (Statistics for Development, Secretariat of the Pacific Community)
RE	renewable energy
SHS	solar home systems
SIS	(Forum) smaller island states — Cook Islands, Kiribati, Nauru, Niue, Palau, RMI and Tuvalu. Non-SIS members are Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu.
TEC	Tuvalu Electricity Corporation
TNEP	Tuvalu National Energy Policy
ULP	unleaded petrol (another name for motor gasoline)
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

Country profile

Tuvalu Energy Policy Framework Vision 2007

'By the year 2020 guided by the principles in the "Te Kakeega II" and the "Malefatunga Declaration", Tuvalu shall attain a prosperous living standard that is fostered through an energy policy that promotes the provision of socially, financially, economically, technically, politically and environmentally sustainable energy systems within the framework of the Tuvalu Initial National Communication under the United Nations Framework on Climate Change (Oct 1999).'

Country	Tuvalu
Capital	Fongafale (main administrative area)
Capital island	Funafuti
Population	11,093 (2009 PRISM projection, male 50%); 15,324 (2006 census)
Land area	26 km^2
Max height above sea-level	<3 m
Geography	Tuvalu consists of five atolls and four coral islands; the nine islands are Vaitupu, Funafuti, Nanumea, Nanumaga, Niutao, Nui, Nukufetau, Nukulaelae and Niulakita. The largest island, Vaitupu, has a land area of about 5.6 km^2 while the smallest, Niulakita, has about 0.42 km^2.
Location	Between latitude 11°– 5°S and longitude 176°–179° E
EEZ	1,300,000 km^2

Climate	Tropical; marine, hot and humid, moderated by trade winds. The climate is tropical to equatorial. Tuvalu is out of the main South Pacific storm belt and tropical cyclones are infrequent but do sometimes hit the southern atolls, inflicting considerable damage due to winds and storm surges. Heavy rains, storm surges and high seas are not unusual as side effects of storms passing to the south in the November to March cyclone season.
Rainfall	Varies considerably with an average of 3,000 mm per annum with April–November lower than the rest of the year.
Mean temperature	30°C
Economy	Tuvalu is a mixed market-subsistence economy and is reliant on remittance and aid; exports include copra, handicrafts, philatelic stamps, agricultural produce and fish.
GDP per capita	USD 2,443
Currency	Australian dollar — AUD
Exchange rate	AUD/USD — $0.7930
Languages	Tuvaluan and English
Government	Independent state and associate member of Commonwealth
Country representative to SPC	Permanent Secretary for Foreign Affairs, Trade, Tourism, Environment and Labour Private Mail Bag,Vaoali, Funafuti, Tuvalu Tel: (688) 20104 / 20117 Fax: (688) 20843 Email: tfalefou@gov.tv or dfa@gov.tv

Energy context

In 2009, Tuvalu's energy consumption scenario totalled 168 TJ with petroleum fuels accounting for 99.97% and renewable energy (RE) contribution from solar accounting for 0.03% (contribution from biomass is excluded in this analysis).

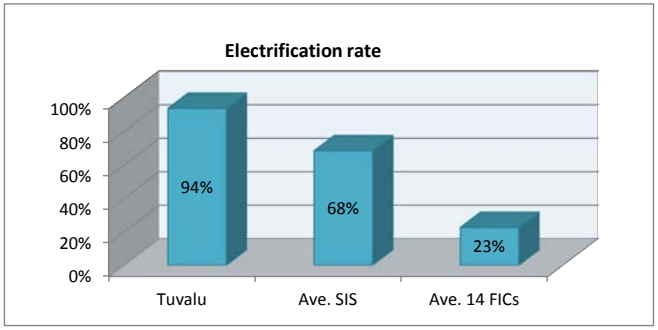
Petroleum fuel is currently supplied to Tuvalu by Pacific Energy, which imports through Fiji. Liquefied petroleum gas (LPG) products are mostly imported in iso-tainers from Australia. In 2009, around 3.3 million litres of diesel, 0.8 million litres of petrol, and 0.3 million litres of kerosene were imported into the country. Fuel import for 2009 stood in the vicinity of USD 5.6 million. This accounts for 20.7% of the total gross domestic product (GDP) (USD 27.1 million). Of the total petroleum fuel imported in 2009, around 35% is for electricity generation, and the transport sector (land, marine and air) is estimated to consume around 60%.

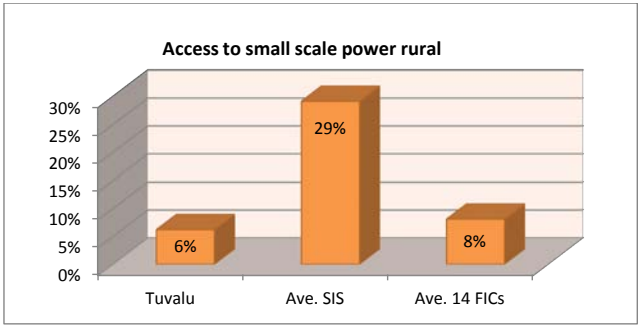
In the power sector, around 94% of households in Tuvalu are connected to the electricity grid network provided by the Tuvalu Electricity Corporation (TEC). In 2009, TEC generated 5.51 GWh of electricity, of which 4.59 GWh was sold, and recorded an estimated 16.66% in distribution loss. Of the electricity generated, around 0.09 GWh was generated from grid connected solar photovoltaic (PV) — 40 kW in Funafuti and 46 kW in Vaitupu.

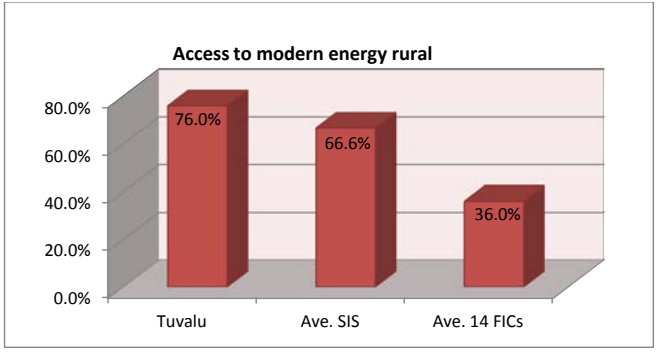
The 2009 baseline energy security indicators presented in this report are compiled and structured according to the four key outcomes to energy security and the seven action themes of FAESP. Graphical comparison included in the analysis provides a snapshot of Tuvalu's situation compared to other Forum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

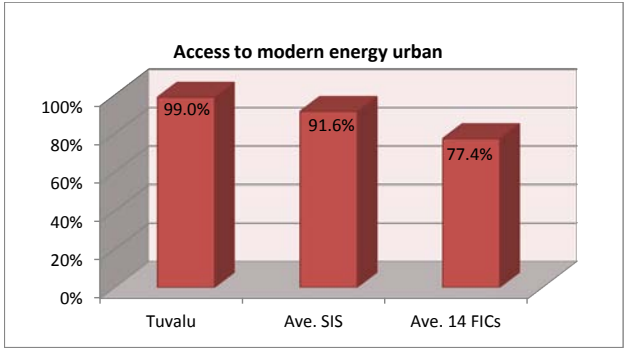
FAESP key energy security outcome 1 — access to energy

No.	FAESP indicators		Explanatory notes
1	Electrification rate (%)	94	*The indicator tracks the share of households actually connected to a utility grid.* Based on the household income and expenditure survey (HIES) 2004/2005, total share of households that are connected to the utility grid in Tuvalu is estimated at 93.7%. This is rounded up to 94%. Share of households in Funafuti that are connected to the grid stands at 95.5% whereas for the rest of Tuvalu the share is 92.4%.
2	Access to small scale power rural (%)	6	*The indicator tracks the share of rural households with access to basic electrification (solar, pico hydro, small wind, community grid).* Based on 2004/2005 HIES, an estimated 4.88% of households in Tuvalu have access to small scale power. In the rural areas, overall access stands at 6.2%.
3	Access to modern energy rural (%)	76	*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.* Based on 2004/2005 HIES, access to modern forms of cooking in rural areas stands at 54%. Estimated access to modern forms of lighting in rural areas stands at 99%. When averaged, estimated share of rural household that has access to modern forms of energy is 76.42%.
4	Access to modern energy urban (%)	99	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. Based on 2004/2005 HIES, access to modern forms of cooking in the urban area (Funafuti) stands at 97.1%. Estimated access to modern forms of lighting in urban areas stands at 100%. When averaged, the estimated share of rural household that has access to modern forms of energy is 98.6%.


Electrification rate
100%
80%
60%
40%
20%
0%
94%
68%
23%
Tuvalu
Ave. SIS
Ave. 14 FICs


Access to small scale power rural
30%
25%
20%
15%
10%
5%
0%
6%
29%
8%
Tuvalu
Ave. SIS
Ave. 14 FICs


Access to modern energy rural
80.0%
60.0%
40.0%
20.0%
0.0%
76.0%
66.6%
36.0%
Tuvalu
Ave. SIS
Ave. 14 FICs

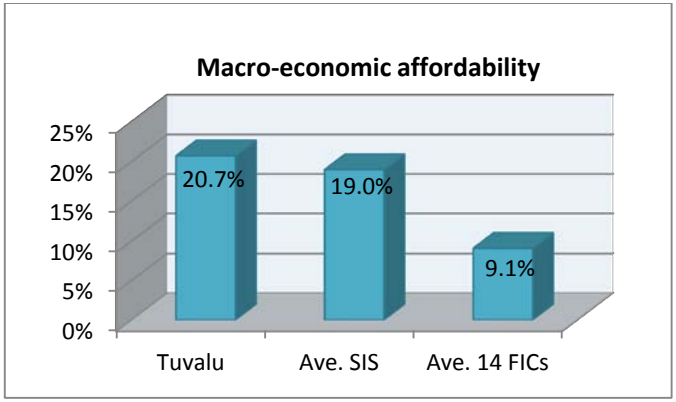

Access to modern energy urban
100%
80%
60%
40%
20%
0%
99.0%
91.6%
77.4%
Tuvalu
Ave. SIS
Ave. 14 FICs

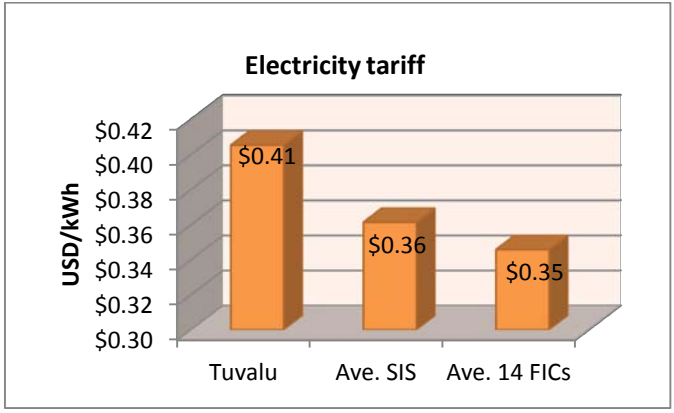
FAESP key energy security outcome 2 — affordability

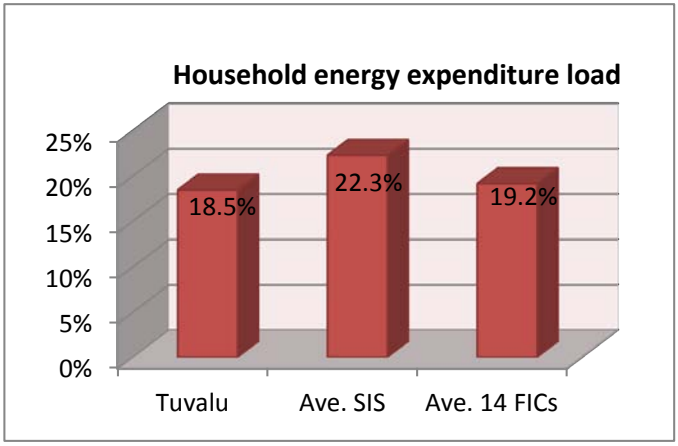
No.	FAESP indicators		Explanatory notes
5	Macro-economic affordability (percentage)	20.7	*The indicator tracks fuel imports as a percentage of GDP. The higher the figure, the more vulnerable an economy is towards world market price volatility.* The macro-economic affordability was calculated by fuel imports over total GDP (USD 5,611,473/USD 27,100,000). Fuel import figures was estimated based on average 2009 wholesale fuel prices and total volume of petroleum fuel imported. 2009 GDP figures are referenced from the International Monetary Fund website.
6	Electricity tariff (USD/kWh)	0.4	*The indicator tracks average tariffs for the year (all tariff categories, i.e. residential, commercial and industrial). Requires averaging during the year as tariffs in most PICTs are adjusted several times a year.* Refer to the table on the right for reference calculation of the average tariff.
7	Electricity lifeline (%)	66.5	*Relation between average tariff and lifeline tariff if a lifeline tariff exists.* Refer to the table on the right for reference calculation of the lifeline tariff.
8	Household energy expenditure load (%)	18.5	*The indicator tracks average household expenditure for energy per year as a percentage of average household income.* The estimate attained is based on the 2008 HIES. Reporting gives a breakdown of expenditure accounted from the total annual costs to household operation and transport expenditure.

		Fongafale	Outstations	Average
Average electricity tariff		0.41	0.40	0.41
Commercial block	USD/kWh	0.44	0.44	0.44
Industrial block	USD/kWh	0.44	0.44	0.44
Residential block (ave.)	USD/kWh	0.33	0.33	0.33
1-50 kWh	USD/kWh	0.24	0.23	0.23
50-100 kWh	USD/kWh	0.31	0.30	0.31
>100	USD/kWh	0.44	0.44	0.44
Lifeline	%	67.4%	65.7%	66.5%

Referenced electricity tariff calculation based on TEC data

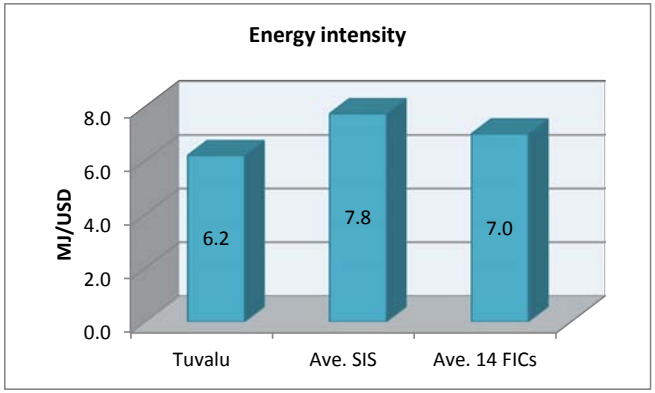

Macro-economic affordability
25%
20%
15%
10%
5%
0%
20.7%
19.0%
9.1%
Tuvalu
Ave. SIS
Ave. 14 FICs

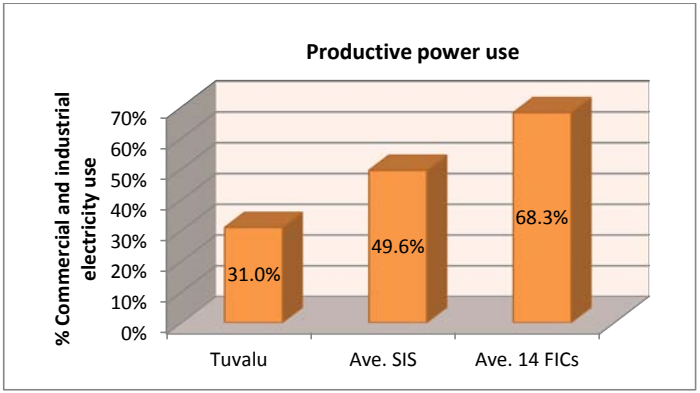

Electricity tariff
USD/kWh
$0.42
$0.40
$0.38
$0.36
$0.34
$0.32
$0.30
$0.41
$0.36
$0.35
Tuvalu
Ave. SIS
Ave. 14 FICs


Household energy expenditure load
25%
20%
15%
10%
5%
0%
18.5%
22.3%
19.2%
Tuvalu
Ave. SIS
Ave. 14 FICs

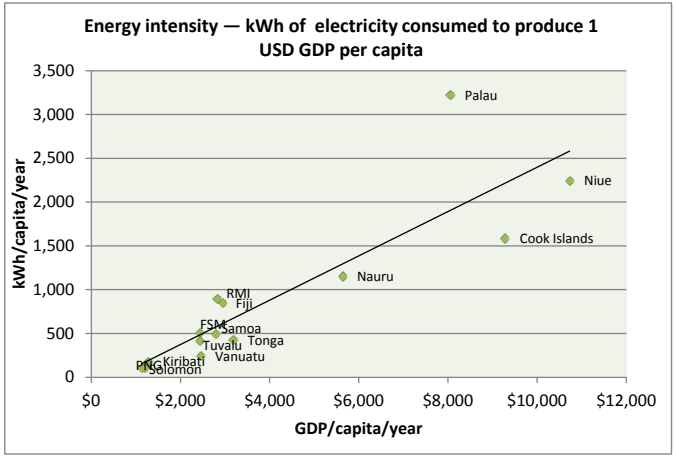
FAESP key energy security outcome 3 — efficiency and productivity

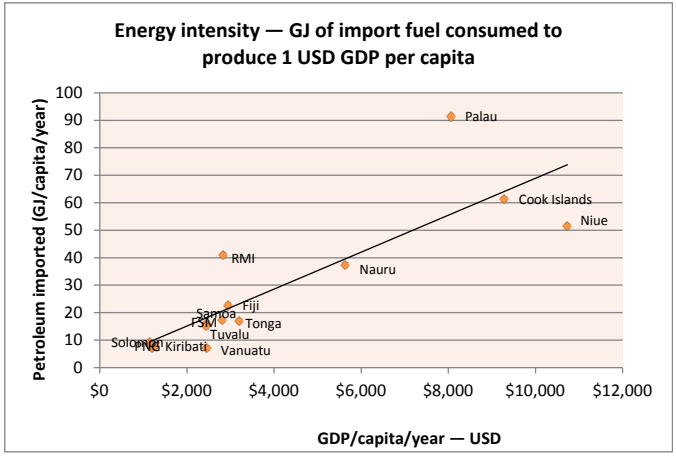
No.	FAESP indicators		Explanatory notes
9	Energy intensity (MJ/USD)	6.2	*The indicator tracks the amount of energy utilised to produce 1 USD of GDP.*
10	Productive power use (%)	31	*The indicator tracks the share of commercial and industrial use of electricity in total supply.* TEC Station Logistics 2009.





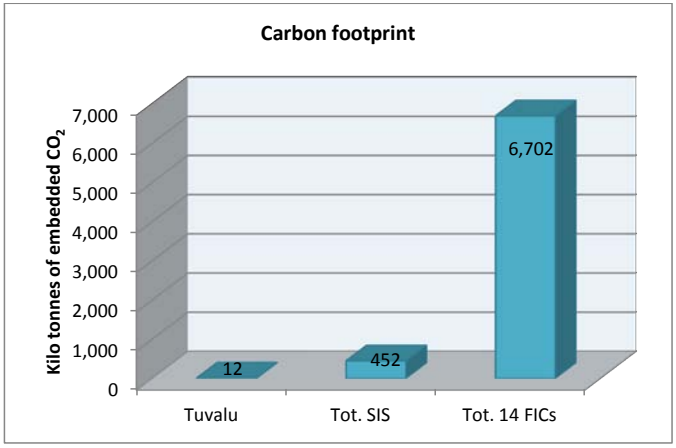
Provided below are energy intensity graphs that are presented in terms of electricity (kWh) and fuel (GJ) consumption against GDP when seen on a per capita comparison. Countries identified above the trend line are perceived to be having higher than average energy consumption levels per person when compared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

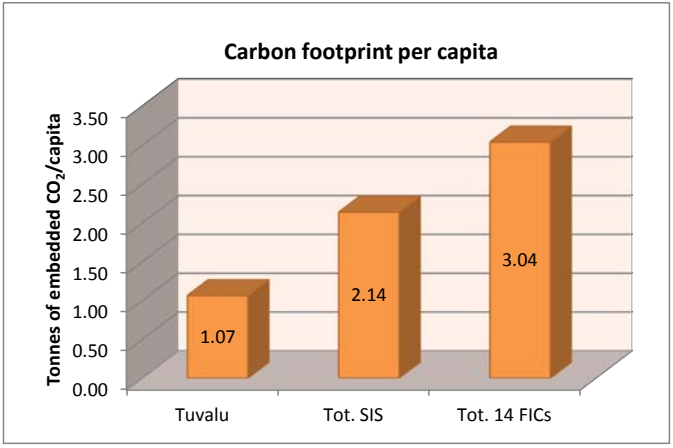




FAESP key energy security outcome 4 — environmental quality

No.	FAESP indicators		Explanatory notes
11	Carbon footprint (tonnes of CO_2)	11,833	*The indicator tracks total GHG emissions using embedded carbon as a measure (not UNFCCC method).* Calculated only from petroleum imported into the country. This specifically refers to diesel (IDO and ADO), motor gasoline (mogas or petrol), kerosene (DPK) and cooking gas (LPG).
12	Diesel fuel quality (ppm S)	5,000	*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)	1	*The indicator assesses the status the energy administration has in the country. (Score system: Energy ministry = 3; Energy department = 2; Energy office = 1)* The Tuvalu energy office is established within the Ministry of Works and Energy and is government's focal point for energy policy and planning development. The energy office also administers renewable energy projects more specifically, overseeing the installation, operation and maintenance of PV systems that fall under the government's jurisdiction. TEC manages all grid-based electrification on all islands. Petroleum is handled by British Petroleum (BP). Pacific Energy took over from BP in 2010.
14	Energy legislation (score)	2	*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 Tuvalu. However, a comprehensive National Energy Policy Framework has been established by the Ministry of Works and Energy (approved by Cabinet in 2006 for 15 years). Strategies aim to ensure 'adequate, secure and cost-effective supply', 'efficient utilisation of energy' and 'minimisation of negative impacts of energy production, conversion, utilisation and consumption upon the environment.' Rudimentary energy administration is handled by one professional. TEC is an incorporated entity under the Tuvalu Electricity Corporation Act. Under the Act,TEC has 'sole and exclusive right to supply electricity for sale within any supply area'. Where TEC is unable to provide a reasonable supply of electricity (Section 6.2 of the Act) arrangements may be made for a licence to be issued to a third party for supply of required electricity. Fuel prices are not fully regulated.
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)* Tuvalu actively participates in regional activities and TEC is a utility member of the Pacific Power Association. In Tuvalu, there is clear sense of collaboration among key energy stakeholders.

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 subsector (i.e. power, petroleum) planning. (Score system: Whole of energy sector plan/roadmap operational with M&E framework = 3; Subsector plan operational with M&E framework = 2; Energy sector plans in preparation = 1)* Energy policy of 2006 has an associated strategic action plan but no government funding for implementation. There is also no long-term power sector development plan. In 2011, Tuvalu began preparation of their ten-year renewable energy and energy efficiency master plan, which is targeted to be endorsed in 2012.
17	Energy sector regulation (score)	1	*The indicator assesses energy sector regulation. It measures 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; Subsector regulator established = 1)* Electricity tariff regulation is undertaken by Cabinet, which approves (or rejects) tariff adjustment proposals made by TEC. An independent tariff study in 2007 formed the basis for subsequent tariff adjustments. Fuel prices are not fully regulated.
18	Enabling framework for private sector participation (score)	0	*The indicator assesses 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 framework for independent power producers (IPP). No policy statements on private sector participation. Power sector extremely small.
19	Private sector contribution (%)	0	*The indicator tracks the share of electricity produced by independent power producers under a power purchase agreement.* No independent power producers in Tuvalu.

FAESP action theme 3 — Energy production and supply

3.1 Petroleum and alternative fuels

No.	FAESP indicators		Explanatory notes
20	Fuel supply security (days)	28	*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).* Indicative estimate is established from the local coastal tanker frequency of refilling in Tuvalu, which happens at least every four weeks. Based on the actual volume of fuel imported into Tuvalu in 2009 over the fuel storage capacity, Tuvalu has a theoretical fuel security of 48.71 days.
21	Fuel supply diversity (%)	0	*The indicator measures the share of locally produced fuel (biofuel or fossil fuel) as a percentage of total supply.* No biofuel projects were undertaken.
22	Fuel supply chain arrangements (score)	1	*The indicator assesses the control of countries over fuel supply chain. (Score system: Joint procurement scheme operational = 2; Participation in preparation of joint procurement arrangements = 1)* Pacific Energy acquired BP's Tuvalu assets in 2010 and is the dominant supplier and key player in procurement. Pacific Energy has storage facility (300,000 litres) and a terminal in Funafuti. Government has no control over the supply chain. There is some room for bulk procurement, as government owns two diesel tanks (300,000 litres) funded by Japan at TEC. Pacific Energy supplies Tuvalu fuel on a local coastal tanker via Fiji. Jet fuel is imported on iso-tainers via New Zealand.

3.2 Renewable energy

No.	FAESP indicators		Explanatory notes
23	Renewable energy share (%)	0.2	*The indicator measures the share of renewable energy as a percentage of total supply for a given year.* Referenced calculation takes into account only the contribution from the grid-connected solar PV units at Funafuti and Vaitupu, as well as other small solar PV installations. This in total equals 86 kW and calculated at 12% capacity factor which contributes to 0.2% of the total RE share.
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)* Indicative assessment data on wind (Funafuti only) and solar available, some data on feasibility of biogas from piggeries and coconut oil as diesel substitute, empirical data of performance of solar systems available from two 40 kW installations in Funafuti and Vaitupu, economic analysis of grid-connected PV available.
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 least-cost development plan for renewable energies; some elements in place.

FAESP action theme 4 — Energy conversion

4.1 Electric power

No.	FAESP indicators		Explanatory notes
26	Generation efficiency (kWh/l)	3.5	*The indicator measures the annual average fuel conversion efficiency for diesel generation in power utilities.* Source: TEC.
27	Distribution losses (%)	16.7	*The indicator compares the amount of kWh sold with the amount of kWh sent out from the power station.* Source: TEC.
28	Lost supply (SAIDI) – (hours)	2	*The indicator tracks electricity outage time (hours of lost supply per customer per year)* Referenced data sourced from 'Performance Benchmarking for Pacific Power Utilities' report.
29	Clean electricity contribution (%)	1.6	*The indicator measures the share of renewable energies as a percentage of total electricity supply.* Power contribution from solar PV units.

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 price	
	ADO(USD/l)	1.51	1.48	Sourced from Tuvalu Energy Office
	ULP (USD/l)	1.5	1.47	Sourced from Tuvalu Energy Office
	DPK (USD/l)	1.42	1.38	Sourced from Tuvalu Energy Office
	LPG (USD/kg)	4.5	n.a.	Sourced from Tuvalu Energy Office
31	Legislative framework (score)	0		*The indicator assesses progress towards a comprehensive legislative framework for import of end-use devices. (Score system: Comprehensive framework covering transport, appliances, buildings = 3; Legislative for one subsector operational = 2; Preparation of frameworks under way = 1)* No legislative framework for supporting importation of efficient end-use devices available. Demand side management mentioned in energy policy.
32	Appliance labelling (score)	0		*The indicator assesses the state of appliance labelling. (Score system: Compulsory appliance labelling operational = 2; Appliance labelling in preparation = 1)* No compulsory appliance labelling programme initiated in Tuvalu. Appliance imports mostly from New Zealand and Australia; some products sold have labels due to requirements in these countries.

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)* Energy balance not available. Partial datasets available from the power and petroleum sectors.

FAESP action theme 7 — Financing, monitoring & evaluation

No.	FAESP indicators		Explanatory notes
34	Energy portfolio (USD)	5,548,183	*The indicator tracks the flow of funding into the country's energy sector. Grant aid commitments + loan commitments* Snapshot of donor portfolio as of 2011 (not 2009 baseline).
35	Availability of financing information (score)	3	*The indicator assesses the 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)* Comprehensive set of information on funding activities available.
36	Monitoring framework (score)	0	*The indicator assesses if there is a national energy sector M&E framework in place. (Score system: M&E framework in place = 1, No M&E framework = 0)* No specific M&E framework in place in 2009.

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