GILBERT ISLAND GROUP

ENERGY STATISTICS YEARBOOK

2000–2009

GOVERNMENT OF THE REPUBLIC OF KIRIBATI

SPC Secretariat of the Pacific Community

Dedication

Mr Eita Metai
Permanent Secretary
Ministry of Public Works & Utilities
Republic of Kiribati

The first issue of this energy statistics yearbook is dedicated in memory of Mr. Eita Metai, Permanent Secretary for the Ministry of Public Works & Utilities from 1 April 2012 to 11 August 2013, who has been an inspiration to all. Eita has dedicated years of work with commitment, righteous and gratefulness.

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Compiled by the SPC Energy Programme for the Government of Kiribati

SPC
Secretariat
of the Pacific
Community

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FOREWORD

"One can only effectively manage what one knows or understands". This has been the key driver behind the Pacific energy ministers' call to strengthen national capacity in collection, collation, management, dissemination and analysis of data and information to better inform national and regional energy planning and policy choices.

A full and better understanding of Kiribati's energy sector is key in determining, planning and pursuing energy security solutions and promoting or attracting investments in the energy sector. This understanding needs to be underpinned by the availability of reliable, easily accessible, accurate and current data/information on petroleum, power, renewable energy, population and social statistics that feed into policy and planning.

The *Gilbert Island Group Energy Statistics Yearbook 2000–2009* is the first product of a collaboration between Kiribati's Energy Planning Unit (EPU) under the Ministry of Public Works and Utilities (MPWU) and the Energy Programme at the Economic Development Division of the Secretariat of the Pacific Community (SPC) to support MPWU's responsibility for coordinating the implementation of Kiribati's national energy policy and providing necessary advice and assistance on all energy activities and related matters in Kiribati.

The eventual completion and release of this booklet has had its own challenges and difficulties, particularly in relation to the access to accurate and reliable historical data. This has resulted in delays in order for the data verification to be completed.

This collaboration has strengthened MPWU's capacity to the extent that EPU will further be working on publishing the Line and Phoenix group statistics booklets, including annual energy reviews. Later year reports will involve more scrutiny work on data validity including updated changes where applicable.

Overall, this statistical booklet is a comprehensive publication, containing macroeconomic information and key statistics on supply and demand for each energy commodity covered in the Gilbert Island group.

I commend this statistical booklet for all.

.....

Mr Eita Metai
Permanent Secretary
Ministry of Public Works & Utilities
Republic of Kiribati

25 June 2013

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The development of the *Gilbert Island Group Energy Statistics Yearbook 2000–2009* could not have been accomplished without the contributions of many individuals. The assistance from the key energy stakeholders in Kiribati in the provision of raw data – in particular, Kiribati Oil Company (KOIL), British Petroleum (BP), Kiribati Solar Energy Company (KSEC), Kiribati Copra Mill Company (KCMC) and the Public Utilities Board (PUB) – is very much appreciated as it has made the disaggregation of end-use sector data more pragmatic. Significant contributions from the Statistics Department, Customs Office and Fair Trading Regulatory Division have bridged the gaps in the compilation of this publication and we owe them much for their great assistance, and acknowledge all their sources.

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Mr. Kireua B Kaiea
Energy Planner

25 June 2013

ABOUT THE PUBLICATION

This publication contains energy statistics relating to the Gilbert Island group of Kiribati covering a time period of 2000–2009. It provides an insight into the group's energy balance, socio-economic history, sources of net energy supplies, end-use sectors, and selected macroeconomic variables.

The first chapter establishes the energy balance of the Gilbert Island group, looking at the energy flow at various stages of production and imports, transformation and consumption by end users. The subsequent chapters focus on the sources of net energy supplies for the group (petroleum, renewable energy and power) and in-depth analysis of end use consumption sectors (transport, commercial, industrial, government, fisheries, residential, community and social services).

Selected macro-economic variables, such as population, gross domestic product and prices, are also considered in this yearbook as they are linked to and have a direct influence on the trend of energy demand and supply in the Gilbert Island group.

The analysis and tables presented in the booklet are extracted from the Kiribati energy database with their respective units and conversion factors. The accuracy of data compiled for the petroleum and electricity sector was comprehensively covered based on readily available data from the energy stakeholders on the ground. The renewable energy data however was difficult to estimate with good accuracy due to scarcity of primary data. The analysis of renewable energy production and consumption estimates therefore relied on secondary data from the statistics office. Moreover, due to rounding off of certain figures, the totals in some cases may not be exactly equal to the sum of displayed data.

The common unit of energy (joules) is used in the final analysis of the energy balance.

All prices are in nominal Australian dollars unless stated otherwise.

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ABBREVIATIONS AND ACRONYMS

ADO	automotive diesel oil
AUD	Australian dollar
avgas	aviation gasoline
ben	benzene
BP	British Petroleum
CEO	Chief Executive Officer
DPK	dual-purpose kerosene
EPU	Energy Planning Unit
FO	fuel oil
GDP	gross domestic product
GJ	gigajoule
GT	gross tonnage
GWh	gigawatt hour
HH	household
IDO	industrial diesel oil
ISO	International Organization for Standardization
IT	information technology
KCMC	Kiribati Copra Mill Company
ker	kerosene
kg	kilogram
KOIL	Kiribati Oil Company
KSEC	Kiribati Solar Energy Company
kWh	kilowatt hour
l	litre
LPG	liquefied petroleum gas
lub oil	lubricating oil
m^2	square metre
MCIC	Ministry of Commerce, Industry and Cooperatives
mcwb	moisture content wet basis
MFED	Ministry of Finance and Economic Development
MCTTD	Ministry of Information, Communications and Transport
MJ	megajoule
mogas	motor gasoline. Also known as unleaded petrol
MPWU	Ministry of Public Works and Utilities
mv	motor vessel
MW	megawatt
OIC	Officer in Charge
MWh	megawatt hour
NRSE	new and renewable sources of energy
PMS	premium motor spirit
PNG	Papua New Guinea
PUB	Public Utilities Board
PV	photovoltaic
R/price	retail price
SPC	Secretariat of the Pacific Community
TJ	terajoule
ULP	unleaded petrol
W/price	wholesale price

GLOSSARY

biogas	Energy produced from the anaerobic digestion of sewage and industrial waste. Includes landfill (garbage tip) gas and sewage gas. Also referred to as biomass gas.
biomass	Material that is derived from nature (trees, grasses, agriculture crops) that can be used for energy conversion, including biofuel. In Kiribati biomass is mainly derived from coconut residue (husks and shells).
end use energy	The amount of energy consumed by final users. Excludes energy used or lost in the process of transforming energy into other forms and in bringing the energy to the final consumers.
conversion	The process of transforming one form of energy into another (derived) form before final end use. Energy used in conversion is the energy content of fuels consumed as well as transformed by energy-producing industries. Examples include the generation of electricity from diesel fuel. Energy used in conversion also includes energy lost in the production, conversion and transport of fuels plus net energy consumed by pumped storage after allowance for the energy produced.
crude oil	Naturally occurring mixture of liquid hydrocarbons under normal temperature and pressure.
domestic	Used in the sense of national (as opposed to foreign) rather than residential.
domestic transport	Includes coastal shipping and national air transport. Excludes international transport.
electricity capacity	Actual electricity generation output as a proportion of generation capacity.
liquid fuel	All liquid hydrocarbons, including crude oil, condensate, liquefied petroleum gas and other refined petroleum products, and liquid biofuel.
joule	Standard unit of energy in general scientific applications. One joule is the equivalent of one watt of power radiated or dissipated for one second.
non-energy use	Use of primary energy for another purpose (e.g. bitumen for roads).
petroleum	Generic term for all hydrocarbon oils and gases, including refined petroleum products.
petroleum products	All hydrocarbons used directly as fuel. These include liquefied petroleum gas, refined products used as fuel (aviation gasoline products, automotive gasoline, dual-purpose kerosene, and automotive diesel oil), and refined products used in non-fuel applications (solvents, lubricants, bitumen, waxes, petroleum coke for anode production, and specialised feedstocks).
primary fuels	Forms of energy obtained directly from nature. They also include non-renewable fuels such as crude oil; naturally occurring liquefied petroleum gas; methane; and renewable fuels such as wood, wind power and solar energy.

ENERGY FLOW DEFINITIONS

PRODUCTION AND IMPORTS – TOTAL PRIMARY ENERGY SUPPLY	
FLOW	DEFINITION
Production	Refers to the quantities of fuels extracted or produced. In Kiribati, production refers to energy contribution from traditional biomass and solar PV systems.
Imports	Comprises amounts having crossed the national territorial boundaries of a country, whether or not customs clearance has taken place. For Kiribati, this mainly refers to petroleum fuel products. Known fuel products imported into Kiribati are ADO, DPK, AVGAS, LPG, ULP and lubricants.
Exports	Comprises amounts having crossed the national territorial boundaries of a country, whether or not customs clearance has taken place. Kiribati does not undertake any form of energy export, such as exporting fuel to other countries.
International marine bunkers	Covers those quantities delivered to ships of all flags that are engaged in international navigation. ***Consumption by ships engaged in domestic navigation is excluded.*** The domestic split is determined on the basis of port of departure and port of arrival.
Stock changes	Reflects the difference between opening stock levels on the first day of the year and closing levels on the last day of the year of stocks on national territory held by producers, importers and large consumers. Oil and gas stock changes in pipelines are not taken into account. With the exception of the large users mentioned above, changes in final users' stocks are not taken into account. ***A stock build is shown as a negative number, and a stock draw as a positive number.***
Domestic supply	Defined as **production + imports – exports ± stock changes**. *Note the Gilbert island group energy flow analysis does not separate international aviation as a form of export.*
Transfers	Comprises *interproduct transfers,* which result from reclassification of products either because their specification has changed or because they are blended into another product, e.g. blending lubricant oil with petrol for two stroke engines-outboard motors and grass cutters. The net balance of *interproduct transfers* is zero.
Statistical differences	Defined as ***deliveries to final consumption + use for transformation and consumption within the energy sector + distribution losses – domestic supply – transfers.*** Statistical differences arise because the data for the individual components of supply are often derived from different data sources by the national administration. Furthermore, the inclusion of changes in some large consumers' stocks in the supply part of the balance introduces distortions that contribute to statistical differences.
Conversion	
conversion sector	Comprises the conversion of primary forms of energy to secondary and further transformation (e.g. diesel fuel oil to electricity).
Auto producer electricity plants	Refers to plants that are designed to produce electricity only. They may be privately or publicly owned.
Distribution losses	
Distribution losses	Losses in gas distribution, electricity transmission and petroleum fuel transport.

TOTAL FINAL ENERGY CONSUMPTION	
Total final energy consumption *is equal to the sum of the consumption in the end-use sectors. Energy used for transformation and for own use of the energy-producing industries is excluded. Final consumption reflects for the most part deliveries to consumers. International marine bunkers are not included in final consumption at the country level.*	
Agriculture and forestry	Covers deliveries to users associated with the agriculture and forestry sectors. For Kiribati, energy consumption in these sectors is not applicable as Kiribati lacks large-scale forestry and agriculture activities.
Fishing	Covers coastal and deep-sea fishing. Also covers fuels delivered to ships of all flags that have refuelled in the country (including international fishing) as well as energy used in the fishing industry.
Industrial sector	Covers the manufacturing, construction and quarrying sectors.
Public sector	Covers users mainly from government, including government-owned and government-rented buildings, government hospitals, and the public works sector. Categorised energy use from the public sector includes electricity consumption in buildings, oil company sales to government for power generation in selected areas (hospital, water and off-grid power supply), and quarrying.
Industrial and government sector	For the end-user analysis of energy consumption in Kiribati, the industrial and public sectors were combined following end-user customer breakdown by the utility company.
Commercial sector	Covers users from wholesale/retail and recreation, finance, insurance, real estate and other commercial-type services. Categorised energy use from the commercial sector includes electricity consumption in buildings, and direct sales by oil companies to the commercial sector.
Community and social services	Mainly covers schools, religious organisations and NGOs. Categorised energy use from the community and social services sector covers electricity consumption in buildings, and fuel use (LPG, biomass and DPK) for cooking and lighting.
Residential	Generally covers users from households. Categorised energy use from the residential sector includes electricity consumption in buildings, and fuel (LPG, biomass and DPK) use for cooking and lighting.
Transport sector	Covers all transport activity (in mobile engines) regardless of the economic sector to which it is contributing. The transport sector is broken up into road, marine and air (domestic and international) transport.

Energy conversion factors

The following **factors are indicative**, because a fuel's specifications varies with source, time, place, temperature, etc. The energy factors measure the gross energy content of the fuel.

1.0 Liquid fuels

	Mega joules per litre	Mega joules per gallon	Litres per tonne	Gigajoules per tonne
LPG (propane)	25.3	95.8	1960	49.6
LPG (butane)	27.7	104.9	1730	49.0
Aviation gasoline (avgas)	33.2	125.7	1410	46.8
Motor/automotive gasoline (mogas)	34.6	131.0	1340	46.4
Dual-purpose kerosene (DPK)	36.8	139.3	1260	46.4
Automotive diesel oil (ADO)	38.6	146.1	1182	45.6
Industrial diesel oil (IDO)	39.0	147.6	1150	44.9
Fuel oil – high sulphur (FO)	40.8	154.4	1050	42.9
Solvents/white benzene	34.0	128.7	1420	48.1
Lubricants and greases	38.8	146.9	1120	43.4
Bitumen	44.0	166.6	980	42.7
Crude oil (PNG Kutubu light)	35.9	135.9	1249	44.9
Coconut oil	34.9	132.1	1100	38.4

2.0 Solid fuels

	Gigajoules per tonne	Gigajoules per ton
Charcoal	30.0	27.2
Fuelwood/woodwaste (40% mcwb)[1]	10.8	9.8
Fuelwood/woodwaste (13% mcwb)[2]	17.1	15.5
Coconut-palm wood	11.5	10.4
Coconut residues:[3]		
Shell (15% mcwb $_{harvested}$)	14.6	13.2
Husk (30% mcwb $_{harvested}$)	12.0	10.9
Average (air dry $_{shell\ and\ husk}$)[4]	14.0	12.7

1. Typical moisture content of undried sawmill residue and timber merchant fuelwood.
2. Typical moisture content of air-dried fuelwood and residue.
3. Average yield of 2.93 air-dried tonnes of residue per tonne of copra produced.
4. Proportion: kernel 33%, shell 23%, husk 44% by dry weight.

Note: Approximate figures at 15° C.

3.0 Gaseous fuels

	Megajoules per Cubic Metre	Megajoules per Cubic Foot
Natural Gas	39.0	1.1
Methane	37.7	1.1

4.0 Electricity

	Megajoules per kWh
Electricity	3.6

METRIC AND OTHER PHYSICAL CONVERSION FACTORS

Length

1 metre = 100 CM
= 39.3701 inches (“)
= 3.28084 feet (‘)
= 1.09361 yards
= 0.001 kilometre (km)

1 kilometre = 1,000 metres (m)
= 0.621371 mile

1 international nautical mile
= 1.85318 kilometres (km)
= 1.15088 miles

Area

1 square metre
= 10.7639 square feet (squ.ft)
= 1.19599 square yards

1 acre
= 4,840 square yards
= 4,046.86 square metres (m2)
= 0.404686 hectares

1 hectare
= 10,000 square metres (m2)
= 2.47105 acres
= 0.01 square kilometres (km2)

1 square kilometre
= 100 hectares
= 0.386102 square miles

1 square mile
= 640 acres
= 258.999 hectares
= 2.58999 square kilometres (km2)

Volume

1 litre (l)
= 61.0238 cubic inches (cu”)
= 1.75975 pints
= 1 cubic decimetre (dm3)
= 0.264170 American gallons
= 0.0353147 cubic feet (cu ft)

1 hectolitre = 100 litres

1 American gallon
= 231 cubic inches (cu”)
= 3.78544 litres (l)
= 0.133681 cubic feet (cu ft)
= 0.0238095 American barrels

1 American barrel (bbl)
= 9,687.95 cubic inches (cu”)
= 158.757 litres (l)
= 42 American gallons
= 5.60645 cubic feet (cu’)
= 0.158757 cubic metres (m3)

1 cubic metre
= 1,000 litres (l)
= 264.170 American gallons
= 6.29894 American barrels (bbl)
= 35.3147 cubic feet (cu ft)

Mass

1 kilogram (kg)
= 1000 g
=2.20462 pounds (lbs)
= 0.001 tonne (te)
1 American (short) ton
= 2,000 pounds (lbs)
= 0.892857 long tons
= 0.907185 tonnes (te)
1 Imperial (long) ton
= 2,240 pounds (lbs)
= 1.12 short tons
= 1.01605 tonnes (te)
1 tonne (te)
= 2,204.62 pounds (lbs)
= 1,000 kilograms (kg)
= 1.10231 short tons
= 0.984206 long tons

Energy and power

1 international table (IT) calorie
= 4.1868 joules (J)

1 megacalorie (IT)
= 1,000,000 calories
= 3968.32 BTU
= 1163 watt hours (Wh)
= 4.1868 megajoules (MJ)

1 joule (J) = 0.238846 calories (IT)

1 megajoule (MJ)
= 1,000,000 joules (J)
= 947.817 BTU
= 277.778 watt hours (Wh)
= 238,846 calories (IT)
= 0.0238846 koe

1 kilogram of oil equivalent (koe)
= 41.868 megajoules (MJ)
= 10 megacalories

1 tonne of oil equivalent (TOE)
= 41.868 gigajoules (GJ)
= 10 gigacalories

1 kilowatt hour (kWh)
= 3,412.14 (BTU)
= 859.845 kilocalories (IT)
= 3.6 megajoules (MJ)
= 1.34102 horsepower hours

Sources:

1. Department of Primary Industries and Energy, Australia.
2. World Bank PREA reports 1992.
3. Energy Data and Conversion Factors (New Zealand Energy R&D Committee 1984).
4. Petroleum Economist and the Steinmuller ‘Pocket Book’, based on the international system of units (SI).
5. IEA Statistics Manual

SUMMARY

The *Gilbert Island Group Energy Statistics Yearbook 2000–2009* provides a ten-year compilation of energy imports, production, transformation and end use sector energy consumption. These are presented in tables, charts and graphs outlining some of the major energy trends from 2000 to 2009.

Key trends from the yearbook include:

i. Energy demand and supply scenario

- The Gilbert Island group's total primary energy supply has increased by 16% to 1140 terajoules from 2000 to 2009.
- Increasing dependence on petroleum fuel products continues to grow throughout the 10 year period with 2009 fuel imports accounting for 48% of total primary energy supply share. Diesel, gasoline and kerosene constitutes the biggest portion and accounts for over 98% of total petroleum products imported in 2009.
- Biomass and solar PV are the only sources of primary energy supply that is produced in the Gilbert Island group.
- From 2000 to 2009, energy contribution from biomass and solar PV in the Gilbert Island group increased by 6% to 534 terajoules.
- Total final energy consumption in the Gilbert Island group grew by 15.6% to around 1139 terajoules from 2000 to 2009.
- Robust final energy consumption growth during 2000 to 2009 was observed in the road transport sector, the air transport sector and the government & industrial sector. Modest energy growth occurred in the residential, community and social services sectors. The commercial and sea transport sector recorded declining growth in energy consumption over the years.
- Total electricity generation increased by 53% to 22.2 GWH from 2000 to 2009.

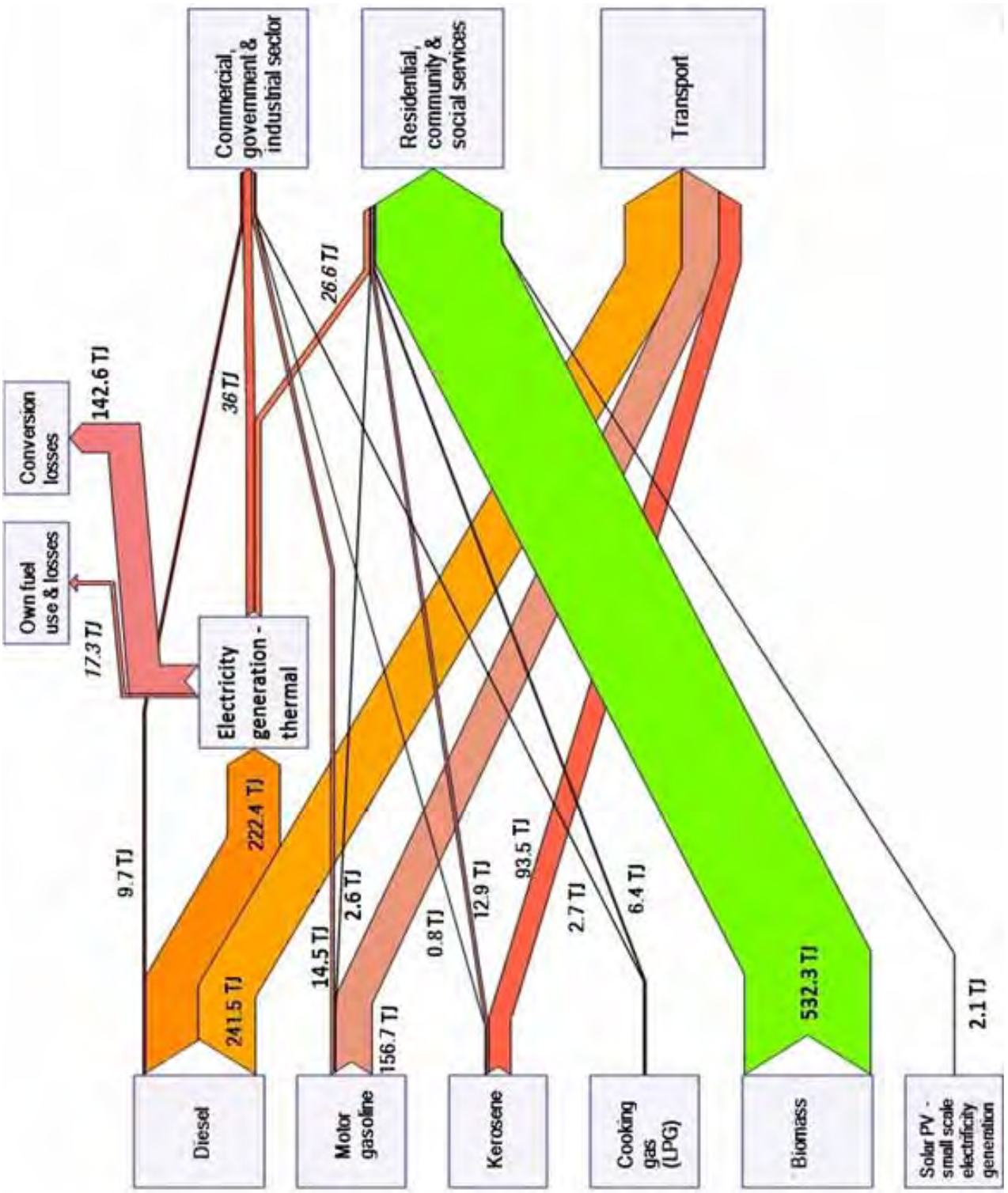
ii. Macroeconomic comparison

- Total GDP in 2009 increased by 13.7% to $152.5 million dollars from the year 2000.
- Fuel imports in 2009 totalled 23.9 million dollars and have increased by more than 2 folds from the year 2000.
- By comparison to total imports and GDP, fuel imports accounted for 26.9% and 15.7% respectively in 2009. In 2000, fuel imports only accounted for 14.5% and 7.4% of the total imports and GDP. An indicator showing Kiribati's growing dependency to fossil fuel consumption and vulnerability of the economy towards world price volatility.
- Trend in volume fuel imports over the ten-year period was fairly modest with an average annual rate of change fluctuating within ±5% from 2000 to 2009. Fuel import bill however showed sharp increases to an all-time decade high in 2008 followed by a distinct drop in 2009.
- Trend in power sales to GDP apart from the year 2006 showed fairly similar relationship over the years from 2000 to 2009 with moderate growth from 2000 to 2008. From 2008 to 2009, power sales fell by 1.95% compared to GDP which fell slightly by 0.7%. The notable drop in the 2009 electricity sales is affected by the sudden growth of global fuel prices in mid-2008.
- The end user sectors however showed somewhat weak to opposite relationships when compared to their respective GDP by sector breakdown by categories.

iii. Population and demographics

- Based on the national census counts from the year 2000, 2005 and 2010, a ten-year trend was estimated for the Gilbert Island group. The number of households in the Gilbert Island group rose by an estimated 16% to 13,648 from 2000 to 2009.
- The urban households accounted for 39% of total households in 2000, almost a decade later, urban households have accounted for an estimated 47% of the Gilbert Island group in 2009.
- Household access to grid connected electrification is estimated at 46% for the Gilbert Island group in 2010.
- Household with access to stand alone generators and solar PV systems accounted for 20% of the total household in the Gilbert Island group in 2010.
- Total number of household solar PV unit installation in the Gilbert Islands recorded 2,316 units in 2009. This has increased by over 3 fold from 2000 (610 units). Notable increases in solar PV installation were accounted in 2004 which recorded over 1,700 new units being installed. This was made possible through the EDF 8 Project funding.

Sankey diagram of the Gilbert Islands energy flow for the calender year 2009

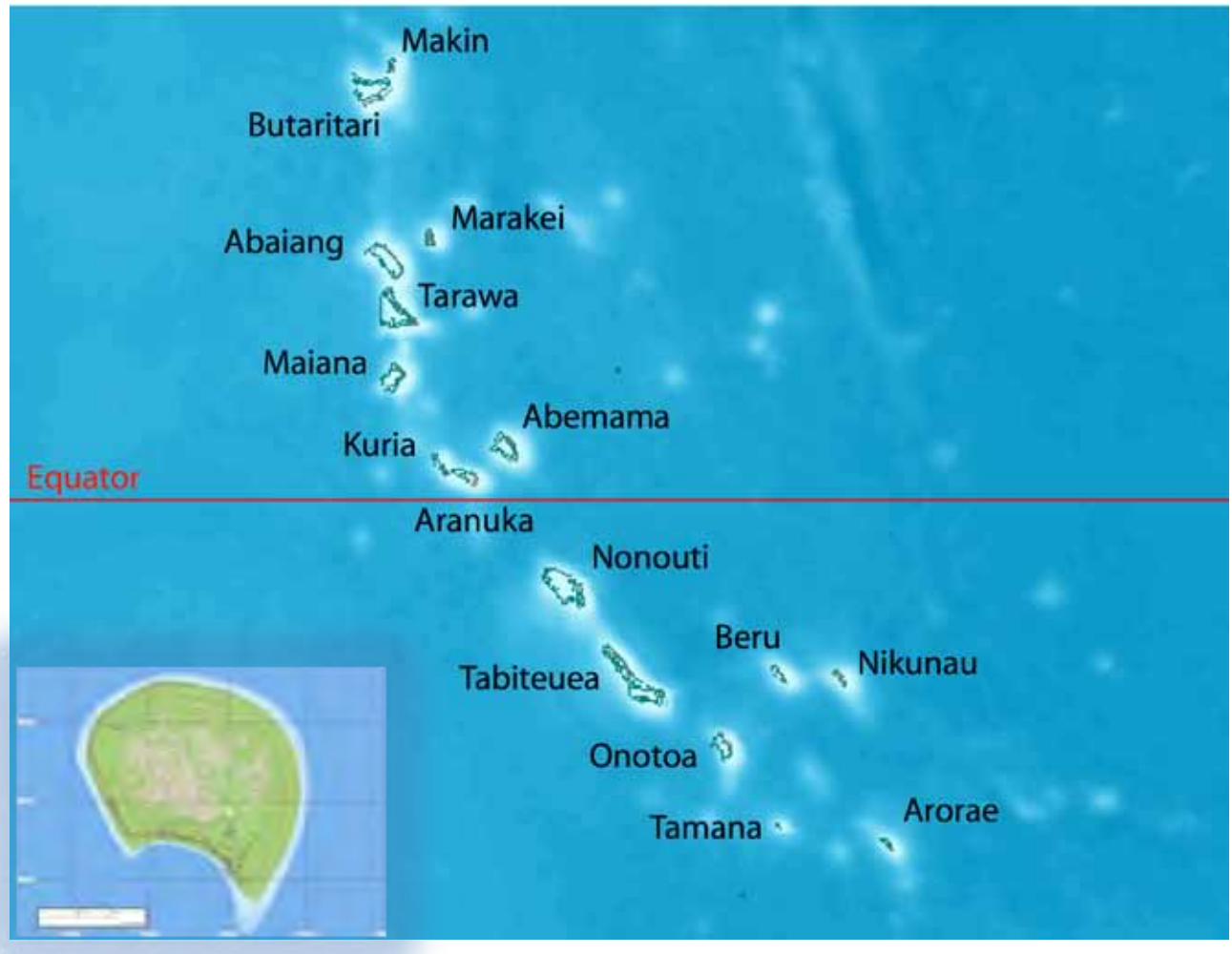


GILBERT ISLAND GROUP PROFILE

The Gilbert Islands lies in the westernmost group of the Republic of Kiribati and consists of a chain of seventeen inhabited islands, including the capital island Tarawa. All of the islands have extensive coral formations, generally as fringing and lagoon reefs. Except for Banaba, the rest of the islands in the Gilbert Islands group are low-lying coral atolls usually rising more than 3 metres above sea level. In a geographical sense, the equator serves as the dividing line between the northern Gilbert Islands and the southern Gilbert Islands.

The southern Gilbert Islands and Banaba have a dry maritime equatorial climate, whereas the islands situated further north have a more humid tropical climate. Temperatures range between 24°C and 30°C, with little variation between the islands. The average annual rainfall in the Gilbert Islands ranges from 1,000 mm in the vicinity of the equator to over 3,100 mm in the northern islands.

Total population of the Gilbert Islands is estimated in the vicinity of 90,000 in 2009 with the biggest concentration of population in Tarawa. As per census record in 2005, around 55% of the Gilbert Islands population live in Tarawa, which is also one of the most densely populated islands in the Pacific Islands region. Tarawa is generally divided into rural North Tarawa and urban South Tarawa.

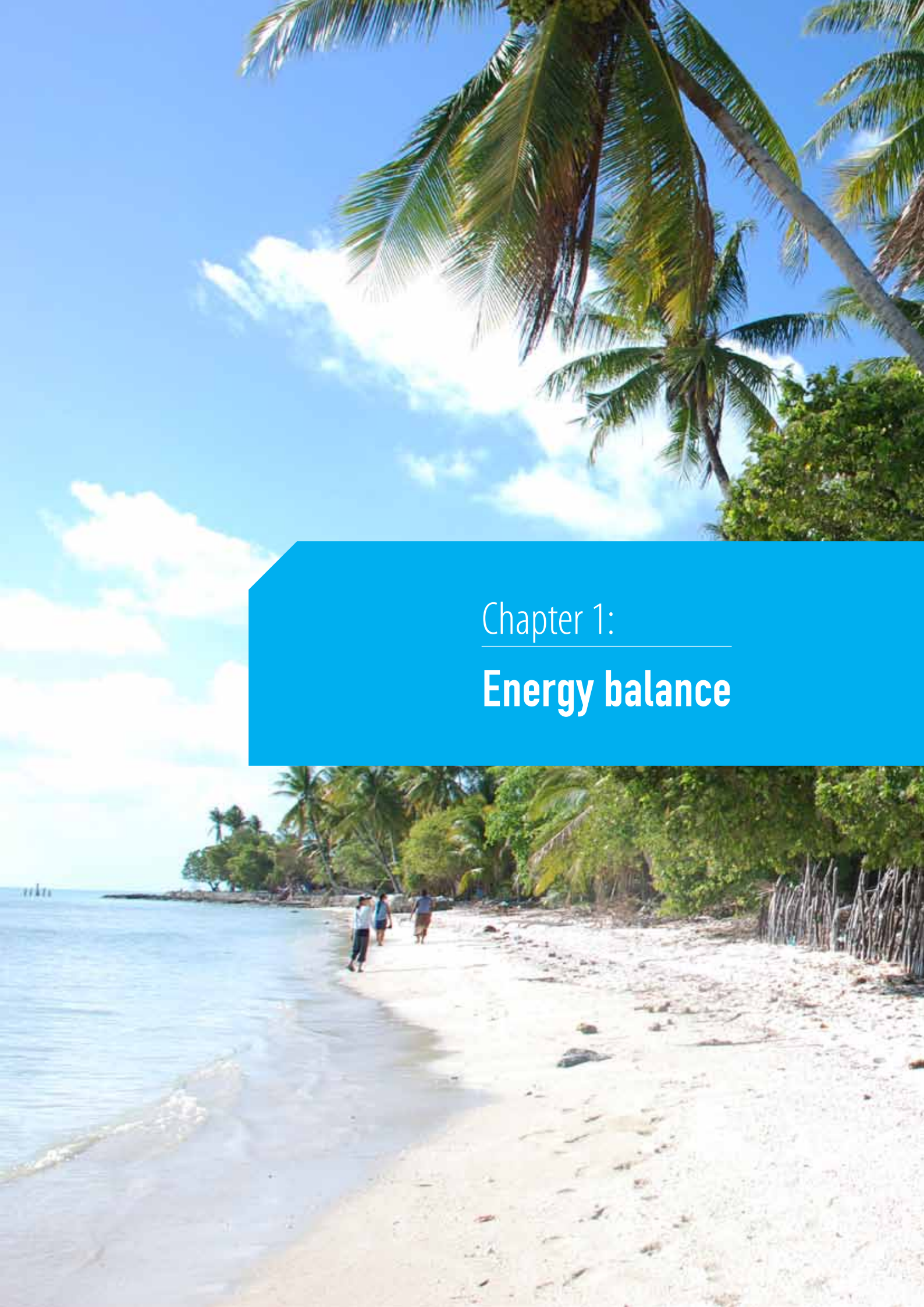


Insert: Banaba

Source; http://en.wikipedia.org/wiki/File:GilbertIslandsPos.png

Island	Land area (km²)	Lagoon area (km²)	Number of villages	Listed number of villages
Banaba	6.3	n.a	3	Tabewa, Antereen, Umwa
Makin	7.9	0.3	2	Makin, Kiebu
Butaritari	13.5	191.7	12	Kuuma, Keuea, Taimainuku, Tanimaiaki, Tabonuea, Antekana, Taubukinmeang, Temanokunuea, Onomaru, Ukiangang, Bikaati, Tikurere
Marakei	14.1	19.6	8	Rawannawai, Temotu, Buota, Tekarakan, Bwainuna, Norauea, Tekuanga, Antai
Abaiang	17.5	232.5	18	Nuotaea, Ribono, Takarano, Ubwanteman, Tebuginako, Borotiam, Aonobuaka, Koinawa, Morikao, Ewena, Taburao, Tebero, Tabwiroa, Tuarabu, Tanimaiaki, Tebwanga, Aoneaba, Tabontebike
North Tarawa	15.3	343.6	14	Buariki,Tearinibai, Nuatabu, Tebwangaroi, Taratai, Nooto, Abaokoro, Marenanuku, Tabonibara, Kainaba, Nabeina, Tabiteuea, Abatao, Buota,
South Tarawa	15.8		16	Tanaea, Bonriki, Temwaiku, Causeway, Bikenibeu, Abarao, Eita, Tangintebu, Taborio, Ambo, Banraeaba, Antebuka, Teaoraereke, Nanikai, Bairiki, Betio
Maiana	16.7	98.4	12	Tebikerai, Tekaranga, Tematantongo, Aobike, Tebanga, Temwangaua, Toora, Tebwangetua, Teitai, Tebiauea, Raweai, Bubutei
Abemama	27.4	132.4	13	Abatiku, Tabiang, Tekatirirake, Tanimainiku, Kauma, Baretoa, Tabontebike, Kariatebike, Bangotantekabaia, Tebanga, Manoko, Kabangaki, Biike
Kuria	15.5	n.a	6	Oneeke, Manenaua, Tabontebike, Buariki, Norauea, Bouatoa
Aranuka	11.6	7.5	3	Takaeang, Buariki, Baurua
Nonouti	19.9	143	9	Abamakoro, Teuabu, Benuaroa, Temanoku, Rotuma, Autukia, Matang, Taboiaki, Temotu
North Tabiteuea	25.8	365.2	12	Tekabwibwi, Tekaman, Tanaeang, Buota, Terikiai, Eita, Utiroa, Tauma, Kabuna, Tenatorua, Bangai, Aiwa
South Tabiteuea	11.9		6	Tewai, Taungaeaka, Buariki, Nikutoru, Katabanga, Taku
Beru	17.7	38.9	9	Autukia, Tabiang, Aoniman, Rongorongo, Nuka, Teteirio, Taubukinberu, Eriko, Taboiaki,
Nikunau	19.1	n.a	6	Muribenua, Tabutoa, Rungata, Manriki, Nikumanu, Tabomatang
Onotoa	15.6	54.4	7	Tekawa, Tanaenga, Buariki, Temao, Otowae, Aiaki, Tabuarorae
Tamana	4.7	n.a	3	Barebuka, Bakaka, Bakarawa
Arorae	9.5	n.a	2	Tamaroa, Roreti

Source: Kiribati statistics office



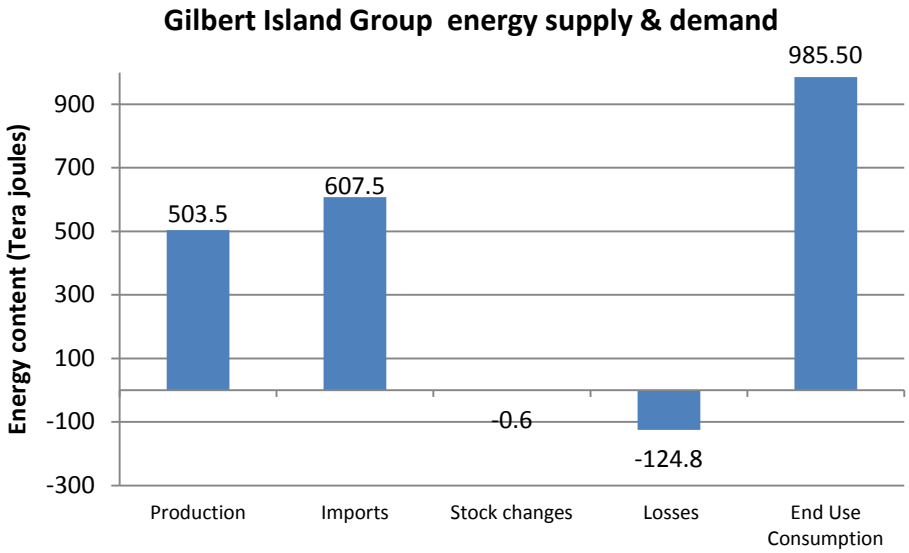
Chapter 1:

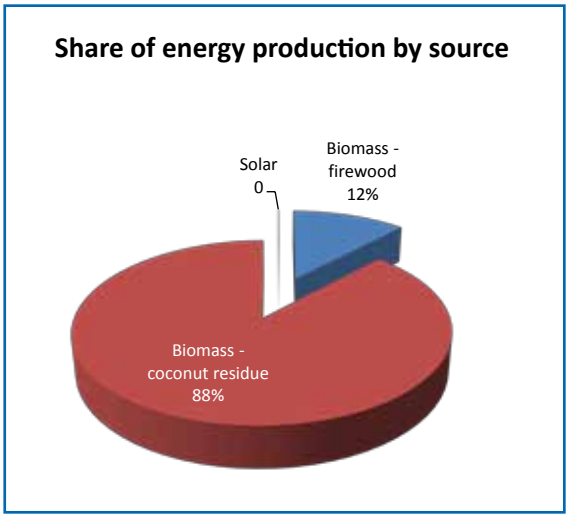
Energy balance

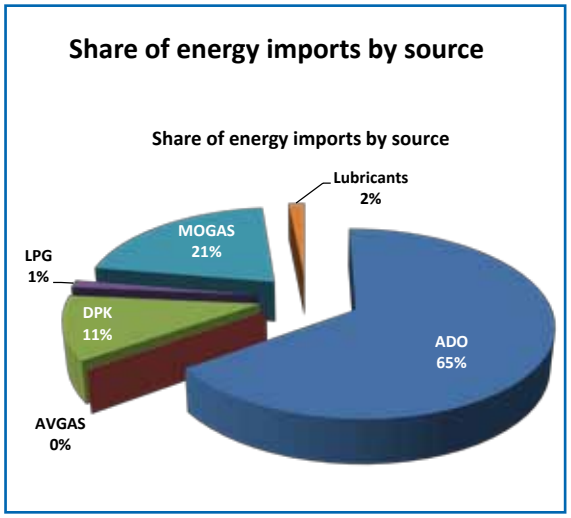
1A: Energy supply and demand balance, 2000

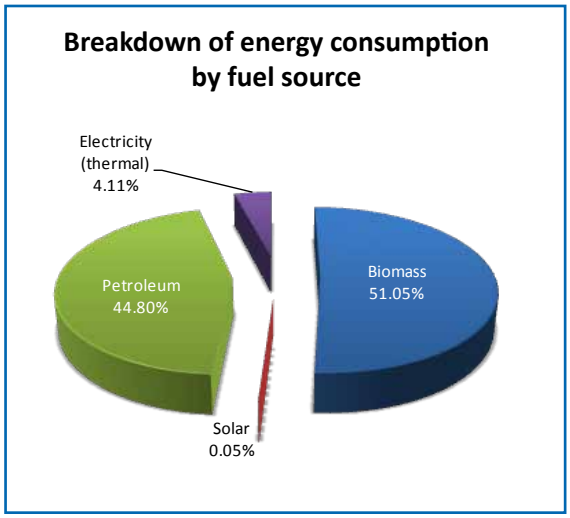
Energy balance Year: 2000 Unit: Terajoules	Coconut & palm oil residues	Fuelwood & wood-waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	442.9	60.1	503.1							0.0		0.5	503.5
plus imports			0.0	395.9	0.5	68.1	7.6	125.8	9.6	607.5			607.5
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	30.6	0.5	-16.0	0.0	-14.6	0.0	0.6			0.6
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	442.9	60.1	503.1	365.2	0.0	84.0	7.6	140.3	9.6	606.8		0.5	1,110.3
minus CONVERSION SECTOR													
Electricity generation			0.0	162.6					2.8	165.3	-52.1		113.2
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	11.6		11.6
= NET OR FINAL ENERGY SUPPLY	442.9	60.1	503.1	202.7	0.0	84.0	7.6	140.3	6.9	441.5	40.5	0.5	985.5
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				10.6		0.0		13.1		23.6	0.0		23.6
Road transport			0.0	109.8				79.6	2.4	191.8			191.8
Air transport			0.0		0.0	63.9			2.3	66.2			66.2
Sea transport			0.0	80.1				45.9	1.9	127.9			127.9
Government & industrial				2.3		0.0			0.3		9.3		9.3
Commercial sector			0.0			1.2	2.3	0.0	0.0	3.4	15.8		19.2
Community & social services	0.0	0.0	0.0			1.0	1.5			2.5	0.0		2.5
Residential	442.9	60.1	503.1			17.9	3.8	1.8		23.5	15.4	0.5	542.4
= FINAL ENERGY CONSUMPTION	442.9	60.1	503.1	202.7	0.0	84.0	7.6	140.3	6.9	441.5	40.5	0.5	985.5

Figure 1: Gilbert Island Group energy overview - 2000









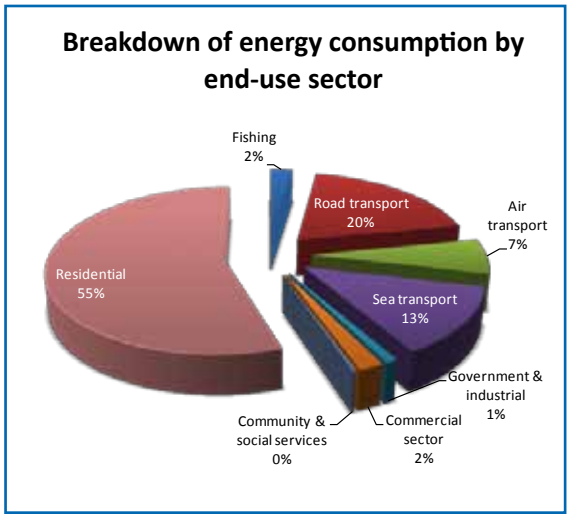
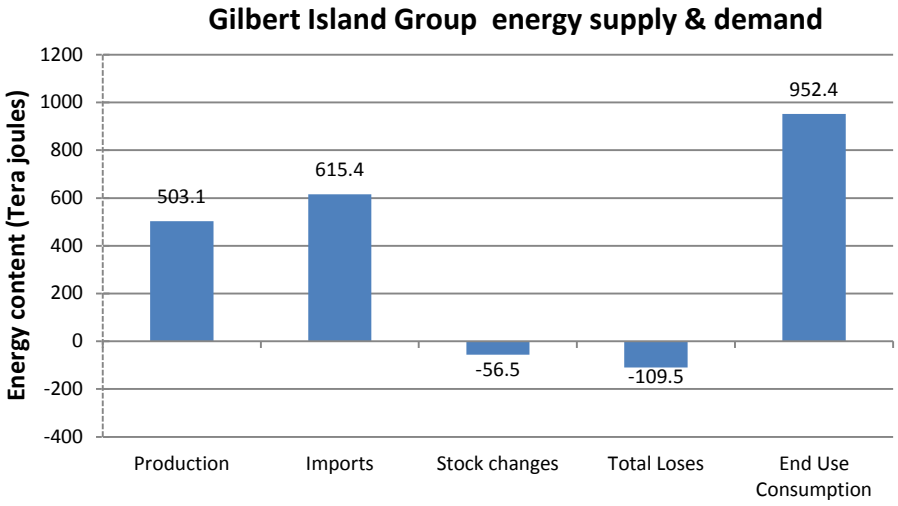
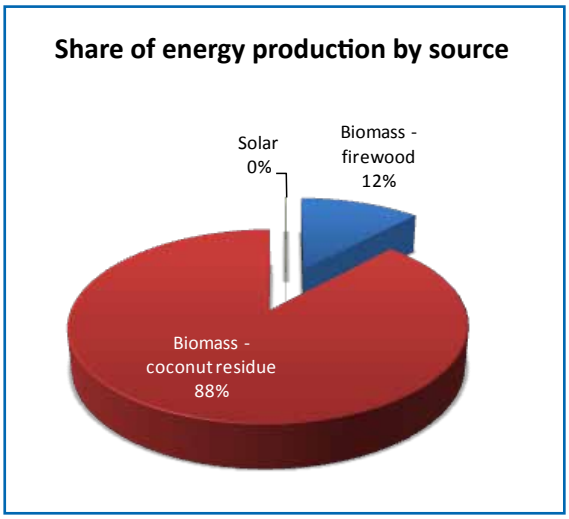


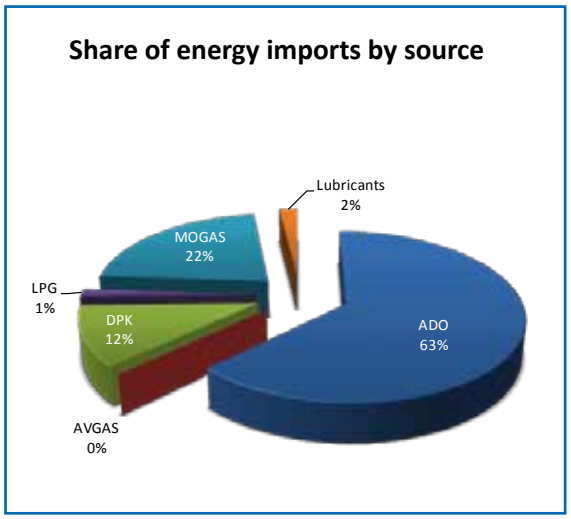
Table 1B: Energy supply and demand balance, 2001

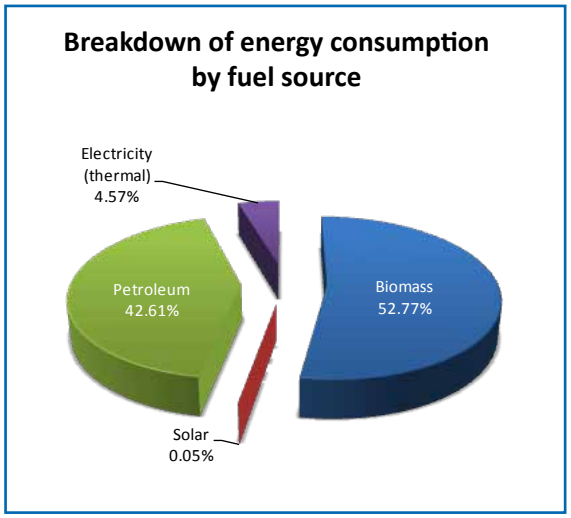
Energy balance Year: 2001 Unit: Terajoules	Coconut & palm oil residues	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	442.5	60.1	502.6							0.0		0.5	503.1
plus imports			0.0	386.9	0.5	71.8	8.5	135.8	11.9	615.4			615.4
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	46.5	0.5	-1.3	0.0	10.7	0.0	56.5			56.5
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	442.5	60.1	502.6	340.3	0.0	73.1	8.5	125.1	11.9	558.9		0.5	1,062.0
minus CONVERSION SECTOR													
Electricity generation			0.0	150.2					2.9	153.1	-54.5		98.6
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	10.9		10.9
= NET OR FINAL ENERGY SUPPLY	442.5	60.1	502.6	190.1	0.0	73.1	8.5	125.1	9.0	405.8	43.6	0.5	952.4
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				8.8		0.1		9.9		18.9	0.0		18.9
Road transport			0.0	112.8				77.0	3.1	193.0			193.0
Air transport			0.0		0.0	55.9			3.0	58.8			58.8
Sea transport			0.0	66.4				36.5	2.5	105.5			105.5
Government & industrial				2.0		0.0			0.4		10.2		10.2
Commercial sector			0.0			1.1	2.6	0.0	0.0	3.7	16.9		20.5
Community & social services	0.0	0.0	0.0			0.9	1.7			2.6	0.0		2.6
Residential	442.5	60.1	502.6			15.1	4.3	1.6		21.0	16.5	0.5	540.6
= FINAL ENERGY CONSUMPTION	442.5	60.1	502.6	190.1	0.0	73.1	8.5	125.1	9.0	405.8	43.6	0.5	952.4

Figure 2: Gilbert Island Group energy overview – 2001









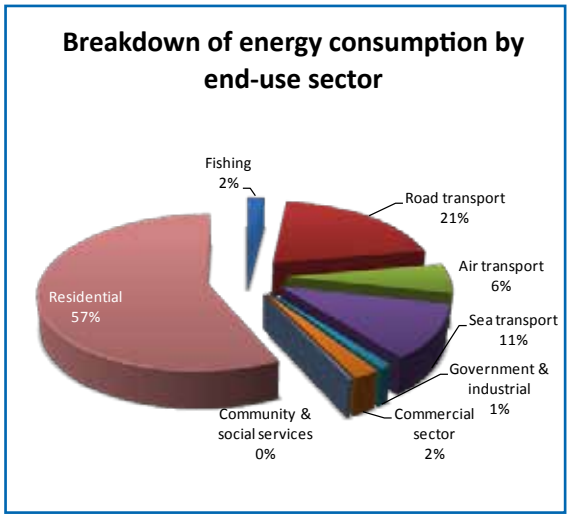
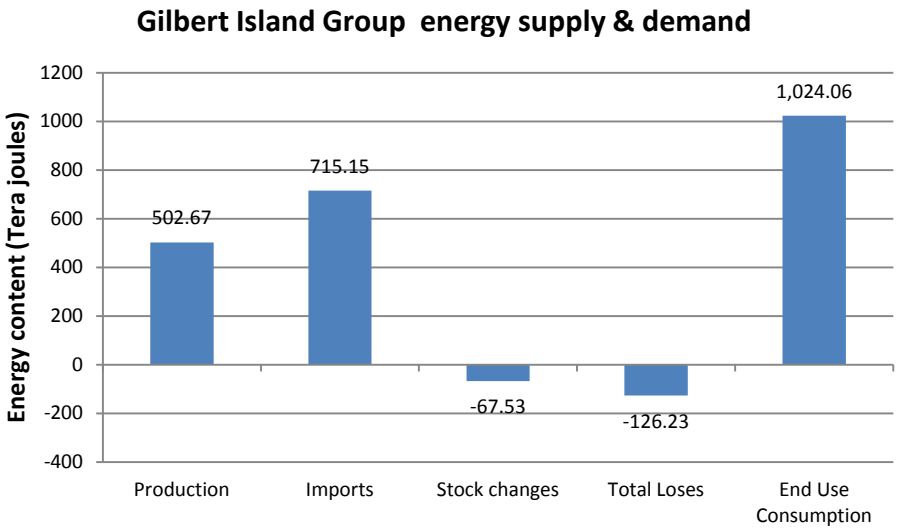
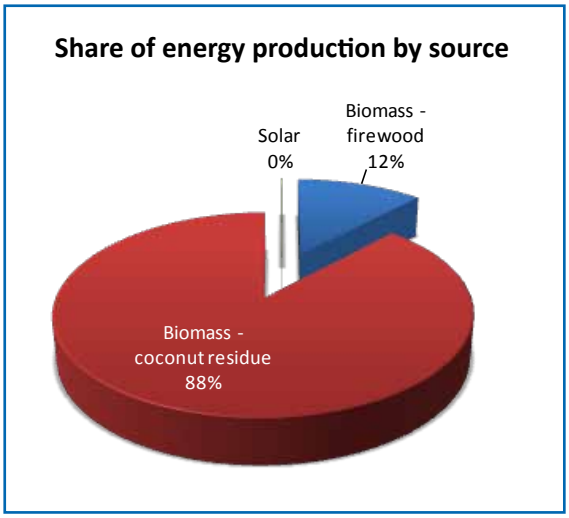


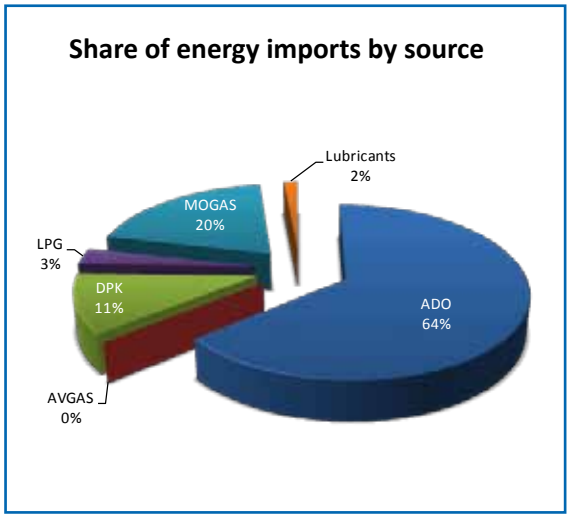
Table 1C: Energy supply and demand balance, 2002

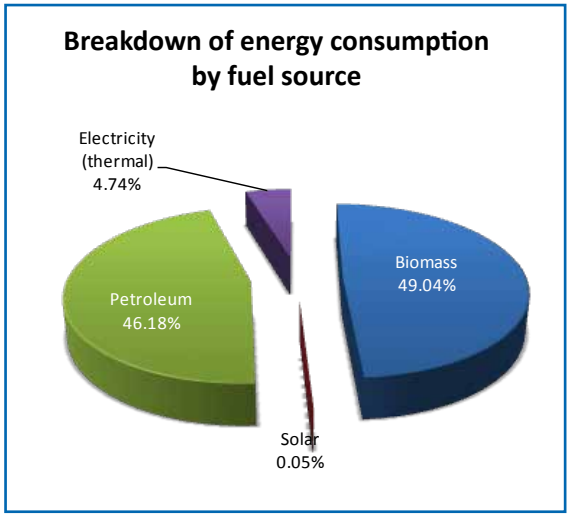
Energy balance Year: 2002 Unit: Terajoules	Coconut & palm oil residues	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	442.2	60.0	502.2							0.0		0.5	502.7
plus imports			0.0	458.7	0.5	80.1	22.4	142.8	10.6	715.1			715.1
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	76.7	0.5	-18.8	0.0	9.1	0.0	67.5			67.5
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	442.2	60.0	502.2	382.0	0.0	98.9	22.4	133.7	10.6	647.6		0.5	1,150.3
minus CONVERSION SECTOR													
Electricity generation			0.0	172.1					2.7	174.7	-62.5		112.2
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	14.0		14.0
= NET OR FINAL ENERGY SUPPLY	442.2	60.0	502.2	209.9	0.0	98.9	22.4	133.7	8.0	472.9	48.5	0.5	1,024.1
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				10.2		0.0		12.0		22.2	0.0		22.2
Road transport			0.0	113.2				78.9	2.8	194.9			194.9
Air transport			0.0		0.0	74.2			2.6	76.8			76.8
Sea transport			0.0	83.6				40.9	2.2	126.8			126.8
Government & industrial				2.9		0.1			0.3		11.3		11.3
Commercial sector			0.0			1.6	6.7	0.0	0.0	8.3	19.5		27.8
Community & social services	0.0	0.0	0.0			1.2	4.5			5.7	0.0		5.7
Residential	442.2	60.0	502.2			21.8	11.2	1.9		34.9	17.7	0.5	555.2
= FINAL ENERGY CONSUMPTION	442.2	60.0	502.2	209.9	0.0	98.9	22.4	133.7	8.0	472.9	48.5	0.5	1,024.1

Figure 3: Gilbert Island Group energy overview – 2002









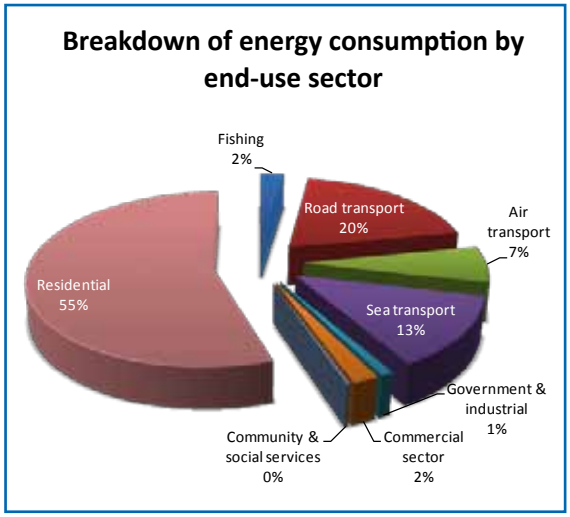
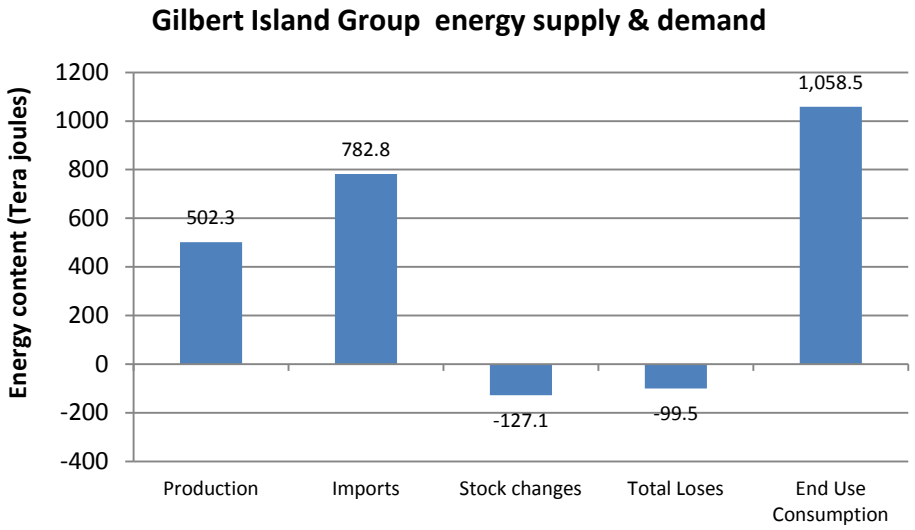
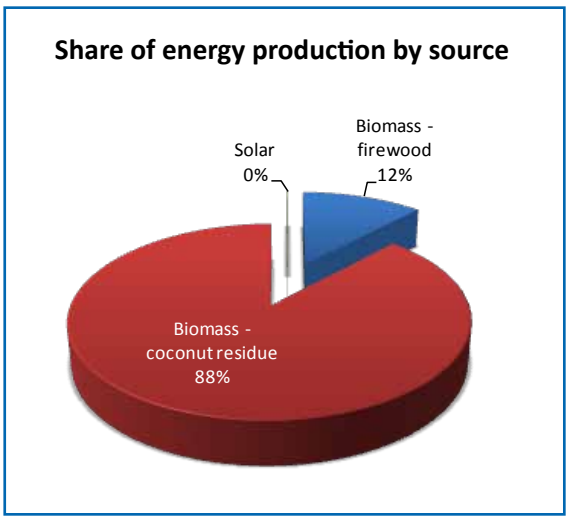


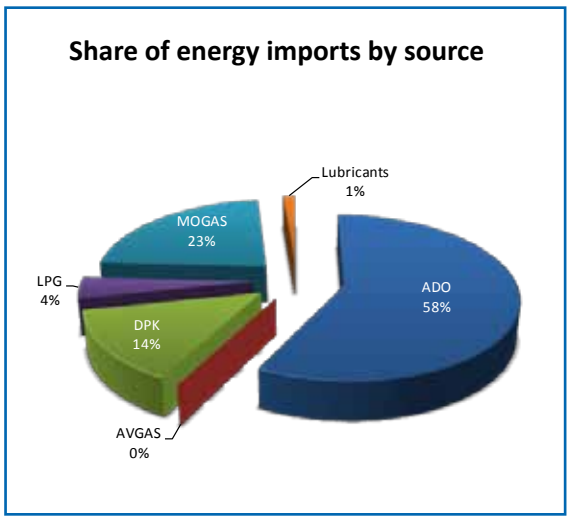
Table 1D: Energy supply and demand balance, 2003

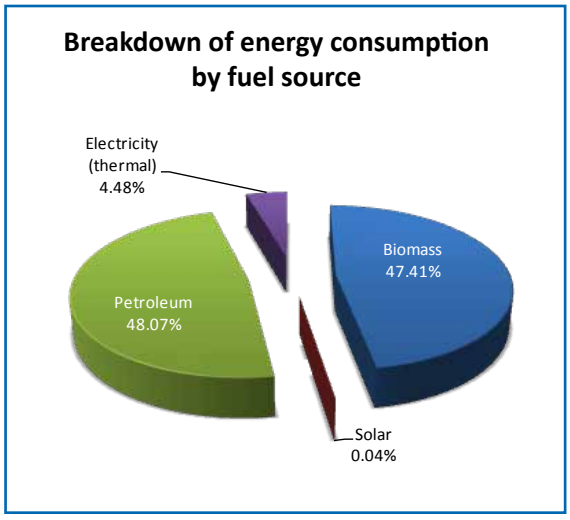
Energy balance Year: 2003 Unit: Terajoules	Coconut & palm oil residues	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	441.9	60.0	501.9							0.0		0.5	502.3
plus imports			0.0	451.3	0.5	109.5	32.6	178.6	10.2	782.8			782.8
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	84.5	0.5	24.2	0.0	17.9	0.0	127.1			127.1
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	441.9	60.0	501.9	366.9	0.0	85.3	32.6	160.7	10.2	655.7		0.5	1,158.0
minus CONVERSION SECTOR													
Electricity generation			0.0	146.3					0.7	146.9	-63.6		83.4
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	16.2		16.2
= NET OR FINAL ENERGY SUPPLY	441.9	60.0	501.9	220.6	0.0	85.3	32.6	160.7	9.6	508.8	47.4	0.5	1,058.5
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				10.6		0.0		15.7		26.3	0.0		26.3
Road transport			0.0	104.3				85.1	3.4	192.7			192.7
Air transport			0.0		0.0	62.0			3.2	65.2			65.2
Sea transport			0.0	103.4				57.4	2.7	163.6			163.6
Government & industrial				2.3		0.1			0.4		9.9		9.9
Commercial sector			0.0			1.4	9.8	0.0	0.0	11.1	18.4		29.5
Community & social services	0.0	0.0	0.0			1.2	6.5			7.7	0.0		7.7
Residential	441.9	60.0	501.9			20.7	16.3	2.5		39.4	19.1	0.5	560.8
= FINAL ENERGY CONSUMPTION	441.9	60.0	501.9	220.6	0.0	85.3	32.6	160.7	9.6	508.8	47.4	0.5	1,058.5

Figure 4: Gilbert Island Group energy overview – 2003









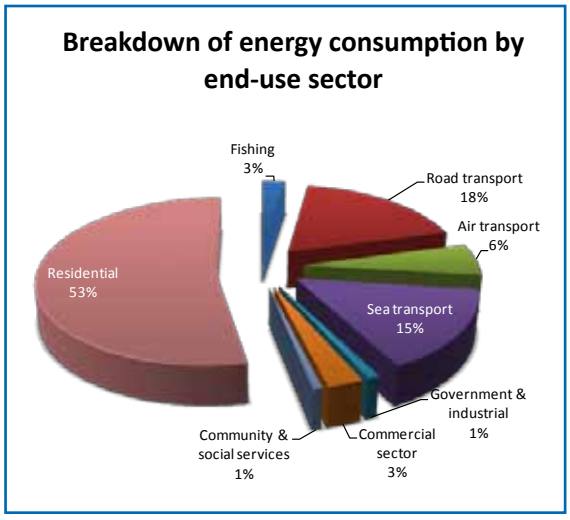
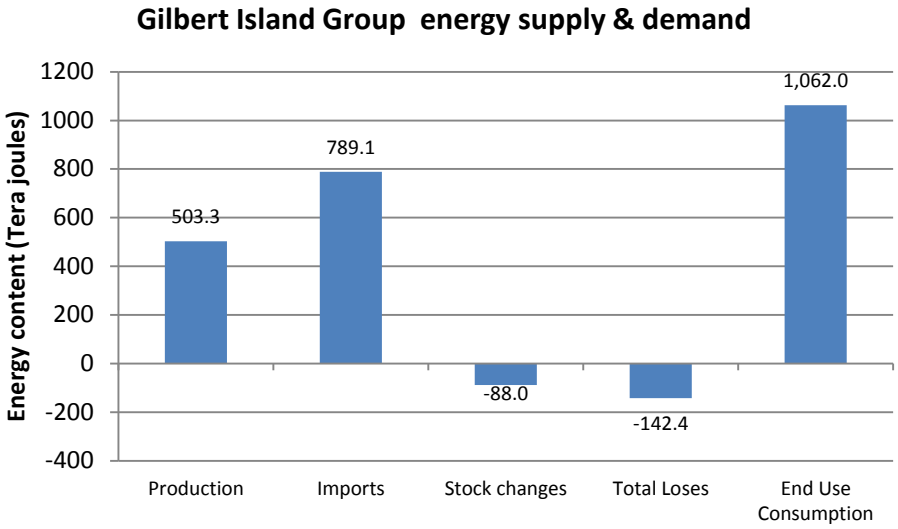
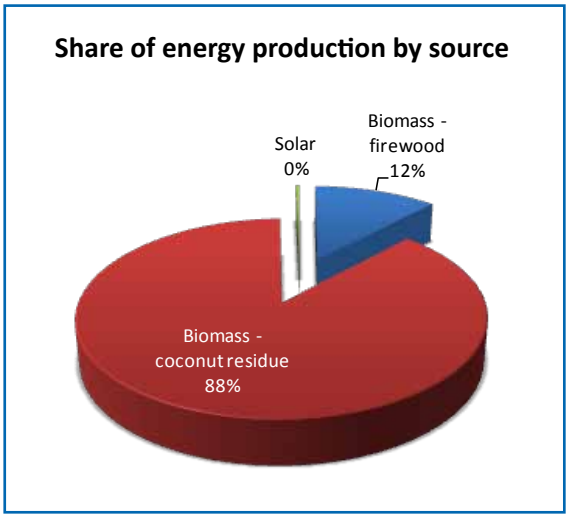


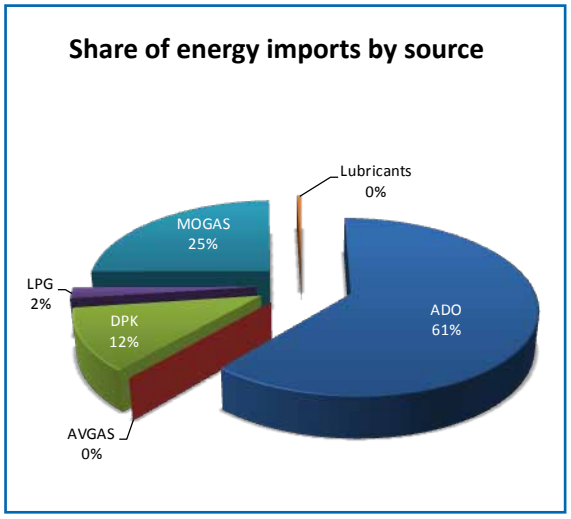
Table 1E: Energy supply and demand balance, 2004

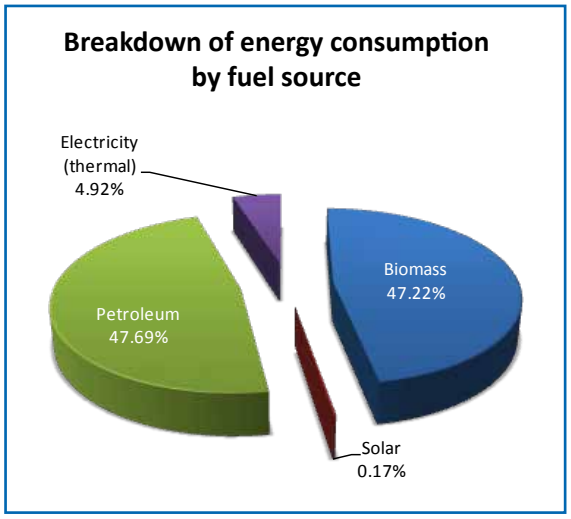
Energy balance Year: 2004 Unit: Terajoules	Coconut & palm oil residues	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	441.6	59.9	501.5							0.0		1.8	503.3
plus imports			0.0	483.7	0.5	90.6	16.2	194.2	3.8	789.1			789.1
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	55.7	0.5	2.0	0.0	29.8	0.0	88.0			88.0
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	441.6	59.9	501.5	428.1	0.0	88.7	16.2	164.4	3.8	701.1		1.8	1,204.4
minus CONVERSION SECTOR													
Electricity generation			0.0	194.2					0.5	194.6	-73.8		120.8
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	21.5		21.5
= NET OR FINAL ENERGY SUPPLY	441.6	59.9	501.5	233.9	0.0	88.7	16.2	164.4	3.3	506.5	52.3	1.8	1,062.0
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				15.1		1.4		17.6		34.1	0.0		34.1
Road transport			0.0	111.7				91.9	1.2	204.8			204.8
Air transport			0.0		0.0	69.2			1.1	70.2			70.2
Sea transport			0.0	104.7				52.4	0.9	158.1			158.1
Government & industrial				2.3		0.0			0.1		13.8		13.8
Commercial sectors			0.0			1.0	4.9	0.0	0.0	5.9	17.5		23.4
Community & social services	0.0	0.0	0.0			0.9	3.2			4.1	0.0		4.1
Residential	441.6	59.9	501.5			16.2	8.1	2.4		26.7	20.9	1.8	550.9
= FINAL ENERGY CONSUMPTION	441.6	59.9	501.5	233.9	0.0	88.7	16.2	164.4	3.3	506.5	52.3	1.8	1,062.0

Figure 5: Gilbert Island Group energy overview – 2004









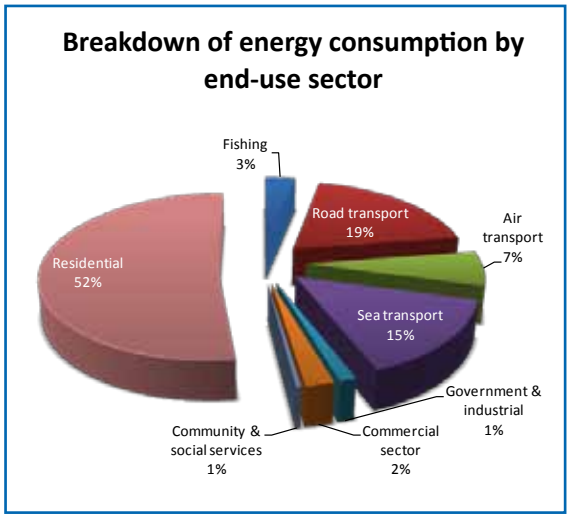
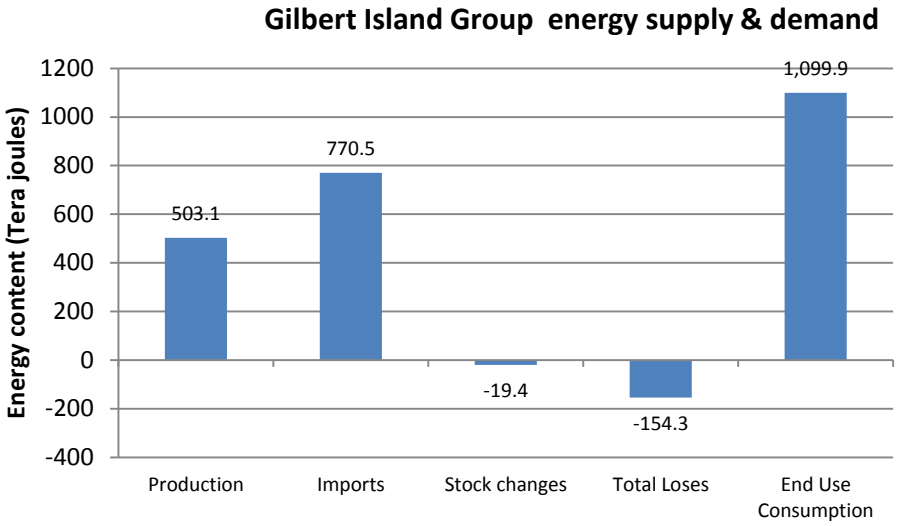
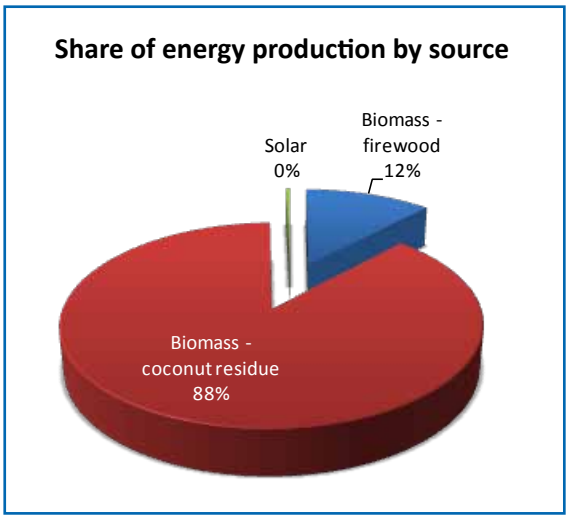


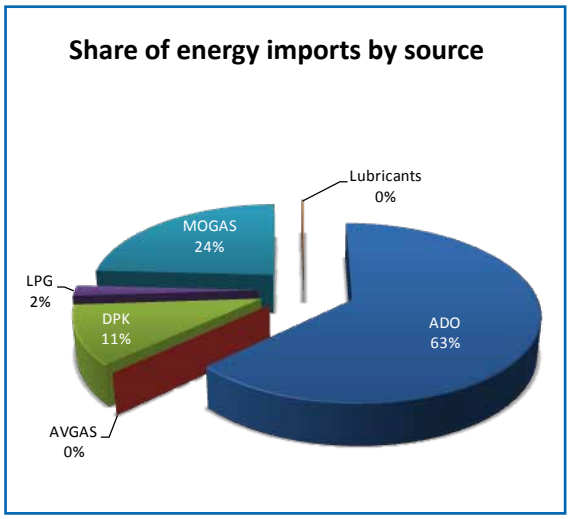
Table 1F: Energy supply and demand balance, 2005

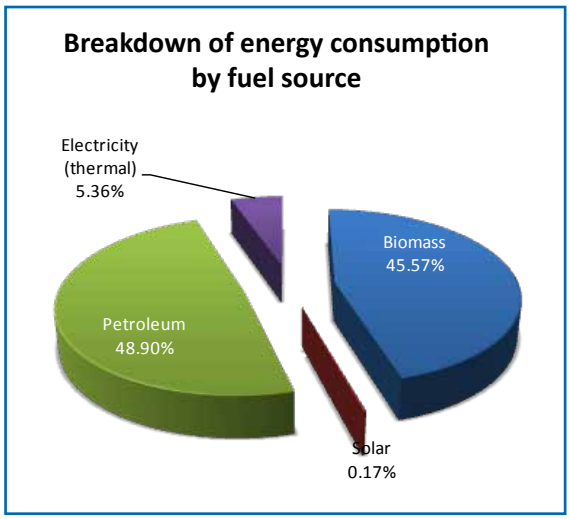
Energy balance Year: 2005 Unit: Terajoules	Coconut & palm oil residue	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	MOGAs	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	441.4	59.9	501.3							0.0		1.9	503.1
plus imports			0.0	485.6	0.5	83.6	15.0	184.0	1.8	770.5			770.5
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	10.6	0.1	-0.9	0.0	9.6	0.0	19.4			19.4
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	441.4	59.9	501.3	475.0	0.5	84.4	15.0	174.4	1.8	751.0		1.9	1,254.2
minus CONVERSION SECTOR													
Electricity generation			0.0	212.5					0.7	213.2	-81.0		132.2
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	22.1		22.1
= NET OR FINAL ENERGY SUPPLY	441.4	59.9	501.3	262.5	0.5	84.4	15.0	174.4	1.1	537.9	58.9	1.9	1,099.9
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				0.0		0.0		0.0		0.0	0.0		0.0
Road transport			0.0	148.9				97.4	0.4	246.7			246.7
Air transport			0.0		0.5	67.7			0.4	68.5			68.5
Sea transport			0.0	110.9				74.3	0.3	185.4			185.4
Government & industrial				2.7		0.0			0.0		12.2		12.2
Commercial sector			0.0			0.9	4.5	0.0	0.0	5.4	18.3		23.8
Community & social services	0.0	0.0	0.0			0.8	3.0			3.8	0.0		3.8
Residential	441.4	59.9	501.3			15.0	7.5	2.7		25.2	28.4	1.9	556.7
= FINAL ENERGY CONSUMPTION	441.4	59.9	501.3	262.5	0.5	84.4	15.0	174.4	1.1	537.9	58.9	1.9	1,099.9

Figure 6: Gilbert Island Group energy overview – 2005









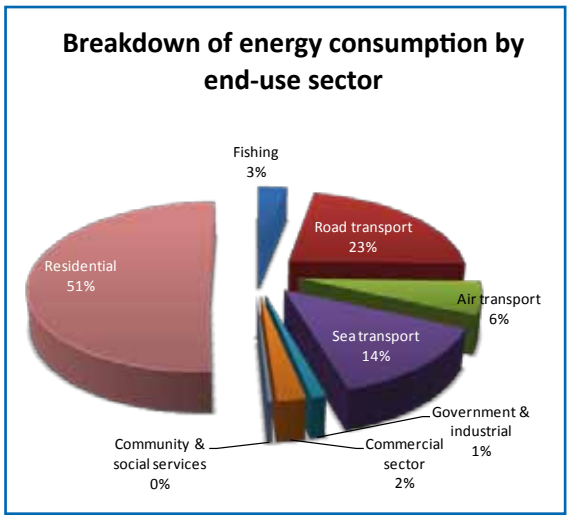
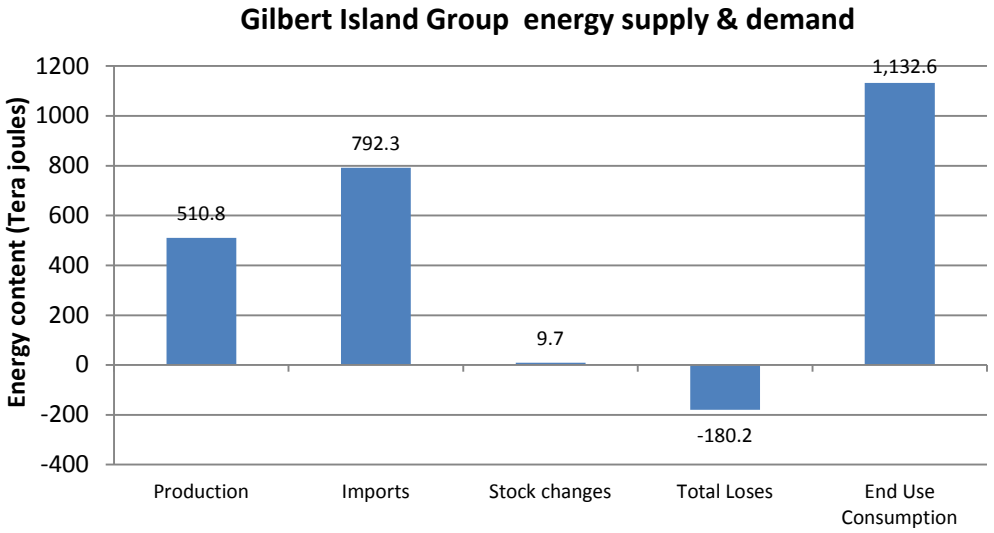
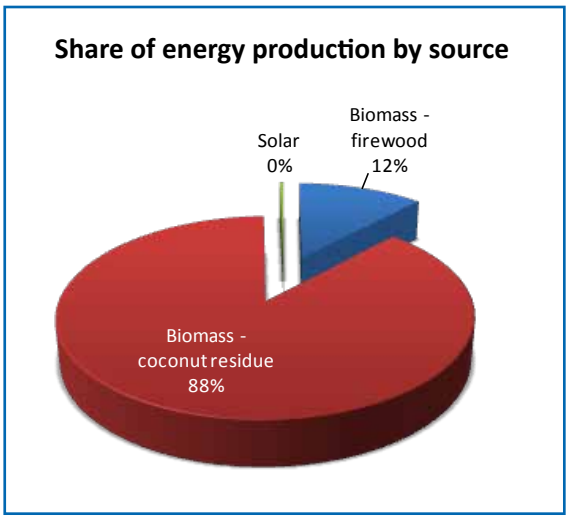


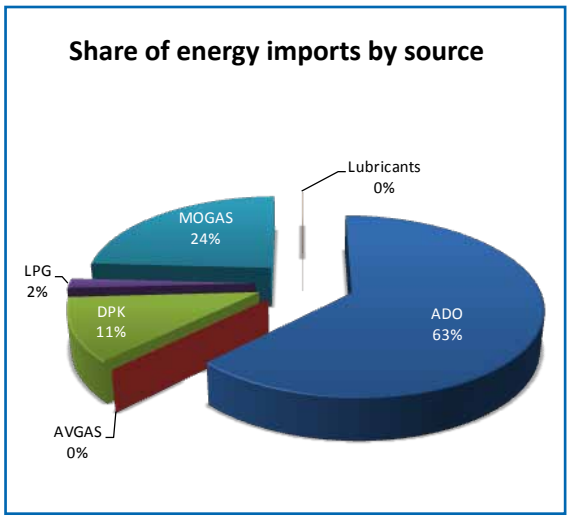
Table 1G: Energy supply and demand balance, 2006

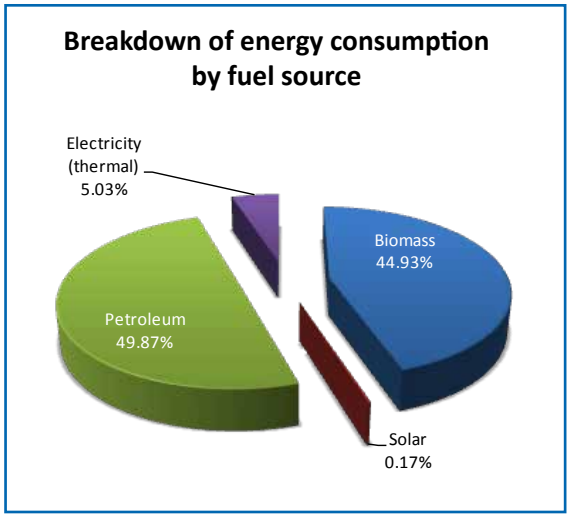
Energy balance Year: 2006 Unit: Terajoules	Coconut & palm oil residues	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	448.0	60.8	508.8							0.0		1.8	510.7
plus imports			0.0	496.1	0.5	90.7	14.0	190.5	0.5	792.3			792.3
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	-12.4	0.3	-8.0	0.0	10.4	0.0	-9.7			-9.7
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	448.0	60.8	508.8	508.5	0.2	98.7	14.0	180.1	0.5	802.0		1.8	1,312.7
minus CONVERSION SECTOR													
Electricity generation			0.0	236.8					0.3	237.1	-85.0		152.1
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	28.1		28.1
= NET OR FINAL ENERGY SUPPLY	448.0	60.8	508.8	271.6	0.2	98.7	14.0	180.1	0.2	564.9	57.0	1.8	1,132.5
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				0.0		0.0		0.0		0.0	0.0		0.0
Road transport			0.0	137.2				96.8	0.1	234.1			234.1
Air transport			0.0		0.2	78.5			0.1	78.8			78.8
Sea transport			0.0	131.6				80.5	0.1	212.2			212.2
Government & industrial				2.8		0.0			0.0		16.0		16.0
Commercial sector			0.0			1.2	4.2	0.0	0.0	5.4	16.2		21.6
Community & social services	0.0	0.0	0.0			1.0	2.8			3.8	0.0		3.8
Residential	448.0	60.8	508.8			18.0	7.0	2.8		27.8	24.7	1.8	563.2
= FINAL ENERGY CONSUMPTION	448.0	60.8	508.8	271.6	0.2	98.7	14.0	180.1	0.2	564.9	57.0	1.8	1,132.5

Figure 7: Gilbert Island Group energy overview – 2006









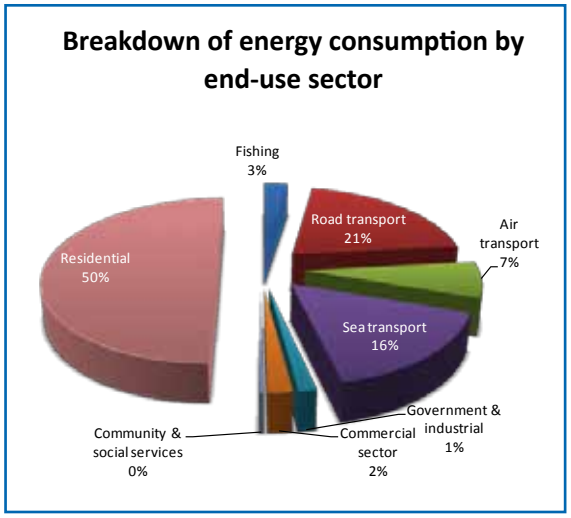
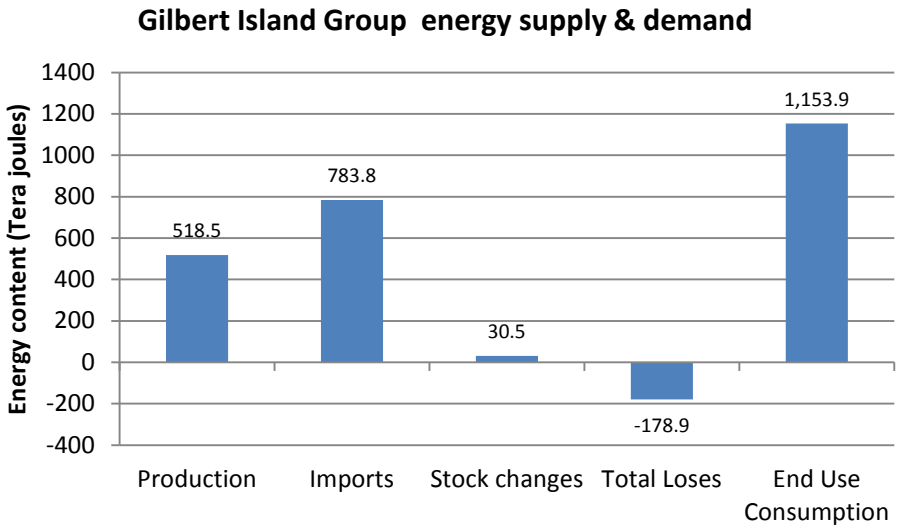
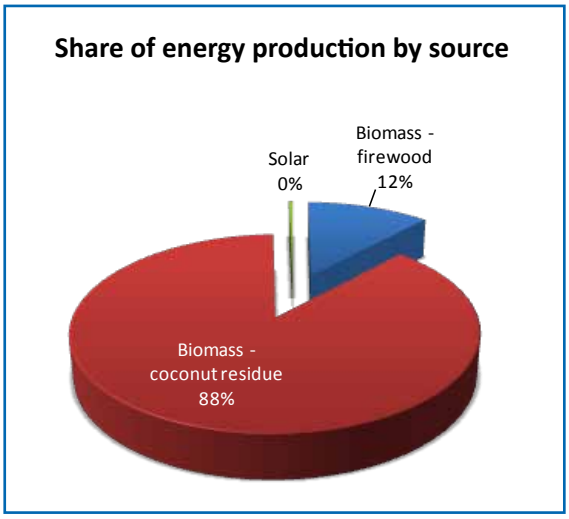


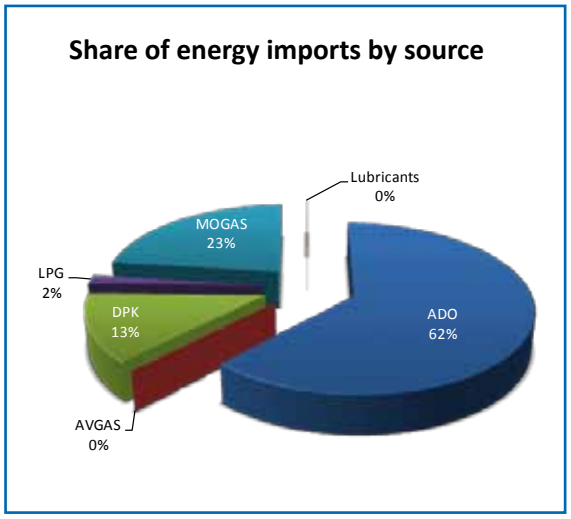
Table 1H: Energy supply and demand balance, 2007

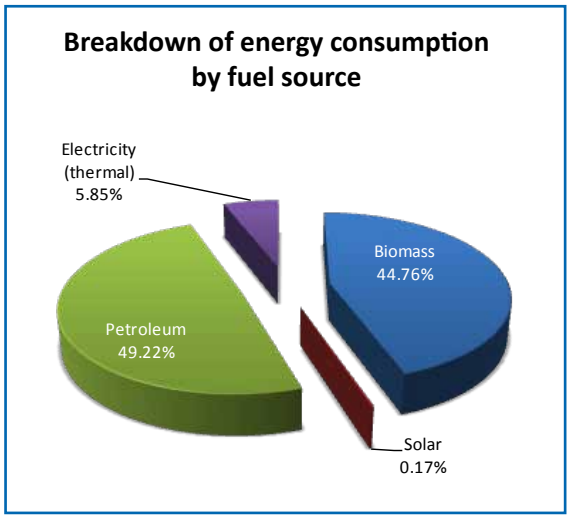
Energy balance Year: 2007 Unit: Terajoules	Coconut & palm oil residues	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	454.8	61.7	516.5							0.0		1.8	518.4
plus imports			0.0	487.4	0.5	102.8	13.8	178.9	0.4	783.8			783.8
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	-29.2	0.5	-3.6	0.0	1.8	0.0	-30.5			-30.5
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	454.8	61.7	516.5	516.6	0.0	106.4	13.8	177.1	0.4	814.2		1.8	1,332.6
minus CONVERSION SECTOR													
Electricity generation			0.0	246.2					0.2	246.4	-85.0		161.4
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	17.5		17.5
= NET OR FINAL ENERGY SUPPLY	454.8	61.7	516.5	270.4	0.0	106.4	13.8	177.1	0.2	567.9	67.5	1.8	1,153.7
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				0.0		0.0		0.0		0.0	0.0		0.0
Road transport			0.0	118.4				90.1	0.1	208.6			208.6
Air transport			0.0		0.0	89.6			0.1	89.7			89.7
Sea transport			0.0	149.1				84.3	0.1	233.5			233.5
Government & industrial				2.9		0.1			0.0		30.0		30.0
Commercial sector			0.0			1.0	4.1	0.0	0.0	5.1	10.3		15.4
Community & social services	0.0	0.0	0.0			0.8	2.8			3.6	0.0		3.6
Residential	454.8	61.7	516.5			14.9	6.9	2.6		24.4	27.2	1.8	569.9
= FINAL ENERGY CONSUMPTION	454.8	61.7	516.5	270.4	0.0	106.4	13.8	177.1	0.2	567.9	67.5	1.8	1,153.7

Figure 8: Gilbert Island Group energy overview – 2007









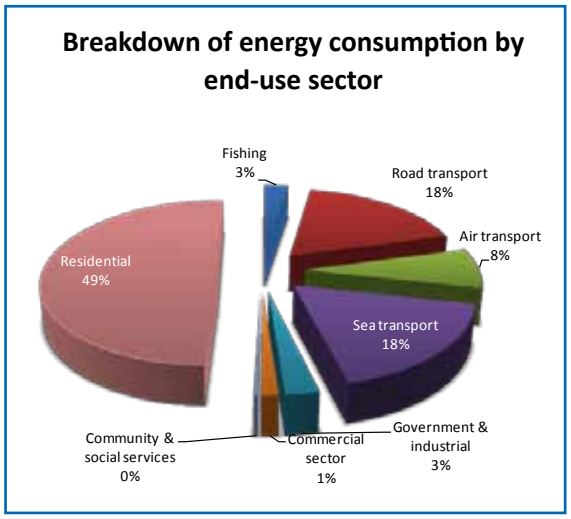
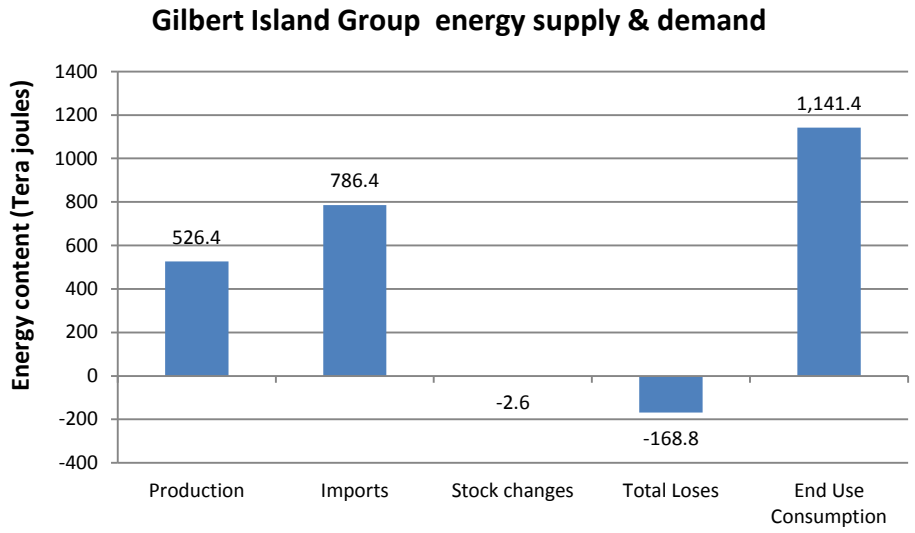
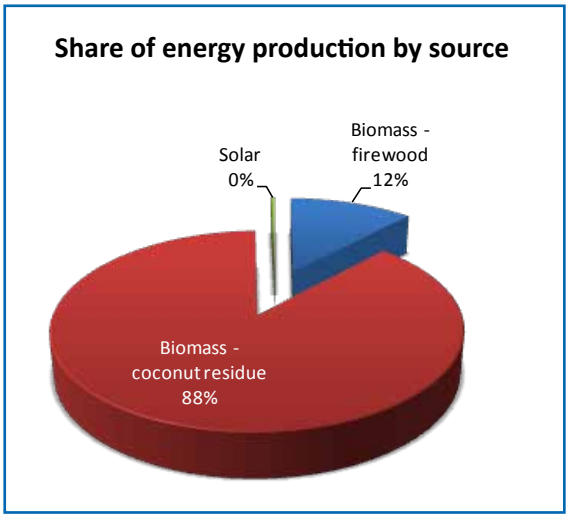


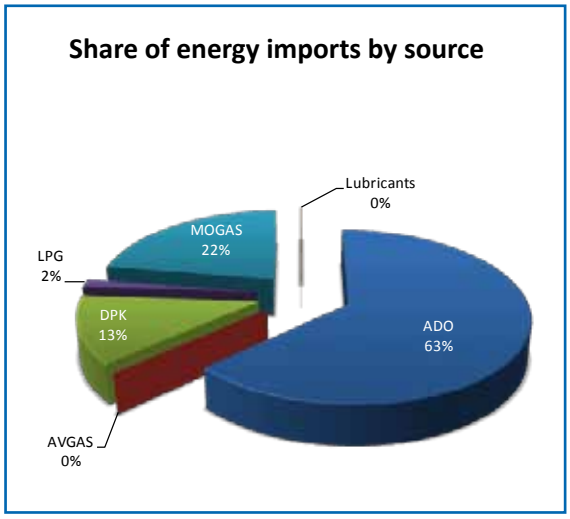
Table 1I: Energy supply and demand balance, 2008

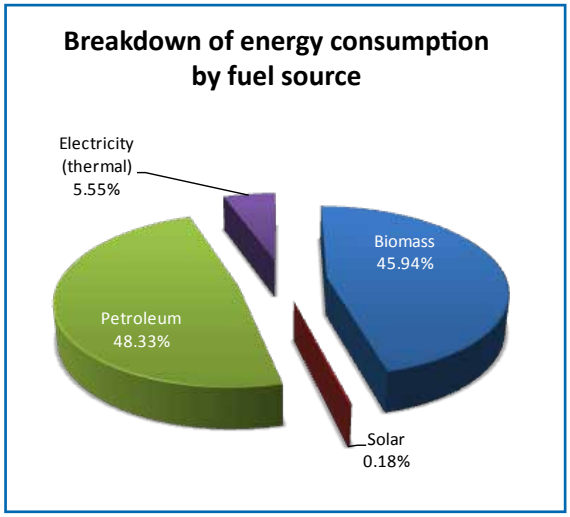
Energy balance Year: 2008 Unit: Terajoules	Coconut & palm oil residues	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	461.7	62.7	524.3							0.0		1.8	526.1
plus imports			0.0	497.6	0.5	100.4	11.7	175.5	0.7	786.4			786.4
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	0.4	0.0	-2.3	0.0	4.4	0.0	2.6			2.6
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	461.7	62.7	524.3	497.1	0.5	102.6	11.7	171.1	0.7	783.8		1.8	1,309.9
minus CONVERSION SECTOR													
Electricity generation			0.0	231.9					0.3	232.2	-80.8		151.4
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	17.4		17.4
= NET OR FINAL ENERGY SUPPLY	461.7	62.7	524.3	265.2	0.5	102.6	11.7	171.1	0.4	551.7	63.4	1.8	1,141.1
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				0.0		0.0		0.0		0.0	0.0		0.0
Road transport			0.0	117.9				94.0	0.1	212.1			212.1
Air transport			0.0		0.5	89.3			0.1	90.0			90.0
Sea transport			0.0	145.1				74.7	0.1	219.9			219.9
Government & industrial				2.2		0.0			0.0		26.4		26.4
Commercial sector			0.0			0.8	3.5	0.0	0.0	4.3	11.1		15.3
Community & social services	0.0	0.0	0.0			0.7	2.3			3.0	0.0		3.0
Residential	461.7	62.7	524.3			11.9	5.8	2.4		20.2	25.9	1.8	572.2
= FINAL ENERGY CONSUMPTION	461.7	62.7	524.3	265.2	0.5	102.6	11.7	171.1	0.4	551.7	63.4	1.8	1,141.1

Figure 9: Gilbert Island Group energy overview – 2008









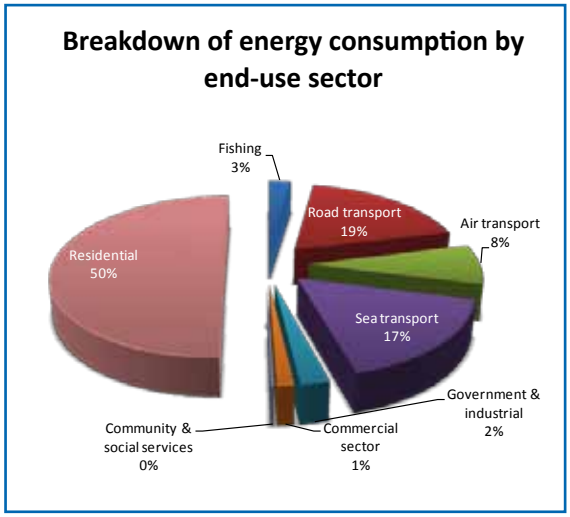
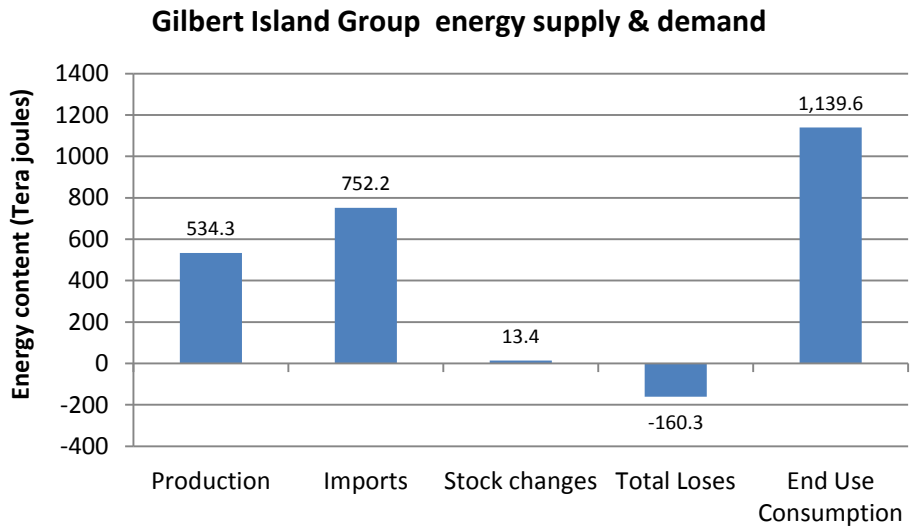


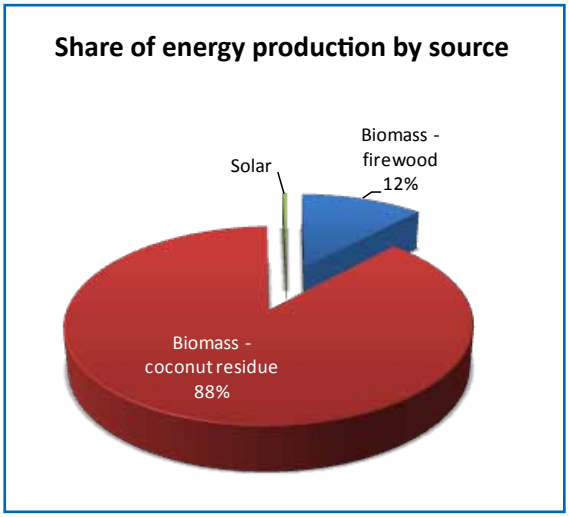
Table 1J: Energy supply and demand balance, 2009

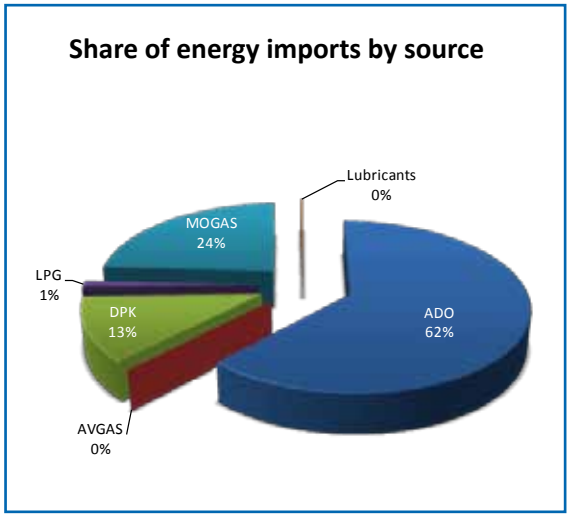
Energy balance Year: 2009 Unit: Terajoules	Coconut & Palm oil residues	Fuelwood & wood waste	Total biomass	ADO	Avgas	DPK	LPG	Mogas	Lubricant	Total petroleum	Electricity	Solar energy Cumulative since 1992	Total energy
ENERGY PRODUCTION AND SUPPLY													
Indigenous production	468.6	63.6	532.3							0.0		1.7	533.9
plus imports			0.0	467.4	0.5	93.4	9.1	179.9	1.8	752.2			752.2
minus re-exports			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
minus stock changes			0.0	-6.2	0.5	-13.8	0.0	6.1	0.0	-13.4			-13.4
+/- statistical discrepancy			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
= TOTAL ENERGY SUPPLY	468.6	63.6	532.3	473.7	0.0	107.2	9.1	173.7	1.8	765.6		1.7	1,299.5
minus CONVERSION SECTOR													
Electricity generation			0.0	222.4					0.5	222.9	-79.9		143.0
Co-generation industries			0.0							0.0			0.0
Own fuel use & losses			0.0							0.0	17.3		17.3
= NET OR FINAL ENERGY SUPPLY	468.6	63.6	532.3	251.3	0.0	107.2	9.1	173.7	1.3	542.7	62.6	1.7	1,139.2
for END-USE SECTOR CONSUMPTION													
Agriculture & forestry	0.0	0.0	0.0	0.0					0.0	0.0	0.0		0.0
Fishing				0.0		0.0		0.0		0.0	0.0		0.0
Road transport			0.0	184.7				108.0	0.5	293.3			293.3
Air transport			0.0		0.0	93.5			0.4	93.9			93.9
Sea transport			0.0	63.9				63.1	0.4	127.4			127.4
Government & industrial				2.6		0.0			0.1		25.8		25.8
Commercial sector			0.0			0.8	2.7	0.0	0.0	3.6	10.2		13.7
Community & social services	0.0	0.0	0.0			0.7	1.8			2.5	0.0		2.5
Residential	468.6	63.6	532.3			12.2	4.6	2.6		19.4	26.6	1.7	579.9
= FINAL ENERGY CONSUMPTION	468.6	63.6	532.3	251.3	0.0	107.2	9.1	173.7	1.3	542.7	62.6	1.7	1,139.2

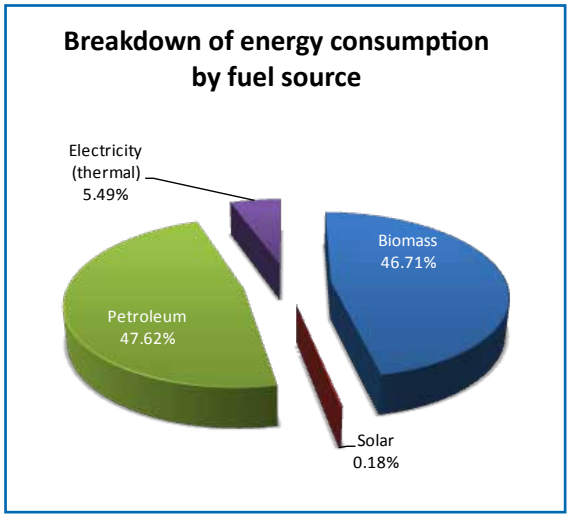
Sources: 1. Kiribati Solar Energy Co. Ltd 2. National energy demand/supply database

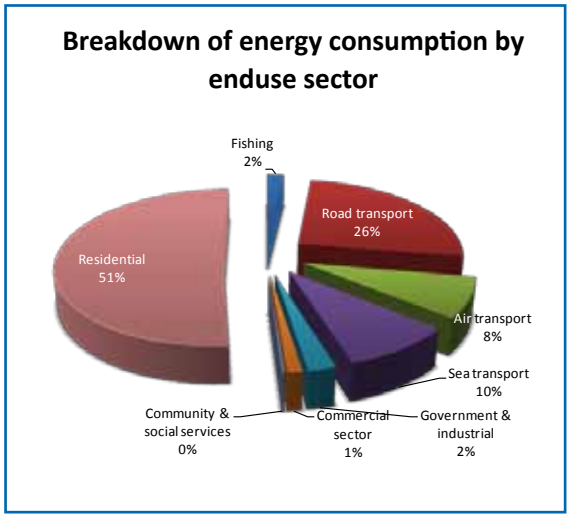
Figure 10: Gilbert Island Group energy overview – 2009











GILBERT ISLAND GROUP ENERGY OVERVIEW 2000–2009

Figure 11: Trend in energy supply & demand for the Gilbert Island group

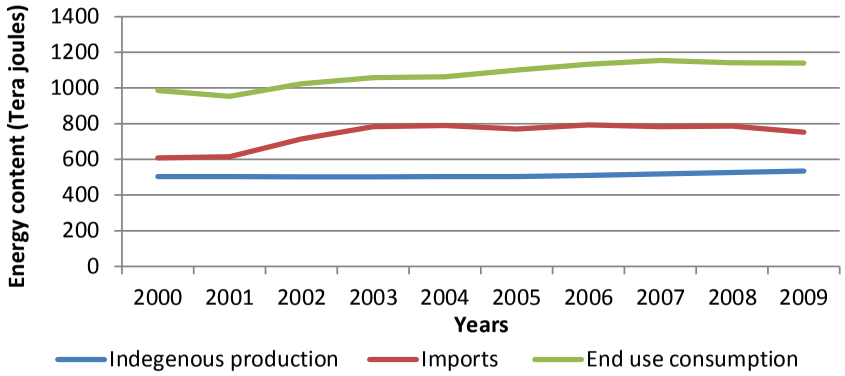
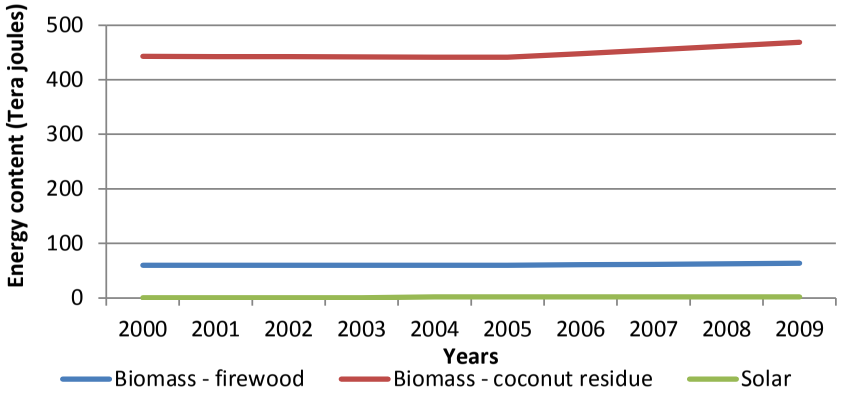


Figure 12: Trend in energy production for the Gilbert Island group



Fiure 13: Trend in energy imports for the Gilbert Island group

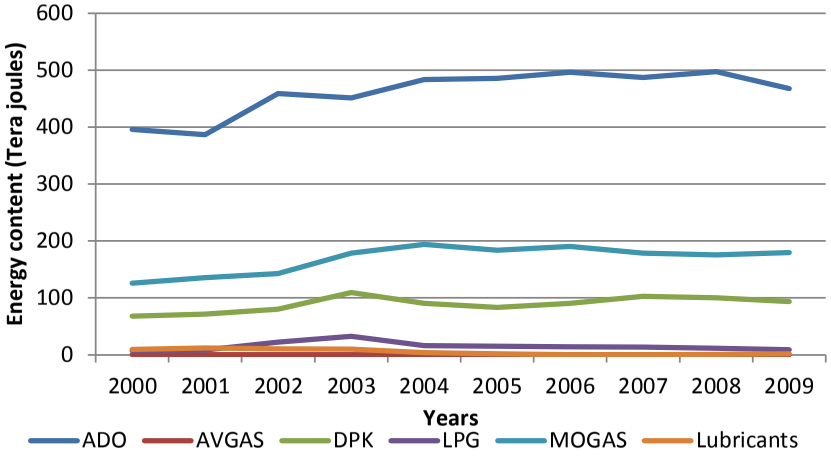


Figure 14: Trend in energy consumption by end use sectors for the Gilbert Island group

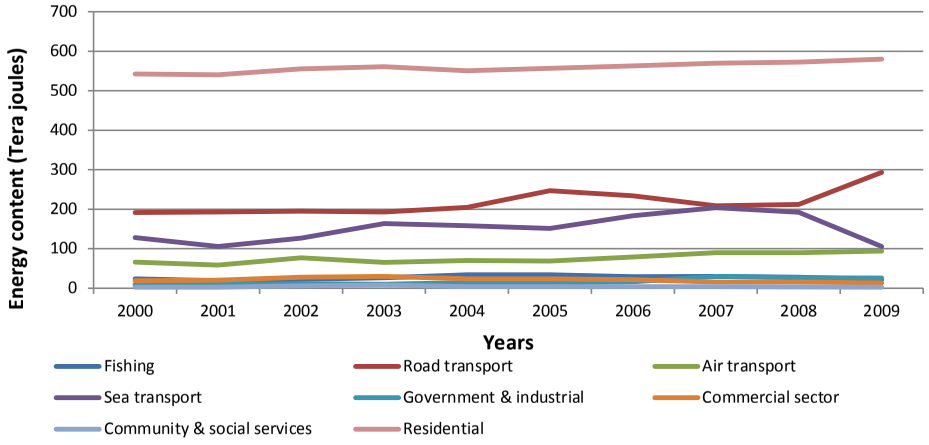


Figure 15: Trend in energy consumption by primary and secondary energy sources for the Gilbert Island group

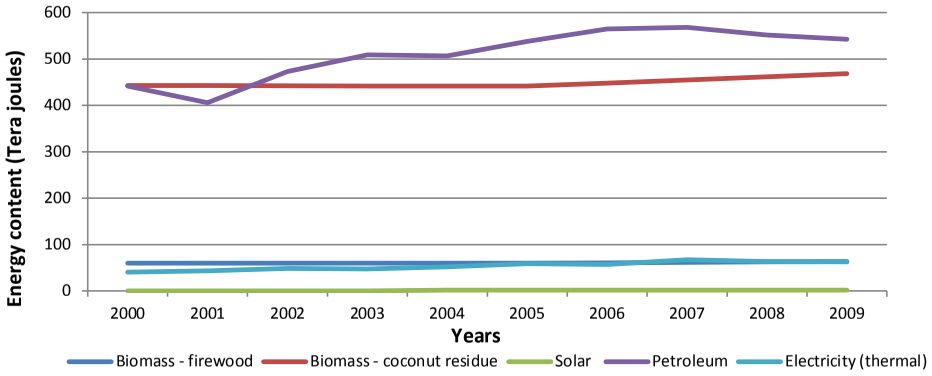


Fig 16: Energy import dependency for the Gilbert Island group

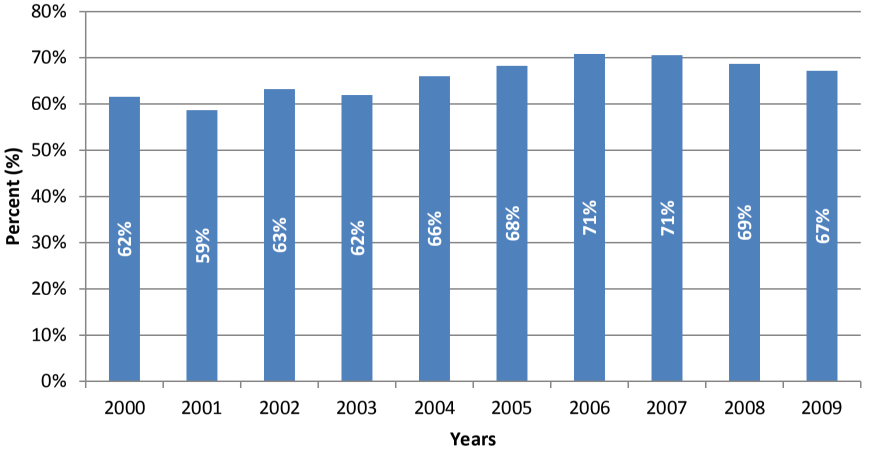


Figure 17: Trend in energy use per real dollar of GDP for Kiribati

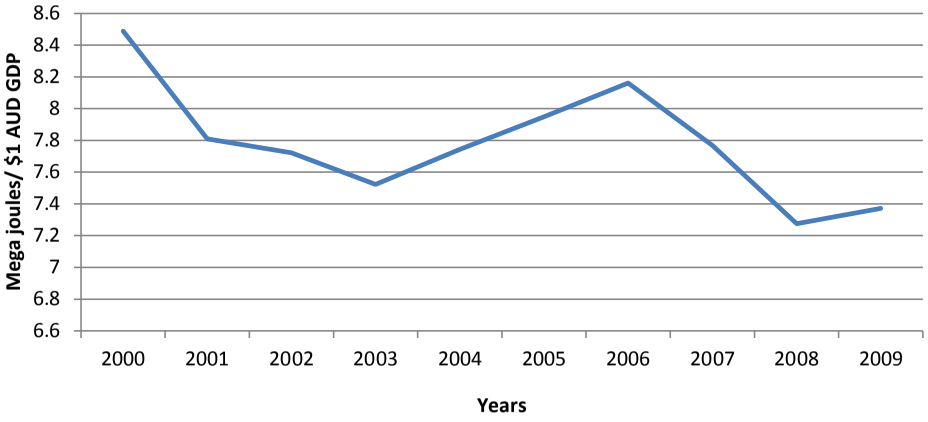
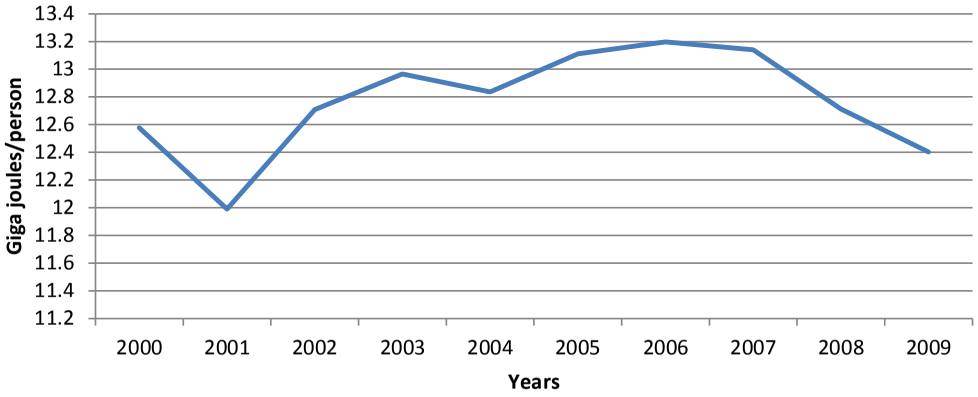


Figure 18: Energy consumption per person for the Gilbert Island group



Chapter 2:
Socio-economic history

Table 2A: Population growth in Kiribati

Unit: As indicated

Year	Rural ('000)	Urban ('000)	Total ('000)
2000	47.78	36.72	84.49
2001	48.67	37.44	86.10
2002	49.57	38.17	87.74
2003	50.49	38.92	89.40
2004	51.43	39.68	91.10
2005	52.22	40.31	92.53
2006	53.19	41.10	94.29
2007	54.18	41.91	96.08
2008	55.19	42.73	97.91
2009	56.22	43.56	99.77
Average annual growth rate (compounded)			
(2000–2005)	1.79%	1.88%	1.83%
(2005–2009)	1.86%	1.96%	1.90%

Source: Statistics Office

Note: Referenced 2000 and 2005 population figures were based on the national census reports. Rest of the years were estimated based on the annual growth rate.

Figure 19: Growth trend of Kiribati's urban and rural populations

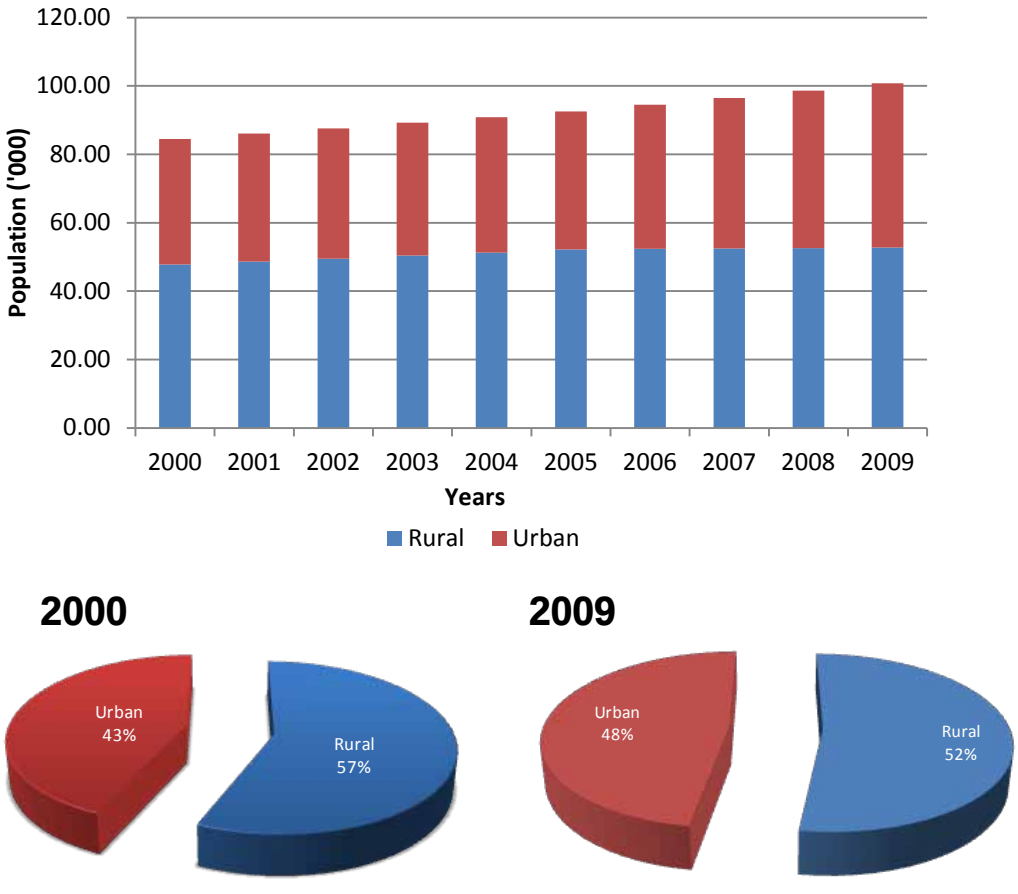


Table 2B: Number of households in Kiribati

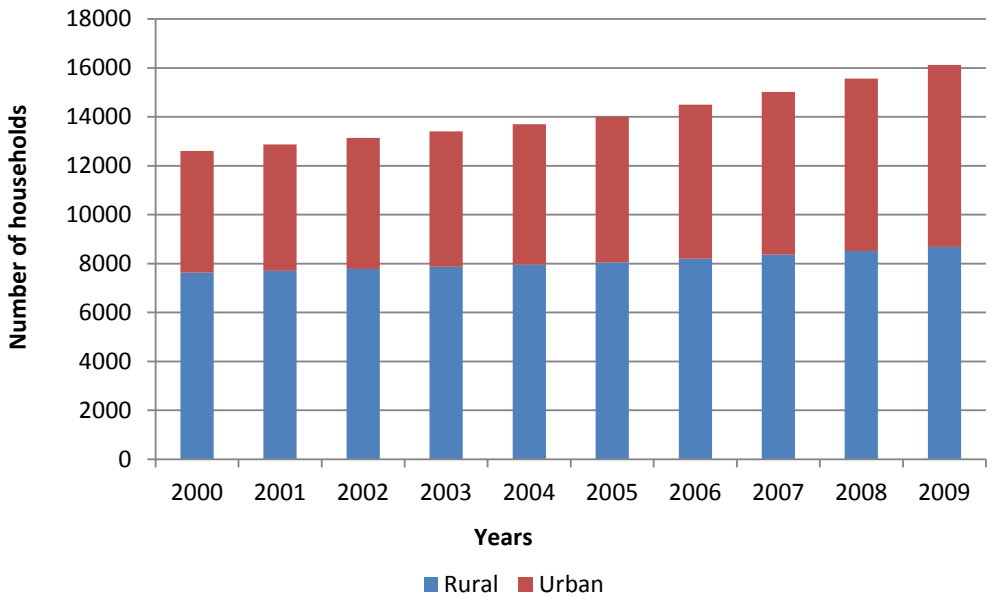
Unit: As indicated

	Rural	Urban	Total
2000	7623	4988	12611
2001	7703	5164	12867
2002	7786	5347	13133
2003	7872	5538	13410
2004	7960	5738	13698
2005	8052	5947	13999
2006	8206	6289	14496
2007	8364	6652	15015
2008	8524	7035	15559
2009	8687	7441	16128
Average annual growth rate (compounded)			
(2000–2005)	1.10%	3.58%	2.11%
(2005–2009)	1.92%	5.76%	3.60%

Source: Statistics Office

Note: Referenced 2000 and 2005 household figures were based on the national census reports. Rest of the years were estimated based on the annual growth rate.

Figure 20: Trend in number of households in Kiribati 2000–2009



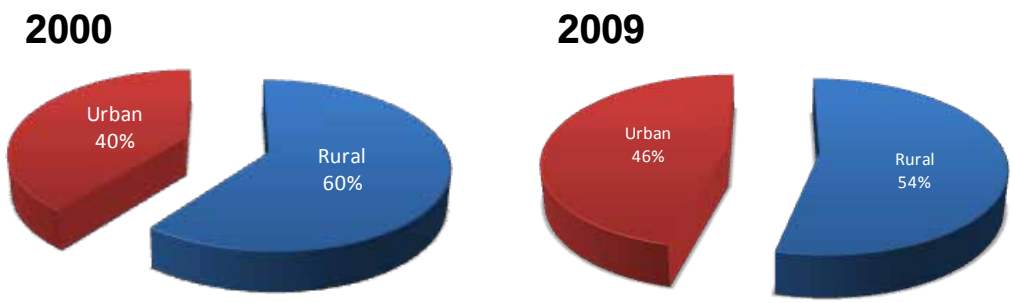


Table 2C: Population and household number in Gilbert Islands group

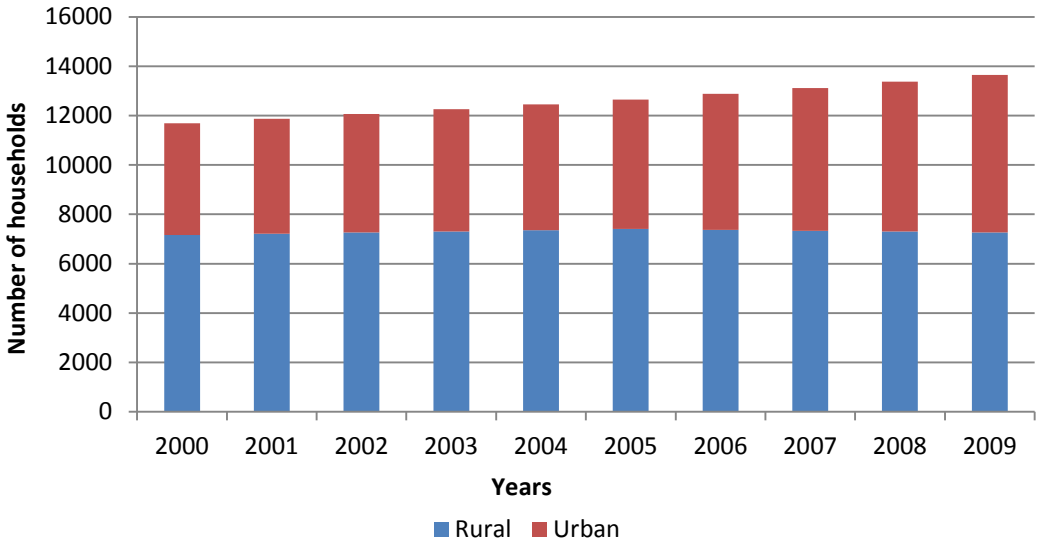
Unit: As indicated

	Population			Household		
	Urban	rural	Total	Rural	Urban	Total
2000	36,717	41,441	78,158	7163	4530	11693
2001	37409	41,824	79233	7211	4665	11876
2002	38114	42,208	80323	7260	4803	12063
2003	38833	42,595	81428	7308	4946	12255
2004	39565	42,983	82548	7358	5093	12451
2005	40311	43,372	83683	7407	5245	12652
2006	42116	43,497	85613	7371	5509	12880
2007	44002	43,586	87588	7335	5786	13122
2008	45973	43,636	89609	7300	6078	13377
2009	48031	43,645	91676	7264	6384	13648
Average annual growth rate (compounded)						
(2000–2005)	*1.89%*	0.39%	1.38%	0.67%	2.97%	1.59%
(2005–2009)	*4.48%*	-0.05%	2.31%	-0.49%	5.03%	1.91%

Source: Statistics Office

Note: Referenced 2000 and 2005 Gilbert Islands population and household figures were based on the national census reports. Rest of the years were estimated based on the annual growth rate.

Figure 21: Trend in number of households in Gilbert Islands group 2000–2009



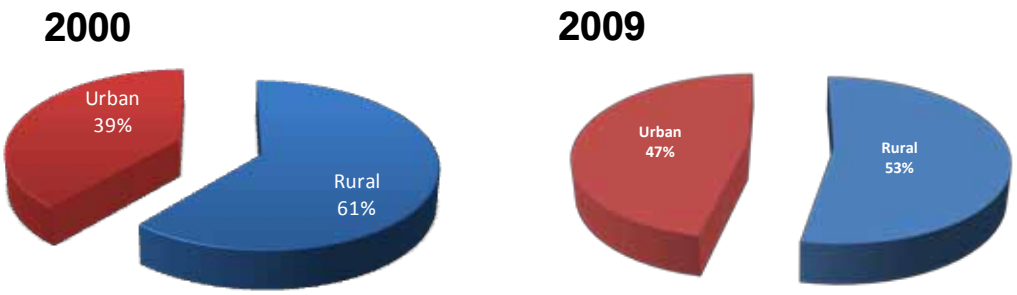


Table 2D: Imports, exports and trade deficit

Unit: AUD '000

Year	Import	Export	Trade deficit
2000	67924.00	6178.00	-61746.00
2001	75008.00	6466.00	-68542.00
2002	91585.00	6322.00	-85263.00
2003	79496.00	4470.00	-75026.00
2004	80753.00	3358.00	-77395.00
2005	100081.00	5643.00	-94438.00
2006	82396.00	3348.00	-79048.00
2007	83632.00	12096.00	-71536.00
2008	87880.00	8790.00	-79090.00
2009	88939.00	8047.00	-80892.00
Average annual growth rate (compounded)			
(2000–2005)	8.06%	-1.80%	8.87%
(2005–2009)	-2.91%	9.28%	-3.80%

Source: Statistics Office

Figure 22: Exports as a percentage of imports 2000–2009

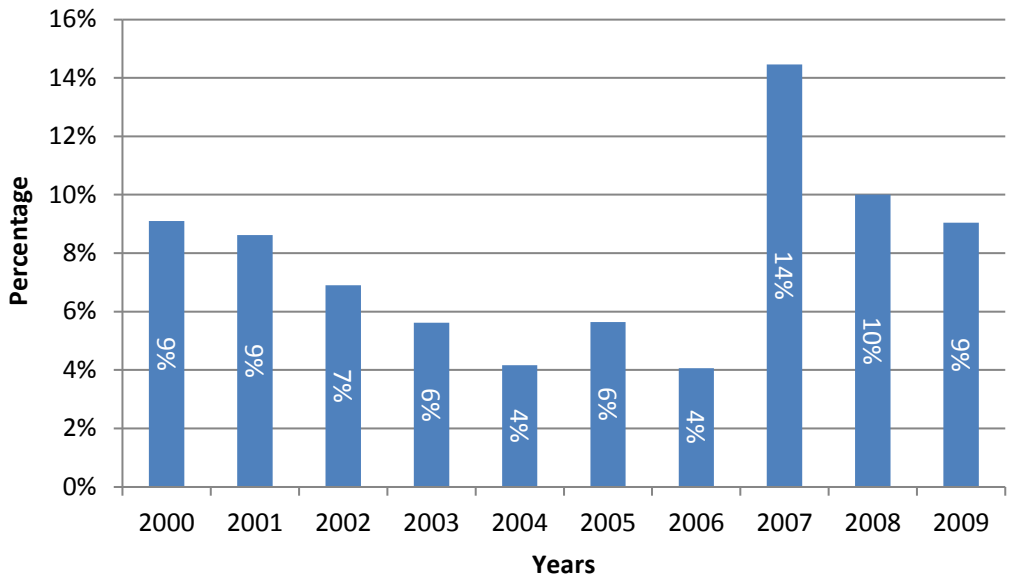


Table 2E: Real GDP, GDP per capita, inflation and exchange rates

Unit: AUD '000, unless otherwise indicated

Year	Current GDP	GDP per capita	Inflation (%)	Exchange rate (local/USD)
2000	134064	1.59	0.91	1.73
2001	135006	1.57	3.87	1.93
2002	135786	1.55	4.73	1.84
2003	141258	1.58	1.86	1.54
2004	145740	1.60	-0.96	1.36
2005	145486	1.57	-0.34	1.31
2006	138949	1.47	-1.47	1.33
2007	149378	1.55	4.21	1.20
2008	153498	1.56	10.97	1.20
2009	152479	1.51	8.37	1.28
Average annual growth rate (compounded)				
(2000–2005)	1.65%	-0.18%		
(2005–2009)	1.18%	-0.98%		

Source: Statistics Office / http://www.spc.int/prism/exchange-rates
Note: GDP per capita calculation is for the whole of Kiribati.

Fig 23a-Inflation (%)

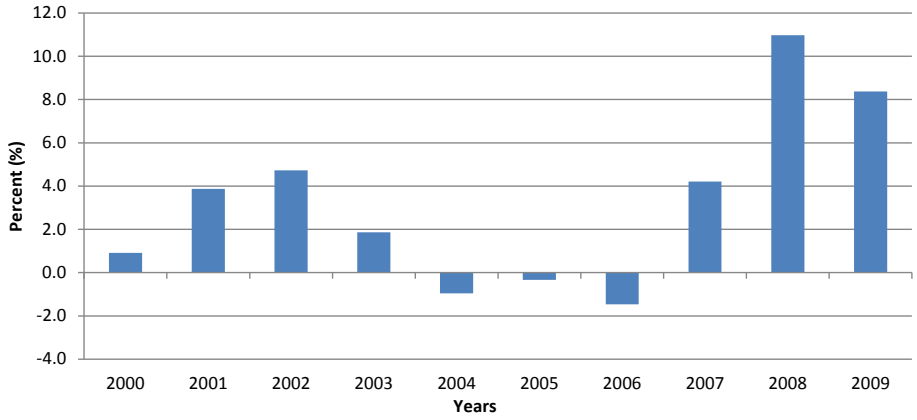


Fig 23b-Real GDP & GDP per Capita

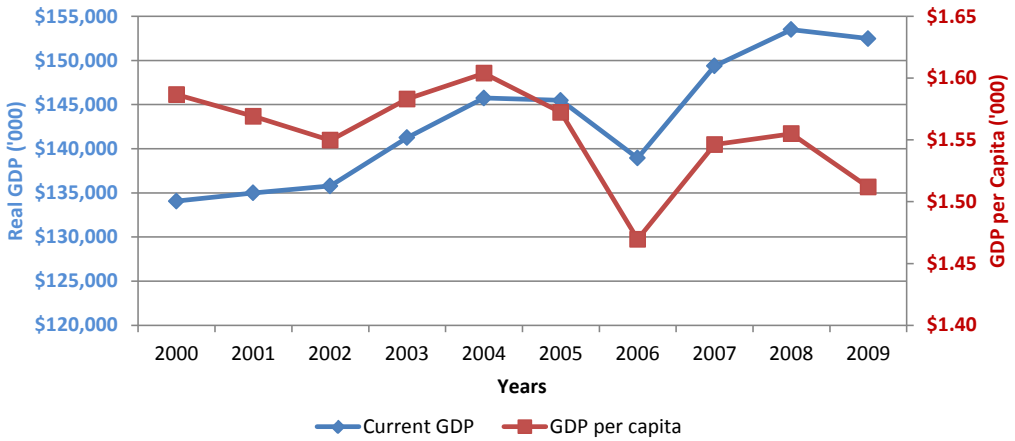


Table 2F: GDP by sector

Unit: AUD '000

Year	Agriculture & fishing	Electricity, gas & water supply	Industrial sector			Commercial sector					Transport and storage	communications	Government sector	Other community, social & personal services
			Mining & quarrying	*Manufacturing*	*Construction*	*Financial intermediation*	*Hotel & restaurants*	*Wholesale & retail trade*	*Business services (3)*	*Real estate (housing business)*				
2000	28,418	301	69	6,224	3,435	5,556	1,514	9,701	1,215	13,778	8,107	5,901	36,245	2,234
2001	29,348	315	74	6,449	3,693	6,135	1,530	10,045	1,243	14,045	7,335	6,168	36,788	2,333
2002	28,215	291	33	6,578	1,632	5,251	1,665	11,060	1,219	14,602	6,520	6,447	37,340	2,260
2003	31,555	374	69	6,153	3,435	6,800	1,957	8,967	1,292	15,188	7,733	6,739	37,900	2,304
2004	32,864	431	137	6,059	6,870	7,379	1,822	9,094	1,335	15,203	7,473	7,044	36,903	2,262
2005	30,416	445	137	6,946	6,870	9,608	1,779	7,042	1,361	15,653	8,110	7,363	39,364	2,343
2006	32,632	475	60	6,789	3,001	10,405	1,117	5,968	1,347	16,200	6,505	7,697	41,524	2,365
2007	33,487	500	133	7,000	6,672	9,751	1,680	9,157	1,432	16,366	5,828	8,045	42,040	2,514
2008	38,521	475	57	7,326	2,842	10,913	1,582	12,156	1,498	16,874	5,349	8,409	42,868	2,421
2009	35,356	448	103	7,280	5,152	9,454	1,684	12,085	1,500	17,380	6,316	8,790	43,720	2,225
AVERAGE ANNUAL GROWTH RATE (compounded)														
(2000–2005)	1.37%	8.13%	14.87%	2.22%	14.87%	11.58%	3.27%	-6.21%	2.29%	2.58%	0.01%	4.53%	1.66%	0.95%
(2005–2009)	3.83%	0.13%	-6.94%	1.18%	-6.94%	-0.40%	-1.36%	14.46%			2.46%	2.65%	2.66%	-1.28%

Source: Statistics Office

Note: Selected sectors covering losses on bank services charges, taxes on products, and losses in subsidies are excluded from table.

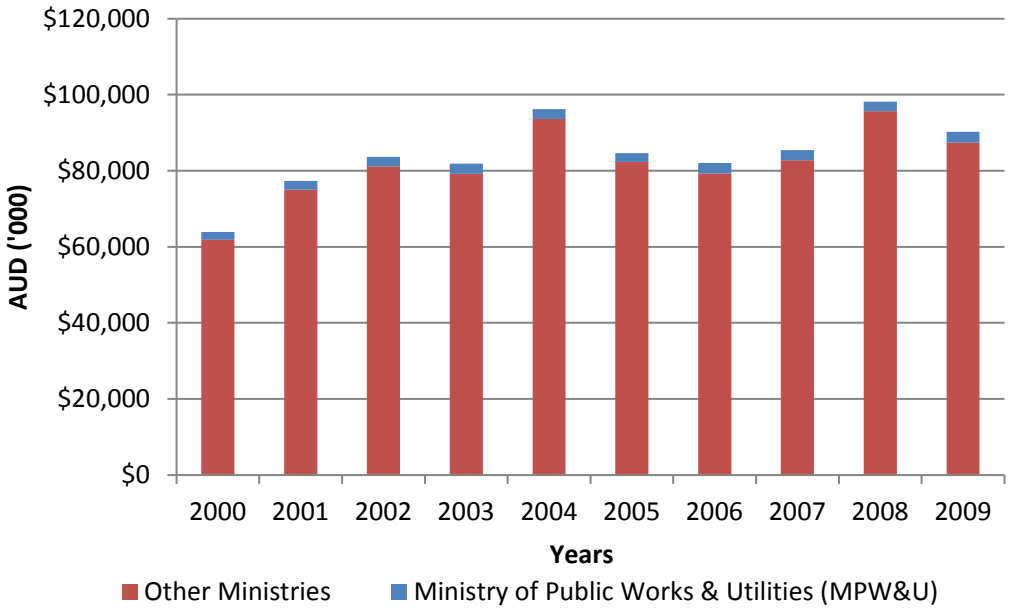
Table 2G: Governmental budget

Unit: AUD '000 unless otherwise indicated

Year	Total budget	Ministry of Public Works & Utilities (MPWU)	% of budget to MPWU
2000	63932.87	2130.54	3.33%
2001	77315.62	2277.60	2.95%
2002	83648.91	2475.54	2.96%
2003	81843.59	2637.59	3.22%
2004	96186.52	2582.48	2.68%
2005	84607.29	2337.02	2.76%
2006	82020.30	2738.99	3.34%
2007	85470.38	2727.20	3.19%
2008	98137.44	2448.99	2.50%
2009	90225.90	2811.91	3.12%
Average annual growth rate (compounded)			
(2000–2005)	5.76%	1.87%	
(2005–2009)	1.62%	4.73%	

Source: Statistics Office

Figure 24: Government budget allocation to Ministry of Public Works and Utilities (MPWU) (the Energy Planning Unit is a branch of MPWU)



Chapter 3:
Petroleum

Table 3A: Fuel imports as percentage of GDP

Unit: AUD '000 unless otherwise indicated

Year	Oil imports	Current GDP	Oil imports on current GDP (%)
2000	9874	134064	7.36%
2001	14491	135006	10.73%
2002	15920	135786	11.72%
2003	17468	141258	12.37%
2004	17202	145740	11.80%
2005	18284	145486	12.57%
2006	22393	138949	16.12%
2007	24451	149378	16.37%
2008	27629	153498	18.00%
2009	23944	152479	15.70%
Average annual growth rate (compounded)			
(2000–2005)	13.12%	1.65%	11.28%
(2005–2009)	6.97%	1.18%	5.73%

Source: Statistics Office

Fig 25a: Oil Imports as a percentage of GDP 2000-2009

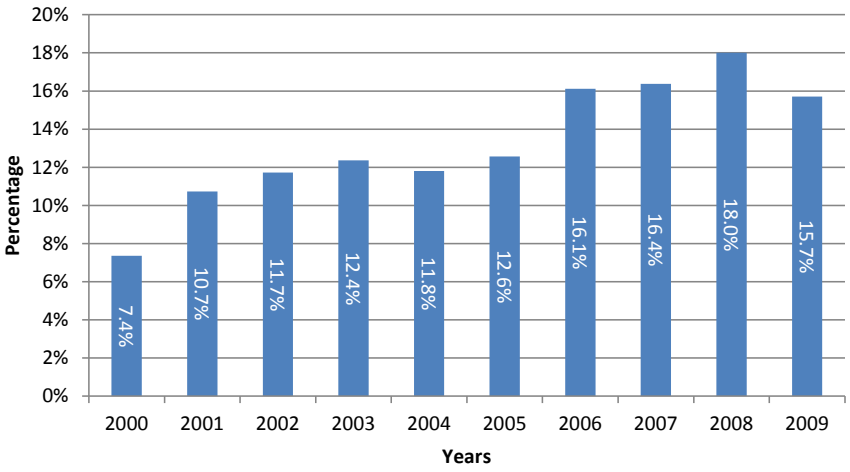


Fig 25b: Oil import to GDP trend comparison

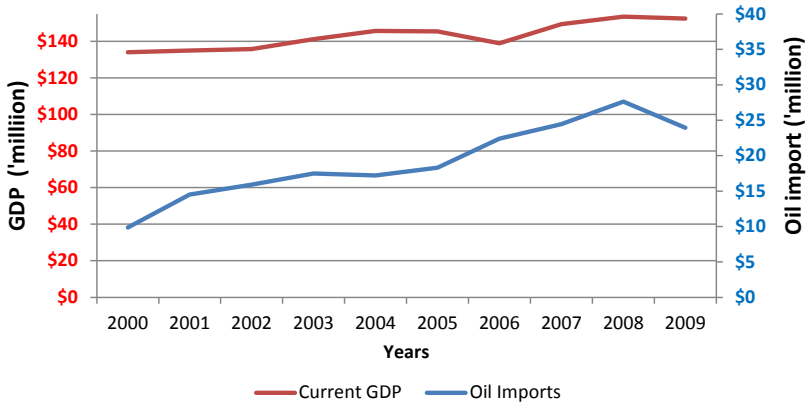


Table 3B: Fuel imports as percentage of total imports and total exports

Unit: AUD '000 unless otherwise indicated

Year	Oil imports	Total imports	Total exports	Oil imports as % of total imports (%)	Total exports as % of oil imports (%)
2000	9874	67924	6178	14.5%	62.57%
2001	14491	75008	6466	19.3%	44.62%
2002	15920	91585	6322	17.4%	39.71%
2003	17468	79496	4470	22.0%	25.59%
2004	17202	80753	3358	21.3%	19.52%
2005	18284	100881	5643	18.1%	30.86%
2006	22393	82396	3348	27.2%	14.95%
2007	24451	83632	12096	29.2%	49.47%
2008	27629	87800	8790	31.5%	31.81%
2009	23944	88939	8047	26.9%	33.61%
Average annual growth rate (compounded)					
(2000–2005)	13.12%	8.23%	-1.80%		
(2005–2009)	6.97%	-3.10%	9.28%		

Source: Statistics Office

Fig 26a: Oil imports to total export comparison

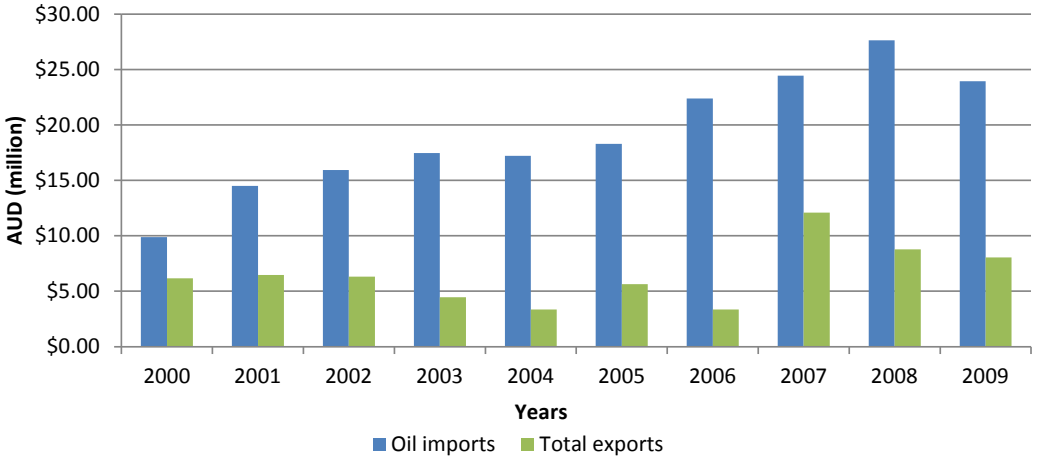


Fig 26b: Oil imports as percentage of total imports

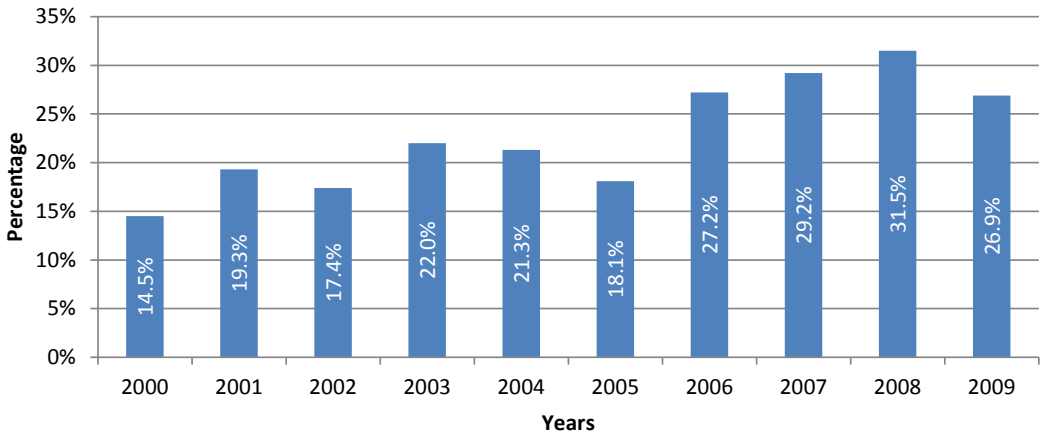


Table 3C: Wholesale and retail fuel prices

Unit: AUD '000 unless otherwise indicated

Effective date	Gasoline		Kerosene		Diesel	
	Wholesale	Retail	Wholesale	Retail	Wholesale	Retail
14-Feb-00	$0.66	$0.74	$0.56	$0.63		
26-May-00	$0.70	$0.79	$0.60	$0.68		
6-Jan-01	$0.87	$0.98	$0.89	$1.00		
26-Jul-01	$0.98	$1.12	$0.90	$1.03		
25-Mar-02	$0.87	$0.98	$0.89	$1.00		
14-Jun-02	$0.87	$0.98	$0.78	$0.88		
9-May-03	$0.90	$1.02	$0.85	$0.96		
12-Sep-03	$0.84	$0.95	$0.77	$0.87		
3-Mar-04	$0.81	$0.91	$0.74	$0.83		
20-Sep-04	$0.87	$0.98	$0.78	$0.88		
29-Oct-04	$0.92	$1.03	$0.85	$0.95		
8-Mar-05	$0.92	$1.03	$0.85	$0.95		$1.00
27-Apr-06	$1.09	$1.20	$1.05	$1.15		$1.17
1-Jan-07	$1.22	$1.33	$1.07	$1.17		$1.17
22-Nov-07	$1.27	$1.38	$1.10	$1.20		$1.19
9-May-08	$1.38	$1.49	$1.35	$1.45		$1.56
1-Mar-09	$1.08	$1.19	$0.85	$0.95		$1.47
Average annual growth rate (compounded)						
(2000–2005)	6.87%	6.84%	8.70%	8.56%		
(2005–2009)	4.09%	3.68%	0.00%	0.00%		10.11%

Sources: 1. Betio Gas Station 2. Kiribati Oil Co. Ltd. 3. Ministry of Commerce, Industry & Cooperatives

Note: In Kiribati, gasoline is commonly called benzene at bowsers and service stations.

Figure 27: Fuel prices 2000–2009

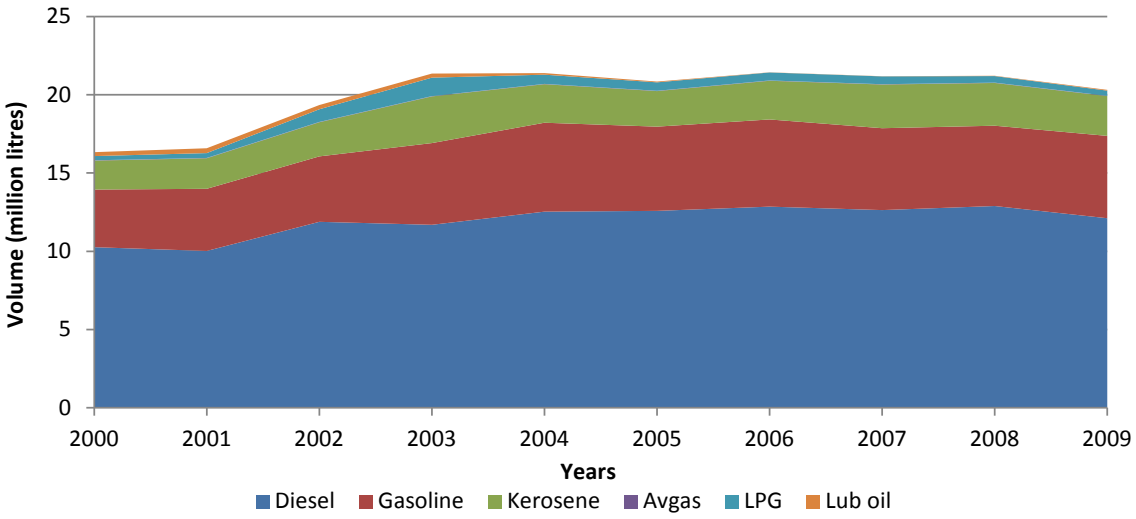
Table 3D: Total imports by fuel product

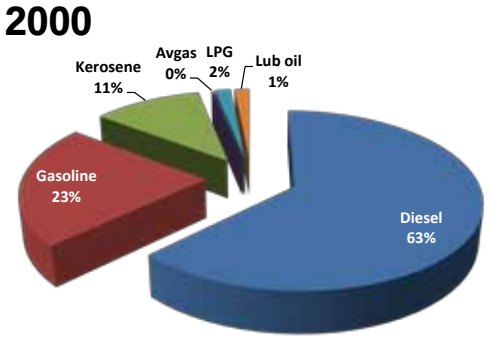
Unit: Million litres unless otherwise indicated

Year	Diesel	Gasoline	Kerosene	Avgas	LPG	Lub oil	Total
2000	10.26	3.68	1.85	0.02	0.27	0.25	16.32
2001	10.02	3.97	1.95	0.02	0.31	0.31	16.58
2002	11.88	4.18	2.18	0.02	0.81	0.27	19.34
2003	11.69	5.22	2.98	0.02	1.18	0.26	21.35
2004	12.53	5.68	2.46	0.02	0.59	0.10	21.38
2005	12.58	5.38	2.27	0.02	0.54	0.05	20.84
2006	12.85	5.57	2.47	0.02	0.51	0.01	21.43
2007	12.63	5.23	2.79	0.02	0.50	0.01	21.18
2008	12.89	5.13	2.73	0.02	0.42	0.02	21.21
2009	12.11	5.26	2.54	0.02	0.33	0.05	20.31
Average annual growth rate (compounded)							
(2000–2005)	4.16%	7.89%	4.18%	0.00%	14.87%	-27.52%	5.01%
(2005–2009)	-0.95%	-0.56%	2.85%	0.00%	-11.58%	0.00%	-0.64%

Sources: 1. Customs Office 2. Kiribati Oil Co. Ltd Note: Jet A-1 is included under kerosene.

Figure 28: Fuel imports by product type 2000–2009





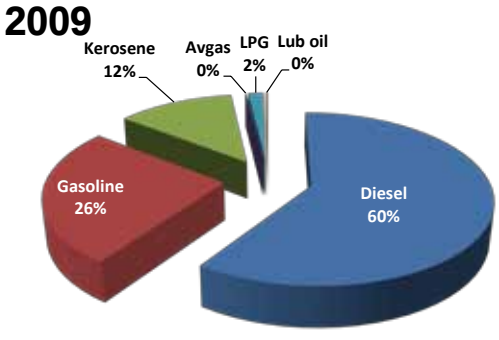


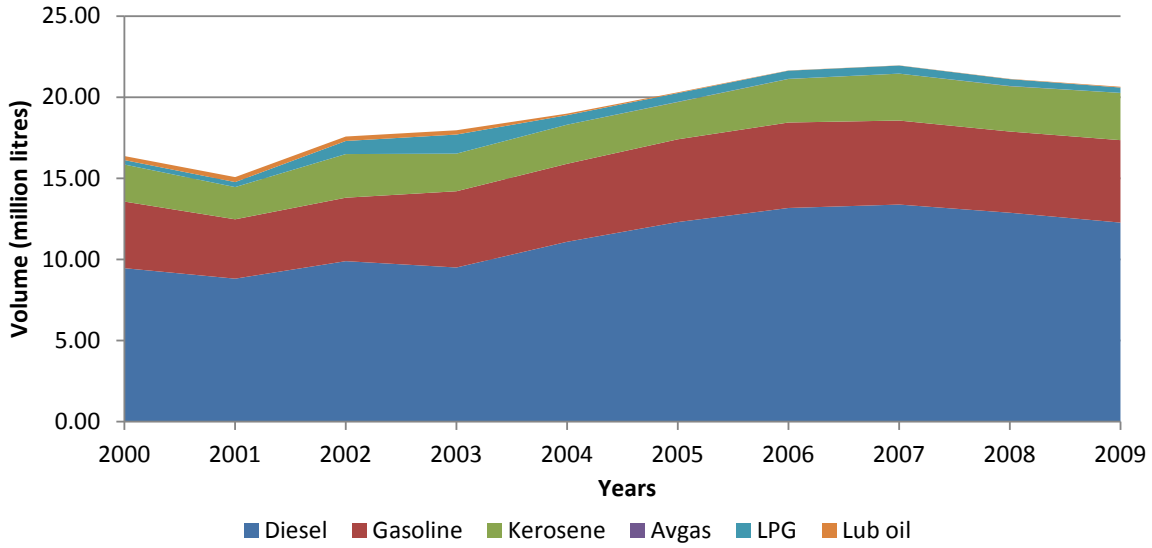
Table 3E: Total sales by fuel product

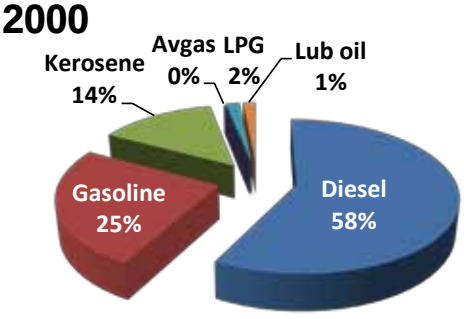
Unit: Million litres unless otherwise indicated

Year	Diesel	Gasoline	Kerosene	Avgas	LPG	Lub oil	Total
2000	9.46	4.10	2.28	0.00	0.27	0.25	16.37
2001	8.82	3.66	1.99	0.00	0.31	0.31	15.07
2002	9.90	3.91	2.69	0.00	0.81	0.27	17.58
2003	9.50	4.70	2.32	0.00	1.18	0.26	17.96
2004	11.09	4.81	2.41	0.00	0.59	0.10	18.99
2005	12.30	5.10	2.29	0.01	0.54	0.05	20.30
2006	13.17	5.27	2.68	0.01	0.51	0.01	21.65
2007	13.38	5.18	2.89	0.00	0.50	0.01	21.96
2008	12.88	5.00	2.79	0.02	0.42	0.02	21.13
2009	12.27	5.08	2.91	0.00	0.33	0.05	20.64
Average annual growth rate (compounded)							
(2000–2005)	5.39%	4.46%	0.09%	n.a	14.87%	-27.52%	4.40%
(2005–2009)	-0.06%	-0.10%	6.17%	n.a	-11.58%	0.00%	0.43%

Sources: 1. Customs Office 2. Kiribati Oil Co. Ltd

Figure 29: Fuel consumption by product type in litres 2000–2009





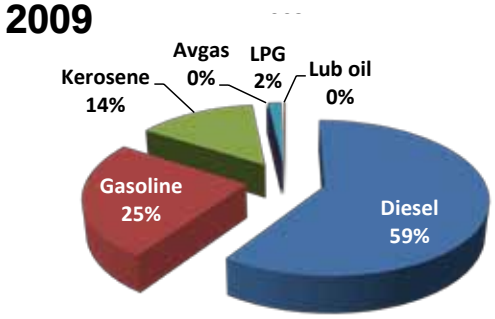


Table 3F: Total fuel consumption by end-use sector

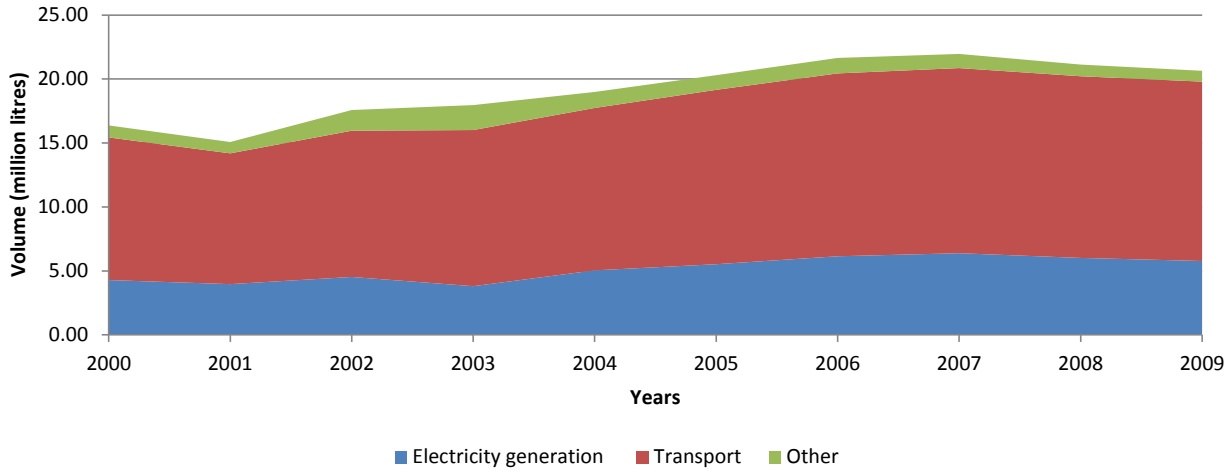
Unit: Million litres unless otherwise indicated

Year	Actual sales = total consumption	Electricity generation	Transport	Other
2000	16.37	4.28	11.15	0.94
2001	15.07	3.97	10.22	0.88
2002	17.58	4.53	11.43	1.62
2003	17.96	3.81	12.20	1.95
2004	18.99	5.04	12.70	1.25
2005	20.30	5.52	13.63	1.15
2006	21.65	6.14	14.29	1.21
2007	21.96	6.38	14.47	1.10
2008	21.13	6.02	14.20	0.91
2009	20.64	5.77	14.02	0.85
Average annual growth rate (compounded)				
(2000–2005)	4.40%	5.22%	4.10%	4.12%
(2005–2009)	0.42%	1.11%	0.71%	-7.28%

Sources: 1. Kiribati Oil Co. Ltd 2. Public Utilities Board

Note: 'Other' includes fishing, government and industrial, community and social services, commercial and residential.

Figure 30: Fuel consumption by end-use sector 2000–2009



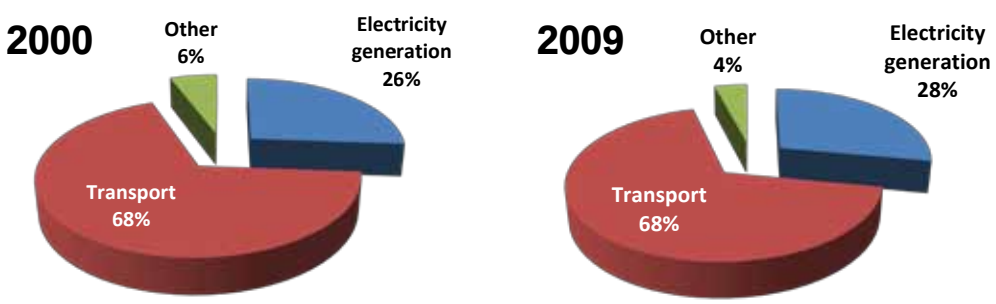


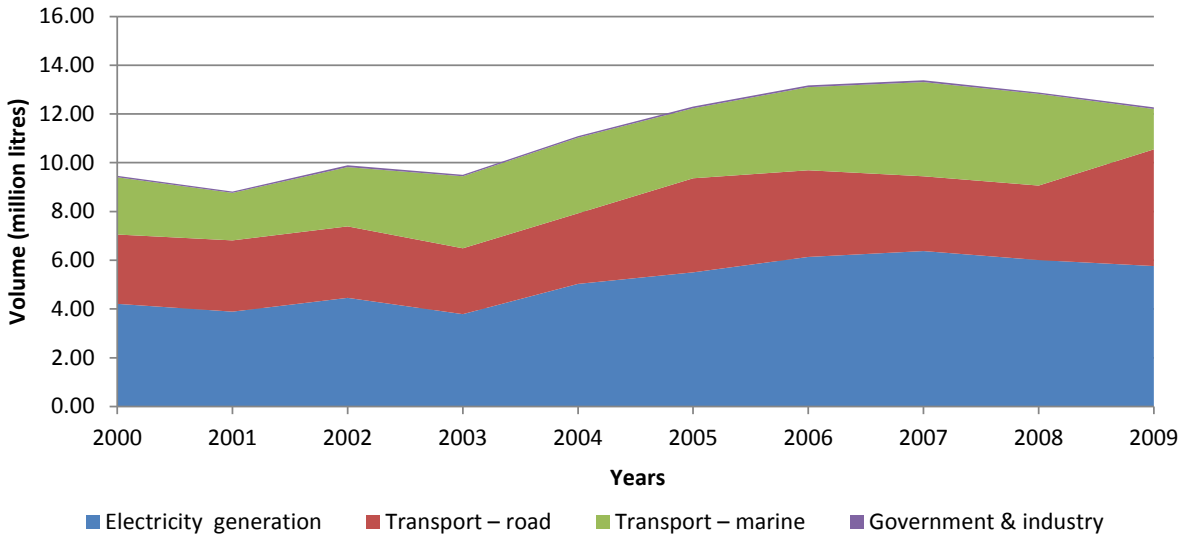
Table 3G: Diesel fuel consumption by end-use sector

Unit: Million litres unless otherwise indicated

	Actual sales = total consumption	Electricity generation	Transport – road	Transport – marine	Government & industry
2000	9.46	4.21	2.84	2.35	0.06
2001	8.82	3.89	2.92	1.95	0.05
2002	9.90	4.46	2.93	2.43	0.08
2003	9.50	3.79	2.70	2.95	0.06
2004	11.09	5.03	2.89	3.10	0.06
2005	12.30	5.50	3.86	2.87	0.07
2006	13.17	6.14	3.55	3.41	0.07
2007	13.38	6.38	3.07	3.86	0.08
2008	12.88	6.01	3.06	3.76	0.06
2009	12.27	5.76	4.79	1.66	0.07
Average annual growth rate (compounded)					
(2000–2005)	5.39%	5.50%	6.29%	4.11%	3.53%
(2005–2009)	-0.07%	1.15%	5.53%	-12.87%	-0.88%

Sources: 1. Kiribati Oil Co. Ltd 2. Public Utilities Board

Figure 31: Diesel fuel consumption by end-use sector 2000–2009



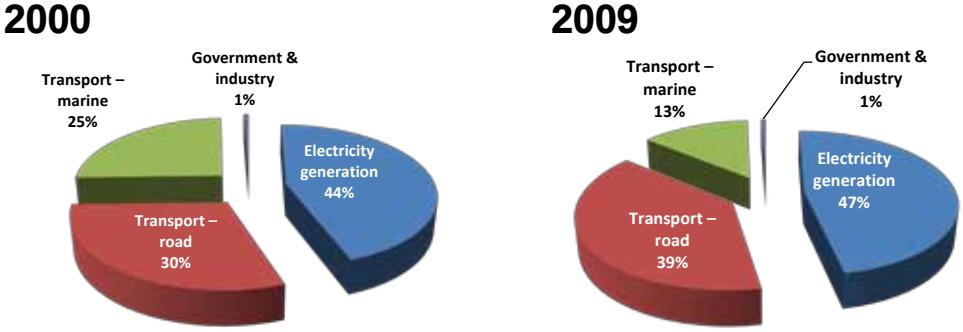


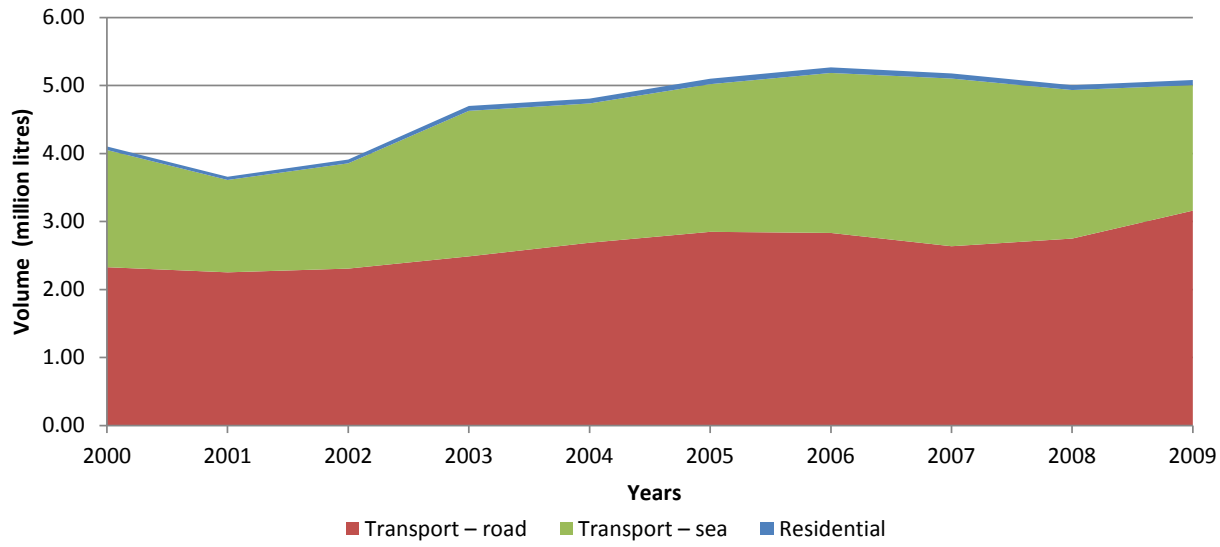
Table 3H: Gasoline consumption by end-use sector

Unit: Million litres unless otherwise indicated

	Actual sales = total consumption	Electricity generation	Transport – road	Transport – marine	Government & industry
2000	4.10	0.05	2.33	1.72	0.06
2001	3.66	0.05	2.25	1.36	0.05
2002	3.91	0.06	2.31	1.55	0.08
2003	4.70	0.07	2.49	2.14	0.06
2004	4.81	0.07	2.69	2.05	0.06
2005	5.10	0.08	2.85	2.17	0.07
2006	5.27	0.08	2.83	2.35	0.07
2007	5.18	0.08	2.64	2.47	0.08
2008	5.00	0.07	2.75	2.18	0.06
2009	5.08	0.08	3.16	1.85	0.07
Average annual growth rate (compounded)					
(2000–2005)	4.44%	9.02%	4.12%	4.73%	3.13%
(2005–2009)	-0.09%	-1.36%	2.63%	-3.99%	0.00%

Sources: 1. Kiribati Oil Co. Ltd 2. Public Utilities Board

Figure 32: Gasoline fuel consumption by end-use sector 2000–2009



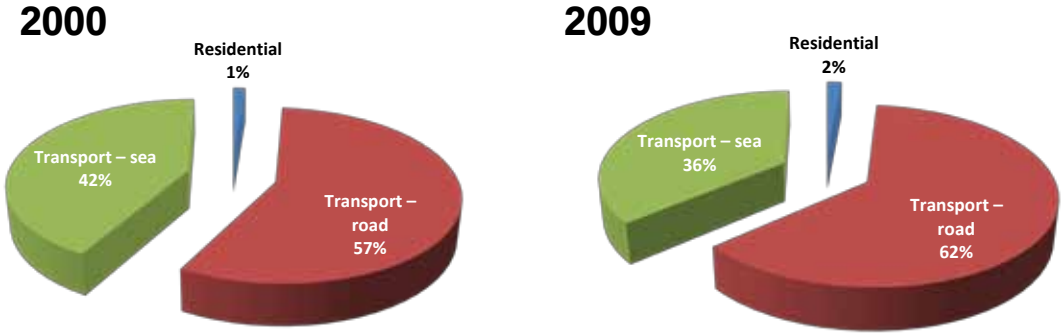


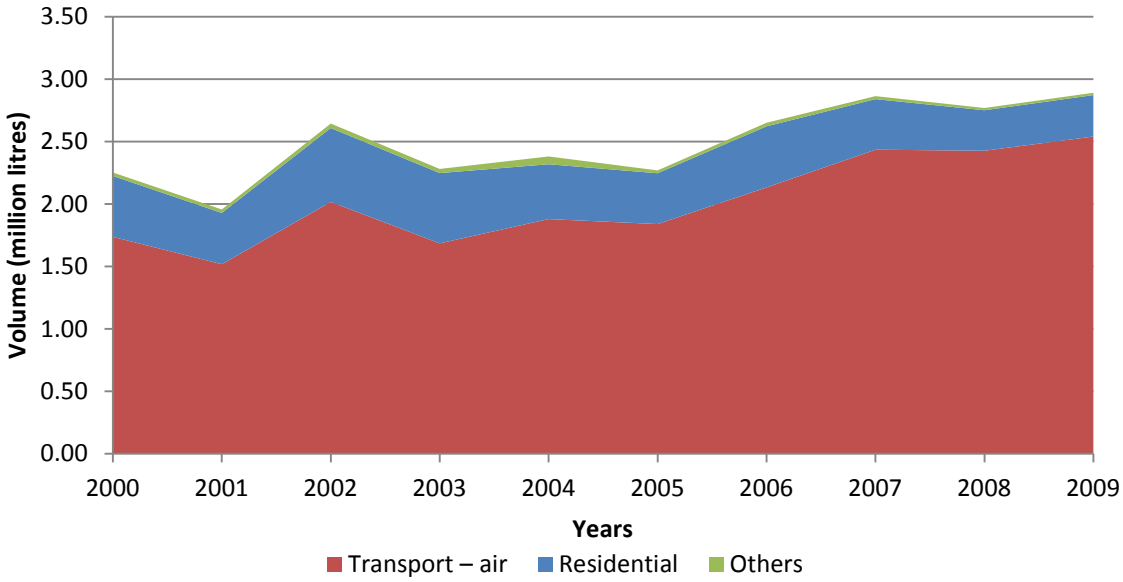
Table 3I: Kerosene consumption by end-use sector

Million litres unless otherwise indicated

	Actual sales = total consumption	Residential	Transport – road	Transport – sea
2000	2.28	0.49	1.74	0.03
2001	1.99	0.41	1.52	0.03
2002	2.69	0.59	2.02	0.04
2003	2.32	0.56	1.68	0.03
2004	2.41	0.44	1.88	0.06
2005	2.29	0.41	1.84	0.02
2006	2.68	0.49	2.13	0.03
2007	2.89	0.40	2.43	0.02
2008	2.79	0.32	2.43	0.02
2009	2.91	0.33	2.54	0.02
Average annual growth rate (compounded)				
(2000–2005)	0.09%	-3.57%	1.15%	-3.86%
(2005–2009)	6.14%	-4.98%	8.40%	-4.90%

Sources: 1. Kiribati Oil Co. Ltd 2. Public Utilities Board
Note: 'Other' refers to community and social services, fishing, and government and industrial.

Figure 33: Kerosene fuel consumption by end-use sector 2000–2009



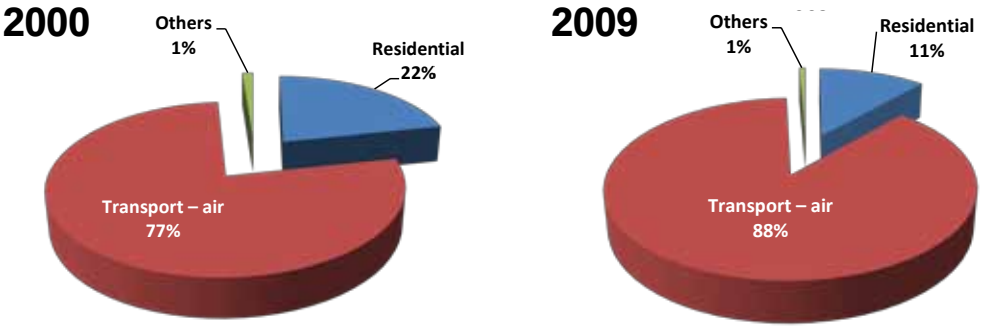


Table 3J: Other fuel type consumption by end-use sector

Unit: Million litres unless otherwise indicated

Year	Avgas	Lubricating oil					LPG		
	Transport – air	Electricity generation	Transport – air	Transport – road	Transport – marine	Government & industrial	Commercial	Community & social services	Residential
2000	0.00	0.07	0.06	0.06	0.05	0.01	0.08	0.05	0.14
2001	0.00	0.07	0.08	0.08	0.06	0.01	0.09	0.06	0.15
2002	0.00	0.07	0.07	0.07	0.06	0.01	0.24	0.16	0.40
2003	0.00	0.02	0.08	0.09	0.07	0.01	0.35	0.24	0.59
2004	0.00	0.01	0.03	0.03	0.02	0.00	0.18	0.12	0.29
2005	0.01	0.02	0.01	0.01	0.01	0.00	0.16	0.11	0.27
2006	0.01	0.01	0.00	0.00	0.00	0.00	0.15	0.10	0.25
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.10	0.25
2008	0.02	0.01	0.00	0.00	0.00	0.00	0.13	0.08	0.21
2009	0.00	0.01	0.01	0.01	0.01	0.00	0.10	0.07	0.17
Average Annual Growth Rate (compounded)									
(2000–2005)		-22.16%	-30.12%	-30.12%	-27.52%	-100.00%	14.87%	17.08%	14.04%
(2005–2009)	-100.00%	-15.91%	0.00%	0.00%	0.00%		-11.09%	-10.68%	-10.92%

Sources: 1. Customs Office 2. Kiribati Oil Co. Ltd 3. Public Utilities Board

Table 3K: Petroleum fuel storage facilities, 2009

Unit: as indicated

KOIL – main depot Tarawa						
	Number of drums		*Storage tank description*	*Storage capacity*	
	200 litres	*50 litres*		*tonnes*	*litres*
Diesel	29	0	TK 1 & TK 2	1,026	1,231,200
DPK	478	78	TK 3 & TK 6	156	199,680
DPK (Jet A-1)	0	0	TK 4	199	254,720
ULP	9	27	TK 5	465	641,700

	Number of gas cylinders				*Storage tank description*	*Storage capacity*	
	9 kg	*13 kg*	*18 kg*	*40 kg*		*kg*	*litres*
LPG – butane (Tarawa)	7	551	1	96	ISO tank	26,800	46,364
LPG – butane (outer islands)	13	10	0	0	n/a	n/a	n/a

KOIL – outer islands					
	Number of drums		*Storage tank description*	*Storage capacity*	
	200 litres	*50 litres*		*tonnes*	*litres*
Diesel	247	247	n/a	n/a	n/a
DPK	247	247	n/a	n/a	n/a
DPK (Jet A-1)	80	0	n/a	n/a	n/a
ULP	247	247	n/a	n/a	n/a

Tarawa Motors				
	Number of gas cylinders	*Number of storage tanks*	*Storage capacity*	
			tonnes	*litres*
LPG – butane (Tarawa)	n/a	n/a	n/a	n/a
LPG – butane (outer islands)	n/a	n/a	n/a	n/a

Public Utilities Board				
	Number of 44-gallon drums	*Storage tank description*	*Storage capacity*	
			tonnes	*litres*
Diesel (Tarawa)	n/a	PUB Bik TK 5 & TK 6	259	310,860
Diesel (outer islands)	n/a	n/a	n/a	n/a

Source: Atirite Bareta, KOIL

Note: n/a refers to no data available

Chapter 4:

Renewable energy

Table 4A: Energy production from renewable energy

Unit: Gigajoules unless otherwise indicated

Year	Total consumption	Solar PV units	Biomass	
			Fuelwood	Coconut residue
2000	546121	468	65204	480449
2001	548647	468	65506	482673
2002	551427	468	65838	485122
2003	554476	468	66202	487806
2004	559104	1763	66600	490740
2005	562831	1859	67034	493938
2006	571706	1843	68097	501765
2007	580740	1840	69177	509723
2008	589859	1772	70275	517813
2009	599101	1673	71391	526037
Average annual growth rate (compounded)				
2000–2005	0.60%	31.78%	0.56%	0.56%
2005–2009	1.57%	-2.59%	1.59%	1.59%

Sources: 1. Kiribati Solar Energy Co. Ltd 2. National energy demand/supply database

Table 4B: Renewable energy consumption by end-use sector

Unit: Gigajoules unless otherwise indicated

Year	Total consumption	Community & social services	Residential
2000	612133	5	546116
2001	625174	0	548179
2002	637202	0	550960
2003	649460	0	554008
2004	663251	0	558636
2005	674795	104	560972
2006	687473	47	569862
2007	700462	60	578900
2008	713675	52	588087
2009	727137	43	597427
Average annual growth rate (compounded)			
2000–2005	1.97%	83.49%	0.54%
2005–2009	1.89%	-19.81%	1.59%

Sources: 1. Kiribati Solar Energy Co. Ltd 2. National energy demand/supply database

Table 4C: Utilisation of solar PV 2000–2009

Unit: as indicated

Year	(Average) Insolation rate (MJ/m2/ day)	Average area per module (m2)	Average system efficiency (%)	Communication		Residential		Total no. of PV modules installed (units)	Total solar energy generated (GJ)
				No. of PV modules (units)	Energy avail/ consumed (GJ)	No. of PV modules (units)	Energy avail/ consumed (GJ)		
2000	20.8	1.0	10.0	6	5	610	463	616	468
2001	20.8	1.0	10.0	6	5	610	463	616	468
2002	20.8	1.0	10.0	6	5	610	463	616	468
2003	20.8	1.0	10.0	6	5	610	463	616	468
2004	20.8	1.0	10.0	6	5	2316	1758	2322	1763
2005	20.8	1.0	10.0	143	109	2316	1758	2459	1867
2006	20.8	1.0	10.0	205	156	2316	1758	2521	1914
2007	20.8	1.0	10.0	284	216	2316	1758	2600	1974
2008	20.8	1.0	10.0	353	268	2316	1758	2669	2026
2009	20.8	1.0	10.0	410	311	2316	1758	2726	2070
Average annual growth rate *(compounded)*									
2000–2005				88.55%	85.22%	30.58%	30.58%	31.90%	31.88%
2005–2009				30.13%	29.97%	0.00%	0.00%	2.61%	2.61%

Source:1. EPU - National Energy Demand/Supply Data base

Note: 1. Energy consumption from solar PV systems are being estimated based on an assumed average panel area of 1m² for all solar PV systems installed in the Gilbert Island group

2. Funding from EDF 8 increased the total number of systems to over 1800 systems from 2003 to 2004.

Figure 34: Trend in solar PV energy consumption 2000–2009

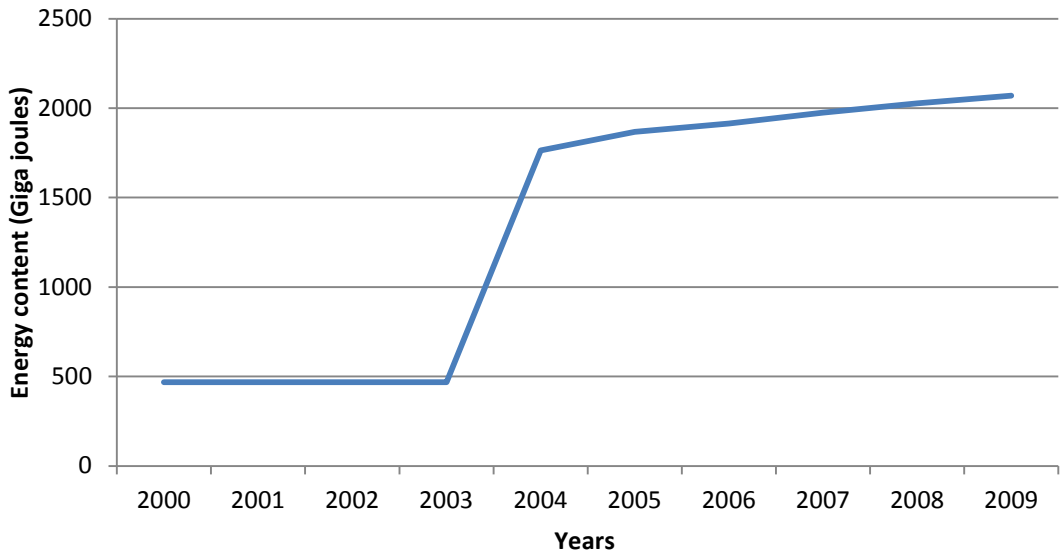


Table 4D: Estimated fuel wood consumption 2000–2009

Unit: as indicated

Year	Urban residential			Rural residential			Total residential consumption (GJ)
	Consumption per household (kg/house/yr)	No. of urban households	Total urban consumption (GJ)	Consumption per household (kg/house/yr)	No. of rural households	Total rural consumption (GJ)	
2000	310	2545	13492	390	6991	46621	60113
2001	310	2498	13239	390	7021	46821	60060
2002	310	2451	12991	390	7051	47021	60012
2003	310	2405	12748	390	7081	47222	59970
2004	310	2360	12509	390	7111	47423	59933
2005	310	2316	12275	390	7141	47626	59901
2006	310	2339	12397	390	7259	48408	60805
2007	310	2362	12520	390	7378	49203	61723
2008	310	2385	12644	390	7499	50011	62656
2009	310	2409	12770	390	7622	50833	63602
Average annual growth rate (compounded)							
2000–2005			-1.87%			0.43%	-0.07%
2005–2009			0.99%			1.64%	1.51%

Source: 1. EPU – National Energy Demand/Supply Data base 2. Statistics Office 3. Kiribati PREA report 1992

Table 4E: Estimated coconut residue consumption 2000–2009

Unit: as indicated

Year	Urban residential			Rural residential			Total residential consumption (GJ)
	Consumption per household (kg/house/yr)	No. of urban households	Total urban consumption (GJ)	Consumption* per household (kg/house/yr)	No. of rural households	Total rural consumption (GJ)	
2000	2790.00	2,545	99,416	3510.00	6,991	343,525	442,941
2001	2790.00	2,498	97,554	3510.00	7,021	344,993	442,547
2002	2790.00	2,451	95,727	3510.00	7,051	346,468	442,195
2003	2790.00	2,405	93,933	3510.00	7,081	347,949	441,882
2004	2790.00	2,360	92,174	3510.00	7,111	349,436	441,610
2005	2790.00	2,316	90,447	3510.00	7,141	350,930	441,377
2006	2790.00	2,339	91,345	3510.00	7,259	356,693	448,038
2007	2790.00	2,362	92,252	3510.00	7,378	362,551	454,803
2008	2790.00	2,385	93,168	3510.00	7,499	368,504	461,672
2009	2790.00	2,409	94,093	3510.00	7,622	374,556	468,649
Average annual growth rate (compounded)							
2000–2005			-1.87%			0.43%	-0.07%
2005–2009			0.99%			1.64%	1.51%

Source: 1. EPU – National Energy Demand/Supply Data base 2. Statistics Office 3. Kiribati PREA report 1992

Table 4F: Overall estimated biomass consumption in the Gilbert Islands group

Unit: GJ

	Gilbert Islands group		
	Urban	Rural	Total
2000	112908	390146	503055
2001	110793	391814	502607
2002	108718	393489	502207
2003	106682	395171	501852
2004	104683	396860	501543
2005	102722	398556	501278
2006	103742	405101	508843
2007	104772	411754	516526
2008	105812	418516	524328
2009	106863	425389	532252
Average annual growth rate (compounded)			
2000–2005	-1.87%	0.43%	-0.07%
2005–2009	0.99%	1.64%	1.51%

Source: EPU – National Energy Demand/Supply Data base

Figure 35 a: Estimated biomass consumption by island group in Kiribati

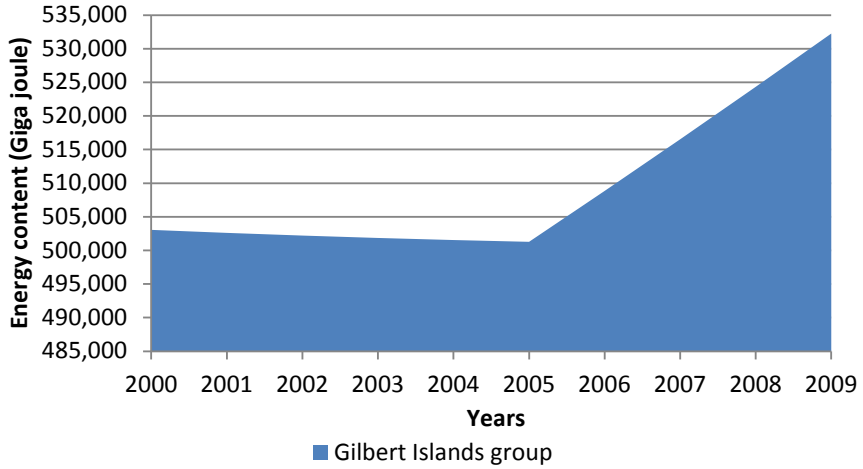
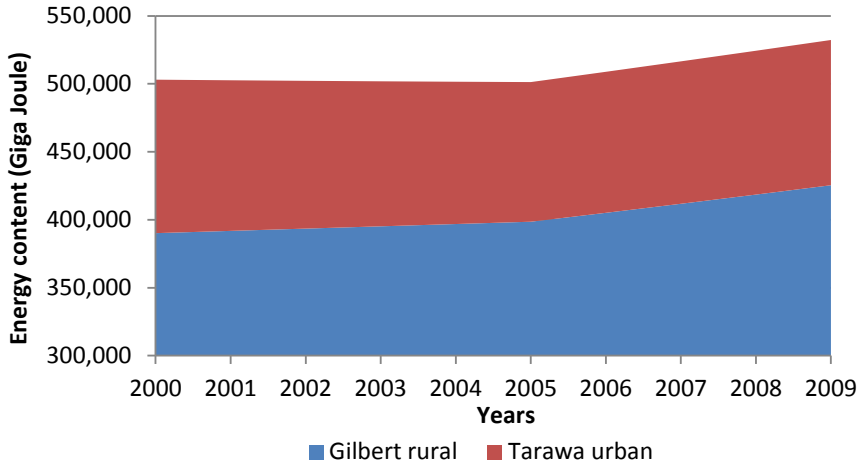
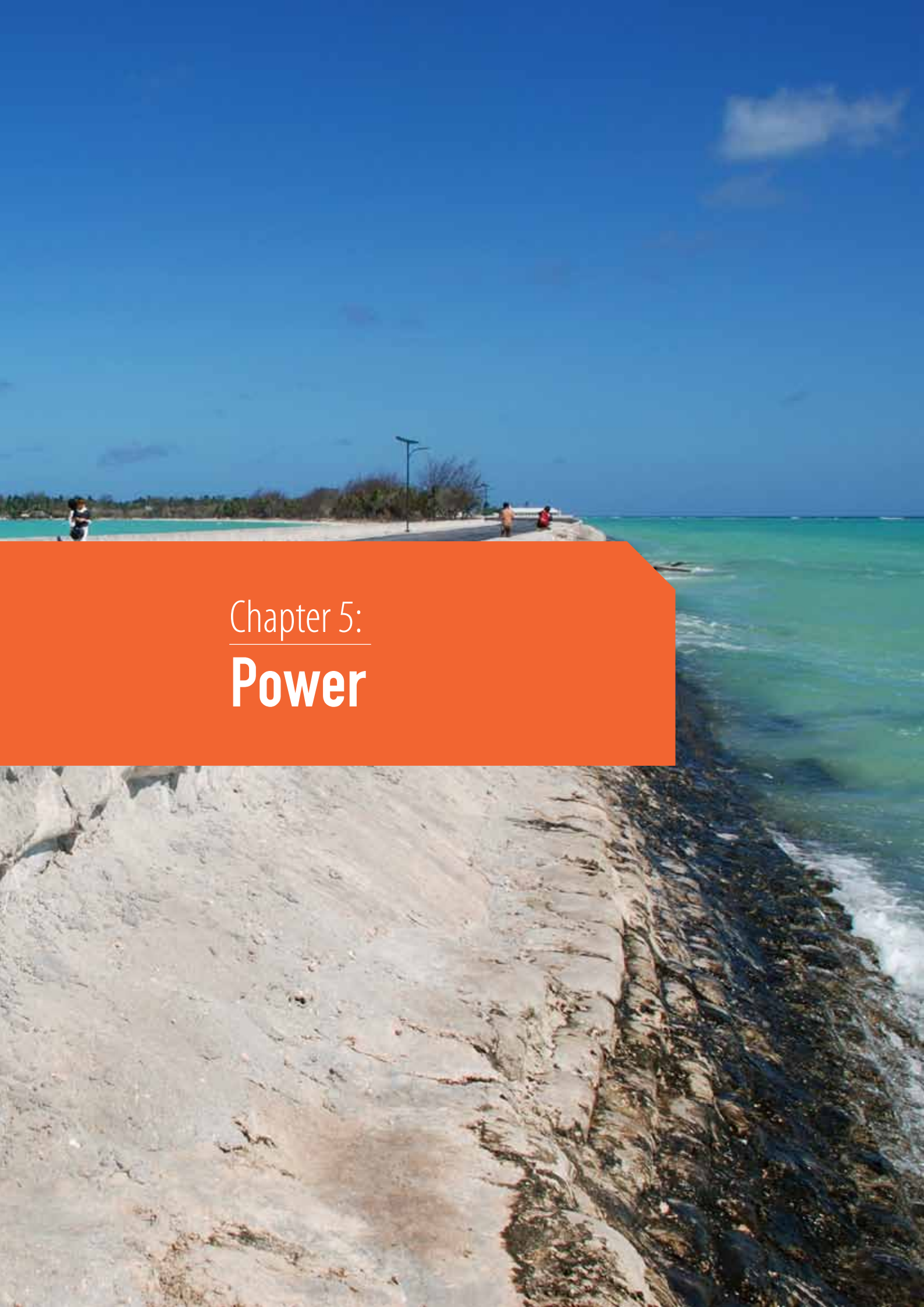


Figure 35 b: Estimated biomass consumption by Gilbert rural and Tarawa urban





Chapter 5:

Power

Table 5A: Installed capacity 2000–2009

Unit: Megawatt unless otherwise indicated

	Installed capacity	De-rated capacity	Peak demand	System capacity factor
2000	3.70	3.30	2.86	0.50
2001	3.70	3.30	2.61	0.52
2002	4.75	4.40	2.55	0.36
2003	4.75	4.40	3.97	0.46
2004	6.00	4.60	3.80	0.51
2005	4.25	3.83	3.99	0.67
2006	5.65	5.09	5.25	0.53
2007	5.45	3.30	5.05	0.82
2008	5.45	5.25	4.73	0.49
2009	5.45	5.10	4.60	0.50

Source: Public Utilities Board

Figure 36: Peak demand as a percentage of total installed capacity

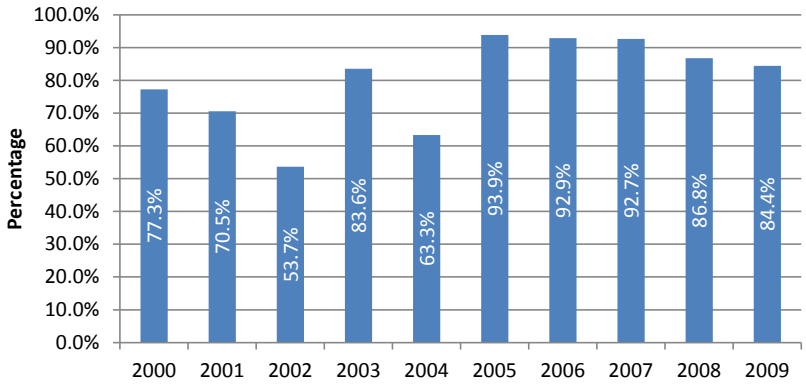


Table 5B: Electricity generation data

Unit: as indicated

	Total diesel (million litres)	Total lubricant oil (million litres)	Total generation GWh	Generation efficiency kWh/l
2000	3.95	0.07	14.48	3.67
2001	3.83	0.07	15.13	3.95
2002	3.91	0.07	13.98	3.57
2003	4.71	0.02	17.66	3.75
2004	5.38	0.01	20.50	3.81
2005	5.91	0.02	22.49	3.80
2006	6.24	0.01	23.62	3.79
2007	6.29	0.00	23.60	3.75
2008	5.88	0.01	22.45	3.82
2009	5.81	0.01	22.19	3.82
Average annual growth rate (compounded)				
2000–2005	8.39%	-22.16%	9.21%	0.70%
2005–2009	-0.43%	-15.91%	-0.34%	0.13%

Source: Public Utilities Board

Figure 37: Power generation trend compared to generation efficiency from 2000 to 2009

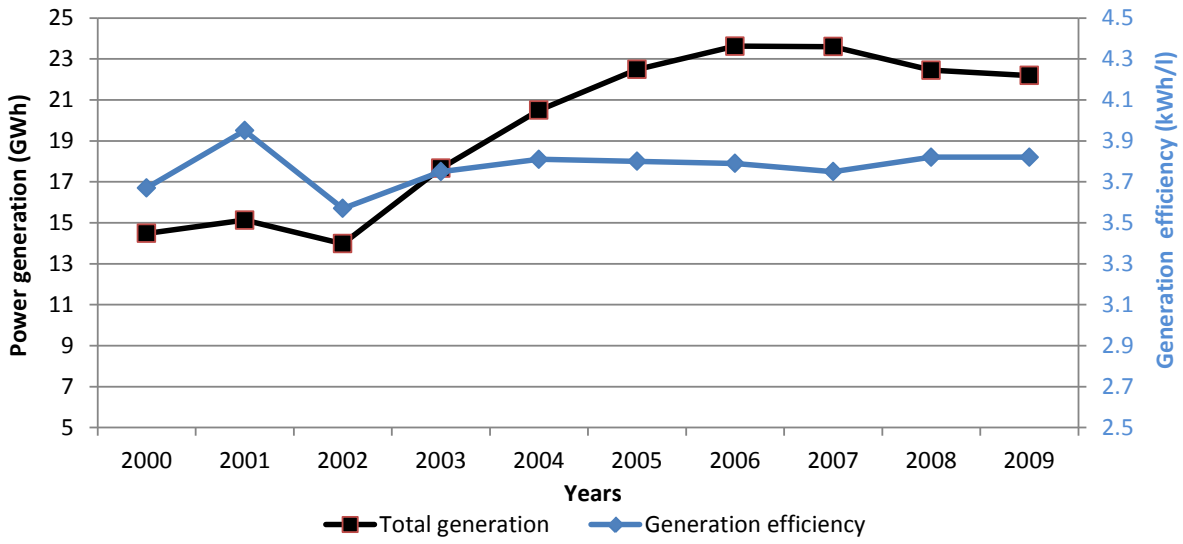


Table 5C: Electricity fuel use as a percentage of total fuel imports

Unit: million litres unless otherwise indicated

Year	Diesel for electricity generation	Total diesel import	% of diesel import	% of total mineral fuel import
2000	3.95	10.26	38.5%	24.55%
2001	3.83	10.02	38.2%	23.48%
2002	3.91	11.88	32.9%	20.94%
2003	4.71	11.69	40.2%	23.07%
2004	5.38	12.53	42.9%	25.71%
2005	5.91	12.58	47.0%	28.84%
2006	6.24	12.85	48.5%	29.41%
2007	6.29	12.63	49.8%	30.05%
2008	5.88	12.89	45.6%	28.01%
2009	5.81	12.11	48.0%	28.72%
Average annual growth rate (compounded)				
2000–2005	8.39%	4.16%	4.07%	3.27%
2005–2009	-0.43%	-0.95%	0.53%	-0.10%

Source: Public Utilities Board

Figure 38: Electricity fuel use as a percentage of total diesel fuel imports

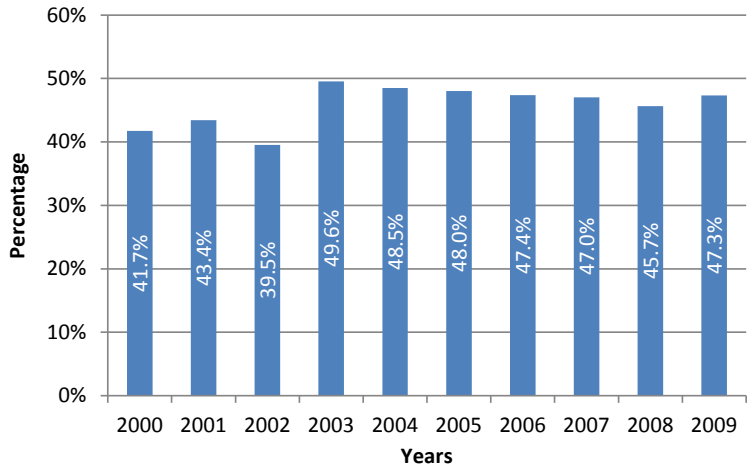


Table 5D: Electricity production and supply

Unit: GWh

	Total generation	Station own use & losses	Net generation sent out	System losses	Total sales
2000	14.48	0.25	14.23	2.97	11.26
2001	15.13	0.25	14.88	2.78	12.10
2002	13.98	0.24	13.74	0.27	13.47
2003	17.66	0.11	17.54	4.38	13.17
2004	20.50	0.12	20.38	5.86	14.52
2005	22.49	0.78	21.71	5.35	16.36
2006	23.62	1.26	22.36	6.54	15.82
2007	23.60	1.17	22.44	3.69	18.75
2008	22.45	1.18	21.27	3.67	17.61
2009	22.19	1.05	21.14	3.75	17.39
Average annual growth rate (compounded)					
2000–2005	9.21%	25.55%	8.82%	12.49%	7.76%
2005–2009	-0.34%	7.71%	-0.66%	-8.50%	1.54%

Source: Public Utilities Board

Figure 39: Electricity production and supply

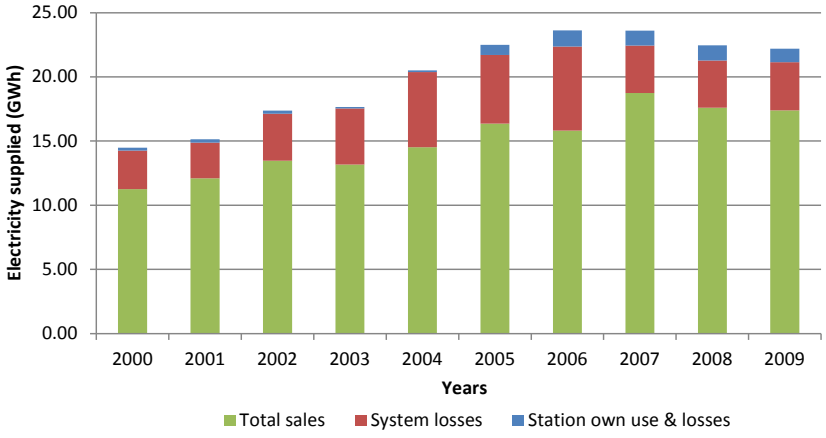


Table 5E: Electricity consumption 2000–2009

Unit: GWH unless otherwise indicated

Year	Total electricity sold	Commercial use	Residential use	Government & industrial use	% of commercial and industrial consumption
2000	11.25	4.39	4.28	2.58	61.96%
2001	12.10	4.69	4.59	2.82	62.07%
2002	13.47	5.41	4.92	3.15	63.55%
2003	13.17	5.10	5.30	2.76	59.68%
2004	14.52	4.87	5.81	3.84	59.99%
2005	16.36	5.09	7.89	3.38	51.77%
2006	15.82	4.50	6.86	4.46	56.64%
2007	18.75	2.85	7.56	8.33	59.63%
2008	17.61	3.07	7.20	7.34	59.11%
2009	17.39	2.83	7.40	7.17	57.50%
Average annual growth rate (compounded)					
2000–2005	7.78%	3.00%	13.01%	5.55%	-3.53%
2005–2009	1.54%	-13.65%	-1.59%	20.68%	2.66%

Source: Public Utilities Board

Figure 40: Electricity consumption by major end-use sector

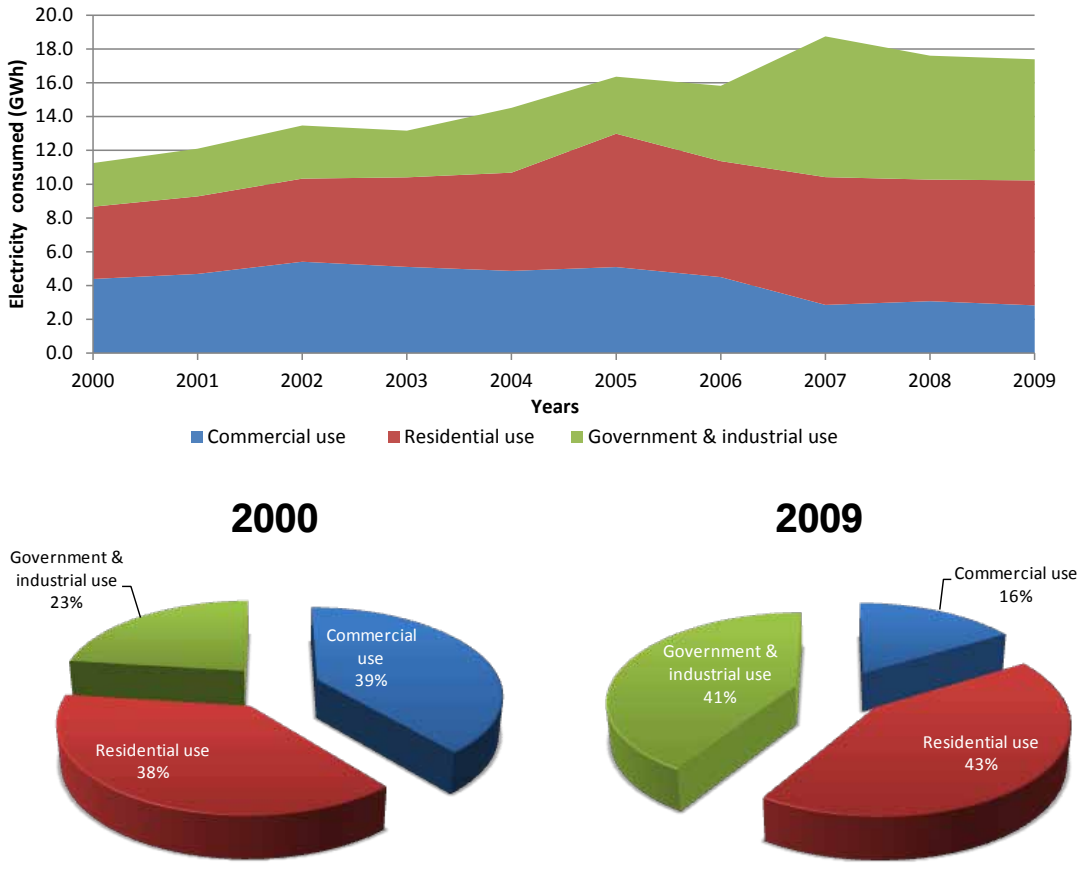


Table 5F: Total number of power utility customers

Unit: As indicated

Year	Number of customers				
	Commercial	Residential	Government & industrial	Total no. of customers	% of commercial & industrial customers
2000	500	3500	140	4140	15.5%
2001	500	3500	160	4160	15.9%
2002	439	4118	234	4791	14.1%
2003	468	4008	238	4714	15.0%
2004	525	4531	239	5295	14.4%
2005	533	4854	248	5635	13.9%
2006	557	5472	274	6303	13.2%
2007	544	5175	267	5986	13.6%
2008	574	5064	290	5928	14.6%
2009	580	5296	305	6181	14.3%
Average annual growth rate (compounded)					
2002–2005	2.15%	11.52%	21.00%	10.82%	–
2005–2009	2.14%	2.20%	5.31%	2.34%	–

Source: 1. Public Utilities Board 2. Data for 2000 and 2001 was estimated based on PREA 2004 report.

Table 5G: Electricity tariffs

Unit: As indicated

Year	PUB-subsidised fuel prices	Generation Cost	PUB tariff settings ($/kWh)		
	($/litre)	($/kWh)	Residential	Government & industrial	Commercial
2000	0.72	$0.20	$0.37	$0.47	$0.47
2001	0.82	$0.21	$0.37	$0.47	$0.47
2002	0.76	$0.21	$0.37	$0.47	$0.47
2003	0.78	$0.21	$0.37	$0.47	$0.47
2004	0.8	$0.21	$0.37	$0.47	$0.47
2005	0.83	$0.22	$0.32	$0.45	$0.45
2006	1.08	$0.28	$0.32	$0.45	$0.45
2007	1.13	$0.30	$0.34	$0.47	$0.47
2008	1.37	$0.36	$0.34	$0.47	$0.47
2009	1.27	$0.33	$0.40	$0.70	$0.55
Average annual growth rate (compounded)					
(2000–2005)	2.88%	2.17%	-2.86%	-0.87%	-0.87%
(2005–2009)	11.22%	11.07%	5.74%	11.68%	5.14%

Source: Public Utilities Board

Figure 41: Electricity tariff and generation cost trend 2000–2009

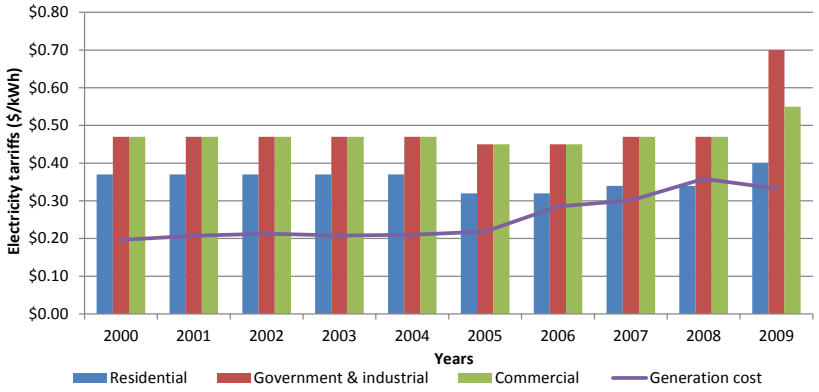


Table 5H: Electricity sales

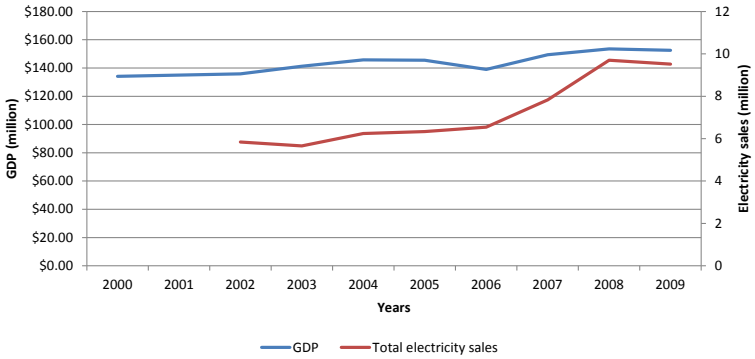
Unit: Million unless otherwise indicated

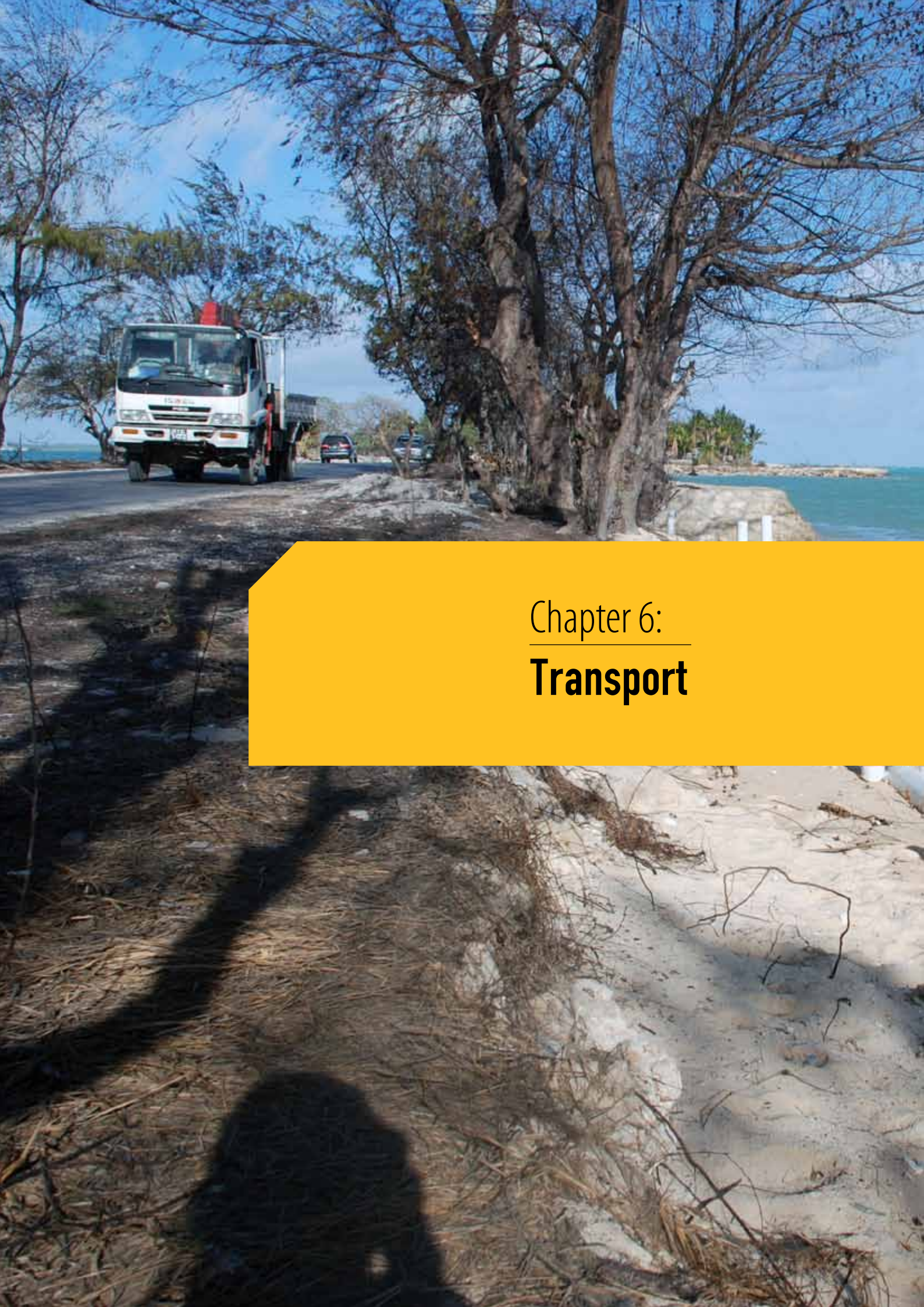
Year	GDP (million)	Sales to commercial sector	Sales to government & industrial sector	Sales to residential sector	Total electricity sales	Total electricity sales as % of GDP
2000	$134.06					
2001	$135.01					
2002	$135.79	$2.54	$1.48	$1.82	$5.84	4.30%
2003	$141.26	$2.40	$1.30	$1.96	$5.66	4.01%
2004	$145.74	$2.29	$1.80	$2.15	$6.24	4.28%
2005	$145.49	$2.29	$1.52	$2.53	$6.34	4.36%
2006	$138.95	$2.11	$2.10	$2.33	$6.54	4.71%
2007	$149.38	$1.34	$3.92	$2.57	$7.83	5.24%
2008	$153.50	$1.69	$5.13	$2.88	$9.70	6.32%
2009	$152.48	$1.54	$5.02	$2.96	$9.51	6.24%
Average annual growth rate *(compounded)*						
2000–2005	1.65%	-3.39%	0.92%	11.54%	2.76%	0.42%
2005–2009	1.18%	-9.51%	34.82%	4.03%	10.69%	9.40%

Source: Public Utilities Board

Note: No electricity sales data available for 2000 and 2001

Figure 42: Comparison of electricity consumption and GDP trend 2002–2009





Chapter 6:
Transport

Table 6A: Fuel use in transport sector

Unit: Million litres unless otherwise indicated

	Land	Air	Marine	Total transport
2000	5.23	1.80	4.12	11.15
2001	5.26	1.59	3.37	10.22
2002	5.31	2.08	4.04	11.43
2003	5.27	1.77	5.16	12.20
2004	5.61	1.91	5.18	12.70
2005	6.72	1.86	5.05	13.63
2006	6.39	2.14	5.76	14.29
2007	5.70	2.44	6.33	14.47
2008	5.81	2.45	5.95	14.20
2009	7.96	2.55	3.51	14.02
Average annual growth rate *(compounded)*				
(2000–2005)	5.12%	0.74%	4.16%	4.10%
(2005–2009)	4.33%	8.18%	-8.70%	0.71%

Source: Kiribati Oil Co. Ltd

Figure 43: Trend in fuel use by sector 2000–2009

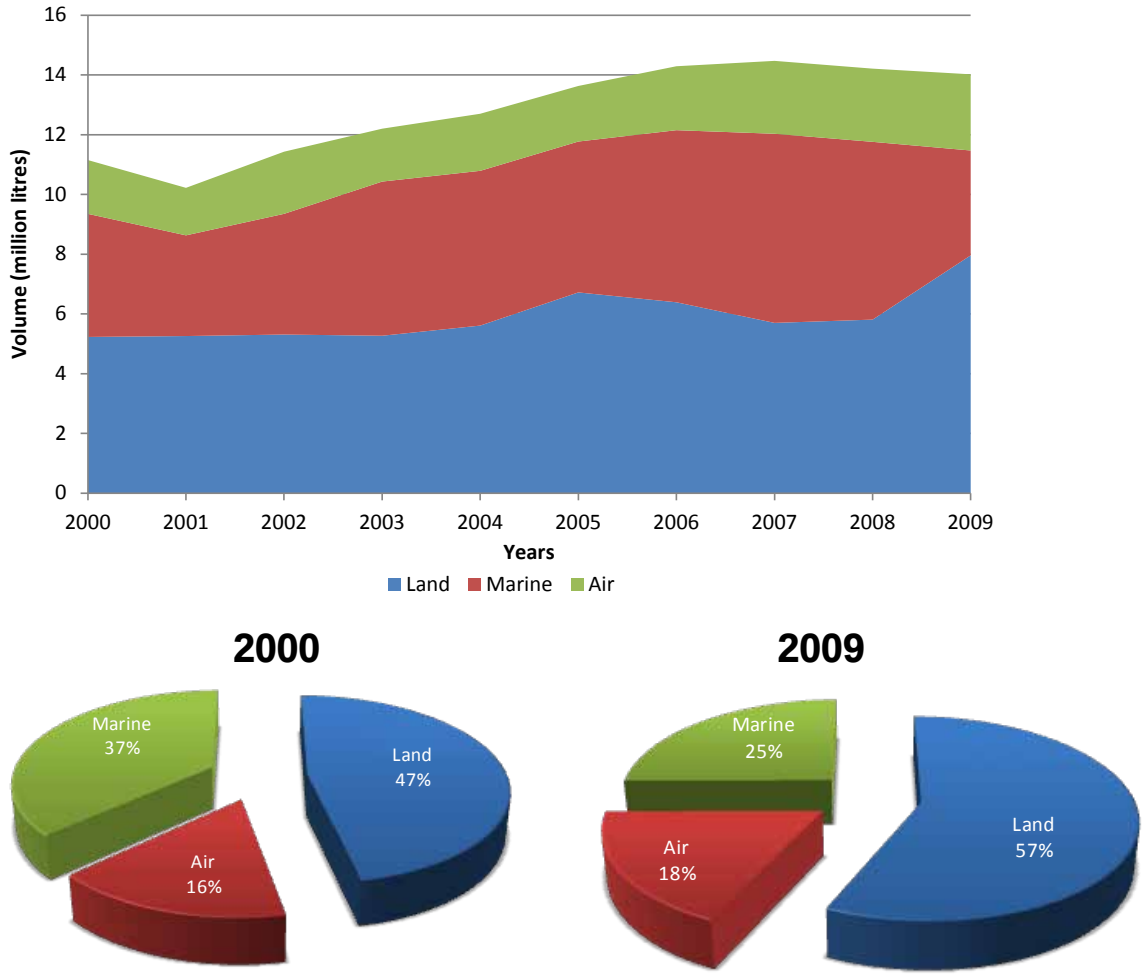


Table 6B: Structural fuel use in transport sector

Unit: Percent

	Road	Air	Marine
2000	46.94%	16.10%	36.96%
2001	51.41%	15.60%	32.99%
2002	46.46%	18.23%	35.31%
2003	43.22%	14.47%	42.31%
2004	44.20%	15.02%	40.78%
2005	49.27%	13.67%	37.06%
2006	44.69%	14.98%	40.33%
2007	39.41%	16.84%	43.74%
2008	40.90%	17.22%	41.88%
2009	56.76%	18.20%	25.04%

Source: Kiribati Oil Co. Ltd

Figure 44: Structural fuel use in transport sector 2000-2009

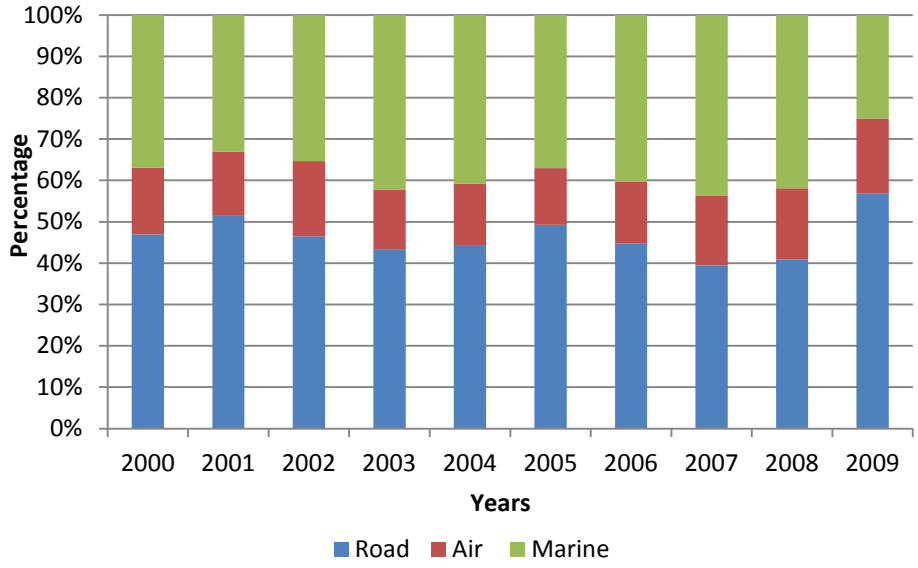


Table 6C: Fuel type usage in transport sector

Unit: Thousand litres unless otherwise indicated

Year	Diesel		Gasoline		Kerosene		Avgas		Lubricant oil				Total fuel usage in transport sector
	Road	Marine	Road	Marine	International air	Domestic air	International air	Domestic air	International air	Domestic air	Road	Marine	
2000	2844	2348	2328	1724	1266	471	0	0	35	23	62	50	11150
2001	2923	1950	2252	1358	975	543	0	0	46	30	81	65	10223
2002	2932	2431	2307	1548	1427	590	0	0	41	27	72	58	11431
2003	2701	2954	2487	2140	1264	421	0	0	49	32	87	69	12204
2004	2895	3105	2687	2048	1200	679	0	0	17	11	30	24	12696
2005	3858	2872	2848	2171	1294	546	14	0	6	4	10	8	13631
2006	3555	3410	2831	2353	1280	853	7	0	1	1	2	1	14294
2007	3066	3863	2636	2466	1214	1221	0	1	1	1	2	2	14472
2008	3055	3759	2749	2184	1143	1283	16	0	2	1	4	3	14200
2009	4786	1656	3159	1845	1368	1172	0	0	7	4	12	10	14020
Average annual growth rate *(compounded)*													
(2000–2005)	6.29%	4.11%	4.11%	4.72%	0.44%	3.00%			-29.72%	-29.52%	-30.57%	-30.69%	4.10%
(2005–2009)	5.54%	-12.86%	2.62%	-3.99%	1.40%	21.04%	-100.00%		3.93%	0.00%	4.66%	5.74%	0.71%

Sources: 1. Kiribati Oil Co. Ltd 2. Kiribati Shipping Line Co. Ltd

Table 6D: Energy use categories in road transport sector

Unit: Terajoules

Year	Tarawa – general	Tarawa – buses	Outer islands	Road transport lubricants	Total road
2000	120.7	45.8	22.9	2.4	191.8
2001	127.6	41.6	20.7	3.1	193.0
2002	143.3	21.8	27.0	2.8	194.9
2003	151.9	9.9	27.5	3.4	192.7
2004	165.2	10.9	27.4	1.2	204.8
2005	187.8	27.3	31.2	0.4	246.7
2006	175.7	26.2	32.1	0.1	234.1
2007	152.3	24.8	31.4	0.1	208.6
2008	160.8	24.4	26.7	0.1	212.1
2009	170.9	92.1	29.8	0.5	293.3
Average annual growth rate (compounded)					
(2000–2005)	9.24%	-9.83%	6.38%	-30.12%	5.16%
(2005–2009)	-2.33%	35.53%	-1.14%	5.74%	4.42%

Sources: 1. Kiribati Oil Co. Ltd

Figure 45: Trend in energy consumption of major end-use customers in road transport sector

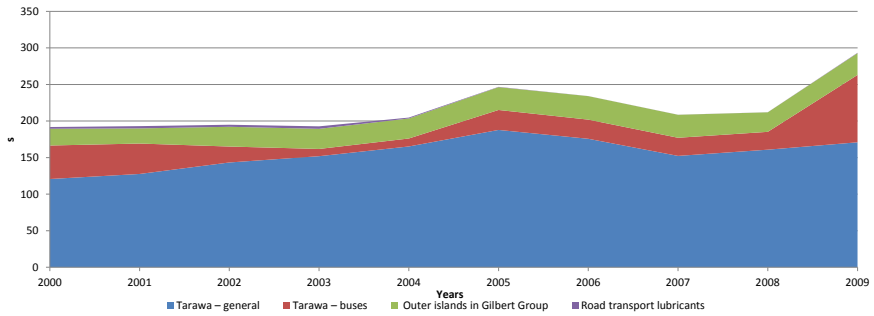


Table 6E: Vehicle imports by type

	Buses & pick-ups	Saloon cars	Trucks & tractors	Motorcycles	Total
2000					
2001					
2002	90	62	129	152	633
2003	62	63	197	284	606
2004	84	220	263	586	1,153
2005	53	245	274	543	1,115
2006	57	166	112	449	784
2007	85	193	149	307	734
2008	88	256	145	350	839
2009	30	84	53	544	711

Source: Statistics Office

Note: no data available for the year 2000 and 2001

Table 6F: Energy use in marine transport sector

Unit: Terajoules

	Fishing	Tarawa general	Cargo & passenger	Outer islands – general	Marine transport lubricants	Total marine
2000	23.6	66.6	26.8	32.6	1.9	151.5
2001	49.9	29.7	23.4	29.7	2.5	135.1
2002	65.2	35.3	24.1	35.3	2.2	162.0
2003	89.5	44.5	26.9	44.5	2.7	208.1
2004	97.4	44.2	15.6	44.2	0.9	202.3
2005	66.4	49.6	35.1	49.6	0.3	201.1
2006	108.2	51.0	23.9	51.0	0.1	234.2
2007	135.0	47.1	21.5	47.1	0.1	250.8
2008	118.7	43.9	29.5	43.9	0.1	236.0
2009	44.1	47.0	14.2	47.0	0.4	152.8
Average annual growth rate (compounded)						
(2000–2005)	22.98%	-5.72%	5.54%	8.76%	-30.87%	5.83%
(2005–2009)	-9.72%	-1.34%	-20.25%	-1.34%	7.46%	-6.64%

Source: Marine Unit, MCTTD

Figure 46: Trend in energy consumption of major end-use customers in marine transport sector

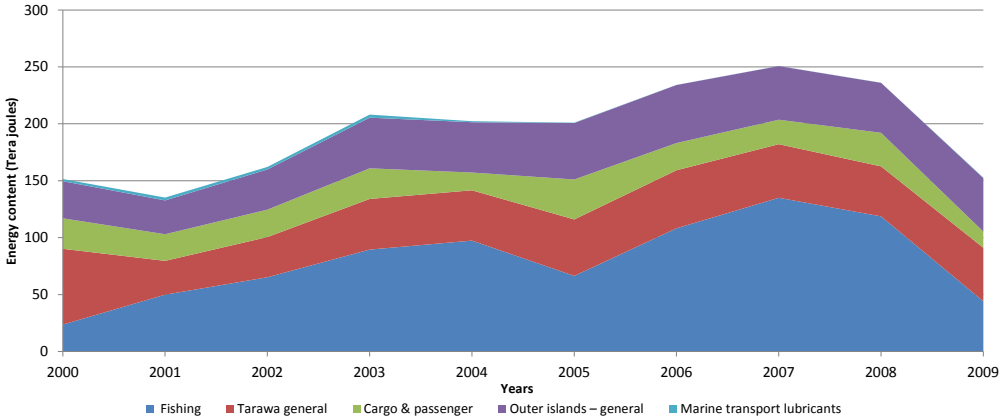


Table 6G: Registered vessels by category and by fuel type

Unit: Number of vessels

	Motor vessel		Canoe with outrigger		Catamaran		Landing craft	Total
	Diesel	Gasoline	Diesel (inboard)	Gasoline (outboard)	Diesel (inboard)	Gasoline (outboard)	Diesel	
2000	8	1	1	2	3	1	0	16
2001	8	1	1	2	3	1	0	16
2002	8	0	2	4	3	2	0	19
2003	8	0	3	5	4	2	0	22
2004	8	0	3	4	4	2	1	22
2005	8	0	0	5	5	2	1	21
2006	9	0	0	6	9	2	1	27
2007	13	0	0	7	9	2	1	32
2008	14	0	0	7	9	3	2	35
2009	14	0	0	8	7	3	2	34

Source: Marine Unit, MCTTD

Kiribati shipping routes

1. The main port of entry for receiving imported goods (general cargo and oil products) in Kiribati is Tarawa.

2. The other (secondary) port of entry for imported goods (general cargo and oil products) is Christmas Island (Kiritimati) in the Line group, with very limited ship calls.

3. The densest domestic shipping route is in the Gilbert Island group, from Tarawa Island to all outer islands in the group. Note that all islands in the group are inhabited, hence cargo is distributed to them regularly by domestic vessels.

4. Kanton Island is the only inhabited island in the Phoenix group, while Christmas Island (Kiritimati), Fanning Island (Tabuaeran) and Washington Island (Teeraina) are the only three inhabited islands in the Line group.

5. The domestic shipping route serving Kanton (Phoenix group), Christmas, Fanning and Washington (Line group) from Tarawa may average 3–4 calls per ship annually from only two domestic vessels, namely MV *Matangare* (GT 1219) and MV *Moamoa* (GT 401). Another domestic vessel, MV *Nakoraoi* (GT 248), makes 2–3 calls annually to these islands.

6. MV *Matangare* and MV *Moamoa* serve Kanton, Christmas, Fanning and Washington islands from Tarawa on a regular basis. Less frequently they serve the other islands in Kiribati. Hence, smaller domestic vessels distribute cargo to islands in the Gilbert Island group.

7. About 20 domestic vessels are in operation now, including MV *Matangare* and MV *Moamoa*. Out of these 20 ships, 18 operate only between Tarawa and the outer islands in Gilbert Island group, including the vessel MV *Nakoraoi*, which sometimes travels to the Phoenix and Line Islands. The two vessels MV *Matangare* and MV *Moamoa* serve the Phoenix (one island) and Line Islands (three islands).

Overseas ships calling at Christmas Island:

8. One cargo ship from Honolulu, Hawaii serves Christmas, Fanning and Washington islands (Line group); it comes on average once every 3–4 months. This ship has a trading route to these islands as well as other Pacific Islands, but not to Kanton (Phoenix group) or islands in the Gilbert Island group.

9. There is also one tanker that serves only Christmas Island, on average once every three months.

10. Occasionally passenger cruise liners visit Fanning Island and Christmas Island, usually 3–4 ships a year.

11. Domestic shipping movements in the Line and Phoenix groups are less frequent than in the Gilbert Island group. Note that Kanton, Christmas, Fanning and Washington are serviced from Tarawa in the Gilbert Island group, and that due to their remoteness from Tarawa, the two domestic vessels take a relatively long time to complete each voyage.

Source: MCTTD

Table 6H: Breakdown of energy use in air transport sector

Unit: Terajoules

	Air transport domestic	Air transport international	Transport lubricants	Total
2000	17.3	46.6	2.3	66.2
2001	20.0	35.9	3.0	58.8
2002	21.7	52.5	2.6	76.8
2003	15.5	46.5	3.2	65.2
2004	25.0	44.2	1.1	70.2
2005	20.1	48.1	0.4	68.5
2006	31.4	47.3	0.1	78.8
2007	45.0	44.7	0.1	89.7
2008	47.2	42.6	0.1	90.0
2009	43.1	50.3	0.4	93.9
Average annual growth rate (compounded)				
(2000–2005)	3.05%	0.64%	-29.52%	0.69%
(2005–2009)	21.01%	1.12%	0.00%	8.20%

Source: Aviation Unit, MCTTD

Figure 47: Trend in energy consumption of major end-use customers in air transport sector

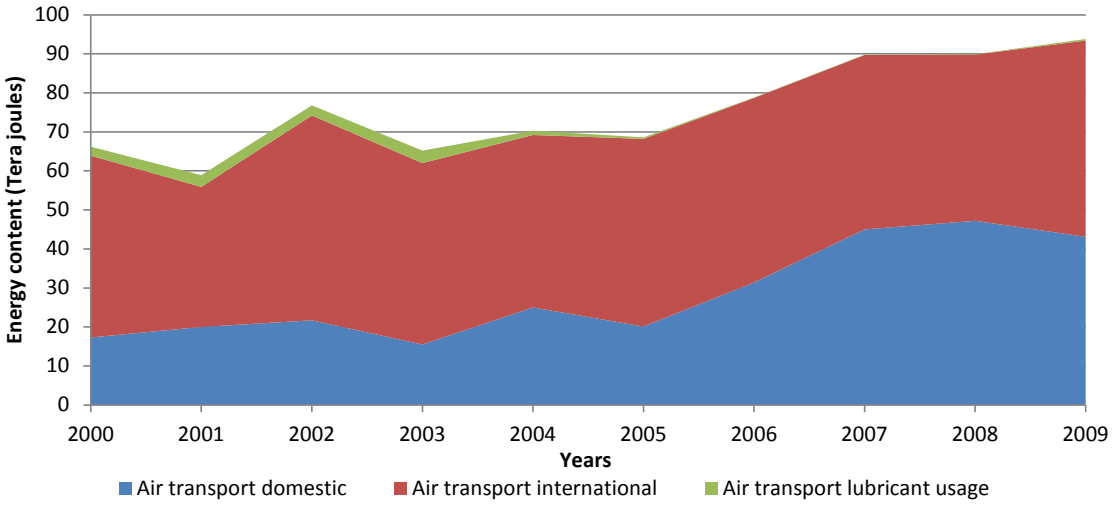


Table 6I: Aircraft and passenger movement recorded at Bonriki Airport

Unit: As indicated

Year	Total Landing	Type of flight		No. of passengers			
		Domestic	International	Domestic		International	
				IN	OUT	IN	OUT
2008	1149	994	155	8705	8533	15890	15480
2009	1785	1583	202	9519	9508	18072	18637

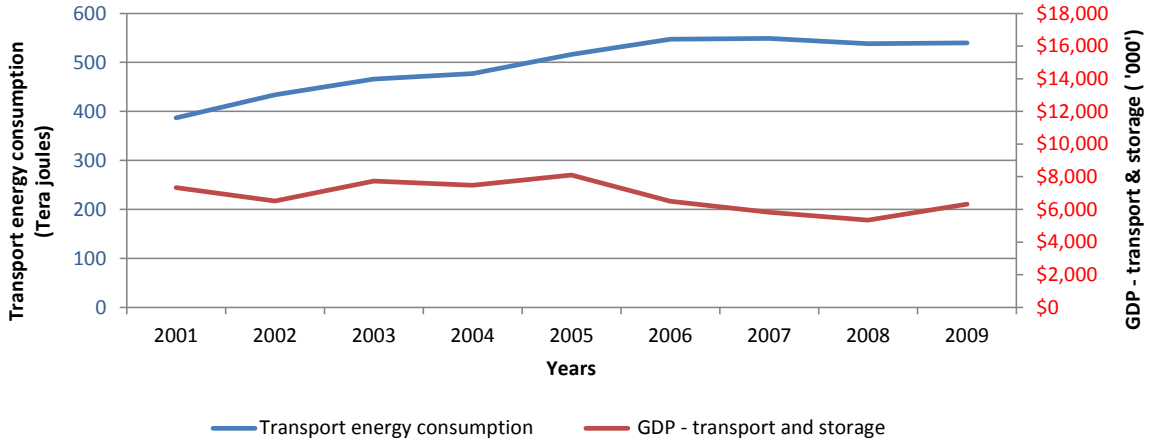
Source: Aviation Unit, MCTTD

Table 6J: Comparison of transport energy consumption to transport and communication sector GDP

Unit: Terajoules unless otherwise indicated

	Road transport	Marine transport	Air transport	Total transport	GDP in the transport & communication sector
2000	191.8	151.5	66.2	409.5	$8,107
2001	193	135.1	58.8	386.9	$7,335
2002	194.9	162	76.8	433.7	$6,520
2003	192.7	208.1	65.2	466	$7,733
2004	204.8	202.3	70.2	477.3	$7,473
2005	246.7	201.1	68.5	516.3	$8,110
2006	234.1	234.2	78.8	547.1	$6,505
2007	208.6	250.8	89.7	549.1	$5,828
2008	212.1	236	90	538.1	$5,349
2009	293.3	152.8	93.9	540	$6,316
Average annual growth rate (compounded)					
(2000–2005)	5.16%	5.83%	0.69%	4.74%	0.01%
(2005–2009)	4.42%	-6.64%	8.20%	1.13%	-6.06%

Figure 48: Transport energy consumption comparison to Transport & Communication sector GDP.



Chapter 7:

Commercial, industrial and government

Table 7A: Structural energy use in commercial sector

Unit: Percent unless otherwise indicated

Year	DPK	LPG	Electricity	Total energy consumed (TJ)
2000	5.3%	11.9%	82.8%	19.08
2001	5.3%	12.5%	82.2%	20.53
2002	5.8%	24.1%	70.0%	27.80
2003	4.6%	33.1%	62.2%	29.51
2004	4.5%	20.8%	74.8%	23.43
2005	4.0%	18.9%	77.1%	23.77
2006	5.5%	19.4%	75.0%	21.59
2007	6.5%	26.8%	66.7%	15.41
2008	5.1%	22.8%	72.1%	15.34
2009	5.9%	20.0%	74.1%	13.73

Sources: 1. Customs Office 2. Kiribati Oil Co. Ltd 3. Kiribati Solar Energy Co. Ltd
4. National energy demand/supply database manual 5. Public Utilities Board

Figure 49: Structural energy use in commercial sector

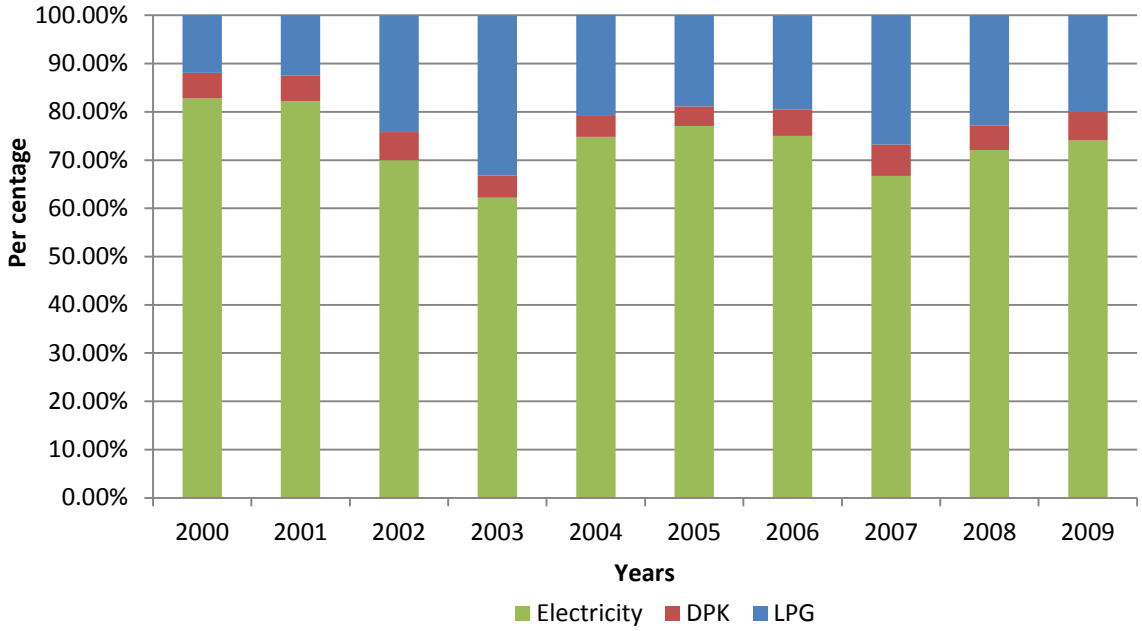


Table 7B: Energy use in government and industrial sector

Unit: Percent unless otherwise indicated

	ADO	Lubricants	Electricity	Total energy consumed (TJ)
2000	19.1%	2.3%	78.6%	11.84
2001	16.2%	2.9%	81.0%	12.55
2002	20.1%	2.2%	77.8%	14.56
2003	18.3%	3.0%	78.7%	12.64
2004	14.3%	0.8%	84.9%	16.27
2005	18.1%	0.3%	81.6%	14.89
2006	14.7%	0.0%	85.3%	18.82
2007	8.9%	0.0%	91.1%	32.93
2008	7.7%	0.1%	92.3%	28.62
2009	9.1%	0.2%	90.7%	28.47

Sources: 1. Customs Office 2. Kiribati Oil Co. Ltd 3. Kiribati Solar Energy Co. Ltd
4. National energy demand/supply database manual

Figure 50: Structural energy use in government and industrial sector

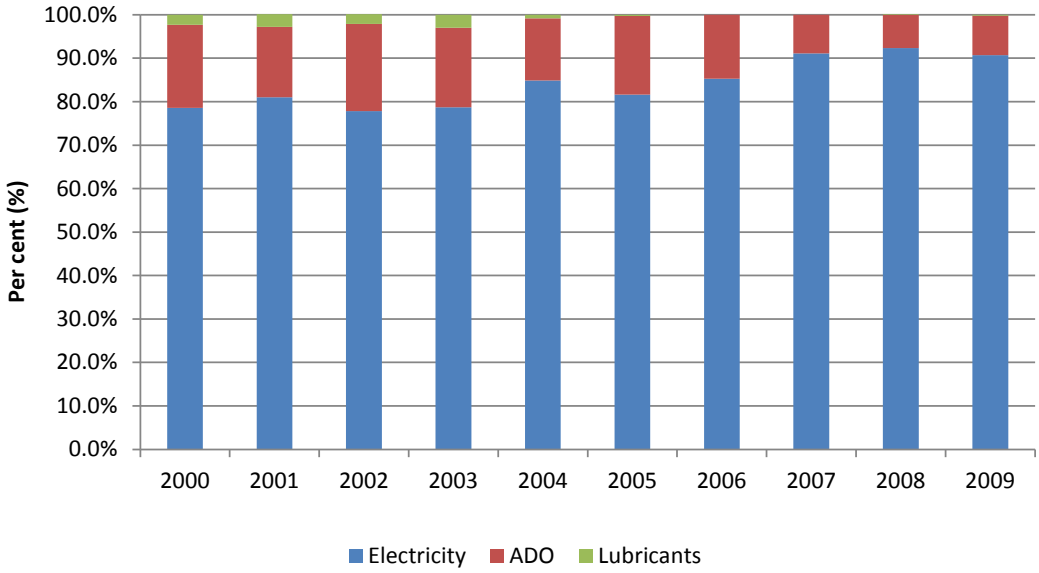
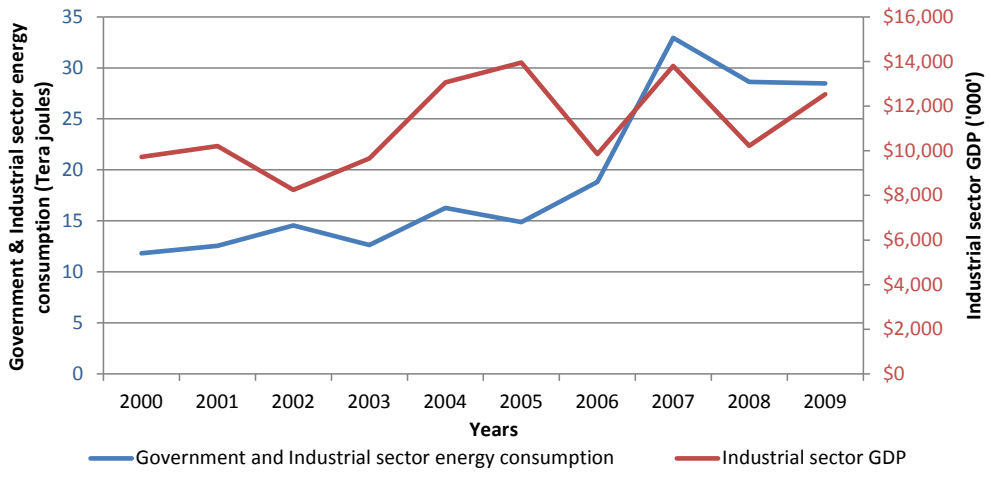


Table 7C: Comparison of industrial & government energy consumption to industrial sector GDP

Unit: Terajoules or otherwise indicated

	Government and industrial sector energy consumption	Industrial sector GDP
2000	11.84	$9,727
2001	12.55	$10,215
2002	14.56	$8,243
2003	12.64	$9,656
2004	16.27	$13,066
2005	14.89	$13,954
2006	18.82	$9,850
2007	32.93	$13,805
2008	28.62	$10,224
2009	28.47	$12,535
Average Annual Growth Rate (compounded)		
(2000–2005)	4.69%	7.48%
(2005–2009)	17.59%	-2.64%

Figure 51: Government & Industrial energy consumption to Industrial sector GDP comparison



Chapter 8:

Fishing

Table 8A: Energy use in fishing sector

Unit: Thousand litres unless otherwise indicated

	Fuel use for fishing vessels		Cooking
	ADO	ULP	DPK
2000	274	382	0
2001	228	291	4
2002	264	351	0
2003	274	461	0
2004	391	516	38
2005	385	558	0
2006	268	545	0
2007	297	537	0
2008	248	534	0
2009	185	424	0
Average annual growth rate (compounded)			
(2000–2005)	7.07%	7.89%	
(2005–2009)	-16.80%	-6.65%	

Sources: 1. Kiribati Oil Co. Ltd 2. Kiribati Shipping Line Co. Ltd

Figure 52: Fuel use trend in the fishing sector

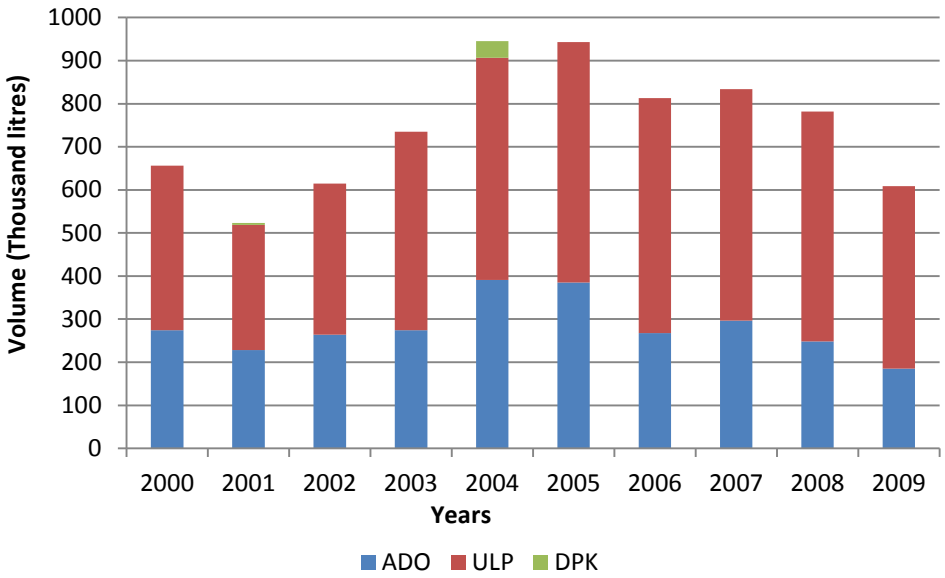
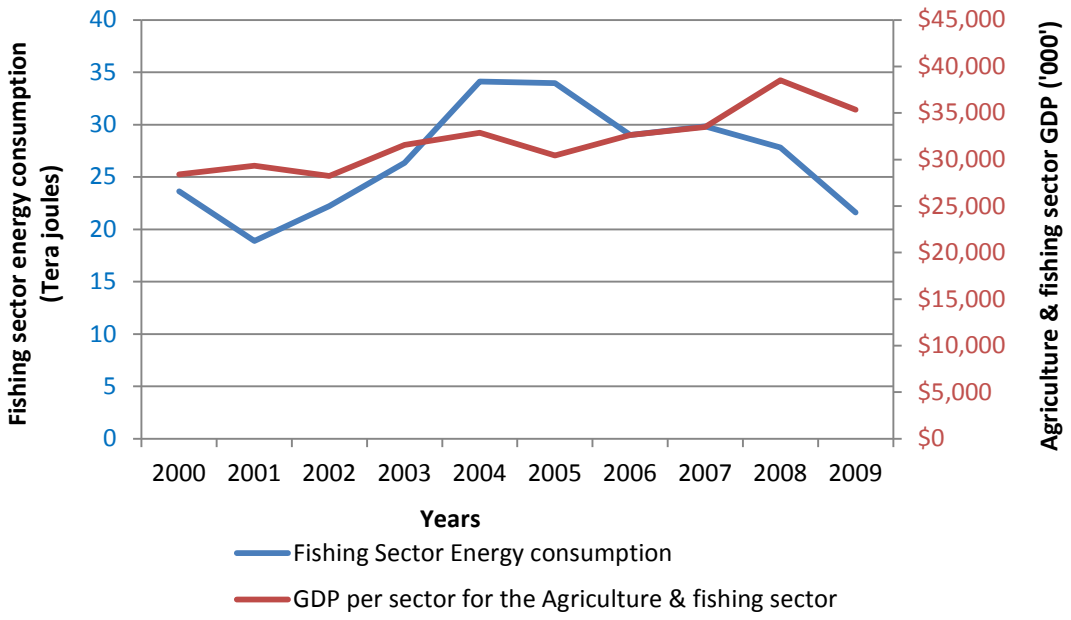


Table 8B: Comparison of the fishing sector energy consumption to agriculture forestry and fishing sector GDP

Unit: Thousand litres unless otherwise indicated

	Fishing sector energy consumption	Agriculture, forestry & fishing
2000	23.62	28418
2001	18.88	29348
2002	22.22	28215
2003	26.35	31555
2004	34.13	32864
2005	33.95	30416
2006	29.02	32632
2007	29.84	33487
2008	27.82	38521
2009	21.61	35356
Average annual growth rate (compounded)		
(2000–2005)	7.52%	1.37%
(2005–2009)	-10.68%	3.83%

Figure 53: Fishing sector energy consumption comparison to agriculture and fishing sector GDP



Chapter 9:

Resdential, community and social services

Table 9A: Energy use in residential sector

Unit: Terajoules

	Biomass – coconut residue	Biomass – firewood	DPK	LPG	ULP	Electricity	Solar	Total
2000	480.4	65.2	17.9	3.8	1.8	15.4	0.5	585.0
2001	482.7	65.5	15.1	4.3	1.6	16.5	0.5	586.1
2002	485.1	65.8	21.8	11.2	1.9	17.7	0.5	604.0
2003	487.8	66.2	20.7	16.3	2.5	19.1	0.5	613.0
2004	490.7	66.6	16.2	8.1	2.4	20.9	1.8	606.7
2005	493.9	67.0	15.0	7.5	2.7	28.4	1.9	616.4
2006	501.8	68.1	18.0	7.0	2.8	24.7	1.8	624.2
2007	509.7	69.2	14.9	6.9	2.6	27.2	1.8	632.3
2008	517.8	70.3	11.9	5.8	2.4	25.9	1.8	636.0
2009	526.0	71.4	12.2	4.6	2.6	26.6	1.7	645.1
Average annual growth rate (compounded)								
(2000–2005)	0.56%	0.56%	-3.57%	14.55%	9.02%	13.03%	31.78%	1.05%
(2005–2009)	1.59%	1.59%	-4.98%	-11.58%	-1.36%	-1.61%	-2.59%	1.14%

Sources: 1. Kiribati Oil Co. Ltd 2. Kiribati Solar Energy Co. Ltd
3. National energy demand/supply database manual 4. Public Utilities Board

Figure 54: Fuel use trend in residential sector 2000–2009

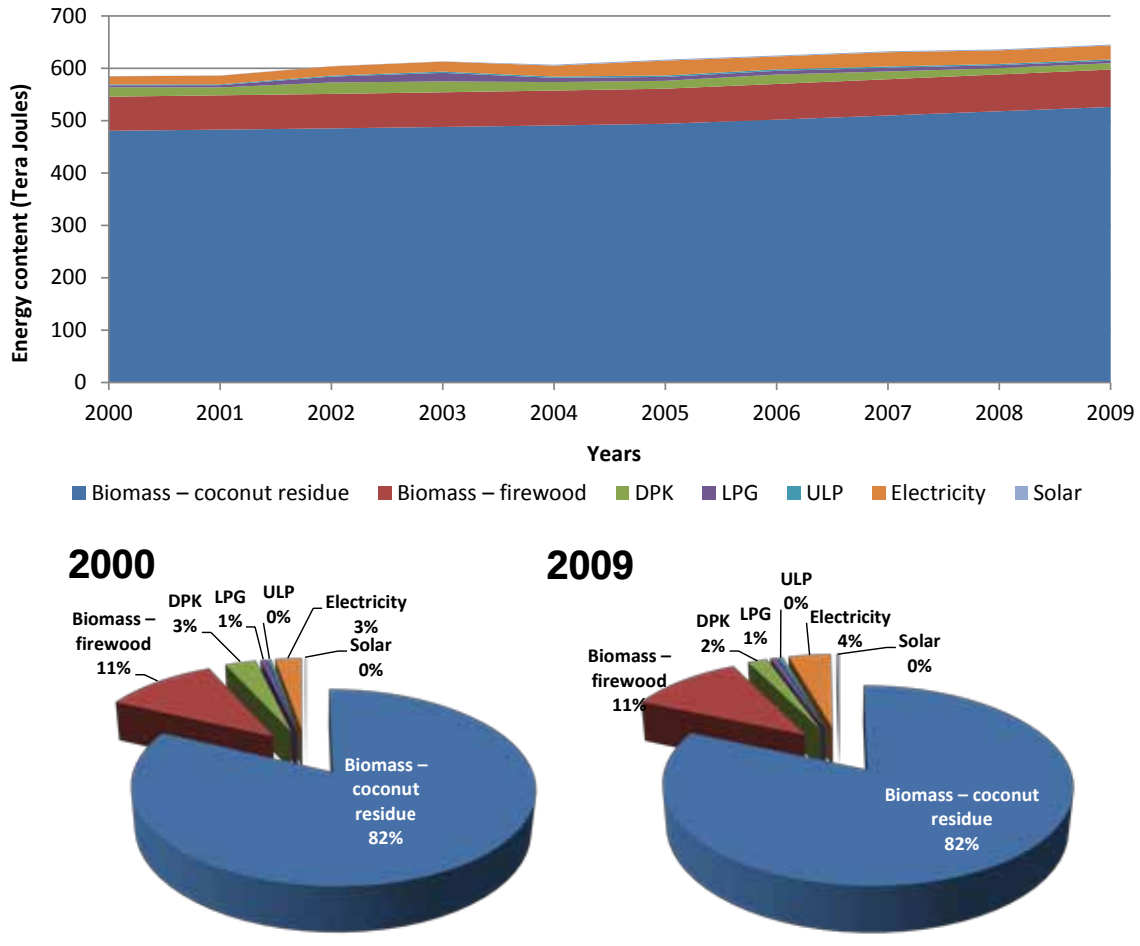


Table 9B: Households with access to electrification (grid and small-scale power) in the Gilbert Island Group

Unit: As indicated

	Census total Households			No. of household connected to the grid		No. of household having generators			No. of household having solar home systems		
	2000	2005	2010	2005	2010	2000	2005	2010	2000	2005	2010
Banaba	54	61	57			5	16	0	5	55	54
Makin	292	328	347			22	38	10	9	92	104
Buataritari	592	561	630			44	72	28	25	102	103
Marakei	429	437	492			26	49	13	64	280	181
Abaiang	843	853	926			81	160	24	62	247	364
North Tarawa	693	867	1002	295	340	43	75	33	136	268	125
South Tarawa	4529	5245	4728	4616	4108	282	190	12	98	106	47
Betio			1977		1837			3			10
Maiana	376	354	383			39	56	18	40	120	127
Abemama	533	592	583			58	165	94	53	156	148
Kuria	182	202	190			12	46	16	17	86	70
Aranuka	194	211	214			26	50	16	18	75	84
Nonouti	508	540	508			53	81	35	91	195	160
North Tabiteuea	599	573	682			50	139	85	26	157	149
South Tabiteuea	230	262	249			27	32	7	10	80	77
Beru	492	462	449			27	73	19	12	86	87
Nikunau	333	335	365			23	39	22	5	87	143
Onotoa	354	332	332			24	49	35	13	93	86
Tamana	214	196	202			15	26	4	9	87	85
Arorae	244	241	238			13	28	7	11	85	79

Source: Statistics Office. Note: PUB only supplies power to Tarawa. Number of households listed excludes the institutions

Table 9C: Energy use in community and social sector

Unit: Terajoules

	DPK	LPG	Solar PV	Total
2000	1.0	1.5	0.0046	2.53
2001	0.85	1.71	0.0046	2.56
2002	1.23	4.47	0.0046	5.71
2003	1.16	6.52	0.0046	7.68
2004	0.91	3.24	0.0046	4.15
2005	0.84	2.99	0.1040	3.93
2006	1.01	2.80	0.0471	3.86
2007	0.84	2.75	0.0600	3.65
2008	0.67	2.34	0.0524	3.06
2009	0.68	1.83	0.0433	2.56
Average annual growth rate (compounded)				
(2000–2005)	-3.58%	14.55%	86.94%	9.26%
(2005–2009)	-4.90%	-11.58%	-19.69%	-10.21%

Sources: 1. Customs Office 2. Kiribati Oil Co. Ltd 3. Kiribati Solar Energy Co. Ltd
4. National energy demand/supply database manual 5. Public Utilities Board

Figure 55: Energy use in community and social sector

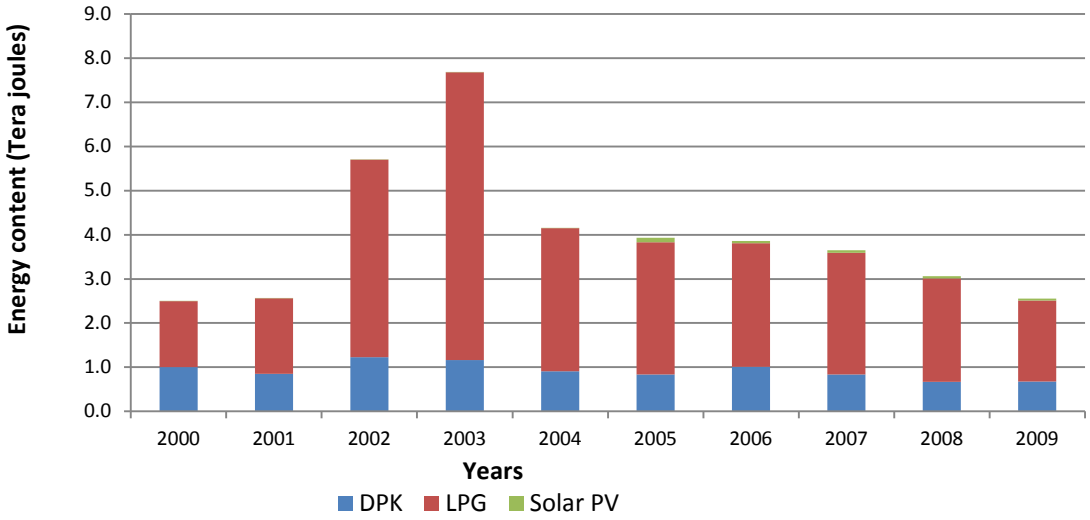
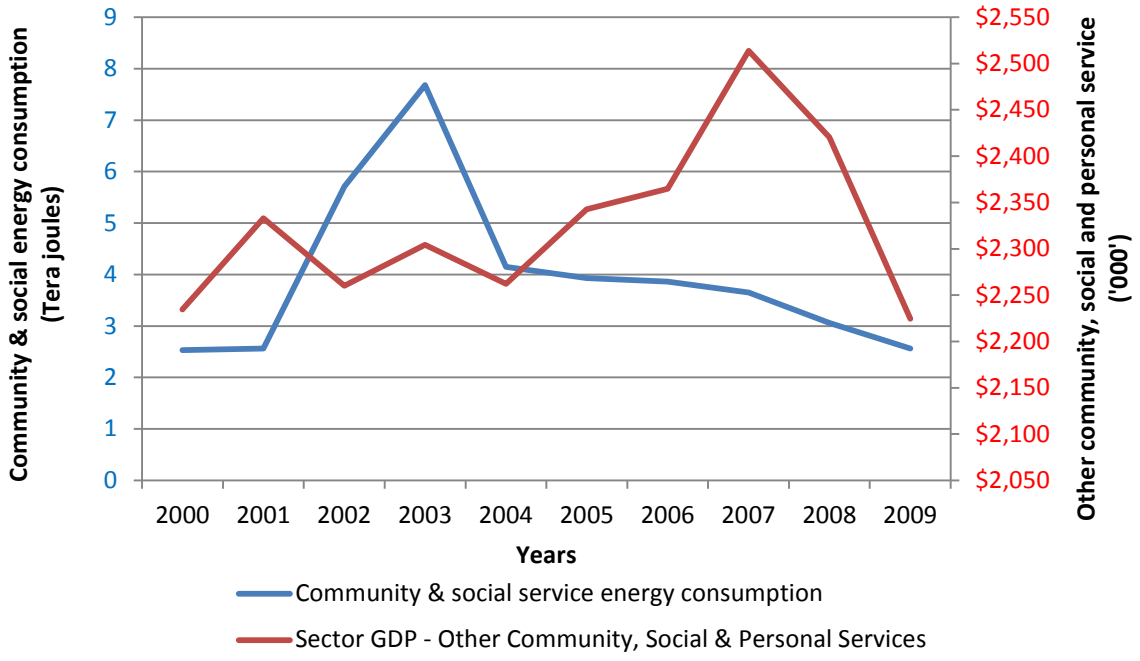


Table 9D: Community & social service comparison of energy consumption to sector GDP

Unit: Terajoules otherwise unless indicated

	Community & social service energy consumptions	Community & social service sector GDP
2000	2.53	$2,234
2001	2.56	$2,333
2002	5.71	$2,260
2003	7.68	$2,304
2004	4.15	$2,262
2005	3.93	$2,343
2006	3.86	$2,365
2007	3.65	$2,514
2008	3.06	$2,421
2009	2.56	$2,225
Average annual growth rate (compounded)		
(2000–2005)	**9.21%**	**0.95%**
(2005–2009)	-10.16%	-1.28%

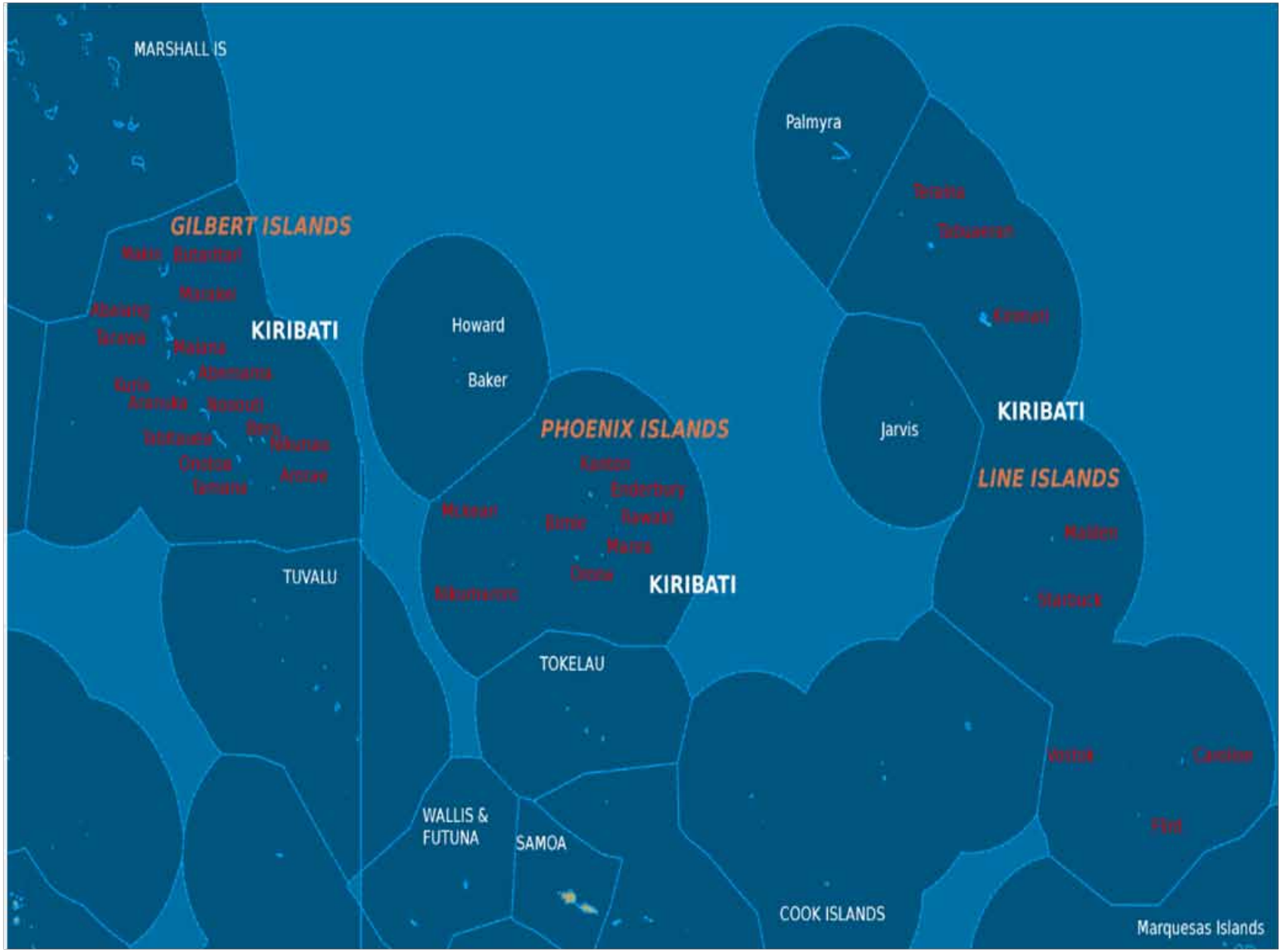
Figure 56: Community & social service comparison of energy consumption to sector GDP



Chapter 10:

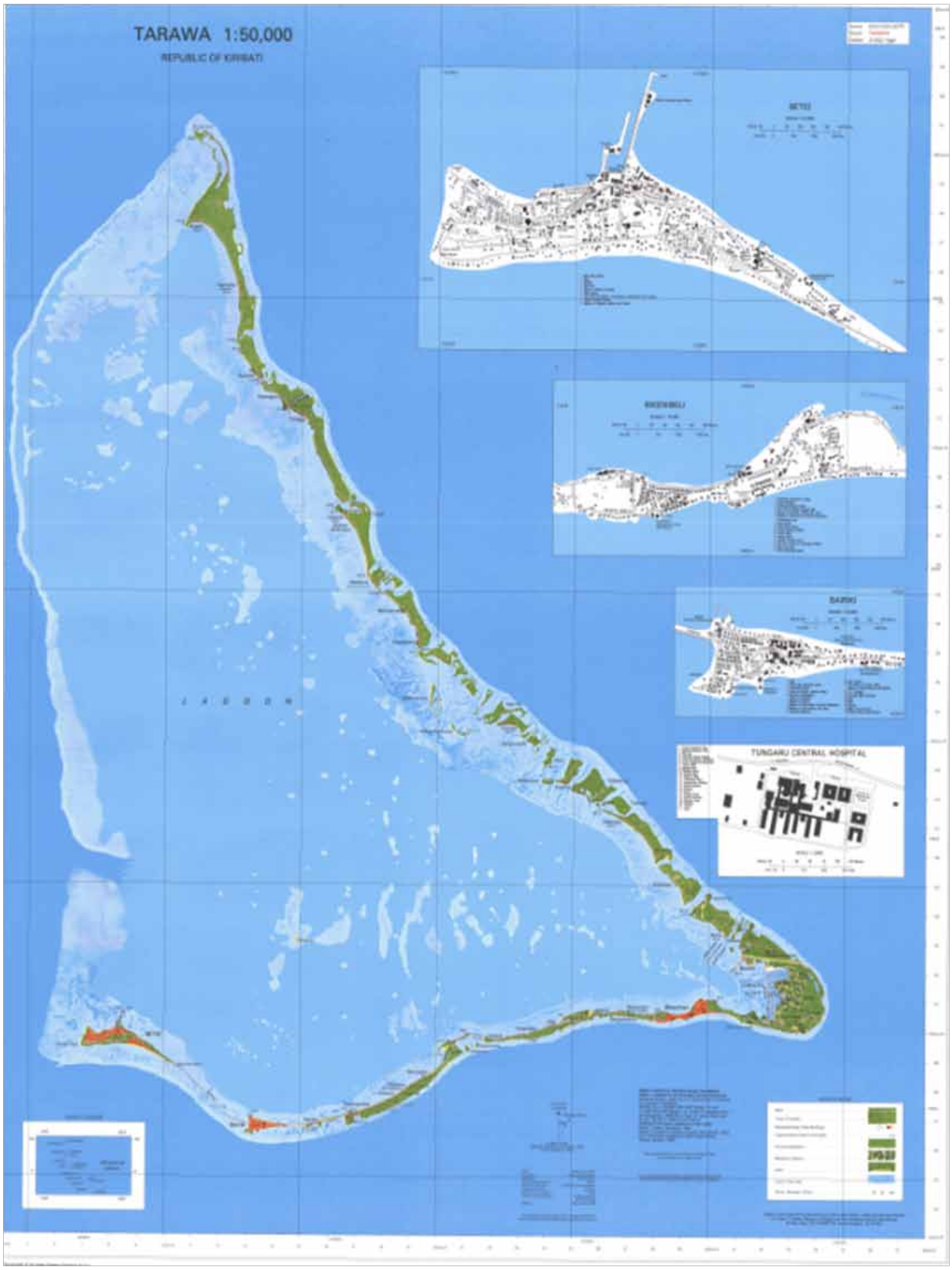
Selected typography maps of the Gilbert Island group

Figure 57: Topographic map of Kiribati



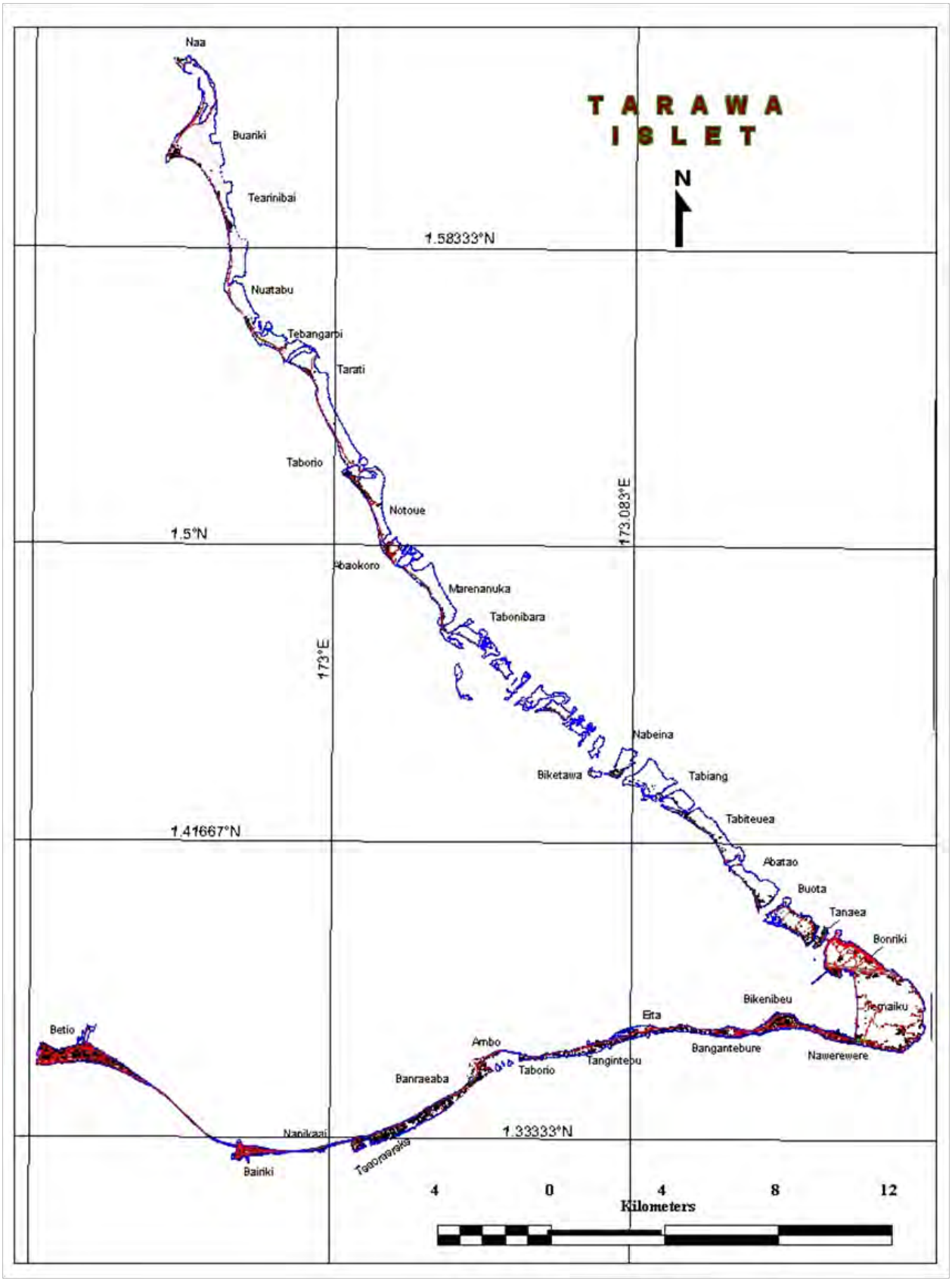
Source: SPC SOPAC Division

Figure 58: Topographic map of Tarawa



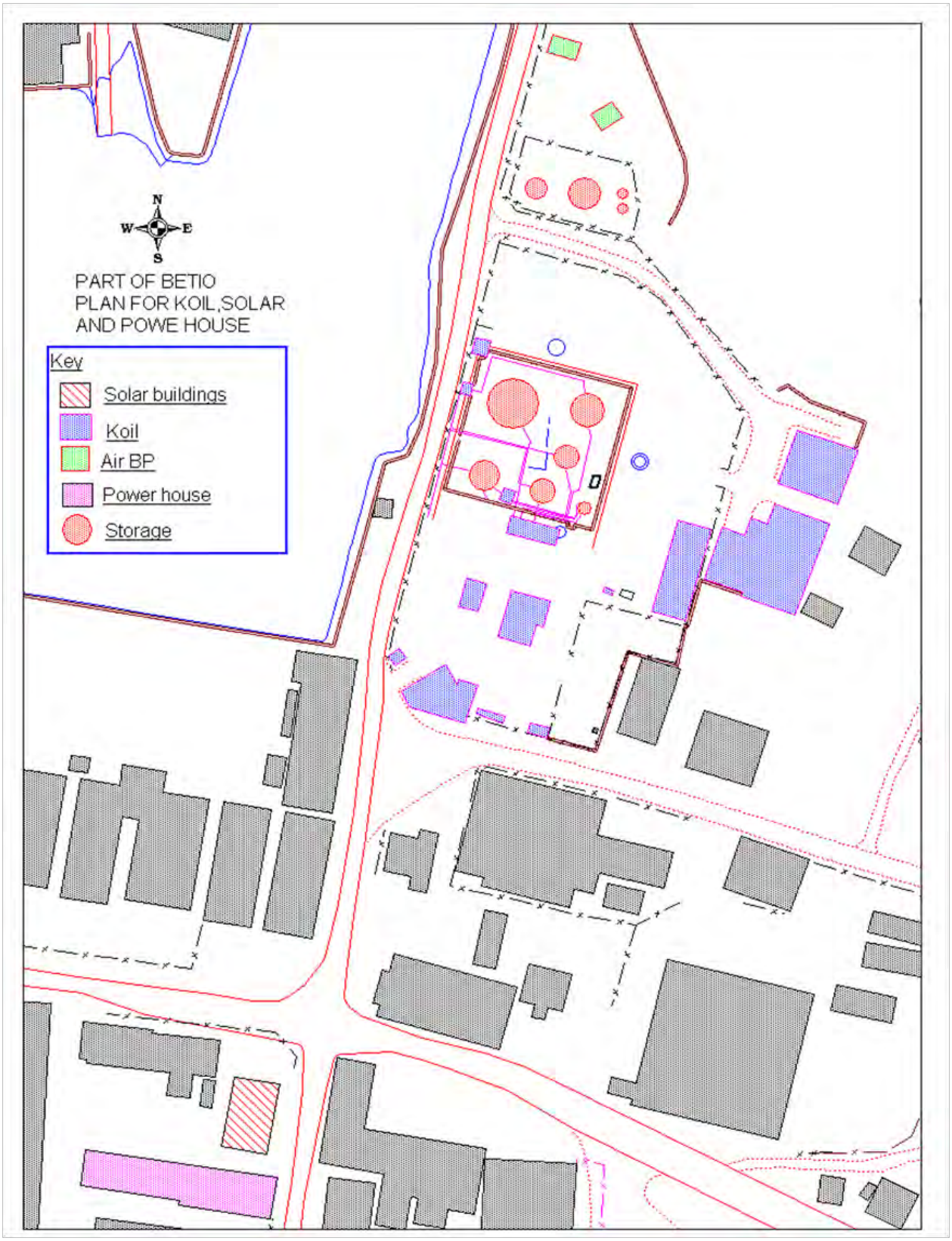
Source: Kiribati Statistics Office

Figure 59: Topographic map of Tarawa Islet



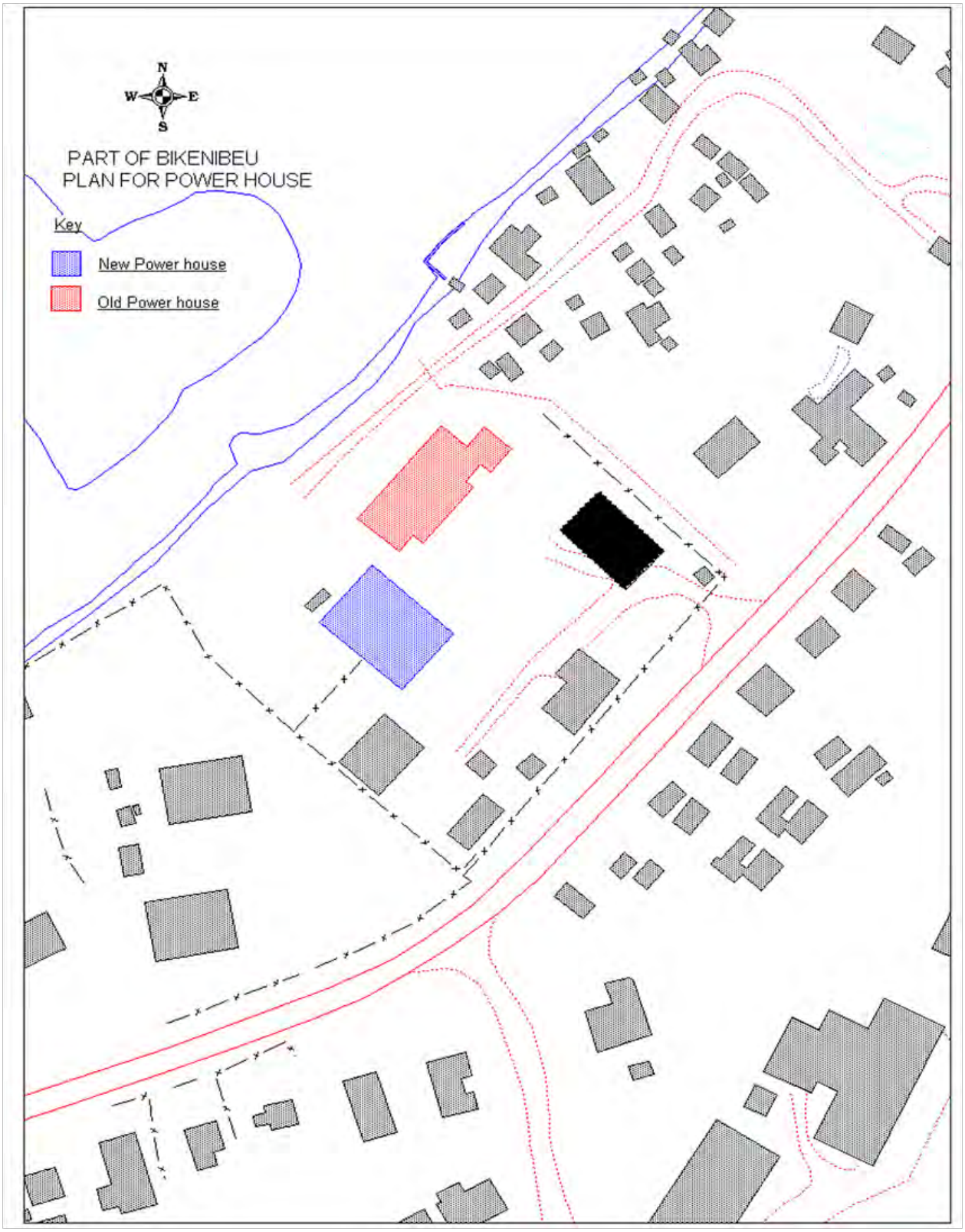
Source: Kiribati Statistics Office

Figure 60: Topographic map of Betio area showing the major energy stakeholder buildings



Source: Kiribati Statistics Office

Figure 61: Map of Bekenibeu area in Tarawa showing location of Public Utilities Board (PUB) building



Source: Kiribati Statistics Office