

# KIRIBATI COOKING FOR LIFE STRATEGY





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Prepared by the Energy Planning Unit, Ministry of Works and Public Utilities with assistance from the Energy Programme of the Secretariat of the Pacific Community

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# ACRONYMS

AMAK	Aia Maea Ainen Kiribati
AUD	Australian Dollars
CFL	Cooking for Life
DPK	Dual Purpose Kerosene
DBK	Development Bank of Kiribati
EDD	Economic Development Division
EDF 10	European Development Fund
EPU	Energy Planning Unit
FSPK	Foundation of the South Pacific Kiribati
ICS	Improved Cook Stove
ксс	Kiribati Consulting Company
КСМС	Kiribati Copra Mill Company
KDP	Kiribati Development Plan
Kg	Kilogram
КНС	Kiribati Housing Corporation
KNEP	Kiribati National Energy Policy
KOIL	Kiribati Oil Company
KPA	Key performance area
KSEC	Kiribati Solar Energy Company
LED	Light-emitting diode
LPG	Liquefied Petroleum Gas
MPWU	Ministry of Public Works and Utilities
PICTs	Pacific Island countries and territories
PSC	Project Steering Committee
RE	Renewable energy
RERF	Revenue Equalization Reserve Fund
SE4ALL	Sustainable Energy for All
SLL	Solar LED Lights
SPC	Secretariat of the Pacific Community
VAT	Value Added Tax

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# **EXECUTIVE SUMMARY**

The Kiribati Cooking for Life (CFL) Strategy is a five year strategic plan to guide the Energy Planning Unit (EPU) of the Ministry of Works and Public Utilities (MWPU) and its stakeholders in the promotion of cleaner and efficient cooking fuel and technology in Kiribati. Cooking fuel in the urban centres is predominantly kerosene or dual purpose kerosene (DBK) followed by biomass or firewood use. In this context, clean and efficient cooking fuel is liquefied petroleum gas (LPG) and cleans and efficient cooking technology is improved cook stove (ICS).

The lead implementing agency for the promotion of LPG use for cooking are the Kiribati Oil Company Limited (KOIL) and the new established LPG company, BAMA, while the agency for increasing the use of ICS acts through a local non-government organisation. The targeted areas of the CFL strategy are South Tarawa, Betio, North Tarawa and Kiritimati Island. The CFL will be reviewed for possible inclusion of other islands of Kiribati after two years of its implementation.

The CFL strategy aims to demonstrate that energy efficiency and conservation in cooking can contribute to saving cooking fuels. The CFL strategy is indirectly contributing to the outcome of the Kiribati National Development Strategy and to the implementation of the Kiribati National Energy Policy (KNEP). In order to achieve the goals and outcome of the CFL, political will is needed to change the policy environment, and the current incentives for kerosene use. The CFL also considers kerosene household use such as lighting, especially in the outer islands and therefore the introduction and promotion of solar LED lights that are affordable and accessible. An Economic Analysis of Kerosene Subsidy Policy Information Paper addresses the removal of incentives for kerosene use, and the benefits to all stakeholders, has been developed and presented to EPU and should be read as part of this strategy.

### Outcome

The outcome of the CFL is aligned to one of the KNEP policy priority issues which is 'Economic growth and improvement of livelihoods'

### Goals

- 75% of households in urban centres have access to LPG for cooking<sup>1</sup> by 2020;
- 80% (9,658) households in urban centres use ICS for cooking by 2020;
- <sup>o</sup> 100% of targeted households in rural areas replace kerosene use with solar LED lights by 2020.

#### Strategies and investment

The total cost of achieving the strategies and ultimately the goals and outcome of the CFL strategy is estimated at **AUD 612,515.** This cost does not include additional investment capital for purchase of LPG, LPG storage and shipment cost.

**Strategy 1:** Provides and supports the affordability of LPG through a pilot study and distribution of starter kits and surveys to 100 households: AUD 100,000;

**Strategy 2:** Provides and supports the accessibility of LPG: AUD 260,500 (gas cylinders) excluding LPG initial cost (287 tons) by 2015, AUD 171,015 for gas cylinders and 471 tons of LPG by 2020;

**Strategy 3:** Develop technical capacities and awareness related to LPG use, safety, environment and health: AUD 13,000;

Strategy 4: Increase access to solar LED lights (SLL) in the urban and rural outer islands AUD 15,000;

Strategy 5: Increase the access and use of improved cook stove (ICS) AUD 53,000.

<sup>1</sup> 

The 2010 Kiribati Census Report showed that only 25% of households in the targeted areas use LPG for cooking.



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### Operational plan for implementing the CFL strategy

# 1. INTRODUCTION

The Sustainable Energy for All initiative (SE4ALL) developed by the United Nations Secretary and endorsed by the global community at the RIO+20 conferences in June 2012, in which the Pacific Island countries and territories (PICTs) including Kiribati participated, has three interrelated goals to be achieved in 2030: universal access to modern energy services, doubling the rate of improvement in energy efficiency, and doubling the share of renewable energy in the global energy mix. In addition, the Cooking for Life (CFL) Partnership is a global initiative that aims to transition one billion people from traditional fuels to cleaner burning liquefied petroleum gas (LPG) by 2030, thus also contributing to the SE4ALL. The Global Alliance for Clean Cookstoves is a public–private partnership that seeks to save lives, improve livelihoods, empower women, and protect the environment by creating a thriving global market for clean and efficient household cooking solutions.

In the context of the SE4ALL first goal, universal access to modern energy services, the Energy Programme of Economic Development Division (EDD) of the Secretariat of the Pacific Community (SPC), through its policy and planning technical assistance to Kiribati, developed a draft concept paper, *The Cooking for Life Initiative*. The paper was presented to the EPU in August 2012, to seek support and participation. The initiative is a five year programme which aims to provide 10,000 households from PICTs with a healthier and cleaner cooking environment by cooking with cleaner fuels and less smoke emitting stoves/technologies. Kiribati was chosen to participate in this initiative due to its limited land mass area, rapidly declining supply of biomass in the urban areas, and the increasing use of imported kerosene in South Tarawa, Betio and Kiritimati Island.

Cooking with biomass and kerosene can cause various health problems such as impairment of lung function, infectious illnesses including tuberculosis and asthma, and the risk of cancer. Nevertheless, few studies have been designed, the quality of existing studies is varied, and results are inconsistent.<sup>2</sup> According to World Health Organization (WHO) statistics, life expectancy in Kiribati is 65 years while the respiratory infections rate is 3.2% compared with the world's lowest of 0.1%.<sup>3</sup> Other ailments related to cooking with biomass and kerosene, include teary eyes, cataract and burns.<sup>4</sup> The prevalence of asthma in Kiribati is 1.0% compared with the world's highest of 2.8%.

Climate change is one of the world's serious threats. Because Kiribati is extremely vulnerable to sea level rise the need to adapt and mitigate the impacts has been and remains a priority for the Government of Kiribati (GoK). The increased demand for energy, in particular, for kerosene for cooking is evident in South Tarawa and Betio and the demand for lighting in the outer islands is evident by increased imports during the last decade from 1.85 million litres in 2000 to 3.6 million litres in 2010. Promoting and developing alternative renewable energy sources for cooking and lighting, and improving energy efficiency have been highlighted in the Kiribati National Energy Policy (KNEP).

The Kiribati Cooking for Life strategy promotes LPG for cooking. LPG is still a petroleum product but has less carbon dioxide per unit of energy than kerosene and other types of oil. It has a higher energy content compared with kerosene. One kilogram of LPG (butane) has an energy content of 44,500 joules compared with kerosene, which has an energy content of 36,800 joules. Therefore less LPG is required to cook food compared with kerosene.

Because this cost does not reflect the charges or taxes imposed on LPG, however, kerosene is cheaper. On the other hand, ICS are considered a modern and efficient technology and the promotion and use of these stoves would reduce the cutting down of trees for cooking purposes, and the burden of collecting firewood usually done by children. Other advantages using the ICS are the reduction in smoke emitted from cooking with biomass, the saving on firewood and, indirectly, reduced time taken by women and children to collect firewood.

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<sup>2</sup> Journal of Toxicology and Environmental Health, Part C Critical Reviews. http://www.tandfonline.com/loi/uteb20

http://www.who.int/quantifying\_ehimpacts/national/countryprofile/kiribati.pdf

These three health effect were collected through the household energy survey conducted on South Tarawa and Betio in May 2013.



# 2. COUNTRY CONTEXT

#### 2.1 Physical description

The Republic of Kiribati is made up of three main groups of low lying islands, the Gilbert Islands Group and the Line and Phoenix Islands. The total land mass is only 813 square kilometres compared with the sea land area of 3,200,000 square kilometres. There are 16 islands in the Gilbert Group, two islands in the Line Islands and four islands in the Phoenix Islands. Kiribati is scattered across a vast exclusive economic zone which also provides the main capital income for the Government. Sale of fishing licenses currently generates around AUD 36 million (USD 25 million) per year. Kiribati relies on official development assistance which is also often tied to specific development objectives determined by donor countries. Kiribati receives around AUD 36 million (USD 25 million), annually in donor funding.<sup>5</sup> Kiribati is one of the PICTS most vulnerable to climate change as its highest point is less than two metres above sea level. The only agricultural commodity is copra; there is some seaweed farming mostly in Fanning, in the Phoenix Islands.

#### 2.2 Economic and political description

Kiribati is vulnerable to the effects of global fuel and food price increases as experienced in early 2008. The retail prices of food items had doubled those of December 2007; although global food prices fell in the second quarter of 2009, the annual rate was still high at 13.2%.

In addition, Kiribati has a very substantial trade deficit, having virtually no commodity exports. Its trade deficit is offset by flows of factor income from abroad (RERF,<sup>6</sup> seafarers, remittances and fishing licence fees) and development assistance. There is very little foreign direct investment and Kiribati is virtually totally reliant on imports of fuel for all transport and power generation. Kiribati is ranked 122 out of 189 in the World Bank Doing Business ranking data, of June 2013.

#### 2.3 Population and households

The total population of Kiribati in 2010 was 103,058; there are 50,796 males and 52,262 females. South Tarawa and Betio have populations of 34,427, and 15,755 respectively. Christmas Island in the Line Islands has a population of 5,586. Therefore the total population in the urban centres 61,695.

Kiribati has a total of 16,043 households. Betio has 1977 households, and South Tarawa alone has a total of 4,728 households, of which 1,217 houses are owned by the Government or Kiribati Housing Corporation. Followed by Kiritimati with 857 households. Therefore the targeted areas have a total of 7,562 households. The average household size for Kiribati is 6 people, although in South Tarawa, it is higher (7 people).

The table below compares the 2005 population and households with the same data for 2010, and provides a forecast for 2015 and 2020 for the four targeted areas, South Tarawa, Betio and Kiritimati Island. Betio islet is over populated and therefore there is very limited space to cater for the projected increased population or households however the projected increase of population is to be absorbed into South Tarawa.

#### Table 1: Number and projections of households 2005-2020

Islands	2005	2010	% increase (2005–2010)	2015 forecast	% Increase (2010–2015)	2020 forecast
	No. of households	No. of households	% increase	No. of households	%	Projected households
South Tarawa	3631	4728	23.20%	5825	18.8%	6922
Betio	1614	1977	17.0%	2313	14.5%	2703
Kiritimati Island	702	857	18.09%	1012	28.0%	1167
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Source: Kiribati 2005, 2010 Census Report and own tabulated projections

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Asian Development Bank, 2009. The Pacific Region Infrastructure Facility – Kiribati Infrastructure Sector Review. Revenue Equalisation Reserve Fund (RERF)

# 2.4 Environment

Kiribati's reliance on firewood and kerosene for cooking contributes insignificantly to the carbon dioxide emissions and greenhouse gases responsible for climate change or global warming. The heavy reliance on firewood for cooking has made its mark on South Tarawa where about 50% of the population resides. The high population has increased the stress and pressure on biodiversity including plants and marine life and services such as water, electricity and housing. Coastal erosion is evident in some parts of the island as people continue to mine these resources for construction of houses and for income.

Kiribati does not have many renewable energy sources except solar energy which is abundant and available all year around. Kiribati's location in the Central Pacific is strongly influenced by adverse changes in weather patterns due to climate change, with El Nino bringing in more intense rain and flooding, and the La Nina bringing long dry months and prolonged drought. The last La Nina in 2007–2008 brought drought conditions that continued for 15–16 months.

One of the concerns of the Environment and Conservation Division relates to the content of dioxins and furans, two persistent organic pollutants caused by burning fuel wood in coastal or salty environments, as in most islands in Kiribati. There are limited studies in relation to the emissions of furans and dioxins in the Pacific or Kiribati; however a regional project is being coordinated by the University of the South Pacific to gather more information and data on these pollutants.

### 2.5 Income and poverty levels

The use of kerosene is correlated with income; for example, lower income groups tend to use kerosene as opposed to LPG. One of the key issues involved in the switch to LPG is affordability, that is, the ability of households to afford the initial capital investment costs for using gas for cooking and the continuous high costs of a 13 kilogram gas stove. Poverty is not recognised in Kiribati as particular problem because traditional Kiribati society embraces caring and sharing, with the extended family as a safety net against harsh poverty. However the increasing monetisation of Pacific societies, including Kiribati, and the weakening of traditional society safety nets, are being acknowledged, which has meant a greater awareness of hardship, if not actual poverty in people's lives.<sup>7</sup> The causes of hardship and poverty centre around the lack of regular and sufficient cash income; poor access to or the poor quality of basic services; and the lack of skills to meet opportunities and challenges as they become available. The 2006 Kiribati Household Income and Expenditure Survey stated that the poorest households are those with low expenditure, which tend to be the largest average households of ten persons per households are also slightly more likely to be poor than household headed by a male and female together or that of a male headed household.

Therefore the CLF strategy will need to consider the hardship of obtaining sufficient cash to continue to use LPG rather than kerosene. The switch from LPG to kerosene will exclude households that cannot afford the higher costs of subsidized LPG over subsidized kerosene but will support these households from switch from open fire cooking to the use of efficient biomass stoves.

### 2.6 Health

Current health issues in Kiribati include an increasing rate of under-five mortality, and generally a persistent trend in maternal mortality. Concerns also include high levels of fertility connected to low contraceptive use especially among young women, which leads to high levels of teenage pregnancy and motherhood.<sup>8</sup> Other issues include prevalence of communicable diseases mainly in South Tarawa with high rates of diabetes, combined risk factors for cardiovascular diseases, obesity and overweight; heavy daily smoking, unbalanced diet and lack of physical activity further compound the problem.

In relation to cooking fuel and health, studies have shown that the relative risks of heart diseases from burning fuels are much higher in fuel-wood compared with second hand tobacco smoke and outdoor air pollution. Studies have also shown that emissions from gas stoves are much lower than wood and kerosene stoves. In other cases, kerosene had caused loss of lives when houses burnt from kerosene stove accidents. Studies conducted on rural women show a correlation between tuberculosis, lung cancer, blindness and birth defects, and the cooking fuel they were using.

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Kiribati National Statistics Office, March 2010, Analysis of the 2006 Household Income and Expenditure Survey, Kiribati Kiribati Development Plan 2012–2015

# 2.7 Gender and youth

Gender issues in Kiribati have been predominantly related to domestic and women's issues with limited work on gender and development or gender mainstreaming into other issues such as climate change or energy. The Women and Development Division is based in the Ministry of Internal and Social Affairs; however a new Ministry of Women was established in October 2013 after the passing of its Bill in Parliament in August 2013. Kiribati is traditionally a patriarchal society and the role of men in decision making is widely acknowledged at household and community level, especially in the outer islands. Nevertheless women are participating in village and island decision making through their networks, such as village committees or church committees. In politics, three women were selected as members of Parliament. Two women were elected ministers, while the third was recently selected to head the recently established Ministry of Women.

Betio village has the highest population of young adults from the ages of 15 to 17 and 18 to 48. The (CFL) Strategy will engage both women and youth in organised groups to be trained in the delivery and use of the ICS, and also enhanced ventilation, energy efficiency in cooking practices, technologies and utensils.

#### 2.8 Energy landscape

Progress on KNEP has been challenged due to the lack of an implementation plan. However the key policies in the 2009 National Energy Policy areas are captured in the strategies and key performance areas of the Kiribati Development Plan (KDP) 2012–2015. The EPU annual work plan and activities are monitored and aligned to the KDP key performance areas. The energy statistics year book 2000 to 2009 provided a snapshot of the energy end-use consumption for the ten-year period for the Gilbert group only. The data showed that an average of 52% of the primary energy supply is used by the residential sector, 19% on road transport, 17% on sea transport, 8% on air transport, 3% for fishing, 2% for government and industrial sector and 1% for the commercial sector. The primary sources of energy supply are: biomass (coconut and palm residues, firewood and waste), imported petroleum, electricity (a secondary form of energy) and solar energy. The residential sector end use activities include heating (boiling) water, drying fish and food crops (copra), cooling (refrigerators and fans) as well as electricity use for lighting at night. The average energy end-use for the residential sector from biomass is 509 TJ, petroleum products (26 TJ), electricity (22 TJ) and solar energy (1 TJ). The trend in energy end use for the residential sector has shown a steady but continuous increase in use of both biomass and petroleum in the last 10 years.

An increase in population forecasted in 2015 and 2020 respectively for the targeted areas in this strategy, South Tarawa, Betio and Kiritimati, will continue to put pressure on the limited resources, in particular biomass as well as an increase dependency on imported fuel such as kerosene and LPG. South Tarawa has limited biomass and firewood collection due to urbanisation and the need to cut down trees for houses as well as other developments such as shops and business centres.

#### 2.9 Cooking fuel uses

Cooking fuels in the targeted areas are dual purpose kerosene (DPK), firewood, copra residues,<sup>9</sup> LPG and to a lesser extend electricity. Kerosene is predominantly used in urban areas while biomass or firewood is limited in urban areas but abundantly used in rural areas such as North Tarawa. Table 3 sets out the cooking fuels in the targeted areas, but we should note that some households use both kerosene or LPG or kerosene and wood/biomass in the urban areas of South Tarawa and Betio.

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	Tatal	Cooking fuels					
Areas	households	Copra residue	DPK	Wood	LPG	Others	Electricity
South Tarawa	4,728	29	2,535	1,932	1,932	4	10
Betio	1,977	50	1,464	315	218	5	1
Kiritimati	857	0	226	615	12	0	4
Total	7,562	79.00	4,384	3,700	2,167	9.00	15
Percentages		1%	58%	49%	25%	0%	

#### Table 2: Number of households and cooking fuels in 2010

Source: Kiribati 2010 Census Report

#### 2.10 Cooking fuel energy contents and accessibility

Fuel	Energy content*	Types	Accessibility	Targeted households
Fuel wood including copra residue	1 kg = 10,800 J	Local, coconut shells, leaves other shrubs and trees	Easy access in outer and rural areas, Limited access in urban areas Copra residue from Kiribati Copra Mill is accessible in Betio and South Tarawa but not at all times	Households using open fire cooking converted to use improved biomass stove
Dual Purpose Kerosene	1 litre = 36,800 J	Imported	Easy access in all urban areas	Reduce number of household using DBK for cooking
LPG	1 kg = 44,500 J	Imported/butane	Less access in urban areas and limited access in rural areas	Continuous use of LPG

#### 2.11 Efficiency and conservation

There is limited awareness of energy efficiency and conservation relating to cooking practices in Kiribati, which can be seen by the way some households do their cooking. Some of these inefficiencies, illustrated in Figure 1, are:

- cooking pots are not closed thus taking time for water or food to cook;
- soot from cooking fuel becomes thick at the bottom or around the pot, so that cooking time increases;
- cooking flame and heat radiates in all directions when cooking on an open fire, therefore less heat goes directly to the pot.

Pot lid open Pot material Cooking flame and heat radiating in all directions Incomplete combustion – yellow and smoky flames

Figure 1: Typical open fire cooking

It is estimated that efficient cooking technologies can also reduce the amount of fuel needed to cook or boil water and therefore reduce costs or spending. Table 3 compares the efficiency and the cost of the cooking technologies that are available in Kiribati. An ICS is more efficient compared with cooking on an open fire.

Table 3: Effic	ciency and	costs of	cooking	technologies
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Cooking technology	Efficiency (%)*	Fuel price (AUD)	Fuel needed to boil 2 litres of water	Estimated costs
Open fire	10%–15%	0.22 kg (copra meal)	2.4 kg	0.53
Improved cook stove	15%–30%	0.22	1.4 kg	0.30
Kerosene stove	30%–45%	0.95 per litre*	0.2 litre	0.19
Gas cooker	55%-65%	3.23 per kg	0.12 kg	0.38
Electricity cooker	75%	0.40 per kwh	1.12 units	0.45
Water heater	90%	0.40 per kwh	0.933 units	0.37

\* www.snvworld.org 2.European Economic Community, Statistical Office of the European Communities \*The cost of kerosene is subsidies and controlled at 0.95 cents

In the Kiribati context, kerosene use is the least expensive compared with other cooking fuels, because the cost of kerosene is subsidised. The true cost of importing and distributing kerosene is calculated at AUD 1.25. More information on the costs and benefits of using LPG is provided in the policy brief paper. Titled, An economic analysis of Kerosene subsidy policy reform – Towards promoting sustainable LPG use in Kiribati.

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# 3. INSTITUTIONAL, POLICY AND LEGISLATIVE FRAMEWORKS

### 3.1 Institutional framework

### 3.1.1 Stakeholders<sup>10</sup> benefits and targets

Stakeholders*	Benefits	Targets	
Government	Subsidy savings Benefits to aviation industry – reducing fuel costs as currently aviation fuel subsidises	The strategy aims to replace 2000 kerosene users by 2015 thus saving 730 metric ton of kerosene per year. This aim is based on the targets of 2000	
	residential use. Tourism may increase, particularly to outer islands if flights costs are cheaper.	households, using one litre of kerosene a day or 365 litres a year.	
Island councils	Develop bylaws to prohibit the use of open fires in urban centres.	Integrate clean and efficient fuel and technologies in the national councils by law.	
KOIL and retailers	Make available storage facilities and small cylinders for LPG, to improve access in targeted areas.	Increase the number of retailers for LPG distribution and improve accessibility.	
Kiribati Housing Corporation	KHC currently provides a home loan scheme; a maximum of AUD 3000 is available under this scheme. In the tenant agreement, occupants of KHC houses are not allowed to use open fire cooking. Kerosene use is allowed, while LPG is highly recommended.	Promote loan schemes and replace kerosene stove with LPG use. KHC has a total of 1200 houses: Bairiki, 300 houses, Betio, 500 houses and Bikenibeu 400 houses. A pilot study based on 100 starter kits to be distributed to KHC houses in the first phase of the project.	
Private sector	Creation of businesses and small enterprises New LPG distribution centres New filling stations	More jobs created and new employment enhances economic development, eg, through construction of filling stations, building storage infrastructure at KOIL, and the potential for new investment.	
	Trainers and maintenance Building of infrastructure for LPG Distribution of energy efficient biomass stove.	KOIL will need to expand its storage facility. One private investor has opted to import gas and is constructing its LPG storage.	
Households	Energy expense (kerosene) savings or spending less on fuel for cooking. Less spending on kerosene when replaced with LPG. Less time spent on firewood when using ICS.	Currently, kerosene use is cheaper to use compared with LPG due to the controlled price of kerosene. LPG use for cooking is more economical, cleaner and efficient compared with kerosene.	
Women	Reduced health risks (eye cataracts, teary eyes and burns) and costs Reduced cooking time Improved/cleaner cooking environment.	Women can use extra time available to be involved in more productive and strategic activities such as sewing or cooking food for sale – also contributing to increased income.	
Children	Reducing shopping time; every day children buy kerosene; when using LPG, an adult or young adult can buy once or twice a month.	Spend more time studying and engaging in other educational activities, rather than spending time cooking and buying kerosene or collecting firewood.	

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Environment & health	Instrumental in creating awareness on the negative impacts of kerosene to health.	Reduction of greenhouse gas emissions and the harmful health and environmental effects resulting from using inefficient fuels.
NGOs	Developing informal training on distributing and using ICS, LPG and SLL in targeted areas.	Important role in accessing funding relevant to mitigation of the effects of climate change thus able to get funding for ICS and SLL distribution.

\* The specific roles of stakeholders in this strategy, and types of impacts they anticipate in its development and implementation.

#### The project implementation partners' structure is set out in Figure 2.

Figure 2: Cooking for Life strategy implementation structure



#### 3.2 Policy framework

#### 3.2.1 Regional Framework for Action on Energy Security in the Pacific

The regional *Framework for Action on Energy Security in the Pacific Islands* is relevant to national strategies, because it includes indicators that can be monitored nationally. One of the energy security indicators is access to modern energy services, under two categories: access to a modern energy source for lighting/ electricity, and access to modern energy for cooking. Modern forms of cooking include electricity use, LPG, and energy efficient biomass stoves. Kerosene and traditional open fire cooking are categorised as traditional forms of cooking due to their inefficiency and harmful health impacts

SPC data collated in 2009 show that compared with other PICTs, Kiribati has a low percentage of households with access to modern energy for cooking (30%). Figure 3 compares access to modern forms of cooking in the fourteen PICTs in 2009.



Figure 3: Comparing access to modern forms of cooking among PICTs in 2009

#### 3.2.2 Kiribati Development Plan

The Ministry of Finance and Economic Planning is the overall reporting ministry on the Kiribati Development Plan (KDP) progress, and coordinates implementation by respective ministries and departments.

The KDP 2012-2015 approved by Cabinet in 2012 has six key performance areas (KPAs):

- KPA 1: Human Resources Development
- KPA 2: Economic Growth and Poverty Reduction

- KPA 3: Health
- KPA 4: Environment
- KPA 5: Governance
- KPA 6: Infrastructure

The KDP does not have specific strategies relating to the use and promotion of cleaner cooking fuel and ICS. KPA 6 mentions the energy sector and focuses on the need to increase fuel storage capacity and bulk purchasing, and to encourage the use of renewable energy. Energy efficiency on the demand side of management is mentioned as an important strategy, and this may be relevant to the efficient cooking technologies, cooking utensils, efficient practices and more efficient fuel sources for cooking.

However in mainstreaming the focus of this strategy on KDP, the relevant areas are economic growth and poverty reduction, health and environment. More explanation is provided below.

KPA 2: Economic growth and poverty reduction	Reducing the subsidy for kerosene through this strategy will improve the trade deficit due to reducing kerosene imports. More information on economic analysis is provided in the policy paper titled <i>'Kerosene subsidies and sustainable LPG use in Kiribati'</i> developed as part of this CFL strategy.
KPA 3: Health	ICS and LPG are much cleaner to use than kerosene and open fire cooking. Kerosene use for lighting is inefficient and also contributes to indoor pollution. CFL thus increases the use of ICS which reduces smoke from firewood use and also kerosene which produces harmful gases when burned.
KPA 4: Environment	ICS use will reduce the amount of firewood and therefore cutting down of trees for fuel. The use of ICS is aligned to the key expected output: reduced threats to biophysical, socio, cultural and economic, environments from the adverse impacts of climate change, by reducing firewood use, and deforestation.

### 3.2.3 Kiribati National Energy Policy

KNEP was endorsed by Cabinet in 2009. KNEP has a vision of 'available, accessible, reliable, affordable, clean and sustainable energy options for the enhancement of economic growth and improvement of livelihoods in Kiribati'

KNEP's main policy themes are:

- 1. policy, planning and coordination;
- 2. power;
- 3. outer islands and rural electrification;
- 4. petroleum;
- 5. efficiency and conservation;
- 6. renewable energy;
- 7. environment;
- 8. transport.

CFL strategy is aligned with KNEP thematic areas: policy planning and coordination and environment. Further details on the CFL's links to KNEP policy outcomes are discussed in Section 4: CFL Strategy Framework. KNEP is implemented by EPU.

#### 3.3 Legislative framework

#### 3.3.1 Environment Act 1999 and its Amendment 2007

The Environment Act does not prohibit the use of open fire cooking, and no bylaws prohibit such activity. Under the Act, only prescribed activities or developments should apply for development consent. The Environment Act is administered by the Environment and Conservation Division under the Ministry of Environment, Lands and Agricultural Development. The Division is responsible for implementing the Kiribati Integrated Environment Policy endorsed in June 2013 and recently launched in September.

#### 3.3.2 Petroleum Act 1970

The Petroleum Act 1970 is very out-dated as the metric units used do not conform to current practices. For example, the Act mentions the measurement of petroleum in gallons, although current practice is in litres. The Act has no specific provisions for proper guidelines for storage of LPG. There is a need to review the Act to reflect the need to increase the use of LPG on South Tarawa, Betio and outer islands. KOIL was established in 1987 under the Kiribati Oil Company Ltd (Special provisions) Act 1987 and is responsible for supplying and distributing petroleum products including LPG. The EPU administers the Petroleum Act, including issuing licences, storage, and inspections of fuel storage.

#### 3.3.3 Customs Act 2005

The Customs Act 2005 relates to the collection and management of customs duties in Kiribati. The Customs Act is administered by the Kiribati Customs Service of the Ministry of Finance and Economic Development.

The Act allows for duty exemptions on kerosene stoves and LPG gas stoves. Pressure cookers have a duty rate of 30%. LPG imports have a duty rate of 35% while kerosene for household use is tax exempted.

Kerosene for aviation has a duty rate of 0.7 cents a litre. The Customs Act is being revised to reflect affect the proposed Value Added Tax (VAT)<sup>11</sup> of 12.5% on consumed products.

The levy of this tax may increase the price of kerosene and LPG, as well as the cost of the stoves.

#### 3.3.4 Price Ordinance (Amendment) Act 1981

The Price Ordinance (Amendment) Act 1981 empowers the Minister to make orders regulating the price of certain commodities that are listed in the Schedule in which includes kerosene and benzene are included. Discussions on accessibility proposed the need to control or monitor the cost of LPG stoves to make them more affordable. The Ministry of Commerce, Industry and Cooperatives administers the Price Ordinance and its regulations. Items or commodities currently covered under the legislation are flour, sugar, rice, baby food, tobacco, exercise books, bar soap, mosquito netting, benzene, kerosene, Oil No. 50, bicycles, (i.e., adult bicycles) and batteries. There is no VAT in Kiribati, however a proposal for VAT has been tabled in Cabinet and currently there kerosene is also exempted from VAT.

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<sup>11</sup> The imposition of VAT should be taken as an opportunity to address deficiencies in the custom tariff as it relates to energy efficiency and poverty; exemption and zero rating policies should be considered.

# 4. COOKING FOR LIFE STRATEGY FRAMEWORK

### 4.1 KNEP vision<sup>12</sup>

'Available, accessible, reliable, affordable, clean and sustainable energy options for the enhancement of economic growth and improvement of livelihoods in Kiribati'

### 4.2 CFL outcome

Economic growth and improvement of livelihoods

#### 4.3 CFL broad goal

By 2020, 75% of households in urban centres have access to modern sources of energy for cooking<sup>13</sup> and 100% of households use ICS for cooking.

#### 4.4 Rationale for the strategy

The Strategy is being developed as part of CFL initiative which encompasses the promotion and use of cleaner and efficient fuel and cooking technology. LPG is recognised as a clean and efficient fuel while the improved biomass cook stove (ICS) is an efficient cooking technology.

In 2013, EPU requested SPC to assist with the promotion of appropriate ICS, mainly in the urban centres as some households are still using biomass for cooking. The 2010 census reported that 52% of households were using biomass and copra residue for cooking since firewood is free and copra residue is more affordable compared to kerosene. However with an increasing population mainly in South Tarawa with a population density of 3,000 people per square metre, proper planning of efficient use of scarce resources such as fuel wood and copra residue is crucial.

Some of the barriers that have hindered the use of LPG stoves and ICS were identified and collated during a national workshop and focus group discussions held in November 2013. These barriers are discussed below:

Barriers	LPG	ICS
Policy environment	<ul> <li>Petroleum Act does not cover LPG storage, standards, and enforcement of its uses</li> <li>LPG is being promoted for use in the Kiribati Housing new projects but lacks regulation</li> </ul>	<ul> <li>There is no legislation or regulation on the use of ICS</li> <li>There is no standard but the Ezy Stove is being demonstrated</li> </ul>
Lack of awareness	<ul> <li>There is no awareness and promotion of the use of LPG</li> <li>Awareness of energy efficiency and conservation relating to cooking practices and fuels is limited</li> <li>Low awareness of the health, environmental, and social economic issues</li> <li>Lack of awareness of the benefits of LPG as a solution</li> </ul>	<ul> <li>There is no promotion of the use of ICS or efficient cooking utensils</li> <li>There is no awareness and promotional programmes on the benefits of ICS</li> <li>There is limited technical knowledge of ICS in Kiribati</li> </ul>

<sup>12</sup> Aligned to the vision of KNEP, CFL strategy is part of KNEP implementation

<sup>13</sup> Modern sources of cooking are LPG use and improved biomass stoves (ICS) and urban centers are South Tarawa, Betio and Kiritimati.

Affordability	<ul> <li>LPG use is not affordable to most households in the urban areas</li> <li>LPG is much more expensive than kerosene</li> </ul>	<ul> <li>Resources to build ICS are limited</li> <li>Knowledge of regional or international projects relating to ICS is limited</li> </ul>
	<ul> <li>LPG costs in outer islands are much higher than in the main Islands due to freight cost. LPG is not included under the freight levy fund while kerosene is included</li> <li>Significant capital is needed to own an LPG cylinder with gas and two burner gas stove. The initial capital costs required is estimated at \$197.30</li> </ul>	Firewood is scarce and copra residue is affordable but is less accessible compared to kerosene. Kerosene is available in most small canteens in South Tarawa and Betio.
	<ul> <li>Per capita income and disposable income are very low</li> </ul>	
Accessibility	<ul> <li>Access to LPG in all areas is limited</li> <li>Lack of necessary infrastructure to expand the LPG market</li> </ul>	<ul> <li>No ICS available at local markets</li> </ul>

The strategy aim is to provide solutions to these challenges with the intention of meeting the targets on increasing LPG use and ICS to 50% of households by 2015 and 75% by 2020 respectively. The risks associated with implementing this CFL and mitigation activities is further provided in Annex 4.

Kerosene is the dominant source of cooking fuel in South Tarawa and Betio as depicted in the latest census report while firewood use has remained steady from 2000 to 2009.<sup>14</sup> However the 2010 census does not record whether a household uses one or two sources of cooking fuel. During the consultation with local people, it was noted that most households use at least two sources of cooking fuel such as LPG with kerosene or kerosene with firewood. The most common cooking fuel is kerosene use followed by firewood use mainly for boiling water and preparing of pig food.

CFL initiative may be seen as contradictory to the region's effort to reduce reliance on fossil fuel since CFL promotes the use of LPG. CFL should result in just about the same level of reliance since it is only a substitution of kerosene with LPG. The CFL initiative will however improve access to *cleaner* fossil fuel and make cooking a much *safer, cleaner and healthier* undertaking. Any increase in emissions from any increase in LPG use should be offset by an increase in greenhouse gas absorption due to the decrease in cutting down trees for fuel wood. Thus as well as increasing use of LPG, there is a need to increase the use of efficient biomass cook stove (ICS) to reduce the cutting down of trees for cooking fuel and therefore absorption of CO2.

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## 4.5 Baseline and targets

The CFL targets is based on the understanding that firewood and kerosene use is increasing in urban areas, mainly in South Tarawa and Betio. The strategy is to reduce the use of kerosene and open fire cooking with the following targets.

CFL Indicators	Baseline	Goals/Targets	
	2010	2015	2020
Goal 1: 75% household in urban centers have access t	o LPG for cooking* by 20	020	
Goal 2: 100% use of ICS in the urban households by 20	)20		
Households cooking with LPG*: increase total households by 50% by 2015 and 75% by 2020	1932 (25%)	5310 (50%)	8730 (75%)
Households cooking with kerosene are reduced to nil by 2020	4384 (51%)	1031 (10%)	0
Households cooking with ICS using firewood and copra residue	0	5415 (52%)	9658 (80%)
Households cooking with open fire cooking	3700 (43%)	2063 (10%)	0
Households cooking with solar cookers	0	300 (1%)	4845 (40%)
Indicators	Baseline	Goals/Targets	
	2010	2015	2020
Goal 2: 100% households in rural households use sola	r LED lights		
Households using kerosene for lighting in targeted households	838 (10%)	400 (5%)	0

\* The 2010 census showed that only 25% of households in the targeted areas use LPG for cooking.

 $\ast$  i.e., in 2015 an estimate of 4000 households will use LPG for cooking.

The following strategies and activities were identified through in-country consultations during September 2013, later presented at a focus group meeting with relevant stakeholders in January 2014.

Policy Statement: Ensure the delive	ery of efficient and effective ener	rgy services		
Strategy 1 Provides and supports the	he affordability of LPG			
Activities	Performance indicators	Baseline	Targets	
			2015-2018	2020
<ol> <li>Government to consider the transfer of subsidy on kerosene to LPG – policy paper is developed as part of this strategy</li> </ol>	Kerosene sold in the urban area is reflective of its true cost, and alternatives are at competitive costs	Kerosene use for households (cooking and lighting) is duty exempted and price to users is controlled. Current price in Tarawa and outer islands is AUD 0.95 cents a litre	Kerosene is removed as an essential commodity – other alternatives available, LPG for cooking and SLL for lighting. Policy paper on removal of subsidy developed and submitted to the Ministry of Commerce, Industry and Cooperatives and MWPU	Kerosene cost is higher than LPG when energy content and other benefits are considered
<ol> <li>Regulate price of LPG stove at a reasonable price (VAT is controlled at less than 12% mark-up)</li> </ol>	Gas stoves are affordable; their cost is competitive compared with kerosene stoves	Current cost of LPG stove ranges from AUD 70 to AUD 200. There is no standard	Consultation with private sectors and gas company on appropriate and affordable standard to be regulated – under a control price and regulated VAT	Gas stoves and accessories are standardised and safe to use
<ol> <li>Submit proposal for funding of pilot study. KOIL to procure first 100 × 4.5 kg gas cylinders</li> <li>Bevelop criteria for pilot study including selection of households and initial payment for starter kits (AUD 20.00–AUD 50.00 – Betio Housing – e.g., Grade F AUD 20.00, Grade A AUD 50.00)</li> </ol>	KHC has a policy for its tenant not to use open fire cooking and promote the use of LPG	No criteria sets	Submit proposal to relevant donors for pilot study – for distribution of 100 LPG with ICS to selected households Procure and distribute to households followed by survey – Refer to Operational Plan Discuss criteria at the first project steering group (PSC) meeting and implement the pilot study	Replicate the projects

		DBK loans expand to include energy loans			2020	Additional 3420 cylinder: cost of AUD 171,015		8730 households, therefore an import of 471 tons of LPG a year equivalent to 42 isotainers or 3 to 4 isotainers per month
Selected households for the trial pilot study have undergone training on use of LPG and ICS Awareness materials for LPG, ICS and solar LED lights developed and disseminated AUD 13,000	MOUs signed between KOIL and EPU MOUs signed between EPU and NGOS MOU signed between EPU and ministry of health and environment Cabinet submissions on removal of kerosene subsidy to LPG is discussed between EPU and the Ministry of Commerce, Industry and Cooperatives and KOIL	KHC and DBK loans are used for LPG and ICS		Targets	2015-2018	100 × 4.5 kg empty cylinder is available; AUD 50 × 100 = AUD 500.00 End of pilot study procure more 4.5 kg cylinders, estimate capital cost AUD 50 × 5210 = AUD 260,500.00	PSC discusses appropriate commission on the sales of LPG	5309 households use 4.5 kg a month: a total import of 287 tons of LPG a year or 26 isotainers a year
Low sales on gas stoves 100 gas stoves per 4 months High sales of kerosene stove – 1 container about 905 stoves are sold within 3 to 4 months	No collaboration with government ministries and NGOs and private sectors on cooking fuels or promotions	<ul> <li>No awareness on KHC loan for home users.</li> <li>No specific KHC and DBK energy loans</li> </ul>		Baseline		There are 9 kg and 13 kg gas cylinders at KOIL costing AUD 29.07 & AUD 41.99 respectively. Only 1% of LPG gas distributed via stores.	Retailers are paid a commission of AUD 2.70 per cylinder	17 isotainers a year (2013)
Households and communities are fully aware of the benefits of LPG and ICS use	Stakeholders are actively involved in promoting ICS and LP Gas	Households are able to access loans for efficient cooking technologies and utensils	LPG accessibility	Performance indicators		A 4.5 kg cylinder to be introduced to allow sales at an affordable cost. LPG (estimate cost of 4 kg gas is AUD 14.55)	LPG retailers are equally paid to the volume of gas sold	Increase supply of LPG to meet demand of 4000 households cooking with LPG by 2015
1.4 Develop and deliver promotional materials, activities and training on LPG use	1.5 Integrate and promote the use of alternative cooking fuels into other stakeholders activities including Ministry of Women Environmental Health, Foundation of the South Pacific Kiribati (FSPK) and other NGOs	<ol> <li>Establish and promote existing loan schemes offered at KHC and DBK</li> </ol>	Strategy 2 Provides and supports	Activities		<ol> <li>2.1 KOIL to procure smaller cylinders (4.5 kg) to improve accessibility and portability (similar to kerosene)</li> </ol>	2.2 Review LPG retailing commission	<ol> <li>Expand Gas Storage at KOIL to cater for increase in demand</li> </ol>

Strategy 3 Develop capacities rela	ated to LPG use, safety and he	salth		
Activities	Performance Indicators	Baseline	Targets	
			2015-2018	2020
<ol> <li>Licensing of LPG storage is regulated</li> </ol>	LPG is included in the Petroleum Act	LPG storage and units (kg) not included in the current Petroleum Act	Amendments to the Petroleum Act to include LPG as a petroleum product and correct units used	LPG agents are licensed; increased understanding of safety and health measures
3.2 Increase promotional activities on LPG in all media, particularly radio programmes (as these are more accessible to most households)	Training on LPG use and promotional activities (radio, newspaper articles, press release, trade shows delivered in 2014–2015)	KOIL is the only supplier of LPG and does not promote LPG use Another private investor is currently establishing LPG storage	LPG use is promoted in all media	LPG demand increases and safety issues related to LPG used are evident
3.3 Conduct awareness on harmful effects of cooking tuels (kerosene and biomass smokes); but also awareness of the time and money savings that arise from alternative cooking fuel sources	Awareness of harmful effects of kerosene use is promoted by the Environment Health Department programme, KCC and NGOs, retailers; alternatives to kerosene use are available: LPG stove and ICS.	Because awareness of the alternatives is limited, there is no demand (and hence no market) for these alternatives	Awareness is improved on health effects of kerosene included as part of Strategy 1.	School children, women and men are most aware of health impacts of smoke from kerosene stove and open fire
Strategy 4: Increase access to solution	lar LED lighting			
<ol> <li>Establish MOU with NGO on the distribution of Solar LED lights</li> </ol>	NGO selected for distribution of SLL	No NGO is engaged in energy work	NGO starts distribution of SLL	
4.2 Distribute SLL to outer islands	SLL (initial 1000) is distributed	No SLL presence in the outer islands	1000 SLL is distributed at landing cost of AUD 15.00. Total cost is 15,000.00	
<ol> <li>Establish solar shops for sustainability</li> </ol>	Solar shops are established in each island with stock on spare batteries and further SLL for sale	No solar shops	Further funding is available for purchase of more SLL to distribute	Funding is available for distribution

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Policy Statement : Minimise 1	he impact of energy production, di	istribution and consumption on the	e environment	
Strategy 5 Increase access to	o improved biomass cook stoves			
Activities	Performance indicators	Baseline	Targets	
			2015-2018	2020
<ol> <li>Government supports PSC, its roles and functions</li> </ol>	PSC meetings and minutes recorded	There is no energy working committee nor any energy coordinating committee	Working committee established with advisory role on implementing the strategy and activities. Members will collaborate with the relevant stakeholders	Committee active and reports on progress on implementing the strategy to both government and donors
5.2 NGO and private sector work on imports of ICS with donor funding	Quotes on ICS obtained Demonstration results were documented Funding on imports of first 100 ICS for pilot study is submitted to donors	No ICS use in Kiribati	Submit project proposal for the purchase of first 100 ICS for pilot study. Cost of AUD 20 × 100 = AUD 2000.00 (included as part of the starter kit) 2 containers, i.e., 5000 ICS from Ezy stoves: cost AUD 19.00; total investment cost AUD 95,000.00	Initial capital evolves and more ICS purchased to meet target
Develop capacity on using ICS	Training of youths under the FSP programme and ECD on Ezy stove use, business skills and energy use delivered in January 2014	No capacity on developing or using ICS. There is no service provider for ICS. Demonstration was done in January 2014	Demonstration and distribution of ICS in South Tarawa, Betio and Kiritimati done together with the LPG promotion	ICS distributed and users understand uses. Youth groups developed skills on marketing of ICS
Assess financial incentives for initial distribution of 100 as parts of the starter kits	Assess whether additional financial incentives or micro credit facilities for low income earners through productive activities such as gardening, handicraft, are necessary	Costs of importing ICS to Betio is AUD 19.00 (landed costs) – no duty and local freight costs included	Small margin needs to be incorporated into the cost of ICS to users, to allow for sustainability of the project to allow purchase of spare parts after 5 years	Other models of ICS are also tested and replicating use of ICS in other outer islands developed in 2016.



# ANNEXES

The capital cost required to implement CFL is presented in the tables below, including the stakeholders and their roles and possible donors.

Annex 1: Investment required to support LPG use for cooking

Strategy 1, 2 & 3	Provide and support the accessibility, affordability and use of LPG as cooking fuel
Responsible	Energy Planning Unit provides support to increase number of LPG retailers
agency	KOIL imports LPG and LPG × 4 kg cylinders
	Ministry of Commerce, Industry and Cooperatives approves LPG as a necessity item under the Price Ordinance Act and Regulations
	Wholesaler imports LPG gas stoves in bulk as part of start-up kit
	Women's Development Office promotes the use of LPG through radio programmes
Background/ rationale:	LPG use is considered by most households in South Tarawa and Betio as expensive due to its high initial start-up costs; a deposit on the cylinder of AUD 50, and a 13 kg cylinder costs AUD 42.00. Transportation of gas cylinders on public buses is not allowed. Households with vehicles have easy access. On South Tarawa there are only 10 retailers (gas stations and small shops) stores that sell LPG. With an estimate of 4,000 households on South Tarawa, one gas station will cater for 571 households which is an unrealistic value. Furthermore, a one-off payment of \$42 for a 13 kg is not affordable to most middle income families. LPG is considered expensive compared with a payment of AUD 1.00 to AUD 2.00 per litre a day.
Objectives	Promote the use and accessibility of LPG for cooking
	<ul> <li>Create enabling platforms to improve affordability of LPG use</li> </ul>
	<ul> <li>Improve accessibility and affordability of LPG stoves</li> </ul>
Scope of works	a. EPU to prepare policy brief to the Ministry of Commerce, Industry and Cooperatives to list LPG and stoves as essential item
	b. Funding of free starter kit and implements
	c. Follow up survey and campaigns
	d. Conduct awareness programme including other stakeholders
	e. Procurements of LPG stoves (bulk purchase) and distribution
	t. Increase KOIL LPG imports and storage
	g. Procurements of 4.5 kg gas cylinders
	n. Review LPG commissions or payment on sales of LPG
	I. Review Petroleum Act for licensing and proper storage of LPG
Benefits	<ul> <li>Reduced kerosene use and improving health and costs to households thus improving income and increase demand for LPG</li> </ul>
	<ul> <li>Public awareness is improved on the benefits, advantages of using LPG over kerosene and this triggers the increase in demand; awareness to include solar cookers</li> </ul>
	<ul> <li>Cost of LPG is reduced and demand increases</li> </ul>
	<ul> <li>Put in place government tax on kerosene use (less than 6 cents a litre) as currently there is no tax, no import duty and no freight costs to outer islands</li> </ul>
Alignment with	Will Contribute to National Development Strategy Objective 5:
National	a. To reduce energy household costs
Development Strategy	b. Women spend less time cooking and more on productive use so more income

Estimated cost	a. Prepare policy papers (first quarter 2014) no associated cost - SPC is providing this paper					
	b. Develop project proposal on free starter kit + LPG use demonstrations for 100 households					
	c. Follow up surveys highlighting ease of use, and financial savings AUD 2000					
	d. Awareness programme, training and coordinating committee AUD 8000					
	e. Pilot study of 100 starter kits at AUD 100: AUD 100,000					
	f. Procurement of 5310 of 4.5 kg cylinders by 2015 cost of AUD 260,000.00 by 2015					
	g. Procurement of additional 3420 of 4.5 kg cylinders by 2020 cost of AUD 171,015					
	TOTAL ESTIMATED COSTS:					
	Pilot study: AUD 100,000.00					
	KOIL investment on 4.5 kg cylinders: 2015, AUD 260,000; by 2020, AUD 171,015					
	Awareness raising and survey: AUD 13,000					
Implementation	2014 AUD 110,000.00					
period	2015–2020 AUD 431,015					
Potential funding	NZAid (public awareness estimates), Government of Kiribati & KOIL – in kind, Business Communities, Republic of China (Taiwan)					

# Annex 2: Promoting and using solar LED lights

Strategy 4	Promoting and using solar LED lights
Responsible agency	Energy Planning Unit, FSPK and other NGOs to seek funding for distribution of SLL in collaboration with SPC through the M3P project
Background/ rationale	Residential uses of kerosene include cooking and lighting mostly in the outer islands. A total amount of 7 litres of kerosene is used per month for lighting in the outer islands. Kerosene supply is sometimes limited due to infrequent arrival of ships in the outer islands. In order to minimise the costs of importing kerosene for lighting, an alternative to kerosene lanterns is included as part of this strategy.
Objectives	To promote the use of solar LED lights replacing kerosene use for lighting
Scope of works	<ul> <li>a. Establish criteria for distribution of solar LED lights</li> <li>b. Establish institutional structure for sustainable use of Solar LED lights</li> <li>c. Find suitable and appropriate lighting systems</li> </ul>
Benefits	Reduced kerosene use and health costs to households Public awareness is improved on the benefits, advantages of using solar LED lights Micro business established in targeted villages
Alignment with National Development Strategy	<ul> <li>Will contribute to National Development Strategy KPA 4:</li> <li>a. To protect the environment and ensure that kerosene use is reduced</li> <li>b. Increase use of renewable energy sources for lighting</li> </ul>
Estimated cost	a. Funding proposal to distribute at least 1000 solar LED lights by 2015, cost of AUD 15 per SLL TOTAL COSTS: estimate costs for SLL: AUD 15,000 per SLL
Implementation period	2015–2018

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Potential funding	SPC, Gender cc Project ( demonstrations and training)
	Development partners

# Annex 3: Investment required to support improved cook stove

Strategy 5	Promoting and using improved (efficient) biomass cook stove (ICS)
Responsible	Energy Planning Unit provides support to the procurement of energy efficient biomass stove
agency	Wholesalers and retailers
	FSPK and Affiliated NGOs
Background/ rationale	Biomass use for cooking continues to be the dominant form of cooking fuel in Kiribati. In the outer islands, all households uses biomass as it is readily available and has no associated costs. However on South Tarawa and Betio, households at the base of the economic pyramid still use open fire cooking using any kind of material that burns such as plastics, cardboards, timbers, with limited understanding of the adverse health consequences. However, most households on South Tarawa and Betio use kerosene stoves for cooking. Engaging the private sector and NGOs in raising awareness of efficient cook stoves was recognised as more
	effective. Therefore a youth group within the Environment and Conservation Division as well as the youth clubs at the FSPK are to be engaged in delivering informal training on the benefits of improved cook stoves and their fabrication and use. SPC has contacted Ezy Life, an international NGO that specialises in initiating sustainable, social, environmental and economic change. Ezy Life has implemented a paradigm project that has provided efficient cook stoves in other parts of world. It is anticipated that a funding proposal to procure a 20 feet container of efficient biomass stoves that could be distributed with minimal cost (AUD 30.00) will be part of this strategy. The number of ICS in a 20 ft container load is estimated to be 2880.
Objectives	<ul> <li>Promoting the use of ICS and reducing use of biomass for cooking</li> </ul>
Scope of work	a. Awareness raising and informal training on use of ICS will be done back to back with the LPG promotion
	b. Establish institutional structure for sustainable use of ICS including the ability to order spare parts, re-order new stoves and be business oriented
Benefits	<ul> <li>Reduced kerosene use and health costs to households</li> </ul>
	<ul> <li>Greater public understanding of the benefits and advantages of using ICS over kerosene,, which will trigger an increase in demand</li> </ul>
	<ul> <li>Cost of efficient cook stoves is reduced and demand increases</li> </ul>
Alignment with	Will contribute to NDS KPA 4:
National	a. To protect the environment and ensure that wood use is reduced
Strategy	b. Reduce energy costs by promoting use of ICS
	c. Use of renewable energy sources for cooking including research on proper use of copra residue
Estimated cost	USD 50,719
	Note: One container (20 ft) with 2880 ICS including freight costs to Betio estimated cost of USD 50,719.00. One ICS costs USD 18.10 or equivalent to AUD 19.00, ( <i>Exchange rate: 1.04244.</i> )
	TOTAL ESTIMATE OF COSTS: AUD 53,000.00
Implementation period	2015–2018
Potential funding	Republic of China (Taiwan), Government of Kiribati in kind contribution, EPU, SPC – Gender cc Project ( demonstrations and training)

### Annex 4: Risks and mitigation

Stakeholders	Goal	Concerns and risks	Mitigation
Government	Cleaner energy Reduce subsidy annually Reallocate kerosene to	Various political and economic interests to keep kerosene (and kerosene subsidy)	Build capabilities/infrastructure to ensure that all the stakeholders involved are fully prepared to efficiently and effectively carry out this program.
	more profitable use	Unstable political and economic conditions during transition period (political – due to unpopular policy, the risk of very high inflation of the price of kerosene (unless the price control remains until the LPG	This includes building partnerships with the private sector to provide LPG infrastructure such as storage facilities, filling stations, skid tanks and LPG trucks. Also includes building dedicated resources to fulfill this mandatory programme. The distribution process will include a survey, early education, distribution of a free starter
		transition is completed) – political and inflation fluctuation during kerosene withdrawal period	package, and kerosene withdrawal. Marketing activities involve understanding the stakeholders, involving government leaders as endorsers, Socialization & Product Activation, and providing incentive and loan schemes for retailers (increase margin, cylinder consignment, provide loan through KHC & DBK).
KOIL	Maintain margin or attain a higher margin Adequate infrastructure to cope with the programme transition Smooth programme transition, with clear direction, financing	Lack of current resource and infrastructural capacity to provide LPG if demand increases Lower margin and revenue as a result of subsidy reduction	KOIL already has the 13 kg gas cylinders, but requires to provides for a smaller cylinder 4 kg
Households and SMEs	Comfortable usage Cheap energy Always available	Lack of experience Fear of explosion Perceived as a more expensive fuel Limited availability/difficulty in refilling	Early education to remove false perceptions of LPG, its use, and its cost Provide information, training and demonstrations, and specific safety training Provides information and awareness on benefits of LPG
Retailers	Maintain current margin at minimum, or get a higher margin Same or less investment (due to financial constraints)	Higher initial investment needed to transition to an LPG retailer (lack of financial capability) Potentially lower margin	Provide incentive and loan schemes for retailers

\$\$K\$\$#\$\$K\$\$#\$\$K\$\$#\$\$K\$\$#\$\$K\$\$#\$\$K\$\$#

#### Annex 5: Organisations consulted

Australian High Commissioner Mr George Fraser High Commissioner Tarawa, Kiribati

Betio Town Council Mr Romano Reo Mayor

*Embassy of the Republic of Taiwan to the* Republic of Kiribati Mr Edisson Hsue Third Secretary

FSPK

Ms Ruiti Aretaake Child Centered Climate Change Adaptation 4CA

Green Energy Solutions Mautaake Tannang Manager

*Kiribati Copra Mill Company Ltd* Paul Tekanene Chief Executive Officer

*Kiribati Chamber of Commerce* Tamaroa Teebaki Member

Kiribati Customs Service, Ministry of Finance, Economic Planning Comptroller of Customs Mr Tekaie Ititaake Comptroller of Customs

Kiribati Housing Corporation Mr Tomwa Baitika Tehumu Chief Executive Officer

Kiribati Institute of Technology Mr Rokobati Tearo Principal

Mr Mikaere Tioro Carpenter Lecturer

*Kiribati Oil Company* Mr Aree Redfern Chief Executive Officer

Tiiroa Antonia Administration Officer *Ministry of Environment, Lands and Agricultural* Development Environnent & Conservation Division Ms Marii Marae Environment Inspector

Ms Tekimwau Otiawa Climate Change officer

Ministry of Health – Environment Health Services Chief Health Inspector

Ministry of Women & Social Affairs Women Development Division Ms Anne Kautu Senior Women's Development Officer

Tekimwau Kanona Outer Islands Liaison Officer

Ministry of Works Public and Utilities Tamaroa Tekeiaki Senior Assistant Secretary

Kireua Kaiea Energy Planner

Tiaon Aukitino Energy Project Engineering

Miriam Tikana Assistant Energy PlannerMwaati Oten Assistant Energy Project Engineering

Katirongo Tureen Assistant IT

Kaiea Burentarawa Energy Planning Unit

*MOEL* Mary Kum Kee Purchasing

New Zealand Aid to Kiribati Ms Kate Cushing Urban Development Coordinator

PUNJAS Bimlesh Prasad Operations Officer

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