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Electric Vehicle Project

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Outline

- Objective of the concept
- Target Area
- Technical, Economic and Social Consideration
- Selection of the most suitable vehicles specification for the pilot
- Environmental and Economic Impacts
- Strategic positioning of charging stations
- Final Recommendations and next steps

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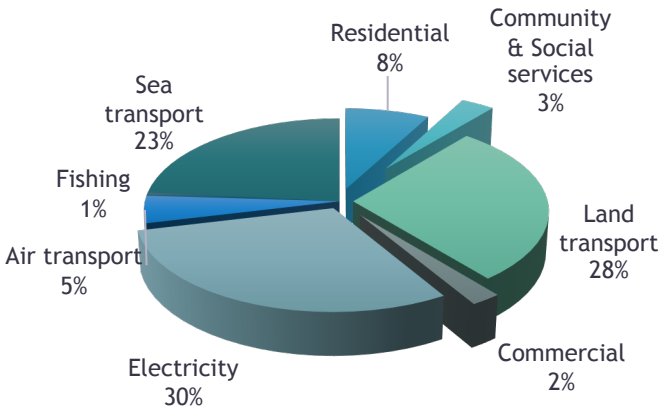
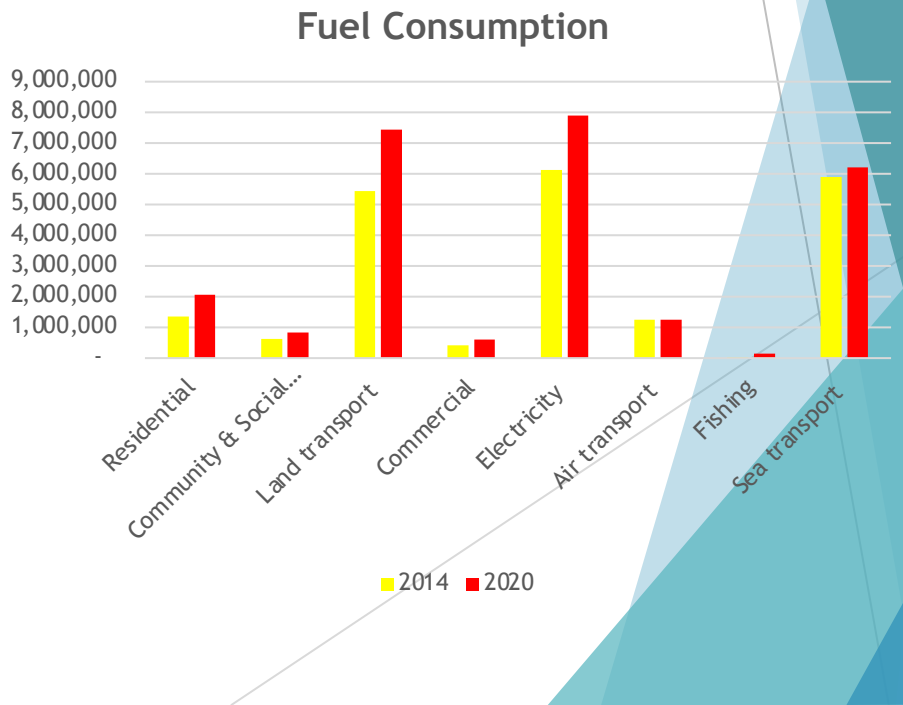
Objective of the concept

- Introduce and demonstrate a clean fleet of vehicles with higher energy and environmental standards and thereby reduce energy consumption, noise, CO2 and pollutant emissions.

Fuel consumption, 2020





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Objective of the concept

- The Kiribati Integrated Energy Roadmap indicated a shift to electric vehicle should be explored starting with public transportation.
- The proposed initiative will be a game changer on government efforts to further reduce Kiribati dependency on imported fuel and to demonstrate its commitment to cut emissions to curb climate change effects.

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Target Area

- Public and government servants transportation is targeted with the use of 100% electric vehicles.
- Road network in Tarawa is not long, only about 40 km from Buota to Betio. The close proximity of both ends of the Island will enable electric-buses to deliver the service required with less charging needs.
- The main target area within the public transport sector is the transportation of Government and SOE public servants who commutes daily from their respective towns to their main office.
- Government spends about 1.8 million every year on transport to support everyday transportation needs. This figure can be significantly reduced by using EVs and putting in place an efficient fleet management policy. About 50% savings can be achieved on operation and maintenance cost.
- savings in fuel use will account for 40% and this could be doubled if solar pv plants are fully utilized to provide power to charging station.

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Technical, Economic and Social Consideration

- E - Buses are typically more expensive than similar conventional and hybrid buses, yet some cost can be recovered through fuel savings, or state incentives.
- Grant funding is needed to support the initiative.
- The infrastructure support that will be developed will enable private sector involvement through the use of charging stations along the island which will trigger the use of EVs among those who can afford small EVs including electric bikes.
- Operating EVs on a central basis is recommended for this pilot for ease of operation and maintenance. Other than that, having a central base for transportation could save the government a significant amount of money on driver's salary, overtime, etc

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Technical, Economic and Social Consideration

Small E-Vehicles	Range (Km)	Upfront Cost (AUD)	Efficiency (kWh/km)
Nissan Leaf	135	40,000.00	0.21
Tesla Model S (premium 85 kWh)	500	100,000.00	0.24
Mitsubishi i-MiEV Electric Car	150	48,800.00	0.19
BYD e6	190	63,990.00	0.22
Ford Focus Electric Car	310	37,665.00	0.20
Renault Fluence Z.E	185	41,483.00	0.15
Renault ZOE Electric Car	150	32,120.00	0.14
E-Buses[4]			
BYD EBus	250	558,000.00	1.3
New Flyer	200	850,000.00	1.14
Complete coach works	185	650,000.00	1.2
Proterra BE35 Bus (38)	350	750,000.00	1.05

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Selection of the most suitable vehicles specification for the pilot

- BYD for E- Bus and Nissan Leaf for Electric Car are selected based on the cost competitiveness from leading manufacturers, the range and price as illustrated in the table above. Depending on the procurement procedure and final specifications that will meet certain requirement for Kiribati, the type of EV for the pilot may change.

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Environmental and Economic Impacts

- The major barriers for introducing EVs currently seen today are the:
  - Cost of battery, in terms of $/kWh, and therefore the cost of the electric car in general, of which the battery represents a significant part (normally not lower than 25%);
  - Limited electric storage capacity that influences the car's range; and
  - Lack of charging infrastructure.

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Environmental and Economic Impacts

- Life cycle comparison between an electric bus and diesel bus

	Diesel Bus	Electric Bus (BYD)
Capital cost	$200,000.00	$558,000.00
Economic and environment Benefits		
Daily travel distance	250km	250km
Daily fuel consumption	144L	
Fuel Price	1.53/L	
kWh Consumed		320kWh
Electricity Price		0.40/kWh
Daily operation cost - fuel	$220.32	$120.00
Maintenance cost	$,1.6/km	$0.64/km
Operation cost(fuel) without driver compensation	$80,300.00	$43,800.00
O&M cost not including Driver compensation per year	$230,862.50	$98,550.00
O&M cost over the bus life (10 years)	$2,308,625.00	$985,500.00
Environmental Benefits		
Equivalent CO2 Emissions	322kg	0kg
CO2 Avoidance		322kg

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Number of vehicles for the pilot

- According to current estimates, about 25 E-buses can accommodate government employees transport need from home to office to home and also provide other service such as relieving pressure on public transportation need whenever required.

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Strategic positioning of charging stations

- Possible charging stations position for consideration. This could be expanded depending on the need.
  - PUB Headquarter in Betio.
  - Office of the Beretitenti in Bairiki.
  - House of Parliament in Ambo.
  - PUB Headquarter in Bikenibeu.
  - Betio Sports complex
  - Bonriki airport
- PUB to operate the charging stations

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Final Recommendations and next steps

- Charging of EVs should be carefully managed to avoid huge impact on demand (kW) of electricity at certain times, in case of uncoordinated charging.
- EVs can be charged when there is surplus renewable capacity available e.g. solar at noon. In the long-term and a mass rollout of EVs, electric vehicles could act as distributed storage resource to support power system integration.

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Questions ???