

SCALING UP RENEWABLE ENERGY IN LOW INCOME COUNTRIES (SREP)

Investment Plan for Kiribati



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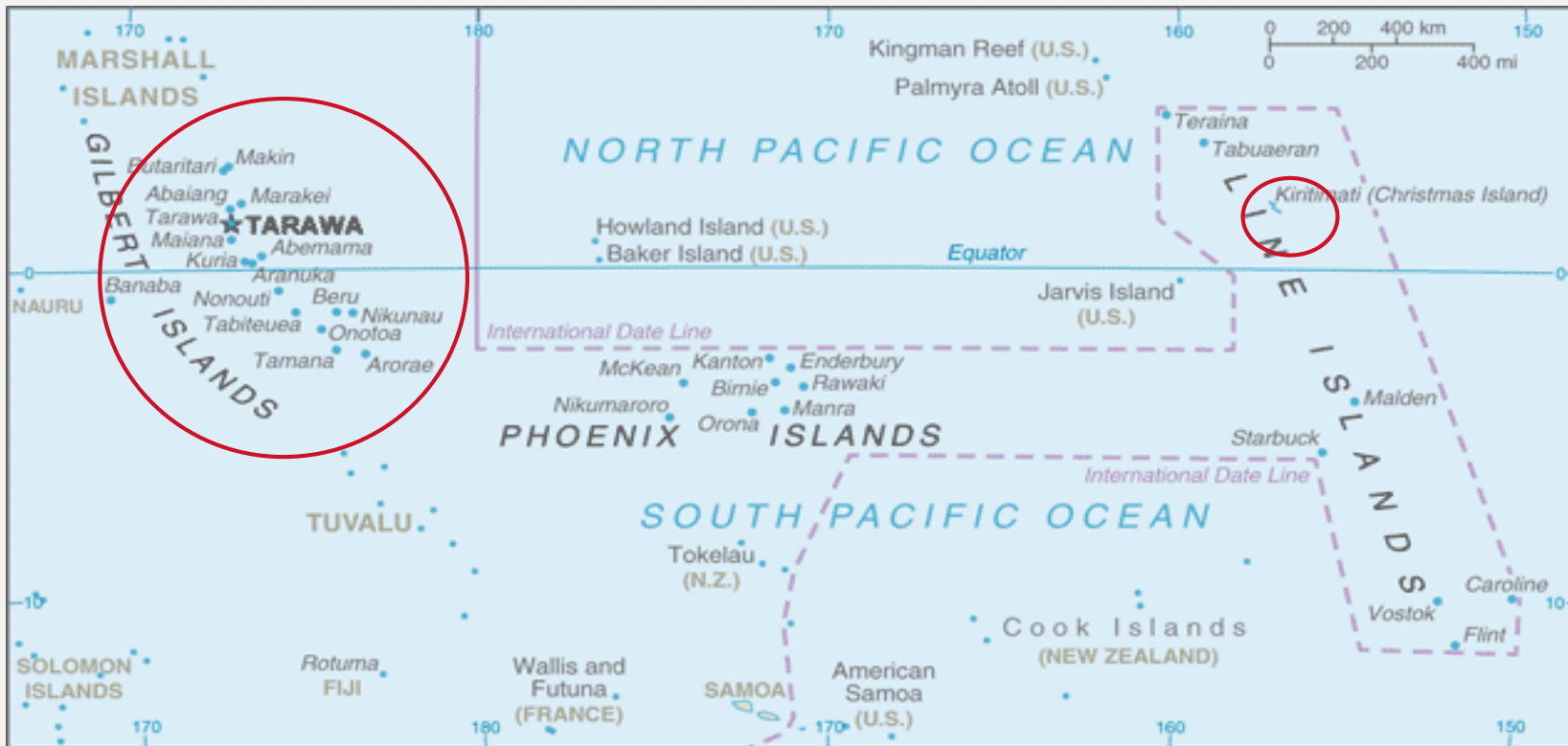
Mr. Jonathan Mitchell

Director, Climate Finance Division

SREP Sub-Committee Meeting
Ouarzazate, Morocco
February 1, 2019



KIRIBATI COUNTRY CONTEXT



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Kiribati Key Stats	Population	Land Area	Pop. Density	Urban: Rural	GDP (MM USD)	Poverty Incidence	Electricity Access
	114,395 (2015)	800 km ²	143 /km ²	54:46 (2015)	181.5 (2016)	13% (2006)	85% (2016)

**Challenge 1:
Over-reliance
on expensive
fossil fuel
imports**

Reliance on diesel generation means that government expenditures on electricity and cost of service is high: 57% of PUB expenditures was spent on diesel and lubricant

Continued reliance on fossil imports is incompatible with GoK's RE and climate change targets

**Challenge 2:
Insufficient
reserve
generation and
energy storage
capacity**

Grid reliability is low on South Tarawa due to lack of back up generation

Grid stability will weaken if further intermittent RE generation is added to the grid

Generator failures result in load shedding

**Challenge 3:
Low financial
viability of PUB**

Tariffs are below cost-recovery to address affordability concerns

High costs of generation resulting from transport costs of imported diesel

Low collection rate

High technical RE potential for solar and some wind...

...but RE resources are currently under-utilized...

...meaning Kiribati relies on imported fuel and local biomass

- Technical potential for solar: **554MW**
 - **70 MW** in South Tarawa
 - **480 MW** in Kiritimati
- Technical potential for wind: **1.1 MW** (all in Kiritimati)

- Solar PV serves **22%** of capacity & **9%** of load in South Tarawa
- Solar PV serves **11%** of capacity in Kiritimati
- Supportive policy but weak institutional and regulatory framework
- Limited availability of financing
- Affordability concerns
- High cost and little quality control of imported technologies
- Limited experience with operating distributed technology
- Limited availability of land

- Coconut oil and imported oil products dominate energy mix
- Biomass (coconut oil, palm oil, wood waste) make up >85% of household energy mix, primarily for cooking
- **Around half** of imported diesel is used for power generation

Kiribati National Energy Policy

- Sustainable, reliable and affordable energy
- Promote and encourage RE
- Guiding principles for the KIER 2015-2025

2009

Renewables Readiness Assessment

- Set RE and EE targets to be adopted in KIER

2012

Nationally Determined Contributions

- 49% reduction in GHG emissions by 2025
- KIER is implementation plan to achieve NDC goals

2015

Kiribati Development Plan

- Access to climate-resilient infrastructure

2016

Kiribati Integrated Energy Roadmap

- Implementation plan for National Energy Policy
- 23% reduction in fossil fuel consumption in South Tarawa —40% in Kiritimati and Outer Islands

2017

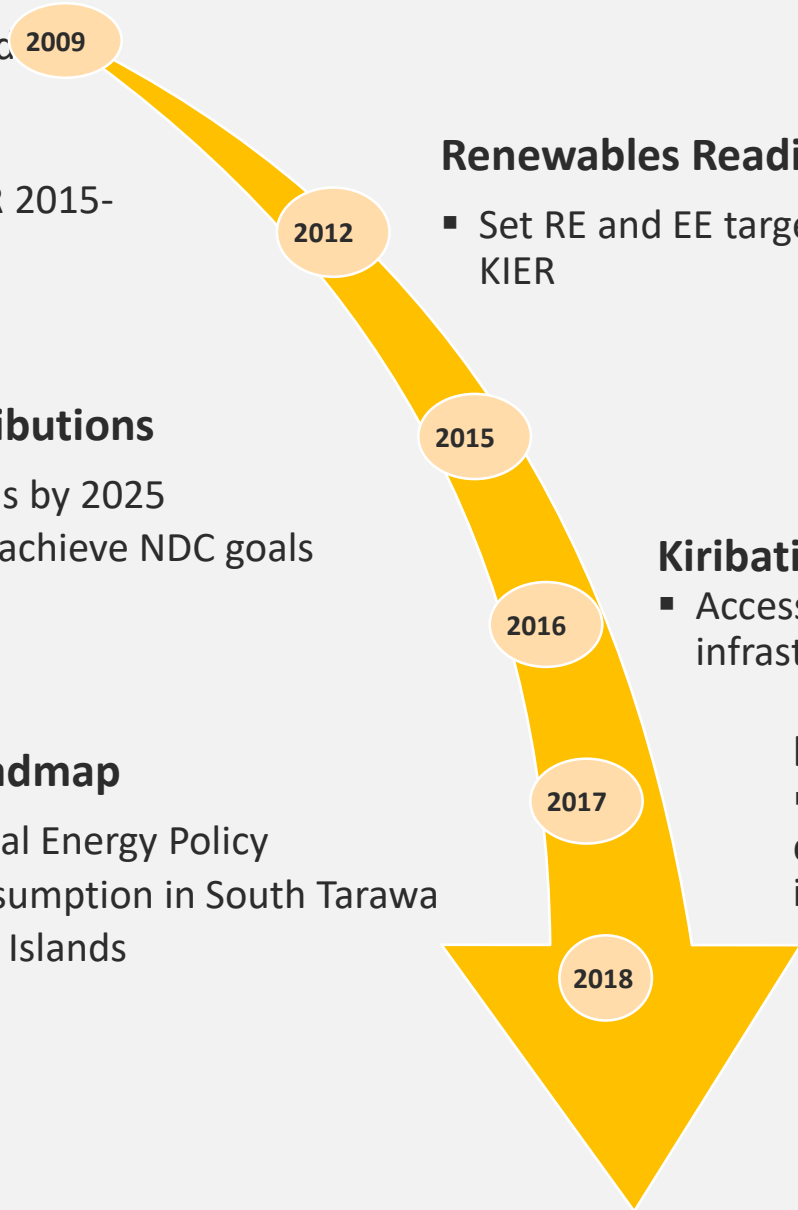
Kiribati Vision 20

- To improve access to quality utility & social infrastructure

2018

Kiribati Climate Change Policy

- Promote transition to RE



RE technologies were evaluated on:

- Technical potential
- Relevance to SREP priorities
- Relevance to national goals



Solar PV and battery backup



Solar microgrids

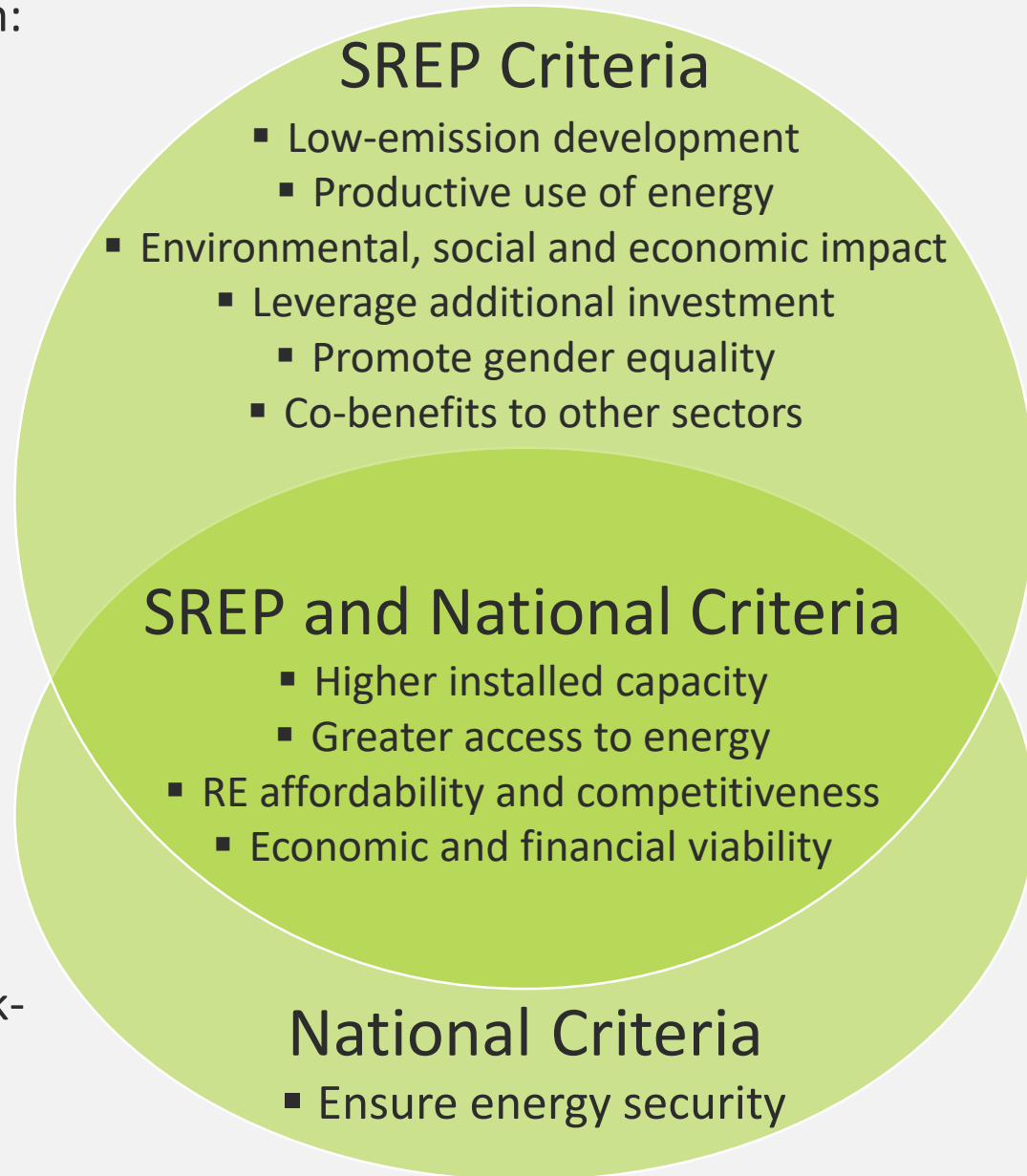


Wind and battery backup



Solar Street Lights

Out of many options considered, utility-scale solar with battery back-up best aligns with SREP and national criteria.



Phase 1 → Phase 2



South Tarawa Solar PV and Battery Storage Project		
Component	Source	Amount (USD)
Solar PV and Battery Storage	SREP	3.7 million
	ADB	5 million
	Bilateral donors	2 million
RE Framework + Integration Study	SREP	1 million*

South Tarawa Solar PV and Battery Storage Project 2		
Component	Donor	Amount (USD)
Solar PV	Private sector	50 million
Battery Storage	Green Climate Fund/ Donor TBD	4.7 million
Project preparation	Donor TBD	0.5 million



Kiritimati Island Electricity Access Project		
Component	Donor	Amount (USD)
Demand Study	European Union**	0.3 million
Capacity building		3.4 million
LV Network Rehabilitation		1 million

Kiritimati Island Grid-Connected RE Project		
Component	Donor	Amount (USD)
RE Investment	GCF/ Donor TBD;	5.3 million
Project preparation	European Union**	0.5 million

*Excludes Investment Plan Preparation Grant (IPPG) of USD 0.3 million; **EU Funds are indicative and will be finalized at a later date

Component 1: Utility-scale Solar PV and Battery Storage

- **4.1MW** ground-mounted solar PV and **1.9MW (2.6MWh)** of battery storage
 - Storage provides grid stability during cloud cover and night
 - storage allows dispatchable generation, displacing diesel generation for peak demand
- Enables Kiribati to meet 26% of electricity from RE

Component 2: RE Enabling Framework

- Supportive framework for private sector participation:
 - Drafting Energy Act
 - Formalize technical standards on imported electrical equipment
 - Draft and update grid codes to support safe operation of RE at high levels
 - Prepare RfPs, PPAs, and other procurement documents to support introduction of IPPs
- Capacity building to PUB, MISE and MFED
- Gender mainstreaming:
 - Quota systems for women's training
 - Building gender-disaggregated targets for the capacity development program

Component 3: RE Integration Study

- Conduct an integration study to evaluate the impact of additional solar PV and inverter capacity on system stability
- Results used to prepare technical requirements for solar PV and storage
- Results also used to identify ways for PUB to manage new assets

Complementary Projects

- World Bank and ADB Solar PV Reverse Osmosis Project
 - Construction of 480 KW solar desalination plants
 - Construction of 2.5 MW solar PV
- NZ MFAT Least Cost Plan Project
 - Identified supply- and demand-side measures to meet fossil fuel reduction goals
 - Recommended network investments to support higher levels of intermitted generation

Component 1: Electricity demand study

- Address uncertainty about demand growth given new land leases and lower migration to Kiritimati
- Identify medium- to long-term RE investment on Kiritimati Island.
- Inform generation investments for Phase 2.

Component 2: Institutional support and capacity building

- Develop regulations for setting tariffs and connection fees
- Install metered connections
- Reform billing procedures
- On-the-job training to implement asset management plan
- Support data collection (load and generation)

Component 3: Low voltage distribution network rehabilitation and expansion

- Replace parts of network that are not compatible with the new HV distribution network
- Expand to underserved areas in Tabwakea, Main Camp, and Poland

Using outputs of Phase 1 to scale up private sector led RE investments for grid-connected solar and energy storage in South Tarawa and Kiritimati.

Component 1: Grid-connected solar investment

- 23.2MW of solar PV via private financing
- Enable Kiribati to meet the 48.8% reduction in GHG emissions
- Reduce fossil fuel consumption by 58%

Component 2: Battery storage investment

- 4.8MW (54.4MWh) battery storage to support the solar PV plant
- Government of Kiribati plans to request GCF to fund the storage facility

Component 3: Support feasibility studies and transaction advisory

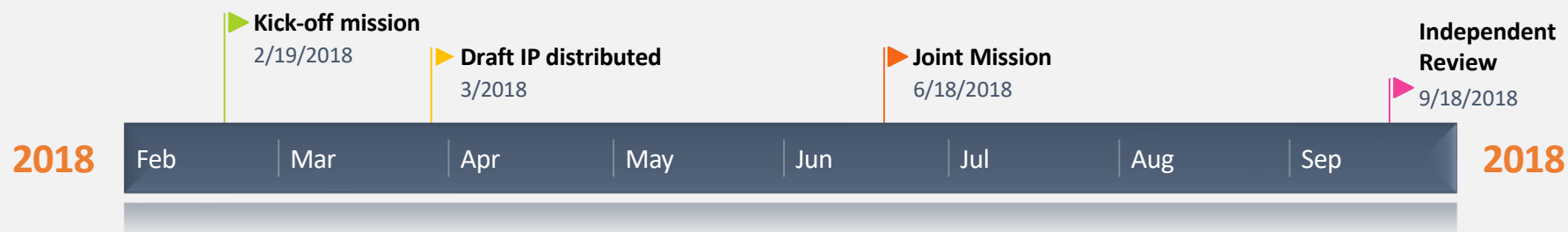
- Funding for feasibility studies, transaction advisory, and procurement

Component 1: RE investment

- Use results of demand study to identify capacity needed to meet Kiritimati's medium-term demand

Component 2: Feasibility studies and transaction advisory

- EU to provide TA for feasibility studies or transaction advisory to the GoK and PUB

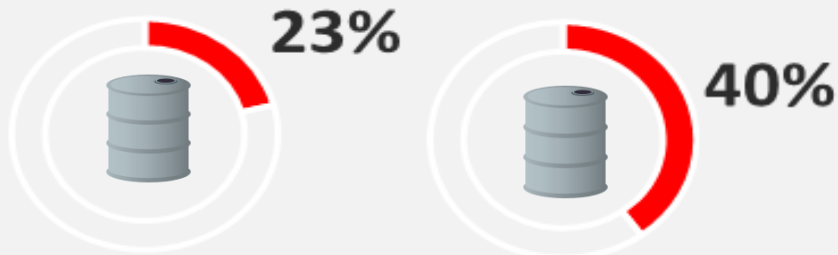


- Stakeholders provided input throughout the IP preparation process:
 - As part of the **kick-off mission** GoK and MDBs met to develop a plan for the preparation of the IP
 - An **options study** was delivered to national stakeholders and donors, detailing the assessment of RE potential and barrier to their development
 - Feedback on the options study and other takeaways from the kick-off mission were used to develop a **draft investment plan**
 - A **joint mission** was organized between MDBs and GoK to obtain feedback on the draft IP, discuss steps to finalize the SREP IP, and explore models for attracting private finance
 - Comments from an Independent Technical Reviewer were addressed, and responses were recorded in the **final investment plan**



SREP IP Targets

Reduction in fossil fuel consumption by 2025 (KIER)



South Tarawa

Kiritimati + Outer Islands

Reduction in GHG emissions by 2030 (NDC)



- Low carbon development pathways achieved through Energy Security
- Increased capacity & Employment opportunities
- Increased access to RE – **60%**
- Reduced costs - **>50%**
- Improved legislative frameworks
- Climate change mitigated & target achieved



Ko'rabwa

North Tarawa