



The Role of Policy and Finance Innovation in Advancing Public and Private Investments in NDC Implementation

Government of Bangladesh Pavilion

Supported by:



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and Nuclear Safety

based on a decision of the German Bundestag

Today's Session: Presentations followed by panel discussion

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Bangladesh

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Ethiopia

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Kenya

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NDCs are at the heart of the Paris Agreement

They outline countries' climate action plans

“Much of the ambition in developing countries' NDCs is conditional on receiving finance support”

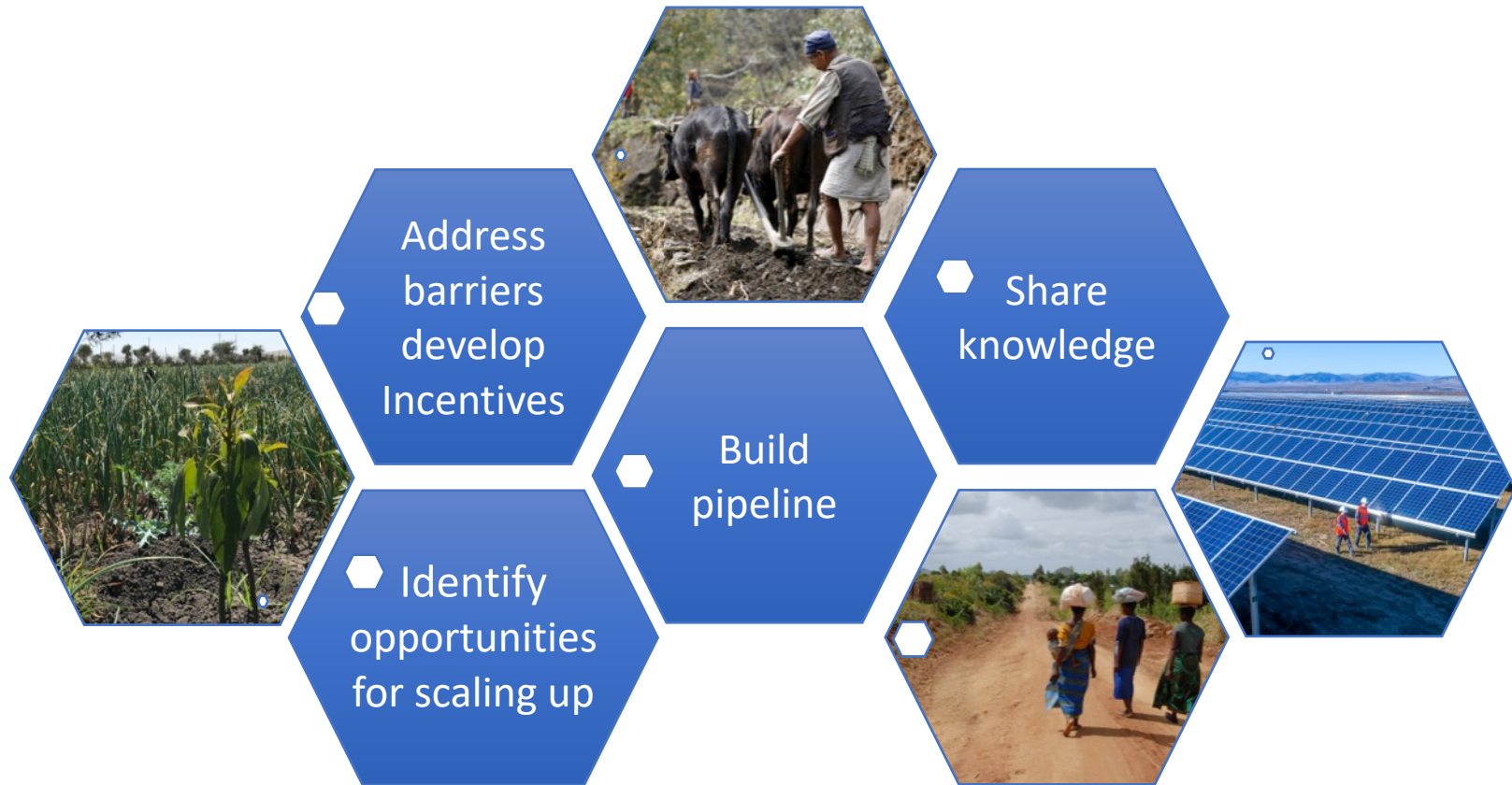
“Finance flows are not sufficient to fund developing country NDCs.”

“Large scale renewable energy and low-carbon transport projects receive the majority of tracked climate finance flows”

Given the urgency of the climate challenge, how do we address this?

Mobilising Investment for NDC Implementation

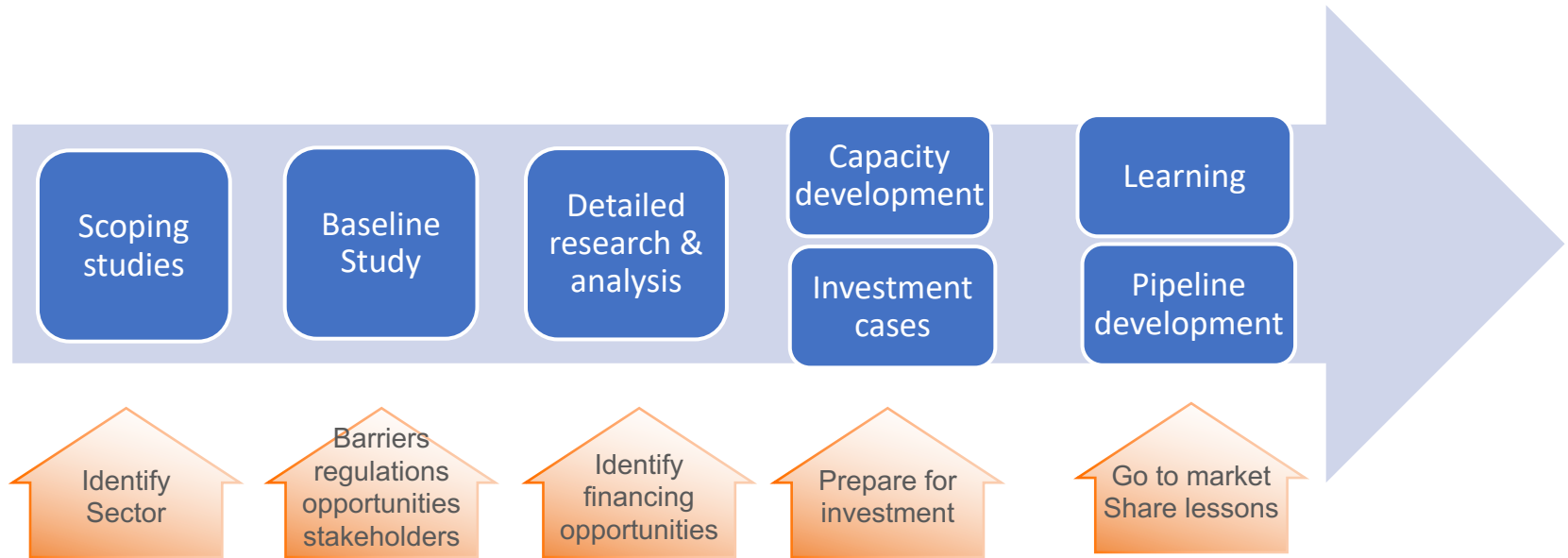
Supporting countries to meet their commitments to the Paris Agreement



Seven highly vulnerable developing countries



Our process and approach to this work...



Our approach:

- Consult Government
- Respond to demand
- Build local capacity
- Engage broader stakeholders
- Competitive procurement for discrete work packages
- Consult private sector players who understands the investment perspective

Country Overview: Sectors and Sub-Sectors

Country	Sector	Sub-Sector
Kenya	Energy	Cooking Fuel replacement: Promoting bioethanol for cooking by displacing kerosene and charcoal using technology and business model innovation
Ethiopia	Energy	Off-grid/Mini-grids: Supporting the development of the mini-grid sector
Bangladesh	Energy, transport	Off-grid/Mini-grid, Solar Pumps & Water transport: Developing bankable business models & investment cases for solar mini-grids, solar pumps & solar boats
Peru	Waste - Energy	Waste management & Waste-to-energy: Developing business models & investment cases for landfill gas capture & waste-to-energy.
Dominican Republic	Energy	Energy efficiency and renewable energy: Advancing clean energy deployment through improved grid codes, incentive structures and minimum performance standards
Vietnam	Energy	Renewable energy: Revising rooftop solar regulations & incentives to spur market development (e.g., third party PPAs, net metering, feed-in tariffs, and interconnection processes)
Philippines	Energy	Renewable energy: Updating renewable energy policies that enable corporates to procure renewable energy directly from the generator, developing projects with private sector.

Over to the country programs:



Bangladesh



SOUTH
SOUTH
NORTH
TOWARDS CLIMATE RESILIENCE



Bangladesh's NDC Ambitions

Bangladesh's contribution to global climate action

- With low elevation, high population density and an economy that is heavily reliant on farming Bangladesh is exceptionally vulnerable to the impacts of climate change
- Conditional commitment to reduce emissions in the power, industry and transport sectors by 15% below compared to a BaU scenario by 2030
- Committed to taking a progressive approach to developing its economy on a low carbon pathway

Renewable energy opportunities

- 2020 target to increase the share of renewable energy production up to 10% of the total energy mix
- Expansion of renewable energy can help shield the country from costs of importing energy
- Cost effective, pragmatic solution for providing electricity to off-grid areas, which is a significant challenge in Bangladesh



Our work in Bangladesh was implemented over three phases

Phase 1



Country scoping studies to identify priority sub-sectors for mobilising investment for Bangladesh's NDC implementation. **Energy** is selected as target sector for reducing emissions

Phase 2



Business models and investment cases built for solar mini grids, solar irrigation pumps (SIPs) and solar boats

Phase 3



Decision-making geospatial mapping tool to identify priority sites to develop further SIPs, delivered to SREDA

Barriers to Investment in Off-Grid Solar

Solar mini grids

- Long-term revenue uncertainty if grid arrives
- Mismatch between project cash flows and debt service obligations
- Difficulty in ensuring maximum uptake of connection and usage among end users
- Higher than expected night to day load ratio has led to increased storage costs and running of expensive backup diesel generators
- Low affordability in some rural areas
- High investment and replacement costs

Solar irrigation

- Low utilisation of SIPs outside of the main BORO irrigation season
- Mismatch between project cash flows and debt service obligations
- Low uptake of SIPs by farmers
- High investment and operation costs

Rolling out Solar Irrigation Pumps (SIP) in Bangladesh

Key findings:

- Solar irrigation has large technical potential
- The most attractive regions for SIPs are in the North and North West of Bangladesh
- Sale of surplus power to the grid could make an important contribution to the commercial viability of SIPs

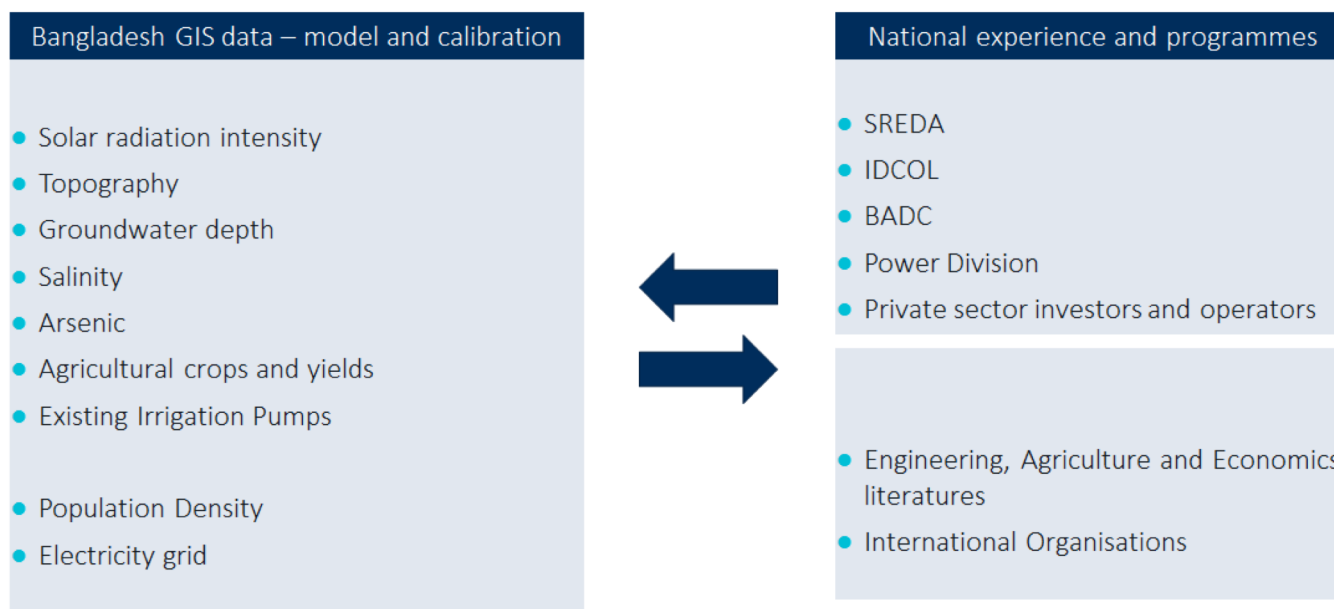
Why this tool?

- Latent demand for power and irrigation in rural regions of Bangladesh where the grid does not reach
- SIPs are a clean, renewable alternative to current diesel irrigation pumps
- Addresses barriers to investment
- Enables rapid scale-up of the market



The Solar Irrigation Pump (SIP) Site Prioritisation Tool

- The tool combines GIS data, economic modelling, national experience and international evidence to reveal sites that are most attractive for SIPs



- The output of the analysis is an interactive, user-friendly tool which shows the attractiveness of Bangladesh at a 2x2km granularity
- Built in options allow SREDA (the main user) to visualise the impact of different policy decisions and make better informed recommendations to the Power Division

The Solar Irrigation Pump (SIP) Site Prioritisation Tool

Overall attractiveness - present and alternative conditions

This 'alternative conditions' page has an additional functionality of switching between four key conditions that could change the overall attractiveness score. The 'baseline', which is displayed on the 'Overall attractiveness' tab assumes that all four switches are set to present day conditions. The four switches can be set to their 'alternative' conditions (see guidance on right side of this page), either in isolation or combination, in order to view the attractiveness under potential changing economic conditions in Bangladesh.

SIP attractiveness rating:

- ☐ Irrigation only
- ☒ With sale of surplus power to grid
- ☐ With sale of surplus power to households

Future condition switches:

Pump costs

- ☒ Present
- ☐ Alternative

Surplus power tariff

- ☒ Present
- ☐ Alternative

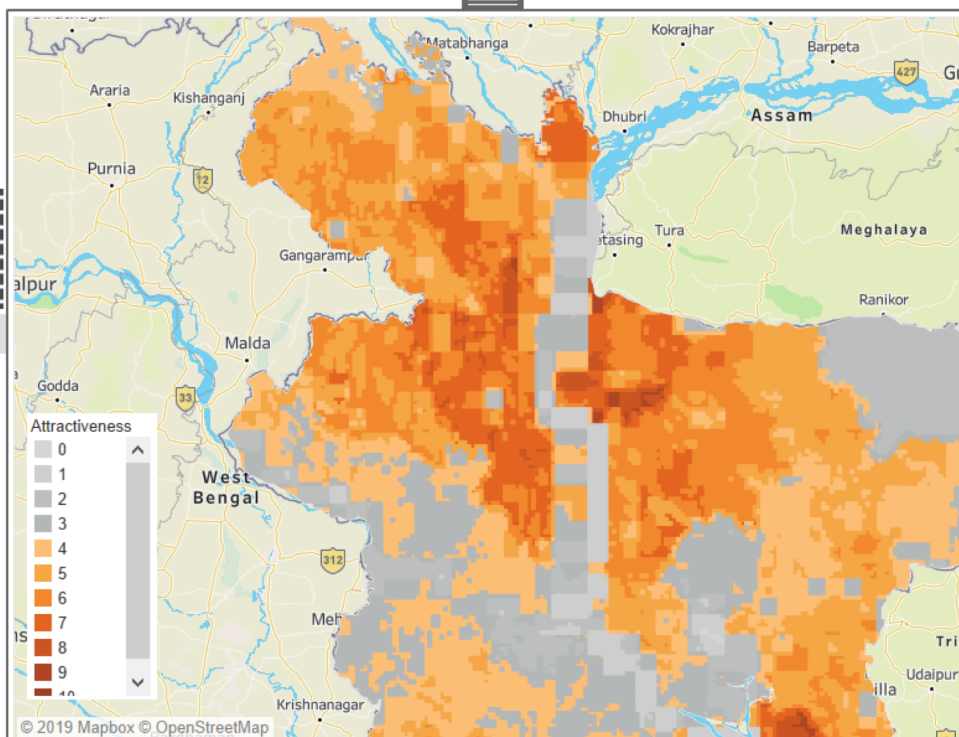
Crop Switch

- ☒ Present
- ☐ Alternative

Irrigation prices

- ☒ Present
- ☐ Alternative

Map view



Guidance

Pump costs:

Present - it is assumed that pump costs are those estimated for a standard SIP installed in Bangladesh under current component prices

Alternative - the cost of the pumping system, PBV modules and pump controllers are reduced by 42% to reflect expectations on cost reductions in the future

Surplus power tariff:

Present - it is assumed that the power remaining after usage for irrigation can be sold back to the grid at 2.5 BDT per kWh

Alternative - the sell back tariff is increased to 3.5 BDT/kWh

Crop switch:

Present - it assumes that the crop patterns are the same as those captured when this tool was created

Alternative - a portion of the land currently used to cultivate boro crop changes to maize or wheat, the degree of switching depends on the suitability in that cell for each of the alternative crop types

Irrigation price:

Present - it is assumed that irrigation prices are approximately the mid-point of observed IDCOL prices for each crop type per acre per season: 2,500BDT - boro, 800BDT - aman, 800BDT - aus, 1000BDT - maize and 800BDT - wheat

Alternative - it is assumed that the prices are at the top end of observed IDCOL prices per acre per season: 3000BDT - boro, 1200BDT - aman, 1200BDT - aus, 1250BDT - maize and 1200BDT - wheat

The Solar Irrigation Pump (SIP) Site Prioritisation Tool

PBS-level Data

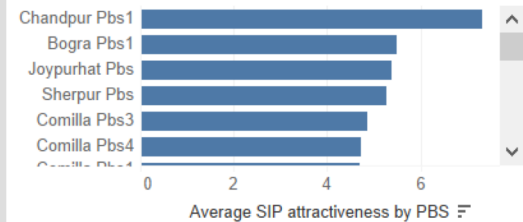
This page allows results to be viewed at a PBS level.

The 'SIP installation potential' and 'Average SIP attractiveness' boxes at the top of this page show these values for each PBS in Bangladesh. The summary data in the lower section of this page will update according to the PBS selected in the dropdown list below. Roll over the map to view the location data for each grid cell within the PBS. The Cell ID can be used to cross reference with other pages of this tool.

SIP installation potential

	SIP potential	Cumulative SIP Potential
Thakurgaon Pbs	3,913	3,913
Patuakhali Pbs	3,192	7,105
Naogaon Pbs 1	2,931	10,036
Mymensingh Pbs3	2,679	12,715
Naogaon Pbs 2	2,672	15,387
Rangpur Pbs1	2,512	17,899
Kurigramlalmonirhat P..	2,492	20,391
Dinajpur Pbs1	2,484	22,875

Average SIP attractiveness



PBS1

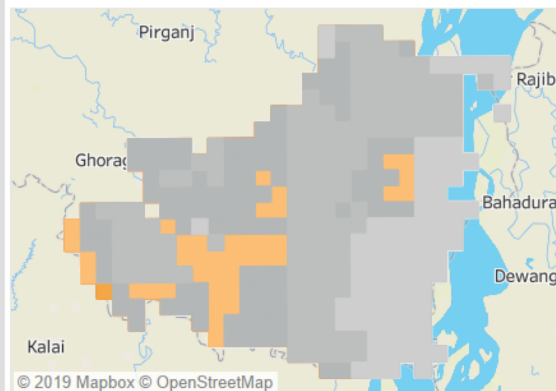
Gaibandha Pbs

PBS-level information for Gaibandha Pbs

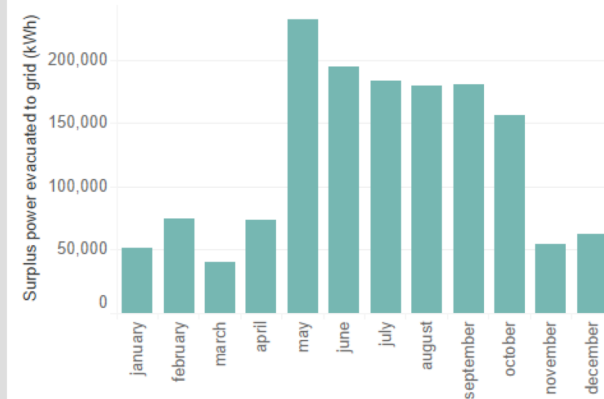
SIP potential	1,764
Number of ADB Pumps	0
Number of Existing Diesel Pumps	20,903
Power Evacuated to the Grid MWh/y	44,507

Map view: PBS level

Search by Cell ID:



Surplus power evacuated to the grid in Gaibandha Pbs



Benefits and impact

Investment barrier	How is this addressed by this work?
Low utilisation of SIPs outside of the main BORO irrigation season	Increases understanding on utilising surplus power outside of the BORO seasons
Mismatch between project cash flows and debt service obligations	Opens up new revenue generating options with predictable cash flows
Low uptake of SIPs by farmers	Opening up sale of power back to the grid increases the overall attractiveness of SIPs to farmers
High investment and operation costs	Opens up new revenue generating options for SIPs



Ethiopia

Ethiopia - Leverage opportunities created by ambitious climate action

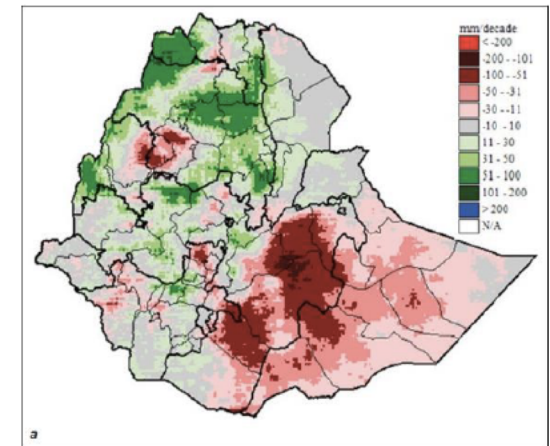
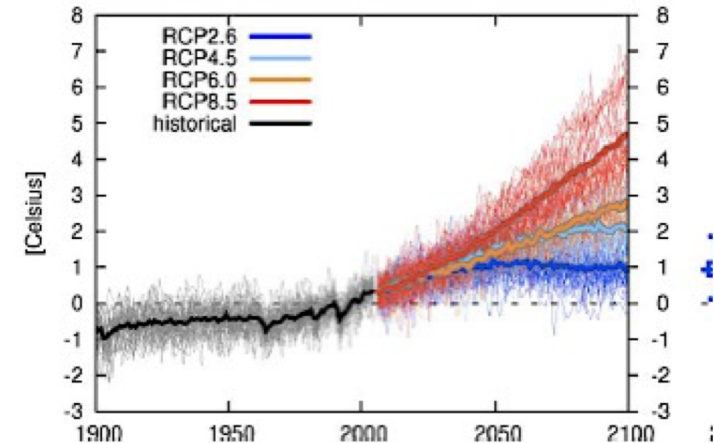
Significant Climate Change Risks

- Hotter, drier, more water stressed
- Vulnerable due to limited capacity to adapt and due to water-related climate shocks
- Land degradation due to unsustainable agricultural practices likely to worsen as the climate crisis evolves
- Sustainable use of water sources, such as groundwater, acting as a buffer and to supplement surface water supply

The NDC requires international support and investment

- The CRGE - Ethiopia's strategy for both adaptation and mitigation.
- Increase resilience of agricultural - productivity, minimize food insecurity and increase rural livelihoods.
- Prioritize renewable energy to increase energy access in rural areas.
- A focus on sustainable land management practices in agriculture and forestry creates opportunities for both adaptation and mitigation projects.

Temperature change Ethiopia Jan-Dec wrt 1986-2005 AR5 CMIP5 subset



Supporting the mini-grid sector for rural electrification

Irrigation, storage, agri-processing the main use-cases

Initial focus on Agri Commercialization Clusters ACCs

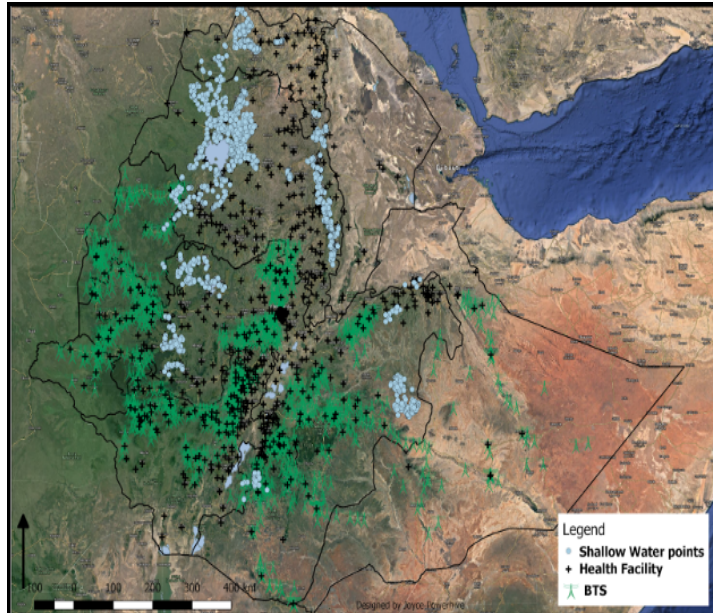
- several hundred farmers, > 200Ha productive land
- Small business, clinics, schools, households
- Clusters producing horticulture crops: the initial target

Hypothesis: Productivity gains will fund the PPA's

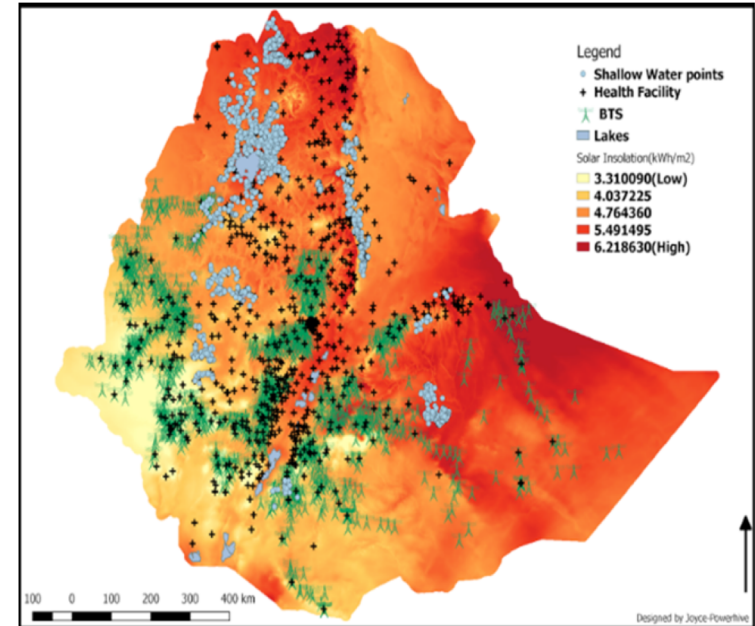
- ✓ Aligned with Government policy objectives (NEP II, GTP II, CRGE)
 - Building a resilient rural economy
 - Supporting food security in the face of climate change
 - Clean renewable energy for off-grid electrification
- ✓ Strong climate change mitigation and adaptation benefits
- ✓ Alignment with SDGs



Using GIS to identify sites – ground water, BTS, health facilities



- Then, **solar irradiation** data was added to the data that had been overlaid.
- Higher insolation was registered in **northern, middle** and **eastern** parts of the country and numerous overlap points were found in those areas.



- Datasets of ACCs, **BTS towers**, **social amenities** and **shallow ground water** points were overlaid.
- **BTS towers** and **health facilities** mostly overlap but **shallow groundwater points** overlap little with the **health facilities** and **BTS towers**.

What next?

**10 Demonstration projects - de-risked
Learn and test business models**

Investment cases and pre-feasibility studies on 10 sites will be presented at investment forums.
Strong M&E lens to feed in to adaptive management and collect robust data

**Broader roll-out once barriers removed
& financial viability proved**

There are a number of outstanding questions

- ✓ Ownership models - PPPs or fully privately owned?
- ✓ Cost-reflective tariffs for business off-takers?
- ✓ Regulatory barriers – licensing, restrictions on foreign investors, repatriation of returns

Lessons from the Ethiopia experience

What lessons can we learn from funding climate action in Ethiopia?

- An independent ‘playmaker’ can play an effective brokering role
- Support from champions key to remove obstacles
- Sharing of outputs with stakeholders builds legitimacy.
- Understand the policy environment and build alignment behind it
- Involve private sector players early and keep asking the question “what does the private sector need in order to invest in this sector”
- De-risked demonstration projects can drive regulatory change.
- Highlight the co-benefits: jobs, food security, livelihoods
- The central role of GIS in planning mini-grid roll out.
- The ACC concept creates opportunities for economies of scale and programmatic roll-out.
- Increasing productivity and revenue generation from irrigation, storage and processing creates the revenue stream to fund the PPA.



Kenya

Impact of using biomass fuel for cooking

Health



- **Indoor air pollution:** 728k Disability-Adjusted Life Years (DALYs) and 16.6k deaths annually, **8-10% of early deaths** in Kenya¹, likely a substantial underestimate of the full disease burden as many negative cooking health effects have not yet been quantified (e.g., burns, eye diseases, physical injuries from carrying firewood, etc.)
- **Lower respiratory tract disease** is the third largest contributor of deaths in Kenya while pneumonia is a major cause of death to children under the age of five, largely due to indoor air pollution¹

Environment



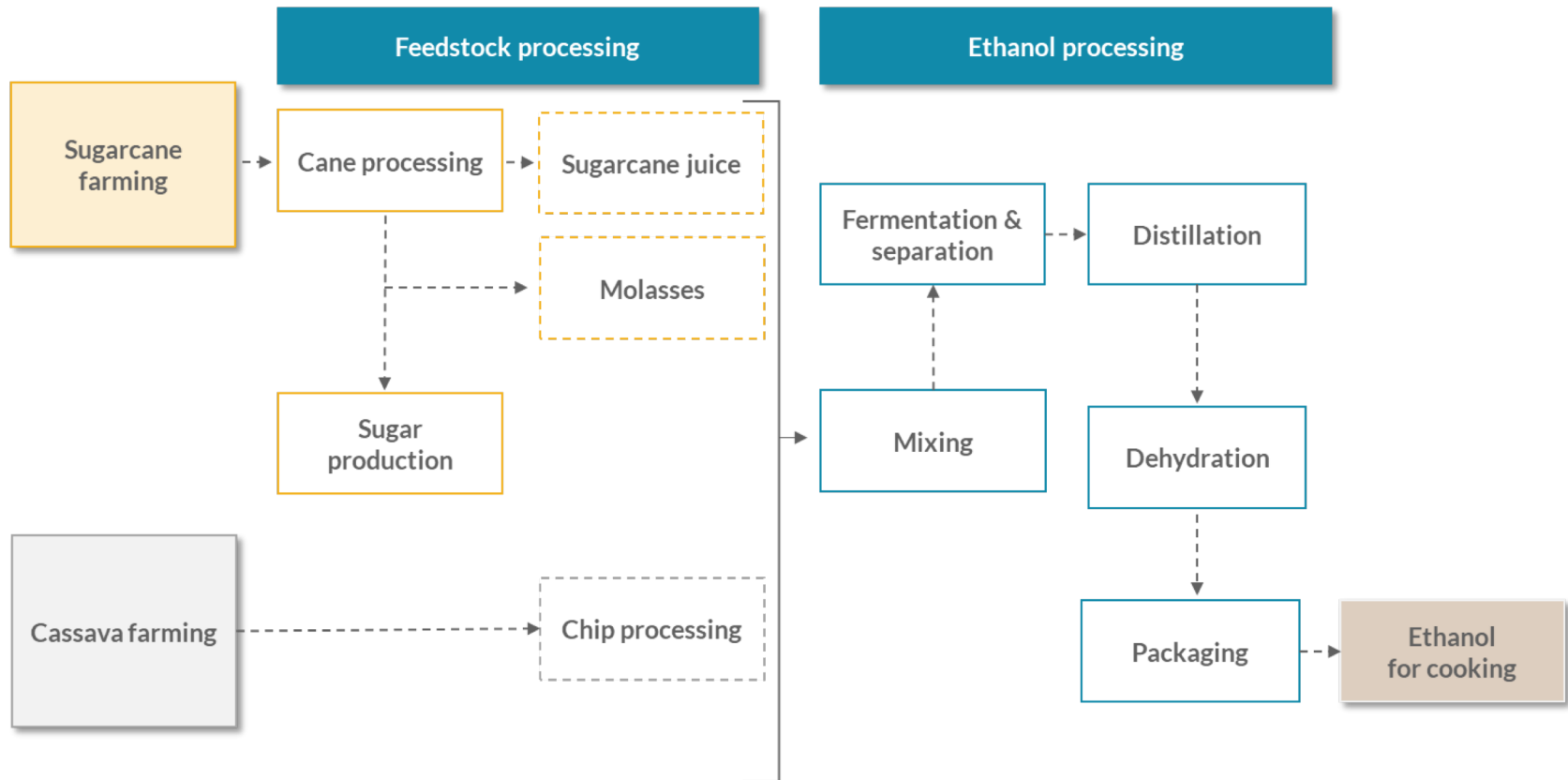
- **Deforestation and forest degradation:** Kenya loses **10.3 million m³ of wood from its forests** every year from unsustainable charcoal and wood fuel use, a major contributor to the 0.3% per year deforestation rate²
- **GHG emissions:** Household fuel use in Kenya contributes **22-35 million tonnes of CO₂ eq** each year, which is equivalent to **30-40% of total Kenya GHG emissions**²

Food insecurity



- **Food insecurity:** deforestation, resulting from the use of dirty fuels, exacerbates food insecurity and harms the agriculture sector. Kenya's five forest water towers feed filtered rainwater to rivers and lakes and provide **over 75 per cent of the country's renewable surface water resources**³

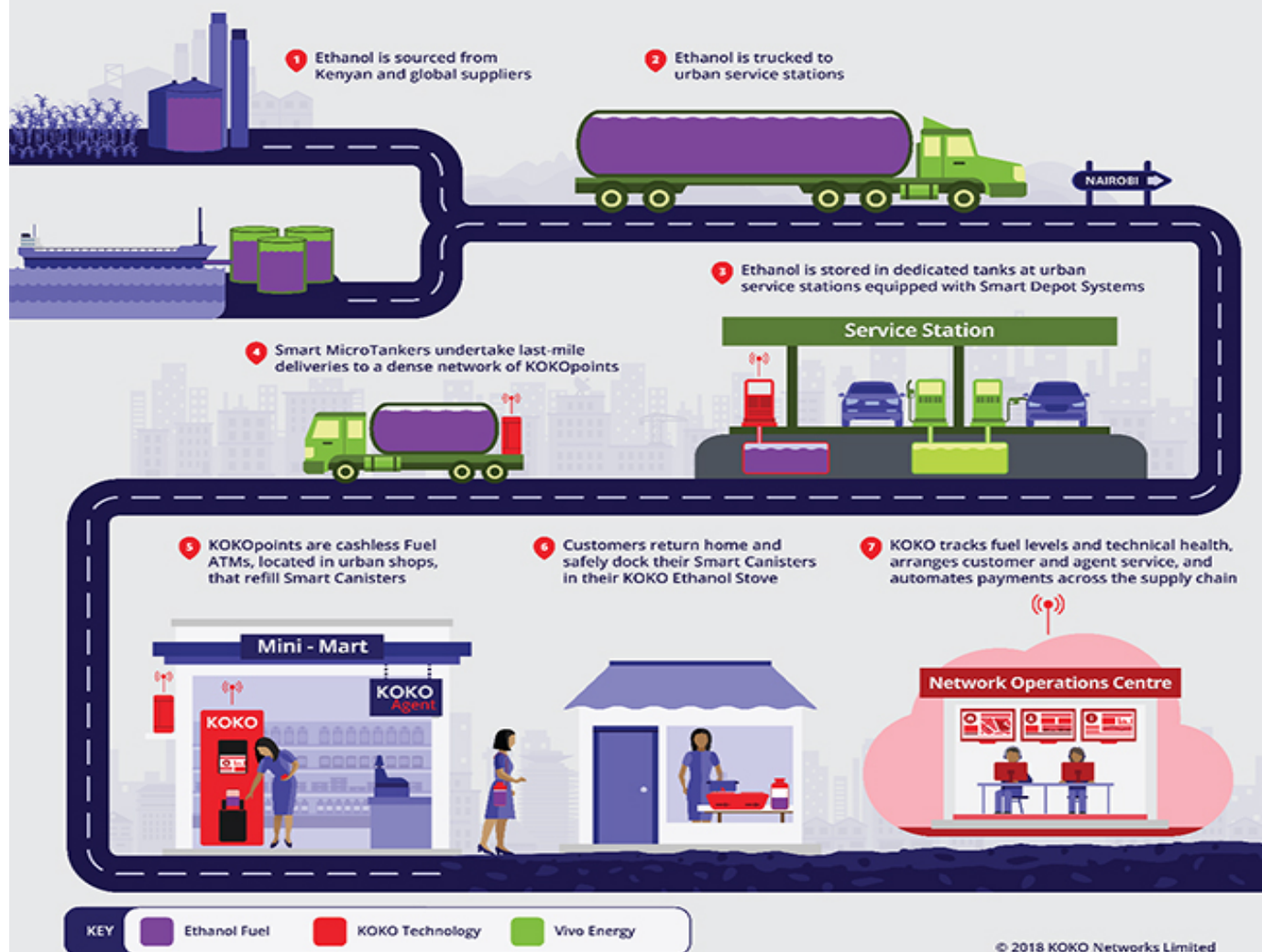
Source of Ethanol for Cooking



KENYAN PARTNERSHIP OVERVIEW

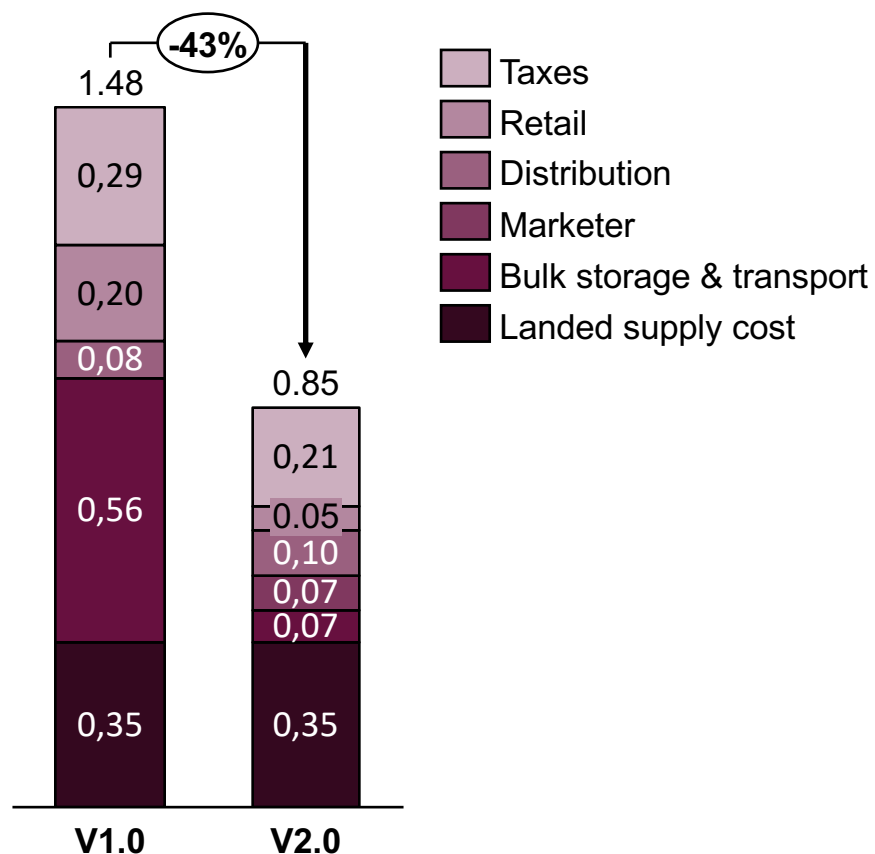
KOKO
NETWORKS

VIVO
ENERGY



Delivering Bio-ethanol at Scale – V2.0 vs V1.0

Supply chain margins for Bio-ethanol
(% of total cost)



Bio-ethanol V2.0 costs are significantly lower than those of Bio-ethanol V1.0

- Leveraging existing downstream infrastructure can **cut down bulk storage and transport costs by ~90%**
- Technology-enabled distribution can **reduce combined distribution and retail costs by ~45%**
- Aside from landed supply cost, taxes drive the retail price of Bio-ethanol V2.0

Impact of VAT and Tariff on Price of Bio-ethanol

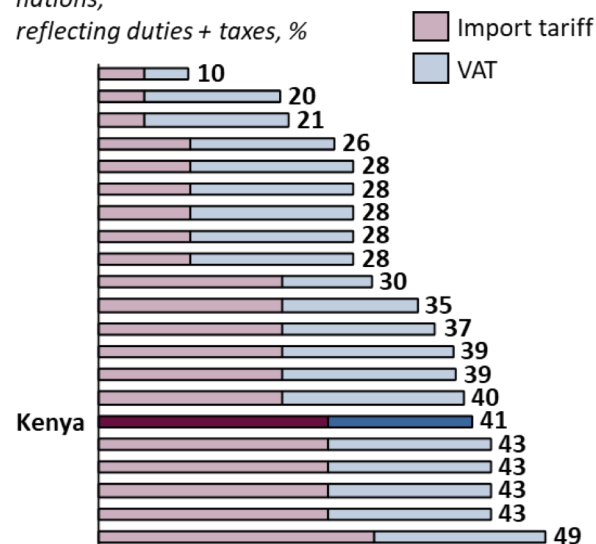
Taxes on Bio-ethanol are high relative to those on other fuels in Kenya

Kenyan duty and VAT rates for cooking fuels:

FUEL	Effective duty	Effective VAT
Charcoal	N/A	N/A
LPG	0%	0%
Kerosene	9% ¹	0%
Denatured technical Bio-ethanol	25%	16%

Taxes on Bio-ethanol are high in Kenya relative to in other countries

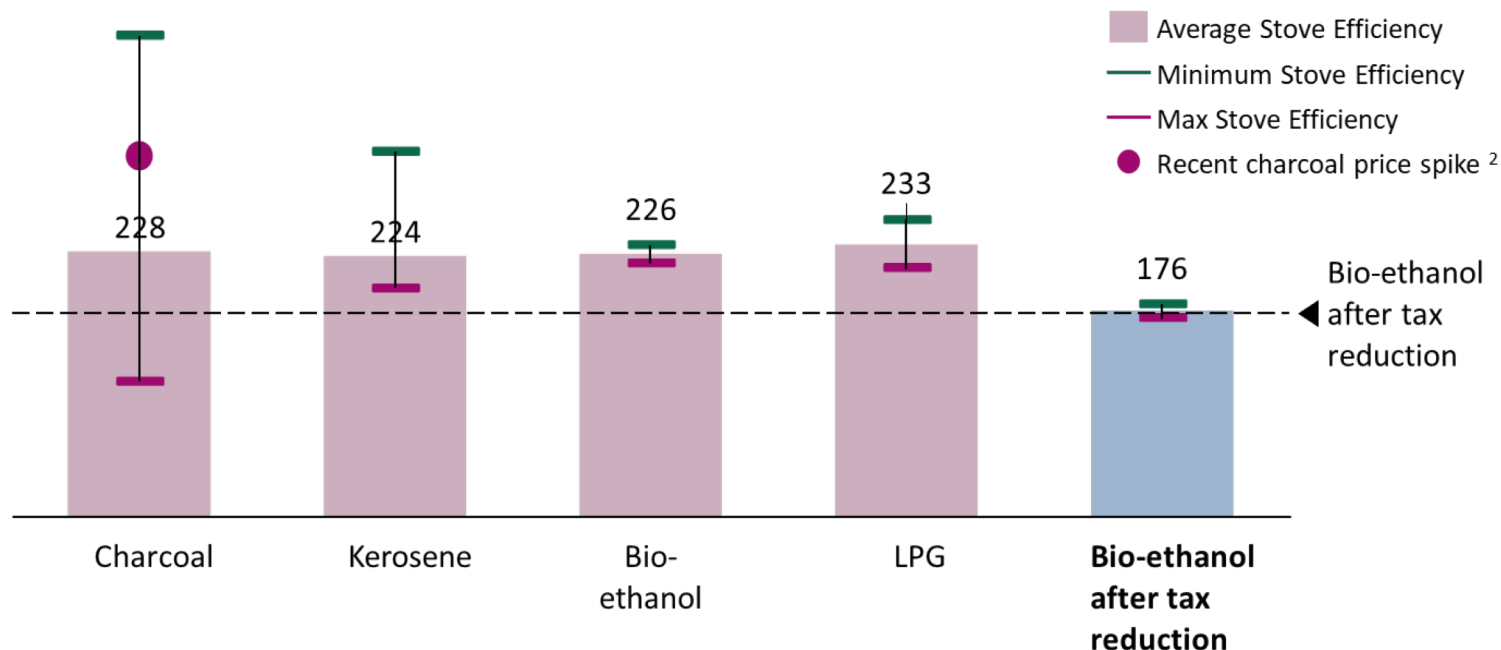
Duty and tax burden on imported denatured Bio-ethanol; subset of 21 SSA nations, reflecting duties + taxes, %



Granting industrial Bio-ethanol imports a VAT-zero rating and eliminating associated tariffs could reduce Bio-ethanol retail prices from \$0.85 /L to \$0.64/L

Granting Bio-ethanol VAT-Zero Rating and Eliminating Tariffs

Average annual fuel expenditure by fuel type to meet 3,500 MJ fuel diet of a typical Nairobi household¹, USD / year



Price

\$0.64/L

Benefits of a Full Transition from Kerosene/Charcoal to Bio-ethanol

3 GOOD HEALTH
AND WELL-BEING



~200,000 DALYs and 1,500 deaths averted^{3 4} over a three year intervention period

5 GENDER
EQUALITY



time savings from collection, cooking, and cleaning **will accrue to women**

7 AFFORDABLE AND
CLEAN ENERGY



USD 60mn in annual consumer savings⁴

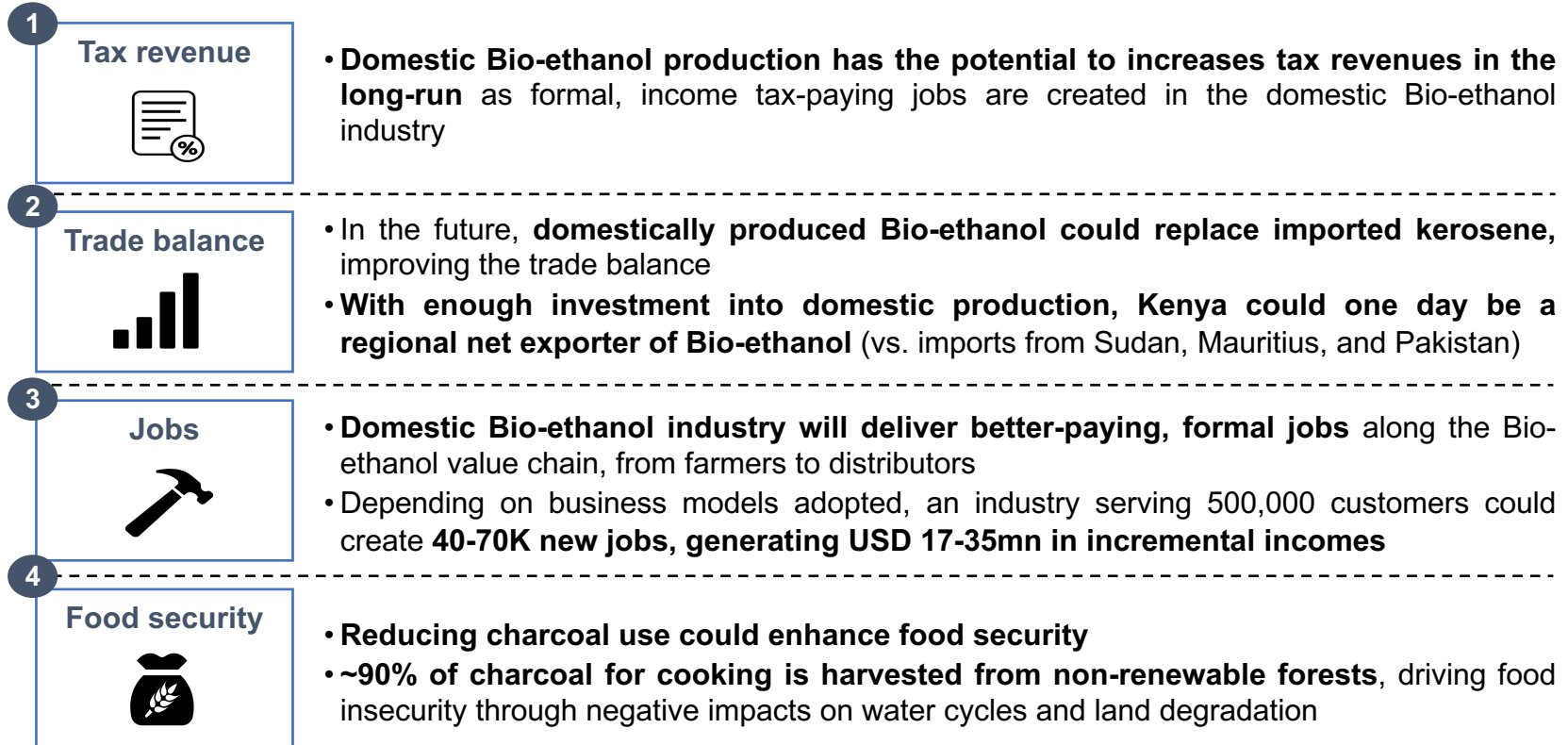
13 CLIMATE
ACTION



Reduction of 2mn tonnes of CO₂eq emissions¹

This represents 2-3% of Kenya's annual GHG emissions and **10% of Kenya's 2030 GHG reduction goal²**

Bio-ethanol presents potential opportunities for strengthening the Kenyan economy





POWERING VIETNAM'S CLEAN, SMART, AND SECURE ECONOMIC GROWTH

NGUỒN ĐIỆN CHO TĂNG TRƯỞNG
KINH TẾ SẠCH, AN TOÀN VÀ THÔNG MINH
TẠI VIỆT NAM



Vietnam



SOUTH
SOUTH
NORTH
TOWARDS CLIMATE RESILIENCE



Panel discussion with:

Bangladesh

Paribesh Bhaban: Director General, Department of Environment, Ministry of Environment Forest and Climate Change (MOEFCC)

Mr. Nurul Quadir, Additional Secretary: MOEFCC, Bangladesh

Mahmood Malik, Executive Director and CEO, Infrastructure Development Company Limited (IDCOL)

Ethiopia

Mensur Dessie Nuri: Director, Multilateral Environmental Agreements Negotiation Coordination Directorate, Environment, Forest and Climate Change Commission (EFCCC)

Kenya

Dr Charles Mutai, Climate Change Directorate, Ministry of Environment and Forestry

Thank you