

REPUBLIC OF KENYA



MINISTRY OF ENVIRONMENT AND FORESTRY

SOUTH
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NORTH

TOWARDS CLIMATE RESILIENCE

Scaling up clean cooking in urban Kenya with Bio-ethanol

Supported by:

Webinar April 2020

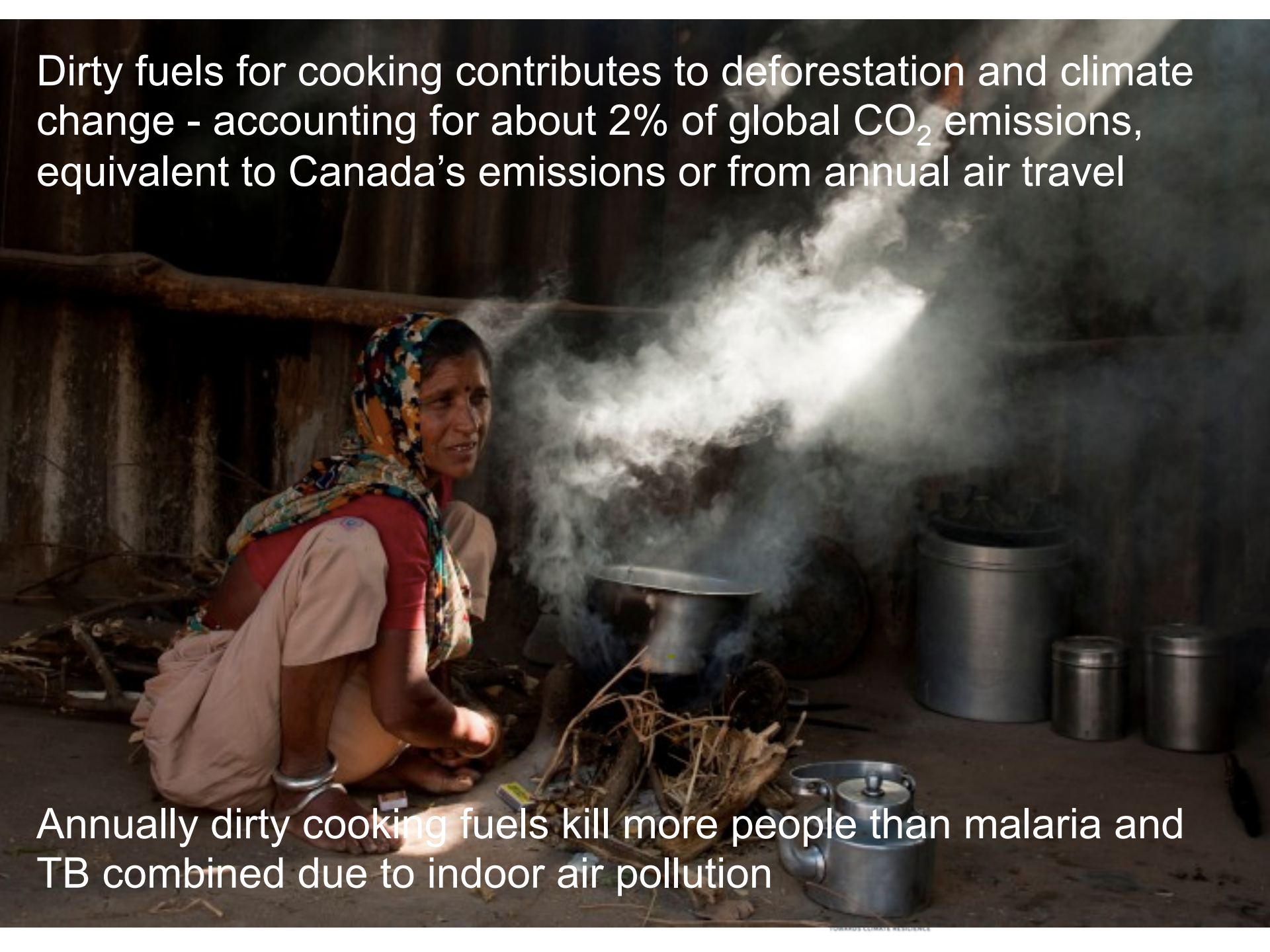


Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

based on a decision of the German Bundestag

Dirty fuels for cooking contributes to deforestation and climate change - accounting for about 2% of global CO₂ emissions, equivalent to Canada's emissions or from annual air travel

Annually dirty cooking fuels kill more people than malaria and TB combined due to indoor air pollution



“

Traditional biomass used for cooking and heating by 2.8 bn people accounts for more than half of all bioenergy used worldwide. Cooking with traditional biomass has multiple negative impacts on human health, particularly for women, children and youth....

...overharvesting of wood fuel, contributes to land degradation, losses in biodiversity and reduced ecosystem services.

....accounts for 1.9–2.3% of global GHG emissions, particularly in ‘hotspots’ in East Africa and South Asia.

Scenarios to significantly reduce reliance on traditional biomass in developing countries present multiple co-benefits.

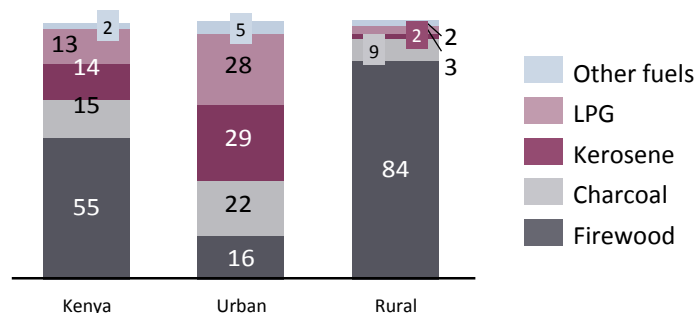
Most mitigation scenarios include substantial deployment of bioenergy..... all 1.5°C pathways include bioenergy, requiring as much as 7 Mkm² to be dedicated to the production of energy crops in 2050..... ”

IPCC - Special Report on Climate Change & Land, 2019

The urban Kenyan cooking fuel market is estimated at USD 600m – 800m per annum, & remains dominated by dirty fuels

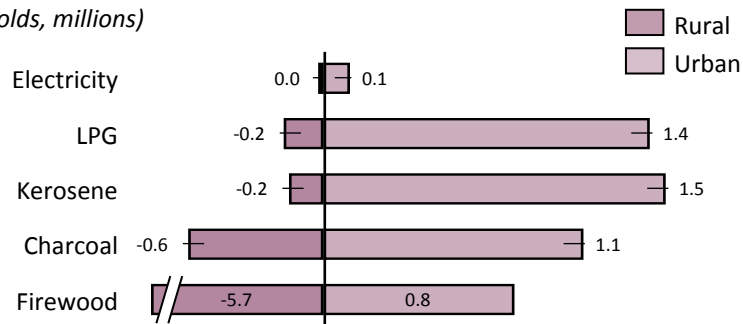
In urban Kenya, the majority still use charcoal and kerosene; this number is much higher when fuel 'stacking' is included

*Primary Cooking Fuel Used in Kenyan Households in 2017
(% of population)*



Kenyan urban households are now ready for rapid uptake of clean, modern fuels

*Primary Cooking Fuel Used in Kenyan Households in 2017
(households, millions)*



The majority of Kenyans currently paying for cooking fuels live in urban Kenya

- Most fuel used in rural areas is gathered not purchased (e.g., 84% of households use firewood as their primary fuel)
- In urban areas, over 80% of households are already purchasing cooking fuel and are prime targets for modern fuel use

Within modern fuel options, Bio-ethanol and LPG are the most feasible today; Bio-ethanol is the least understood

- LPG is well-understood, already promoted by the Gov, and enjoys strong consumer recognition
- Bio-ethanol is relatively unexplored and has achieved lower penetration thus far
- Electricity will become increasingly important to the overall cooking mix; however, for now, only higher income consumers can afford the expensive but efficient electric stoves

Continued dependence on dirty cooking fuels poses serious health, environmental, and food insecurity risks for 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

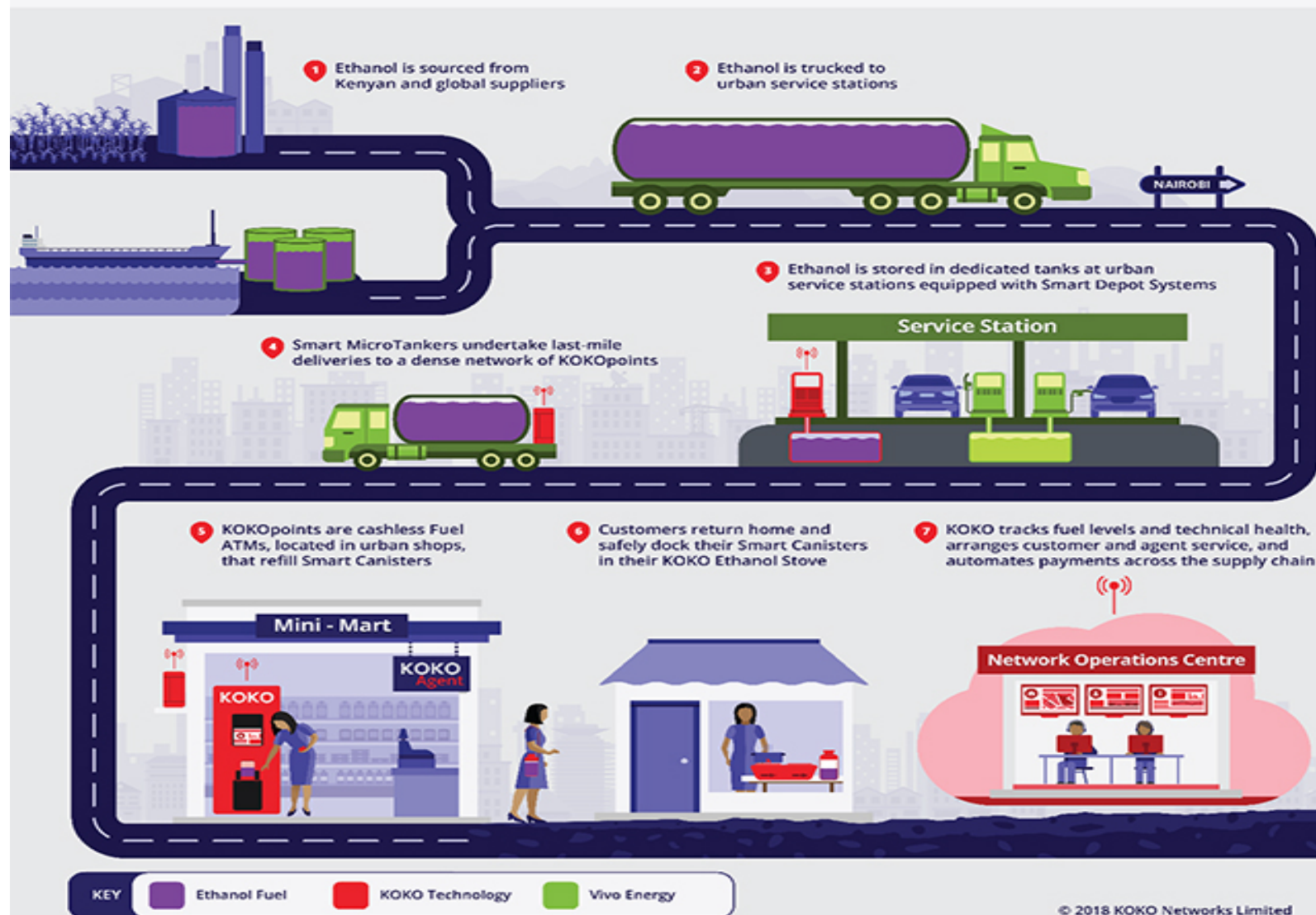
Most ethanol is produced from sugarcane. Cassava can also be used as a feedstock



KENYAN PARTNERSHIP OVERVIEW

KOKO
NETWORKS

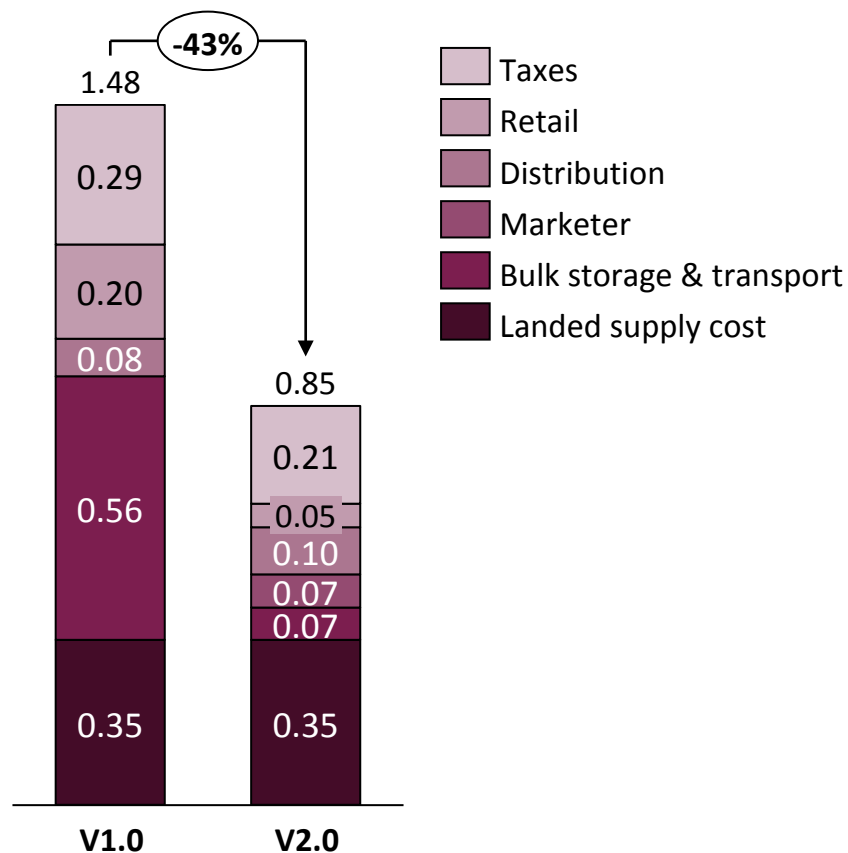
VIVO
ENERGY



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V2.0 innovations mean that Bio-ethanol can be delivered at scale to the customer at a price up to ~40% less than the V1.0 approach

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

The cost at which Bio-ethanol can be sold to customers is inflated by high import taxes and VAT, which drive ~25% of the retail price

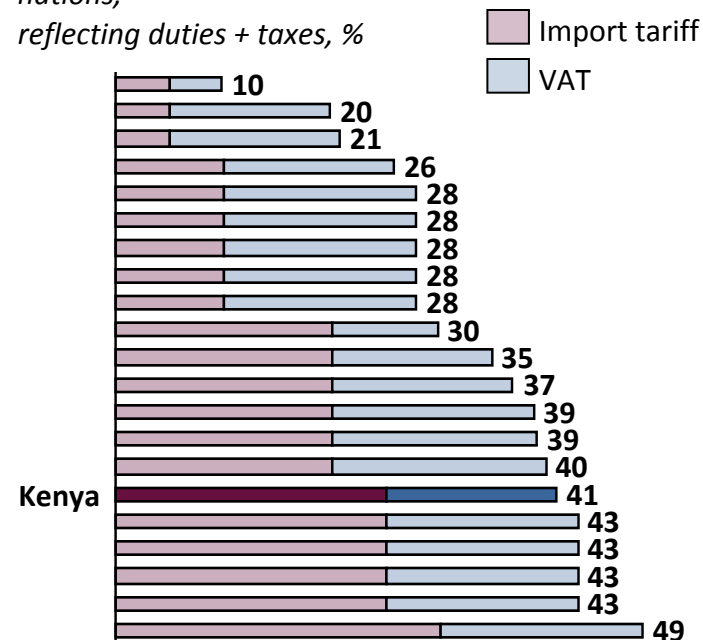
Taxes on Bio-ethanol are high relative to those on other fuels in Kenya

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

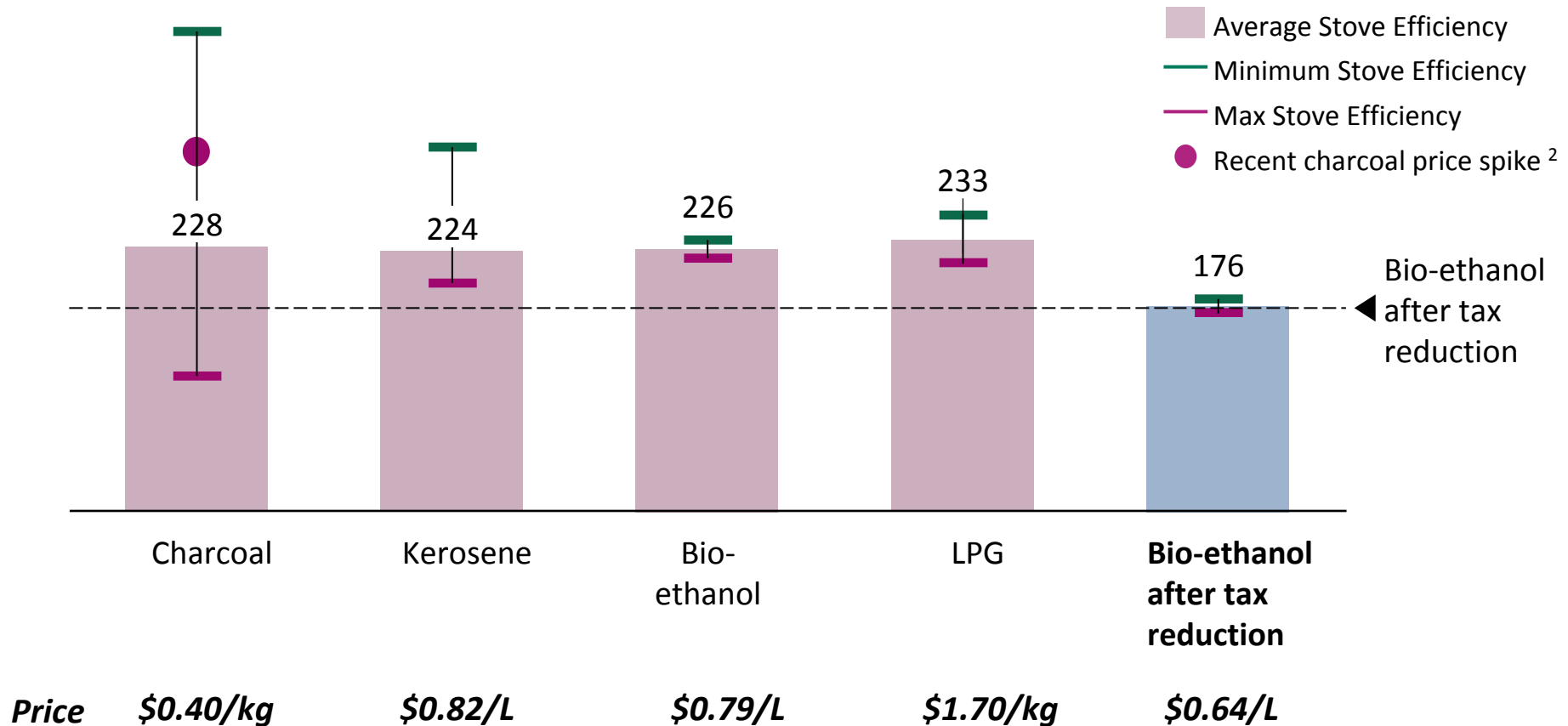
Duty and tax burden on imported denatured Bio-ethanol; subset of 21 SSA nations, reflecting duties + taxes, %



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 a VAT-zero rating and eliminating tariffs would make it the cheapest cooking fuel option for Kenyans

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



(1) Average fuel diet taken from survey data; average size of household in Nairobi assumed to be 3.2

(2) Recent price spike in charcoal price reach \$0.5/kg and continue to rise; this is due to a ban on illegal logging introduced by the government in addition to the expected upswing during the wet season

(3) Assumes V2.0 model and using imported Bio-ethanol

Source: Renetech 2017; TERI 2016; Kenya institute for Public Policy Research and Analysis 2010; KOKO Networks consumer research; Dalberg Analysis

A transition of all kerosene / charcoal users in Nairobi to Bio-ethanol could result in ~2mn tonnes GHGs, 200K DALYs, and 1,500 deaths averted p.a.

A full transition of kerosene and charcoal users to Bio-ethanol in Nairobi alone would help towards achieving the Sustainable Development Goals



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



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



USD 60mn in annual consumer savings⁴



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

Tax revenue



- **Domestic Bio-ethanol production has the potential to increase tax revenues in the long-run** as formal, income tax-paying jobs are created in the domestic Bio-ethanol industry

Trade balance



- In the future, **domestically produced Bio-ethanol could replace imported kerosene**, improving the trade balance
- **With enough investment into domestic production, Kenya could one day be a regional net exporter of Bio-ethanol** (vs. imports from Sudan, Mauritius, and Pakistan)

Jobs



- **Domestic Bio-ethanol industry will deliver better-paying, formal jobs** along the Bio-ethanol value chain, from farmers to distributors
- Depending on business models adopted, an industry serving 500,000 customers could create **40-70K new jobs, generating USD 17-35mn in incremental incomes**

Food security

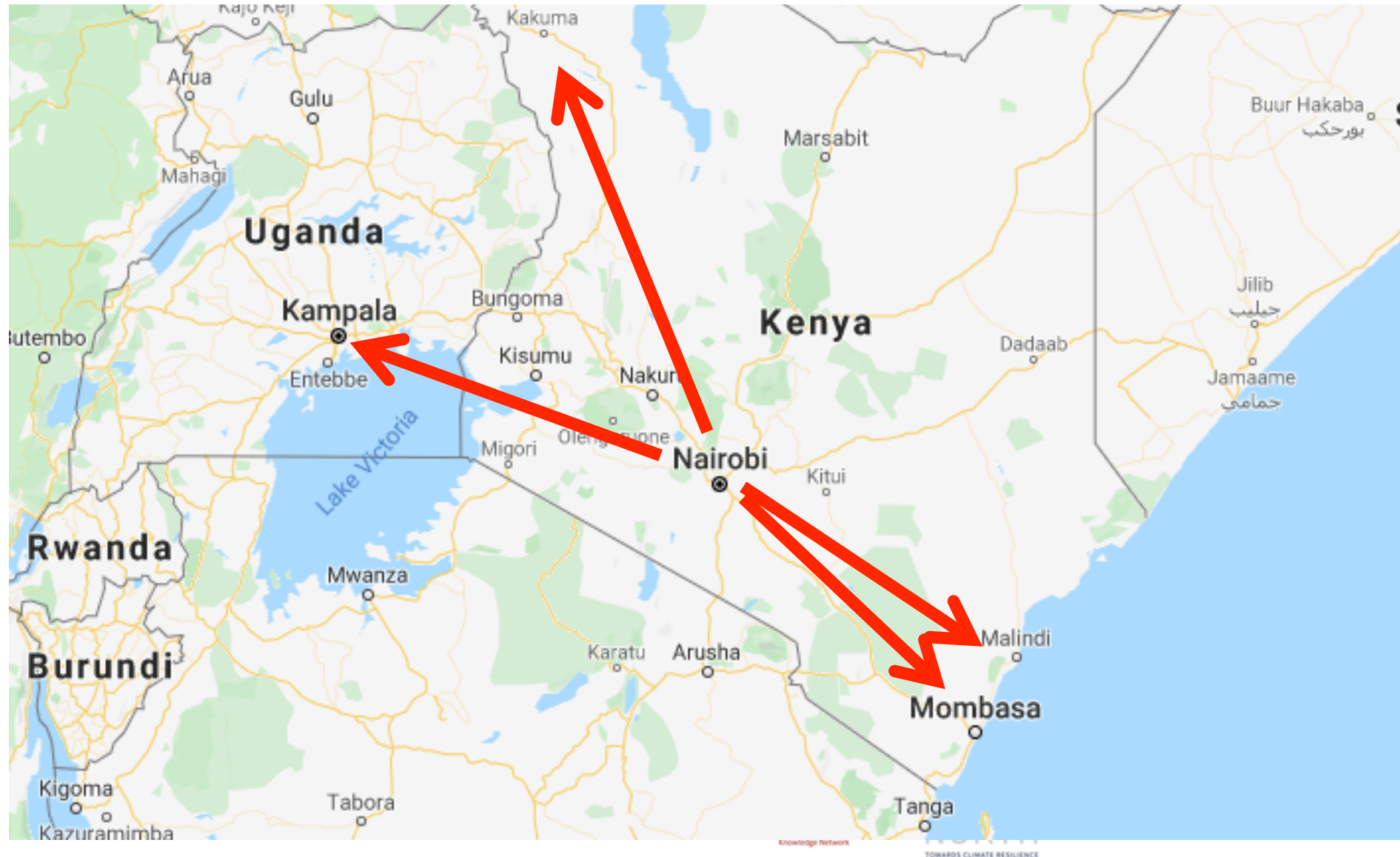


- **Reducing charcoal use could enhance food security**
- **~90% of charcoal for cooking is harvested from non-renewable forests**, driving food insecurity through negative impacts on water cycles and land degradation

Next steps

Expanding beyond Nairobi for urban clean cooking

Project pipeline for domestic production of bioethanol



Ethanol Cooking Fuel (ECF) Masterplan



Why a Masterplan?

Commissioned to provide a **roadmap** for the establishment of an ECF industry in Kenya

Objective to:

- Signal to investors in order to build confidence
- Provides an evidence base to guide the development of ECF infrastructure and distribution systems.
- Recommend policies on how the Government of Kenya and other stakeholders can support the industry.
- Provides scope on the macro-economic benefits, jobs and foreign investment
- Potential to deliver on the objectives of key national strategies if planned and implemented responsibly

Kenya's Big Four Agenda (food security, affordable housing, manufacturing, affordable healthcare for all)

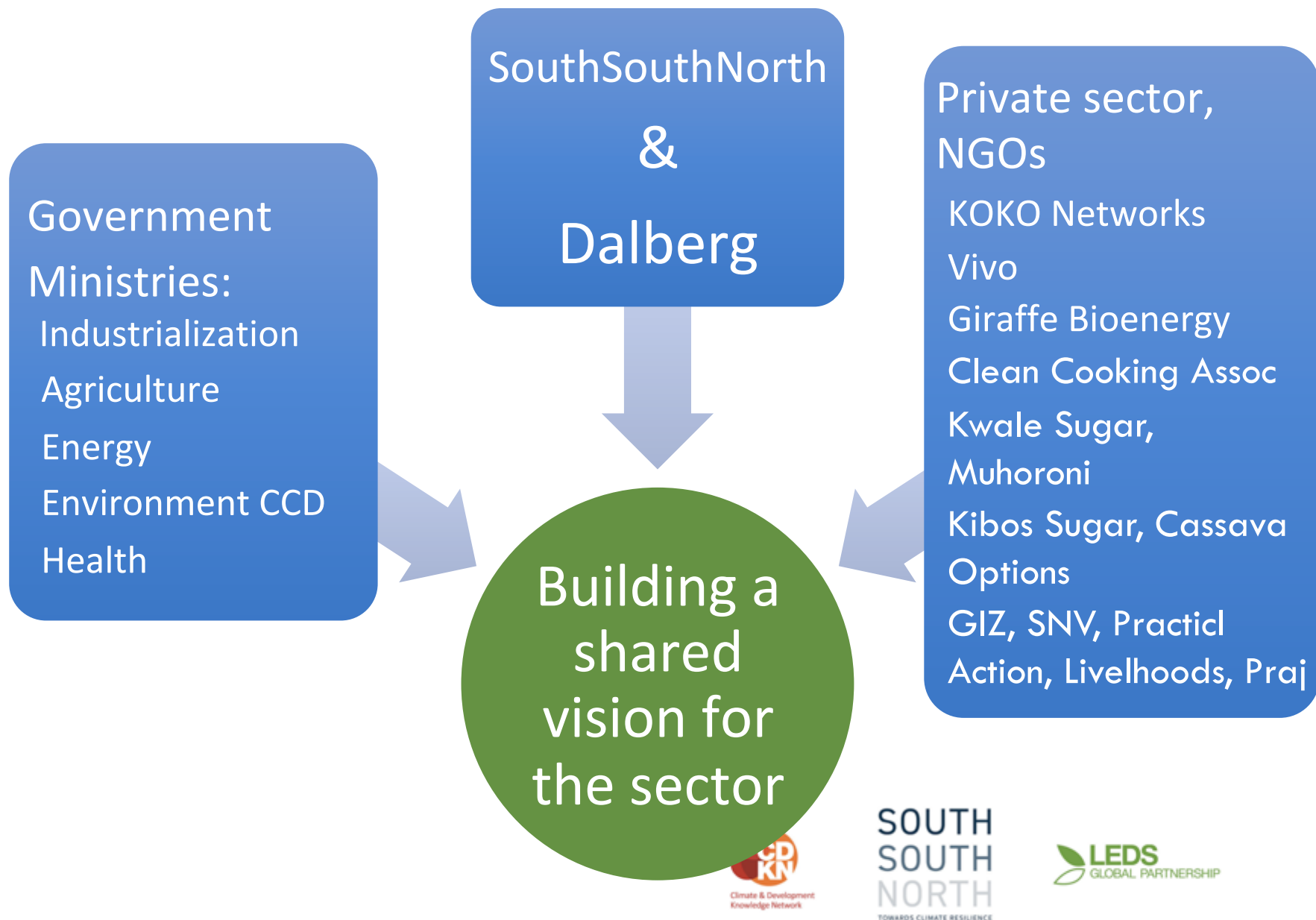
Vision 2030 - aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030

Nationally Determined Contribution

National Climate Change Action Plan 2018-2022 (NCCAP)

Global Sustainable Development Goals.

We convened two working groups



Key recommendations – demand & supply

To boost demand:

- Partnerships with private sector and donor community for stove financing
- Awareness raising and discouraging use of dirty cooking fuels
- Tax and fiscal incentives across the value chain
- VAT, Import Duty, Tax Rebates, Low-interest loans

To support local production of ECF:

- Creating supportive smallholder farmer ecosystems
- Expanding feedstock growing zones
- Unlocking climate finance to develop ECF ecosystem

NEXT STEPS



Official Government
adoption of the Plan.



Conduct feasibility
studies on setting up
ethanol plants



Create a working
group to identify and
resolve supply chain
challenges

Using social media to build awareness



<https://www.youtube.com/watch?v=05adyqTUSd8>

Thank you

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