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A paradigm shift in meeting
basic energy needs





The Global Energy Situation



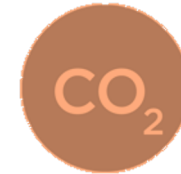
Three Billion People Rely On Wood, Charcoal Or Animal Waste For Cooking



Indoor Air Pollution Kills **4.3 Million** People Every Year– Mostly Women & Children



One In Five People Still Lack Access To Modern Electricity



Energy Produced From Fossil Fuels Contributes To **60% Of Greenhouse Gas**



SDG7: Ensure Access To Affordable, Reliable, Sustainable And Modern Energy For All

Target 7.1

By 2030, ensure universal access to affordable, reliable and modern energy services

- Access to electricity
- **Access to clean fuels and combustion technology**

Target 7.2

By 2030, increase substantially the **share of renewable energy** in the global energy mix

Target 7.3

By 2030, double the global rate of improvement in **energy efficiency**



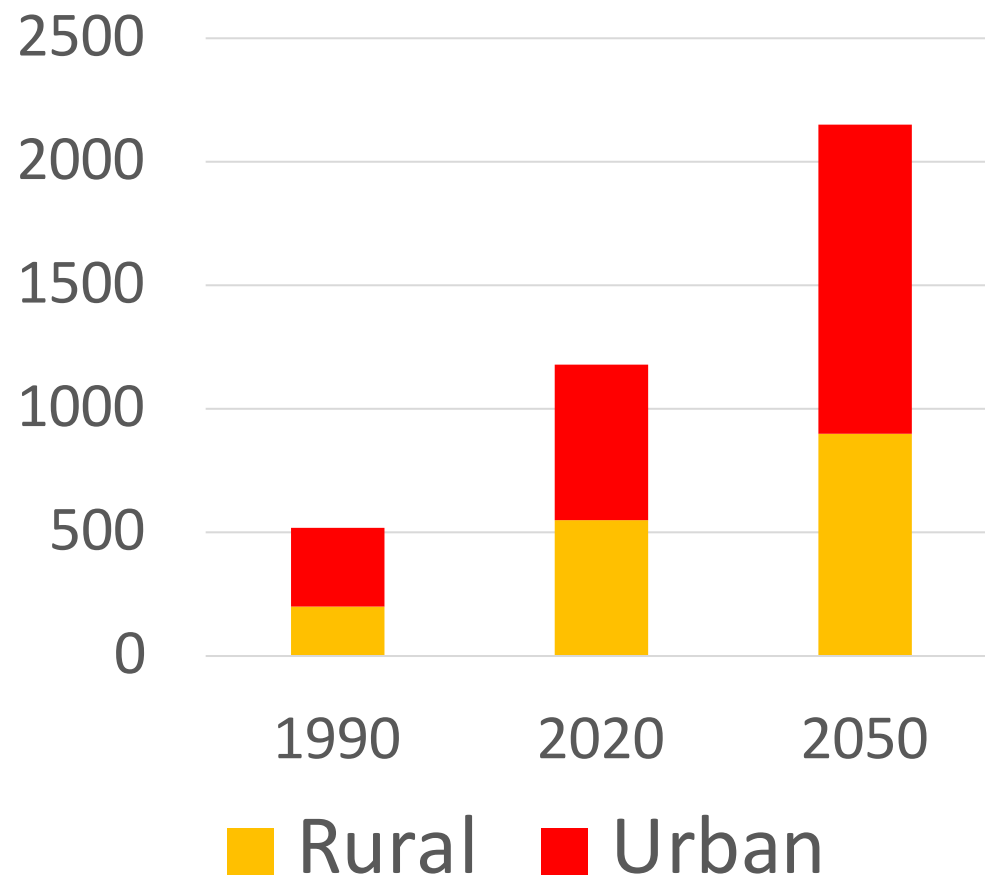
Seven Myths About Biomass/Wood Fuel In Africa

1. The fuel cannot be burned clean and efficiently
2. The fuel cannot be produced sustainably
3. The fuel will soon be replaced by other sources of energy
4. The sector contributes little to local economies
5. The sector is male dominated
6. Its use contributes greatly to climate change
7. The issue is domestic / country specific



55%
Of People
In African
Cities live in
Informal
Housing
and use
mostly
charcoal

African Urban Population Will Double By 2050



63% of the Population use
Wood, Charcoal Or Animal
Waste For Cooking



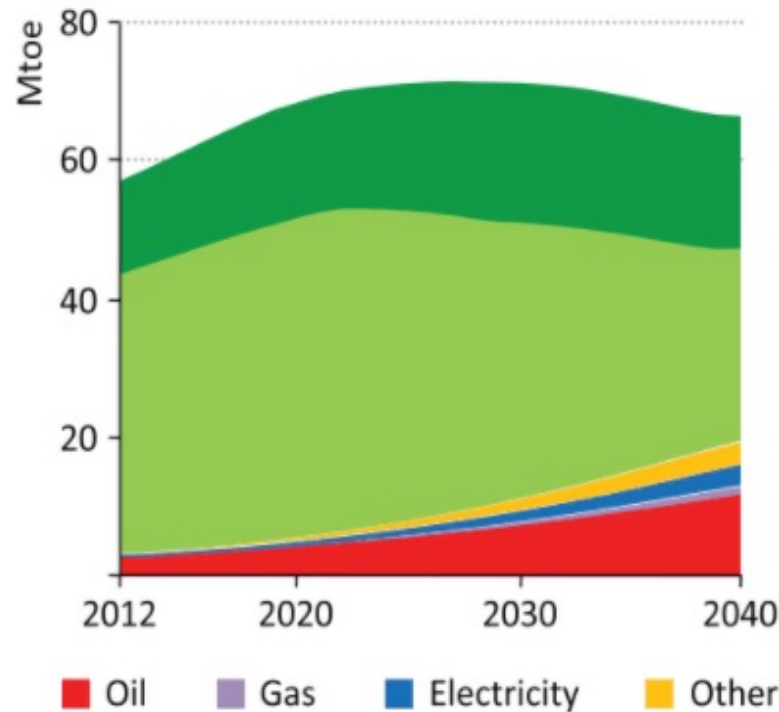
2 in 5 People do not have
Access To Modern Electricity



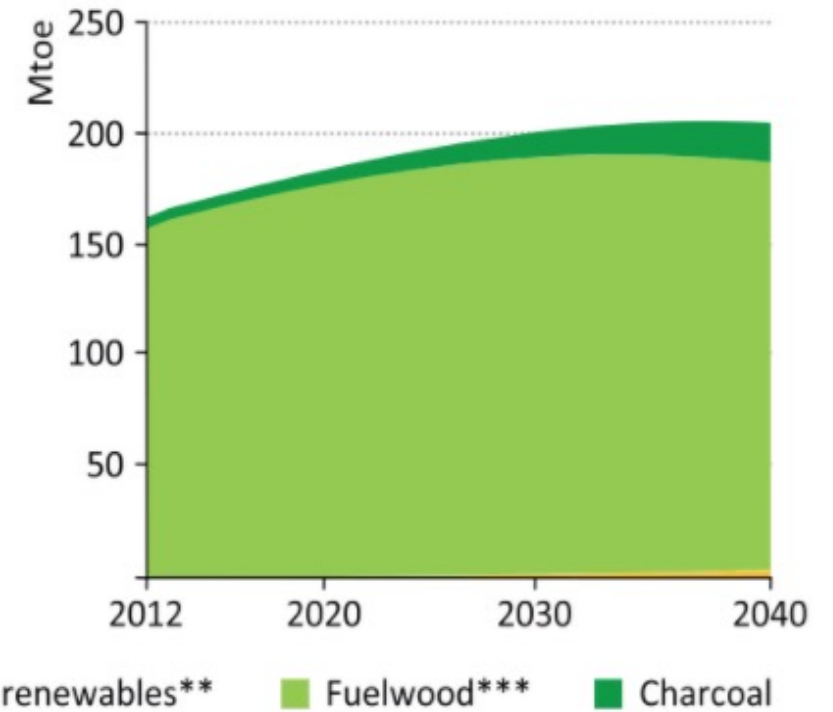
Charcoal production in SSA in 2012 was estimated at >36 million tonnes! Estimated market value of \$11 billion

Projected Cooking Fuel Consumption in SSA

URBAN



RURAL



*IEA -Outlook for African energy to 2040



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We focus on Energy Solutions for
Urban Off-Grid Informal Settlements

We provide Hybrid Energy Appliances
that cater for Electricity and Clean Cooking

We support the digitization of
PAYG Finance and Carbon Tracking



We support the Multi-Tier Framework For Modern Energy Access In Support of SDG7



MTF



MULTI-TIER
FRAMEWORK





Multi-tier Framework For Cooking Access

Graded in Tiers 0-5



Sustainable Fuel

4 Attributes/Factors



Advanced Stove

4 Attributes/Factors





Exposure
Risk

Harmful
Emissions

CO PM_{2.5}

What do modern & clean fuels and combustion technology mean by definition in the MTF?

Do households have access to clean fuels as their ***primary source for cooking*** and are they considered ***safe at point of use?***

The following energies / fuels are considered clean

- *solar,*
- *electric,*
- *biogas,*
- *liquefied petroleum gas*
- *alcohol fuels, including ethanol*

For other **fuel–technology combinations**, including biomass, the **cooking system is classified as clean** if it meets the WHO ERT guidelines.

- CO: grams / MJ Energy Delivered
- PM2.5: milligrams / MJ Energy Delivered
- Measured at High. Medium & Low
- Vented vs Non-Vented Environments



Combustion
Efficiency

Safety

Durability

What else about the combustion technology or heating device defines it as modern?

Is the device at least 40% energy efficient (tier 4) when transferring generated heat to the water?

Ten characteristics that include

- *tipping angle, surface temperature, containment of fuel, containment of flames and sharp angles.*

Seven characteristics that include

- *impact resistance, damage after extended use, corrosion and coating adhesion*



All these aspects are encapsulated in the VPT (Voluntary Performance Targets) by ISO / WHO

Highlighted Tiers are considered Clean & Modern

Performance	Tier	Thermal efficiency (%)	Emissions factor (default)		Safety (score)	Durability (score)
			CO (g/MJ delivered)	PM _{2.5} (mg/MJ delivered)		
Better performance ↑	5	≥ 50	≤ 3.0	≤ 5	≥ 95	< 10
	4	≥ 40	≤ 4.4	≤ 62	≥ 86	< 15
	3	≥ 30	≤ 7.2	≤ 218	≥ 77	< 20
	2	≥ 20	≤ 11.5	≤ 481	≥ 68	< 25
	1	≥ 10	≤ 18.3	≤ 1030	≥ 60	< 35
	0	< 10	> 18.3	> 1030	< 60	> 35



How do the stoves stack up? ILLUSTRATION...

	WOOD TSF	CHARCOAL JIKO	LPG GAS BURNER	ETHANOL BURNER	PELLETS GASIFIER
Exposure	1	3	5	5	5
Efficiency	1	3	5	5	4
Safety	1	2	4	4	4
Durability	1	1	5	5	5



What factors does the Multi-Tier Framework use for evaluating Cooking Fuels?

Availability

Is the cooking fuel available when the household needs it?

Convenience

How long does it take to get and prepare fuel for cooking?

Affordability

Can the household pay for the cooking fuel?

Climate

How does the use of the fuel affect the global warming / climate?



How do the fuels stack up? ILLUSTRATION...

	WOOD	CHARCOAL	LPG	ETHANOL	PELLETS
Availability	4	4	2	2	4
Convenience	1	4	5	5	4
Affordability	5	3	1	2	4
Climate	4	1	0	3	4



Multi-tier Framework For Cooking Access

Graded in Tiers 0-5



Sustainable Fuel

4 Attributes/Factors



Advanced Stove

4 Attributes/Factors



WE AIM TO OFFER SOLUTIONS THAT MEET TIER 4 IN ALL LEVELS



Our Cooking Access Solution



Biomass Pellets

- Made from Waste & Renewable Sources
- Safe to handle & Easy to light
- More affordable than LPG or Electricity
- Produced & distributed locally



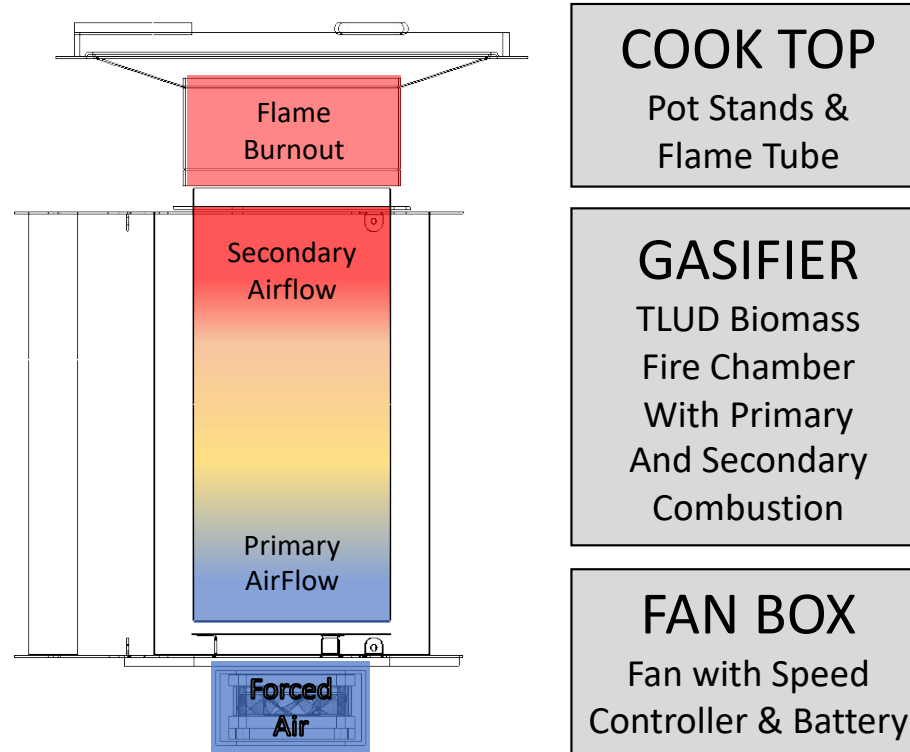
Forced Air Gasifier

- Over 40% Combustion Efficiency
- Very Low Emissions
- Sturdy Safe Cook Frame
- All steel design with SS Fire Chamber



A Forced Air Gasifier Cook Engine

- TLUD Gasifier Principles
- Fan Assisted Air Flow
- IoT / PAYG Upgradable
- Optimised for Biomass Pellets
- 40% Combustion Efficiency
- Low CO emissions
- Replaceable Fire Chamber



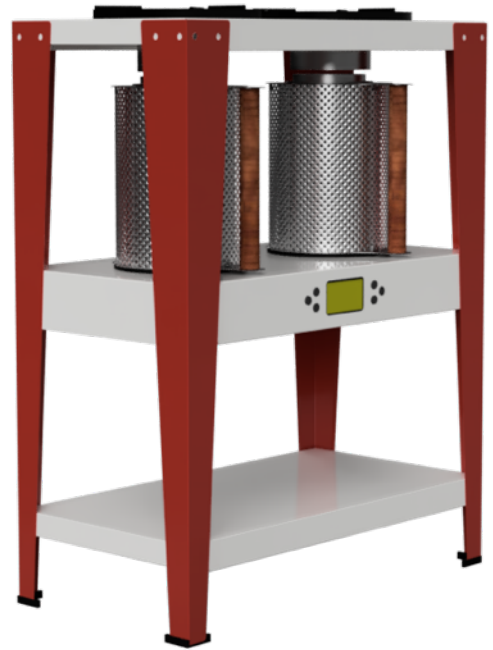
*Simple Fan Speed Control
Or Advanced IoT Controller*





Energy Appliance Kit Makeup

- Modular Design
- Energy Kit Approach
- Local Assembly
- Easier Field Maintenance
- Customisable Solar Options
- PAYG Capability
- Carbon Tracking



Completed Appliance

=



Flat Pack Frame Kits

+



FabStove Kits

+

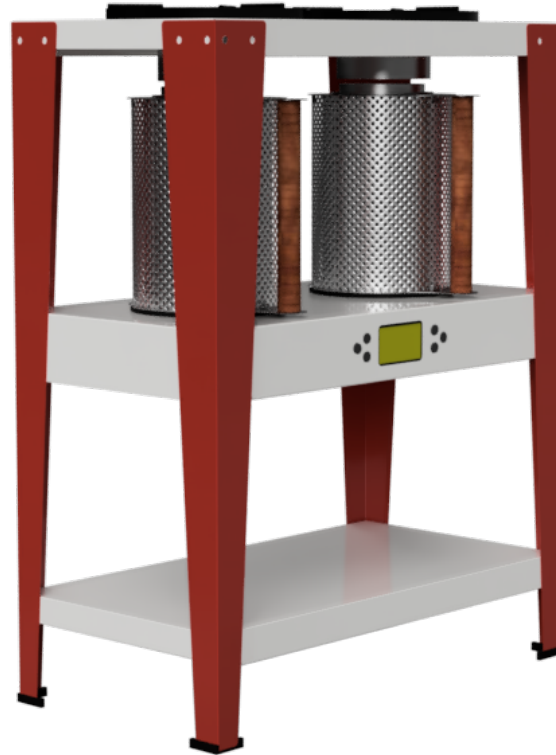


PowerBase Kits



PowerQueen Home Energy Appliance

**ADVANCED
LEVEL
HOME
APPLIANCE**



SOLAR HOME SYSTEM FEATURES

1. 50Wp of Solar (Upgradable to 200 Wp)
2. 200Wh Li-Ion Battery (Upgradable to 500Wh)
3. Multi-Light & Small Appliance Capable
4. AC Inverter Upgradable
5. PAYG & IoT Capable
6. Mobile App

CLEAN COOKING SYSTEM FEATURES

1. Double Stove at Counter Height
2. 40% Combustion Efficiency
3. Heat control through Fan Speed
4. Low Emissions of CO & PM2.5
5. Renewable Biomass Pellet Fuel
6. Removable Gasifier / Fire Chamber
7. IoT Carbon Tracking



FabStove Home Energy Appliance

**ENTRY
LEVEL
HOME
APPLIANCE**



SOLAR HOME SYSTEM FEATURES

1. 10Wp of Solar (Upgradable to 50 Wp)
2. 20Wh Li-Ion Battery (Upgradable to 100Wh)
3. Multi-Light & Phone Charging Capable
4. PAYG & IoT Capable

CLEAN COOKING SYSTEM FEATURES

1. Sturdy All Steel Frame
2. 40% Combustion Efficiency
3. Heat control through Fan Speed
4. Low Emissions of CO & PM2.5
5. Renewable Biomass Pellet Fuel
6. Removable Gasifier / Fire Chamber
7. IoT Carbon Tracking



Seven Myths About Biomass/Wood Fuel In Africa

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Re-engineering the biomass sector will not be easy, but it is possible and will certainly be more attainable and sustainable given the realities in Africa!



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Supports Local Sustainable
Biomass Fuel Production

Provide Hybrid Energy Appliances
that cater for Electricity and Clean Cooking

Provide digital solutions for
PAYG Finance and Carbon Tracking