

**ETHIOPIAN
STATISTICS
SERVICE**

Biofuel Production data (good and Best practice)

Venue: Sarkawa Hotel

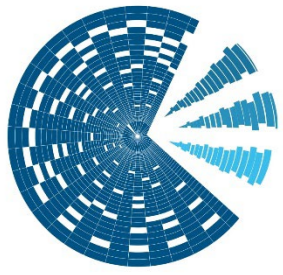
Lome, Togo

25 April 2023

Presenter

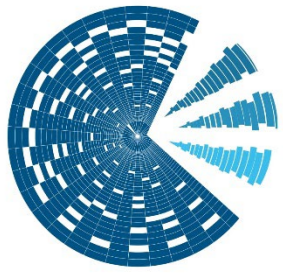
Zealelem Hailegiorgis Haile

Ethiopia Statistics Service (ESS)



Content

- Overview of the country
- Concepts and definition
- Energy and Biofuel statistics framework
- Method of Data Collection
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- Scenario Ethiopia Energy statistics

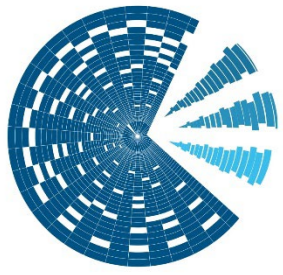


Overview of the Country

Ethiopia is

- considered one of the largest and most densely populated countries in Africa.
- Located in the Horn of Africa, it is a rugged country split by the Great Rift Valley (Ethiopian History 2011).
- around 108 million based on population projection by ESS.
- Around 20.6 per cent of the population is urban (22,180,245 people in 2021).
- population is around 49.8 per cent male and 50.2 per cent female, and the median age is 18.8 years
- Ethiopian land area is 1 million square kilometers (km²), and the population density is 108 persons per km² (279 persons per square mile).

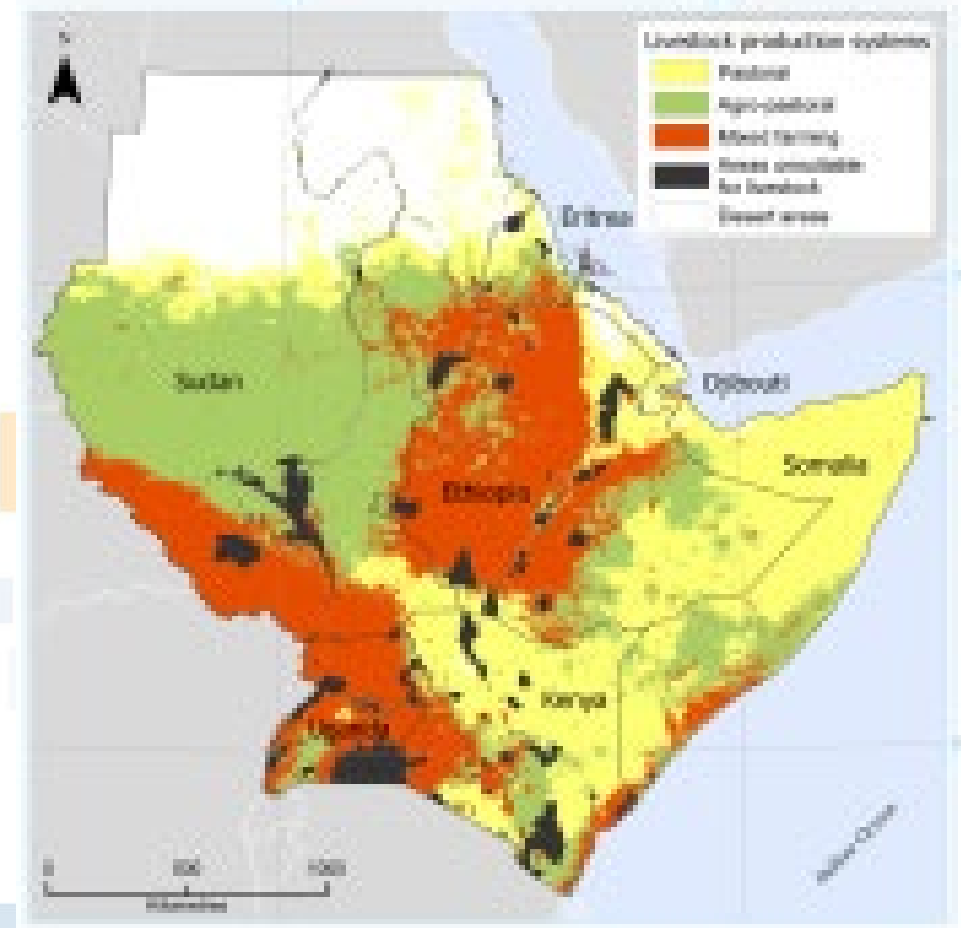


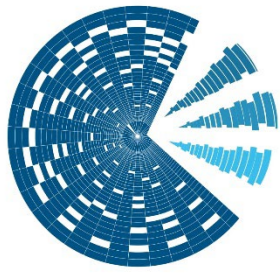


Overview of the Country

Agriculture and livestock

- accounts for around 40.0 per cent of GDP
- around 80.0 per cent of total exports
- 80 per cent of total employment in the country (LFS2021)
- around 51.3 million hectares of arable land only around 20 per cent is currently cultivated
- production of coffee and accounts for over 3 per cent of the global coffee market.
- livestock population is considered the largest in Africa and the tenth largest in the world according FAO
- with 65 million cattle, 40 million sheep, 51 million goats, 8 million camels and 49 million chickens in 2020 (Central Statistics Agency, ESS, 2020a)





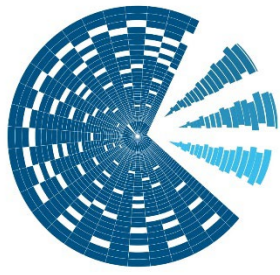
Overview of the Country

The energy situation

Resources and supply

- Ethiopia is endowed with renewable and sustainable energy sources
- potential for hydropower is around 45 gigawatts (GW),
- for wind is 10 GW and for geothermal is 5 GW, and
- solar irradiation ranges from 4.5 kilowatt-hours (kWh)/m²/day to 7.5 kWh/m²/day (Mondal *et al.* 2018).
- annual production of electricity is around 11,000 gigawatt-hours mainly generated from hydropower (93 per cent) followed by wind energy (7 per cent), and around 1.6 per cent of this production is exported

Sources of energy	Energy production capacity [kWh]	Energy production capacity (%)	Energy production capacity per capita [kWh/capita]
Hydropower electricity	20.97 x 10 ⁹	86%	199.83
Renewable energy (biomass, solar, wind energy)	2.7 x 10 ⁹	11%	25.56
Fossil fuels	0.7 x 10 ⁹	3%	6.97
Total	24.39 x 10⁹	100%	232.36



Overview of the Country

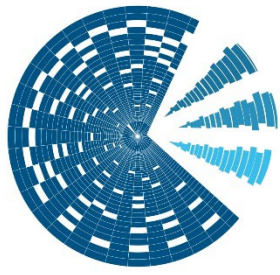
The energy situation

- **Energy indicators**

- The key indicators describing the energy situation of Ethiopia in 2016 are provided in Table

- Source: IEA World Energy Balances 2018. Available at: <https://www.iea.org/statistics/?country=ETHIOPIA&year=2016&category=Renewables&indicator=RenewGenBySource&mode=table&data>

Parameter	Value	Unit	Parameter	Value	Unit
Population	102	Millions	TPES/population	0.50	toe/capita
GDP	52	Billion 2010 \$	TPES/GDP	0.98	toe/thousand 2010 \$
GDP PPP	161	Billion 2010 \$	TPES/GDP PPP	0.32	toe/thousand 2010 \$
Energy production	48	Mtoe	Electricity consumption / population	0.09	MWh/capita
Net imports	4	Mtoe	CO2/TPES	0.21	t CO2/toe
TPES	52	Mtoe	CO2/population	0.11	t CO2/capita
Electricity consumption	9	TWh	CO2/GDP	0.21	kg CO2/2010 \$
CO2 emissions	11	Mt CO2	CO2/GDP PPP	0.07	kg CO2/2010 \$

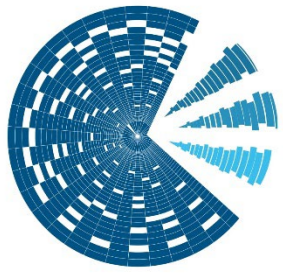


Concepts and definition

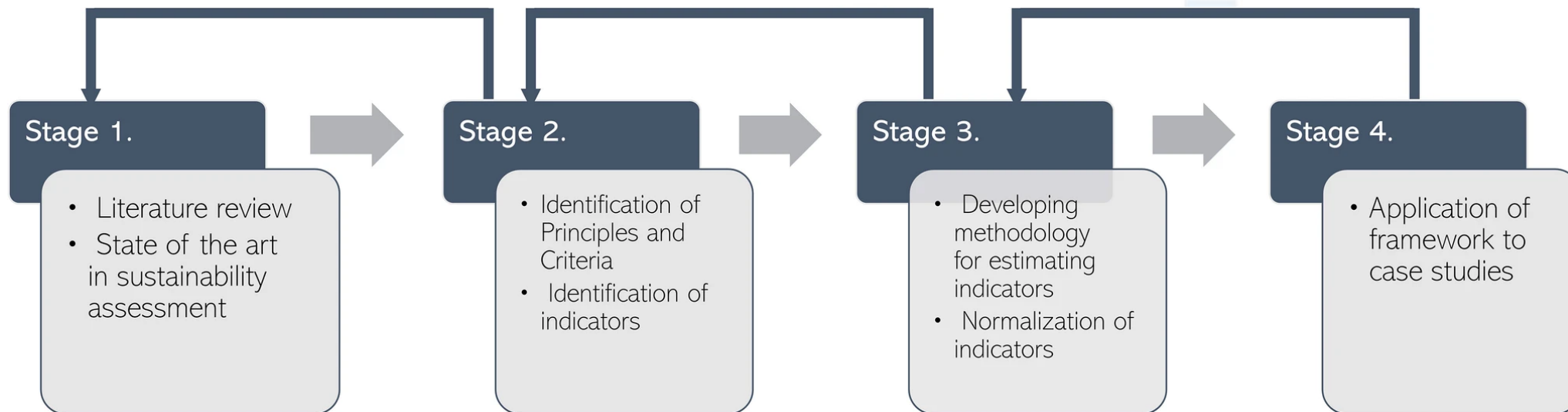
- **Biofuels** are fuels derived directly or indirectly from biomass.
- **Solid biofuels** covers solid organic, non-fossil material of biological origin (also known as biomass) which may be used as fuel for heat production or electricity generation.
- In energy statistics, solid biofuels is a product aggregate equal to the sum of charcoal, fuelwood, wood residues and by-products, black liquor, bagasse, animal waste, other vegetal materials and residuals and renewable fraction of industrial waste.

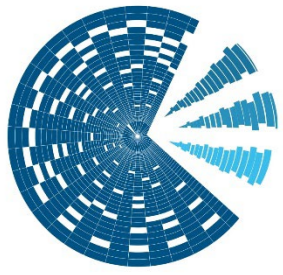
Biogas is a gas composed principally of methane and carbon dioxide produced by anaerobic digestion of biomass or by thermal processes from biomass, including biomass in waste. In energy statistics, biogas is a product aggregate equal to the sum of landfill gas, sewage sludge gas, other biogases from anaerobic digestion and biogases from thermal processes.

Liquid biofuels includes all liquid fuels of natural origin (e.g. produced from biomass and/or the biodegradable fraction of waste), suitable to be blended with or replace liquid fuels from fossil origin. In energy statistics, liquid biofuels is a product aggregate equal to the sum of biogasoline, biodiesels, bio jet kerosene and other liquid biofuels.



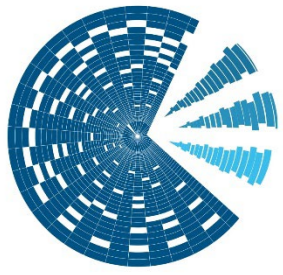
Energy and Biofuel statistics framework





Method of Data Collection

- Statistical Business Register used for list frame
 - Enterprises Surveys
- Enumeration Area is used as Sample frame
 - Household (household Consumption and Expenditure Survey)
 - Sample HH carry out every five years covers 56thousand HH
- Face to Face but Using TABLATES & CPro android enabled
- Administrative data sources mainly used for the supply of energy.



Data sources

- **Electricity and Heat Producers**
- **Statistics collected by**
 - type of producer
 - type of generating plant

Main (activity) producers:

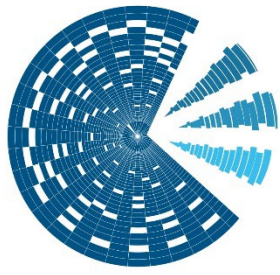
- Produce electricity and/or heat for sale as their main business: all production is recorded as electricity and heat production (Power house Ethiopia)

Autoproducers:

- Electricity and/or heat production not their main business and some production may be consumed internally: electricity production is recorded, but only heat sold to others is recorded as heat production E.g. sugar factories

Electricity Plants:

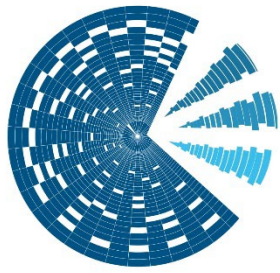
- Produce only electricity either directly from natural sources (hydro (7), geothermal, wind(3) etc.) or from combustion of fuels.



Data sources...

Energy Consumers

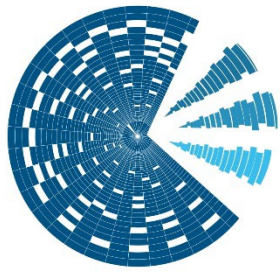
- Based on industrial classification (ISIC):
 - Energy sector (not in final consumption) Enterprises survey
 - Industry (manufacturing mining, construction)
 - Commerce and public services, Enterprises survey
 - Other (agriculture, forestry fishing) Household survey Agriculture survey
 - Residential (cooking, heating) Household survey HCE, welfare monitoring



Questionnaire

SECTION 5.2 SOURCE OF ELECTRICAL POWER & TYPE OF OVEN

5201	5202	5203	5204	5205	5206	5207
HOW IS THE PRIMARY RESPONSE FOR THIS SECTION?	What is the main source of light for the household?	IF Q5202 IS CODE 11,12,13 & 21 During the past 7 days, how many outages/blackouts of the main source specified in Q5202 happen?	IF Q5203 > 00 During the past 7 days, how many hours long was a typical outage/blackout of the main source specified in Q5202?	On average, how many hours of electricity were available each day during the last 7 days (max 24 hours)	On average, how many hours of electricity were available each evening between 6pm and 11pm during the last 7 days (max 4 hours)	In the last 12 months, did any of your appliances get damaged because of issues in the electricity system?
RECORD ID NUMBER OF THE RESPONDENT	11= Electricity meter-private 12= Electricity meter-shared 13= Electricity from generator 21= Solar energy 22 Bio -gas 31= Light from Dry cell with switch 32 lantern 41= kerosene light lamp (In portable) 42 Local kerosene lamp (In portable) 51= Candle/wax 61= Fire wood 71= Other Q5208	RECORD THE TOTAL NUMBER OF INTERRUPTIONS IN THE PAST 7 DAYS IF NO INTERRUPTION RECORD.....00. Q5205 IF NO ELECTRICITY AVAILABLE AT ALL IN PAST 7 DAYS, RECORD.....99. Q5207				1= Yes 2= No



5208	5209	5210	##	##	5213	5214
What type of kitchen does the household use?	code "2-5" for Q52	What type of cookstove is your primary cookstove (excluding mitad)?	Where does your household normally cook with the cookstove?	Do you usually use chimney, hood or other exhaust system while using this stove?	ASK ONLY IF Q5210 = 1, 2, 3, 4, or 7 In the last 12 months what is primary fuel you commonly used for this cookstove?	What is the primary type of oven (Mitad) used for baking injera/bread?
1= No kitchen	Does the household share this kitchen with other household?	1 = Does not cook → Q5301	1= In dwelling, not in a sleeping area	1= Yes	01 = Collected firewood	1 = Iron «mitad»
2= A room used for traditional kitchen inside the housing unit	1 = Yes 2 = No	2 = 3-Stone/Open fire stove	2= In dwelling, in a sleeping area	2= No	02 = Purchased firewood	2 = Traditional «mitad» (oven) removable
3= A room used for traditional kitchen outside the housing unit		3 = Self built permanently usable stove /Charcoal used/	3= In a separate dwelling		03 = Charcoal	3 = Traditional «mitad» not removable)
4= A room used for modern kitchen inside the housing unit		4 = Traditional/common stove /Charcoal used/	4= In a veranda (roofed platform with at least two open sides)		04 = Crop residue/leaves	4 = Improved energy saving «mitad» (rural technology products)
5= A room used for modern kitchen outside the housing unit		5 = Improved energy saving stove	5= Outdoors		05 = Dung/manure	5 = No «mitad»
		6 = Self built biomass (charcoal, wood, crop residue, etc.)	6= Other, specify		06 = Saw dust	
		7= Manufactured biomass (charcoal, wood, crop residue etc.)			07 = Kerosene	
		8 = LPG/Natural gas stove			08 = Butane gas	
		9 = Kerosene stove			09 = Electricity (from grid or generator)	
		10 = Electric stove			10 = Solar energy	
		11 = Other (specify)			11 = Bio-gas	
					12 = Other, specify	

Indicators in Energy producer or consumer

- number of establishments,
- persons engaged, number of employees
- Sex, nationality and occupation,
- initial and current paid up capital,
- gross value of production, services
- industrial and non-industrial costs,
- operating surplus,
- value added, per-capita
- value of fixed assets,
- investment,
- quantity raw materials
- Policy problems during operations.



By

Industrial
Classification

By Industrial Park

Type of Ownership

Ownership Gender

Employment Type

Region ----- Urban

Source of Investment

Capacity Utilizations

Residential Energy consumer

- Estimated number of Household,
- Estimated value for the sources of energy
- Access of the biomass sources of energy
- Usage of improved cooking stove



By

Type of biofuel
energy

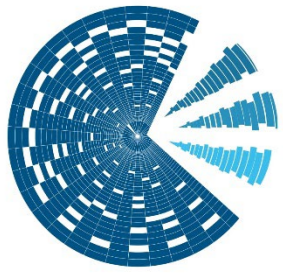
Fire Wood

Charcoal

Branch's of wood or
leaf

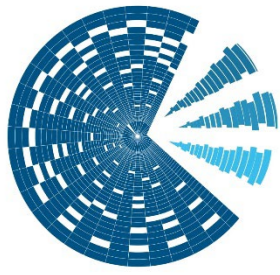
Kerosine

Lpg

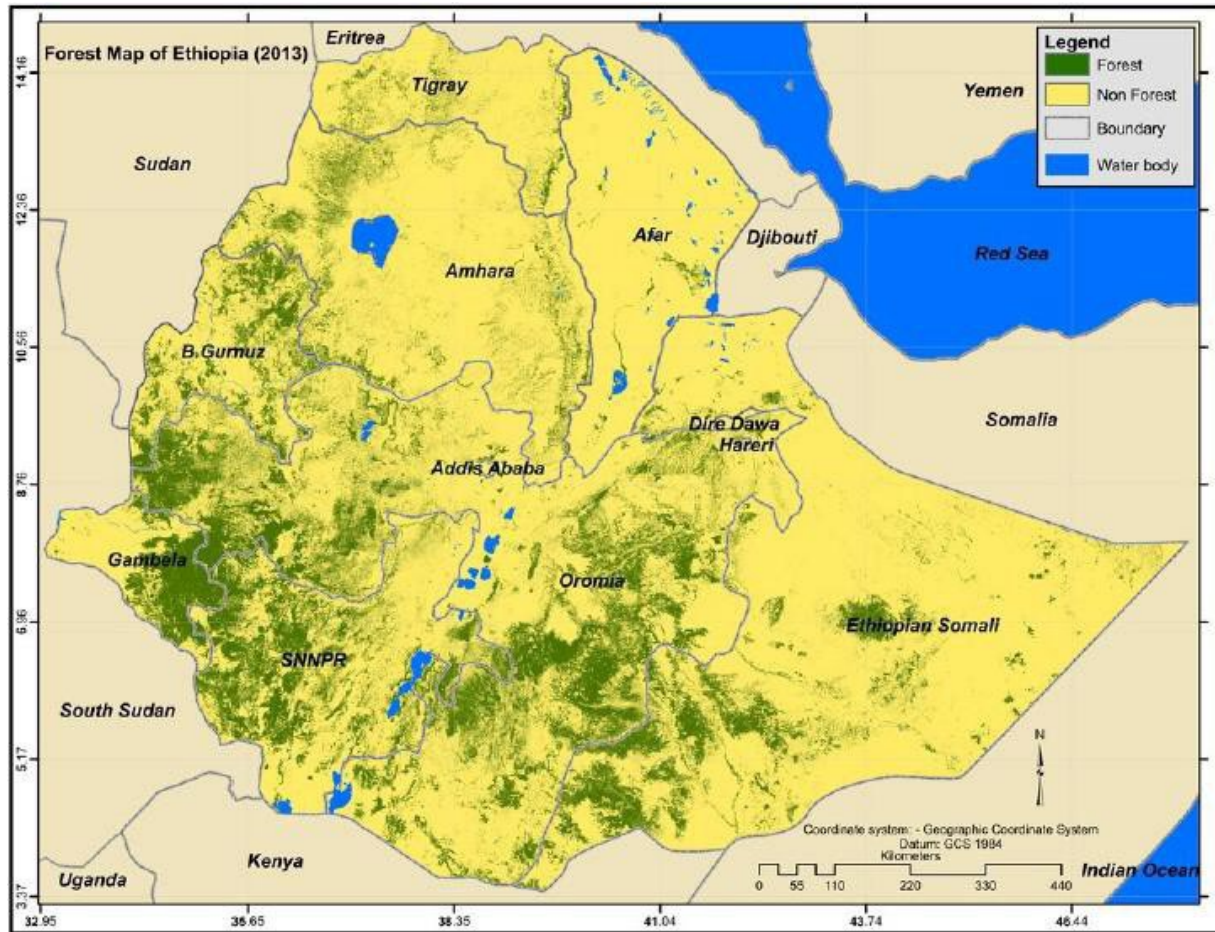


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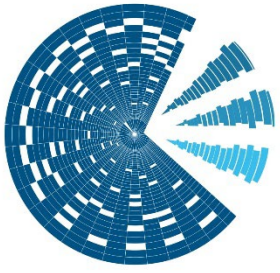
Scenario of Ethiopia's Biofuel Statistics



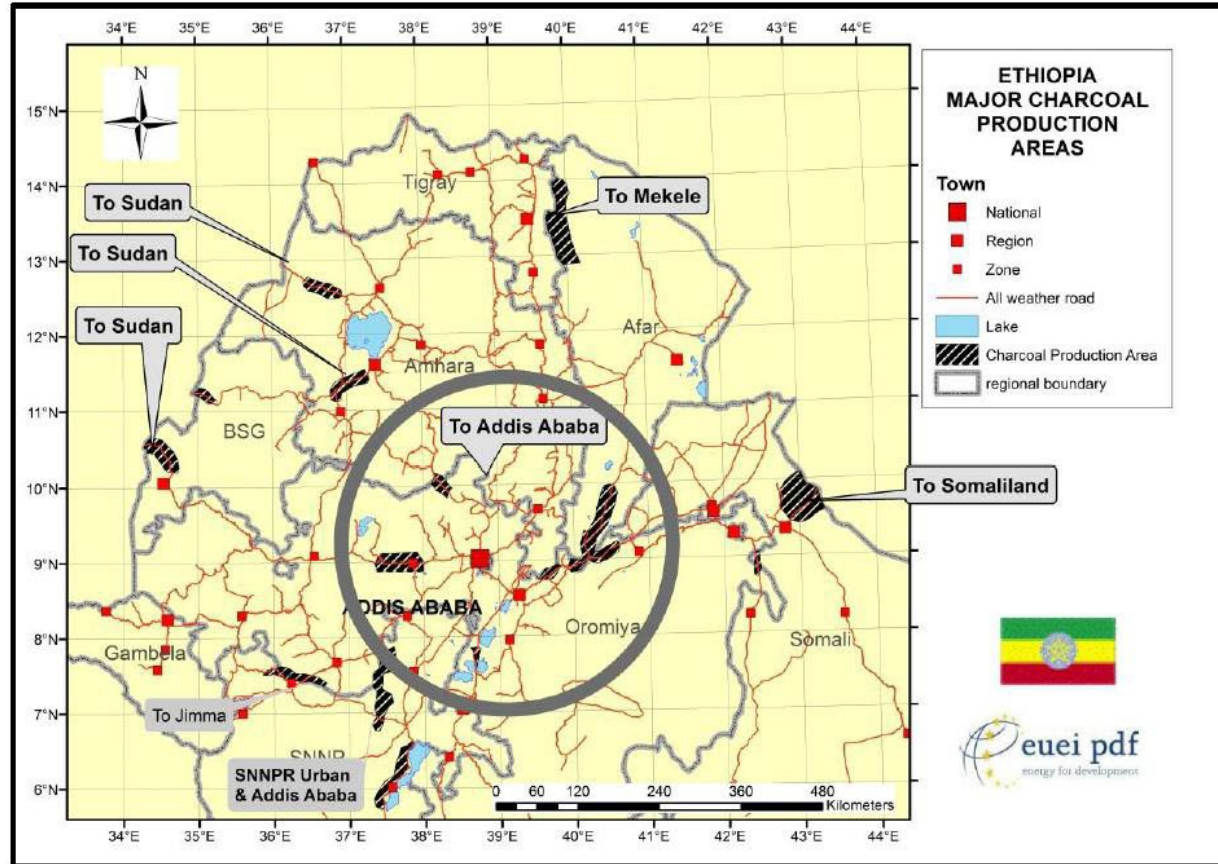
ETHIOPIAN STATISTICS SERVICE

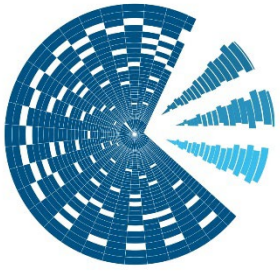


Category of forests	Sub-category	Coverage [mil. ha]	Mean annual increment [m3/ha/year]	Annual yield	
				[mil m3]	[mil tons]
Natural forest	High forest	2.9	5.65	10.5	7.6
	Woodland	21.5	0.8	11.1	8.0
	Shrubland	20.1	0.5	6.5	4.7
	Subtotal (Natural)	44.5		28.1	20.4
Plantation	Public plantations Oromia	0.0577	15.7	0.9	0.7
	Public plantations Amhara	0.0321	15.7	0.5	0.4
	Particleboard plantations	0.015	15.7	0.2	0.2
	Public plantations other regions	0.052	20	1	0.8
	Peri-urban energy plantations	0.0267	15	0.4	0.3
	Private/community small-scale woodlots	0.778	15	11.7	8.5
	Subtotal (manmade forests)	0.9615		14.8	10.7
All forests		45.5		42.9	31.1



Supply of charcoal

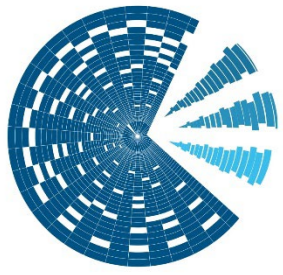




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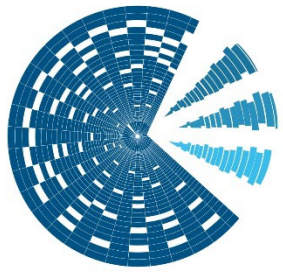
Beyond Providing Data



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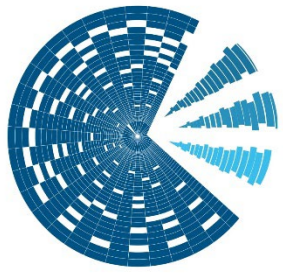
Injera baking biomass improved cookstoves available in Ethiopia





Reference

- Ethiopia Statistics Service Survey Report
- Ethiopia Energy Strategy Program
- Ethiopia Ten Years Perspective Development Plan
- Sustainability of Biogas and Solid Biomass Value Chains in Ethiopia Technical Report



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Thank You

Merci