



# Solid Waste Management Practices in Addis Ababa City

## *An Overview*

**Shimelis Kebede (Ph.D.)**  
**Associate Professor, School of Chemical and Bio Engineering**  
**Addis Ababa Institute of Technology**  
**Addis Ababa University**



**AAiT**

ADDIS ABABA INSTITUTE OF TECHNOLOGY  
አዲስ አበባ ቴክኖሎጂ ኢንስቲትዩት  
ADDIS ABABA UNIVERSITY  
አዲስ አበባ ዩኒቨርሲቲ

# Outlines

- ❑ Overview of Addis Ababa University
- ❑ Overview of Addis Ababa Institute of Technology
- ❑ Fact About Addis Ababa City
- ❑ Solid waste in Addis Ababa
- ❑ The flow of municipal solid waste management practices
- ❑ Informal Collectors
- ❑ Available Landfill
- ❑ Plastic Waste Generation
- ❑ Recycling Practice

# Addis Ababa University (AAU)



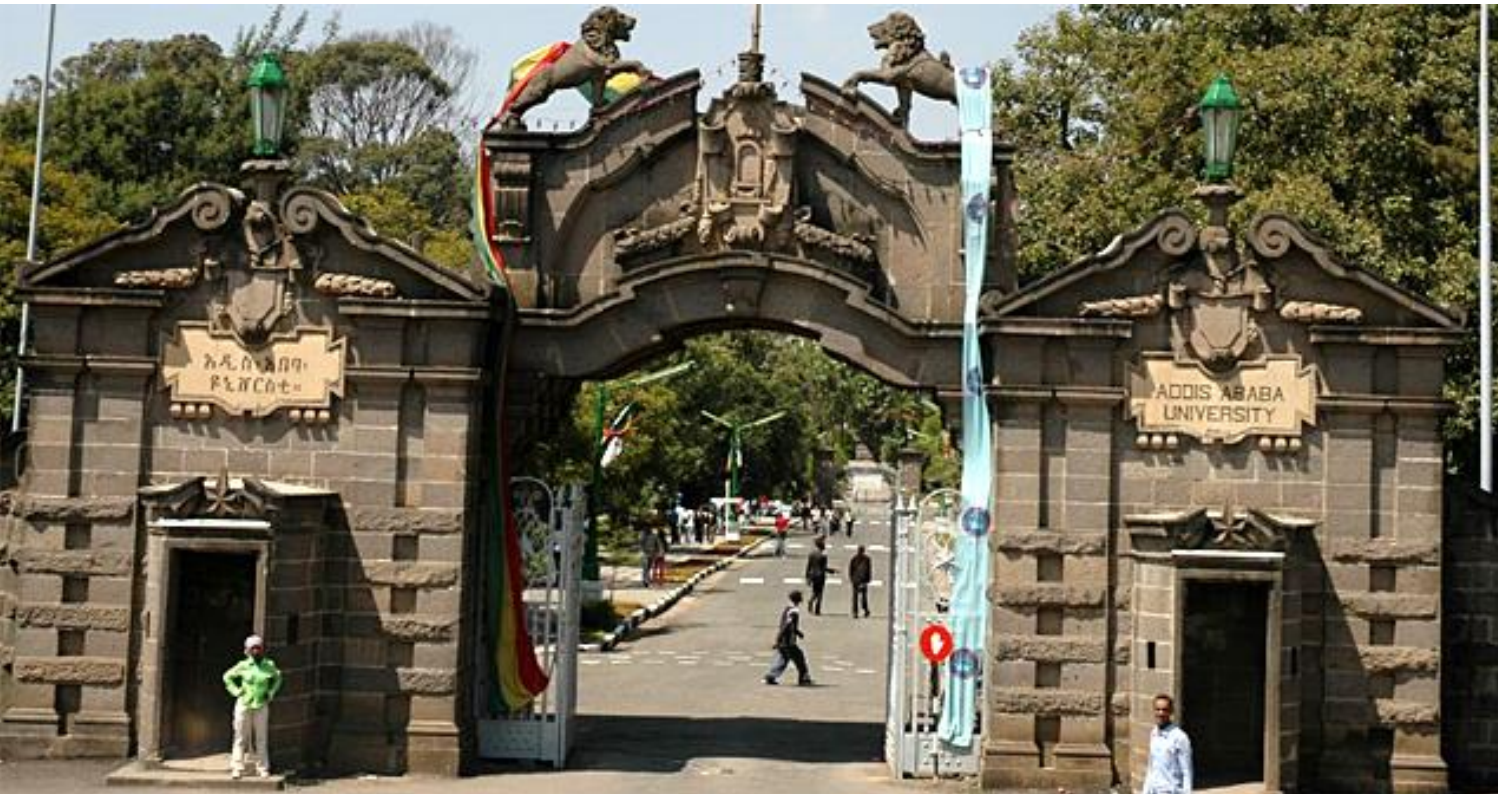
**Addis Ababa University :main Campus**



# Addis Ababa University

## አዲስ አበባ ዩኒቨርሲቲ

SEEK WISDOM, ELEVATE YOUR INTELLECT AND SERVE HUMANITY !



University College of Addis Ababa (1950–1962)



Haile Selassie I University (1962–1975)



Highly residential national university in Addis Ababa



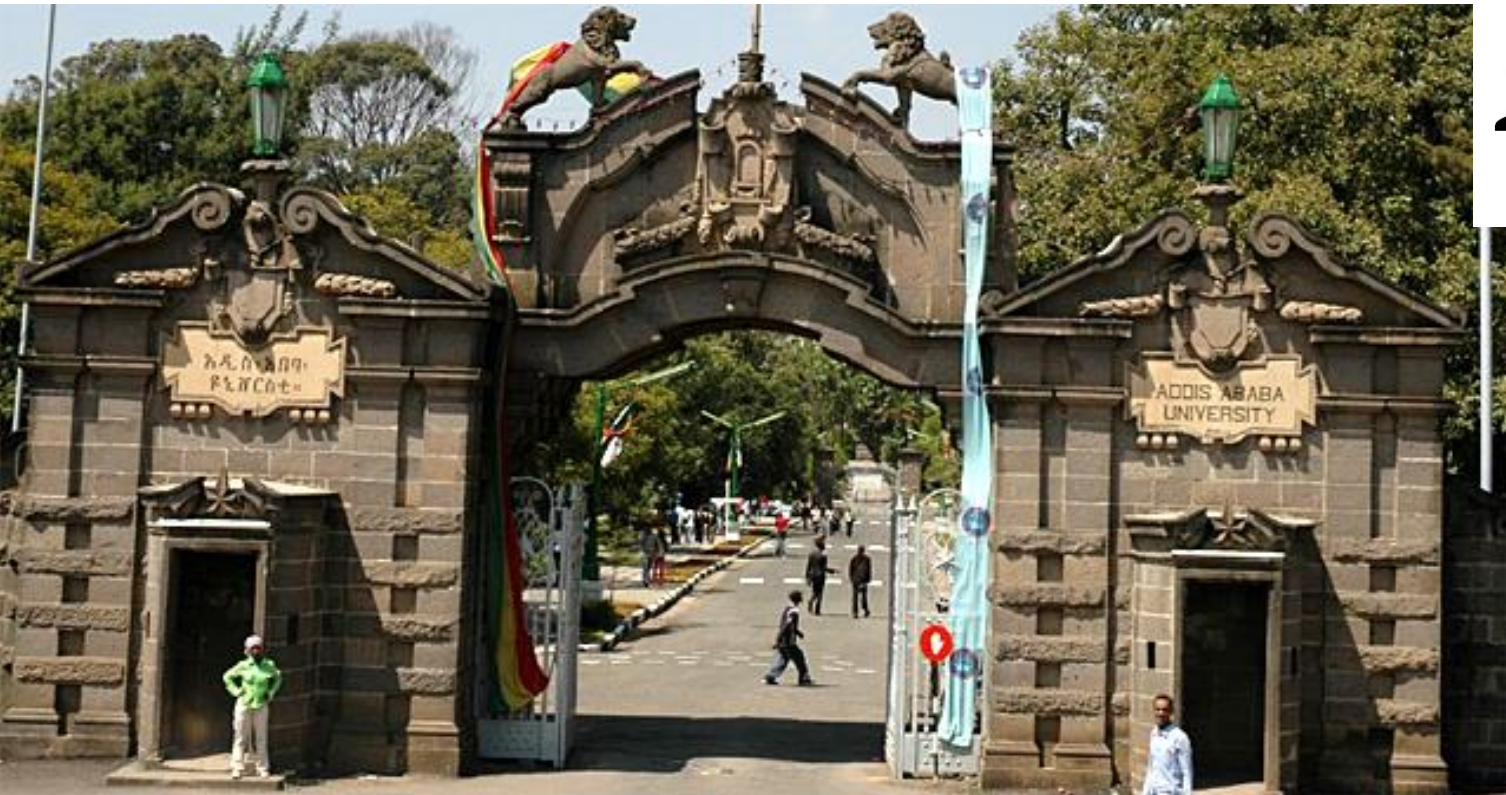
University Ranking: World 1135, Africa 6, East Africa 1



# Addis Ababa University

## አዲስ አበባ ዩኒቨርሲቲ

SEEK WISDOM, ELEVATE YOUR INTELLECT AND SERVE HUMANITY !



47,610 students (29,872 undergraduate, 15,398 Master's and 2,340 PhD students)



8,709 staff



70 undergraduate and 293 graduate programs (72 PhD and 221 Masters)



14 campuses

# AAiT Campus



**School of Mechanical and Industrial Engineering**

**School of Civil and Environmental Engineering**

**School of Electrical and Computer Engineering**

**School of Chemical and Bio Engineering**

**School of Multidisciplinary Engineering**

**School of information Technology and Engineering**



**Over 5500 undergraduate and about 4500 postgraduate**



**Over 400 academic and 600 administrative staff.**



**Six Schools and Centers.**

**አዲስ አበባ ቴክኖሎጂ ኢንስቲትዩት**  
**ADDIS ABABA INSTITUTE OF TECHNOLOGY**



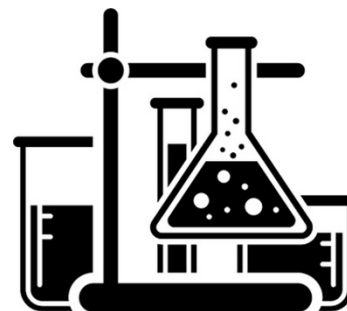


Over 200 undergraduate and about 40 MSc and 110 PhD Students



Over 95 academic and 5 administrative staff.

- 3 full prof
- 7 associate prof.
- 9 assistant prof.



There are 7 laboratories in the school:

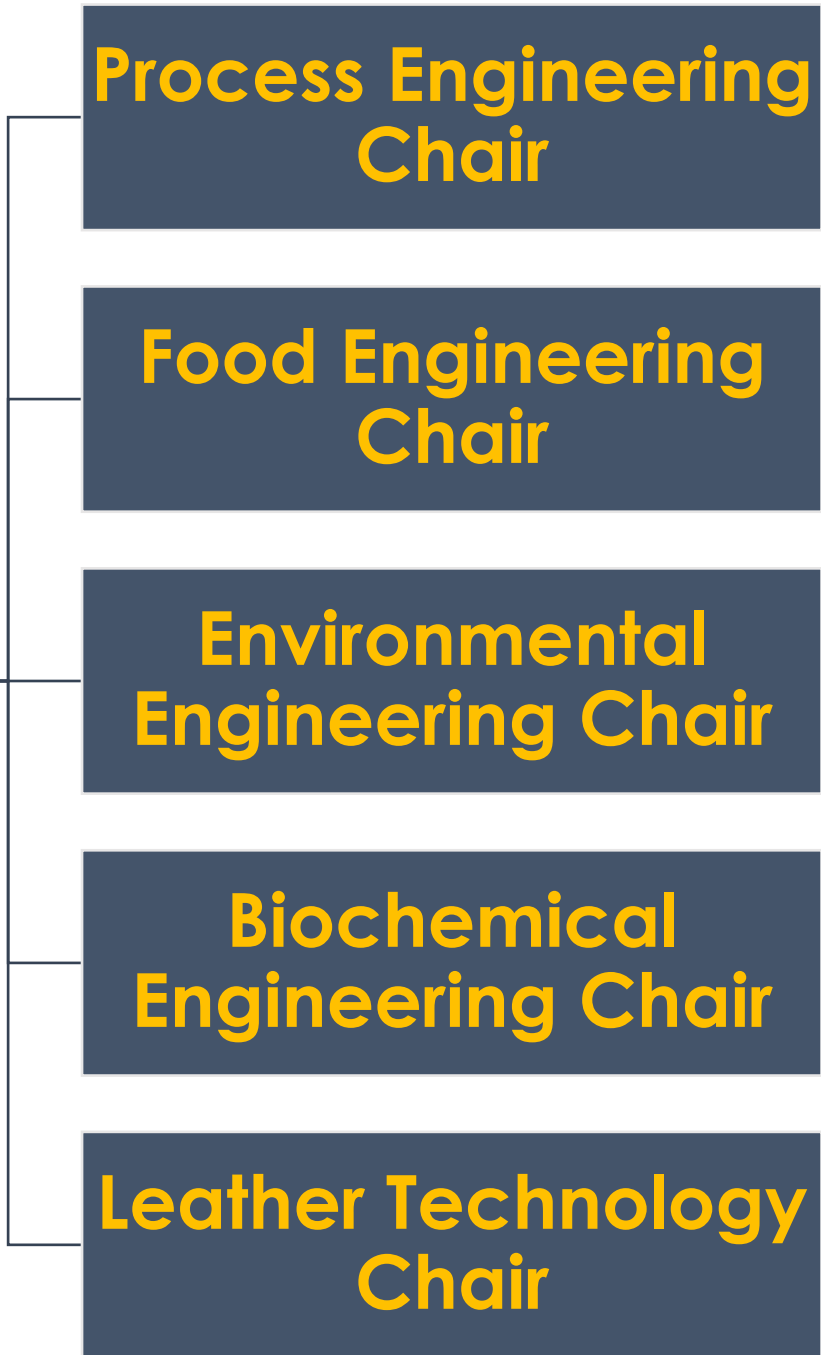
- Reaction lab,
- Mass and Thermal uo lab,
- Mechanical uo lab,
- Analytical lab,
- Environmental lab,
- Food lab and
- Biochemical lab





ኬሚካልና ባዮ ኢንጅነሪንግ ትምህርት ቤት  
**SCHOOL OF CHEMICAL AND  
BIO ENGINEERING**  
(Ground Floor) →

**School of Chemical and  
Bio Engineering**





**Research Priority Area**

**Renewable Energy**

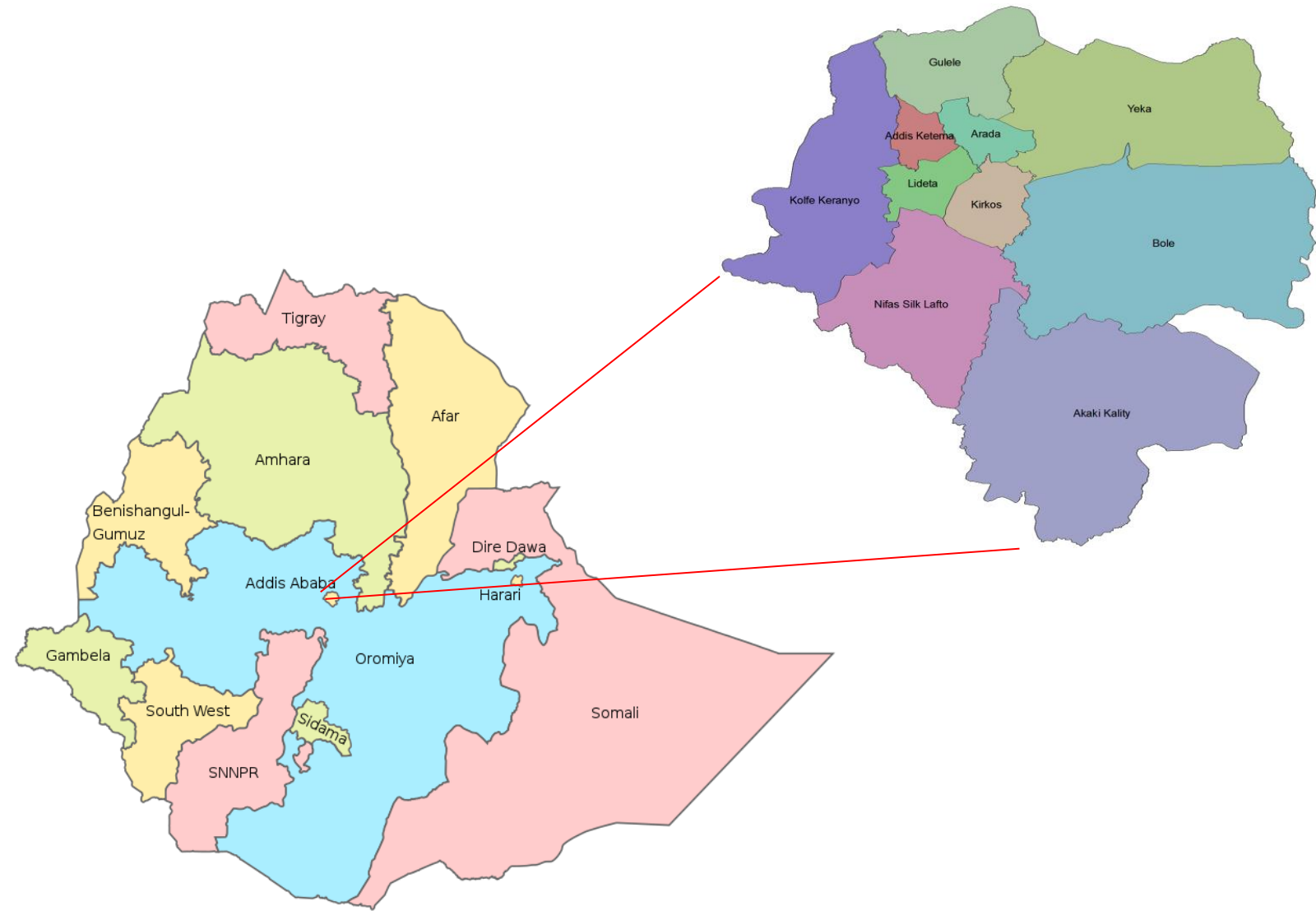
**Water and Wastewater Treatment**

**Catalysis**

**Solid waste Management**

**Air pollution**

# Fact About Addis Ababa City



Founded: 1886



Area: 527 km<sup>2</sup>



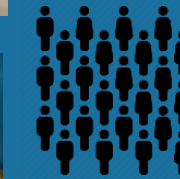
Elevation: 2,355 m



11 Sub City



Capital City



Over 5.5 million



Over 115  
International  
organization



International  
Conference  
Hub

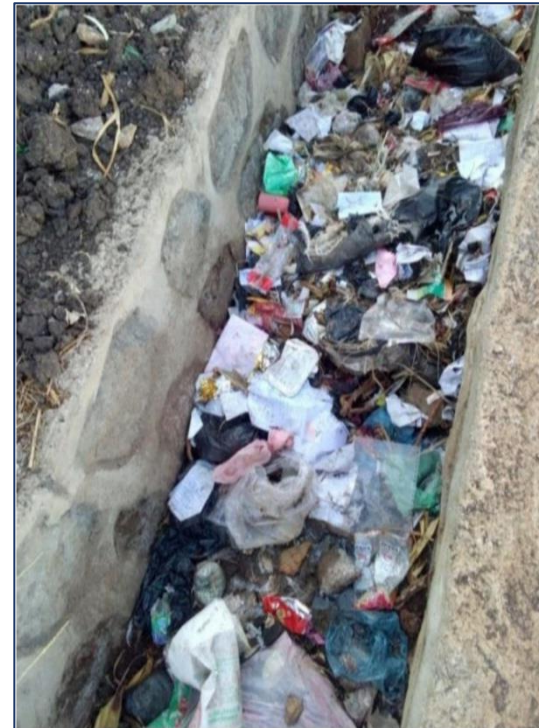
# Major Economic Activities of the City



The dominant economic activity in Addis Ababa is trade and commerce. Other economic sectors which offer most employment opportunities in the city include: manufacturing and industry, home making, civil administration, transport and communication.

# Solid waste in Addis Ababa

**Solid waste is one of the social and environmental challenges that urban areas are facing.**

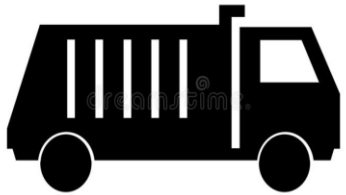


**70% is collected through the formal solid waste management system that is administered by the city government while the remaining 30% gets dumped into rivers, kept in informal local dumps or lost in the inefficiency of the waste management system.**

# Solid Waste Generation



The average waste generation rate was 0.45 kg/capita/day



More than 754,236 tones per year



The percentage of waste generated from domestic is 76 %, commercial waste 9 %, hotels 3 %, industrial waste 5 %, street sweeping 6 %, and hospitals 1 %.

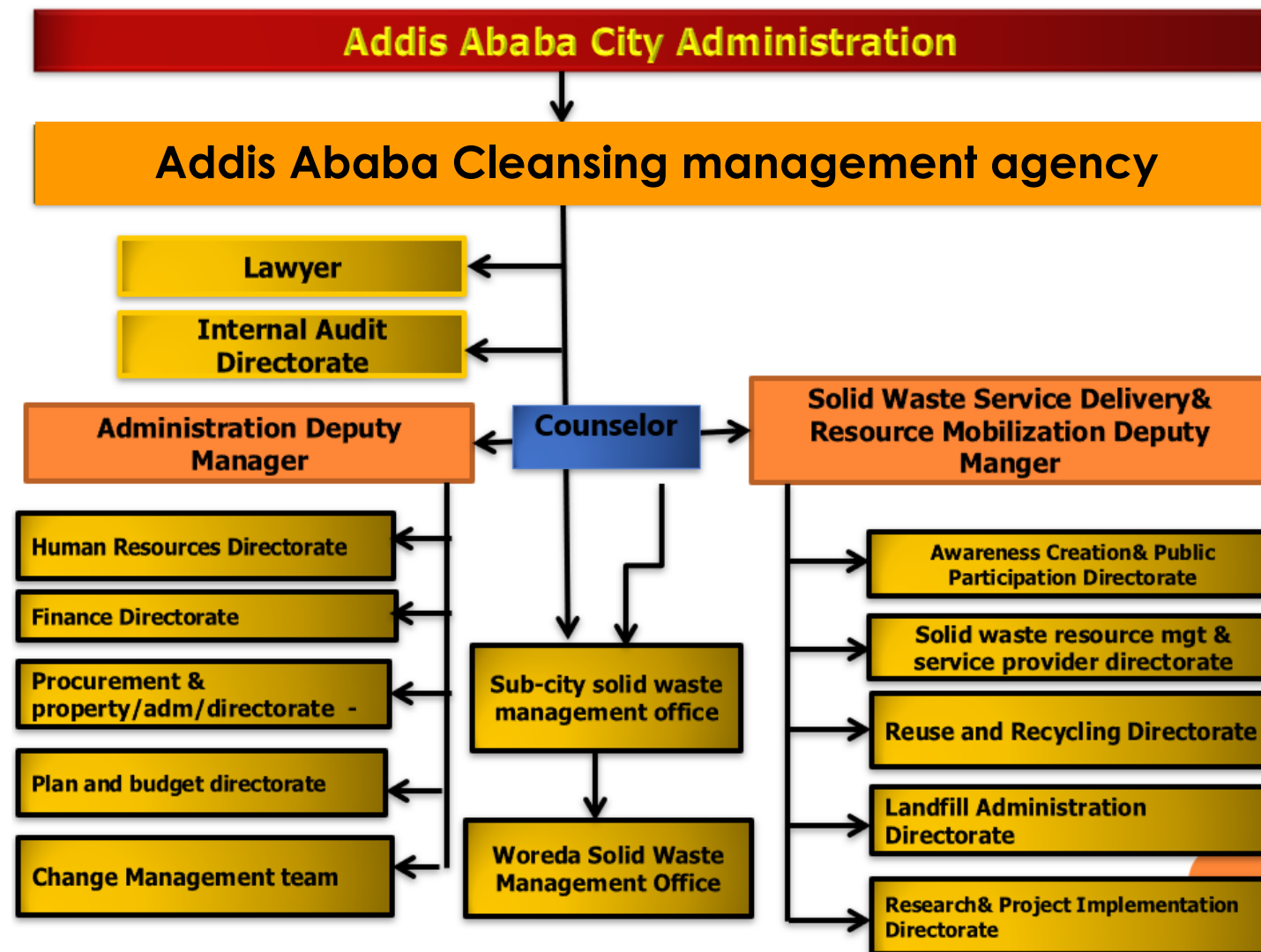
# Solid Waste Composition (HHSW)

Waste	Composition (%)
Food waste	52.84
Paper waste	4.99
Textile waste	2.21
Plastic waste	9.61
Glass waste	1.32
Metals & aluminum	1.25
Leaves/grass waste	10.33
Diapers & sanitary napkins	7.07
Others waste including leather waste, wood, rubber waste, bones & ceramics waste	3.02
Ashes/fines waste	6.13
Miscellaneous	1.2

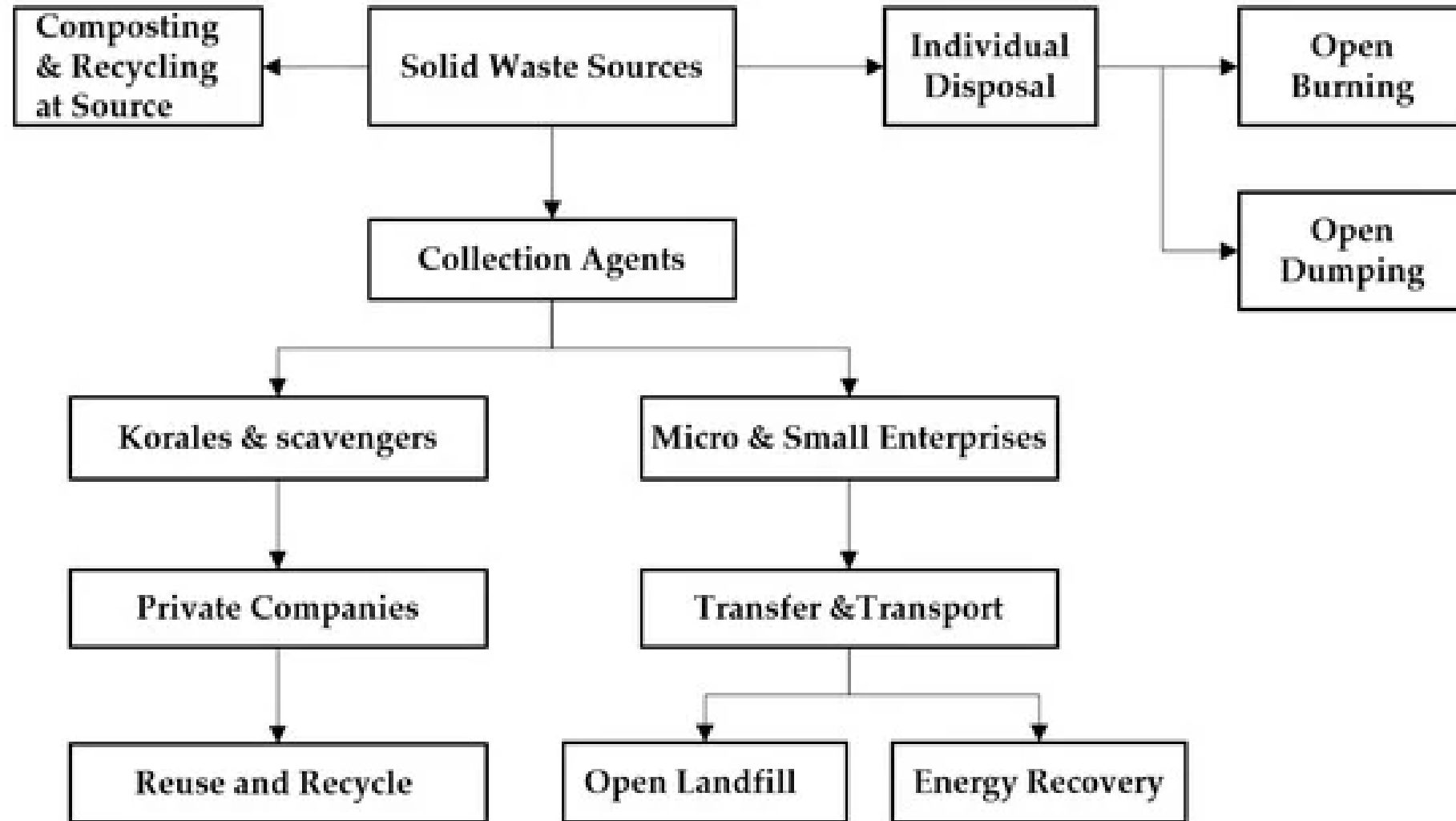
**About 74.29% of the household waste was biodegradable organic, 17.41% of it was recyclable and the rest 8.27% was potentially hazardous waste. (AASWMA ,2020)**



# Management structure at Addis Ababa Cleansing management agency



# The flow of municipal solid waste management practices



# Household Solid Waste Collection Practice

- ❑ Solid waste collection services are **divided** in to **two sub systems** : **primary** and **secondary** collection
- ❑ Primary collection is done by **micro** and **small** enterprises (as a **formal sector** started in 2003/2004)
- ❑ Creating **job opportunities** for the **young** and **unemployed**, thereby playing a **part** in **poverty reduction** and private sector development
- ❑ Payment is Volume based rate( **\$ 0.7** Per m<sup>3</sup> )

# Household Solid Waste Collection Practice

- ❑ The number of **small scale enterprises (SSEs)** organized to work on solid waste collection and transportation is **89** with a total members of **7000** individuals

The other **small and medium enterprises (SMEs)** 2434 associations /groups with the total number of 2435 members or reuse and recycling (compost, paper, plastics and others)

- ❑ Service Charges are collected with **water consumption rate** (About **Residential houses** 20%, **Commercial houses** 42.5%)

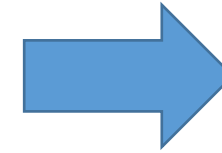
# Household Solid Waste Collection Practice (Formal)



waste collection from HH



waste transporting from HH



waste transporting from HH



waste final dumping site



waste transporting from Temporary holding site



waste at temporary holding site

# Collection & transportation mechanisms



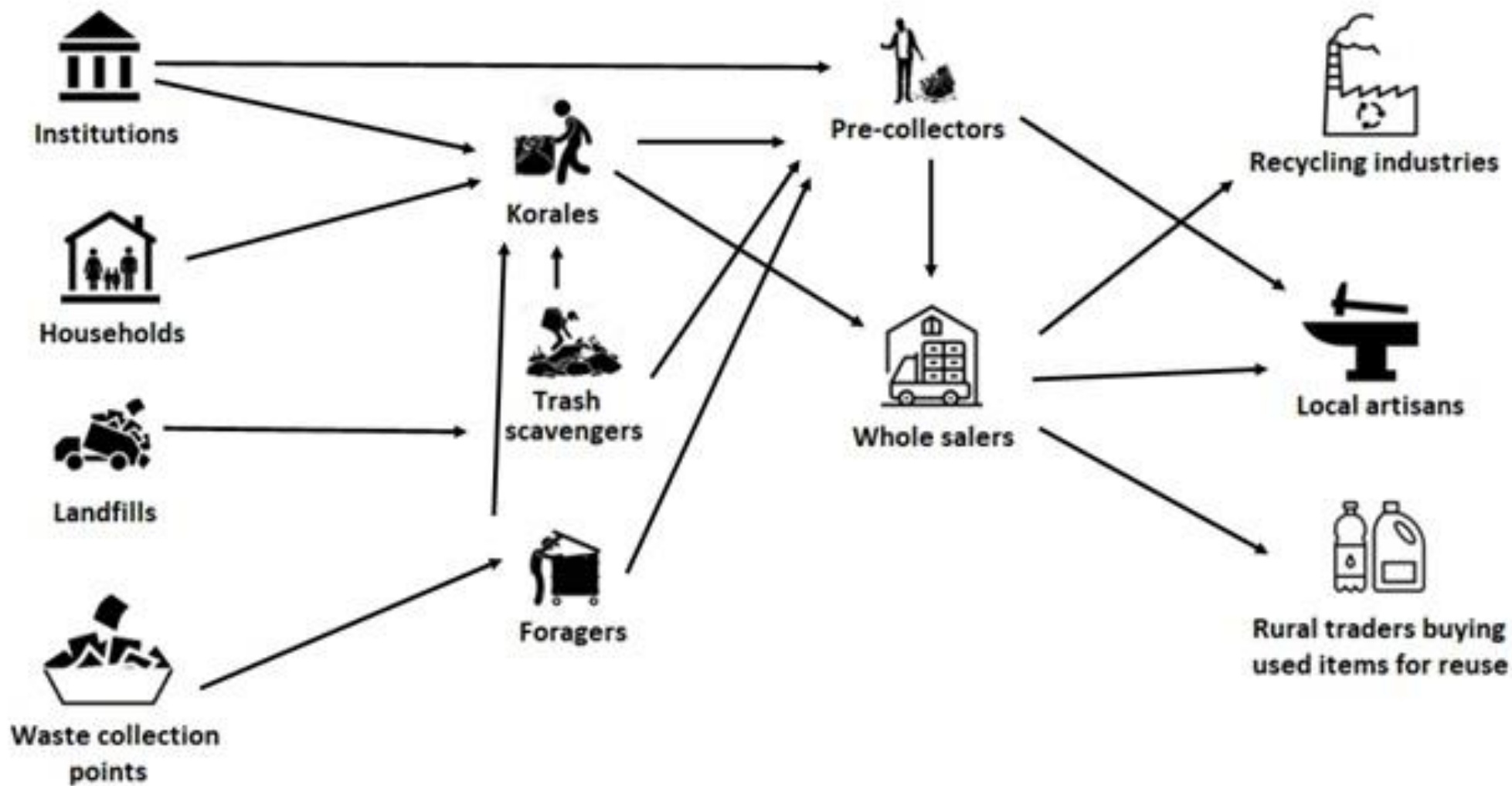
# Informal Collectors

**Informal waste collection, recycling, and reusing systems greatly support the formal waste management system by creating a source of inputs for what would have ended up in landfills.**



**Minalesh Tera: informal recycling and reusing market**

# Different actors in the informal sector



Source: <https://www.et.undp.org>



# Informal Actors: Korales



Informal collectors and so-called "Korales" gather all kinds of recyclables from Households, streets, and landfills. Recycled materials are not only restricted to plastic, paper, glass, and metals but also contain biomass, textiles, rubber, silt, ash, dust, and waste oil since the demand for these raw materials is high.

# Informal Actor: Lewach



Informal collectors and so-called "Lewach" gather mostly used clothes and shoes from Households and sell it to reuse for vely low income peoples.

# Available Landfill

- ❑ There is open landfill (**Qoshee** also known as **Koshe**)
- ❑ The site is located in the **southeastern part of Addis Ababa.**
- ❑ It has been in operation for about **50 years**
- ❑ A total area of about **36 hectares**



# Waste to Energy Facility



- ❑ The project was built by Cambridge Industries Limited (CIL)

- ❑ It was fully funded by government with the overall cost put at 2.6 billion birr (\$54 million)

- ❑ 25 mega watt electricity per hour

- ❑ 1400 tone mixed waste per day

- ❑ started operation since August 2018.

# Another Practice on the landfill

- ❑ **Landfill gas** and **Leachate control** system is in place to **reduce** emission of **GHGs** & environmental **pollution**
- ❑ The **CDM project** is based upon the **capture** and **destruction** of the harmful greenhouse gas methane produced by decomposing organic matter at the **landfill site**.
- ❑ The project to **capture** and **flare** the **methane** has been made possible through **revenue from the sale of certified emissions reductions (CERs)**.

# Tips: Clean development mechanism (CDM)

- ✓ The Clean Development Mechanism (CDM), defined in Article 12 of the Protocol, allows a country with an **emission-reduction** or **emission-limitation commitment under the Kyoto Protocol** (Annex B Party) to **implement an emission-reduction project in developing countries.**
- ✓ Such projects can earn **saleable certified emission reduction (CER)** credits, each equivalent to one tonne of CO<sub>2</sub>, which can be counted towards meeting Kyoto targets

# Tips: Clean development mechanism (CDM)

- ✓ The developed country gets credits for meeting its emission reduction targets, while the developing country receives the capital and **clean technology to implement the project**.
  
- ✓ The parties involved:
  - ✓ Must participate **voluntarily**;
  - ✓ Must **establish** national **CDM authority**;
  - ✓ Must have **ratified** the **Kyoto Protocol**;

# Some Practice on the landfill

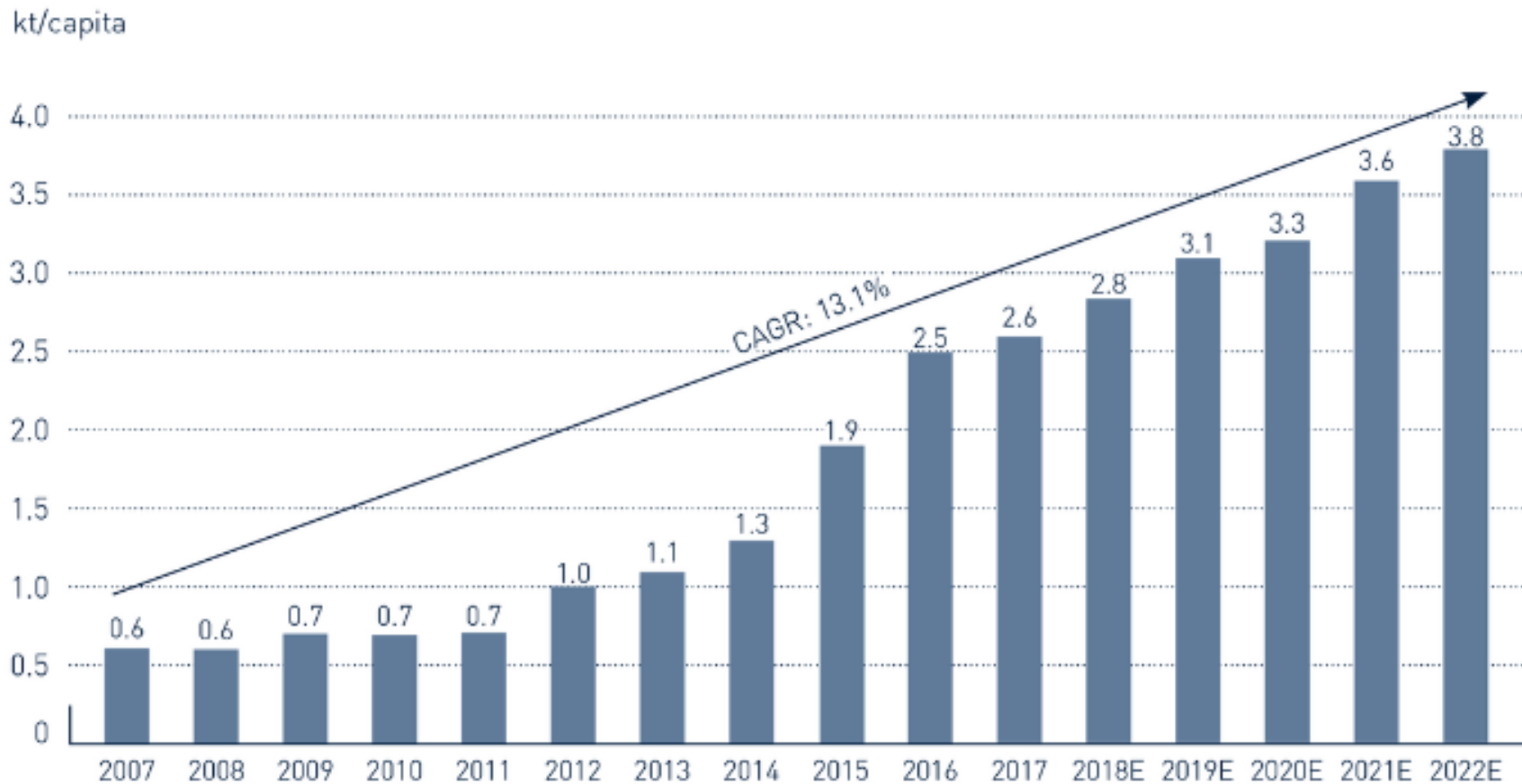
- The **Addis Ababa City Administration, Horn of Africa Regional Environmental Centre** and an **international contractor** have installed the **first stages** of the methane capture and flaring system.





# Plastic Waste Generation

- The per capita consumption of plastics in Ethiopia has grown by about 13.1% annually over the past years, from 0.6 kg in 2007 to 2.8 kg in 2018 and is estimated to be 3.8 kg in 2022.



Source: EUROMAP / Graph: fairtrade 2019

©Addis Stand

# Recycling Practice



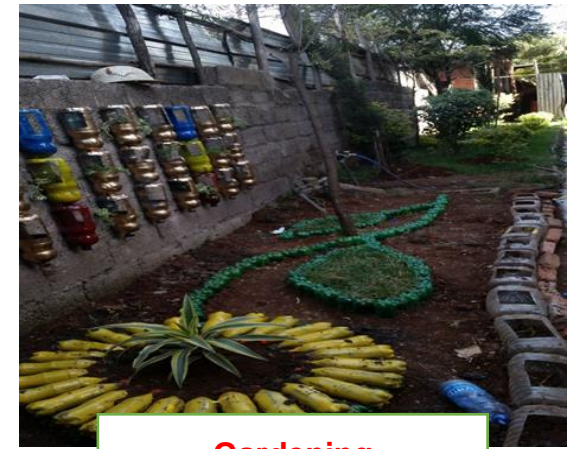
To be sorted by color



To be pressed



Pressed



Gardening



Crashed



Ready for export



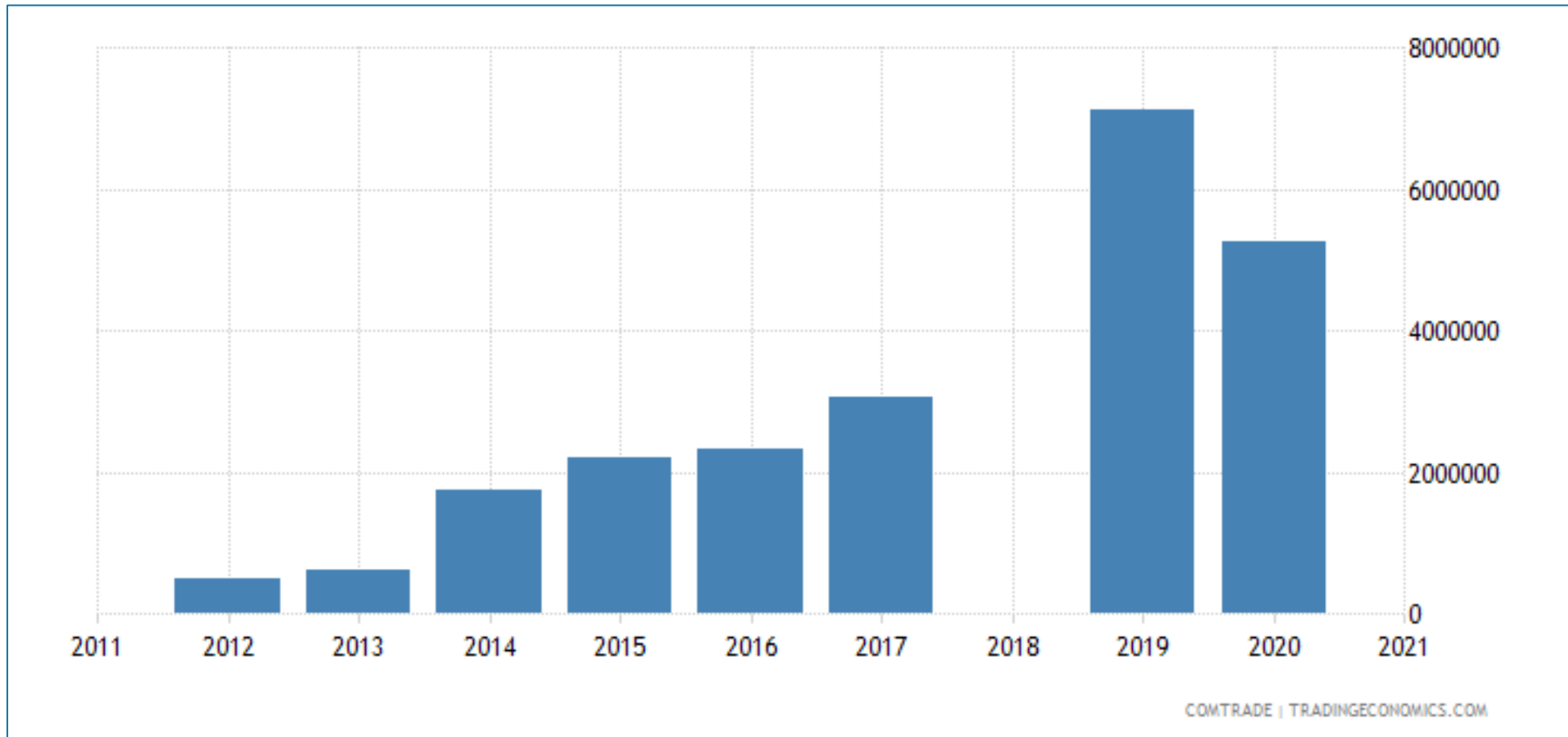
Plastic Rope



Household Materials

# Plastic Export earning (\$)

Export to India, China, Indonesia and Bangladesh



# E-waste Ethiopian Profile

- ❑ In Ethiopia, typically in Addis Ababa and regional cities and towns, there is currently **no formal e-waste collection** from private households and businesses.
- ❑ The majority of residents and households give their obsolete **electric and electronic waste** (WEEE) to repair shops so that it can be reconfigured.
- ❑ If the equipment is beyond repair, the repair shop will usually retain it and use it as a source of replacement parts.

# Cont...

- ❑ E-waste collection from federal government offices was organized by the Public Procurement and Property Disposal Service (PPPDS) under the Ministry of Finance and Economic Development (MOFED).
- ❑ e-waste send to the Demanufacturing Facility (DMF) in Akaki Kaliti.



# Cont...

- ❑ the center **received pieces of equipment** including computers, TVs, mobile phones, typewriters, printers, and copy machines.
- ❑ Other institutions such as the African Development Bank, The World Bank, the World Food Program as well as several NGOs located in Addis Ababa have **handed overused** and end-of-life EEE.
- ❑ As a country, the problem of **e-waste seems an infant** to come into a big issue, but the trend of our waste management system will bring us to those risks happening due to informal e-waste collection and illegal managing of the waste.

