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# **Inclusive Green Economy Policy Review for Ethiopia**

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## PREFACE

In order to achieve Agenda 2030, we need to get the economic incentives right and make sure to leave no one behind. In other words, we need a transformation towards an inclusive green economy. Such transformation requires increased knowledge on, and capacities to apply, policy instruments such as bans, taxes, fees, subsidies, permits and refund-systems that generate incentives for an inclusive green economy. The Inclusive Green Economy (IGE) Program aims to strengthen country and regional capacity of green economy transformation in Ethiopia, Kenya, Rwanda, Tanzania and Uganda. The program is financed by the Swedish International Development Cooperation Agency (Sida) and is implemented by the University of Gothenburg and the Environment for Development Initiative (Efd) in collaboration with academic centres in the five East African countries. This *Inclusive Green Economy Policy Review* is a learning material co-created by the academic partners in the program and the program participants at governmental ministries and agencies.

The review aims to facilitate learning on priorities, challenges and opportunities related to national green economy visions and strategies and policy instruments in three important policy areas in the country and the region. The policy areas fossil fuels, plastic pollution and forest loss are chosen as they are of importance for an inclusive green economy in all five participating countries.

In short, the Inclusive Green Economy Policy Review:

- Gives an overview of the visions, strategies and programs connected to IGE transformation and the organizational structure for their implementation.
- Describes the current use of policy instruments to reduce plastic pollution, forest loss and the use of fossil fuels.
- Identifies the acceptance for policy instruments among the general public and different stakeholders, including public and private sector actors, as well as civil society organizations in the three policy areas.

The review provides a basis for critical analysis and dialogue on the current use of policy instruments and gaps in a transition to greener and more inclusive economies. Besides being a key component in the educational material used in the training program, the review also contributes to national and regional dialogues. The national dialogues facilitate in-country peer learning between the academic partners in the program and the program participants as well as with their colleagues.

The review is also used for cross-country learning where one country's group of program participants conduct an analytical review of a neighboring country's National Policy Review to facilitate cross-country peer learning. These cross-country peer learning reviews workshops aim to strengthen networks on IGE in East Africa.

Hence, this report should be read as a learning material, co-created between the academic partners and civil servants enrolled in the program. This means that this should not be referred

to as a complete review of all IGE policies for these policy areas in this region and, has not been through a quality review process. This is a document that gives a first overview with the aim to facilitate interesting discussions and learning between countries struggling with the similar challenges in their work towards an inclusive green economy.

This policy review has been written by Asaye Ketema, Dr. Hailemariam Teklewold and Dr. Dawit Woubishet from the EfD Ethiopia in collaboration with the following enrolled civil servants Yizengaw Yitayih, Rehima Mohammed. Getachew Beyene, Getu Dame and Girma Mekonnen.

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**GOTHENBURG CENTRE FOR  
SUSTAINABLE DEVELOPMENT (GMV)**



## List of Abbreviations

AA-LRT	Addis Ababa Light Rail Transport
BAU	Business as Usual
BRT	Bus Rapid Transit
CAT	Climate Action Transparency
CDM	Clean Development Mechanism
CO <sub>2</sub>	Carbon Dioxide
CRGE	Climate Resilient Green Economy
EBI	Ethiopia Biodiversity Institute
EEFRI	Ethiopia Environment and Forest Research Institute
EFAP	Ethiopian Forestry Action Plan
EFCCC	Environment, Forest and Climate Change Commission
EIA	Environmental Impact Assessment
EPA	Environment Protection Authority
EPSE	Ethiopia Petroleum Supply Enterprise
ERC	Ethiopia Railway Corporation
ETB	Ethiopia Birr
EDR	Ethiopia-Djibouti railway
FAO	Food and Agriculture Organization
FDRE	Federal Democratic Republic of Ethiopia
FREL	Forest Reference Emission Level
FUG	Forest Users Group
GDP	Gross Domestic Products
GHG	Greenhouse Gas
GTP II	Growth and Transformation Plan II
Ha	Hectare
IGE	Inclusive Green Economy
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contribution
IEE	Initial environmental examination
KM	Kilo Meter
KWh	Kilo Watt Hour
LPG	Liquefied Petroleum Gas
M&E	Monitoring and Evaluation
MEFCC	Ministry of Environment, Forest and Climate Change
MoA	Ministry of Agriculture
MoARD	Ministry of Agriculture and Rural Development
MoM	Ministry of Mines
MoME	Ministry of Mines and Energy
MoT	Ministry of Transport
MoTI	Ministry of Trade and Industry
MoTL	Ministry of Transport and Logistics
MoWE	Ministry of Water and Energy
MRV	Measuring, Reporting and Verification
MT	Million ton
Mt CO <sub>2</sub> e	Million ton Carbon Dioxide equivalent
NAP-ETH	National Adaptation Plan - Ethiopia
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization
NMT	Non-Motorized Transport
NTFP	Non-Timber Forest Product

PDC	Plan and Development Commission
PES	Payment for Ecosystem Services
PET	Polyethylene Terephthalate
PFM	Participatory Forest Management
REDD+	Reducing Emission from Deforestation and Forest Degradation
SBPDA	Sanitation, Beautification and Park's Development Agency
SDG	Sustainable Development Goal
SIWI	Stockholm International Water Institute
SNNPRS	Southern Nations Nationalities and People Regional State
UN	United Nations
UNDP	United Nations Development Program
UNEA	United Nation Environment Assembly
USD	United States Dollar
WRI	World Resource Institute
YDP	Ten Year Development Plan

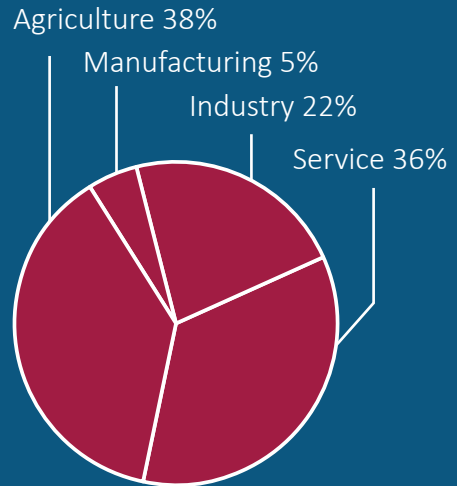
# Country Profile: Ethiopia

## Size / Population density



**1 104 300**km<sup>2</sup>  
**104**people/km<sup>2</sup>

## Key sectors in the economy



## Population / Growth



**114,9M**  
**2.5%**

## Life expectancy



**F 68**  
**M 65**

## Poverty rate



**25.3%**

## Populations access to power



**51%**

## GDP per capita



**925 USD**

## Rainfed / Irrigated agricultural land



**R 98%**  
**I 2%**

## Land area cover in forest



**14%**



- SDG achievement
- Challenges remain
- Significant challenges remain
- Major challenges remain
- ↑ On track
- ↗ Moderately increasing
- Stagnating
- ↘ Decreasing
- — Data not available



## Chapter 1: OVERVIEW OF IGE VISIONS STRATEGIES AND PROGRAMS

An Inclusive Green Economy is an alternative to today's dominant economic model, which generates widespread environmental and health risks, encourages wasteful consumption and production, drives ecological and resource scarcities and results in inequality. In its simplest expression, such an economy is low carbon, efficient and clean in production, but also inclusive in consumption and outcomes, based on sharing, circularity, collaboration, solidarity, resilience, opportunity, and interdependence. It is focused on expanding options and choices for national economies, using targeted and appropriate fiscal and social protection policies, and backed up by strong institutions that are specifically geared to safeguarding social and ecological floors.

Although Ethiopia contributes a very small proportion of global greenhouse gases, the country is highly vulnerable to the impacts of climate change. This has grave implications for the achievement of the country's development goals. It has been estimated that climate change could reduce the country's GDP by up to 10% by 2045 compared with a 2011 baseline scenario (MEFCC, 2015). While the Government of Ethiopia approved the 2030 Sustainable Development Agenda and integrated with the 2<sup>nd</sup> Growth and Transformation Plan (GTP II) and now the 10-year economic development plan (10-YDP), the country is still experiencing severe over-exploitation of natural resources such as land and forest degradation due to increasing population pressure, growing demand for agricultural products and inefficient agricultural practices.

As part of building inclusive green and resilient economy, the Federal government of Ethiopia has finalized the preparation of Climate Resilient Green Economy development strategy (CRGE) and began its implementation in 2011. CRGE is the growth engine for Ethiopia under changing climate and consist of different sectors as major pillar in the country's vision to become a middle-income, carbon-neutral, and resilient economy by 2025. The strategy will enable exploitation of the vast hydropower potential, adoption of improved cook stoves in rural areas, efficiency improvements in livestock value chain, preservation of the forest, utilization of electricity for freight and public transportation by building railway network and light train transit in cities and use of improved and new technology vehicles with higher efficiency.

The strategy also identified six sectors that were considered to have high carbon-abatement potential (such as agriculture; forests (e.g., through the Reducing Emissions from Deforestation and Forest Degradation, or REDD+ initiative); transport; energy supply; green cities; and industry) prioritized more than 60 initiatives across the different sectors. The initiatives together are expected to enable the country to achieve its development goals while limiting GHG emissions in 2030 to 150 MtCO<sub>2</sub>e. These initiatives intend to save 255. MtCO<sub>2</sub>e with around 83% of low-carbon development opportunities coming from the Agriculture and Land Use Change Forestry sectors (CRGE, 2011). Ethiopia was one of the few countries to present Intended Nationally Determined Contributions (INDCs) commitments sufficient to reach the most ambitious 1.5-degree target during the milestone global climate agreement in Paris in 2015 (FDRE 2015). In the year 2021, Ethiopia submitted an updated NDC, which is built on the CRGE Strategy, with a target to reduce 277.7 Mt CO<sub>2</sub>e (68.8 %) by 2030.

However, in order to implement this strategy and policy the government put in place several policy instruments used by the governing authorities to promote certain policies to achieve the predefined set of goals. They are interventions that offer the opportunities to advance both

sustainability and social equity as functions of a stable and prosperous financial system; and a pathway towards achieving the 2030 Agenda for Sustainable Development, eradicating poverty while safeguarding the ecological thresholds, which underpin human health, well-being, and development. Some of the policy instruments used in the fossil fuel, plastic pollution and forest loss includes price/economic based, information based and regulatory based price instruments.

Over the last few decades, a wide range of climate smart approaches has been developed to build adaptive capacity with an important component that entails improving ecosystem services that enhance resilience while at the same time increasing production and lowering greenhouse gas emissions (FAO 2014). To support these different strategies and policy has also been developed and implemented (Appendix 1). The implementation of IGE in the country may include issues on **political commitment, institutional capacity, the policy process and stakeholder engagement** (CAT, 2020). The implementation of IGE also requires strong stakeholder Engagement in policy development; information exchange. This in turn requires strengthen public awareness and outreach efforts around climate mitigation and adaptation; and improving coordination of all actors (development partners, development finance institutions, private sector, academia etc.) to identify synergies and avoid duplication of efforts. However, in the context of a progress assessment on the implementation of the CRGE strategy and achievement of CRGE targets, there is no robust method to attribute the potential decrease in emissions to the CRGE strategy or the initiatives driven specifically by the CRGE strategy due to different limitations.

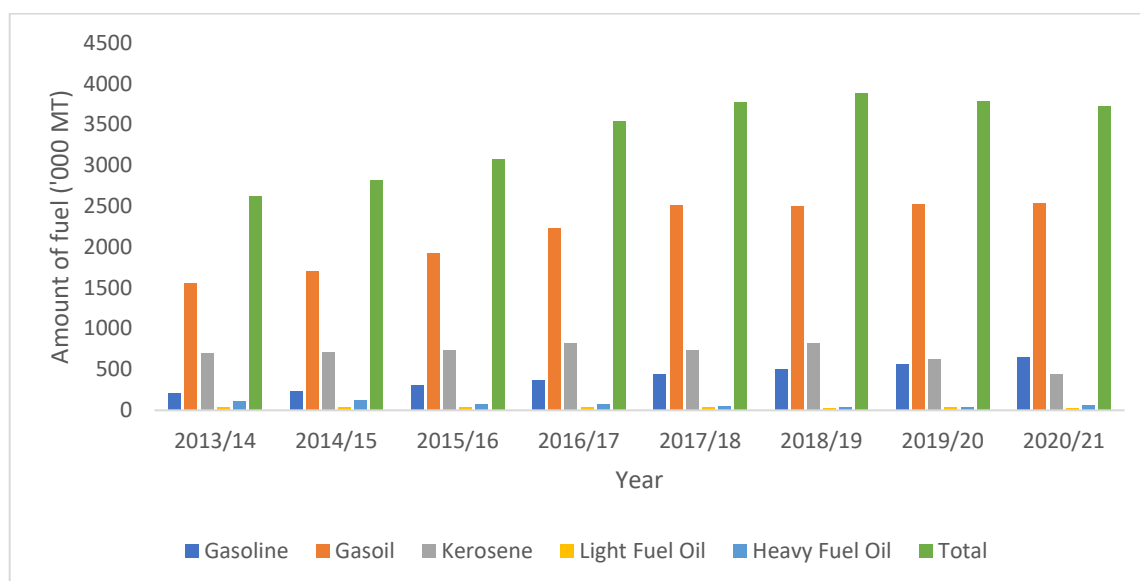
## Chapter 2: POLICY INSTRUMENTS IN SELECTED POLICY AREAS

In this chapter we review policy instruments to address challenges related to three critical policy areas for an inclusive green economy: fossil fuel use, plastic pollution, and forest loss. Important lessons can be learned from studying the implementation of different policy instruments to address these challenges in the East African countries. For each policy area, we first identify challenges to an inclusive green economy and then review the key policy instruments used to address these challenges.

### 2.1 Fossil Fuels

Ethiopia is endowed with diversified renewable energy resources, namely hydro, wind, solar, geothermal, and biomass. The country's fossil fuels reserve is significant, but the demand is entirely dependent through imports. For instance, it is estimated that the reserve of coal is over 300 million tons (Ashebir and Desta, 2021), where Ethiopia yearly coal demand is around 1.5 million tons (Business info Ethiopia, 2022). There are also on-going efforts to explore oil fields in some parts of the country. According to Ethiopia Petroleum and Supply Enterprise report, the country imported a total of 3.7 million MT of fuel at a cost close to ETB 91.7 billion (around USD 1.7 billion) between July – December 2021 (EPSE, 2022).

Figure 1 Amount of fuel imported by type



Source – Based on data from EPSE (<http://www.epse.gov.et/web/guest/supply-facts-and-figures>)

Currently fossil fuel is used as a source of energy for different activities such as transport, industries, cooking and lighting. Figure 1 shows the amount of different type of fuel imported in the country. There is an increasing trend of the country's fossil fuel demand. On average, annually the amount of fossil fuel imported increases by about 5%. Gas oil constitute the largest share of all imported fuel type (more than 60%), which is mainly used in the transport sector, industries, generator, pumps, farm and construction equipment etc. While gasoline and gasoil importation show increasing trend, the amount of importation of other fuel types are decreasing overtime. The annual decline of the importation of kerosene may have implications on the demand for fossil fuels for household consumption.

The large volume of consumption of fossil fuels poses different socio-economic and environmental problems such as GHG emission, air pollution and affecting the development of other social infrastructures (like health facility, education etc.). The importation of fossil fuels demands significant foreign currency expenditure which affects the country's balance of payments (Yacob, 2013). Therefore, the government is considered the energy sector as one of the key pillars in its CRGE strategy mainly through identifying alternative sources of energy to substitute fossil fuel consumption. Moreover, the strategy is also targeted to increase the fleet share of hybrid and electric vehicles to 13% and 2.2%, respectively, by 2030. It also considers shifting 7% and 3% of the city commuters to Light Rail Transit (LRT) and Bus Rapid Transit (BRT) by 2030. In addition, the strategy aims at improving the rate of fuel efficiency by 3.3% between 2010 and 2030 for the freight transports.

### 2.1.1. Policy Instruments to Reduce the use of Fossil Fuels

GHG emissions in Ethiopia's transportation sector are projected to grow by 36 MtCO<sub>2e</sub> from 2010 to 2030 under a business-as-usual scenario (FDRE, 2011). The primary drivers of this increase are freight and passenger transport. The CRGE Strategy estimated that the sector has an abatement potential of up to 12.2 MtCO<sub>2e</sub> in 2030 (FDRE, 2011). The Ethiopian government plans to increase fuel efficiency standards and promote the uptake of hybrid and electric vehicles; construct a renewable energy powered electric rail network; improve public transportation in some cities; and increase the use of biofuels.

Figure 2 Overview of policy instruments to reduce use of fossil fuels

Price-based	Right-based	Regulatory	Information-based
<ul style="list-style-type: none"> <li>Fossil Fuel Subsidy Removal</li> <li>Subsidy of public railway tariffs (Addis Ababa Light Transit Rail and the Ethiopia-Djibouti railway)</li> <li>Tax for substitution of used vehicles</li> </ul>		<ul style="list-style-type: none"> <li>Regulation on blending of ethanol with petrol, and biodiesel with diesel</li> </ul>	<ul style="list-style-type: none"> <li>Electric vehicle promotion –</li> <li>Public awareness to encourage non-Motorized transport</li> <li>Creating awareness to promote Menged Le Sewe (meaning “Streets for People” in English) Campaign</li> </ul>

Source: Adapted from Sterner et al. (2019)

#### Fossil Fuel Subsidy Removal

The Ethiopian government gradually removes the long-running fuel subsidy mainly to ease the financial burden in an economy and used to stabilize rising food prices. The removal of fuel subsidy and the implementation is coordinated by Petroleum and Petroleum Products Supply and Distribution Regulatory Authority, Ministry of Trade and Regional Integration, Ministry of Water and Energy, Ethiopia Petroleum Supply Enterprises and Oil companies (like NOC, Oil Libya, total etc.). For the past years, the government was subsidizing a higher portion of the retail price of

fuel products to absorb the shocks of rising global fuel prices. However, in the last one and a half years, due to the high and continuous increase in the global petroleum market price, the government has reached the point where it is impossible to keep on the subsidy. Fuel subsidies were very costly, representing more than 50 % of total export earnings, contributing towards an increased trade deficit and curtailing investment in other development fields such as health and education (Peter Wooders, 2018). The federal government has spent more than ETB 25 billion (about USD 475,285,171) for fuel subsidization only during the three months and it is expected that the government will spend ETB 15 billion (USD 285,171,102) in the next 3 months for fuel price subsidy if the price of fuel globally is not dynamic (Ilyas Kifle, 2022).

In 2022, the government started to reduce fuel subsidy under the new arrangements called “targeted subsidy” by defining eligible and non-eligible vehicles. The eligible vehicles are those that provide transportation services to the public (such as taxi, buses) and where the government subsidizes 85% of the fuel price. For non-eligible vehicles the amount of subsidy substantially declines and consequently increases the price of fuel in the country (Table 2). For instance, on July 9, the government issued a statement that while the government covered 75 percent of the (price) difference, and the remaining 25 percent would be transferred to consumers. After three months, on September 29, another statement issued to decrease the subsidy from 75% to 50 for gasoline and from 75% to 66.7% for kerosene and diesel. Even though there is no empirical study on the impact of the subsidy removal on fossil fuel demand, a recent shift from subsidizing oil to grain to ease the spiral cost of food is an attempt the government has made so far but still with price hikes on several commodities.

Table 1 Subsidy removal and fuel price

Fuel Type	May 8, 2022		July 9, 2022		September 29, 2022		Public Transport
	Subsidy	price	Subsidy	price	Subsidy	price	
Petrol	100	ETB 36.87 (USD 0.69)	75	47.83 (USD 0.89)	50	57.05 (USD 1.06)	41.26 (USD 0.77)
Diesel	100	35.43 (USD 0.66)	75	49.02 (USD 0.91)	66.7	59.90 (USD 1.12)	40.86 (USD 0.76)
Kerosene	100	35.43 (USD 0.66)	75	49.02 (USD 0.91)	66.7	59.90 (USD 1.12)	
Light fuel oil	100	52.45 (USD 0.98)	0	53.10 (USD 0.99)	0	53.10 (USD 0.99)	
Heavy fuel oil	100	51.78 (USD 0.96)	0	52.37 (USD 0.97)	0	52.37 (USD 0.97)	
Jet Fuel	100	78.87 (USD 1.47)			0		

October 7, 2022 – CBE Exchange rate 1 USD = 53.7146 Ethiopia Birr

### Subsidy of public railway tariffs (Addis Ababa Light Transit Rail and the Ethiopia-Djibouti railway)

The Government of Ethiopia encourages the public to use light rail mass transportation using **subsidized transportation tariff**. This **pricing instrument** represents one of the key transport policies to promote intermodal transport and modal shift from road to rail; and reduce demand of vehicle by raising the relative commuting price to alternative mass transit in cities. In Ethiopia, the existing public road transport network consists of primarily taxi, minibuses and buses running on a mix of gasoline and diesel fuel. Rail has the smallest carbon impact and more energy efficient

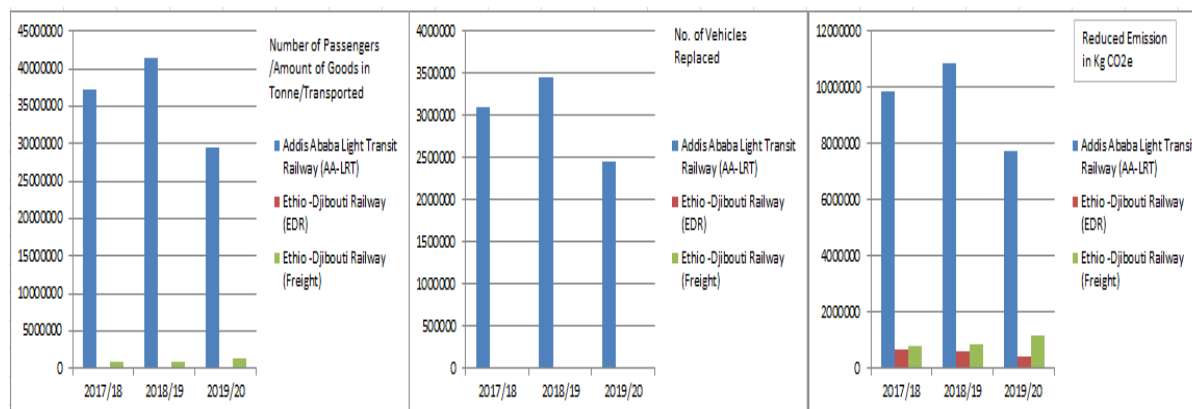
than the other transport modes. Increased investment in rail infrastructure would decrease carbon emissions and could have additional benefits, such as driving growth in regional areas that were previously not easily accessible. Ethiopia is expanding its rail network with electrified lines that provide additional emissions reductions and energy efficiency.

In 2015, Ethiopia introduced the first light rail and rapid transit which is monitored by the Ministry of Finance; the Ministry of Water and Energy, Ethiopia Energy Power and Ethiopia Energy. The total length of both lines is 31.6 Km, and each train was planned to have a capacity to carrying capacity of 286 passengers. This will enable the light rail transit to provide a transportation service to 15,000 passengers per hour per direction and 60,000 in all four directions. According to the Ministry of Transport report, in 2019 AA- LRT transported at least 120,000 people per day and over 29 million commuters were transported in twelve months (Figure 3).

At the beginning, the AA-LRT system has an average travel cost of ETB 0.43 per km (USD 0.008 per Km) (Yassin 2016). This is comparatively low compared with any of the road transport tariffs, which is between ETB 0.45 to 1 per kilometer (USD 0.0084-0.019) (Business Info Ethiopia, 2021). After 4 years of operation, since 2019, the Ethiopian Railway Corporation revised the tariff to a flat rate of ETB 4.00 (USD 0.074) for all trips. While the main objective of the tariff revision is to create a secured control system and minimize the cost of tickets publishing when modernize the ticket system, the revision in fact increases the cost of shorter distance travel (Fortune, 2019). The AA-LRT certainly shows a crucial role to a sustainable, safer, and greener evolution of the transport system, reducing more than 110 thousand tons of GHGs emissions (Figure 3).

On the other hand, in 2017, Ethiopia has also completed the construction of the Ethiopia-Djibouti railway (EDR) for transporting passengers and goods across the 759 km journey of cross-border that connects Ethiopia to Red Sea and boosting Ethiopia's import-export sector. The fully electrified line doesn't only benefit the economy but also makes traveling more convenient for people and environmentally friendly by reducing greenhouse gas emissions. The railway is transported about one million tons of freight in 2019 but it is built to carry up to 24.9 million tons of freight annually (Figure 3). EDR is also transporting over 155,000 passengers in the past year. The electrified train transport is estimated to avoid the emission of more than one million tons of Carbon in 2019/20 year (Figure 3).

Figure 3 Emission Reduction by AA-LRT and Ethio-Djibouti train



### Challenges:

Most of the problems that challenges the functioning of LRT are

- Lack of communication and coordination between ERC and city agencies. The LRT is under the responsibility of the federal body which is disconnected from the city's co-ordination program. This poses challenges in-terms of co-coordinating services, prices, subsidies and for its integration into the overall transport network (Clelie Nallet, 2018).
- Lack of funding to sustain operation. The LRT is assumed to provide affordable transportation for low-income people, it is not financially sustainable without subsidy from relevant authority.
- Power shortage, mostly results in cancellation of schedule (For instance, LRT experiences more than 5,000 delays a year).
- Lack of spare parts for the LRT - The basic unit of AA-LRT is two vehicles (coupled), but often runs as one (single) vehicle due to the lack of spare parts (Ashenafi *et al.*, 2021).

### Regulation on blending of ethanol with petrol, and biodiesel with diesel

In October 2008, the government introduced regulation-based policy instrument which enforces blending of 5 % ethanol with 95 % gasoline in the transport sector. Later in 2011 the blending share increased to 10% ethanol with a target to increase the share to 15% in 2015 (Yacob 2013). A plan for developing biodiesel in Ethiopia was started as early as 2007, when the government with different stakeholders developed an ambitious biofuel strategy aimed at exploiting the opportunity. In this strategic plan *Jatropha* is considered as a principal feedstock for biodiesel production and sugarcane as a principal feedstock for bioethanol production (MoWE, 2013). Given these considerations, the government has also taken steps to support the emergence of biofuel value chains and has launched a Biofuel Expansion Task Force that led to the development of a Biofuel Strategy document in 2007. Policy makers also created a high-level Biofuel Promotion Committee and an Exclusive Biofuel Development Coordination Directorate under the Ministry of Mines and Energy (MoME). The introduction of biofuel productions (both bioethanol and biodiesel) required the engagement of different stakeholders including Ethiopia Mineral, Petroleum and Biofuel Corporation; Ethiopia Sugar Industries Groups; EPA; MoTRI; Oil Companies and feed stock producers (Appendix 2 Stakeholders responsibility).

Ethiopia has a huge land potential, a large labor force, and suitable climate, soil and agricultural condition for the production of biofuel. Moreover, Ethiopia has the potential of producing one billion liters of ethanol per year, with the total identified irrigable land for sugarcane plantation of about 700,000 hectares (MoWE, 2013). From the government's perspective, a strong biofuel sector may be attractive not only to diversify energy resources but also to improve energy access, to reduce import dependency, to save foreign currency, to promote the development of rural areas through investment and job creation and to reduce greenhouse gases emissions (MoME, 2007).

Currently, the country's annual ethanol production capacity is around 20 million liters in the two sugar factories, Fincha and Metehara (Ashebir and Desta, 2021). In the near future, Tendaho, the largest state-owned sugar factory, is expected to develop over 50,000 hectares of land to increase the capacity of ethanol production. Wonji/Shoa and the other new factories under construction together are also expected to start producing ethanol and raise the total annual quantity to about 182 million liters in 2015 (Sugar Corporation, 2013; MoWE, 2013). A number of market segments are available in the ethanol industry serving a wide range of uses in the medical sectors, pharmaceuticals, beverages, industrial, household, and transport uses. However, the most prevalent use of bioethanol in Ethiopia is the transport sector. A significant potential advantage of biodiesel is that the raw materials can be produced without requiring large fossil fuel. Thus, biodiesel can result in substantial reduction (by about 80%) of net GHG emissions. The country has saved USD 20.5 million in fuel imports since the policy began in 2008 until 2012. (Biofuel Digest, July 2012). In 2013 only, the country used more than 8.6 million liters of domestically produced ethanol for the 20% blending process and in 2014 a total of 12.5 million liters of ethanol was used for blending which contributed to the saving of USD 10.2 million in gasoline imports (Biofuel Digest, July 2015).

Despite the huge potential for biofuel development in Ethiopia, the level of production is very small compared with the demand. The Ethiopian biofuel development was very progressive until it reaches the 10% blending approach in 2011. Afterward, the production amount remained constant, and the current production capacity is below the anticipated target (400 barrels per day in 2016). Despite the government's huge investments in sugar factories to produce ethanol as a second product, the country's goal to start 20% ethanol blending approach in 2015 was not achieved due to several challenges (Michael et al., 2021). The following are the major challenges:

#### Policy

- Lack of enforcing mechanism: there is no obligation to blend biodiesel for fuel suppliers.
- Lack of accompanying investment incentives such as tax exception or secured market. for higher biodiesel blends or bioethanol development in the country.
- Lack of adequate standard and guidelines (pricing, quality control).
- Lack of clear mandate, responsibilities, and linkages among institutions on biodiesel production and utilization (EPSE, MoWE, MoT).

#### Technology

- Unavailability (and high cost) of the required technologies.
- Limited number of bioethanol-gasoline blending and storage facilities.



- Shortage of well-trained personnel, especially in biodiesel production.

#### Feedstock

- No land sustainability certification for feedstock production.
- Low productivity of biodiesel crops (as it grows on marginal lands).
- Lack of proper farm mechanization to produce feedstock.
- Lack of adequate financial and technical support to farmers who plants Jatropha.
- Limited research activities on seed varieties for biofuel production.

#### Market, information and finance

- Poor information flow in promoting the policy.
- Difficulty to access financial resources and lack of sufficient working capital.
- Poorly developed network for the supply of biofuel in the country.

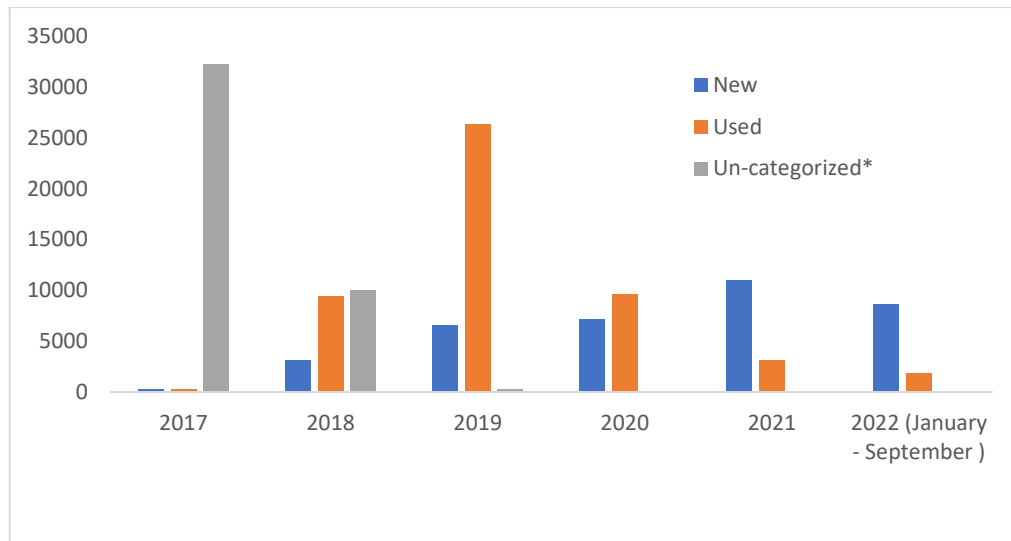
#### **Tax for substitution of used vehicles**

In 2020, the Government introduced a new excise tax policy to encourage the importation of new vehicles and discourage importation of used vehicles into the country (see Appendix 1 on the tax structure). Previously, new cars were considered as luxury goods and, relatively high excise tax was imposed compared to the used cars. All motor vehicles imported within three years of their manufacture date and mileage not exceeding 4,000Km benefit from the lower excise tax levied as brand-new cars. The excise tax proclamation significantly reduced the tax imposed on new cars from as high as 100 percent to as low as 30 percent in the case of vehicles with an engine capacity below 1,300cc. The government is also encouraging assembly plants by exempting them from excise and duty taxes. The monitoring of the policy implementation will be the responsibility of Ministry of Finance, Ethiopia Custom and Revenue Authority and Ministry of Transport and Logistics.

It is estimated that the vehicle population has exceeded 325,000 and growing by about 10% annually. Most of the vehicles are older than 15 years and beyond their useful service life. As a result, high fuel consumption, emission of pollutants, and road accident are serious problems in the country. According to Ethiopia's CRGE strategy, if business goes as usual (BAU), emissions from the motor vehicles will increase from 5 tons CO<sub>2</sub> in 2010 to 41ton CO<sub>2</sub> in 2030 (FDRE,2011).

Thus, the new law seems to have achieved the goal of reducing fossil fuel consumption and GHG emissions by 10-fold in the second half of last year (Fig 4). Simultaneously, earning from excise tax has increased by 65%. Car importers state that new vehicles currently dominate the market. The implementation of the policy instrument is too early to assess its effectiveness and impact on the economy, society, and environment.

Figure 4 Number of used and new imported cars (2017-2022)



The policy instrument being the infant stage of implementation, no empirical evidence was found to discuss the advantages and disadvantages on the economy, environment, and society.

#### Electric vehicle promotion – information-based instrument<sup>1</sup>

The Ethiopia government jointly with the Green Tech company is creating awareness using different Medias and information dissemination campaign in the country to promote the use of electric vehicles. As part of the awareness creation campaign, 60 electric powered vehicles provided free transport services for the community, which lasted for one month. At this promotional campaign program, the Green Tech’s Green transport venture has also presented a 40/60 electric car sale package to customers. This provision will help middle- and low-income societies of Ethiopia secure automobiles and create alternative income streams for themselves and their families. Upon purchase, 60 percent of the payment will be covered by customers and Green Transport covers the remaining 40 percent. Customers can pay 30% of their 60% ownership to purchase their cars and the remaining 70% payment will be paid as per the directives of the agreement between the two parties.

The Government is working to realize the vision of creating a carbon-free transportation and logistics system in the country by integrating the vast renewable energy potentials with competitive electric based vehicle technology by partnering with different stakeholders. To realize this vision the Ministry of Transport and Logistics has planned to introduce 4,800 electric based buses and 148,000 electric based automobiles in its ten years development plan (MoTL 10 YDP, 2020). In 2022, the Ministry of Transport and Logistics has provided the license to Marathon and Green Tech companies, respectively, to the assembly and importation of different electric

<sup>1</sup> Recently, the government issued a tax-based policy instrument to the importation and assembly of electric vehicles. On September 16, 2022 the government has announced that imported and domestically produced electric public transport vehicles, domestic automobiles and cargo vehicles will be subject to lower customs tariffs and will be exempted from value added tax, excise tax and surtax. According to the new directive, the tax rate for fully imported electric vehicles has dropped to 15%, while semi-assembled vehicles will be taxed only 5%. All electric automobiles are also free from 15 Value Added Tax (VAT), 10% surtax and excise tax (5-500% depending on the engine size, age and type). The purpose of the tax reform is to make the rapidly growing number of vehicles in our country compatible with environmental safety in a policy framework, to implement a transportation system that does not harm the public’s health, does not affect the climate and biodiversity, and uses renewable energy sources properly, and to make electric vehicles available to the public at affordable prices. In addition, in the long run it is also expected to reduce the hard currency spending of the Government of Ethiopia to import fuel (Ministry of Finance, 2022).

cars with a capacity of 4 -15 person to promote electric cars in the country. Furthermore, the Ministry in collaboration with these stakeholders has constructed around 40 power charging station in Addis Ababa and other major cities.

While it is too early to evaluate and discuss the impact of the campaign program on shifting the demand to electric vehicle and the country's fuel expenditure as well as GHGs emissions, as compared with fuel consumed vehicles, the electric cars are very advantageous<sup>2</sup>. Since the price of 1kilo watt electricity versus that of 1 liter of gas is 88 folds cheaper the use of electric car can reduce the country's fuel expenditure by one third. The 4-seater automobiles have a 26kWh capacity and with full charge can be driven to a distance of 200 km with only ETB 9.10 (about USD 0.17) while that of the minibus can be driven to a distance of 360km once it 80kWh battery is fully charged with only ETB 28 (about USD 0.53). These prices are even lower than that of 1liter of petroleum gas (about USD 0.92).

The key stakeholder responsible in the promotion of electric vehicles includes the Ministry of Transport and Logistics, Ministry of Finance, Ethiopian Customs and Revenue Authority, Ministry of Water and Energy, Ethiopia Electric Utility, Ethiopia Electric Power, and Private sectors (currently Marathon Motor and Green Tech Car Companies).

#### Challenges

- The purchase price of electric vehicle battery is considered to be high.
- Lack of experts on maintaining electric vehicles in the country.
- Shortage of foreign currency.

#### **Public awareness to encourage non-Motorized transport**

The Government has taken the initiative to establish the necessary infrastructure and create awareness through different Medias to encourage and motivate city dwellers to walk and use cycles as a substitute of motorized transportations. The development and awareness of non-motorized mode of transportation involves promoting bicycle network by dedicating cycle track with safe, user-friendly, and convenient infrastructure to enhance safety and provide comfort zone for cyclists and attract new users. In addition, pedestrian network is promoted by constructing a continuous pedestrian realm with high-quality footpaths, safe at-grade crossings, street trees, and adequate street lighting along new and existing streets.

The implementation of promotional campaign involve the cooperation of multiple stakeholders mainly - the Ministry of Transport and Logistics plays a leadership role in disseminating the NMT policy and monitor progress over time; Ethiopia Road Authority as an institutional body responsible for constructing the necessary infrastructure; Federal police with traffic police control and manage the operations, enforce traffic rules, educate street users, and identify where improvements are required to improve safety; Ministry of Finance is supporting by allocating the necessary budget for the establishment of the infrastructure; and Broadcasting corporation – for media promotion.

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<sup>2</sup> This is based on personal communication of experts from the Transport sector

## **Creating awareness to promote Menged Le Sewe (meaning “Streets for People” in English) Campaign – Information based Policy Instrument**

Ethiopia is promoting *Menged Le Sewe* (meaning “Streets for People” in English) campaign, by creating awareness to advocate for active non-motorized mobility. The *Menged Le Sewe (Streets for People)* day is organized on the last Sunday of the month by opening up street spaces for sports, walking, cycling and playing. In December 2018, seven Ethiopian cities joined the campaign: Addis Ababa, Dire Dawa, Bahir Dar, Hawassa, Adama, Jimma, and Jigjiiga (Iman Abubaker, 2019), in a bid to encourage green transportation and to encouraged walking and use bicycles (Jerry Omondi, 2018). On December 9, 2018, Ethiopia’s capital, Addis Ababa, has led the way by committing to support Menged Le Sewe by closing 4 kilometers of road at the heart of the city encouraging pedestrians to take to the streets.

Currently, several actors are involved in facilitating and implementation of Menged Le Sewe campaign. This includes:

- The Ministry of Transport and Logistics lead and coordinate the campaign.
- The city managers and the Mayor to further decentralize the initiative to districts within the cities to make the event more accessible and far-reaching.
- International NGOs (like United Nation Habitat (UN-Habitat), Institute for Transportation and Development Policy (ITDP) and World Resource Institute (WRI)) support organizing by the campaign by providing technical support, conducting awareness raising workshops and trainings.

The Government is creating awareness using different outreach mechanisms like television, social Medias, News Paper, phone text message to motivate the community. Vehicle free roads in major cities is occasionally implemented (often on Sunday) for non-motorized movement by the public, and the event usually promoted by the officials and celebrities. The campaign intends to encourage exercise, thereby reducing carbon emission by motor vehicles. Successful car-free days are known to influence policy, contributing to a paradigm shift toward moving people instead of moving motor vehicles (ITDP Africa, 2019).

So far, several *Menged Le Sewe* days have been successfully organized, each one bringing in new participants and activities. For instance, in Addis Ababa’s monthly *Menged Le Sewe (Streets for People)* day program, streets are transformed into open public spaces in 16 areas, encouraging active transport and community-building events. In Dire Dawa, every Sunday morning all the roads in the city are closed for vehicles and transformed into public spaces. In addition, the Addis Ababa city is now planning to scale up the frequency of the events to make it weekly and also cover a larger area of the cities (C40 Knowledge, 2019). The campaign has also showed that with more outreach, awareness campaigns and capacity building, Menged Le Sewe can reach its full potential and be a model for other cities in the region, demonstrating that streets can be more than just a medium to move cars – they can be a place for people too. The events improve air quality, help to drive sustainable behavior change and show citizens a vision of a future less reliant on motorized transport (C40 Knowledge, 2019).

## 2.2 Plastic Pollution

Plastic pollution is one of the most important solid wastes. With regard to the generation of plastic waste in the city, a decade ago, single use plastic products constitute only 3 to 5% of the total solid waste in the country. The figure has now jumped to almost 14%, according to a recent assessment by the EFCCC (EBR, 2020). Currently, annual total plastic consumption in Ethiopia is between 280,000 to 300,000 tons of which single use plastic constitutes 70% (Solid Waste Management Agency, 2020). In addition, the rapid growth of spring water industry, trade and services has accelerated the generation of plastic bottles (Massreshaw, 2018). In Hawassa city, the proportion of plastic waste generated is around 8% of the total waste produced (127 t/day. This gives an average of 10.16 t/day of plastic waste in urban areas, out of which 63% (6.4 t/day) are light plastics (SIWI, 2020). Note that waste contributes about 13% the total GHG emission in Addis Ababa city. Solid waste releases about 0.32 Mt Co<sub>2</sub>e (6.46%), which is significant emission as a sub-sector in Ethiopia case (AAEPA, 2015). In Bahir Dar, the average household plastic waste generation rate is about 1.73 gm/household/day (that is 0.35 gm/capita/day) (Ayanu, 2007). The same study also showed that, the total of 24.87 tons of plastic waste was generated annually in the city which is equivalent to more than 12 million Plastic bags per year.

The above discussion highlight that large numbers of people depend on using plastic bags but making less effort to minimize the proper disposal of plastic bag waste. Plastic bags are not only convenient for handling and carrying goods, but they are also easily accessed in most places and times; they are cheap and even freely available in the market while buying goods. For the traders, the profit obtained from the thin plastic bags is higher than the other types of plastic bags. Thus, wholesalers usually prefer to distribute thin plastic bags to the users (EFCCC, 2020). Associated with this, the lack of proper solid waste management systems and low public awareness results in littering, illegal dumpsites and consequently increased amounts of plastic waste in the environment, streets, canals, rivers, ditches, and sewerage systems. Most of the collection of plastic for reuse and recovery in the cities is performed by the informal sector with limited role on the government provision (Bjerkli, 2005).

Considering the existing waste pollution problem, in 2007 the Government introduced a solid waste management proclamation (proclamation No. 513/2007 which states that 'Urban Administrations shall create enabling conditions to promote investment on the provision of solid waste management services'. Ethiopia has also given strong policy and strategic support for building green cities through its Climate Resilience Green Economy (CRGE) strategy as one of the CRGE pillar (FDRE, 2011). Internationally, Ethiopia has also endorsed the Plastic Pollution Resolution on the Fifth Session of the United Nation Environment Assembly (UNEA) in 2022. To address the challenges raised here and fulfilled the goals of the strategies, different policy instruments have been adopted. In the following section we will present some of these policy instruments.

## 2.2.1 Policy Instruments to Reduce Plastic Pollution

Figure 5 Overview of policy instruments to reduce plastic pollution

Price based	Right-based	Regulatory	Information-based
<ul style="list-style-type: none"> <li>Supporting plastic collectors through price support (subsidy)</li> </ul>		<ul style="list-style-type: none"> <li>Banning of Plastic Bags (equal and/or less than 0.03 mm)</li> </ul>	

Source: Adapted from Sterner et al. (2019)

### Banning production and import of Plastic Bags equal and/or less than 0.03 mm

The Solid Waste Management Proclamation (Proclamation No.513/2007) Ethiopia banned the production and import of plastic bag with a wall thickness of 0.03 millimeters and less than 0.03 millimeters. Article (8) Sub article (1) of this proclamation states that “it shall be unlawful to put on the market any plastic bag that is not labeled to how it is biodegradable or not” and Article (8) sub article (3) also states that “It is prohibited to grant permit for the manufacture or import of any non-bio degradable plastic bags with a wall thickness of 0.03 millimeters and less than 0.03 millimeters”. This allows the production and use of plastic above 0.03 mm thickness as well as decomposable products.

Several institutions at Federal and Regional/City Administration level are trying to work together to implement the regulatory policy instrument (Appendix 3) long ago. However, the policy instrument is poorly implemented to achieve the intended targets. The main shortcoming in this regard is the absence of strong law enforcement mechanism which would work towards the implementation of the regulations. Only six out of eleven regions had established regional environmental authorities until 2014; and even regions that established authorities lack strategies and implementation due to a lack of staff and organization. A study conducted on the compliance level showed that 14 out of 21 companies inspected were found producing below the required 0.03 millimeter thickness (Woldegiorgis 2017).

In spite of the various efforts by several institutions, plastic waste management is still the challenge in Ethiopia. This is mainly because:

#### Policy focus

- The current proclamation focuses only producers without due considerations to restrict traders, distributors and consumers from selling and using plastic bags.
- There is no transition strategy to support plastic producers to shift to another business (the machine cannot be used for another purpose).
- Lack of enabling environment across the value chain from generation, collection, onsite storage, transportation, treatment and disposal (UNDP 2020).

#### Institutional

- Low institutional capacity to regulate the production and distribution of illegal plastic bags.
- the absence of strong enforcement mechanism and poor coordination among the institutions responsible for plastic waste management including government organizations at the municipal, sub-city, and district levels and cooperate with wards, the private sector, industries, and civil society organizations; (Bkerkli, 2005).
- High turnover of experts and officials in different responsible institutions affecting the implementation of policies and long-term strategies.

#### Private Sector

- Engagement and consultation of the private sector, particularly plastic manufacturers from the government side were limited during the development and introduction of the plastic bags ban.

#### Infrastructure

- Limited solid waste management systems; lack of sorting area; and limited number of recycling facilities coupled with huge waste accumulation are the root causes for plastic bag and bottles litter.

#### Awareness

- Low public awareness raising campaigns and participation which are necessary to bring behavioral changes and get the general public to actively participate in waste reduction, separation, and recycling (Xie and Mito, 2021).

### **Supporting plastic collectors through price support (Subsidy)**

In view of institutionalizing the plastic collection system and encourage the plastic collectors, the government organized the collectors into formal associations and provides subsidy of additional 2 birr for each kg of plastic collected. At that time selling price of plastic waste was about 3 to 4 birr/kg. The incentive payment (that is 2 birr/kg) was paid by the government after the plastic collectors provide the receipt from selling the amount of plastic waste to the recyclers. Currently, the government has stopped the price support due to the upsurge of the price to more than 20 birr/kg as a result of the increase in demand for plastic bottle.

The government considered institutionalizing the informal sector with the objective of supporting the informal plastic collectors and ensures a sustainable waste management. Different government stakeholders in collaboration with NGOs, worked together to develop a sustainable plastic waste management system in the country. The stakeholders include:

- **Federal, Regional and City Administration Environmental Protection Authority** – develop over all policy and guidelines on waste management in general and plastic specifically, as well as regulate and monitor the implementation of the policies.

- **Addis Ababa Cleaning Agency** - the agency organizes the informal collector to formal association in order regularly monitor, provide capacity building, provide storage areas and link with buyers' company.
- **International organizations** – in collaboration with government bodies provide technical and institutional capacity building to the associations like training and bailing machines.

According to an interview with Addis Ababa Cleaning Agency, some 3 to 4 years ago the plastic pollution was creating pressure on the landfills, water ways and environment. However, the implementation of this price-based policy instrument has contributed to the reduction of plastic pollution in the country. According Mekonnen *et al.*, (2016), per capita collection capacity of a collector is around 42 kg per day. Assuming the average numbers of 4864 collectors in Addis Ababa are working every day; 204 tons of mixed recyclable materials were collected from the city within a day. With an average number of five working days in a week, 1020 tons recyclable will be recovered per week, 20400 tons per month and 244800 tons per year mixed materials are collected, which would have either end up in landfill, environment and water bodies. Where, out of total recyclable waste collected 46 percent were plastics, 34 percent were metals, 16 percent were glass and 4 percent were others by mass.

Ethiopia have also earned over USD 3.9 million by exporting waste plastic products, which was generated from the export of 5,283 tonnes of waste plastic products to India, China, Indonesia and Bangladesh (Solomon, 2019). In addition, the activity carried out by the plastic collectors generated a positive social externality such as reduction of production costs, minimizing city's collection and disposal cost and increasing of landfills' lifetime.

### Challenges

- Lack of recycling and storing facility outside Addis Ababa (UNDP-Lab, 2020).
- Lack of technology and vehicles- for example, plastic bottles bailing machine, shredding machines (Mekonnen, et al., 2016).
- Lack of access to water and electricity - (Natural Resources Stewardship Programme, 2021).
- Low quality of the collected plastic – Plastic waste collected is often too dirty for further use and limitations of use are also due to plastic color, quality and material history.

### 2.3 Forest Loss

Ethiopian forests are under threat from different type of human activities. The CRGE strategy (2011) indicated that forest-related emissions which amounts almost 55 Mt CO<sub>2</sub>e in 2010 is driven by deforestation for agricultural land (50% of all forestry-related emissions) and forest degradation due to firewood consumption (46%) as well as formal and informal logging (4%). Kooser (2014) also indicates that every year, nearly 200,000 hectares of forest land are destroyed in an effort to collect wood in Ethiopia. Similarly, FREL (2016) revealed that about 17.2 million hectares of the Ethiopian forest stock is threatened by an average annual deforestation rate of 0.54% i.e., an annual loss of about 92,000 hectares despite an afforestation of 19,000 ha annually



between the year 2000 and 2013. These results an emission of 17.9 Mt CO<sub>2</sub>e/year from deforestation while removals from afforestation/reforestation account only 4.8 Mt CO<sub>2</sub>e/year.

The Government recognizes that forest loss by deforestation and forest degradation must be reversed if the country needs to meet its development goals. Thus, protecting and re-establishing forest is considered as one of the four pillars of the country's green economy strategy (CRGE, 2011). The 10-year development plan (2022-2031) also considered the forest sector to increase forest coverage from 15.5 to 30%, restored forest land of 3.96 to 13.96 million ha, and reforested land 3.3 to 11.3 million ha (PDC, 2020). The revised NDC also targets to sequester about 99.87 Mt CO<sub>2</sub>e through afforestation, reforestation and sustainable forest management by 2030 (NDC 2021).

In 2007, the Council of Ministers adopted a forest policy for the first time in history. The overall objective of the policy is to conserve and develop forest resources for the sustainable supply of forest products to the society and contribute to the development of the national economy. However, the 2007 forest policy stands for state and private forests with lack of provisions for community forestry. For instance, because all restored forest land was treated as state property, so even after decades of restoration effort by a given community; the state could reallocate the land to other users.

The 2018 National Forest Law (Forest Development, Conservation and Utilization Proclamation No, 1065/2018) – a revised version of the 2007 forest law – clearly recognizes the rights of communities and acknowledges their role in managing natural forests and establishing plantations. The new law contains the following key changes:

- Recognizing four categories of forest – state forest, private forest, community forest and association forest and grants rights for each to manage and benefit from forests;
  - Recognizes participatory forest management (PFM) as a vehicle to enhance the role of communities in sharing responsibilities and benefits of managing natural forests in accordance with agreed-upon forest management plans;
  - Providing incentives for the private forest developers through mechanisms such as lease-free land, better access to land use and forest ownership certificates, and tax holiday until and including the first harvest (for private investors and associations) and the second harvest (for communities); and
  - Putting severe penalties on those who expand farming into forests; tamper with forest boundaries; or set fire, settle, or graze animals in state, communal, association or private forests.
- 
- In case any person is found trespassing the restrictions set in the forest law, the Proclamation provides the penalty fee ranging from ETB 1,000 to 30,000 including imprisonment depending on the type of violation (See Appendix 6).

### 2.3.1. Policy Instruments to Decrease Forest Loss

The forestry sector CRGE strategy focuses mitigation from afforestation, reforestation and forest management. The strategy also emphasizes on reducing pressure on forests from agricultural expansion and underscores interventions that reduce demand for fuelwood, such as efficient stoves, and other advanced cooking technologies. In this assessment we focus on economic policy instrument that affects existing forest positively (decrease forest loss).

Figure 6 Overview of policy instruments to decrease forest loss

Price based	Right-based	Regulatory	Information-based
<ul style="list-style-type: none"> <li>Payment for Ecosystem service/Carbon Market through PFM</li> </ul>	<ul style="list-style-type: none"> <li>local ownership and right to manage forests</li> </ul>		Promotion of improved cook stoves

Source: Adapted from Sterner et al. (2019)

#### Payment for Ecosystem service/Carbon Market through PFM

Payment for Ecosystem Services (PES) emerged as a potential price based policy instrument to reduce deforestation and forest degradation to achieve carbon emission reduction through Participatory Forest Management (PFM). Previously, various attempts to arrest the rapid decline in forest cover has proved unsuccessful largely because they failed to address private incentives. Only when local communities are recognized as key stakeholders and mutually beneficial management arrangements are in place can they be effectively engaged to fill the institutional gaps that appeared when forest management was centralized (Mulgeta *et al.*, 2015). As a price based policy instrument, the PES enables creating an additional income stream for the community to incentivise conservation of the forest by avoiding deforestation and forest degradation through the implementation of Participatory Forest Management (PFM). The engagement of local communities has been motivated primarily by the anticipation of their share of carbon credits and income generated from forest products-based enterprise developments, which serve to offset financial gains that could have been made through the conversion of forest to other land uses.

PFM is also considered as a right based policy instrument used to protect forests and enhance the livelihoods of communities who are dependent on forest resources, by providing the right to involve all key stakeholders in the process of forest management, understanding their needs and situations, allowing them to influence decisions and receive benefits and increasing transparency. It also gives the communities sense of local ownership and right to manage forests in a sustainable manner (Dereje and Mulugeta, 2019). PFM was initiated in the late 1990s in two regions of Ethiopia, Oromia and Southern Nations Nationalities and People Regional State (SNNPRS) (Ameha *et al.*, 2014). Then, Ethiopia has been implementing a national PFM scaling up program since 2010 (MoARD 2010). All the scaling up of PFM project is concentrating on capacity building at different levels: of woreda and kebele staff to enable support to PFM and NTFP development; at federal level to take the lead in coordinating and monitoring PFM nationwide and at regional and zonal level to enable backstopping to field based extension agents. The PFM model creates a framework

for collaborative forest management between local communities and government forestry agencies. Organized community groups and the relevant government body share the benefits, roles and responsibilities for the forest where the government has the strict ownership of the forest.

The scaling up of PFM project by MoARD is exploring REDD and CDM and voluntary carbon markets for their future PFM projects. Ethiopia has benefited from carbon market from Humbo forest and Bale forest by registering certified emission reduction from the conservation of forest through the engagement of the communities.

- The Humbo project is the first of its kind in Ethiopia using farmer-managed natural regeneration (FMNR) techniques to generate carbon credits. The project aims at rehabilitating 2,728 ha of a formerly forested area that had been degraded due to human activities mainly tree cutting, charcoal production and livestock grazing. The project is expected to sequester 880,296 tonnes of Carbon dioxide equivalent (tCO<sub>2</sub>e) for an operating lifetime of 60 years and a fixed 30 year crediting period with an average net anthropogenic greenhouse gas removals by sinks of 29,343.2 tCO<sub>2</sub>e per year (Byamukama B. et al. 2012). The rural communities around Humbo forest has successfully restored 2,728 hectares of biodiversity-rich land and generating cash from the reduced carbon emission. The carbon revenue awarded was reinvested in productive, community-driven activities and establishing for micro businesses such as beekeeping and livestock husbandry.
- Bale forest is an area of significant ecological importance, where open access to the forest had been driving rapid deforestation for many years. The PFM project is implemented to reduce deforestation in the eco-region by 50% for the first five years and overall by 70% over the entire project period (2012-2031) of what would have happened under a “business as usual” scenario. Between 2012 and 2015, a total of 12,496 hectares of forest was saved, which was equivalent to a saving of 5.5 million tonnes of carbon dioxide emissions and gain 149 million birr (about 3 million USD) from carbon trading (Farm Africa, 2021). . The income from the sale of the carbon credits was shared on a 20/80 basis between the Government and forest management cooperatives (Mulugeta et al, 2015). In addition further emission reductions from reduced deforestation between 2016 and 2019 is being verified and once completed, the proceeds from the revenues from these sales are distributed to the local communities and the forest management agency in Bale according to a 60/40 benefit sharing agreement.
- Bonga PFM project –is one of the oldest pilot sites and indicated community-based management of the PFM project have positive impacts both on the state of the forest and living condition of participant households (Gobeze et al., 2009).
- Another study from five PFM pilot projects in Oromia and SNNP Regional States, all of which are in their post project phases, indicated that in all of the five cases the state of the forest have improved with the introduction of PFM, and in four of the cases the improvement was maintained after projects ended (Ameha et al.,2014). The same study

also revealed that although regulated access to the forests following introduction of PFM was not perceived to have affected forest income negatively, there are serious concerns about the institutional effectiveness of the Forest Users Group (FUGs) after projects ended, and this may affect the success of the PFM approach in the longer term.

Several institutions are involved in the promotion and implementation of PFM (for carbon market in the country):

- Forest Development (previously part of the EFCC) as the main actor in forest development, conservation and utilization in the country.
- Other relevant government organs including Ministry of Agriculture (MoA), Ministry of Water and Energy (MoWE) and Ministry of Mines (MoM).
- Ethiopia Wildlife Conservation Authority and Regional Forest and Wildlife Enterprise
- Ethiopia Biodiversity Institute (EBI)
- Ethiopia Environment and Forest Research Institute (EEFRI)
- Forest dwellers Association and Community Based Organizations and NGOs (Farm Africa and SOS Sahel Ethiopia).

These institutions provide different supports including - facilitating the estimation, verification and sale of carbon emission reduction in international market and ensure the equitable share of benefit among the community according to the pre-signed agreement; provide information and awareness raising of the value and importance of forests to surrounding communities; encourage adoption of fuel efficient stoves, afforestation and reforestation as well as creating additional source of income by introducing beekeeping, spice and fruit development schemes; and arrange exchange visits to earlier PFM projects with other PFM communities to provide input and ideas along the way to enable development of the PFM.

### **Challenges**

The following are challenges that constrain the implementation of PES and PFM:

#### **PES**

- Contradictory agreements made for overlapping forest areas.
- Leakage-When restricting the use of a particular forest area there is a risk of redirecting extraction pressure to other forest areas.
- Policy and legal limitations that restrict business and income earning from forest resources for forest management associations.
- lack of adequate capacity, which includes institutional and human capacity, of forest offices at the lower level of administration.
- Low direct benefit to the community due to the failure of carbon trade.
- Lack of budget and logistics: Particularly at *weredas* (districts) to undertake the proper monitoring and evaluation.
- Absence of proper institutional arrangement and weak inter-sectorial linkages.

#### **PFM**

- Resistance and skepticism from communities when introduced to the concept of PFM.
- Boundary disputes during the delineation of the forest and difficulties in building mutual trust between community/farmers around the forest and implementers.
- Illegal private investments on the delineated forest areas that compromise the carbon emission reduction plan.
- Risks of increasing social and economic differences between neighboring communities.
- Inconsistent and sporadic support from government institutions at both regional and local level.
- High turnover of officials in key positions, e.g. development agents and government staff.
- lack of clarity in policies and regulations for ownership and utilization rights.

### 2.3.2 Promotion of Improved Cook Stoves (ICS)

In its CRGE strategy, the government aims to disseminate 31 million improved cook stoves before 2030 (CRGE, 2011). The Improved Cook Stoves Program is mandated to disseminate the stove by raising the awareness of rural and urban households, and promote the use of different type of ICS and reduce the pressure on the forest. As information based policy instrument, the awareness creation mechanism considered includes production and distribution of posters and user leaflets; conducting stove demonstration; participation on trade fairs and exhibitions; medias (TV/ Radio); billboards; newspaper; sponsoring of magazine and bulletin; and coupon system is one of promotional tools used to subsidize limited number of stoves for first few buyers with in limited period of time.

The Ministry of Water and Energy (MoWE) takes the lead on managing the ICS programme although much implementation take place within regional centres. However, there are also other important stakeholders, including the Ministry of Finance (financing), Forest Development, (tracking effects on deforestation and forest degradation), the Ministry of Health (MoH) (tracking indoor air pollution impacts), and the Ethiopia Quality and Standards Authority (approving ICS standards).

About 80 % of the biomass energy comes from woody biomass, and about 10 % each from crop residues and animal dung (Hiwote Teshome, 2014). The traditional three-stone stove, which has about 90 per cent energy loss, is used by around 80 % of the population (Ministry of Water and Energy, 2013a). In recent years peoples who lived in urban areas are starting to use electricity as a source of energy but still there is higher consumption of biomass fuel wood like charcoal, branches and leaves which accounts more than 105,172,465ton/yr. According to Geissler et al., (2013) the national charcoal demand has also increased from 48,581 to 4,132,873 tons/year between the years 2000 to 2013. This indicates that household domestic fuel wood consumption has a great impact on changes of forest land cover type (Negasi et al., 2018).

To address this energy inefficiency from traditional stove efforts have been made on the advancement and distribution of improved cook stoves over the last-two -recent decades (Tucho & Nonhebel, 2015; Mekonnen et al., 2020). Between 2011 and 2017, around 11,110,492 ICS was distributed by the Ethiopian government and GIZ (Aster Woldu, 2022). A study by Paul *et al.*,

(2018) also indicates that 9 million ICS was distributed by the government through the national improved cook stove program of Ethiopia. The improved cook stoves achieved fuel savings of 35–50% compared to conventional stoves (Mehetre et al., 2017). Hence, 300 kg/year of charcoal per family could be saved and achieved healthier cooking environment. In addition, the use of ICS pause the conventional cooking trend and moved large populations away from practices resulting in unacceptably high GHG emissions, indoor air pollution and deforestation (Mehetre et al., 2017).

However, the dissemination of ICS still has challenges affecting the progress towards achieving the target set in the CRGE. According to the MEFC report (2018) the following challenges has been identified:

### **Policy and strategy**

- limited promotion of the program for the participation of potential development partners, and inadequate performance on existing commitments.
- Poor Monitoring and evaluation system including a strong sector database.
- Lack of coordination among institutions to align their objectives such as clean cooking, forest development, environment, climate change, health, gender, and technology and innovation.

### **Institutions**

- There is no central government institution with mandates to provide guidance and oversight as well as coordinate efforts in the clean cooking sector.
- Lack of strong clean cook stove association which contributes to innovation, quality products, productivity and undeveloped distribution system for improved and clean cooking sector in Ethiopia.
- Institutional instability both vertical and lateral.
- the absence of a well-organized research organization working in the development of improved cook stove in the country both at the national or regional level.

## Chapter 3: PUBLIC ACCEPTANCE OF POLICY INSTRUMENTS

An important component contributing to an effective introduction and implementation of environmental policy instruments is that there is public acceptance. From a normative democratic perspective, it is desirable that policies are in line with people's preferences. But there are also practical reasons for why public acceptance is important.

There are several examples from all over the world when we have seen protests in connection to the introduction of new reforms or policy instruments. This can be from certain interest groups (e.g., plastic bag producers opposing a ban on plastic bags) or from the general public protesting against increased fuel prices (due to for example reduced subsidies or increased carbon taxes). Some recent examples from East Africa are the introduction of a 16% tax on fuel products in Kenya prompted strikes and protest across the country and stakeholders from the private sector protested against changing the ban on import on older vehicles from 8 to 5 years. In July 2022, police in Uganda fired teargas and arrested more than 40 people who participated in large protest over increased fuel prices and refusal by government to cut taxes on cooking oil and fuel. In Ethiopia in July 2017, frustrated by a significant tax increase on small businesses with an annual turnover of up to 100,000 Birr, cities in various parts of the region protests on the streets and damaged state-owned properties, shut their businesses in protest and disrupt transport services. Many small business owners in the capital Addis Abeba are queuing to return their business licenses or file complaints with the revenue authority. In the wake of protests by the affected business people, Ethiopian authorities have withdrawn a proposed tax hike for small businesses. These examples illustrate the need to enact policies that have wide public acceptance and support, since politicians will be reluctant to introducing policies and people are less likely to comply if there is low public support.

While carbon pricing is often recommended by economist as a way to reduce the use of fossil fuels, such policies often receive low support from the general public, compared to other policy instruments (Davidovic & Harring, 2020). Higher prices on fossil fuels imply higher costs for goods and services for most households. People are likely to dislike policies that affect them or their group negatively and perceive such policies to be unfair. However, research has shown that there are also other individual level factors or qualities that influence people's attitudes to climate and environmental policy instruments (Harring, 2021). For example, factors linked to people's beliefs or values, such as *concern* for environmental degradation is positively linked to policy instrument support. Another factor is *trust* or confidence in public agencies. People are simply less likely to support the introduction of policy instruments if they believe that the responsible public institutions are not competent, motivated or have sufficient resources to do their job. Previous studies have shown that trust in public institutions is particularly important for accepting or supporting<sup>3</sup> economic instruments (e.g., taxes and fees) (Harring 2014; Davidovic & Harring 2020).

There are few studies of public acceptance of climate or environmental policy instruments from the Global South in general and from Africa in particular (Bergquist et al., 2022). In a unique survey

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<sup>3</sup> Acceptance is a passive evaluative response to a policy, and public support is an active evaluation of a policy, for example linked to behavior (e.g., voting in favor of a policy) (Kyselá et al., 2019).

we have investigated the general acceptance for several policy instruments. The results are accounted for below.

### 3.1. Survey on Acceptance of policy instruments

In the following sections we will present the results for Ethiopia from two surveys on acceptance towards the use of price-based and regulatory-based policy instruments within the three thematic areas we have presented earlier. That is: fossil fuels, plastic pollution and forest loss.

The first survey was conducted via telephone to the general public in Ethiopia, Kenya, Uganda, Rwanda and Tanzania during March 2022. In total 5 078 adults responded to the survey across the five countries, with approximately 1000 respondents in both urban and rural areas in each country. In the case of Ethiopia, the total number of respondents were 1 015. This data was a good representation of the population characteristics in Ethiopia, in terms of gender. However, there was relatively large number of older respondents with tertiary education and residing in urban areas as compared to population data. This was because low penetration rate of telephone in the rural areas and during data collection more urban and people with relatively high education were willing to participate in the survey as compared to low-educated people living in rural areas<sup>4</sup>.

The second survey targeted stakeholders within public sector, civil society, academia, and private sector. The stakeholders were selected for their knowledge within the three thematic areas, and the survey carried out in workshops in each of the five countries during July and August 2022. The survey was responded to individually at the beginning of the workshop. In total 249 respondents, with a range of between 36-65 respondents in each country. In Ethiopia the number of respondents was 38, representing the following kinds of stakeholder: 51% civil society, 27% public sector, 16% academia, and 6% private sector.

#### 3.1.1. Acceptance of Policy Instrument affecting Fossil Fuels

In the surveys we asked our respondents about their opinion about three proposed policy instruments to deal with the negative consequences for the global climate and local air quality caused by the use of fossil fuels (such as petrol, diesel, gas, kerosene and coal). The following three policy instruments are:

- Decreasing the quantity of fossil fuels by regulating how much households can buy
- Increasing the prices on fossil fuels by introducing a tax
- Increasing the prices on fossil fuels by reducing subsidies

Figure 4 shows the results for the general population in Ethiopia. It indicates that there is a stronger opinion against these policy instruments, rather than in approving of them. Further, there is a similar level of acceptance for the three policies: regulation (27%), tax (28%) and subsidy

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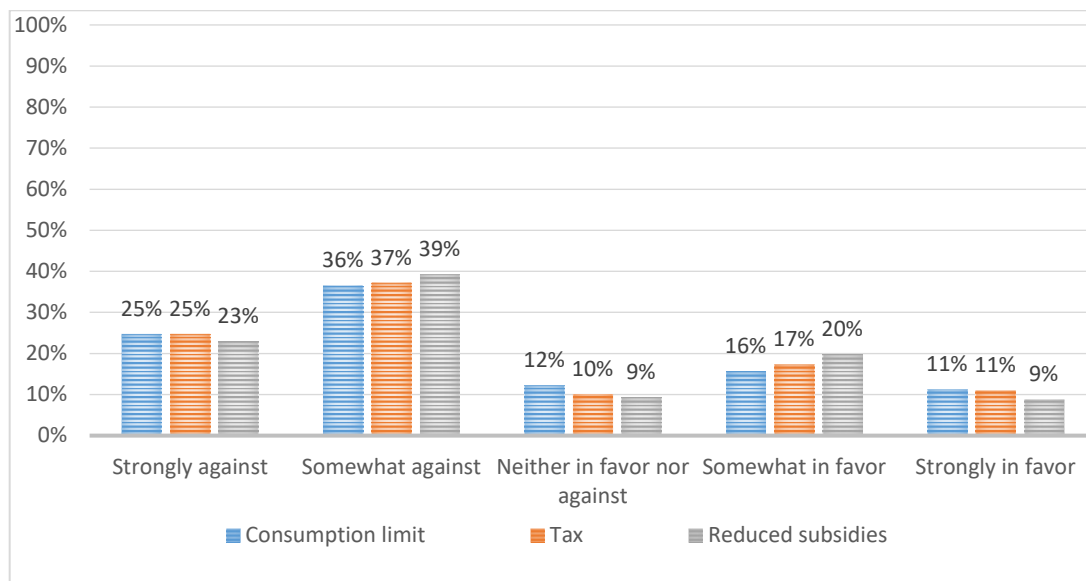
<sup>4</sup> We have conducted statistical test on the population sample (Kruskal-Wallis) to confirm statistically significant differences between the distribution of responses per policy instrument. This has not been done for the stakeholder survey, due to the low sample size.



reduction (29%). The figure in brackets refers to the share of respondents stating that they are either somewhat or strongly in favor of the policy instrument.

However, the picture changes when respondents were informed that the revenue was going to be used for a specific purpose. Such as education, infrastructure or to an environment or social program. In Ethiopia, the acceptance for a tax or reduced subsidy increased from 28% (without specified revenue use) to 52-54% when revenue use was specified to be for education, infrastructure, or environmental programs, and to 61% for social programs targeting the poorest households in society.

Figure 7 General population's acceptance of 3 different policy instruments affecting fossil fuel use (1015 respondents)

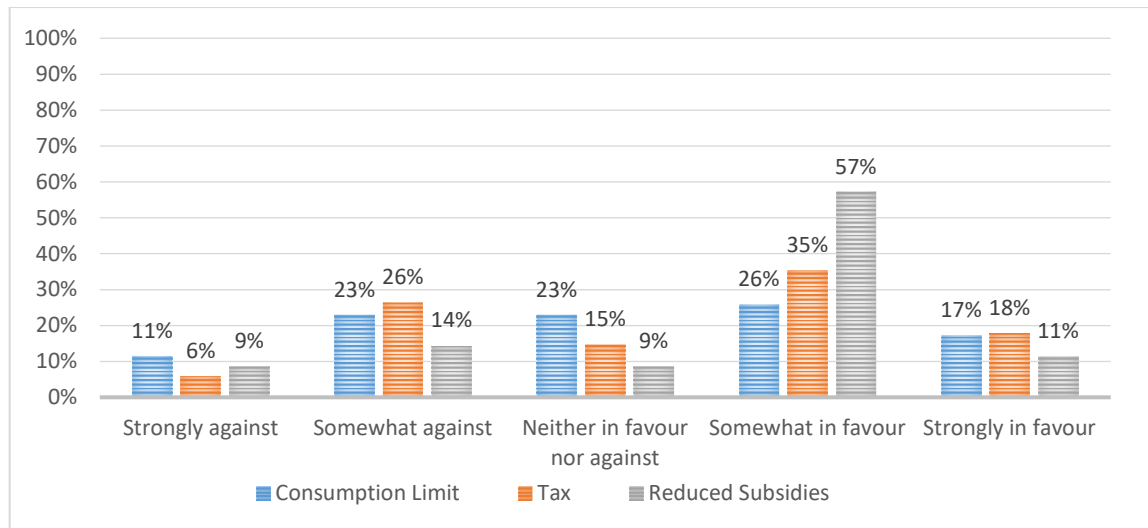


In addition to the question on general fossil fuel use, we also asked about the opinions concerning a decrease in the price on cooking gas (i.e. Liquid Petroleum Gas, LPG) by a subsidy. The acceptance of this subsidy was strong with 53 % of the respondents stating they were somewhat of strongly in favor. In comparison to the other countries where the survey was conducted the acceptance was much higher for the LPR subsidy, between 76% in Tanzania and up to a 98 % acceptance in Rwanda.

### Stakeholders' perspective

When asking different stakeholders, the same questions as the general public, the responses turn out rather different as seen in Figure 5 below. Here the results indicate a higher acceptance to the three policy instruments affecting fossil fuel use. There is preference toward the reduced subsidy compared to the consumption limit and the tax. The acceptance increased even more when the use of collected revenues were specified, a similar pattern as we saw amongst the general public. However, it is important to keep in mind the large difference in number of respondents between the two surveys, only 38 respondents in the stakeholder survey compared to 1015 respondents from the general public.

Figure 8 Stakeholders' acceptance of 3 different policy instruments affecting fossil fuel use (38 respondents)



### 3.1.2. Acceptance of Policy Instrument affecting Plastic Pollutions

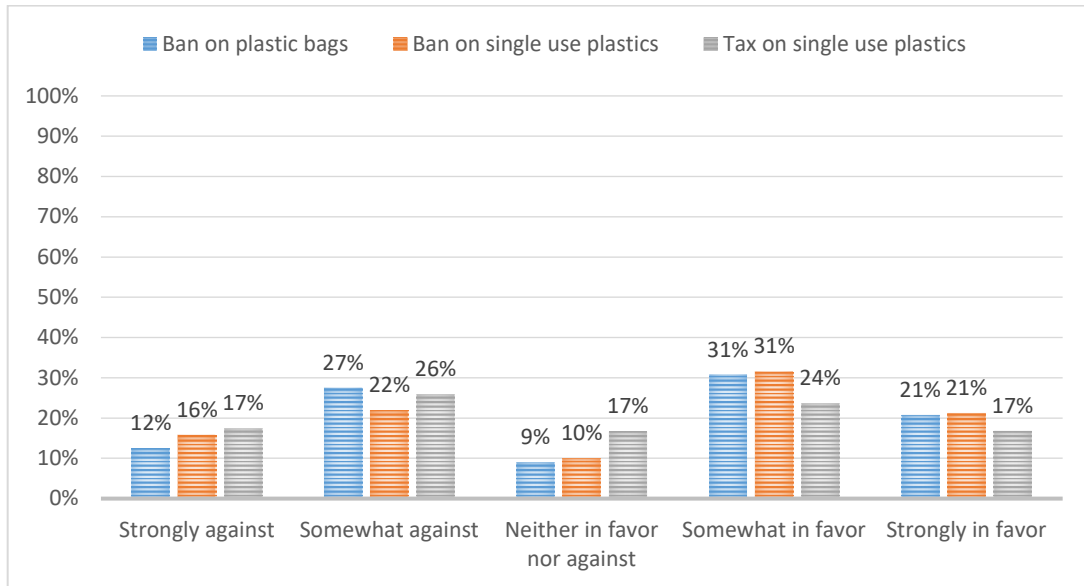
Concerning plastic pollution, we asked in the survey about the opinions on the following three proposed or already implemented policy instruments:

- A ban on the usage of plastic carrier bags
- A ban on the usage of single use plastics
- A tax on the usages of single use plastics

Compared to the relatively low acceptance of the policy instruments on fossil fuels, it is much higher for the ones concerning plastic carrier bags and single use plastics (see Figure 5). The respondents are more in favor than against the proposed bans. However, concerning the tax the share of respondents against are slightly higher, with 43% strongly or somewhat against vs 41% somewhat or strongly in favor.

Our results also indicate that there is a higher level of acceptance for a ban (52%) compared to a tax (41%) on single-use plastics amongst the general population. The acceptance of a ban of single use plastics and plastic carrier bags is however the same.

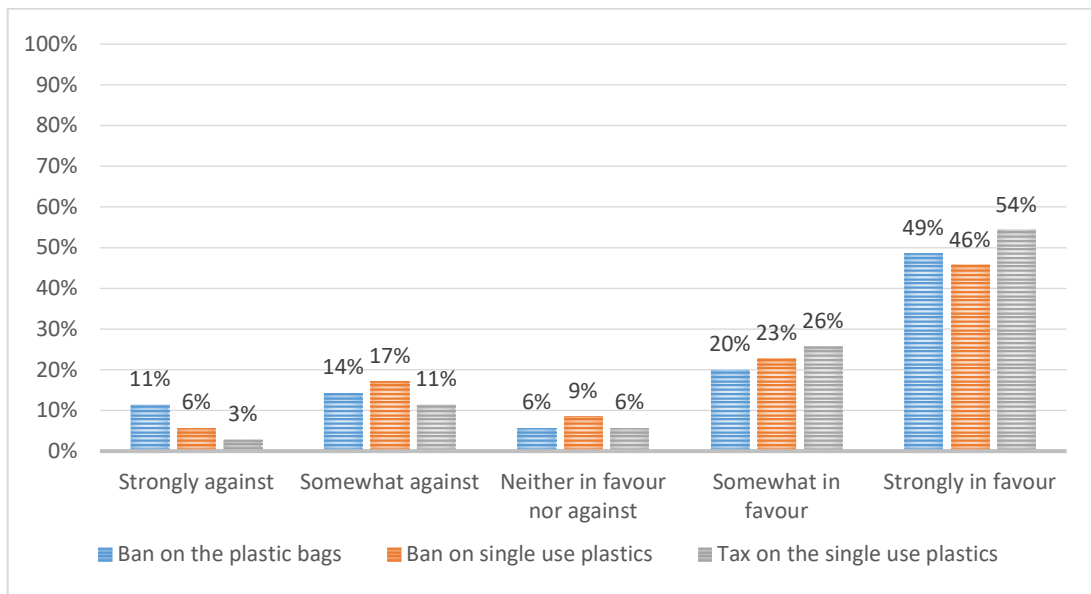
Figure 9 General population's acceptance of 3 different policy instruments affecting plastic pollution (1015 respondents)



### Stakeholders' perspective

For policy instruments affecting plastic pollution, the results from the stakeholder survey shows that the majority of the respondents are somewhat or strongly in favor of all three (see Figure 5). Hence, our results indicate that there is an acceptance for the proposed policy instruments both among the general public and stakeholders in Ethiopia. It is interesting to note, that in the case of stakeholders we see a preference toward a tax on single use plastic compared to a ban. This differs from the general public's preference towards a ban, rather than a tax. Figure 7 notes the low number of respondents per category.

Figure 10 Stakeholders' acceptance of 3 different policy instruments affecting plastic pollution (36 respondents)



### 3.1.3. Acceptance of Policy Instrument affecting Forest Loss

To address the issue of forest loss we asked questions on the opinions on a regulatory-based (ban) and a price-based (tax or fee) policy instrument for (1) cutting trees in community forests and (2) producing, selling and usage of charcoal. The results are presented in Figure 8 and 9 below.

The respondents are in in much higher degree somewhat or strongly in favor of regulating tree cutting in community forest via both a ban and tax (64-65%), compared to against (28-31%). For charcoal, we see the opposite, although, the difference between the ones against and in favor is smaller (40-42% in favor vs. 46% against).

Figure 11 General population’s acceptance of 2 different policy instruments affecting forest loss due to cutting trees (1015 respondents)

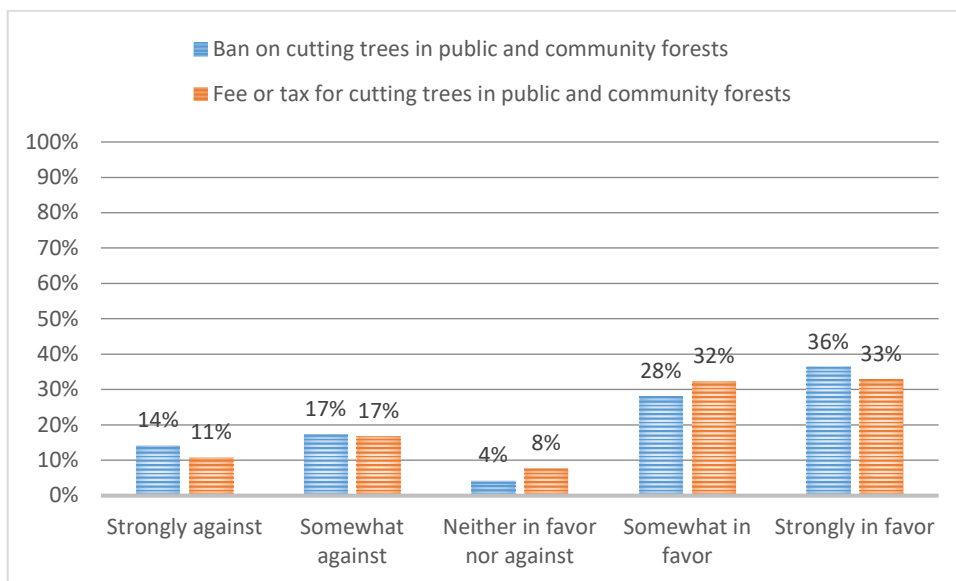
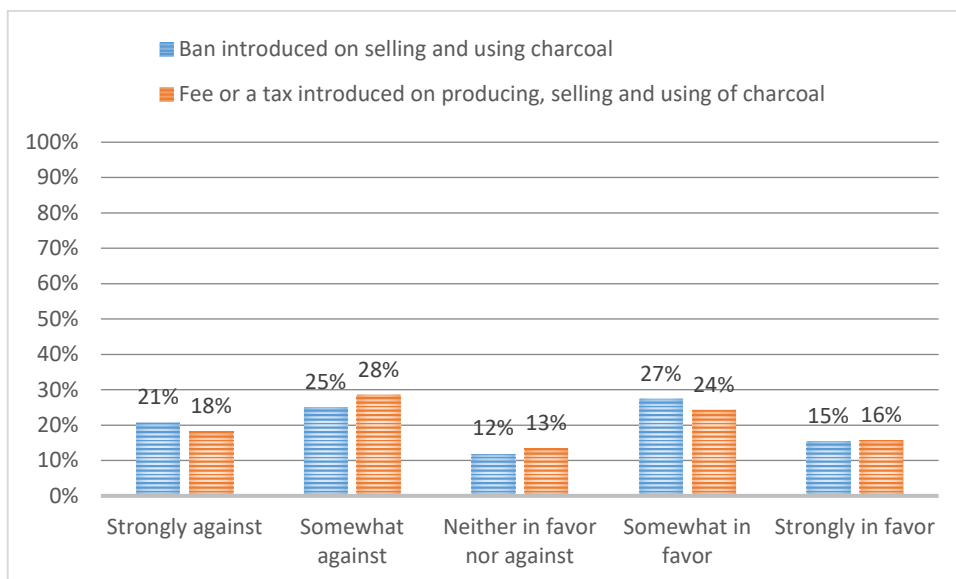


Figure 12 General population’s acceptance of 2 different policy instruments affecting forest loss due to charcoal (1015 respondents)



## Stakeholders' perspective

The result of the stakeholder survey shows that the majority of the respondents are strongly or somewhat in favor of the proposed policy instruments to tackle forest loss, as can be seen in Figure 10 and 11 below. For a ban on or a fee/tax for cutting trees in public and community forests the stakeholders' perspective is indicated to be similar to the general public, but more in favor and less against the policies. For charcoal, the stakeholders also seem to more in favor of than against, but to a far lesser extent than for regulating the cutting of trees.

However, it is important to keep in mind the large difference in sample size and note that we do not have the stakeholders' responses on a fee or tax on charcoal, hence, we are not able to assess the acceptance for this policy instrument.

Figure 13 Stakeholders' acceptance of 2 different policy instruments affecting forest loss due to cutting trees (38 respondents)

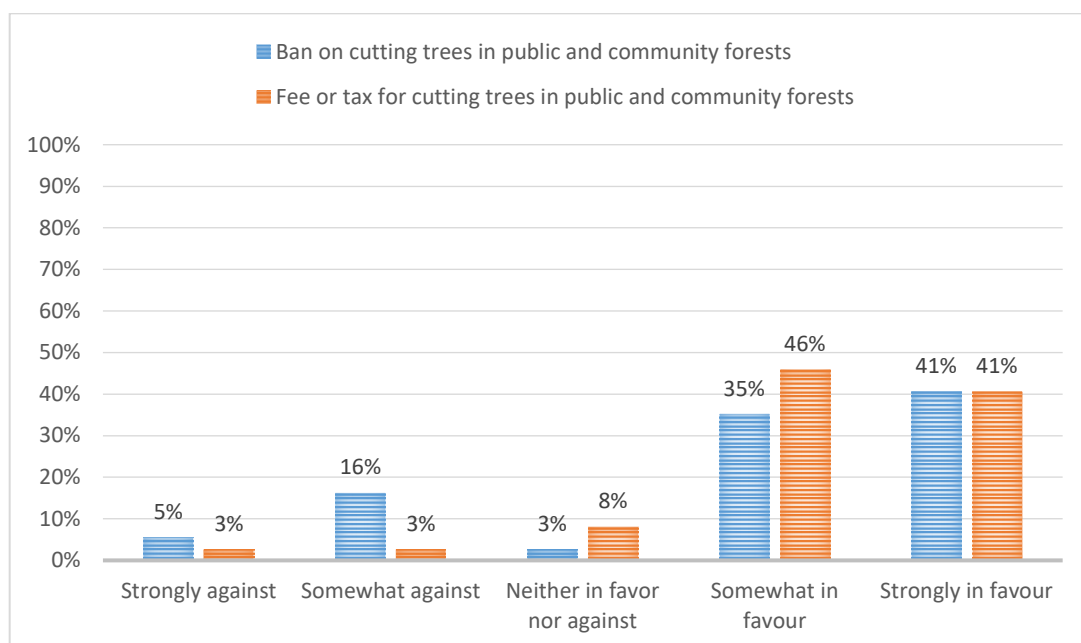
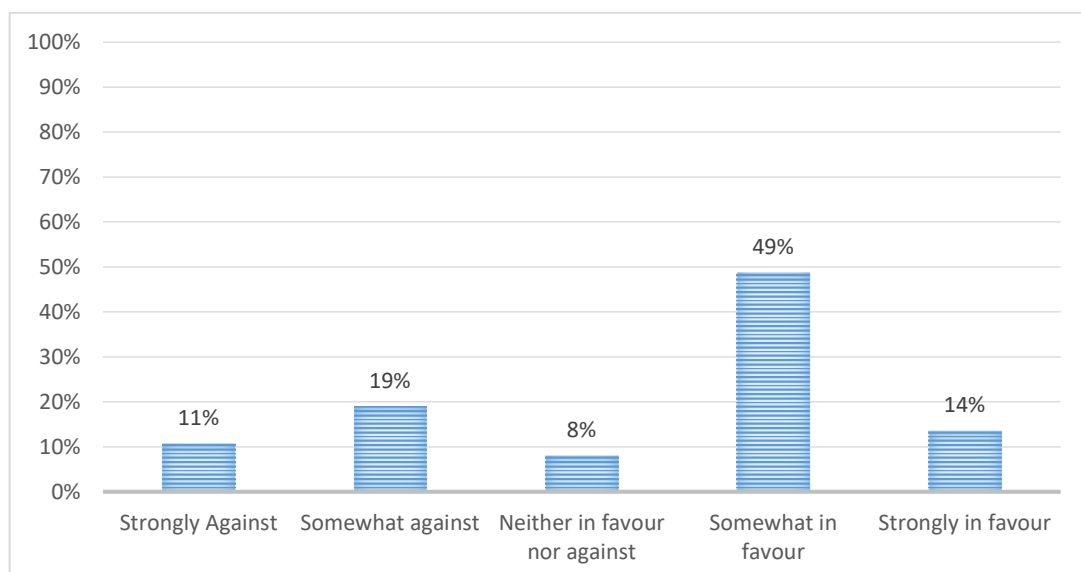


Figure 14 Stakeholders' acceptance of a ban on selling and using charcoal (38 respondents)



## Chapter 4: DISCUSSION AND CONCLUSION

### 4.1 Discussion on Policy Instruments

On the three identified thematic areas (fossil fuels, plastic pollution and forest loss), different policy instruments such as information based, regulatory and price based (that is charges, fees, taxes, subsidies) are discussed. The policy instruments discussed on each thematic area are focused on and related with the sectoral pathways that will support Ethiopia's developing a green inclusive economy. These sectoral pathways are focused on agricultural and land use efficiency measures, increased GHG sequestration in forestry, increased use of renewable and clean power generation and increased use of advanced technologies in industry, transport, and buildings.

More specifically for the transport sector, the CRGE strategy expects to reduce significantly Ethiopia's dependence on imported fuels and cut transport-based carbon emissions significantly by 2030. With regard to fossil fuels that mainly focuses on the transport sector, we see multiple opportunities due to the discussed policy instruments mainly to decrease emissions and the development of sustainable transport. The policy instruments contributes to the transport sector to the resilient development pathway through imposing age limits for second hand used vehicles imported; promoting electric vehicles to counter the low efficiency of the existing vehicle fleet; constructing an electric rail network and introducing urban light rail transit– powered by renewable energy to substitute road freight transport and to improve urban transport; substituting imported fossil fuels with domestically produced biodiesel and bio-ethanol, and promote walking and cycling in all urban centers.

Although it is too early to look in to the overall impact, the policy instruments emphasize the need to make investments in the transport sector not only because of GHG considerations but because it also for safety, congestion and overall efficiency of Ethiopia's transport system. For instance, the current tax-based policy on electric vehicles is expected to increase the demand for electric vehicle which will have prominent advantages for reducing CO<sub>2</sub> emissions and alleviating the dependence on fossil fuel consumption in the transport sector. Despite the fact that the adoption of electric vehicles has increased in the past few years in most parts of the world, more policies, such as financial incentives, technology support or charging infrastructure, should be made by governments to promote broader range use of electric vehicles. Other alternative policies include fuel economy standards and zero-emission vehicle mandates can also stimulate electric vehicles markets. Preferred parking, access to toll roads, and other non-financial policies can also create an enabling electric vehicle environment. On the other hand, according to Climate Resilient Green Economy (CRGE) Strategy of Ethiopia (FDRE, 2011), 75% of the emissions of road transport in Ethiopia comes from freight and construction vehicles, and to a lesser extent private passengers' vehicle. This means the current policy which focuses on passenger vehicles might have little effects on emission reductions.

While plastic waste management is one of the important obligatory functions of not only urban local bodies but also of rural local bodies, this essential service is not efficiently and properly performed by the concerned bodies. This aggravates various sanitation, social and environmental problems. Plastic waste management problem is complex because it involves a multitude of

scientific, technical, economic and social factors. Though there is no single readymade solution to control the plastic pollution, we found it important to indicate issues requiring serious attention of concerned bodies. Among others, lack of financial resources, institutional weakness, lack of technology, transportation systems and disposal options, social problem associated with limited concern towards environmental cleanliness and sanitation, have made this service unsatisfactory and inefficient in the country. Moreover, it is important to understand that the households constitute the largest source of plastic waste in major cities of the country, and therefore the policy instruments that affect the households are important actors within the plastic collection and recovery system. For instance, the policy that discourage littering of plastic wastes and incentivize the households for sorting the wastes. Similarly, despite the benefits the informal plastic recovery system provides for the society, the government ignores the actors operating in the system. This may include designing better policy instruments that influence the financial capacity of the operators, harmonize the working environment of actors in the value chains; increase the awareness and understanding of the society that plastic waste is a resource.

Establishment of protected and forest priority areas, as well as protecting the sacred forest sites by introducing payment for ecosystem service and new energy efficient stoves are attempts taken to protect forests in the country. Rehabilitation of forests through area enclosures with participatory forest management (PFM) practices are another conservation effort that the government is implementing to generate the carbon credits. PFM is a mechanism to protect forests and enhance the livelihoods of communities who use and benefit from them in the process. Thus, it is a strategy for addressing deforestation and forest degradation as well as promoting carbon enhancing activities. The success of PES and PFM mainly depends on collaboration, involvement, continuous follow-up and support of relevant regional and local government sectors; as well as linking income generation to forest management as well as improving market access for forest products. In some cases, Forest management is not the main priority for communities while livelihoods are. Long term commitment may be needed to consider PFM strategy as direct interventions for addressing deforestation and forest degradation and on-ground interventions for enhancing forest carbon stocks. This in turn implies the need for reforms in legal and institutional aspects as well as land use planning that should complement PFM strategy.

In our NPR, however, we are unable to find studies and reports that show the direct and unintended impact of the different policy instruments. The lack of evidence based real value impact analysis is hindering for learning from own experience and possible way of suggesting options for designing sustainable strategies for identifying suitable mechanisms for GHG mitigation. The availability of evidence also ensures the most important aspect to consider proper infrastructure and regulatory changes are in place and have been enacted. The selected policy instruments were considered because of feasibility of implementation and proven success elsewhere. But the instruments should then be studied and prioritized for high potential for GHG mitigation and high feasibility of implementation in the short- and medium-term. The policy instruments should also consider a number of critical factors that are considered such as the complexity and technical capacity that needs to be in place, the cost of implementation in comparison with the benefits, and the political support that will be demanded in order to ensure an enabling institutional and legal environment to realize these opportunities.

## 4.2 Discussion on Acceptance of Policy Instruments

The findings from our surveys presented above, indicates overall that stakeholders seem to be more accepting of the proposed policy instruments compared to the general public. Comparing the different sectors, the acceptance is stronger for regulating plastic carrier bags, single use plastic and cutting of trees in public and community forests. The lowest acceptance is seen for fossil fuels (apart from the subsidy on LPG) and charcoal.

Part of the explanation for the difference between could be that the stakeholders were selected based on their knowledge within the thematic areas, and hence might be aware of the reasons for why these regulations are being proposed. In the literature people's values and concern for environmental degradation is one factor positively linked to policy instrument support (Harring, 2021).

There seem to be a preference towards regulatory-based policy instruments compared to price-based ones when it comes to a tax or fee (not subsidy, as the case of LPG) for fossil fuels and forest loss. Price-based policy instruments, such as taxes on fossil fuels as proposed here imply higher costs for many households, are often receive low support from the general public, compared to other policy instruments (Davidovic & Harring, 2020), which our results support.

When it comes to taxes, our results showed that the acceptance increased when respondents were informed that the revenue was going to be used for a specific purpose: such as education, infrastructure, environment programs or social programs targeting the poorest households in society. However, it was the lowest share of acceptance amongst the 5 countries where the survey was conducted. Here the question on perceived fairness and trust is important, if you trust that other will pay tax and that the revenues the government receives are spent in good governance (Solvinger, 2022; Harring 2014; Davidovic & Harring 2020). In general, in Ethiopia the trust to others as well as institutions are rather low and varies extensively from one institution to another (Demissie and Kaur 2020). Citizens' trust is a function of their expectation of the quality of the services offered, as well as their evaluations of government's efforts to provide services in a fair and equitable manner (Kebede 2019).

Although for plastic pollution, stakeholder results indicate a preference for a tax rather than a ban on single use plastic. During the stakeholder workshop this was discussed, and one argument was that a tax is keeping the market for single-use plastics, which they argued as important since there are many that makes profit on plastic bags. Stakeholder further discussed bans as a less preferable, exemplifying with the lagging enforcement of the current ban on the production of thin plastic bags, since there is a worry that alternatives would be more expensive and bans in general is not appreciated. In Ethiopia, the participants also suggested the possibility to consider banning littering of plastic instead of banning plastic production.

Elaborating further on the case of forest loss, we see a higher acceptance to regulate the cutting of trees in public and community forests, compared to regulating charcoal. This could partly be related to the fact that our sample is including a higher share of urban population and less dependency on firewood for cooking but with more preference to use charcoal for cooking. Probably, the respondents may also understand that forest conservation is more likely with the strategies that protects the cutting of trees.



However, to draw general conclusions based on the presented data is precarious and needs to be interpreted with care, since the sample from both the public and stakeholders are not fully representative.

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## APPENDIX

### Appendix 1: Overview of national and cross-sectorial IGE visions, strategies and programs

Name of vision/strategy/Program	Year of implementation and valid until	What are the main objectives?
Climate Resilient Green Economy Strategy (CRGE)	2011 - 2025	To become a middle-income, carbon neutral and climate - resilient economy.
Nationally Determined Contribution (Revised)	2021-2030	To update Ethiopia first NDC covering the period 2021-2030, to reduce emission to the level of 125.77 Mt CO <sub>2</sub> e by 2030 (68.8%) when compared to the BAU scenario, which was estimated to reach 403.46 Mt CO <sub>2</sub> e
National Adaptation Plan (NAP-ETH)	2020 - 2030	To reduce Ethiopia's vulnerability to the impacts of climate change by building adaptive capacity and resilience. The sectors considered in the NAP includes agriculture, forestry, health, transport, power, industry, water and the urban sector.
Hazardous waste Management and Disposal Control Proclamation (Proclamation No. 1090/2018)	2018 – On going	To prevent damage to human or animal health and the environment by creating a system for environmentally sound management and disposal of hazardous waste.
Solid Waste Management Proclamation (Proclamation No. 513/2007)	2007 – On going	To enhance Federal, Regional, Zonal and district levels capacities to prevent the possible adverse impacts of solid waste
Environmental Pollution Control Proclamation (Proclamation No. 300/2002)	2002 – On going	To protect the environment in general, and safeguarding human health and wellbeing as well as the maintaining of the biota and the aesthetic value of nature through Pollution control, Management of Hazardous Waste, Chemical and Radioactive Substance, Management of Municipal Waste, formulation of environmental standards, Offences and Penalties.
Environmental Impact Assessment Proclamation (Proclamation No. 300/2002)	2002 – On going	To bring about transparency and accountability, as well as to involve the public and, in particular, communities in the planning of and decision making on developments which may affect them and its environment.
Biosafety (Amendment) Proclamation (Proclamation No. 896/2015)	2015 - ongoing	To protect human and animal health, biological diversity and in general, the environment, local communities and the country at large by preventing or at least limiting the adverse effects of genetically modified organisms (GMO) to levels of insignificance; enhance access to and transfer of technologies including modern biotechnology, that serves for conservation and sustainable use of biological diversity.



Transport Proclamation (Proclamation 468/2005)	2005-ongoing	To clearly define the power and duties of the executive organs at the federal and state levels with regard to transport to create favorable conditions for the smooth and effective implementation of the government transport policy
Vehicles Identification, Inspection and Registration Proclamation (Proclamation 681/2010)	2010-ongoing	. to set internationally acceptable standard to implement uniform vehicles registration and annual inspection procedure at the national level.

## Appendix 2. Key stakeholders in biofuel sector

Institution	Responsibility
Biofuel Development Coordination Directorate (at the MoWE)	<ul style="list-style-type: none"> <li>• Promotion, coordination and follow-up of biofuel investment</li> <li>• Organize and heads the National Biofuel forum, which was set up in 2008 and is responsible for advising, monitoring and evaluating national biofuel development</li> </ul>
Ethiopia Mineral, Petroleum and Biofuel Corporation	<ul style="list-style-type: none"> <li>• Engage in investment, development and production of biofuel operations on its own or in association with others</li> </ul>
Ethiopia Sugar Industries Group	<ul style="list-style-type: none"> <li>• Administer state owned sugar factories</li> <li>• Engage in investment &amp; production of sugar cane &amp; bio-ethanol</li> </ul>
EPA	<ul style="list-style-type: none"> <li>• Initial environmental examination (IEE) and EIA</li> <li>• Prevention of environmental degradation and pollution</li> <li>• Assurance of environmental compliance</li> </ul>
MOTRI	<ul style="list-style-type: none"> <li>• Promotion and expanding biofuel industries</li> <li>• Provisions of Commercial registration and business licensing</li> <li>• Price determination for biofuels</li> </ul>
Oil Companies (Nile Petroleum, National Oil Corporation, OilLybia and Total Ethiopia etc)	<ul style="list-style-type: none"> <li>• Owns and manage ethanol blending facilities</li> <li>• Blends gasoline with ethanol (5-10%) for their own requirements and for other distributors who do not have blending facilities</li> </ul>
Feedstock producers companies and small holder farmers (SHF)	<ul style="list-style-type: none"> <li>• Grows feedstock (castor Jatropha and Palm)</li> </ul>

### Appendix 3. List of institution responsible for Plastic Waste Management

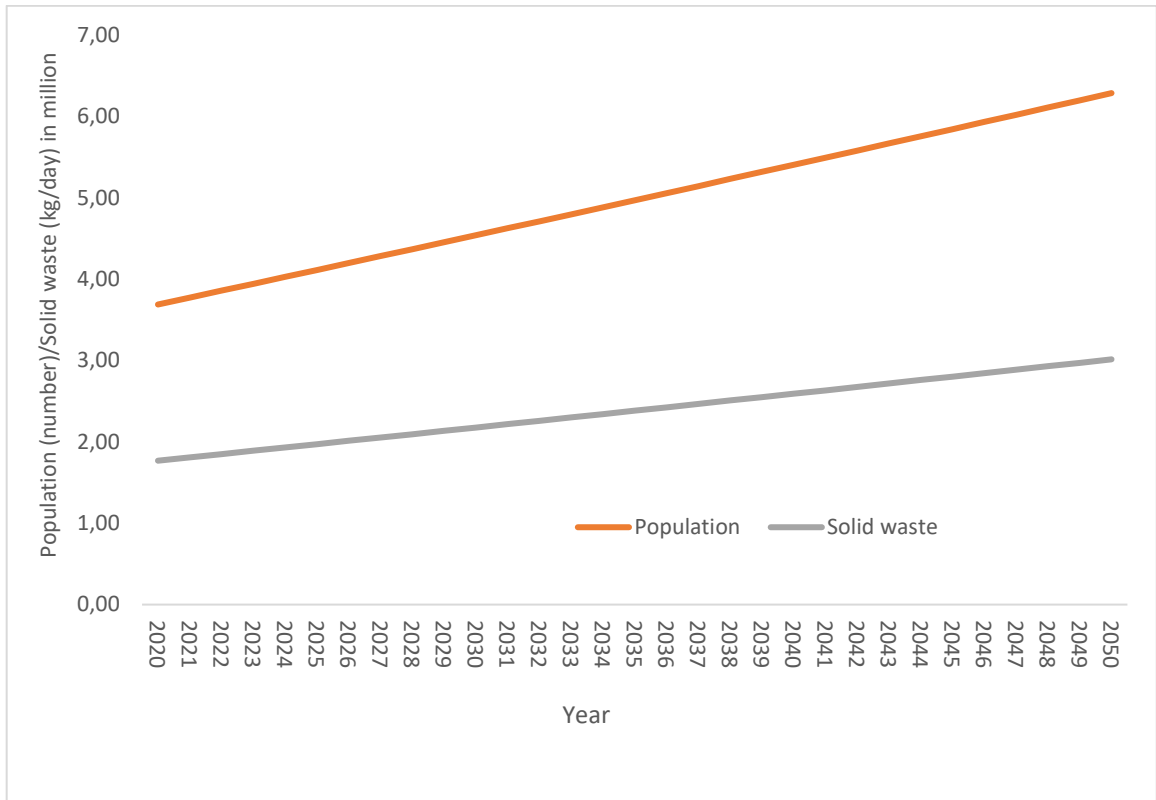
Institutions	Responsibility
Ministry of Urban Development and Infrastructure (MUDI)	<ul style="list-style-type: none"> <li>• Setting criteria and targets for urban sanitation, beautification, and greenery development plans.</li> <li>• Facilitating the integration of infrastructure and services provision, including SWM, in national programs and projects.</li> </ul>
Environmental Protection Authority	<ul style="list-style-type: none"> <li>• Formulating national strategies, regulations, policies, standards, and procedures for environmental and natural resource management and climate change, including SWM;</li> <li>• Coordinating, monitoring, supervising, and enforcing environment policies and regulations at the national level;</li> </ul>
Ministry of Health	<ul style="list-style-type: none"> <li>• Enacting the sanitation and hygiene promotion strategy and guidelines related to SW.</li> </ul>
Ethiopia Standard Agency (ESA):	<ul style="list-style-type: none"> <li>• Sets and manages various standards including plastic bags and bottles;</li> </ul>
Environmental Protection and Green Development Commission of Addis Ababa and Regions	<ul style="list-style-type: none"> <li>• Preparing and implementing environmental management strategy, policy, and plans at the municipal level;</li> <li>• Enforcing and monitoring pollution control measures in the city and regions;</li> </ul>
Addis Ababa Solid Waste Management Agency (AASWMA)	<ul style="list-style-type: none"> <li>• Implementing SWM policies and strategies at the municipal level.</li> <li>• Managing daily operations of SWM activities</li> <li>• Engaging private sectors in waste collection, transportation, and recycling activities;</li> <li>• Raising public awareness, research, and capacity building for SWM</li> </ul>
SWM office in subcity governments	<ul style="list-style-type: none"> <li>• Collecting for secondary waste collection within sub-city;</li> <li>• Guiding and coordinating with district (woreda) SW office.</li> </ul>
District SWM office	<ul style="list-style-type: none"> <li>• Collecting for primary waste collection within districts.</li> <li>• Coordinating with communities and households in SW collection</li> </ul>
Non-governmental Organizations (NGOs) and Civil Society Organizations (CSOs)	<ul style="list-style-type: none"> <li>• Creating awareness on proper solid waste management</li> </ul>

**Appendix 4. New Excise tax for different types of Vehicles**

Vehicle type	Excise tax						
	New, Completely Knocked Down (CKD) to be assembled by domestic	New, Semi Knocked Down (SKD) to be assembled by domestic industry	New, Completely Built Up (CBU)	Used, of age one year or more but not exceeding two years	Used, of age exceeding two years or more but not exceeding four years	Used, of age exceeding four years but not exceeding seven years	Used, of age exceeding seven years
Vehicles, with only spark-ignition internal combustion reciprocating piston engine							
• <i>Three Wheeler</i>	30%	30%	30%	80%	130%	230%	430%
• <i>Others</i>	30%	30%	30%	80%	130%	230%	430%
• <i>Of a cylinder capacity not exceeding 1,300 cc</i>	30%	30%	30%	80%	130%	230%	430%
• <i>Of a cylinder capacity exceeding 1,300 cc but not exceeding 1,500 cc</i>	60%	60%	60%	110%	160%	260%	460%
• <i>Of a cylinder capacity exceeding 1,500 cc but not exceeding 1,800 cc</i>	60%	60%	60%	110%	160%	260%	460%
• <i>Of a cylinder capacity exceeding 1,800 cc but not exceeding 3,000 cc</i>	100%	100%	100%	150%	200%	300%	500%
• <i>Of a cylinder capacity exceeding 3,000 cc</i>	100%	100%	100%	150%	200%	300%	500%
Vehicles, with only compression-ignition internal combustion reciprocating piston engine (diesel or semi-diesel)							
• <i>Three Wheeler</i>	30%	30%	30%	80%	130%	230%	430%
• <i>Of a cylinder capacity not exceeding 1,300 cc</i>	30%	30%	30%	80%	130%	230%	430%
• <i>Of a cylinder capacity exceeding 1,300 cc but not exceeding 1,500 cc</i>	60%	60%	60%	110%	160%	260%	460%
• <i>Of a cylinder capacity exceeding 1,500 cc but not exceeding 1,800 cc</i>	100%	100%	100%	150%	200%	300%	500%
• <i>Of a cylinder capacity exceeding 1,800 cc but not exceeding 2,500 cc</i>	100%	100%	100%	150%	200%	300%	500%
• <i>Of a cylinder capacity exceeding 2,500 cc</i>	100%	100%	100%	150%	200%	300%	500%
Other Vehicles, with both spark ignition international combustion reciprocating piston engine and electric motor as motors for propulsion, other than those capable of being charged by plugging to external source of electric power							
• <i>Three Wheeler</i>	30%	30%	30%	80%	130%	230%	430%

Vehicle type	Excise tax						
	New, Completely Knocked Down (CKD) to be assembled by domestic	New, Semi Knocked Down (SKD) to be assembled by domestic industry	New, Completely Built Up (CBU)	Used, of age one year or more but not exceeding two years	Used, of age exceeding two years or more but not exceeding four years	Used, of age exceeding four years but not exceeding seven years	Used, of age exceeding seven years
<ul style="list-style-type: none"> <li>Of a cylinder capacity not exceeding 1,300 cc</li> </ul>	30%	30%	30%	80%	130%	230%	430%
<ul style="list-style-type: none"> <li>Of a cylinder capacity exceeding 1,300 cc but not exceeding 1,800 cc</li> </ul>	60%	60%	60%	110%	160%	260%	460%
<ul style="list-style-type: none"> <li>Of a cylinder capacity exceeding 1,800 cc</li> </ul>	100%	100%	100%	150%	200%	300%	500%
Other vehicles, with both compression- ignition internal combustion piston engine (diesel or semi-diesel) and electric motor as motors for propulsion, other than those capable of being charged by plugging to external source of electric power:							
<ul style="list-style-type: none"> <li>Three wheelers</li> </ul>	30%	30%	30%	80%	130%	230%	430%
<ul style="list-style-type: none"> <li>Of a cylinder capacity not exceeding 1,300 cc</li> </ul>	30%	30%	30%	80%	130%	230%	430%
<ul style="list-style-type: none"> <li>Of a cylinder capacity exceeding 1,300 cc but not exceeding 1,800 cc</li> </ul>	60%	60%	60%	110%	160%	260%	460%
<ul style="list-style-type: none"> <li>Of a cylinder capacity exceeding 1,800 cc</li> </ul>	100%	100%	100%	150%	200%	300%	500%
<ul style="list-style-type: none"> <li>Other Vehicles, with only electric motors for propulsion</li> </ul>				50%	100%	200%	400%
Motor Vehicles for the transport of ten or more persons, including the driver							
<ul style="list-style-type: none"> <li>With only compression-ignition internal combustion piston engine (diesel or semi-diesel)</li> </ul>					100%	200%	300%
<ul style="list-style-type: none"> <li>With both Compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor as motors for propulsion</li> </ul>					100%	200%	300%
<ul style="list-style-type: none"> <li>With both spark ignition internal combustion reciprocating piston engine and electric motors for propulsion</li> </ul>					100%	200%	300%
<ul style="list-style-type: none"> <li>With only electric motor for propulsion</li> </ul>					100%	200%	300%
<ul style="list-style-type: none"> <li>Other</li> </ul>					100%	200%	300%

**Appendix 5. Projected total population and total solid waste generation**



## Appendix 6. Penalty fee Forest Loss

No.	Activity	Penalty
1	Any person who cuts trees or removes, process, or uses in any way forest products from state, community, and private forest without the permit of the forest possessor shall, without prejudice to confiscation of the forest product	be punishable with rigorous imprisonment not less than one year and not exceeding five years and with fine from Birr 10,000 to Birr 20,000
2	Any person who destroys damages or falsify forest boundary marks	shall be punishable with rigorous imprisonment not less than one year and not exceeding three years and with fine from Birr 10,000 to Birr 30,000
3	Any person who intentionally causes damage to a forest by setting a fire or in any other manner shall be punishable with rigorous imprisonment not less than 10 years and not exceeding 15 years; if the damage caused by negligence	shall be punished with simple imprisonment not less than one year and not exceeding two years or with fine Birr 5,000 up to 10,000 Birr.
4	Any person who settles or expands farmland or undertake the construction in a demarcated forest and forest land	shall be punishable with rigorous imprisonment not less than two years and not exceeding four years and fine with from Birr 10,000 up to Birr 40,000
5	Any person who illegally moves forest products	shall be punishable with simple imprisonment not less than six months and not exceeding one year and with fine from Birr 5,000 up to Birr 10,000.
6	Any owner of forest who fails to immediately inform the relevant body having the knowledge about the occurrence of forest vermin weeds and disease in his forest	shall be punishable with simple imprisonment not less than six months and not exceeding one years and with fine from Birr 1,000 up to Birr 5,000.
7	Any owner of forest who introduces unauthorized plants, animals and micro organisms	shall be punishable with rigorous imprisonment not less than one year and not exceeding three years and with fine from Birr 10,000 up to Birr 30,000
8	Any person who cut trees, transport, accumulate and sale forest products illegally from state, association, community, and private forests	shall be punished with rigorous imprisonment not less than 5 years and not exceeding 8 years and with fine from birr 15,000 up to birr 20,000

CBE Currency exchange as 08/04/2022 – USD (52.1277) and EURO (56.7932)

## Appendix 7. Suitable Areas for Commercial Plantation by Region

Region	Total land area (ha)	Suitable land for Commercial plantation (ha)	Most Potential Areas	
			Lowlands with enough rainfall (ha)	Degraded Natural Forest (ha)
Addis Ababa	55,069	-	-	-
Afar	9,720,470	-	-	-
Amhara	15,564,812	8,007,764	2,145,700	21,837
Benishangul Gumz	4,980,554	1,175,799	1,035,725	-
Diredawa	105,556	-	-	-
Gambella	2,568,628	-	-	-
Harari	37,165	-	-	-
Oromia	32,442,869	11,703,496	1,498,795	328,325
Somali	31,673,967	-	-	-
SNNPR	11,251,487	5,321,996	1,692,090	103,483
Tigray	4,940,596	554,541	219,019	-
Total	113,341,173	26,763,596	6,591,329	453,645

Source: Indufor for IFC/World Bank Group 2016

## Appendix 8. References to Country Profile

Ethiopia	Data	Reference
Size Population density	1 104 300 km <sup>2</sup> 102 people/km <sup>2</sup>	<i>Countries by Area - WorldAtlas</i> <a href="https://www.worldatlas.com/features/countries-by-area.html#countriesBySize">https://www.worldatlas.com/features/countries-by-area.html#countriesBySize</a> Accessed: 2022-02-04 <i>World Development Indicators   DataBank (worldbank.org)</i> <a href="https://databank.worldbank.org/reports.aspx?source=world-development-indicators">https://databank.worldbank.org/reports.aspx?source=world-development-indicators</a> Last Updated: 12/22/2022 Accessed: 2023-02-13
Key sectors in the economy	Agri: 38 Industry: 22 Service: 36 Manufacturing: 5	Year 2021  value added (% of GDP)  <i>World Development Indicators   DataBank (worldbank.org)</i> <a href="https://databank.worldbank.org/reports.aspx?source=world-development-indicators">https://databank.worldbank.org/reports.aspx?source=world-development-indicators</a> Last Updated: 09/16/2022 Accessed: 2022-10-14
Population Growth	114, 9 million 2.5%	Year 2020  <i>World Development Indicators   DataBank (worldbank.org)</i> <a href="https://databank.worldbank.org/reports.aspx?source=world-development-indicators">https://databank.worldbank.org/reports.aspx?source=world-development-indicators</a> Last Updated: 09/16/2022 Accessed: 2022-10-14
Life Expectancy (F/M)	68/65	Year 2019  <i>World Development Indicators   DataBank (worldbank.org)</i>

		<a href="https://databank.worldbank.org/reports.aspx?-source=world-development-indicators">https://databank.worldbank.org/reports.aspx?-source=world-development-indicators</a> <i>Last Updated: 09/16/2022</i> <i>Accessed: 2022-10-14</i>
Poverty rate	25.3%	<b>Year 2020</b> <i>Africa SDG Index and Dashboards Report - Sustainable Development Report:</i> <a href="https://www.sustainabledevelopment.report/reports/2020-africa-sdg-index-and-dashboards-report/">https://www.sustainabledevelopment.report/reports/2020-africa-sdg-index-and-dashboards-report/</a> <i>Accessed: 2022-10-14</i>
Access to electricity	51%	<b>Year 2020</b> <i>World Development Indicators   DataBank (worldbank.org)</i> <a href="https://databank.worldbank.org/reports.aspx?-source=world-development-indicators">https://databank.worldbank.org/reports.aspx?-source=world-development-indicators</a> <i>Last Updated: 09/16/2022</i> <i>Accessed: 2022-10-14</i>
GDP/capita	925 USD/capita	<b>Year 2021</b> <i>World Development Indicators   DataBank (worldbank.org)</i> <a href="https://databank.worldbank.org/reports.aspx?-source=world-development-indicators">https://databank.worldbank.org/reports.aspx?-source=world-development-indicators</a> <i>Last Updated: 12/22/2022</i> <i>Accessed: 2023-02-13</i>
Rainfed/Irrigated agriculture	98/2%	<b>Year 2020</b> <i>Land Use Indicators, Land area equipped for irrigation</i> <a href="https://www.fao.org/faostat/en/#data/EL">https://www.fao.org/faostat/en/#data/EL</a> <i>Accessed: 2022-10-13</i>
Land area covered in forest	11%	<b>Year 2015</b> <i>Forest Monitoring, Land Use &amp; Deforestation Trends   Global Forest Watch</i> <a href="https://www.globalforestwatch.org/">https://www.globalforestwatch.org/</a> <i>Accessed: 2022-01-12</i>