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Inclusive Green Economy Policy Review for Rwanda



MINECOFIN



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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 of, 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 of fossil fuels, plastic pollution, and forest loss are chosen as they are important 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 of 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 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 similar challenges in their work towards an inclusive green economy.

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



List of Abbreviations

DDS	: District Development Plan
DFNC	: Department of Forestry and Nature Conservation
EAC	: East African Community
FLR	: Forest Land Scape Restoration
FONERWA	: National Green Fund
GGCRS	: Green Growth and Climate Resilience Strategy
GoR	: Government of Rwanda
ICS	: Improved Cook Stove
IGE	: Inclusive Green Economy
LAFREC	: Landscape Approach to Forest Restoration and Conservation
MINECOFIN	: Ministry of Finance and Economic Planning
MINICOM	: Ministry of Trade and Industry
MININFRA	: Ministry of Infrastructure
MoE	: Ministry of Environment
MRV	: Monitoring, Reporting and Verification
NDC	: Nationally Determined Contribution
NSCCLCD	: National Strategy for Climate Change and Low Carbon Development
NST	: National Strategy for Transformation
PES	: Policy Engagement Specialist
PoA	: Programme of Action
RDB	: Rwanda Development Board
REG	: Rwanda Energy Group
REMA	: Rwanda Environment Management Authority
RFA	: Rwanda Forest Authority
ROR	: Republic of Rwanda
SDG	: Sustainable Development Goals
SIDA	: Swedish International Development Cooperation Agency
SSP	: Sector Strategic Plan
RRA	: Rwanda Revenue Authority
GEF	: Green Environment Fund
DFO	: District Forest Officer
MINILAF	: Ministry of Land and Forest

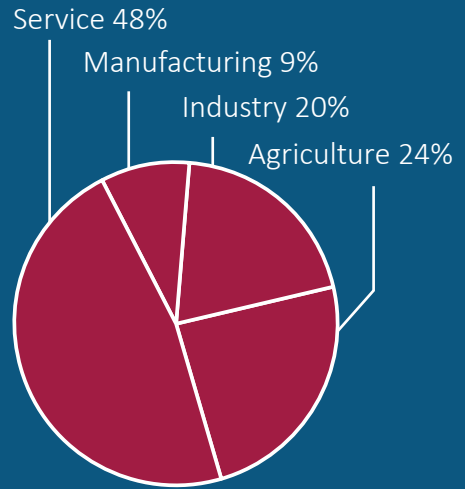
Country Profile: Rwanda

Size / Population density



26 338km²
503people/km²

Key sectors in the economy



Population / Growth



13,2M
2.3%

Life expectancy



F 70
M 66

Poverty rate



45.9%

Populations access to power



61%

GDP per capita



854USD

Rainfed / Irrigated agricultural land



R 99.5%
I 0.5%

Land area cover in forest



30%



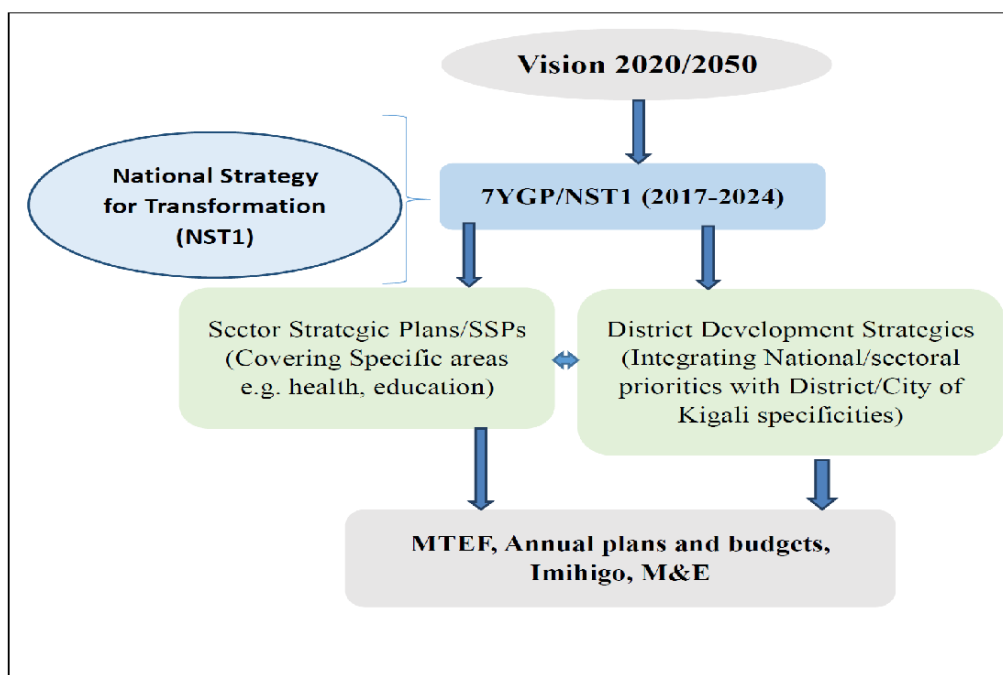
- SDG achievement
- Challenges remain
- Significant challenges remain
- Major challenges remain
- ↑ On track
- ↗ Moderately increasing
- Stagnating
- ↘ Decreasing
- — Data not available

Chapter 1: OVERVIEW OF IGE VISIONS STRATEGIES AND PROGRAMS

Inclusive green economy (IGE) is a balanced and realistic pathway to sustainable development. As an economic model, it differs from traditional ones in that it takes due consideration of environmental and social externalities and does not focus on GDP growth as ultimate economic goal but rather focuses on resource efficiency and on ecosystems as a building block of the economy, whilst considering that environmental degradation undermines long term economic growth and human development.

The government of Rwanda, with its strategy for transformation and environmental mainstreaming, it has subscribed to the national, regional and global development commitments (e.g., Vision 2050, National Strategy for Transformation (NST-1), Green Growth and Climate Resilience Strategy (GGCRS), Nationally Determined Contributions (NDCs), Sustainable Development Goals (SDGs), Agenda 2063, East African Community - EAC Vision 2050, etc.). Figure 1.1 highlights the development planning framework for vision 2050 and NST-1. Over the years, Rwanda has prioritized and developed a number of policy frameworks to tap into opportunities of a green growth led and climate resilient economy e.g., Green Climate Fund (GCF), Strategic program for climate resilience (SPCR) and Forest Investment Program (FIP), Rwanda's National Strategy for Climate Change and Low Carbon Development (NSCCLCD).

Figure 1 The development Planning Framework for vision 2050 and NST 1



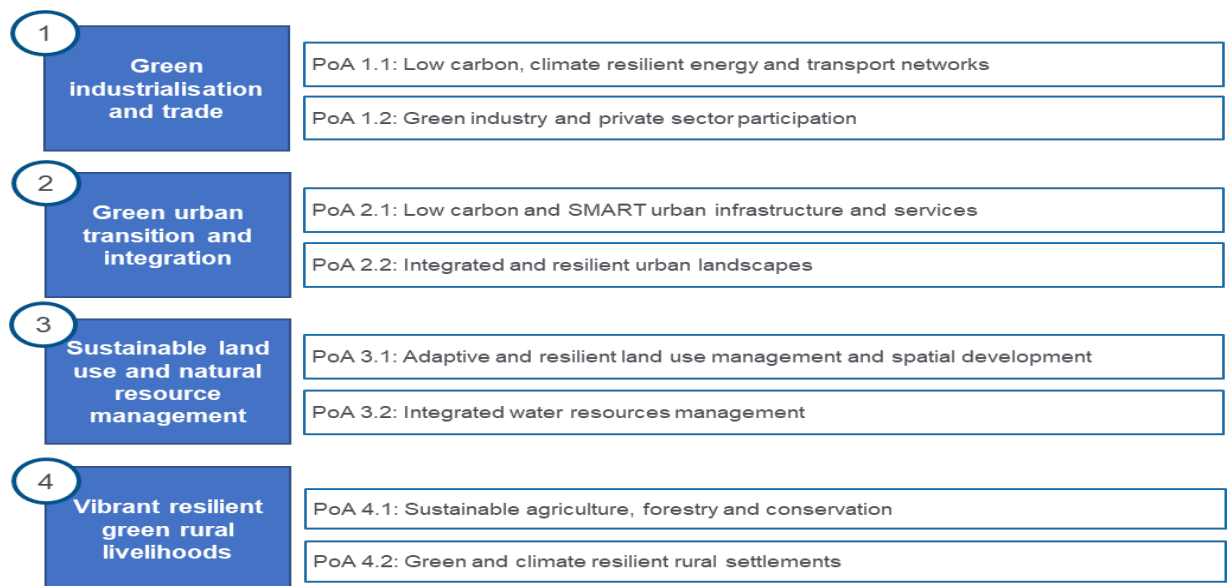
In the revised Green Growth and Climate Resilience Strategy (MoE, 2022), Rwanda has defined a pathway to achieve Vision 2050 through climate resilience and green economic innovation. The Vision is for the country to achieve upper middle-income status by 2035 and high-income status by 2050 through a *developed, climate-resilient, and low carbon economy*. The GGCRS and Vision 2050 have three Strategic Objectives:

1. To achieve Energy Security and Low Carbon Energy Supply that supports the development of Green Industry and Services and avoids deforestation.
2. To achieve Sustainable Land Use and Water Resource Management that results in Food Security, appropriate Urban Development and preservation of Biodiversity and Ecosystem Services.
3. To ensure Social Protection, Improved Health and Disaster Risk Reduction that reduces vulnerability to climate change impacts.

Implementation of the IGE strategies

In order to implement the vision and strategic objectives, Programmes of Action (PoAs) have been designed to address the most important areas of work required to achieve Green Growth and Climate Resilience. The revised GGCRS streamlines the necessary actions into a set of eight Programs of Action to ease implementation and coordination. The Programmes of Action are further consolidated in four Thematic Programme Areas (1. Green industrialization and trade; 2. Green urban transition and integration; 3. Sustainable land use and natural resource management; 4. Vibrant resilient green rural livelihood) which deliver strategic intent toward the GGCRS objectives. Each of the action programs comprises a number of Strategic Interventions that cover a balanced focus between climate change mitigation, adaptation and green growth.

Figure 2 The 4 Thematic Program Areas and their focus



Source : MoE (2022)

These strategic interventions are conceptualized for the short-medium term, to be implemented over the next 5 – 10 years and long-term interventions up to 2050 and beyond.

The implementation of these GGCRS Strategic Interventions is made possible through the definition of Enabling Pillars. According to MoE (2022) these pillars provide a strong foundation for current and future actions by guiding Institutional Arrangements; mobilizing Finance; building Cross-cutting areas (training, capacity building and inclusion); and capitalizing on Digital

Transformation and Innovation for enhanced green growth and climate resilience. The pillars align strongly to the National Strategy for Transformation (NST-1) as follows:

- The Institutional Pillar aligns to the NST-1's pillar for **Transformational Governance**
- The Finance Pillar aligns to the NST-1's pillar for **Economic Transformation**
- The Capabilities, Inclusion and Training Pillar aligns to the NST-1's pillars for both **Social and Economic Transformation**
- The Digital Transformation and Innovation Pillar also aligns to the NST-1's pillar for **Economic Transformation**.

Rwanda's institutional arrangement for the GGCRS must be responsive and capable to ensure effective flow of information and knowledge, and transparent deployment of financial resources.

Financing of the GGCRS will be driven by the National Fund for Climate and the Environment (FONERWA) as the centerpiece of the Finance Enabling Pillar. Importantly, FONERWA will drive partnerships for leveraging additional finance from climate funds, the private sector, enhanced domestic revenues, and other innovative financing mechanisms.

Effective implementation of the revised GGCRS will require broad-based skills development and green economy education, innovative approaches to service delivery and development that promote labor-intensive and inclusive methods, and finally the stimulation of private sector and SMME driven exportable jobs in the service and knowledge economy.

Data-driven, SMART, and innovative technological and digital systems will be applied across all sectors implementing GGCRS interventions through the Digital Transformation Pillar.

Stakeholders' involvement

In order to fully implement the policies and strategies relating to green economy, clear actions, roles and responsibilities of all institutions in coordination, monitoring and evaluation is of paramount importance. To coordinate and monitor the implementation of the policy and strategies for IGE, all ministries have to be involved especially the ministry in charge of the environment with the most direct authority over environment, climate services and climate change; it carries out its mandate in collaboration with other ministries or central agencies in charge of finance and economic planning, investment, forestry, agriculture, energy, sanitation, mining, industry, tourism and wildlife, education, research and other professional training, gender and youth, local government, etc.(MINECOFIN, 2022).

The key responsibility of local government is to ensure that orientations and guidance from the central level are well internalized and that proposed activities are well implemented at local levels. The private sector, civil society organizations and communities have responsibilities to support the government in implementing, monitoring and evaluating the policy. The policy and strategies on IGE are implemented through ministerial and DDS, SSPs, annual *Imihigo*¹ targets and action plans. The policy and strategies on IGE are also implemented through the action plans

¹Imihigo is a home-grown solution and a tool for accessing progress toward national development aspirations.

of development partners, CSOs and the private sector who translate the policy and strategies for IGE into action.

Challenges ahead connected to the strategies

The key issues and challenges connected to the strategies include high population density, water, air and soil pollution, land degradation, fossil-fuel dependency, high-carbon transport systems, irrational exploitation of natural ecosystems, lack of low-carbon materials for housing and green infrastructure development, inadequate waste treatment for both solid and liquid waste, increase of electronic, hazardous chemicals and materials waste, among others (MoE, 2019).

Achieving the policy and strategies for IGE calls for substantial and additional financial resources to implement the proposed policy actions. This requires strong strategies to mobilize sufficient resources to ensure adequate financing. However, the government cannot do this alone; the private sector, civil society, faith-based organizations, and citizens all have a role to play.

The key challenges include raising the level of domestic resource mobilization for inclusive green economy, and devising innovative ways to increase green financing for the private sector. Developing capacities and a robust mechanism to tap into global environment and climate finances, including from the private sector and foreign direct investments is also critical for the successful implementation of green initiatives (ROR, 2020).

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 with a focus on Rwanda in this review. 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

The energy resources in Rwanda include both non fossil fuel and fossil fuels. For instance, biomass resources in Rwanda include biogas, peat, wood, methane gas, and other organic wastes, which constitutes about 85% of national energy consumption and contributes about 5% to the GDP (Nyaga et al. 2021). Apart from wood, liquefied petroleum gas (LPG) usage for cooking in cities is increasing but its usage rate is low (Bimenyimana et al. 2018). Rwanda, however, has not yet discovered petroleum oil resources (Africa natural Resource Centre,2018). The daily national petroleum products consumption is about 6,000 bbl (US liquid barrel) and most of the oil fuels used is imported from Kenya and Tanzania (African Development Bank Group, 2013). The most commonly available renewable energy resources in Rwanda are hydro, solar, and geothermal. Furthermore, the largest proportion of power generated in Rwanda is from hydro, which is derived from its very numerous rivers and waterfalls (MININFRA, 2018)

Petroleum production and use in Rwanda

Petroleum products imported and used in Rwanda include white fuels (gasoline, diesel, kerosene, various industrial & auto lubricants, etc.); black fuels (bitumen, black oil, etc.) and other petroleum products such as Liquefied Petroleum Gas (LPG). Gasoline (petrol super) and diesel are the main products consumed, 80% of which are used in transport (MININFRA, 2014).

The petroleum industry is typically divided into three major components: upstream, midstream and downstream. Some midstream operations, such as refining, are usually categorised as downstream. Rwanda has no upstream oil industry or refinery activities, so all petroleum operations are downstream. The present petroleum operations therefore exclude refining and processing of petroleum products.

Petroleum fuels economy

Petroleum production, use and disposal are central to any economy, as it drives industrial and commercial operations. Petroleum products account for 11% of the primary energy use in Rwanda, with 89% coming from biomass (MININFRA,2018). In Rwanda, the increasing use of motorised transport and the active investments in infrastructure that require heavy fuels, along with the fact that petroleum products are imported and transported expensively, make it a special resource (REMA, 2012).

With the expansion of economic and social development activities that are energy-dependent, petroleum consumption has been on the upward trend. The volatile nature of petroleum products, sensitivity of the ecosystems and underdeveloped infrastructure of Rwanda's

petroleum operations, raise concerns for the environmental impacts in the use of petroleum product.

The current situation of fossil fuel demand indicates that as of 3rd July 2020, the number of registered vehicles countrywide was 264,524 excluding security organs and Government vehicles. The transport sector is rapidly growing with an annual vehicle growth rate of 12%, therefore, if no action is taken, air pollution and resulting adverse health impacts will increase. Emission from the vehicles was estimated based on the study conducted by REMA in 2018 on Sources of Air Pollution in Rwanda. The study revealed that vehicle emissions are the biggest contributor to poor air quality along busy roads. It further indicated that most of the transport related Greenhouse Gas (GHG) emissions are generated from burning fuel in combustion engines (MININFRA (2021a).

REMA (2018) indicated that Transport sector is among the main contributors to the Greenhouse Gas (GHG) emissions. In Rwanda, cogeneration of energy where simultaneous production of electrical or mechanical energy and useful thermal energy from a single energy source, such as oil, coal, natural or liquefied gas, biomass (REMA, 2015), or solar is not well developed. It means that all imported petroleum is basically used by transport sector with little quantity used by industry.

A study made by TRAIDE Rwanda in 2020 on “Investment Opportunities in the Rwandan Energy Sector” indicated the share of energy consumption by consumers in Rwanda, where electricity, biomass, and petroleum products account for 2%, 85% and 13%, respectively.

Goals of the sector

Part of Rwanda’s green growth and climate resilience strategy is built around a significant shift away from the use of fossil fuels and certain biomass fuels such as firewood. However, the migration towards solar and hydropower is constrained by current large dependence. Investing in green energy has the goals like:

- efficient use of energy in public institutions, and amongst industrial and household end-users.
- ensuring the sustainability of energy exploration, extraction, supply, and consumption so as to prevent damage to the environment and habitats.
- promoting safe, efficient, and competitive production, procurement, transportation, and distribution of energy.
- developing the requisite institutional, organizational, and human capacity to increase accountability, transparency, national ownership, and decentralized implementation capacity for sustainable energy service delivery.
- Transition away from fossil fuel dependency.
- Invest in renewable energy.
- Promote and invest in Electric Vehicle technologies.

2.1.1 Policy instrument to reduce fossil fuel

Industry and transportation sectors remain the major users of fossil fuel in Rwanda, the policy instruments put in place are targeting these sectors by looking at the way the reliance on fossil fuel can be reduced as the current consumption remains at 11 percent (REMA, 2021).

Current efforts towards smart transport systems need to be enhanced through electrification of both road and rail transport systems but also ensuring further reduction in electricity generation from fossil sources. As one of the few countries assembling electric cars, Rwanda is a leading player in Africa in clean transportation. An enabling policy environment that promotes electric vehicles while discouraging fossil fuel powered vehicles is necessary. The policy environment must also allow for the development of the infrastructure for use of electric vehicles, including working with local authorities and power utility companies to facilitate the construction of electric car charging points (MININFRA, 2021a).

Climate smart solutions need upscaling in Rwanda, including mass public transport systems driven by clean energy from renewable sources. The smart public transport system will be favoured by the public if it is efficient and on time. Huge tariffs on the use of personal fossil fuel driven cars may deter the public from owning and using fossil fuel driven cars. The incremental investment in clean forms of energy will make Rwanda a low-carbon economy by 2050 if the current efforts are sustained (MININFRA, 2021b).

The existing policy instrument for fossil fuel management in Rwanda entails expanding domestic exploration and production, boosting investments in supply and storage infrastructure, and promoting sound management of downstream petroleum resources. Since Rwanda relies on imported fossil fuel, the energy policy targets to maintain a reserve that covers three month's supply for reducing the risk of supply shortage. Therefore, the policies promote the use of other sources of energy as alternative to fossil fuel source and complying with international commitment that promote green energy.

Table 1 Policy instrument used to reduce fossil fuel

Price-based	Right-based	Regulatory-based	Information-based
Subsidy on improved cooking stove and cooking gas Incentives for investing in alternative source of energy Subsidy for Rural Electrification Fiscal Incentives for promoting the use of clean energy in transport The Levy on petrol and gas oil for the establishment of strategic petroleum products reserves	Non fiscal Incentives for promoting the use of clean energy in transport	Public transport improvement through standardisation Petroleum exploration and production activities	Strategies for reduction of national dependence on fossil fuel

Subsidy on improved cooking stoves and cooking gas

Energy policy in Rwanda promotes improved cook stoves (ICS) and biogas digesters. Subsidy program for household biogas digesters, by implementing market transformation activities that incentivize fuel switching to cleaner, more sustainable fuels and cooking technologies such as biogas, biomass pyrolysis, LPG, and vetted improved cook-stoves models. Strategies utilized for the policy vary depending on end-user appropriateness and economic viability (MININFRA, 2018). Despite the policy, the report from International Renewable Energy Agency, 2022 indicated low access to clean cooking source with a 5%. NST1 referred to this policy by setting up the target where 40% of the population, including institutions, is required to use LPG by 2024.

Incentives for investing in alternative source of energy

Energy demand increases along with the global population growing, Fossil fuel resources are in decline, and their use is associated with environmental destruction. This highlights the need for more investment in energy resources that can meet the global demand without harming the environment. Clean forms of energy, such as hydropower, solar and wind, are successful and readily available, yet investment in them has fluctuated. Low accessibility to renewable energy

has been due to the slow uptake of investment, technological maturity which are the barriers hindering the transition from fossil-fuel-based energy to renewable sources (Qadir, et al. 2021).

For ensuring the transition, the government has motivated investors interested in this green energy sector as follow:

- (a) Provision of transmission access to all power projects on government's cost,
- (b) Authorized road access, water service and all infrastructures needed during energy projects development,
- (c) Free tax on power equipment during energy projects development, and
- (d) Provision of land on power projects by the government or compensation to private developers on the cost of land.

Subsidy for Rural Electrification

The strategy aims at reducing the reliance on fossil fuel by financing other source of energy: Setting up facilities allowing low-income households to gain access to modern, clean, and sustainable energy services using basic solar power systems, to make solar power products to be more financially affordable. Allowing private sector to develop and create mini-grids and the government will provide the help of sites identification and proper framework and to extend the electricity network through Energy roll out programs (MININFRA, 2018). The target for the households to access electricity in 2021 was 61% from 56%. Report from REG 2022, As of September 2022, the cumulative connectivity rate is 74.5% of Rwandan households including 50.9% connected to the national grid and 23.6% accessing through off-grid systems (mainly solar).

Public transport improvement through standardisation

Currently, present moment there is no railway network in Rwanda. The land public transport services are solely oriented in road based public transport services. Although at present there are 41 companies and cooperatives, which operate different types of public transport vehicles, the major market shares of vehicles come from individual operators. In terms of total available seat capacity, the individual operators provide 70% of the supply.

Out of 72,292 seat capacity, large buses, medium buses and minibuses cater for 84% of the total supply, whereas taxi cabs and motorcycle taxis provide 3% and 13% of the passenger capacity respectively. Minibuses, having 18 seat capacities are the principal mode of transport, which cater for 54% of the total supply. It is, therefore, evident that public transport services organized by the private operators in Rwanda is dominated by individual or small operators having smaller vehicles, such as minibuses and motorbikes (Bajpai and Bower, 2020). Public transport is improved by providing subsidy to common transport operators and fixing the prices of fuel on the pumps.

Subsidy to the cost of fuel to cushion consumers

With the shortage of petroleum and the expansion of economic and social development activities that are energy-dependent affect the cost of transport, what would affect the price of goods on the market. Government subsidizes the cost by foregoing some of the taxes for petroleum

products consequently keeping the pump prices lower, it is known as negative carbon pricing. The latest intervention is in addition to government efforts to subsidize public transport, it also invested about Rwf29.3 billion in the sector. Without the subsidy, the cost of living increases in multiples, including food, transport, production among others which could have gone up significantly affecting welfare and quality of life of many. National transport policy and Strategy (MININFRA, 2021b), has included fuel tax among the fund for intercity projects; under this Policy, the GoR would gradually enforce a regime of cost recovery that covers both freight and intercity passenger transport. Therefore, this fund is among the foregone opportunities due to the shortage of petroleum products to cushion consumers.

According to REMA (2018), the transport sector continues to be among the main contributors to the Greenhouse Gas (GHG) emissions and will continue as long as the fuel subsidy is applied and taxes from fuel are included in the national infrastructure development. Even though green energy will be developed, the cost of bridging the gap of fuel contribution to economic development will remain uncovered, while green energy requires investment, tax exemption and subsidized using the taxes collected from trading in petroleum products. Subsidizing the cost of fossil fuel opposes the promotion of green economy, if alternative green energy is not strong enough to substitute fuel contribution to economic development.

Incentives for promoting the use of clean energy in transport

The instrument seeks to accelerate the transition to EVs in line with the sustainable transportation hierarchy to reduce greenhouse gas emissions from vehicle transportation in Rwanda. The applicability of the policy instrument covers fiscal incentives like electricity tariff for charging stations be capped at the industrial tariff level (large industry category); The electric vehicles to benefit from a reduced tariff during the off-peak time; Electric vehicles, spare parts, batteries and charging station equipment be treated as VAT zero rated products; Exemption of import and excise duties on electric vehicles, spare parts, batteries and charging station equipment; Exemption of withholding tax of 5% at customs and upcoming introduction of carbon tax to discourage polluting vehicles. For non-fiscal incentives cover: Rent free land for charging stations (for land owned by Government); Provisions of electric vehicle charging stations in the building code and City planning rules; Green license plate to allow EVs getting preferential treatment in parking, free entry into congested zones that will be determined; Free license and authorization for commercial EVs; Access to High Occupancy Vehicle lanes (Dedicated Bus Lanes) (E-mobility paper 2021). In 2021 the country had 282 e-moto with 17 charging stations and 94 vehicles with 3 charging stations.

The Levy on petrol and gas oil for the establishment of strategic petroleum products reserves

This is the law established on 30/06/2015, The rate of the levy imposed on petrol and gasoil for establishment of strategic petroleum products reserves is set at thirty-two point seventy-three Rwandan francs (32.73 Frw) per litre. The levy on petrol and gasoil is collected at the customs point in accordance with the customs legislation. The levy on petrol and gasoil shall be deposited into a sub account of the Public Treasury Single Account. This policy along with the incentives

provided to promote EVs, can reduce the dependence on petroleum based for personal transport vehicles in Rwanda.

Regulating petroleum exploration and production activities

This is the law established on 02/05/2016 with law No 13/2016. The exploration and exploitation of petroleum is expected to be done in accordance with a licence provided under the law and a petroleum agreement. The permit for petrol exploitation has the validity of 3 years renewed upon satisfaction of the requirements. Despite the law been established in 2016 Rwanda has not yet discovered crude oil. Rwanda has rather invested in the alternative source of energy and therefore it could be better if Rwanda does not invest in the exploration and exploitation of fossil fuel due to the risk associated due to currently energy transition taking place in the World that has greatly favoured renewable energy sources and where currently investors are channelling most of the investment in the energy sector. Furthermore, if Rwanda continues with the exploration for hydrocarbons and becomes successful, the exploitation will likely emit more carbon and jeopardise the national target of being a net zero carbon emission by 2050.

2.2 Plastic Pollution

The use of plastic in Rwanda

Rwanda is experiencing a rapid urbanization process associated with rapid population growth in its towns and cities. This increase is resulting in huge waste generation and high demand in public services including solid waste management services. For instance, in City of Kigali, levels of waste entering landfill sites increased from 141.38 tons per year in 2006 to 495.76 tons per year in 2015 (Rajashekar at al. 2019). A standard “collect and dump” approach is the dominant waste management in most Rwandan cities. Even though the single use plastics have been banned, there are some wastes of this kind found in the landfill around Kigali, which means more effort and strategies are needed to achieve the target.

The plastic use in Rwanda was ranging from the single use light packaging materials to the big tanks that are used to store water for home use or other purpose. In Rwanda some industries were licensed to manufacture plastics like AMEKI, Soimex Plastics, Mironko Plastic industry for listing few of them. With the awareness of single use plastic pollution from around 2004, some of the mandates of these industries were changed to plastic waste management and manufacturing of alternative packaging materials (REMA, 2014). Other types of plastics were still being manufactured till 2019 when the government of Rwanda took the initiative of reducing and control the use of plastic in general, the adopted initiative made Rwanda a champion for plastic pollution control all over the world, and Kigali was awarded the cleanest city in Africa.

2.2.1 Policy instruments to reduce plastic pollution

Rwanda has been one of the leading countries in Africa in implementing various policies to reduce plastic pollution. The country has utilized various policies that included ban on single use plastics, promoting plastic circularity and use of information. These policies are presented in Table 2.

Table 2: Policy instruments used to reduce plastic pollution

Price-based	Right-based	Regulatory-based	Information-based
Promotion of Circular economy		Ban on single use plastic	Information using radio and other media

Plastic Ban

Rwanda has become a pioneer in banning single-use plastic bags with its tough approach to plastic pollution. The Rwandan government first implemented its all-out ban on plastic bags in 2008, which included a ban on the manufacture, use, sale, and importation of such bags. The government decided to take action after a concerning study revealed that improper disposal of plastic has numerous adverse effects on the environment, and well-being of Rwandan citizens (Börkey and Brown, 2021).

Among the requirements for banning plastic use was to remove all plastic packaging at customs as well as requirements for companies that sell food in plastic bags to provide detailed business plans specifying how they plan to collect and recycle the used bags. Such stringent anti-plastic laws resulted in Rwanda being lauded as one of the cleanest nations in the world. However, there are drawbacks to the strict laws Rwanda has implemented to achieve this title, particularly for small businesses and local citizens (Allyssa, 2020).

The policy instruments used to control the plastic pollution was successively because, in 2008, Kigali - the capital of Rwanda - received one of the United Nations Human Settlement Programs (UN Habitat) Scroll of Honour Awards for its innovative way of having re-built the city into a modern, but above all clean and beautiful, capital. In the motivation to the award, the ban on plastic bags is mentioned as one of several important measures taken (UN Habitat). Despite that, it is still needed the application of economic instruments to stimulate the manufacturing of alternative to plastic made materials (Jian, and Martin, 2022).

Information-based

Umuganda, Rwanda’s monthly community work day, was at heart of the government’s dissemination efforts involving plastic bag collections and this was coupled with information about the up-coming bag ban, and educational communication on the harmful impact of plastics on human health and the environment. As monthly community service is mandatory in Rwanda for all people aged 18 to 65, sufficient outreach over the years was a good bet. Through publicizing the proposal of a ban in 2004, the ensuing media campaign and community service helped instill a recycling mind set among citizens.

The implementation of the plastic bag ban was realized in several steps: ‘In the beginning, it was awareness; by sensitization in the form of information through for instance TV and radio programs, Information and knowledge about the up-coming plastic bag ban was also spread through the Rwandan monthly community work, the so-called Umuganda, then after a few years

the information was more about the penalties, the fines for instance. After that, there were more inspections.’ Furthermore, it is described how the plastic bag ban now is put into people’s habit (Börkey and Brown, 2021).

This is an example of increasing degrees of force, starting with awareness as an incentive form of informing, continuing by informing about the penalties to prepare the public, and ending by focusing more on inspections which could be understood as quite a repressive way of making sure that the is being complied with.

The combination of incentives, regulation and information campaigns were given more importance, with more focus on regulation than incentives, or to be more precise, repressive without incentivizing counterparts. For instance, economic means are used in a repressive way with levies in the form of fines and there are no economic interventions that are more stimulative, such as subsidies for plastic bags recycling or financial support to companies that like to search for and produce environmental-friendly alternatives. Also, for the category of regulation, there is a nation-wide ban – a strict prohibition, in other words – with a penalty in the form of imprisonment for up to one year, but no more stimulative counterparts such as voluntary contracts or covenants. It seems to be primarily for the category of information that more stimulative instruments have been combined with more repressive ones, although there are a few examples of information campaigns that are more uncertain.

Promoting Circular Economy

“Circularity” is increasingly recognized by governments as an effective way to rethink the concept of waste and reduce the consumption of non-renewable raw materials. A ‘circular economy’ aims to reduce the use of natural resources and energy, and contribute to the minimization of plastic waste keeping resources in use for as long as possible. The approach involves extracting the maximum value from materials while in use, then recovering and regenerating products and materials at the end of their service life. The overall intent is to reduce the consumption of non-renewable materials, reduce waste, and extend the lifespan of products, while regenerating natural systems (Jian, and Martin, 2022). Rwanda has taken measures to better manage and reduce the use of plastics, including adoption of the law no 17/2019 of 10/08/2019 relating to the prohibition of manufacturing, importation, use and sale of plastic carry bags and single-use plastic items.

Key interventions were used for promoting plastic circularity in Rwanda; by prevention of waste and pollution related to manufacturing plastic product this was done through the promotion of design durable plastic materials (HDPE), repairing, reusing and recycling into product and alternative materials. REMA and PSF forged a cooperation in 2021 that is bearing dividends where 3 million of USD was invested in a factory that recycles plastic garbage into paving stones.

Being a founding member of the African Circular Economy Alliance (ACEA) and the Global Alliance on Circular Economy and Resource Efficiency (GACERE), Rwanda encourage waste prevention and recycling behavior using the companies involved in waste management, they do not only collect wastes from households but they teach community how wastes are sorted for proper handling and reduction by consumers (e.g., sorting and disposing of waste) and waste management services (e.g., collecting, bulking and distributing used plastics) with the recycling and reprocessing of products and materials.

2.3 Forest Loss

Rwanda is turning around a legacy of deforestation in keeping with its 2020 goal to increase forest cover to 30% of national land area (MINIRENA, 2015). Forests, which cover 10.8 % of the country, comprise forested belts in National Parks, forest reserves, natural and gallery forests and other remnant forests. Forest plantations of exotic tree species (mostly eucalyptus and pine), woodlots and agro-forestry plantations cover 18.4 % and represent nearly 63% of the country's total forest cover. Plantation forests supply almost all fuelwood, with charcoal accounting for about 15.2 % of households' primary energy sources. Rwanda is actively promoting agro-forestry to provide wood for fuel during the transition to available and affordable electricity for all. Agro-forestry also helps combat soil erosion, provides fodder, improves soil fertility and contributes to social well-being and green economic growth (GoR, 2018a).

According to the third national communication report, 2018, over the last half a century, Rwanda lost more than half of its natural forest estate to deforestation, as population growth increased and the area under agriculture expanded. Due to this reason, the Government of Rwanda has embarked on a number of programs to restore the forest estate through national interventions and private sector initiatives in carbon marketing.

As target, Rwanda forestry policy is expected to facilitate achievement of targets set respectively in NST1 and the Vision 2050 in terms of increased forest cover. In this context, national forest cover will be brought to 30% of total area till 2024 from 29.6 in 2017. This will be supported by activities of forestation and reforestation in line with National and District Forest Management Plans. Tree species planted will be increasingly oriented towards commercially viable ones to support development of the wood industry and agroforestry (Republic of Rwanda, 2017).

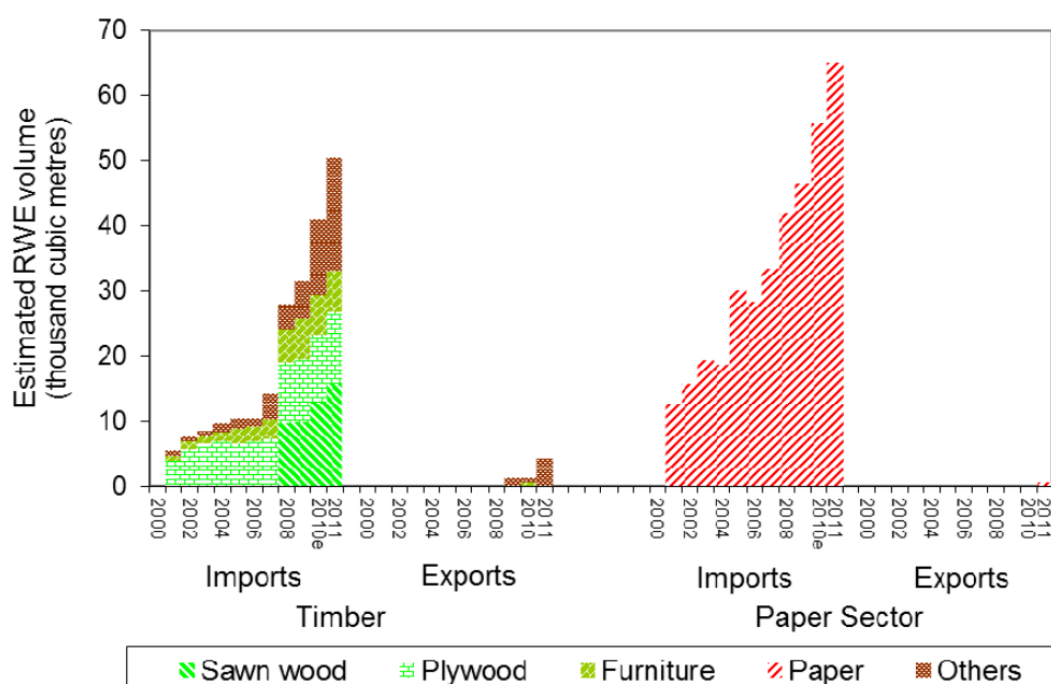
Trees and forests are not delivering their potential values for soil and water conservation, a situation exacerbated by unsustainable agriculture on steep land without adequate soil conservation measures. Biodiversity is threatened, especially outside national parks, which are generally well protected, and natural forest is disappearing rapidly. Loss of trees along watercourses and other features also reduces connectivity and restricts gene flow. The table 3 below is indicating the tree cover loss by provinces according to the Ministry of Land and Forestry (2017).

Table 3 Tree cover loss by year at the subnational level (level of provinces)

Provinces	Tree cover extent (2001) <i>ha</i>	Tree cover loss (2001-05) <i>ha</i>	Tree cover loss (2006-10) <i>ha</i>	Tree cover loss (2011-15) <i>ha</i>	Tree cover loss (2016-20) <i>ha</i>	Tree cover loss (2001-20) <i>ha</i>	Tree cover loss (2001-20) %
North	58,111	369	290	790	1,507	2,956	5.1%
South	96,901	919	1,536	2,037	3,270	7,762	8.0%
East	92,258	1,384	1,966	1,073	1,016	5,439	5.9%
West	247,815	2,697	3,185	5,641	9,617	21,140	8.5%
Kigali city	2,801	93	132	55	90	370	13.2%

Forests have a significant role to play in Rwanda’s national development because they provide 86% of the primary energy source mainly as domestic cooking energy. They hold the base for the country’s tourism opportunities, which in 2013 generated US\$ 294 million and are targeted to increase to over US\$ 600 million by 2020. Rwanda’s forests protect watersheds and downstream wetlands, supporting agriculture which accounts for 36% of GDP, 80% of employment and generates more than 45% of the country’s export revenues. Economically, forest contributes to the national export and import of forest products as indicated on the figure 3.

Figure 3 Rwanda's trade in wood-based products (2000-2011, by product)



Source: Byamukama et al. (2011)

The consumption of fuelwood for Rwandan households is estimated at 2.7 million tons per year and charcoal making accounts for about 50% of total fuelwood used. The deficit between wood supply and demand was estimated to be 4.3 million tons (oven dry weight) in 2017, which is projected to increase to 7.5million tons by 2026 (RoR, 2017a) and 10 million tons by 2050 (RoR, 2020). This implies over-exploitation of already low stocked forests unless improved. In fact, the national forest inventory has revealed that the majority of forest plantations in the country are under-stocked with the national average stocking of 50 m³ per hectare (DFS et al. 2016).

2.3.1 Policy instruments to reduce forest loss

Table 4: Policy instruments to reduce forest loss

Price-based ²	Right-based	Regulatory-based	Information-based
Carbon market Forest subsidies Cutting Permit Tree transport permit Certificate of selling forest products Payment ecosystem services Tourism revenue sharing; incentives Forest Investment Program Support	Public Private Partnership Promotion of Gender	Ban immature tree cutting Improved cook Stoves	Use of agroforestry

Rwanda sets a path for green and climate resilient growth, with the aim of achieving carbon neutrality by 2050 and a prosperous, climate-resilient society one of the strategies to achieve this goal is the reduction of forest loss (MoE, 2020). A number of instruments are expected to be used for the reduction of forest resources and to promote national investment. The main potential investment incentives in Rwanda include international financial instruments such as REDD+ and GCF as well as national private incentives which include impact investment funds and public funds such as FONERWA and other incentives. The Payment for Ecosystem Services (PES) and fiscal and regulatory incentives are yet to be introduced and/or operationalised.

Description of used instrument to reduce forest loss

FOREST CONSERVATION CATEGORY

Carbon market

Rwanda has currently no developments in carbon pricing mechanisms. Nevertheless, Rwanda is member of the Vulnerable 20 Group (V20). The V20 countries committed to introducing domestic carbon pricing by 2025. Rwanda's Green Growth Strategy outlines green growth of the economy through implementation of mitigation and adaptation actions. This includes fiscal reforms such as potential taxes on environmentally harmful behavior mostly forest resources. At the same time, the country already provides a competitive advantage to renewable energy solutions. Rwanda has created the Green Fund 'FONERWA' which gives guidance on green growth, MRV

² We have made a limitation to mainly focus on price-based instruments for forest loss.

mechanisms, and the monitoring of individual projects and overall performance. However, Rwanda has yet to develop a full MRV system. Regarding the crediting of emission reductions achieved domestically, Rwanda has not yet utilized the potential of the voluntary market although there is a potential for emission reductions in the forestry sector, agricultural sector and from renewable energy. Rwanda also envisions the implementation of REDD+ projects in the future. The forestry policy of 2018 is rooted in the national constitution and it is aligned with other national policies and strategies such the National Strategy for Transformation, vision 2050, Green Growth and Carbon Resilience Strategy, Landscape restoration initiative for targeting carbon market access. If we take two sets of forests in Rwanda of 353.6 (approximated to 354 ha) currently store 1,809,309 t CO₂ ha⁻¹ yr⁻¹. Assuming a deforestation rate of 0.5% per year, protecting these forests reduces emissions by 475.5 t CO₂ ha⁻¹ yr⁻¹: amounting to a total avoided emissions from forest protection of MFFP = 354 ha * 0.005 yr⁻¹ * 475.5 t CO₂ ha⁻¹ yr⁻¹ = 844 t CO₂ ha⁻¹ yr⁻¹ = amount of carbon to sold.

Rwanda recently announced that it is preparing to leverage a market scheme of trading carbon credits which an entity gets by reducing carbon emissions extensively beyond the required levels and selling them to those unable to meet their reduction requirements in other organizations or countries.

Forest subsidies

According to the Forest policy of 2017-2024, forest subsidy is applicable in case of competition between forestry and other land uses; according to the policy, two major incentives to tree plantations have been provided by the government and supporting projects, namely the free distribution of the seedlings (it has been the general "policy" for a long time) and initial woodlot establishment support (approach of some projects). This form of subsidy given to private forestry together with the strict control of deforestation allows for maintaining a real interest in tree planting among the population. Under Bon challenge 2011-2020, Rwanda supported landscape restoration, in 2015 with financial support from the Government of Germany, a project of 3 million Euros in two pilot landscapes, Gatsibo and Gicumbi districts, was implemented. The project aimed to promote the restoration of a mosaic of forest landscapes and enhance carbon stocks in Rwanda as well as deepen commitments to FLR across Eastern Africa.

Through the LAFREC project, forest subsidies enabled to reach 40,482 household members who benefited from the project interventions and 53% were female. During the six years of implementation, the Project restored 603 hectares of Gishwati-Mukura National Park buffer zone in the co-management approach, restored 32 hectares from illegal mining activities, planted improved woodlots on 283 hectares private land and public forests on 634 hectares, and 446 hectares of farmland were managed under silvopastoralism approach among many other achievements.

As regards Government funding of the sector, the national budget for forestry is channeled to these different institutions (DFNC, districts). The ordinary budget of the forestry sector in Rwanda has been on the increase in the last 10 years, especially since 2005. It was equivalent to about 100,000 € /year from 2000 to 2004 and about 500,000 € /year from 2005 to 2010 (ROR, 2014).

Challenges to implementing policy

Being a land-locked and overpopulated country, Rwanda has around 20 000 km² used for agriculture, with 90 percent of cropland on slopes of 5 to 55%, and 40 percent of cultivated land is at risk of severe erosion. The topography of the “land of a thousand hills” and the climatic conditions cause significant forest, soil and water degradation. Erosion, reduced soil fertility, and destructive rains are among the most frequent environmental problems affecting households. With a degraded and ever-scarcer natural resource base, feeding Rwanda’s growing population will be a huge challenge in the near future

Subsidy on gas

The Government increased subsidy on gas to reduce the use of charcoal, which is a good alternative. Rwanda planned to replant trees and reduce the dependence on biomass energy. According to the National Strategy for Transformation (2017-2024), more than 83.3% of households in 2014 were dependent on firewood as a source of energy for cooking. Rwanda aims to reduce the percentage of households using wood fuel and charcoal for cooking from 83.3% in 2014 to 42% in 2024. Subsidizing cooking gas was adopted to reduce the dependence on charcoal as source of household energy. Energy-efficient cooking stoves, the use Liquefied Petroleum gas (LPG) and of biogas have all been tested in urban and rural areas and subsidies were provided to facilitate the accessibility.

Challenges to implement the policy:

Despite the proposed solutions, constraints due to the cost, availability, and acceptability are major challenges to clean energy accessibility. For instance, 6kg of Liquefied Petroleum Gas (LPG) the minimum cylinder size available on the market costs RWF 12,000. This is six times as much as many Rwandans earn in a day, and due to the increase in international price which affected the domestic market, the people have now shifted back to the use of charcoal instead of using gas hence more deforestation.

Payment ecosystem services

The specific objective is to increase forest and agroforestry resources in order to meet the national needs in timber and nontimber forest products and services for public, personal and commercial uses. This instrument is intended to provide opportunities for extra income, not only directly improve material standards of living, but also allow for important investments to increase the productivity of the major asset of the rural poor – land. Increased income can allow farmers to invest more in fertilizers, improved seeds, small-scale irrigation projects, and be a cushion during more meager times, such as droughts (Andrew and Masozera, 2010). Rwanda specifically has experienced a decline in multiple ecosystem services that impact human well-being. For example, deforestation in mountainous areas and the destruction of wetlands in low-lying areas have reduced the capacity of these ecosystems to filter, regulate, and clean water (IUCN, 2017).

Payment for Ecosystem Services (PES) by different users of natural resources especially those driven or contributed for by forest is considered as a good source of investment in the forest sector and thus contribute to the sustainable management of existing forests as well as expanding forest cover across the country. This can be offered to farmers and landowners as incentives for

managing and expanding forest cover across the country. PES being largely driven by voluntary initiatives, the increasing awareness among businesses for corporate social responsibility represents a good opportunity for PES. Moreover, the policy and institutional landscape in Rwanda is conducive enough to support the development and implementation of PES schemes in the country.

Forest Investment Program Support

The key overarching issues to be tackled are the huge imbalance in wood supply and the low productivity of trees and forests. Tackling these would result in improved economic development, better livelihoods, more employment opportunities, stable and sustainable landscapes in addition to reduced GHG emissions, and much increased carbon storage.

The proposed projects are intended to be synergetic by focusing on, (i) Agroforestry to stabilize farmland, increase soil structure and fertility and enhance farm production and income opportunities; (ii) Rehabilitation of public forests and improving private and group tree planting to improve productivity and delivery of service values; and (iii) increasing efficiency along the wood supply chain to provide rapid reduction of the wood supply gap. The first two proposed projects would be based on fine-scale land use planning and would be closely coordinated with the SPCR (Strategic Program for Climate Resilience) support for sustainable agriculture. Among the projects involved in the program includes fiscal support.

Fiscal Support is a wide measure needed to cover all aspects and opportunities. Rehabilitation of public forests, including restoration of natural forests, would be achieved through leases of degraded areas to the private sector and groups of interested individuals. Grants would be provided to cover perhaps 50% of current direct costs. The key elements are that those engaged receive free skills training but must operate to defined high standards and grants are paid in arrears subject to inspection. A similar approach can be adopted for private tree planting at the full range of scales, perhaps with a lower limit of 0.25ha; Grants that result in improved productivity and service values deliver substantial economic benefits directly, through increased activity levels, and indirectly through avoided costs of soil erosion and flooding. Grants can also be given for agroforestry, including micro-credit to support value chain development. For the improvement of wood use efficiency, it is envisaged that grants would be mixed with loans to cover the cost of new, more efficient technologies (MINILAF, 2017).

TIMBER HARVESTING CATEGORY

Harvest forest resources permit:

Cutting permit is compulsory for woodlots of at least 0.5 ha (although in some instances owners have been fined for having harvested in their woodlot of less than 0.5 ha). The permit is delivered by the DFO based on (i) a report by the administrative sector (in turn based on a report by the administrative cell) confirming that the wood comes from the applicant's woodlot, in order to avoid conflicts and (ii) a visit report by the Forest Extensionist or the DFO himself to evaluate the value of the wood. The taxes paid to obtain the cutting permit are 1% of the value of the wood to the National Forestry Fund and a fixed amount to the district (not to RRA) (3000 RWF e.g.). A cutting permit is valid 3 months or less.

Bans and restrictive regulations have been introduced because it was believed that fuelwood harvesting is the major factor driving forest depletion and deforestation. As these regulations worked against traditional socio-economic benefits derived from the fuelwood industry, they have not achieved desired results. As there is no single factor of deforestation no isolated intervention can address it.

Permit issue for forest harvesting has never worked since harvest never balanced the demand for wood. The record of forest resource indicates a permanent unsustainable harvest of wood products in Rwanda and consequently increased forest depletion (GEF, 2016).

Transport permit:

This permit is necessary when the wood products are transported in a vehicle and even when the transport is limited to within an administrative sector. Otherwise, it can be valid for the whole country. The permit is signed by the DFO based on (i) the cutting permit, (ii) the receipt showing payment of the specific tax (see below) and (iii) if the wood has been bought to someone else the invoice. The tax paid to obtain the transport permit is a fixed amount to the district. This fixed amount varies according to the district across Rwanda (from 1200 to 20000 RWF). In order to travel, the truck (or boat) needs to be able to present in theory the copy of the cutting permit (but this is rarely controlled) and the original transport permit. The latter is valid 3 months or less and mentions (a) the name of the owner of the products, (b) the type and quantity of the products (pieces of sawn timber, sacks of charcoal, cubic meters of stacked firewood), (c) the origin of the products, (d) the destination of the products, (e) the plate number of the vehicle, (f) the name of the driver and (g) the period of validity. 1 permit is necessary for 1 type of product (Ministerial order Determining the issuance of license used for the activities relating to a district or private forest, 2015).

HARVESTING OTHER FOREST PRODUCTS CATEGORY

Certificate of selling forest products:

The sale certificate is similar to the transport permit but separate. It normally concerns the location of the sale, after the transport. The permit is delivered by the DFO of the district where the sale takes place, based on (i) a copy of the cutting permit, (ii) the receipt showing payment of the specific tax (see below) and (iii) the invoice if the wood has been bought to someone else. The sale certificate corresponds to the payment of a tax to be allowed to sell the products. This tax is a fixed amount to the district. This fixed amount varies according to the district across Rwanda (from 1200 to 20000 RWF). A sale certificate is also valid 3 months or less. 1USD = 1030RWF

Tourism revenue sharing; incentives

The Tourism Revenue Sharing (TRS) program was introduced by the Rwanda Development Board (RDB) as proposed by Tourism policy, with the aim to share a percentage of the total tourism park revenues with the communities living around the protected area. The TRS is one of the most progressive and successful community programs. The goal of revenue sharing is to reduce illegal activities in the park and improve the living conditions of the communities by providing alternatives to park resources and compensation to farmers for the loss of productivity due to wildlife crop raiding. Between 2005 and 2010, \$536,665 went to community projects through the

revenue sharing program. In May 2017, revenue sharing was increased from 5% to 10% of gross tourism revenues earned by our Rwanda Development board (RDB, 2022).

Additional policy instrument used

Ban on the use of firewood in some activities

Until now the National Forestry Fund has been supplied by one of the taxes on cutting permits and by fines for forest infractions. It seems that fines are now collected by the districts and are also variable according to the districts. Two conspicuous measures were taken in the last years to reduce the pressure on wood resources, in particular on "immature" trees, and they are effectively enforced:

- the ban of the use of firewood to make bricks and tiles: this sector of construction used to consume huge amounts of wood as these were the main materials to build houses.
- the ban of the use of round wood poles for scaffolding. Nowadays, scaffolding in use in the country is made of sawn planks and re-used wooden materials, sometimes of steel.

Both measures were controversial when they were taken. Namely, the one on bricks because alternatives also have an environmental impact (switch to non-renewable energy sources, use of more polluting fuels), whereas the one on scaffoldings because it was a specific market for the sale of young eucalyptus poles for private woodlot owners (measure seen as economically artificial and potentially a deterrent to private investments in forestry). Nevertheless, the construction sector has continued its spectacular growth, so these measures have probably had a useful effect.

Public-Private Partnership

In Rwanda, the government is making efforts to build public-private partnerships to complement its efforts in forest protection and conservation, forest establishment and management, processing, value addition and trade with the aim of ensuring the long-term and sustainable supply of forest products and services. Presently, private sector participation is biased to forest-based industries, small scale processing, manufacturing and trade with limited participation in primary production (Cheboiwo et al. 2018). The National Forestry Strategy clearly emphasizes public private investment in forestry through 7 out of 14 principles that guide the implementation of the strategy. These principles include sustainable forest management (SFM), commercialization of forestry operations, stakeholder involvement and partnerships and private sector involvement in forest management and processing of forest products, leaving the public sector only the regulatory function, research and quality assurance.

Promotion of gender equality

Forest resources decrease often severely increases women's labor, especially with regard to the time required to gather firewood and the cost of purchasing it hence negatively impacting

household nutrition. The country's policies and legislations promote equality of men and women in all socioeconomic activities including forestry. Despite the equality, a study by NISR (2020) showed that there is inequality of gender participation in agriculture, fishing and forestry, where males represent about 82% compared to women (61%). This indicates the need to promote gender equality initiatives.

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 Rwanda even though people can manifest a misunderstanding of a particular policy, so far there is no record for open manifestation. Disputes that may be raised in relation to policy interpretation, are solved in open discussion between population and policymakers. If not, central government organizes a yearly national dialogue headed by the Head of state to address unsolved issues for having common understanding on particular issues including policies.

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 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 economic³ 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 we have investigated the general acceptance for several policy instruments. The results are accounted for below.

³ 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).

3.1. Survey on Acceptance of Policy Instruments

In the following sections we will present the results for Kenya 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 Kenya, the total number of respondents were 1 009. This data was a good representation of the population characteristics in Rwanda, in terms of gender and education. However, there was relatively large number of older respondents residing in urban areas as compared to population data. This was because during data collection more urban people were willing to participate in the survey as compared to people living in rural areas⁴.

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 was carried out at 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 Rwanda the number of respondents were 36, representing the following kinds of stakeholder: 47% public sector, 34% civil society and 19% private sector. Academia was not represented in the survey.

3.1.1. Acceptance of Policy Instruments 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

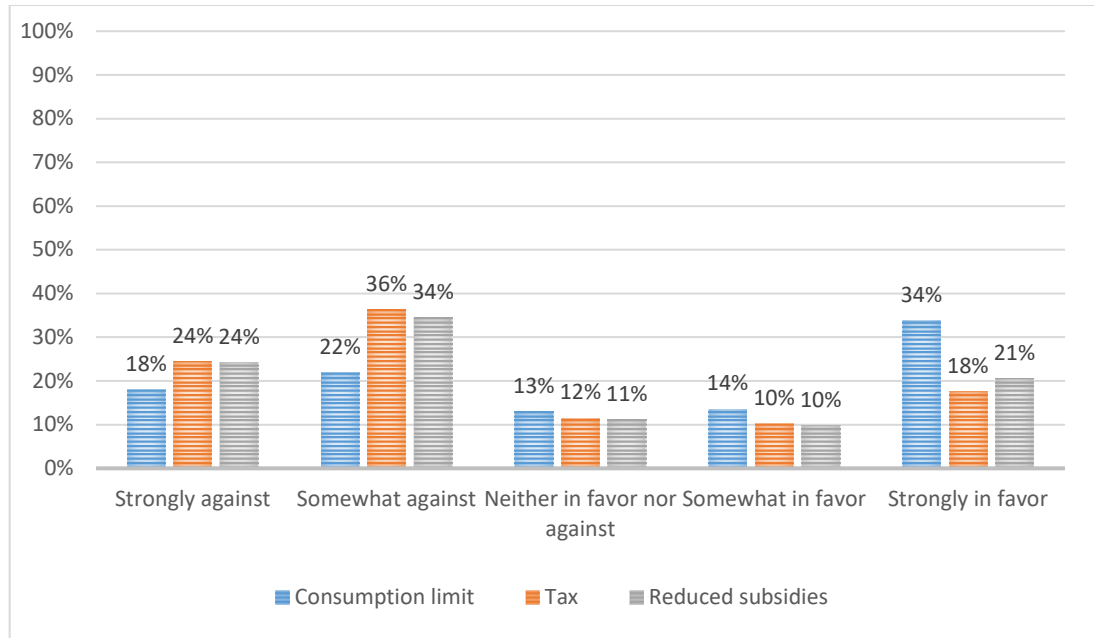
Figure 4 shows the results for the general population in Rwanda. It indicates that there in general is a stronger opinion against the price-based policy instruments, rather than in favor of them. That is, 58-60% are strongly or somewhat against the tax and reduced subsidy, compared to only 28-31% which are somewhat or strongly in favor. However, for the regulation of how much fossil fuels the households are allowed to buy there is a stronger acceptance with 48 % in favor, compared to 40 % against. Hence, there is a stronger acceptance towards a regulatory policy instrument compared to price-based in this context.

However, the picture changes when respondents were informed that the revenue was going to be used for a specific purpose. Such as education, infrastructure, environment programs or social

⁴ 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.

programs targeting the poorest households in society. In Rwanda, the acceptance for a tax or reduced subsidy increased a lot, from 28-31% (without specified revenue use) to 94-99%, when revenue use was specified.

Figure 4 General population's acceptance of 3 different policy instruments affecting fossil fuel use (1009 respondents)

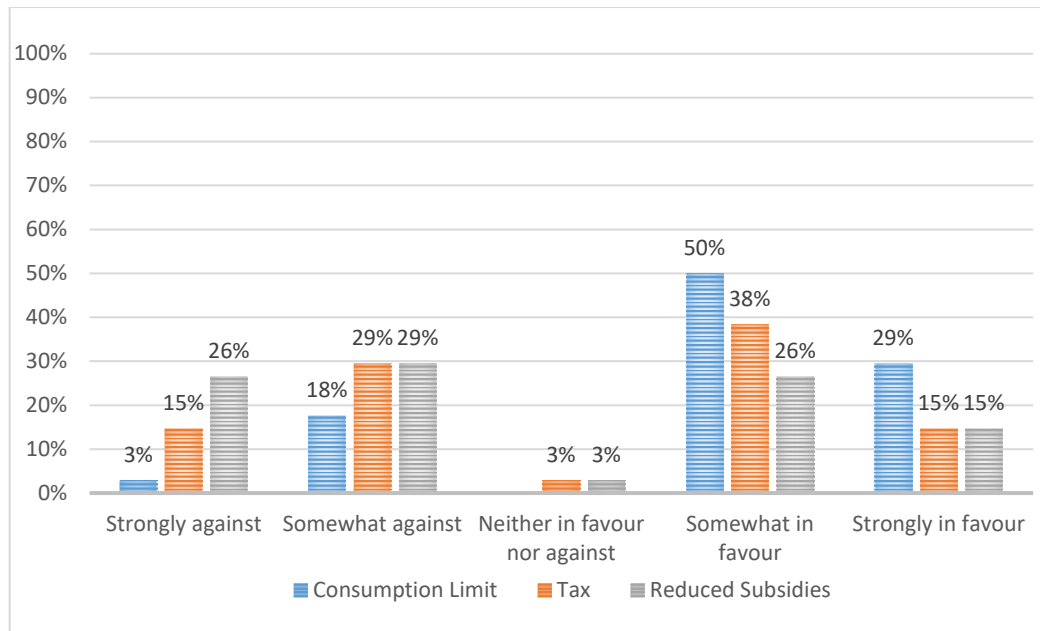


In addition to the question on general fossil fuel use, we also asked about the opinions concerning a decrease in the price on cooking gas (i.e. Liquid Petroleum Gas, LPG) by a subsidy. The acceptance of this subsidy was strong compared to the other instruments with 98% of the respondents stating they were somewhat or strongly in favor, whereof 86% stated strongly in favor. In comparison to the other countries where the survey was conducted the acceptance for this LPG subsidy are the highest among the Rwandan respondents.

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 all three policy instruments affecting fossil fuel use. There is a preference toward the consumption limit compared to the tax and reduced subsidy. The acceptance for the tax increased a lot 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 36 respondents in the stakeholder survey compared to 1009 respondents from the general public. In Appendix 2, the responses divided per category of stakeholders are presented.

Figure 5 Stakeholders' acceptance of 3 different policy instruments affecting fossil fuel use (36 respondents)



3.1.2. Acceptance of Policy Instruments affecting Plastic Pollution

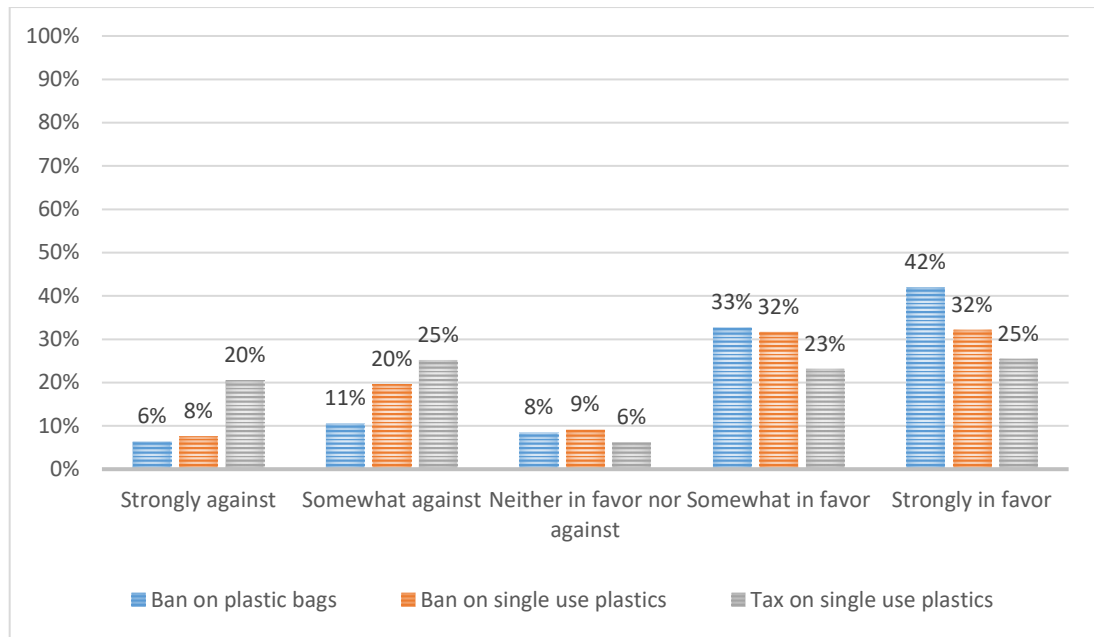
Concerning plastic pollution, we asked in the survey about the opinions on the following three already implemented policy instruments:

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

Compared to the rather low acceptance of the policy instruments on fossil fuels, apart from the LPG subsidy, it is higher for the ones concerning a ban on plastic carrier bags and single use plastics (see Figure 6). The respondents are more in favor (64-75%) than against (17-28%) for all the proposed bans to deal with plastic pollution. For the tax on single-use plastics, we see a similar pattern as for fossil fuels with a lower acceptance for a price-based instrument (when revenue use is not specified). However, there is in this case a somewhat higher share of respondents in favor (48%) compared to against (45%).

Our results do indicate a preference towards regulatory-based policy instruments compared to the price-based ones amongst the general population.

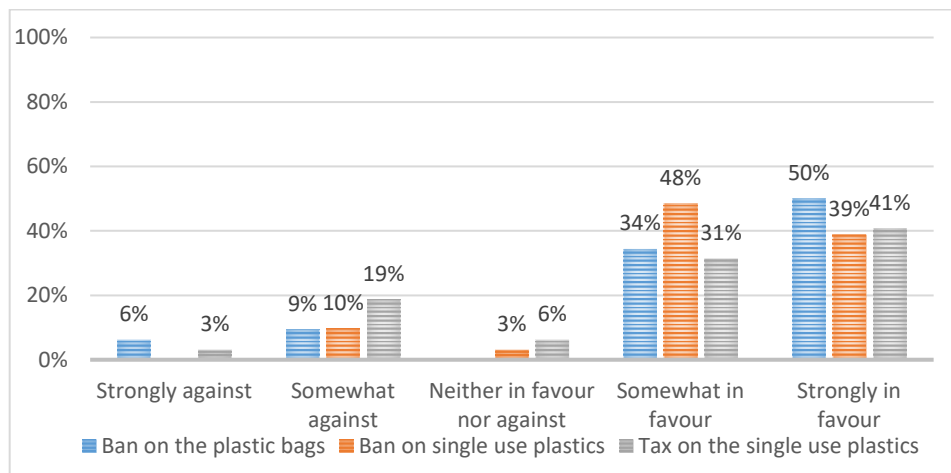
Figure 6 General population's acceptance of 3 different policy instruments affecting plastic pollution (1009 respondents)



Stakeholders' perspective

For policy instruments affecting plastic pollution, the results from the stakeholder survey turned out to be rather similar to the general public (see Figure 7), compared to the differences seen for fossil fuel. Our results indicate that there is a strong acceptance for the three proposed policy instruments both among the general public and stakeholders in Rwanda. The strongest acceptance is found for the bans on plastic carrier bags and single use plastic, which are two already implemented policy instruments in Rwanda today. The responses per stakeholder category is shown in Figures 7 in Appendix 2. Note the low number of respondents per category.

Figure 7 Stakeholders' acceptance of 3 different policy instruments affecting plastic pollution (36 respondents)



3.1.3. Acceptance of Policy Instruments affecting Forest Loss

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

The respondents are more in favor (somewhat or strongly) of regulating tree cutting in community forest via both a ban and tax (61-85%), compared to against (11-18%). Although, there is a higher acceptance for a ban (85%) compared to a tax or fee (61%).

For charcoal, we see the opposite, with a stronger share against regulating charcoal production, selling and usage. For a ban 52% are strongly or somewhat against and 41% are somewhat or strongly in favor, the equivalent percentage for a tax or fee is 61% resp. 27%.

We see a preference towards a ban (85%) compared to a tax/fee (61%) to regulate the cutting of trees. We can find a similar pattern for charcoal, with 41% in favor of a ban compared to 27% for a tax/fee. However, as mentioned above, the majority is strongly or somewhat against regulating charcoal (52-61%).

Figure 8 General population's acceptance of 2 different policy instruments affecting forest due to cutting trees (1009 respondents)

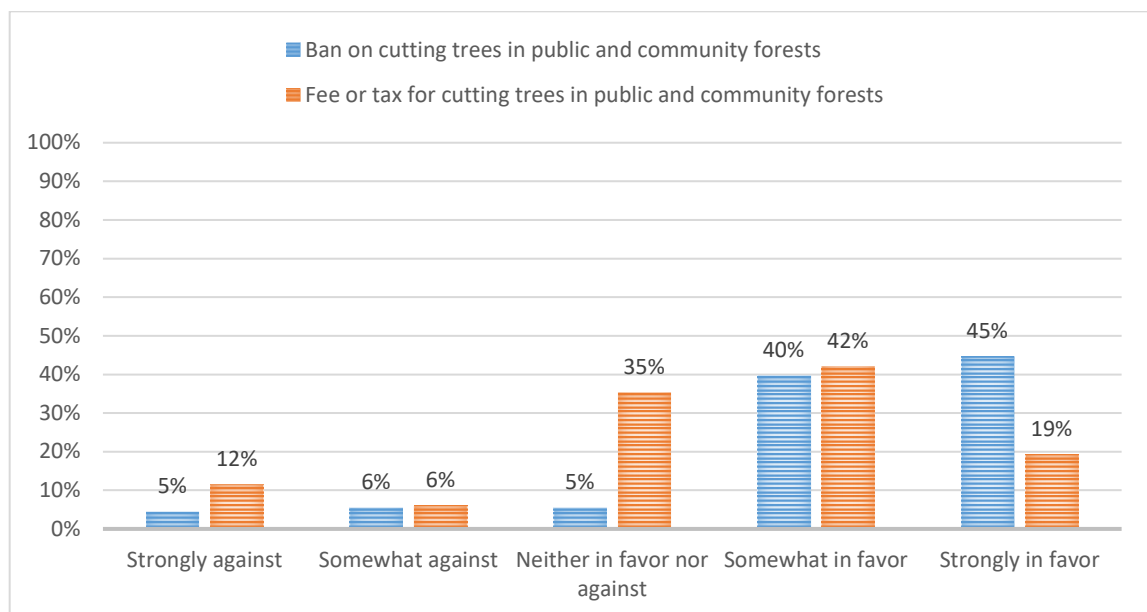
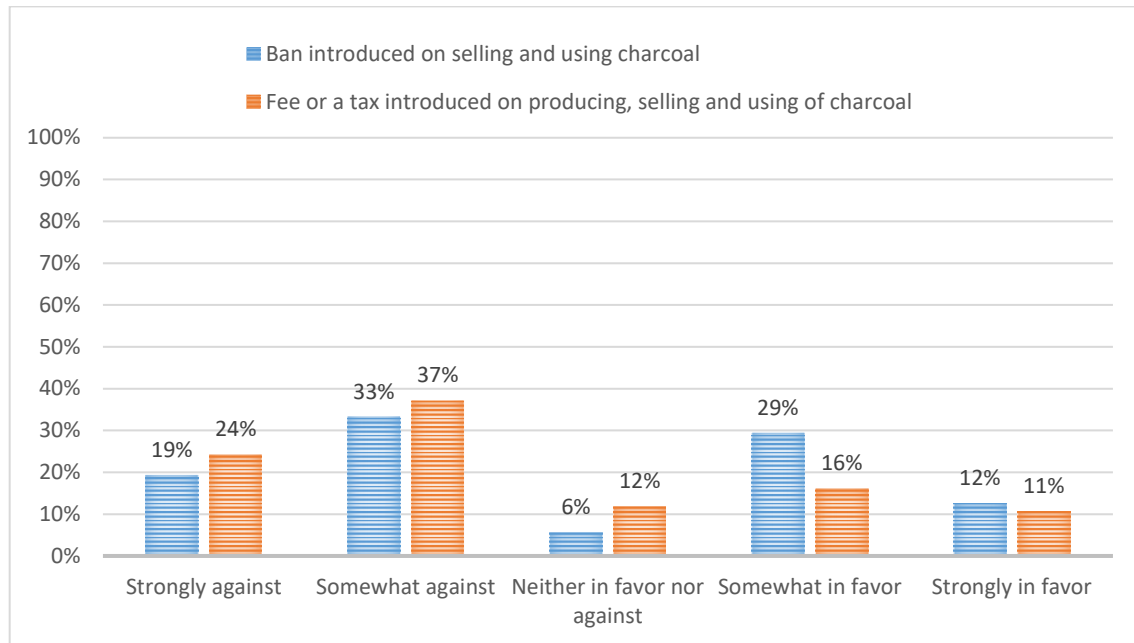


Figure 9 General population's acceptance of 2 different policy instruments affecting forest loss due to charcoal (1009 respondents)



Stakeholders' perspective

The stakeholders' perspective, as can be seen in Figure 10 and 11 below, differs from the general public. For example, the stakeholders' responses indicate a much lower acceptance of a ban on cutting trees in public and community forest, but a rather similar level of acceptance of the charcoal ban as the general public. The main difference is seen for a tax/fee on charcoal, where the stakeholders are much more in favor. Hence, there is a preference toward the price-based policy instrument (tax/fee) compared to a ban, for regulating both the cutting of trees in public and community forest and selling and using charcoal. However, it is important to keep in mind the very large difference in sample size. The breakdown of responses per stakeholder category is presented in Appendix 2.

Figure 10 Stakeholders' acceptance of 2 different policy instruments affecting forest due to cutting trees (36respondents)

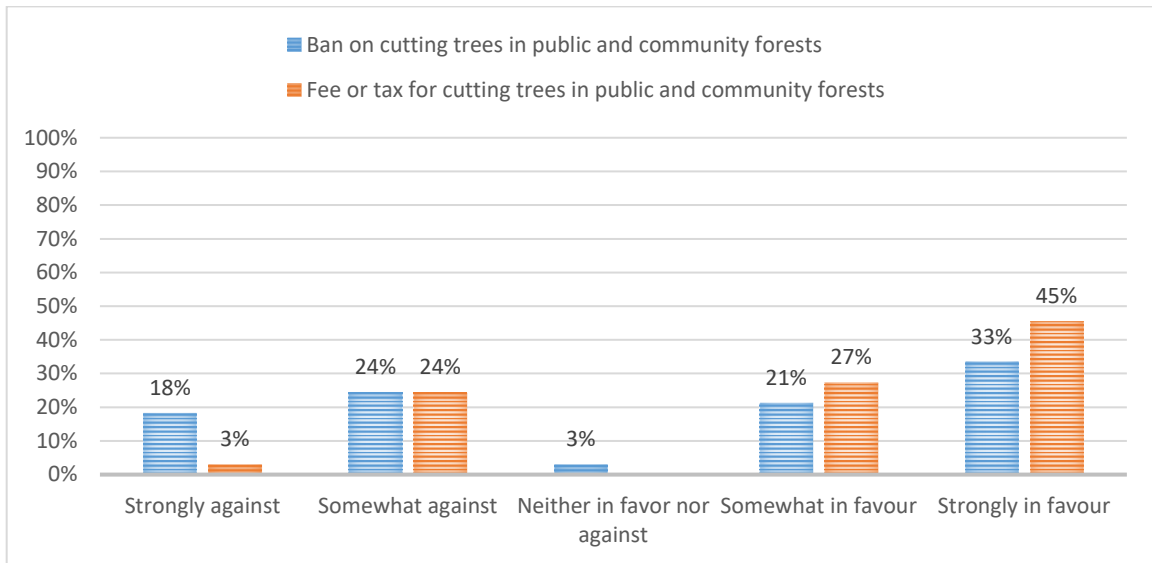
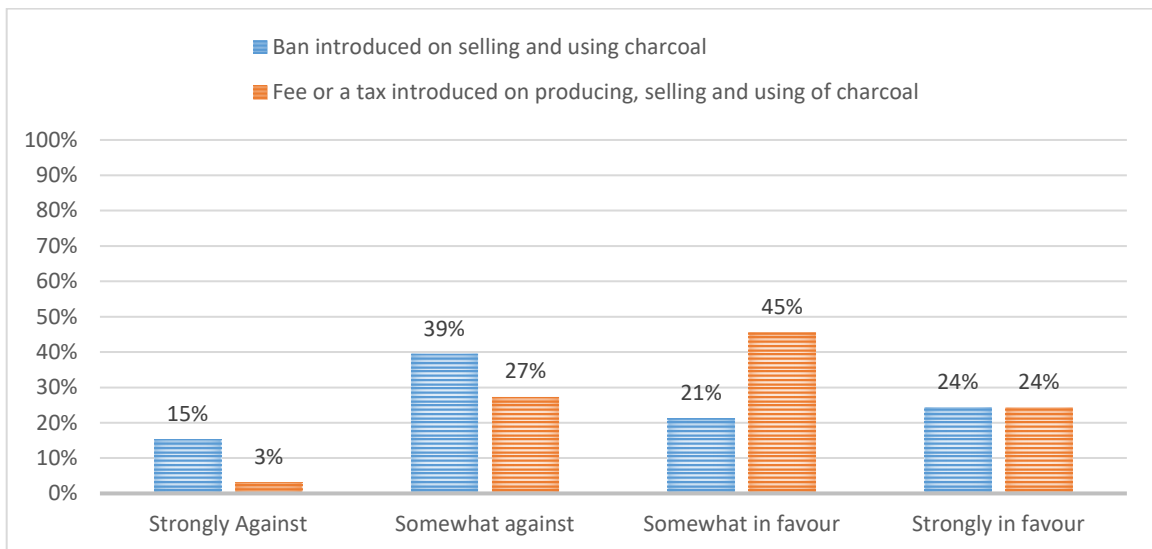


Figure 11 Stakeholders' acceptance of 2 different policy instruments affecting forest loss due to charcoal (36 respondents)



Chapter 4: DISCUSSION AND CONCLUSIONS

4.1 Discussion on Policy Instruments

Fossil Fuel

Rwanda is a 100% importer of fossil fuel products, any impacts at the upstream level would impact its economy. The target as indicated in the energy policy is to have enough storage that can sustain the country in the time of crisis. Between 2000 and 2012 petroleum importation increased by more than 700% and consumption grew by 16 % in the same period. Due to the increase in vehicles and air traffics, it is expected to have an increase in petroleum products importation. The national target for petroleum storage was 150 million liters by 2017 and this target was overreached as we are in 2022 (Bimenyimana, Asemota and Li, 2018). This is happening while transitioning electricity generation from diesel to renewable energy in order to reduce diesel importation. Rwanda has developed alternative sources of energy for emission reduction from fossil fuel burning. The proposed development of alternative sources of energy are: hydropower, solar energy, wind, biogas, biomass, peat, geothermal, and methane gas. The proposed alternative source of energy has not yet been successful to replace the use of fossil fuels, as some of them are still in trial period for use. Beside the development of alternative sources of energy, the country has adapted its regulation and policy frameworks relating to fossil fuels for pollution and emission reduction.

Plastic pollution

Rwanda has taken measures to better manage and reduce the use of plastics, including adoption of the law n° 17/2019 of 10/08/2019 relating to the prohibition of manufacturing, importation, use and sale of plastic carry bags and single-use plastic items. The transition to a circular and eco-efficient economy is promoted through the National Policy on Environment and Climate Change of 2019 and the Green Growth and Climate Resilience Strategy of 2011 and revised since 2022.

In addition, a large number of policy instruments – ranging from awareness campaigns to inspections and penalties in the form of fines and confiscation of plastics that are legally prohibited– are applied. The country has also been successful in significantly reducing the plastic bag waste by enforcing the law through joint-monitoring and inspection by different institutions (e.g. Rwanda Environment Management Authority, Rwanda National Police, and local administrative entities). The country uses different communication channels to raise awareness about the dangers of plastic pollution. However, the effective awareness campaigns on the dangers of plastic bags and single-use plastics require the use of different communication channels, focusing on community-based awareness campaigns (Allyssa, 2020).

Rwanda promotes cleaner production imbedded in circular economy, through Cleaner Production & Climate Innovation Centre (CPCIC) which offers advisory services on adoption of cleaner production and climate resilient technologies and supporting businesses in transition to alternatives. However, despite a special attention paid to plastic pollution prevention in Rwanda, there are still limitations:

- 1) The current policy and legal framework does not cover all plastics.
- 2) The existing communication strategy reaches the public in a limited way.
- 3) There is limitation in recording data on enforcement.

- 4) Alternatives such as recycling, circular economy activities are considered, but still limited mainly due to lack of technical and financial resources. This area needs more focus in the future.
- 5) Tailoring suitable communication products and channels to specific audiences still limited.

It is important to note that enforcing the policy on banning plastic bags was not without obstacles. A black market emerged, triggered by a reluctance to behavioral change, but also a lack of alternatives to replace plastic bags.

The ban on plastic bags has had a negative impact on the production costs of most manufacturing companies. Farmers complained about the price of bio-degradable bags and industry demanded support for those companies producing plastic bags who would suffer from the ban. However, given the comparatively limited strength and size of plastic manufacturers in Rwanda, the industry was not able to shape or influence government action. The Rwandan Government has been running a service-based development strategy, which was targeting tourism and transforming Kigali into a 'model' city – thereby inviting investors to a clean and safe destination. Under the Rwandan 'VISION 2020', service sectors like tourism were favored over manufacturing.

The key driver for transformation with regard to plastic bags was the strong political will to enforce the ban. Continuous campaigns and a non-existent plastic lobby accelerated the transformation as the government did not have to advocate against business power linked to associations and local manufacturing groups.

Forest loss

Forest policies help determine the use, retention and protection of forests. As the country has set the ambition of achieving 30% of forest cover in 2020, this was achieved through the synergy among different sectors. The evolving nature of sustainable forestry goals requires advances in forest policy instruments for multi-functional forestry. In particular, the new forest policy instruments must improve our ability to provide and to protect common pool and collective goods to account for and mitigate market failures and externalities and to include communities and new non-government stakeholders better for maintaining the achieved goal.

Absence of alternative sources of energy – still promotes majority to use firewood and charcoal. Thus, while the policy instrument is implemented, it does not curb forest loss since communities have to harvest charcoal/firewood. Little is known on the effectiveness in terms of protecting forests. Similarities is existing in implementing, affecting, and affecting stakeholders. Since all policy instruments are in one sector, thus implementation falls under the same authorities responsible in the concerned sector. The policy instruments used are not limited to payment ecosystem services, trying carbon market, controlling trade and transport of forest resources, tourism revenue sharing which increases with the income revenue and many more.

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. The only exceptions are on the bans to prevent forest loss. This was discussed during the workshops held with the selected stakeholders, and part of the explanation for the difference 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.

If we look at the different thematic areas, the highest acceptance found in the surveys was for regulating plastic pollution and cutting of trees in public and community forest, meanwhile it was lower for fossil fuels and charcoal (except for LPG subsidy). But some exceptions occur. For stakeholders, the acceptance is relatively high for a tax/fee on charcoal and for the consumption limit on fossil fuels. The latter received a relatively large acceptance also from the general public, compared to their acceptance of a tax on single use plastics.

Our results indicate that amongst the general public there is a preference towards regulatory-based policy instruments compared to price-based ones (specifically a tax or fee), since the price-based instrument LPG subsidy gained the highest acceptance of all instruments amongst the general public (not asked for the stakeholders). 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 & Haring, 2020), which our results support.

For stakeholders, the pattern is more mixed. There seems to be a preference toward taxes rather than bans for regulating charcoal and cutting trees. Meanwhile, for single use plastic the ban gained higher share of in respondents in favor as well as consumption limit on fossil fuel compared to both the tax and reduced subsidy. 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

When it comes to taxes, our results showed that the acceptance increased a lot 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. 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; Haring 2014; Davidovic & Haring 2020).

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 dependent on firewood for example cooking.

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APPENDIX

Appendix 1: References to Country Profile

Rwanda	Data	Reference
Size/Population density	26 338 km2 503/km2	<p><i>Countries by Area - WorldAtlas</i></p> <p>https://www.worldatlas.com/features/countries-by-area.html#countriesBySize</p> <p>Accessed: 2022-02-04</p> <p><i>National Institute of Statistics of Rwanda (2023) KEY FIGURES: 5th Rwanda Population and Housing Census (PHC)</i></p> <p>https://www.statistics.gov.rw/publication/key-figures-5th-rwanda-population-and-housing-census-phc</p> <p><i>Last Updated: 27/02/2023</i></p> <p>Accessed: 2023-03-01</p>
Key sectors in the economy	Agri:24 Indu: 20 Service: 48 Manu: 9	<p>Year 2021</p> <p><i>World Development Indicators DataBank (worldbank.org)</i></p> <p>https://databank.worldbank.org/reports.aspx?source=world-development-indicators</p> <p><i>Last Updated: 09/16/2022</i></p> <p>Accessed: 2022-10-14</p>
Population Growth	13,2 million 2.3%	<p>Year 2022</p> <p><i>National Institute of Statistics of Rwanda (2023) KEY FIGURES: 5th Rwanda Population and Housing Census (PHC)</i></p> <p>https://www.statistics.gov.rw/publication/key-figures-5th-rwanda-population-and-housing-census-phc</p> <p><i>Last Updated: 02/27/2023</i></p> <p>Accessed: 2023-03-01</p>
Life Expectancy (F/M)	70/66	Year 2020

		<p><i>World Development Indicators DataBank (worldbank.org)</i></p> <p>https://databank.worldbank.org/reports.aspx?source=world-development-indicators</p> <p><i>Last Updated: 09/16/2022</i></p> <p>Accessed: 2022-10-14</p>
Poverty rate	45.9%	<p>Year 2020</p> <p><i>Africa SDG Index and Dashboards Report - Sustainable Development Report</i></p> <p>https://www.sdgindex.org/reports/2020-africa-sdg-index-and-dashboards-report/</p> <p>Accessed: 2021-12-01</p>
Access to electricity	61%	<p>Year 2022</p> <p><i>National Institute of Statistics of Rwanda (2023) KEY FIGURES: 5th Rwanda Population and Housing Census (PHC)</i></p> <p>https://www.statistics.gov.rw/publication/key-figures-5th-rwanda-population-and-housing-census-phc</p> <p><i>Last Updated: 02/27/2023</i></p> <p>Accessed: 2023-03-01</p>
GDP/capita	854USD	<p>Year 2022</p> <p><i>MINECOFIN (2022) National strategy for transformation (NST1) 2017-2024 Midterm review. Kigali: Government of Rwanda</i></p> <p>Report published: 2022</p>

		<p><i>Last Updated: 12/22/2022</i></p> <p>Accessed: 2023-01-13</p>
Rainfed/Irrigated agriculture	99.5/0.5%	<p>Year 2020</p> <p><i>Land Use Indicators, Land area equipped for irrigation</i></p> <p>https://www.fao.org/faostat/en/#data/EL</p> <p>Accessed: 2022-10-13</p>
Land area covered in forest	30.4%	<p>Year 2022</p> <p>MINECOFIN (2022) National strategy for transformation (NST1) 2017-2024 Midterm review. Kigali: Government of Rwanda</p> <p>Report published: 2022</p>

Appendix 2: Ongoing Policy and strategies put in place for reduction of the use of fossil fuel

The following table is summarizing the policies and strategies put in place in order to promote the use of alternative energy to fossil fuels, some of them are still new other are being implemented.

Type	Policy/Strategy	Year	Description
Electricity access	Se4all action agenda	2016	Present plan to deliver energy efficiency and renewable energy (biomass, off-grid, and power generation from renewable energies).
	Scaling up renewable energy program(SREP) investment plan	2015	Support implementation of the SE4ALL action Agenda with World Bank funding
	Rural electrification strategy (RES)	2016	Set out four programs which deliver off grid solutions (SHS and mini grid).
	Electricity access roll out program (EARP)	2013	Key driver of on-grid access growth with lots established for electrification to 2017/18

	National electrification plan (NEP)	2018	Detailed plan of on and off-grid expansion
Energy efficiency	Energy efficiency strategy	2018	Outline initiatives to improve efficiency across generation, transmission and distribution and end-user consumption
Technical	Rwanda master plan and least cost development plan (LCDP)	2017	Present detailed analysis of current power system and future growth
	Grid code	2013	Details the technical running of the power system
Resources	Management prescription for the development of Lake Kivu Gas resources	2009	Sets out the required standards and processes for gas extraction. Has been updated
	Peat resource for power generation	2014	Details the peat reserves for power generation across Rwanda
	Simplified licensing procedure	2015	Sets out requirements for small scale off grid renewable developers
Biomass	Biomass energy strategy	2018	Forecasts demand and supply balance across scenarios and includes action plan to deliver targets focused on efficiency
	National Biomass Program (NBP)	2018	Present clear initiatives to promote use of efficiency and alternative cooking technologies and establish sustainable biomass consumption
Petroleum	Downstream Petroleum Strategy	2014	Detailed plan to establish effective regulatory and institutional framework coupled with suitable and sufficient petroleum facilities to ensure supply and distribution
Laws	Electricity law of Rwanda	2018	Governs activities of electricity production transmission, distribution and trading
	Public Private Partnership (PPP) law	2016	Establishes processes and requirements for entering PPPs (including procurement)
	Radiation protection law	2017	Establishes rules and requirements for the use of radiation.
	Renewable Energy and Energy Efficiency law	2018	Govern renewable energy sources and energy efficiency in Rwanda with the aim of promising further development, utilization and sustainability.

Appendix 3 - Stakeholder survey – responses per category

Fossil Fuels

Figure 11: Stakeholders' acceptance of a consumption limit on fossil fuel use (36 respondents)

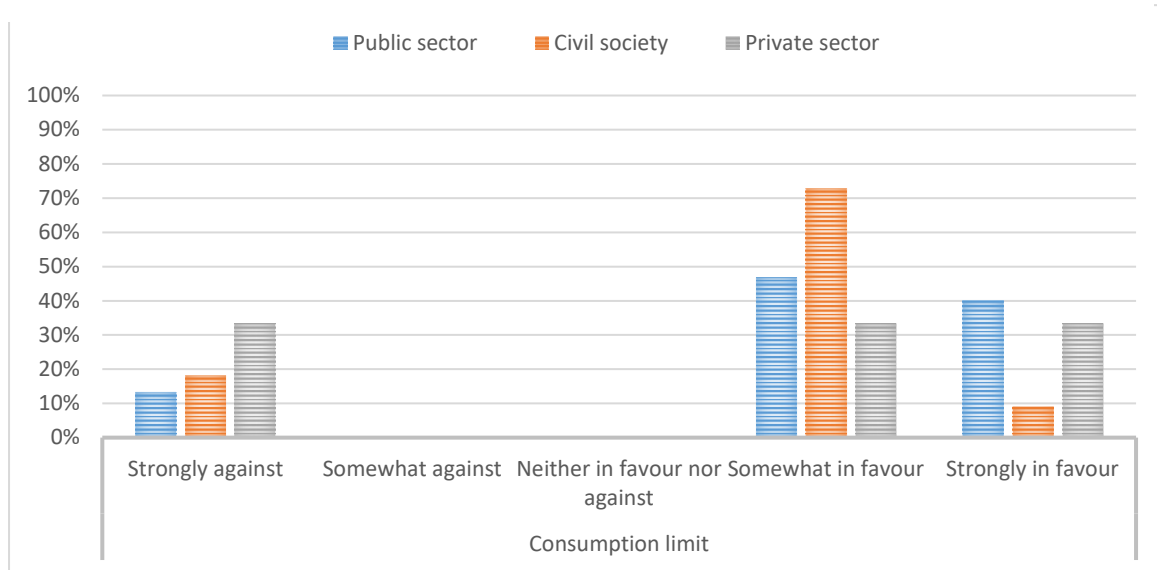
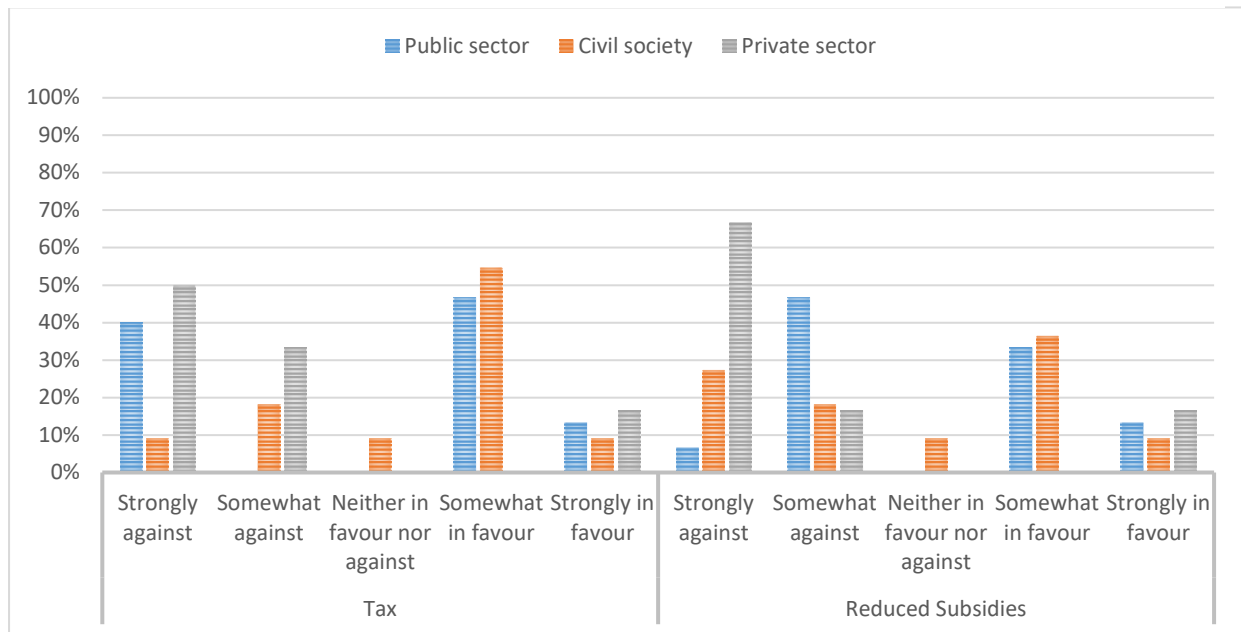


Figure 12: Stakeholders' acceptance of a tax and reduced subsidies on fossil fuel (36 respondents)



Plastic Pollution

Figure 13: Stakeholders' acceptance of a ban on plastic carrier bags (36 respondents)

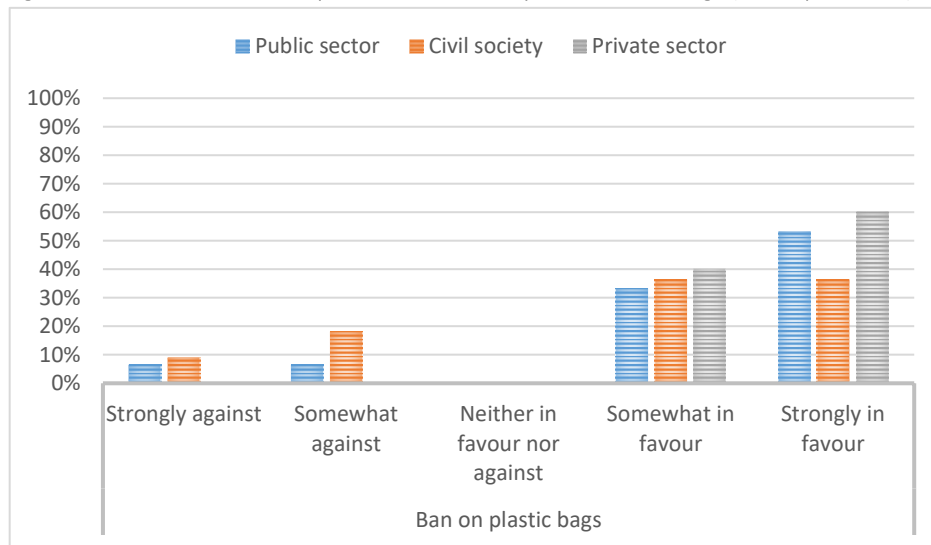
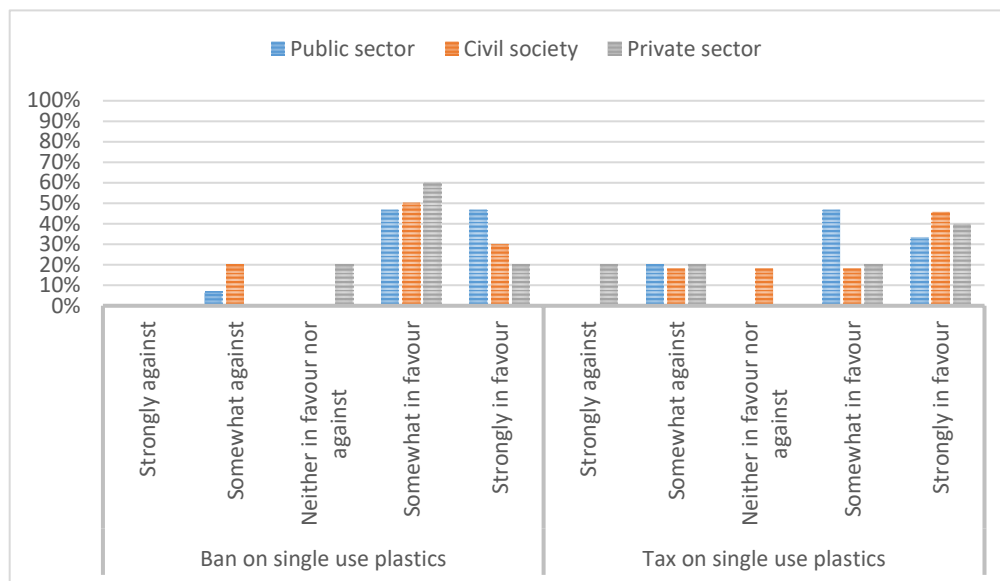


Figure 14: Stakeholders' acceptance of a ban and tax on single use plastics (36 respondents)



Forest Loss

Figure 125: Stakeholders' acceptance of a ban and tax/fee on cutting trees (36 respondents)

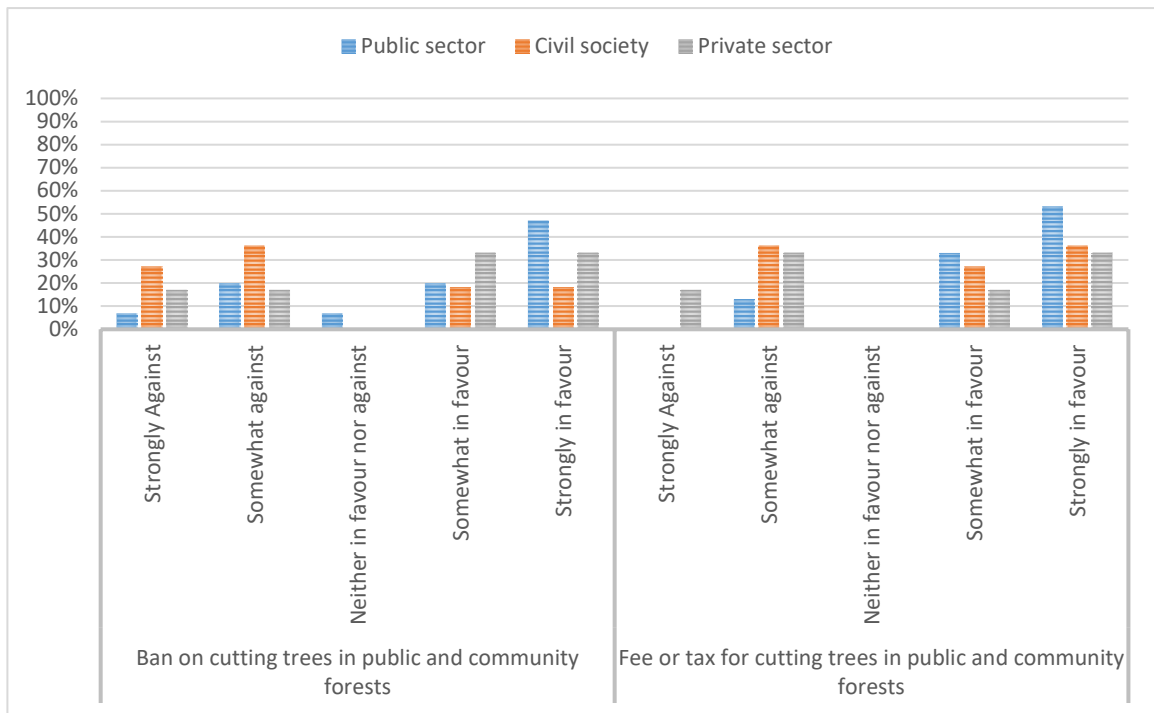


Figure16: Stakeholders' acceptance of a ban and tax/fee on charcoal (36 respondents)

