



**Green Bonds
Programme**
— KENYA —

FINAL REPORT BY:



**Strategic
Business
Advisors
(Africa) Ltd**

Business, Economics & Finance
Consultants

ASSESSMENT OF GREEN INVESTMENT OPPORTUNITIES IN THE TRANSPORT SECTOR IN KENYA

STUDY SUPPORTED BY:

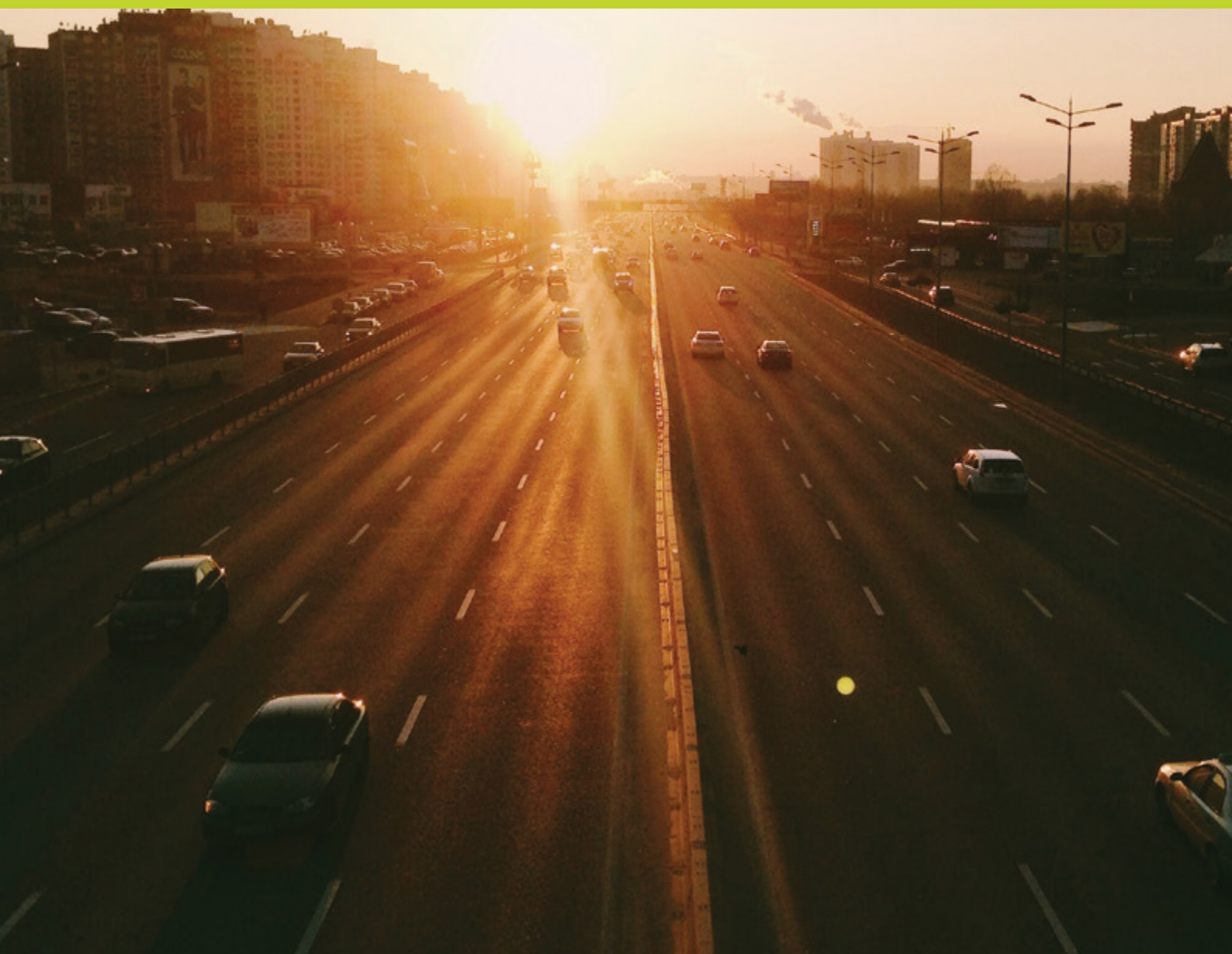


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Executive Summary

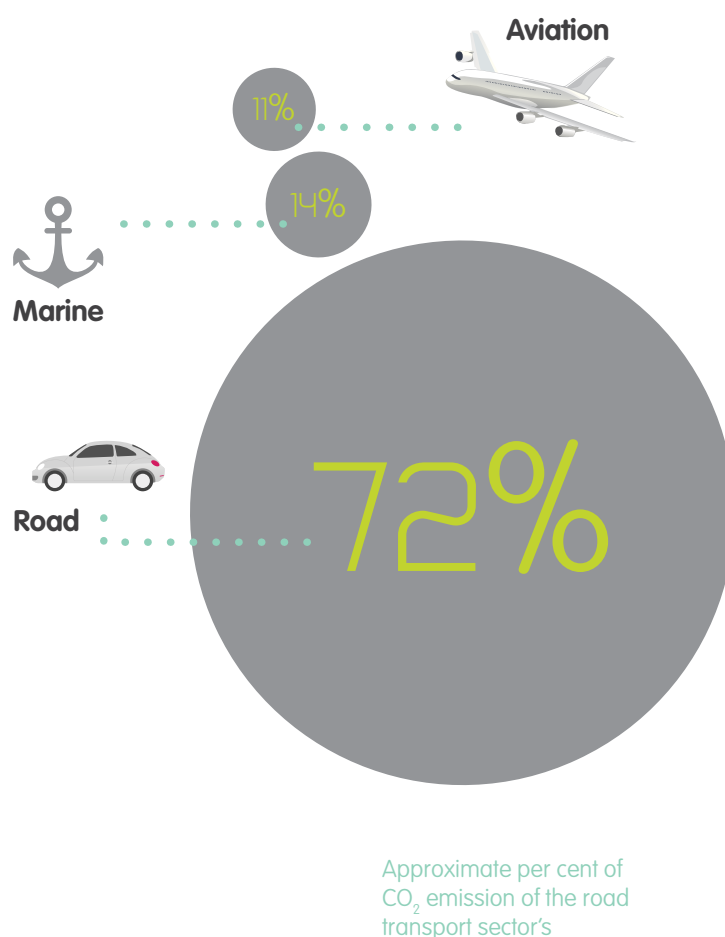
Introduction

The research project “Assessment of Green Investment Opportunities in Kenya” was carried out in partnership between the Green Bonds Program Kenya and WWF Kenya. The project was funded by WWF Kenya and the research was conducted by Strategic Business Advisors (SBA) Africa.

The overall objective of the study is to quantify the investment opportunity for green investments in Kenya, to identify barriers and to propose solutions for creating bankable projects under the Green Bonds Programme Kenya.

The transport sector in Kenya includes rail, road, air and waterways both inland and open sea. Road is the most popular mode. The transportation sector has been reported as the second largest source of anthropogenic carbon dioxide (CO₂) emissions. The sector’s utilization of petroleum based fuels is the main reason making this sector a major culprit in CO₂ emissions.

¹Road transport accounts for approximately 72 per cent of the sector’s emissions. In road transport freight trucks and automobiles are the main sources of emission. Marine shipping accounts for 14 per cent and aviation 11 per cent. Despite being the least contributor to carbon emissions, aviation has been one of the fastest growing sources of the emissions. It is important to note that international flights create about 62 per cent of the emissions and the balance by domestic flights.



¹ <https://whatsyourimpact.org/greenhouse-gases/carbon-dioxide-emissions>

The Kenya greenhouse gas (GHG) emissions report shows 4 million tons of carbon dioxide emitted under the transportation sector in the year 2000. This represents 7 per cent of the total emissions. In 2010, emissions in transportation had risen to 7 million tons of carbon dioxide out of 70 tons representing 10 per cent of total emissions. In 2015, emissions in transportation again rose to 9 million tons of carbon dioxide out of 80 tons. The 2020 forecast shows transportation having total emissions of 12 million tons of carbon dioxide out of 96 million tons. The forecast for 2030 puts emissions at 21 million tons against a total of 142 million tons.

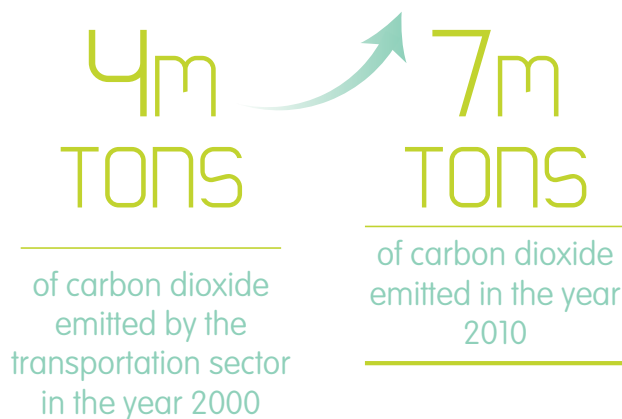
Key Findings

The IFC Climate Investment Opportunity Report (2016) identifies transport as the largest investment potential sector in sub-Saharan Africa with a potential of USD \$ 499 billion out of a projected possible 783 billion. This accounts for approximately 63 per cent of total investment potential in the region.

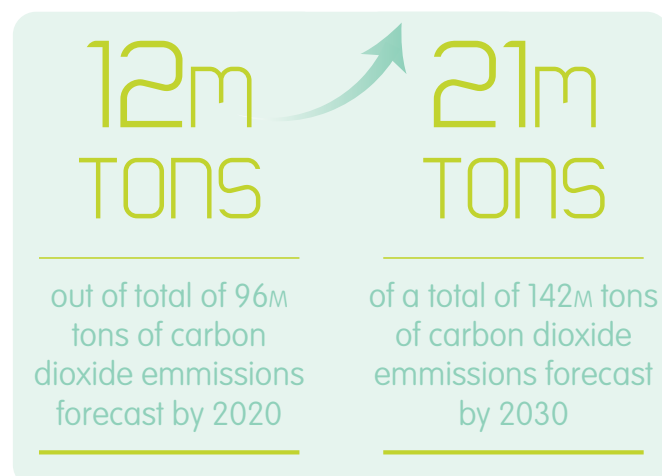
Based on a review of investment opportunities in Kenya in the immediate and long term over \$500 million worth of investments were identified as highlighted below.

Current and forecast CO₂ emissions in the transport sector in Kenya

Emissions



Forecast



Transport sector has the largest investment potential in sub-Saharan Africa

\$499Bn.
OUT OF A
PROJECTED
\$783Bn.

Investment opportunity	Short term immediate (1-2 years)	Medium term (5-10 years)	Impact on climate ² change	Opportunities for SMEs
City rail Nairobi		\$140 million	Significant as there will be large shift away from motorised transport	
BRT model Nairobi and Mombasa		\$350 million	Significant	
Ride sharing /car pooling	\$1-\$3 million		Limited	
Ride hailing		\$10 million	Small contribution	Many opportunities for SME owners of transport
Freight matching services	\$2million	\$3-\$5 million	intermediate	
Vehicle trailer modification	\$2-\$3 million	\$3-\$4 million	intermediate	
Logistics management technologies/services	\$5 million	\$15 million	If scale is achieved can have significant impact in the medium term through efficiency enhancements	Opportunities for SMEs to develop innovative solutions
Electric vehicle charging station		\$30 -\$40 million	Intermediate	Potentially some SME opportunities as service providers
Cleaner Fuels – Production of Bio Fuels		\$5-\$10 million	Limited	Potential Opportunities in the supply of raw materials
Total	\$8 million	\$610million		

Based on the data presented immediate finance opportunities are approximately \$8 million growing to over \$580 million in the medium term. Most of the highest impact projects will be largely in the light rail and BRT systems which will be funded by the government and other development finance institutions. Given the large size of these projects there may be scope for a government backed green bond to finance these projects.

² Data presented earlier highlights that emissions from transport are about 10% of total emissions in Kenya. Key contributors are cars and trucks – projects that improve efficiency of road transport (ride sharing electric cars etc) have potential to impact significantly on reducing carbon emissions. Also projects that increase use of alternative more efficient transport (e.g. Light rail and BRT) can have a significant impact in emission reductions.

Key constraints identified include the following:

- For large transport projects (BRT and light rail) there is need for significant political will in the highest levels of local and national government to push the projects through;
- Funding of the large projects is also a constraint for many local authorities. For example, Mombasa is considering a BRT system but will need significant amounts of concessional financing to make the project viable.
- For the smaller transport projects (ride sharing etc) the main challenges relate to competition and pricing of the services proposed. An uncertain regulatory environment (e.g. VAT changes on fuel) and managing various stakeholders like drivers, consumers of the service may also pose a challenge to implementation of private sector driven initiatives.

Based on the challenges identified key recommendations include:

- Prioritization of key impact projects in the MTP III such as BRT and city rail; private sector organisations like KEPSA should lobby for implementation of these high priority projects to ensure implementation in as short a time as possible.
- Implementation of low hanging fruit such as development of dedicated BRT and carpooling lanes.
- Passing of incentive legislation such as tax rebates on importation of electric cars and cars that utilize biofuels together with any related infrastructure such as charging stations.
- Issuing of Green Bonds ring fenced specifically for these projects. The funds raised in these bond issues should be channelled to prioritized government projects as well as to identified venture funds with requisite green fund management expertise.



1 Introduction

1.1 Background

The research project “Assessment of Green Investment Opportunities in Kenya” was carried out in partnership between the Green Bonds Program Kenya and WWF Kenya. The project was funded by WWF Kenya and the research was conducted by Strategic Business Advisors (SBA) Africa.

The Green Bond Program – Kenya is brought together by Kenya Bankers Association (KBA), Nairobi Securities Exchange (NSE), Climate Bonds Initiative (CBI), Sustainable Finance Initiative (SFI), Financial Sector Deepening Africa (FSD Africa) and FMO, the Dutch Development Bank. The Green Bonds Programme Kenya is endorsed by the Central Bank of Kenya (CBK), Capital Markets Authority (CMA) and the National Treasury. The program aims to facilitate capital flows into green investments to support sustainable economic growth in Kenya through the following work streams:

- Research the potential of green bond issuance in Kenya;
- Develop a pipeline of green investments and engage with investors;
- Support demonstration green bond issuance from leading banks and corporates;
- Promote green Islamic finance;
- Develop a pool of Kenya-based licensed verifiers;
- Develop of a pooled bond facility that would allow smaller banks and corporates to also take advantage of wholesale debt capital markets; and
- Develop Kenya’s Green Bond Market and build local capacity to catalyze similar programs across EAC.

The program aspires to contribute to the national agenda by helping achieve Vision 2030, the Kenya Green Economy Strategy and Implementation Plan, as well as Kenya’s climate change commitments as outlined in the National Policy on Climate Finance, the National Climate Change Act, the Climate Change Action Plan and the Nationally Determined Contributions under the Paris Climate Agreement.

WWF-Global is one of the largest conservation organizations in the world. WWF-Kenya (WWF-K) implements programs and projects that contribute to providing an enabling environment for the achievement of sustainable natural resource management. It is in light of this that WWF Kenya through this project, supported the Kenya Green Bond Program to understand the existing and estimated future investment potential and financing demand for green investment projects in Kenya.

1.2 The Green Investment Opportunity

Arguably there has never been a better time to invest in green, sustainable and climate smart solutions. The cost of clean technologies has fallen dramatically, globally governments are embracing policies that encourage climate investment, and the Paris Agreement has galvanized support for measures that keep global warming under two degrees Celsius.

A dramatic drop in the price of clean technologies and the rise of smart policies are driving businesses to climate-smart investments.³ The International Renewable Energy Agency reported that by the end of 2017, the global renewable energy generation capacity had increased by 167 GW to 2,179GW globally. Global energy-efficiency potential is large and growing – governments and business invest more than \$300 billion each year to improve the efficiency of power grids, transport, industry, and buildings. The global green buildings market continues to double in size every three years. Climate-smart agriculture is also a growing private sector opportunity, as companies seek to increase crop resilience and food productivity, as well as their profits.

The growth in greenhouse gas (GHG) emissions is expected to come mainly from emerging markets – which require \$4 trillion per year to build and maintain infrastructure. How rapidly growing middle-income nations respond to their infrastructure needs will directly affect whether we can achieve the promise of the Paris Agreement. The good news is that growing economies can invest in new, climate-resilient infrastructure and offset higher upfront costs through efficiency gains and fuel savings.

Companies are also increasingly recognizing the need to ensure that their operations are resilient against supply chain disruptions and other effects of climate change. As a result, forward-looking businesses are moving quickly to climate-smart investments because it is good for the bottom line. Wall Street firms like Morgan Stanley report that investing in sustainability usually meets, and often exceeds, the performance of comparable traditional investments⁴.

There are also barriers that may slow down the green pipeline and investment growth. For example the global annual survey of the clean energy sectors by the International Energy Agency⁵, concludes that transformation towards a clean energy system is not in line with stated international policy goals. Many technology areas suffer from a lack of policy support, and this impedes their scaled-up deployment.

Furthermore, while some sectors—notably renewable energy—have good investment forecasts in a global context, there is no such forecast for Kenya and there are also limited data and forecasts in areas such as climate-smart agriculture and forestry, energy efficiency, green transportation and waste management.

1.3 Objective of the Study

The overall objective of the study is to quantify the investment opportunity for green investments in Kenya, to identify barriers and to propose solutions for creating bankable projects.

The outcomes of this exercise as will be seen in this report have provided a clear indication of the space for green investments in Kenya. It is important to note that green investments refer to not only investments in opportunities that contribute to mitigation of climate change but also other issues as have been identified under the Sustainable Development Goals as having direct relevance to the Green Bonds Principles⁶. These include; pollution prevention, terrestrial and aquatic biodiversity conservation and food security. The mapping table of green bonds principles to SDGs is found in the annex of this report.

3 <http://www.irena.org/newsroom/pressreleases/2018/Apr/Global-Renewable-Generation-Continues-its-Strong-Growth-New-IRENA-Capacity-Data-Shows>

4 Morgan Stanley Institute for Sustainable Investing (2015), Sustainable Reality: Understanding the Performance of Sustainable Investment Strategies, access at <http://www.morganstanley.com/sustainableinvesting/pdf/sustainablereality.pdf>

5 International Energy Agency (2017). The Annual Tracking Clean Energy Progress (TCEP) report of the Energy Technology Perspectives 2017

6 <file:///C:/Users/Ben/Downloads/Green-Bond-Principles---June-2018-140618-WEB.pdf>

As a result of a prioritization exercise conducted in the study, the report has focussed on three key sectors:

1. Agriculture
2. Transport
3. Manufacturing

This report covers the Transport sector.

1.4 Methodology

In order to undertake the study and in particular to identify and size investment opportunities the SBA team used multiple approaches that included:

- Interviews with key informants working in relevant capacities – commercial bankers, fund managers, development finance institutions, relevant donor funded programmes, private companies in the sector, NGOs and some Government representatives – to understand sector dynamics and opportunities ⁷;
- Review of relevant literature – to understand performance of the sector as well as to identify global best practice and investment trends for climate smart transport projects. The research also looked extensively at online sources of data on existing financing of climate smart projects in Kenya by various funds;
- Developing list of potential investment opportunities identified from different sources;
- For each investment identifying the market size of the opportunity and growth potential using either direct data source or proxies e.g. for organic fertiliser estimated size of entire fertiliser market in Kenya using data

available; – through interviews, discussions with players in the sector like key buyers able to estimate that organic fertiliser market share is less than 5% of total.

- Based on an estimate of market size and growth estimates, estimate current and future financing potential using understanding of the sector, the size of investment needs and existing financing available. Each investment is analysed independently using the information available and data available on financing on different sectors ⁸. It should be noted that the investment sizes are conservative estimates subject to more detailed market studies for each investment opportunity.
- Key findings were presented to an industry stakeholder group organised by Kenya Private Sector Alliance (KEPSA) and comments received incorporated into the final report.

1.5 Structure of the Report

The structure of the report is informed by the objective and scope of the study. The report is structured as follows:

- Transport Sector
 - o Overview of the Sector
 - o The Case for Sustainable Development in the Transport Sector
- Investment and Financing Opportunities in Transport Sector
 - o Key Investment Areas / Type of Projects
 - o Size of the Opportunity / Demand
 - o Potential Risks (incl. Credit Risks) and barriers
- Summary of investment pipeline
- Conclusions and recommendations

⁷ See list of persons met in Annex 3

⁸ For example, Central Bank publishes data on lending to different sectors in the economy; lending to agriculture is about 5% of gross loans, manufacturing 12% and transport 7%.

2 Transport

2.1 Overview of Transport in Kenya

The transport sector in Kenya includes rail, road, air and waterways both inland and open sea. Road is the most popular mode.

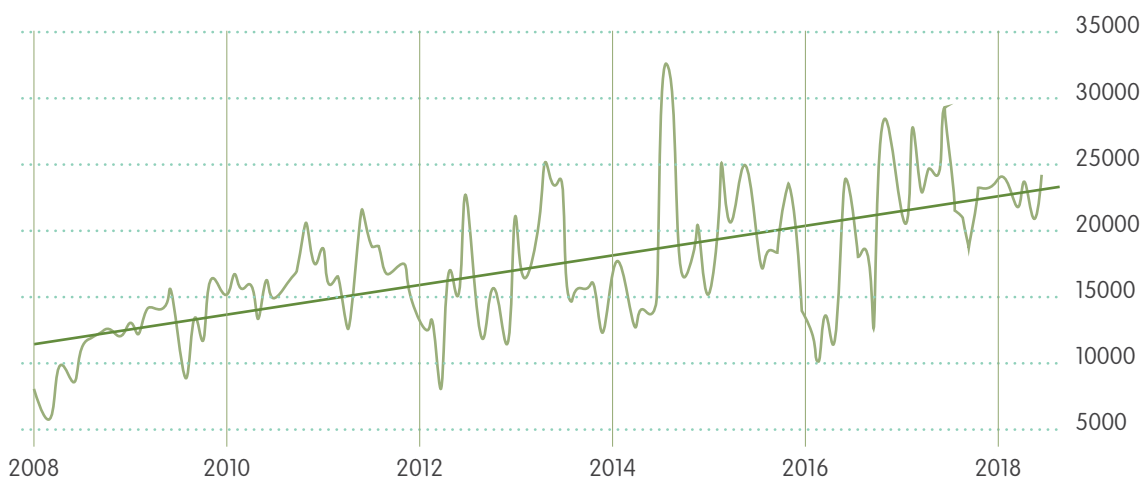
Kenya is the origination point of the Northern Corridor, a road and rail network connecting Kenya to the landlocked countries of Uganda, Rwanda, Burundi, Eastern DR Congo and South Sudan. Air passenger travel saw an increase in 2017 with a total of 10.1 million, an increase of 3.5% from the previous year. Kenya's Jomo Kenyatta International Airport is the largest airport in the East African region and serves as a major African hub. The airport served 7,111,501 passengers in 2016 making it the seventh busiest airport in passenger traffic in Africa. Further, the airport in 2017 received Category 1 status which effectively enables it to serve the US continent directly from Kenya. The inaugural flight is expected on the 28th of October 2018.

The port of Mombasa is the largest port in East and Central Africa handling over 1,000,000 containers. Total cargo throughput handled at the port increase to 30.3 million tonnes in 2017 an increase of 10.6% from the previous year.

Purchases of transport and transport related equipment remains high. Import duty collections on transport equipment in 2017 were the second largest of any collections, after food, drinks and tobacco. In 2017, collection on transport equipment stood at Kshs. 16.59 billion while those on food, drinks and tobacco stood at Kshs. 24.18 billion and the next category of miscellaneous commodities at 9.83 billion, followed by machinery at Kshs. 8.736 billion.

New motor vehicle registration in Kenya has largely been on the increase over the past 10 years as is seen in the chart ⁹ below:

Kenya New Vehicle Registrations



Source: KNBS (2018)

⁹ <https://tradingeconomics.com/kenya/car-registrations>

Data from 2017 indicates that new vehicle registrations increased from 90,176 in 2016 to 91,071 in 2017. Station wagons and saloon cars stood at 66,698 (an increase of 19.9 % by station wagons and a decrease of 8.9 % by saloon cars) while vans and pick-ups decreased by 22.4% to 9,866. The figure below shows new registration by month in 2017.



Figure 1: Kenya New Vehicle Registrations

Motorcycle registration went up from 123,539 units in 2016 to 191,601 units in 2017. This increase in motorcycle registration may partly be attributed to the removal of excise duty on motor cycle import from September of 2016. Three wheelers also increased to 5,167 in 2017 from 3,815 units in 2016.

The number of lorries and trucks however, declined to 7,460 in 2017 from 9,632. Similarly, the number of newly registered trailers fell from 2,829 in 2016 to 1,953 in 2017. Buses and matatus registrations also dropped from 519 in 2016 to 459 in 2017.

The decline in trucks, lorries and trailers is largely attributed to the anticipation of the introduction of the Standard Gauge Railway freight service that was expected in the last quarter of 2017.

This service was expected to greatly reduce the number of loads, containers and other bulk cargo, available for trucks and lorries. This decline is expected to continue in 2018 now that the SGR service is in full swing with 6 trains in operation daily and further with the government directing that 100% of local cargo is transported via SGR and not by road.¹⁰ Reports by local sources indicate an expected 1500 trucks will be off the road by November of 2018. This decline may be largely attributed to the uncertainty by road freight transport companies of the impact that the Standard Gauge Railway service would have once the freight service was introduced in January of this year.

¹⁰ <https://www.standardmedia.co.ke/business/article/2001285508/more-sgr-trains-set-to-boost-cargo-haul>

2.2 The Case for Sustainable Development in the Transport Sector

The transportation sector has been reported as the second largest source of anthropogenic carbon dioxide emissions. The sector's utilization of petroleum based fuels is the main reason making this sector a major culprit in CO₂ emissions.

2.2.1 Overview

¹¹ Road transport accounts for approximately 72 per cent of the sector's emissions. In road transport freight trucks and automobiles are the main sources of emission. Marine shipping accounts for 14 per cent and aviation 11 per cent. Despite being the least contributor to carbon emissions, aviation has been one of the fastest growing sources of the emissions. It is important to note that international flights create about 62 per cent of the emissions and the balance by domestic flights.

The Kenya greenhouse gas (GHG) emissions report shows 4 million tons of carbon dioxide emitted under the transportation sector in the year 2000. This represents 7 per cent of the total emissions.

In 2010, emissions in transportation had risen to 7 million tons of carbon dioxide out of 70 tons representing 10 per cent of total emissions. In 2015, emissions in transportation again rose to 9 million tons of carbon dioxide out of 80 tons. The 2020 forecast shows transportation having total emissions of 12 million tons of carbon dioxide out of 96 million tons. The forecast for 2030 puts emissions at 21 million tons against a total of 142 million tons.

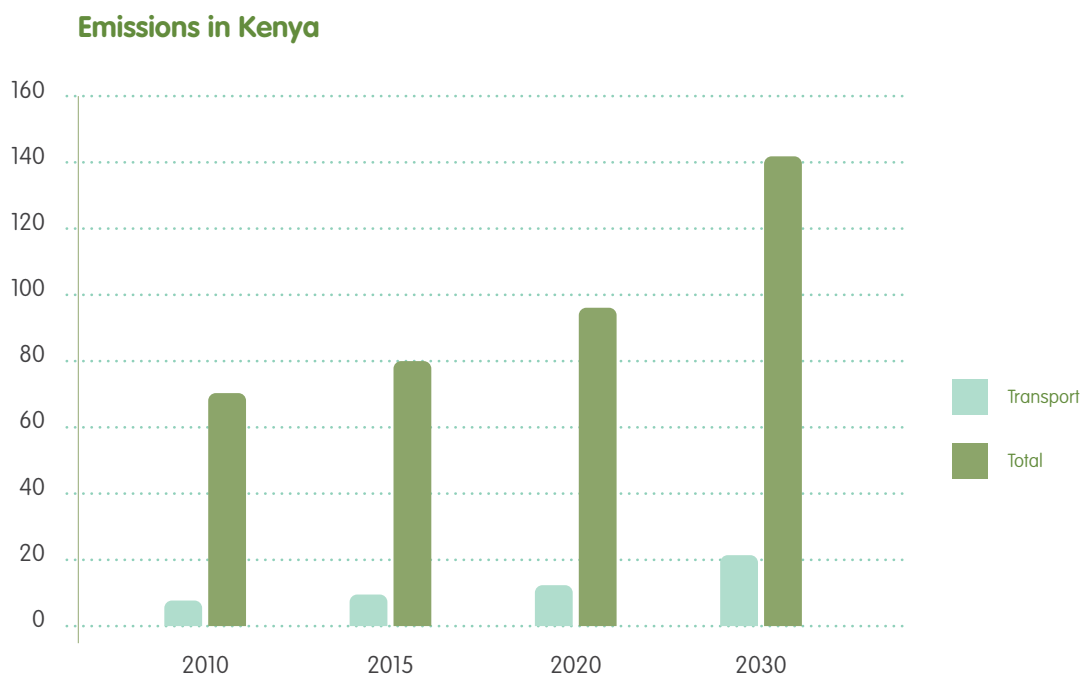


Figure 2: CO₂ Emissions in Kenya – Millions of Tonnes

CO₂ Emissions in Kenya – Millions of Tonnes

¹¹ <https://whatsyourimpact.org/greenhouse-gases/carbon-dioxide-emissions>

2.2.2 The Kenya Vision 2030 Context

Kenya's Vision 2030 aims for 'A globally competitive and prosperous nation with a high quality of life by 2030'. One key aspiration of Kenya's Vision 2030 is a well interconnected country served by a robust network of roads, railways, ports and airports. Another important aspiration is the generation of more energy at a lower cost through among other strategies, exploitation of geothermal power, coal, renewable energy sources and connecting Kenya to energy-surplus countries in the region.

Achievements in the transport sector under the Second Medium Term Plan (MTP II) include:

- Launch of the Standard Gauge Railway
- Low carbon transport under the Strengthening Adaptation and Resilience to Kenya Plus (StARCK+) programme
- Development of the Feebate tax structure and vehicle labelling - A feebate tax structure proposes a fee or levy on inefficient vehicles and a rebate or refund on efficient vehicles while a vehicle labelling scheme provides information on vehicle fuel efficiency to consumers
- Nairobi Metropolitan Service Improvement Project (2012-2017)
- The creation of the Nairobi Metropolitan Transport Authority (NaMATA) whose mandate includes the development of a mass transit system for Nairobi.

The Third Medium Term Plan (2018 – 2022) endeavours to achieve 10 per cent economic growth rate by the end of the period. Further and most relevant to the area of sustainability is the mainstreaming of climate change and the 17 Sustainable Development Goals into the plan. In MTP I and MTP II, climate change was included in the Environment Sector and not as a cross cutting standalone issue for mainstreaming in all sectors. This approach was found to have

adverse effects in the achievement of sustainable development. Mainstreaming means that climate change priorities identified in the National Climate Change Action Plan (NCCAP) and National Adaptation Plan (NAP) are integrated into MTP III sector plans and priorities. The goal of the Climate Change Thematic Area in Kenya's Vision 2030 MTP III is to "Enhance climate actions towards a low carbon and climate resilient development".

The Climate Change Act (2016) defines climate finance as money available for or mobilized by government or non-government entities to finance climate change and adaptation actions and interventions. The NCCAP provides a guiding framework for mobilizing climate funds from various sources thus enhancing access to local and international finance for climate such as the Green Climate Funds. The policy also establishes institutional framework for coding, tracking and reporting of climate finance. The government has created a climate change budget code and through the Kenya Climate Public Expenditure and Budget Review (CPEBR) it has also provided guidance to climate finance in public financial management systems and in the Medium- Term Expenditure Framework (MTEF) Processes.

Under the mainstreaming exercise, transport was identified as a key sector (together with forestry and energy) in the mitigation of climate change. The sector presents an opportunity for actions to lower greenhouse gas emissions and move the economy towards resource efficiency that is low in carbon emissions.

2.3 Sustainable Transport

Earth Times provides the definition of sustainable transport as follows: Sustainable transport, sometimes known as green transport, is any form

of transport that does not use or rely on dwindling natural resources and has low impact on the environment.

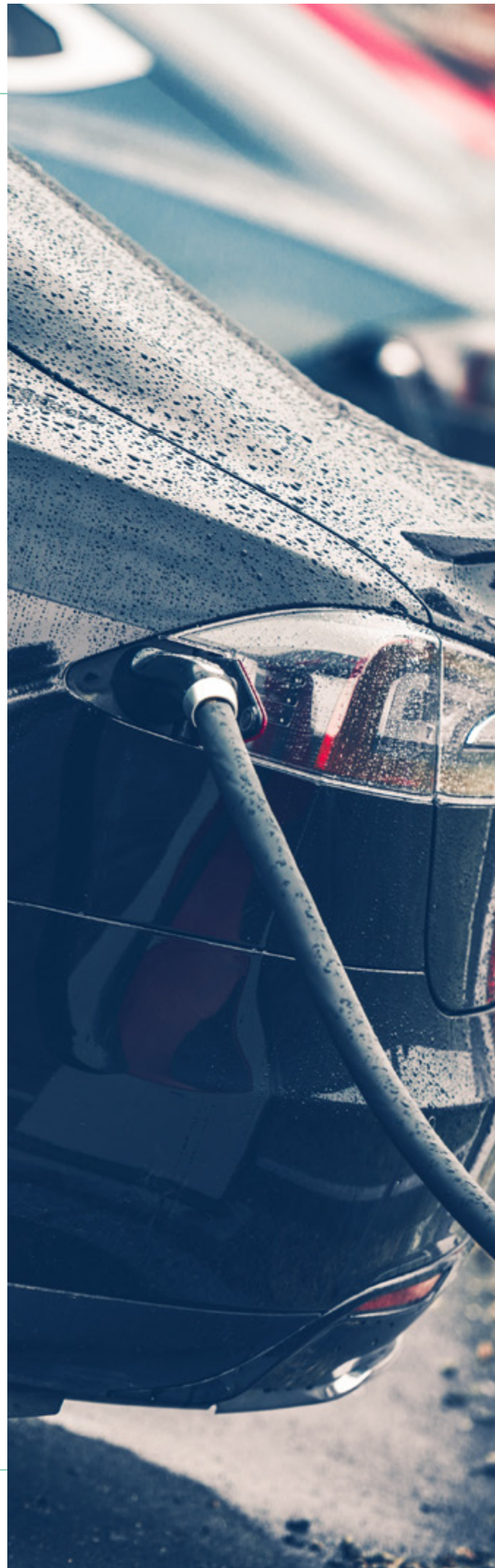
2.3.1 The Role of Transport in Sustainable Development

¹² The role of transport in sustainable development was first recognized at the 1992 United Nation's Earth Summit and reinforced in its outcome document – the Agenda 21. In undertaking the five-year review of the implementation of Agenda 21 during its nineteenth Special Session in 1997, the General Assembly noted that, over the next twenty years, transportation is expected to be the major driving force behind a growing world demand for energy. It is the largest end-user of energy in developed countries and the fastest growing one in most developing countries.

Sustainable transport is essential to achieving most, if not all, of the proposed Sustainable Development Goals (SDGs) and the 2030 Agenda for Sustainable Development. Although sustainable transport is not represented by a standalone SDG, it is mainstreamed across several SDGs and targets, especially those related to food security, health, energy, infrastructure and cities and human settlements.

2.3.2 The Green Economy Strategy and Implementation Plan

The Green Economy Strategy and Implementation Plan (GESIP) was developed as a result of the second Medium Term Plan (MTP II) 2013 -2017 that prioritized the development of a National Green Economy Strategy. Further, a Green Economy Assessment Report of 2014 confirmed that Kenya would derive great benefit from transforming into a green economy. The Ministry of Environment and Forestry led the effort of formulating the GESIP through a Steering Committee representative of



¹² <https://sustainabledevelopment.un.org/topics/sustainabletransport>

3 Investment and Financing Opportunities in Transport

The IFC Climate Investment Opportunity Report (2016) identifies transport as the largest investment potential sector in sub-Saharan Africa with a potential of USD \$ 499 billion out of a projected possible 783 billion. This accounts for approximately 63 per cent of total investment potential in the region.

3.1 Strategy: Avoid - Shift-Improve (ASI) Approach

A global response to sustainable transport has called for the development of transport infrastructure and services to be guided by the 'Avoid-Shift-Improve (ASI) Approach.

1. **Avoid:** Avoid the need for unnecessary motorized trips through smarter land use and logistics planning;
2. **Shift:** Shift the transport of goods and persons to the most efficient mode; and
3. **Improve:** Improve the efficiency and environmental performance of transport systems through improved vehicle, fuel and network operations and management technologies.

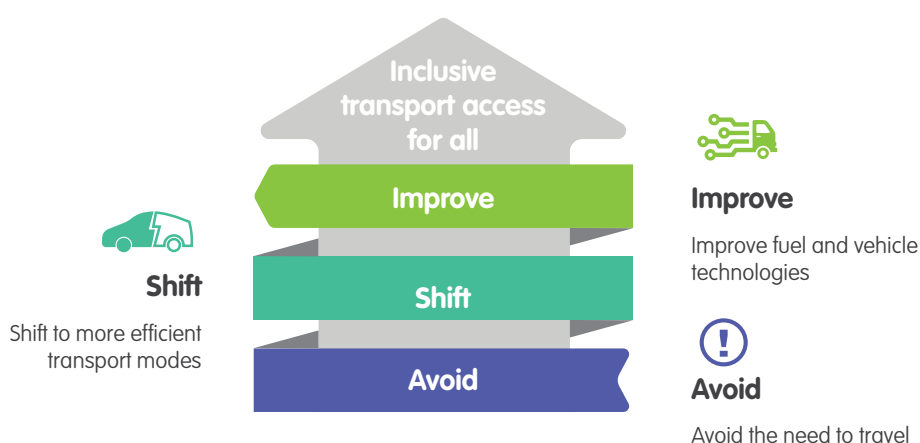
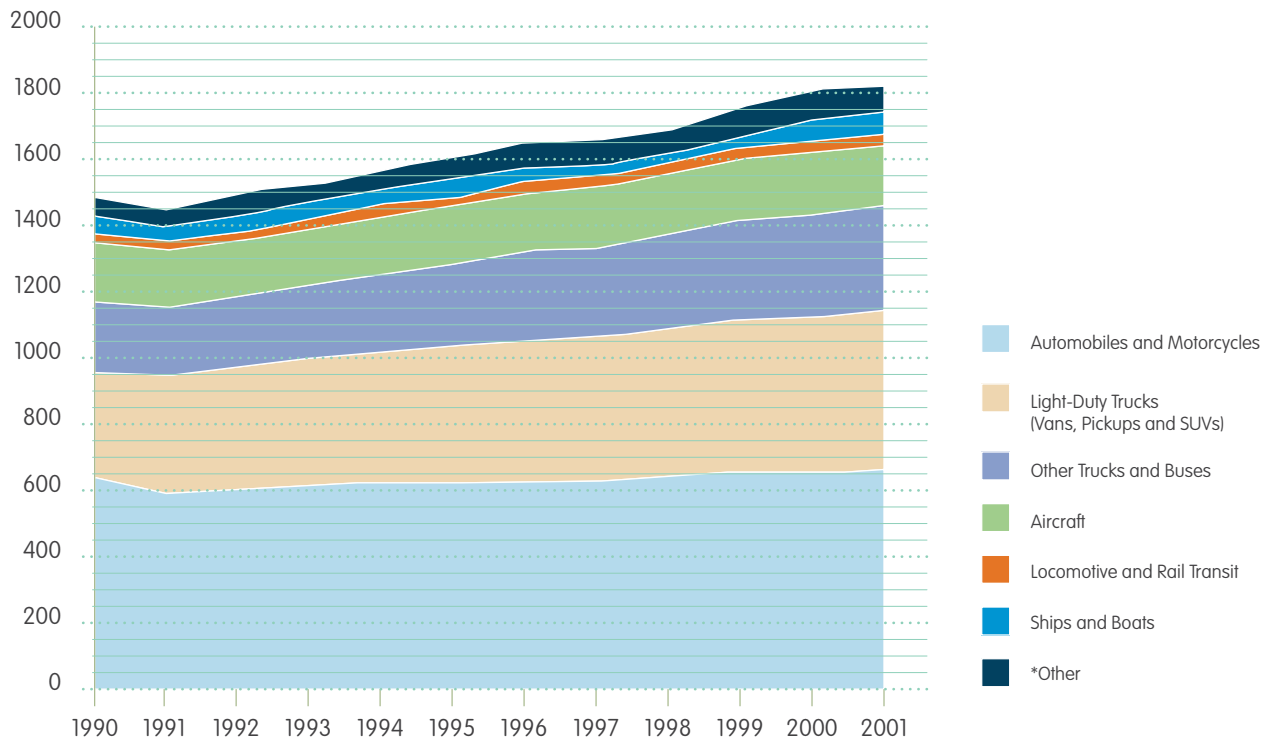


Figure 3: Sustainable transport paradigm

A study by Cowart, Pesinova and Saile (2003), analyses GHG emissions in the transport sector by vehicle type. Such analysis can help to identify the main 'culprits' of GHG emissions in transport and therefore provide direction in the type of interventions for example modal shifts that would reduce GHG emissions in the transport sector as a whole. The figure below shows the analysis of GHG emissions by vehicle type under the same study:



*Other Includes non-highway sources not in categories, such as construction and agricultural equipment, pipelines, lubricants, mobile air conditioners, and refrigerated transport but does not include bunkers. Source: Table 2.

Figure 4: Analysis of GHG Emissions by Vehicle Type

The figure above correctly describes the situation in most parts of Africa and the world where automobiles and motorcycles form the majority of the transport vehicles in terms of number and intensity of usage. Light-duty trucks follow with their usage being largely for short haul deliveries within towns and cities. Trucks and buses are used mostly between major towns. Rail use is further limited to towns along the rail infrastructure and air between towns, cities with airport and airfield facilities. Ships are only available where there are major waterways. From the bottom upwards, intensity of use decreases as does the number of vehicles in that category.

Cowart, Pesinova and Saile (2003) further analyze vehicle use and miles covered by purpose of movement. These are indicated as:

- Earning a living (to and from work, work related business travel)
- Family and personal business (e.g. shopping, doctor)
- School and church
- Social and Recreational (vacations, visiting friends and family)

From their analysis, the results are shown as below:

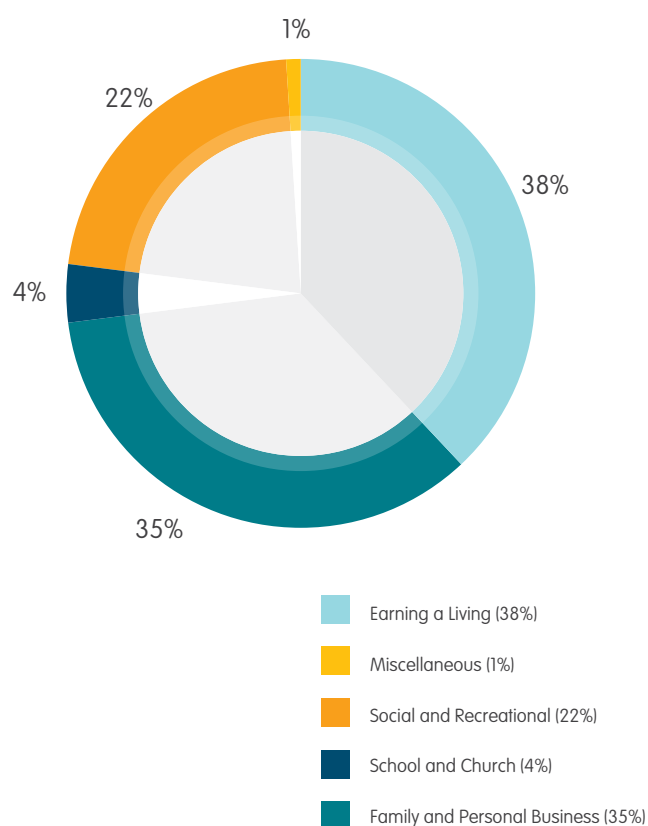
% of Vehicle Miles of Travel by Trip Purpose

Figure 5: % of Vehicle Miles of Travel by Trip Purpose

The chart above basically shows the percentage of movements under the different purposes of travel. By reviewing these percentages, it is possible to identify areas where change of mode of transport or frequency of the movement can be adopted in the reduction of GHG emissions.

3.2 Key Investment Areas ¹³

Filosa et al. (2017) reports on tests done to determine the level of GHG emissions in the transportation space. The same report notes that BRT and streetcar projects generate relatively low levels of GHG emissions primarily due to their low infrastructure needs and low annual

transit vehicle miles travelled (VMT). Further, the results for the rail projects suggest that projects with a high ridership effect, regardless of length, alignment, and number of stations, result in a net reduction in GHG emissions. Similarly, commuter rail projects with a high ratio of displaced VMT to transit VMT are expected to result in low or net reductions in GHG emissions.

1. Mode Shift

Shift from road to rail has the potential to greatly reduce GHG emissions. As indicated earlier, road transport emits the largest quantities of carbon in the sector. The main investment in this area is to expand the rail network. The Standard Gauge Rail currently transports goods from Mombasa to Nairobi. The network is expected to expand to other countries in the northern corridor such as Uganda and Rwanda.

2. Smart Transportation – Passenger Travel

Shift from small vehicles to mass transport vehicles decreases the number of vehicles on the road and therefore the total GHG emissions. In Kenya, private passenger saloons and SUVs will transport between 4 and 7 passengers while public service vehicles such as mini vans and buses will carry a minimum of 14 passengers or an equivalent of 2 passenger saloon cars.

a. Bus Rapid Transit

¹⁴ The Institute for Transportation and Development Policy defines Bus Rapid Transit (BRT) as a high quality bus-based transit system that delivers fast, comfortable and cost effective services at metro-level. A BRT has dedicated lanes, off-board fare collection and fast and frequent operations.

¹⁵ The TransMilenio in Bogota has a daily passenger demand of 1.98 million while the Metrobus in Mexico City and in Istanbul carry

¹³ Investment opportunities have identified by examining best practice in other jurisdictions that may apply to Kenya and consultations with key informants

¹⁴ <https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/what-is-brt/>

¹⁵ <http://wrirosscities.org/research/publication/social-environmental-and-economic-impacts-bus-rapid-transit>

between 600,000 and 800,000 passengers daily. Reported capital costs per kilometre for BRT systems range from \$0.9 by Rea Vaya in Johannesburg, South Africa to as high as \$12.5 by TransMilenio in Bogota, Colombia. These variations are as a result of variables such as extent of road works required, upgrading of facilities along the BRT corridor, IT utilization e.g. automatic fare collection and passenger information systems and advancing of traffic control for the BRT network. Other conditions such as labor and capital costs also contribute to these variations.

The impact of BRT systems includes:

- **Reduction in travel times** Johannesburg BRT users are reported to be saving an average of 13 minutes each way while users of the Metrobus in Istanbul save up to 52 minutes per day.
- **Reduction on GHG emissions** The TransMilenio in Bogota, Colombia is reported to have saved close to 1 million tO₂s annually.
- **Reduction of road fatalities, crashes and injuries** BRTs in Latin America are reported to have contributed to reduction of crashes by 40% on routes where they were implemented.

b. **Ride Share Services / Car Pooling / Cab Hailing**

The utilization of sharing services such that private cars are utilized to capacity. This service allows drivers to add passengers to their cars who are going in the same direction. In addition to being a source of income to the driver, the service also reduces the number of vehicles on the road going in the particular direction. The more reliable the service, the less people travelling on that

route will require to use their own cars or even purchase cars. The taxi hailing services have reduced empty running of taxis by linking taxis to passengers closest to their locations. This reduces movement of taxis that were previously travelling long distances to meet their clients and thereafter travelling additional long distances to return to waiting points or to other clients.¹⁶ The service in Kenya is said to have over 5000 drivers and over 363,000 active users.

Seyedabrishami et al (2012) studies the impact of carpooling and reported that if effected would result in decrease of vehicle trips per day by about 780000 vehicle trips per day and a reduction in annual fuel consumption by 336.53 million litres. The study also provides strategies that would increase popularity of carpooling such as identifying appropriate rideshares. This would increase carpooling by 30 per cent and effectively reduce annual fuel consumption by about 240 million litres. Another strategy is the introduction of high occupancy vehicle lanes (HOV) that reduce travel time for those ridesharing.

3. **Green Freight**

Freight carrying vehicles have significant impact on climate and air quality. There are two avenues through which these heavy duty vehicles can contribute to sustainable transport:

- a. **Reduction of empty miles** Empty miles refers to vehicle travel covered without a load. In freight transportation especially in countries with greater imports than exports, (most developing countries fall in this bracket), freight traffic is often largely one way
- b. **Increase in truck sizes and weight** Although still a controversial topic, there is a

¹⁶ <https://www.capitalfm.co.ke/business/2017/09/uber-has-363000-active-riders-in-kenya-driven-by-5000-drivers/>

school of thought advocating for larger truck sizes with greater allowable weight limits. The argument herein is that with larger trucks and greater weight limits, a single truck is able to consolidate the loads that would otherwise have been divided amongst several trucks due to size and weight constraints. This argument for consolidation would see a reduction of trucks on the roads and therefore fewer emissions from freight transportation as a whole.

4. Expanded Cycling and Public Bike Schemes

These schemes have the overall effect of reduction in requirement of the fossil fuels typically required in passenger vehicles. An alternative to travelling by car, public bike schemes enable users to access different parts of the city on rented bicycles. Reported impact of bike sharing schemes include decrease in traffic, reduction in energy consumption, decrease in emission of harmful gases and improvement of public health. China is home to 16 of the largest 20 bike sharing platforms globally. Research by Qiu and He (2018) shows that bike sharing in Beijing can help each worker save an average of 8 minutes per day. Additionally, these schemes, in a scenario where 75% of kilometres travelled by bicycle replaces the same distance travelled by personal vehicle, fuel consumption would reduce by 225.06 thousand tons. Given the same replacement, results show that bike-sharing would also decrease health costs by about 2420.57 million yuan (approx. USD 349 million). The main negatives of these schemes would be in bicycle maintenance and scheme management, both of which are controllable.

5. Fuel Economy, Cleaner Fuels and Electric Vehicles

Technological advancements in vehicle engines and fuel quality have reduced fuel consumption thereby reducing the emissions from these fossil fuels. The less fuel required by the vehicles to travel the same distances, carrying the same loads, the less emissions released to the atmosphere.

Bio fuels which have less GHG emissions (almost 90% less GHG emissions) are now available in some countries. An example is Brazil's sugarcane ethanol, considered to be the world's most successful alternative fuel. The ethanol is mixed with gasoline and used to run light vehicles as well as buses.

Electric vehicles have zero GHG emissions. These are considered the ultimate transportation vehicles. However, Electric vehicles have challenges such as high cost of the vehicles as well as critical parts such as the vehicle battery. Another challenge is access to charging stations. For short distances, one may charge at their convenient locations, however, accessing a charging station for long distant road trips this may pose a challenge.

¹⁷ Uptake of electric cars is on the rise. Total stock of electric cars increased to over 3 million in 2017 with China holding over 40% up from 10% in 2013. Further, the Electric Vehicles Initiative (EVI) launched the EV 30@30 campaign in 2017 to define its ambition of an average 30% market share for electric vehicles by 2030, including cars, buses and trucks to help meet the Paris Agreement. The campaign includes several implementing actions to help achieve the goal in accordance with the priorities and

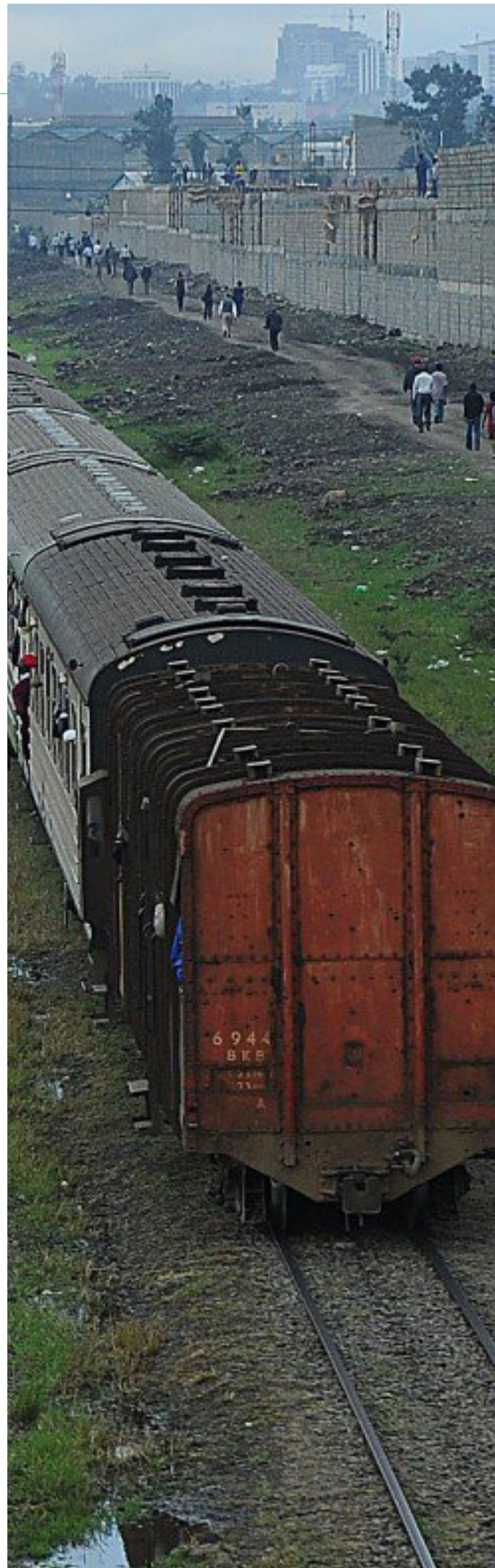
17 <https://www.iea.org/tcep/transport/evs/>

programmes of each EVI country. These actions include:

- Supporting the deployment of EV chargers and tracking progress.
- Galvanising public and private sector commitments for EV uptake in company and supplier fleets.
- Scaling up policy research, including policy efficacy analysis, information and experience sharing and capacity building.
- Supporting governments in need of policy and technical assistance through training and capacity building.
- Establishing the Global EV Pilot City Programme, a global co-operative programme that aims to facilitate the exchange of experiences and the replication of best practices for the promotion of EVs in cities.

6. Logistics

A key element in ensuring efficient use of transport in any economy is to improve efficiencies of movement of goods and people. Investments in appropriate logistics/storage services to enhance efficient movement of goods from rural to urban centres or from ports to key markets will become more and more important in the future. Traceability of product from production to the market will be a critical component of this as consumers both in export and local markets demand better quality. Opportunities exist for investments in cold storage to reduce waste along the value chain growth; technologies that enhance traceability of products to address food safety and sustainability concerns of consumers will also increase. Technologies such as drone technologies that allow farms to predict climate patterns or target harvesting of produce will also enhance efficiencies on the farm and reduce emissions.



3.3 Selected Financing and Investment Opportunities

3.3.1 Mode Shift

Key Investment Areas / Type of Projects

Key project identified is the proposed city rail services project for the Nairobi metropolitan area as highlighted below.

Type of Project	Size of Opportunity/Demand	Potential Risks	Finance Demand
City Rail Services	¹⁸ Nairobi Commuter Rail Service Development looking to cover nine commuter corridors include Ruiru-Thika, Juja Road-Kangundo, Jomo Kenyatta International Airport-Athi River, Lang'ata Road-Karen and Upper Hill-Ngong, Kabete-Kikuyu, Gigiri-Limuru and Outer Ring Road in the city's Eastlands area. There are approximately 1.5 million people who travel into the Nairobi Central Business District daily. This service will be looking to capture at least 50% of this population.	<p>The service must be highly efficient with strict time schedules in order to attract users.</p> <p>Project requires coordination from multiple players with diverse interests. Needs strong government commitment to push through against vested interests which may take time.</p> <p>Due to the above, the risk level for this kind of venture is medium to high.</p>	<p>The expected cost of this project is Kshs. 14 billion (\$ 140 million);</p> <p>Project is to be funded by The World Bank and GOK. Pressure however to finance other projects may slow down implementation.</p>

¹⁸ <https://www.businessdailyafrica.com/economy/Igathe-warning-invaders-land-light-rail-Nairobi/3946234-4143740-bva4tt/index.html>

3.3.2 Smart Transportation – Passenger Travel

Key Investment Areas / Type of Projects

Key investment areas identified under this category include the Bus Rapid Transit project and other private sector opportunities – ride sharing/carpooling and ride hailing.

Type of Project	Size of Opportunity/Demand	Potential Risks	Finance Demand
Bus Rapid Transit (BRT) Model	The BRT model providing transportation to between 100 and 160 passengers per bus has the potential to attract a majority of the 1.5 million people travelling into and within the CBD daily.	The service must be highly efficient with strict time schedules and operate within key demanded routes in order to attract users. Needs strong capacity and commitment from multiple players in central and local government.	The expected cost of this project is Kshs. 20 billion (\$200 million). In Nairobi and about 15 billion (\$150 million) in Mombasa. Returns from this are likely to be in the long term. ¹⁹
Ride Sharing / Carpooling	Carpooling in Kenya is yet to take root. There have been known start-ups in this area. One company, Liquid Telecom set up a staff carpooling scheme and slashed the cost of transport by 28.46 per cent in six months.	Security is key in setting up this service. Corporate schemes such as the one by Liquid Telecom may be a preferable starting point.	The majority of the investment would be in the technology, support structure and marketing of the service. An investment of USD 1 million to USD 3 million with returns in the medium to long term.
Ride Sharing / Carpooling	Ride hailing services such as Uber, Taxify and Little Cab have transformed passenger transportation in Kenya. Uber alone is said to have over 363,000 users in Kenya.	The main risk is in the pricing of this service. Low prices have led to several strikes and go-slows by drivers of these service.	The cost of introducing a similar service would be in the range ²⁰ Kshs. 1 billion (\$10 million).

¹⁹ Based on estimates from Bogota Colombia which is under consideration in Kenya - \$5 million per km

²⁰ <https://kenyanwallstreet.com/safaricom-backed-taxi-app-little-seeks-sh-10b-funding-regional-expansion/>

3.3.3 Green Freight

Key Investment Areas / Type of Projects

Key investment opportunities identified include freight matching and vehicle modification services.

Type of Project	Size of Opportunity/Demand	Potential Risks	Finance Demand
Freight Matching Services	Freight matching where trucks get access to cargo via web applications is gaining ground in Kenya. East African Online Transport Agency Ltd (EAOTA) is one such company with over 500 transport companies signed up to access loads. This service provides not only onward cargo but reduces empty running by providing return cargo.	The main risk is in ensuring cargo security and fostering a reliable transporter base.	This kind of service requires an investment in the range of USD 2 million with returns in the medium and long run.
Vehicle Modification/ Body Builders	Trailer modification to allow larger loads has the potential to reduce the number of trucks required to haul loads. This is especially so for loads that are bulky but light. There is opportunity to increase the number of pulling trucks in Kenya, these are trucks of between 65ft (25ft lorry and 40ft trailer) or 80ft (two 40ft trailers) as opposed to the traditional 40ft trucks on Kenyan roads.	The main risk is in the road infrastructure. Roads with multiple roundabouts made manoeuvring of such vehicles difficult.	Trailer manufacture is relatively inexpensive in comparison to traditional vehicle assembly lines. The investment may be anywhere from Kshs. 200 million.

3.3.4 Logistics

Key Investment Areas / Type of Projects

Key investment areas identified related to the development and management of technology based solutions in the transport sector as highlighted below.

Type of Project	Size of Opportunity/Demand	Potential Risks	Finance Demand
Logistics management technologies / services	<p>As supply chains become more sophisticated and customers demand traceability solution providers that are able to provide end to end solutions that increase efficiencies will earn a premium.</p> <p>Block chain technology is likely to play an increasingly important role in the region although it is limited currently.</p>	<p>The service must be highly efficient with strict time schedules and operate within key demanded routes in order to attract users.</p> <p>Needs strong capacity and commitment from multiple players in central and local government.</p>	<p>There are already TP's in the market providing basic services to clients to enhance distribution efficiency. Demand for finance is likely to continue to grow in the medium term</p> <p>(\$5- \$15 million per year) in the medium term</p>

3.4 Fuel Economy, Cleaner Fuels and Electric Vehicles

Key Investment Areas / Type of Projects

Key opportunities identified relate to production of bio fuels and investments related to electric vehicles as highlighted below.

Type of Project	Size of Opportunity/Demand	Potential Risks	Finance Demand
Cleaner Fuels – Production of Bio Fuels	<p>Biofuels have the potential to replace fossil fuels in the running of machinery and vehicles. They are also cheaper with stable pricing as they are not reliant on external world market factors. They are further easy to produce and hence entry into supply of biofuels is fairly easy unlike traditional fossil fuels dependent on oil fields and expensive equipment.</p> <p>The current VAT introduced to fuel prices has raised the cost of fossil fuels providing further opportunity for the uptake of the cheaper biofuels.</p>	²¹ The main risk in the set-up of a biofuel plant is in ensuring adequate supply of oil seeds for commercial biofuel production.	<p>Biofuel set ups can range from small scale domestic use set ups to large scale set ups.</p> <p>Demand for finance will grow slowly due to lack of supply of raw material. A few projects may require financing over the next 5-10 years in the range of \$5-\$10 million. Should a reliable source emerge then the investment requirements will be higher.</p>
Electric Vehicles – Charging Stations	<p>As electric vehicles become more popular, there is opportunity for entrepreneurs to set up charging stations similar to traditional fuel stations.</p>	The main risk is inadequate customer base to sustain a profitable operation.	²² These can start from single public charging stations of Kshs. 5,000,000 (USD 50,000). Investment requirements likely to be in the range of \$10 - \$30 million to cover at least 30-40 new stations per year in five years

²¹ http://kerea.org/wp-content/uploads/2012/12/Executive_Summary_Kenya_Biofuel_Roadmap.pdf

²² [\\$10](https://www.treehugger.com/cars/how-set-public-electric-vehicle-charging-station-fast-charging-edition.html)

4 Summary Conclusions and Recommendations

Based on the data presented above a summary of key opportunities is presented below:

Investment opportunity	Short term immediate (1-2 years)	Medium term (5-10 years)	Impact on climate ²³ change	Opportunities for SMEs
City rail Nairobi		\$140 million	Significant as there will be large shift away from motorised transport	
BRT model Nairobi and Mombasa		\$350 million	Significant	
Ride sharing /car pooling	\$1-\$3 million		Limited	
Ride hailing		\$10 million	Small contribution	Many opportunities for SME owners of transport
Freight matching services	\$2million	\$3-\$5 million	intermediate	
Vehicle trailer modification	\$2-\$3 million	\$3-\$4 million	intermediate	
Logistics management technologies/services	\$5 million	\$15 million	If scale is achieved can have significant impact in the medium term through efficiency enhancements Intermediate	Opportunities for SMEs to develop innovative solutions
Electric vehicle charging station	\$8 million	\$30 -\$40 million	Limited	Potentially some SME opportunities as service providers
Cleaner Fuels – Production of Bio Fuels		\$5-\$10 million		Potential Opportunities in the supply of raw materials
Total		\$610million		

²³ Data presented earlier highlights that emissions from transport are about 10% of total emissions in Kenya. Key contributors are cars and trucks – projects that improve efficiency of road transport (ride sharing electric cars etc) have potential to impact significantly on reducing carbon emissions. Also projects that increase use of alternative more efficient transport (eg. Light rail and BRT) can have a significant impact in emission reductions.

Based on the data presented immediate finance opportunities are approximately \$8 million growing to over \$580 million in the medium term. Most of the highest impact projects will be largely in the light rail and BRT systems which will be funded by the government and other development finance institutions. Given the large size of these projects there may be scope for a government backed green bond to finance these projects.

Key constraints identified include the following:

- For large transport projects (BRT and light rail) there is need for significant political will the highest levels of local and national government to push the projects through;
- Funding of the large projects is also a constraint for many local authorities. For example, Mombasa is considering a BRT system but will need significant amounts of concessional financing to make the project viable.
- For the smaller transport projects (ride sharing etc) the main challenges relate to competition and pricing of the services proposed. An uncertain regulatory environment (e.g. VAT changes on fuel) and managing various stakeholders like drivers, consumers of the service may also pose a challenge to implementation of private sector driven initiatives.

Based on the challenges identified key recommendations include:

- Prioritization of key impact projects in the MTP III such as BRT and city rail; private sector organisations like KEPSC should lobby for implementation of these high priority projects to ensure implementation in as short a time as possible.
- Implementation of low hanging fruit such as development of dedicated BRT and carpooling lanes.
- Passing of incentive legislation such as tax rebates on importation of electric cars and cars that utilize biofuels together with any related infrastructure such as charging stations.
- Issuing of Green Bonds ring fenced specifically for these projects. The funds raised in these bond issues should be channelled to prioritized government projects as well as to identified venture funds with requisite green fund management expertise.

Annex I

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Annex II

East African Online Transport Agency Ltd

Name of Company	East African Online Transport Agency Ltd
Location	Kenya
Ownership	100 % Kenyan

East African Online Transport Agency Ltd (EAOTA) is a freight exchange operating in East and Central Africa with a membership of over 500 logistics related companies and a combined fleet size of over 2000 trucks. The service matches cargo to trucks creating efficiency in time and cost of transportation. The service also provides trucks with return cargo increasing the earnings by the transporters and reducing emissions where additional trucks would have been engaged to transport the cargo.

Impact

- Reduction in truck idle time.
- Matching of trucks to cargo closest to the truck's position.
- Increased utilization of truck capacity by consolidating cargo and avoiding partial loads.
- Matching of trucks to correct loads and load weights and sizes thereby ensuring efficiency in deliveries.

A Multimodal Approach to Reduce Emissions

EAOTA has adopted a multimodal approach that enables it to plan the supply chain and utilize the most efficient mode at each leg of transportation. An example is the utilization of the SGR service to handle parts of the transport service. EAOTA supports utilization of the SGR service by matching the rail service to trucks for last mile delivery. The trucks position at the rail terminal in Nairobi to collect cargo and deliver to the final destination. The trucks, once offloaded, return the empty shipping containers to the rail for return to Mombasa. Some containers are loaded directly to vessels while other are again collected by EAOTA trucks for delivery to nominated shipping line container depots.



²⁴ Zijani

Name of Company	Zijani
Location	Kenya
Ownership	100 % Kenyan

Zijani was founded in 2014 to commercialize biodiesel production and refining, with a focus on fuel quality and environmental sustainability. In November 2014, Zijani opened Kenya's first biodiesel research and development refinery in Nairobi, which was capable of producing up to 13,000 litres per year. In 2016, they completed their specialist biodiesel plant in Nairobi, capable of producing 50,000 litres of biodiesel per year. It is Kenya's first purpose-built plant dedicated to producing biodiesel from used cooking oil.

Support

The company has received business advisory services and linkages to financing and investment opportunities from the Kenya Climate Innovation Center (KCIC).

²⁴ <https://www.kenyacic.org/news/growing-demand-bio-diesel-spurs-business-idea>

Government Projects

Item	Estimate KShs	Timeframe
BRT Nairobi	20billion	Next ten years (commenced)
BRT Mombasa	15 billion	Next ten years (commencement not yet determined)
Light rail Nairobi	70 billion	Not yet determined but after 2030
Rural roads	150 billion	2019-25

Annex III

List of Persons Met

1. Anjali Saini , Independent Energy and Climate Change Consultant	Consultant KPMG and formerly AECF
2. Peter Kinyanjui , General Manager, Group Business Development	ABC Bank
3. Lee Gachomba , Head of SME Banking	
4. Philip Wambu , General Manager, Treasury and Financial Institutions	
5. Martin Mureithi , Senior Dealer - Markets	
6. Dr. L. Murei , Switch Africa Green Project Manager	Barclays Bank of Kenya
7. Sheila Karue , Consultant	UNDP/Africa Agricultural Trade and Investment Fund
8. Kamala Ernest , Programme Management Officer	
9. Elijah Isabu , SUNREF Program Coordinator	KAM
10. Joyce Njugu , Head of consulting	
11. Grace Kibuthu Ogola , Financial Sector Specialist	International Finance Corporation
12. Mr. Eric Kimani , Managing Director	Palmhouse Dairy
13. Wangui Muna , Consultant	Climate Focus
14. Joshua Anampi	National Environmental Trust Fund
15. Almut van Castaren , Director	Equator Kenya
16. Rishi Kubchandani , Investment Manager	GROFIN
17. Mr. A. Njagi , Operations Director	KTDA
18. Masood Mahmoud , Financial Advisor to KCVDF	World Bank
19. Marion Moon , Proprietor	Wanda Organic
20. Titus Gitau , Director	MEA Ltd.
21. Kamau Kuria , Managing Director	Coffee Management Services Ltd.
22. Florence Kariuki , Adviser	SNV Smart Water for Agriculture
23. Helene Carlson Rex , Program Leader	Sustainable Development World Bank;
24. James Mutonyi , Managing Director	AgMark;
25. Catherine Watson , Chief of Program Development	World Agroforestry Center;
26. Mr. George Nesbitt , Managing Director	TEA Warehouses Ltd.
27. Richard Muli , Trade Manager	AIMS Project
28. Viola Maina , Director	Smart Farmer Africa

List of Persons Met (continued)

29. Hanna Dohrenbusch , Head Corporate Affairs	Sunculture, Small scale irrigation
30. Mr. Nicholas Nesbitt , Regional Manager	IBM Africa
31. Francis Miano , General Manager- Technical Services	Kenya Tea Development Agency (KTDA)
32. Doreen Mutoro	China Road and Bridge Corporation
33. Joan Karani , Operations and HR Manager	Shengli Construction Company
34. Michael Kariuki , Chairman	Mt Kenya Matatu Owners Association
35. Anthony Weru , Senior Public Private Dialogue (PPD) Officer	Kenya Private Sector Alliance (KEPSA)
36. Doris Abaya	National Transport and Safety Authority (NTSA)
37. Geoffrey Gangla , CEO	Genghis Capital
Alfonce Iregi , Corporate Finance	
38. Ms Aliya Khanbai , Head Industrial Sector	Stanbic Bank
Susan Njuguna , Corporate and Investment Banking	Cooperative Bank
39. Angela Muga , Corporate Banking	Kenya Climate Ventures
40. Paul Ohaga , Chief Investment Officer	



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