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Policy Advice Paper

Electric bicycles in Rwanda:
Fiscal and regulatory framework

Imprint

Purpose: This deliverable aims to provide policy advice from the SOLUTIONS+ consortium partners to to the Government of Rwanda on the fiscal and regulatory conditions applicable to electric bicycles.

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Executive Summary

Rwanda is a frontrunner in supporting low-carbon transport, specifically through innovations in transport electrification and active mobility (walking and cycling). The National Environment and Climate Change Policy stresses green mobility and the need to strengthen low-carbon transport systems. In its updated Nationally Determined Contribution (NDC), the Government of Rwanda identified that the use of electric vehicles can help reduce energy-related carbon emissions by 9 per cent by 2030. It also recognised non-motorised transport lanes as a key mitigation measure. Lastly, the 2021 National Transport Policy and Strategy for Rwanda states that the introduction of electric mobility should be accompanied by measures facilitating a shift from personal motor vehicles to walking, cycling, and public transport.

Pedal-assist electric bicycles can play a key role in the transition to electric mobility. Electric bicycles can serve short trips, improve last-mile access to public transport, encourage healthier lifestyles and tourism opportunities while also offering more affordable mobility in the face of rising petrol prices.

Experience in cities around the world has demonstrated that electric bicycles can replace private car trips, helping to reduce emissions, air pollution and congestion. Electric bicycles also can help residents navigate the hilly topography in Rwandan cities and towns making active mobility more accessible to those that may have physical limitations. Beyond assisting in hilly conditions, they extend the range, nature and scope of journeys that are manageable by bicycle, therefore increasing the viability of electric bicycles as an alternative to other modes of transport. This is key to limiting the strong growth of private cars forecasted by 2050 in the Kigali Transport Master Plan. In addition, bicycles use a fraction of the space occupied by cars and can contribute to the efficient use of space in Rwandan cities.

Electric bicycles are cheaper to acquire and require lower costs for charging compared to larger electric vehicles. This, combined with lower public charging infrastructure costs for the government, can help reach electrification targets more rapidly. Widespread availability of affordable electric bicycles has the potential, overall, to improve gender equity and accessibility in the transport system, bolster Rwanda's green economy including cycling tourism, and fortify the country's cycling culture.

To facilitate a growing role for electric bicycles, SOLUTIONSPPlus recommends that the Government of Rwanda apply existing fiscal incentives for electric vehicles, including value-added tax (VAT), import duty, excise duty, and withholding tax exemptions, to electric bicycles. Aside from fiscal incentives, the government can pursue complementary measures to support the role of cycles, including the implementation of safe cycle networks, scaled-up IT-based e-bikeshare systems, secure cycle parking, minimum cycle parking requirements in buildings, and car-free zones.

1. Introduction

Rwanda is a frontrunner in supporting low-carbon transport solutions, specifically those geared towards electrification and active mobility. The National Environment and Climate Change Policy includes a statement on green mobility, stressing the need to strengthen low-carbon transport systems and reform the tax regime to promote low-emission vehicles (Ministry of Environment, 2019). In 2020, the government of Rwanda identified in its updated NDC that the use of electric vehicles could help reduce energy-related carbon emissions by 9 per cent by 2030 (Republic of Rwanda, 2020).

Consequently, the government set ambitious electrification targets, aiming for 25% of vehicles introduced in 2022/23 to be electric, 30% in 2023/2024, and 70% in 2034/3035. In terms of active mobility, high-density walkable cities have been a priority for several years, as reflected in the Rwanda Green Growth Strategy (Ministry of Environment, 2011) and subsequent national and city-level policies and strategy papers. The 2021 National Transport Policy and Strategy for Rwanda indicates that the introduction of electric mobility should be accompanied by measures facilitating a shift from personal motor vehicles to walking, cycling, and public transport.

Pedal electric bicycles can play a key role in the transition to e-mobility. Electric bicycles can serve short trips, improve last-mile access to public transport, and offer affordable mobility in the face of rising petrol prices. On a global level, up to USD 24 trillion could be saved in a high uptake scenario of cycling and e-bicycle use between 2015 and 2050 (World Bank, 2021). Bicycles use a fraction of the space occupied by cars and can contribute to the efficient use of street space in Rwandan cities, which is particularly useful as the country is one of the most densely populated in the region.

To facilitate a growing role for electric bicycles and further support Rwanda's efforts to improve the active mobility landscape, SOLUTIONSPUS recommends that the Government of Rwanda apply existing fiscal incentives for electric vehicles, including VAT, import duty, excise duty, and withholding tax exemptions, to electric bicycles. This policy briefing covers the background and rationale for the interpretation of the fiscal incentives, presenting lessons learned from other cities and countries.



2. Background

To facilitate the transition to low carbon transport, the Government of Rwanda enacted in 2021 a set of far-reaching fiscal, non-fiscal and administrative incentives addressing financial, technical, and awareness barriers to electric mobility.

Table 1. Approved incentives for e-mobility (MININFRA, 2021)

Fiscal incentives	<ul style="list-style-type: none"> 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. Introduce carbon tax to discourage polluting vehicles.
Non-Fiscal Incentives	<ul style="list-style-type: none"> 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).
Administrative Measures	<ul style="list-style-type: none"> Enforcement of existing emission standards to discourage the purchase of polluting vehicles; Establish restricted zones for green transport; Regulate importation of used vehicles by imposing age limit; Provide preference to electric vehicles for Government hired vehicles.
Other measures	<ul style="list-style-type: none"> Companies manufacturing and assembling electric vehicles (battery electric vehicles, plug-in hybrid electric vehicles and hybrid electric vehicles) in Rwanda are given other incentives in the investment code such as 15% Corporate Income Tax (CIT) and tax holiday (irrespective of the investment value).

The E-mobility Technical Committee jointly set up by the City of Kigali and the Ministry of Infrastructure organises regular discussions on the implementation of e-mobility incentives. The Committee combines government institutions (national and local level, across diverse governance topics including transport, energy, infrastructure, environment, urban planning), private stakeholders and non-governmental actors. This combination of policy targets, incentives, and stakeholder dialogue has eased the transition to low-carbon transport.

Supported by this enabling regulatory environment, private and public electric mobility initiatives have flourished. Fleets of electric motorcycle taxis are growing quickly (Rwanda Electric Mobility-REM, Ampersand, Safi Ride), followed by electric cars used for ride-hailing services (Volkswagen, MTN) or personal usage (Mitsubishi Motors Corporation/Victoria Motors Rwanda, REM). Numerous public and private actors are committed to supporting the upcoming introduction of electric buses. Shared electric bicycles (Gura Ride) are slated for deployment, building upon the existing bikeshare system using

conventional bicycles. Rwandan Adventures is already providing electric bicycles. The Rwanda Environment Management Authority (REMA) has installed an electric car charging station at its office in Kacyiru. Lastly, international partners are actively involved in supporting the transition (IFC, SOLUTIONSPplus, Government of Japan, GGGI, IGC, FONERWA, ICLEI, and Carbon Trust).

The Strategic Paper on Electric Mobility Adaptation in Rwanda (2021) identified three types of electric vehicles: battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), and plug-in hybrid electric vehicles (PHEVs), which will benefit from the incentives adopted in April 2021. However, it is unclear whether electric bicycles and other micromobility vehicle types will benefit from the incentives. The Strategic Paper only explicitly mentions buses, taxi cars, and motorcycle taxis. On the other hand, the Rwanda Development Board (RDB) has granted tax exemptions to a bikeshare company to introduce electric bicycles, on a bilateral basis. In the next sections, this paper presents why it is key to support the uptake of electric bicycles, and the corresponding fiscal and non-fiscal recommendations.

3. Need for electric bicycle incentives

#1: Electric bicycles can substitute polluting motorised vehicle trips

Research has shown that electric bicycles have the potential to substitute to larger motorised vehicles (UN-Habitat, 2022). In 2018, a large study conducted in the United States and Canada showed that 46 per cent of private e-bicycle trips replaced commute trips that otherwise would have been made by car (MacArthur et al., 2019). In Knoxville, a study indicated that 11 per cent of shared e-bicycle trips had replaced car trips (Langford et al., 2013). Castro et al (2021) found that a quarter of e-bicycle trips in seven European cities substituted car trips. In a meta-analysis, Bourne et al (2020) found that e-bikes substitute for 20 to 86 per cent of private car trips. This behaviour change translates into significant reductions in carbon emissions (Philips et al., 2022).

The ability of electric bicycles to replace car trips is based on three major benefits:

- (1) They significantly increase trip convenience, especially in hilly conditions or hot weather.
- (2) They allow higher loads to ferry passengers such as children, or carry goods, for instance after shopping trips. These higher loads are also convenient for companies.
- (3) They allow users to travel longer distances.

The potential of electric bicycles to replace motor vehicle trips has been recognised at international level. The Intergovernmental Panel for Climate Change (IPCC) states that “electric bicycles offer many of the benefits of light-duty vehicles (LDV) in terms of independence, flexibility of routes, and scheduling freedom, but with much lower emissions and improved health benefits.” (Sims et al., 2014). Consequently, the IPCC recommends that “electric vehicles

(...), electric bikes and electric transit (...) would need to displace fossil fuel-powered passenger vehicles by 2035–2050 to remain in line with 1.5°C-consistent pathways.” (De Coninck et al., 2018).

This potential was also recognised in the Sweco-ifeu feasibility study, indicating that electric bicycles “are not compared to conventional bikes in terms of absolute impacts since the addition of the motor changes the functional unit” and that they “will primarily increase accessibility, but may also substitute conventional vehicles” (ifeu-Sweco, 2019). Indeed, the functionality of electric bicycles changes compared to conventional bicycles as the longer trips and higher loads allow them to compete with large, motorised vehicles, especially in urban environments. In Europe, they are increasingly used to ferry goods or passengers such as children, in the form of electric cargo bicycles. For those two reasons of low acquisition costs and functionality improvement, they can be adopted by private users instead of cars. Their innovative characteristics give them a desirable social status, especially for an urban population moving away from space-consuming and cost-intensive private vehicles.

In Kigali, the potential of electric bicycles is high as they will allow more people to cycle especially in hilly conditions or hot climates. Substitutability to other motorised trips is high, especially as the government supports the development of connected cycling lanes. The 2020 Transport Master Plan foresees an increase of the modal share of cars and moto-taxis from 32% in 2017 to 52-60% in 2050 under a baseline scenario, which will lead to a massive increase in congestion and pollution. Electric bicycles can offer a viable alternative to the increasing use of cars and the related challenges.



#2: Electric bicycles can help reach electrification targets more rapidly and with lower investments

Compared to cars and motorcycles, electric bicycles offer lower costs for private consumers and lower infrastructure costs for the government. For private consumers, electric bicycles are much cheaper to acquire compared to large conventional or electric vehicles. With a much smaller battery size than electric cars or electric motorcycles, the costs of recharging are considerably lower, and it takes less time to recharge. If the government sends a clear message supporting electric bicycles, these may pick up much faster than electric cars, which are particularly expensive to purchase. In the U.S., consumers bought twice as many electric bicycles as electric cars in 2020 (Surico, 2021). Globally, the number of electric bicycles sold annually is poised to surpass that of electric cars and trucks (Deloitte, 2020). Rwanda can take advantage of this global trend.

Compared to large electric vehicles, batteries for electric bicycles are mostly charged in buildings (homes, offices, etc.) or by operators of shared fleets, significantly reducing the need for public recharge and associated costs for the government. The negative impact on the electrical grid is reduced when using vehicles with smaller battery size such as electric bicycles. Charging off-grid with decentralised energy sources is a further option for electric bicycles.

Along with these direct cost benefits, electric bicycles provide large indirect cost reductions for the government. Even when supported by electric assistance, physical activity brings health benefits, reducing health care costs and corresponding government spending. As vehicles weigh much less, electric bicycles will reduce the impact on road surfaces and corresponding maintenance and renewable investments. As they use less urban space, Rwandan cities can make better use of space and create a more liveable city focused on achieving health and well-being targets. Lastly, electric bicycles can improve revenues from the cycling tourism (see points 6 and 7).



Fiscal incentives for electric bicycles in Europe

Many public authorities in Europe recognise the benefits of electric bicycles and have included them in the scope of financially supported electric vehicles. Among the more than 300 financial incentives supporting cycling in general (ECF, 2022), an increasing number of public financial schemes have specifically targeted electric bicycles since 2019. These schemes support various types of electric bicycles and use cases: pedal-assist electric bicycles, electric cargo bicycles, used by individuals or by companies, including for delivery services.

Financial incentives to individuals:

- Scrappage systems supporting vehicle substitutability:
 - o France, national level: the government provides a EUR 1,500 scrappage grant representing a maximum 40% of the purchase cost if an individual purchases a pedal-assist electric bicycle (new or second-hand) and hands over a diesel-fuelled car or van registered before 2011 or a gasoline-fuelled car or van registered before 2006 (Agence de Services et de Paiment, 2021).
 - o Finland, national level: the Car Scrapping Bonus Act for 2020 and 2021 enables individuals to scrap a conventional car for a low-emission car (electric, blend ethanol, gas-fuelled car a rechargeable hybrid) or to use the premium for a pedal-assist electric bicycles, a public transport seasonal ticket or a right to free travel in public transport (LVM, 2020).
- Schemes supporting individual purchases:
 - o Sweden, national level: subsidies for electric bicycles of circa USD 1,100 were introduced in 2017. Research shows that electric bicycles had a major effect on trip patterns of people surveyed receiving the subsidy: initially 34% of them used their car on a daily basis; after the purchase, only 4% of them used it every day. In addition, 54% of them were using it less frequently. This enabled a reduction of 1.3 tons lifetime carbon emissions for each electric bicycle (Davis, 2022; Anderson & Hong, 2022).
 - o Germany, city level: subsidies of EUR 2,000 were introduced for electric cargo bicycles in Hamburg (Hamburg New, 2020).
 - o France, city level: the cities of Bordeaux or La Rochelle tie electric bicycles subsidies to social criteria (Bordeaux Métropole, 2022; Yélo, 2022). These two schemes apply to new pedal-assist electric bicycles, but also covers refurbished electric bicycles and conventional bicycles retrofitted to electric via a conversion kit. Other cities do not link subsidies to social criteria, such as Montpellier, France (Midi Libre, 2021).
 - o Germany, city level: subsidies for the purchase of a pedal-assist electric bicycle were granted in Tübingen to consumers switching to electricity supply powered by renewable sources (Clean Energy Project, 2017).

Financial incentives to companies:

- o Tax reductions or exemptions for companies related to e-bicycle use. In the Netherlands, companies can apply four different tax reduction schemes for electric bicycles. The schemes include among others VAT deduction, a 7% deduction on the retail price for company bicycles, tax exemption on allowance to purchase a bicycle, and interest-free loan (Business.gov.nl, 2022).
- o Companies active in urban logistics via electric cargo bicycles. In France, companies buying a cargo bicycle in France can benefit from a subsidy covering up to 40% of the purchase cost and a maximum of EUR 1,000 (Ministère de la transition énergétique, 2022). Other subsidy schemes for electric cargo-bicycle are found in regions (for instance in Baden-Wurtemberg, Berlin, Piemonte, Vienna's region etc.) and cities (Nantes, Graz, Heidelberg) (ECF online interactive tool, 2022).
- o Public owned bikeshare systems with electric bicycles or subsidies to privately-operated schemes. Such schemes have been deployed in cities such as Madrid and Lisbon.

#3: Electric bicycles can improve gender equity in the transport system

The introduction of electric bicycles can help transform gender norms and expand women's access to cycling. In Kigali, cycling is currently dominated by male cyclists. Electric bicycles and other types of micromobility such as e-scooters are attractive to a wide range of user groups, appealing to a more diverse population than traditional cycling in most cities (ITDP, 2019). The availability of electric bicycles can expand ridership among women (Wild et al., 2021).

#4: Electric bicycles support active travel

Electric bicycles increase the attractiveness of cycling and encourage happier, healthier lifestyles. In Rwanda, on average, people spend up to 73.9 minutes walking or cycling for transport every day (women spend 62.2 minutes and men 86.8). National and city governments place significant emphasis on living healthy and active lifestyles, however, when faced with the choice, most individuals would choose the comfort and speed of a private vehicle (UNEP & UN-Habitat, 2022).

Electric bicycles encourage the use of bicycles for longer journeys and can assist in ensuring last-mile connectivity. They are an attractive option for many road users who would like to commute by walking or cycling but do not have the time or physical ability. Individuals switching from conventional cycling to electric bicycles still accrue enough physical activity to achieve significant health benefits, in part as a result of the increased range of electric bicycles (Behrendt et al, 2021). Emerging research has revealed that people that use electric bicycles also report a much higher level of commute satisfaction owing to, among other things, the ability to control the arrival time reliability, the 'feel better' effects of moderate-intensity exercise and the opportunities for social interaction (Wild & Woodward, 2019).

#5: Electric bicycles can support Rwanda's leadership in sustainable mobility

Supporting electric bicycles and other forms of micromobility can reinforce Kigali's position as a sustainable mobility champion. Kigali has been leading by example with regard to promotion of cycling and walking. The Car-Free Days and car-free zones are internationally recognised as best practices (Graaf et al., 2021).

#6: Electric bicycles can strengthen Rwanda's green economy

Electric bicycles can increase the attractiveness of Rwanda's growing cycling tourism industry and boost revenues from this sector. Exempting electric bicycles from taxes is aligned and will support past and current initiatives in that field, such as the collaboration between Rwanda Cycling Federation FERWACY in Musanze District with RDB for a 25% tax waiver on the importation of mountain and racing bicycles (UN, 2020). The National Transport Policy for Rwanda also indicates that reducing tariffs on bicycles could expand access to NMT for low-income residents (MININFRA, 2021).

#7: Electric bicycles can support Rwanda's cycling culture

Electric bicycles can strengthen the existing cycling culture in Rwanda. Rwanda is known for hosting various international cycling competitions such as Tour du Rwanda. The upcoming hosting of the 2025 World Road Cycling Championships will be an excellent opportunity to raise awareness and display achievements in supporting cycling, including the promotion of electric bicycles.

#8: Electric bicycles can improve rural mobility

Electric bicycles have the potential to serve communities that live in rural or remote areas. In rural areas, people rely primarily on walking and intermediate means of transport (IMT) to transport their produce to the market or reach essential services (AfDB, 2013). Electric bicycles have the ability to transverse the lack of all-season roads in rural areas and support the efficient movement of people and goods to and from more remote communities (Greyson et al, 2021).



4. Policy recommendations

Recommendation 1: Apply existing electric mobility incentives to electric bicycles

Electric bicycles are equipped with pedals and have a battery-powered motor providing assistance to the rider (ITDP, 2019). Electric bicycles and their spare parts, batteries, and charging equipment should benefit from all fiscal incentives that apply to other types of e-vehicles, including but not limited to the following (Ministry of Infrastructure, 2021):

- VAT exemption
- Import duty exemption
- Excise duty exemption
- Withholding tax exemption
- Electricity tariff for charging facilities capped at industrial rates
- Reduced electricity tariff during off-peak times

The following text should be included in the Strategic Paper, Section 3:

“Pedal-assist electric cycles, where the output of the motor is cut off when the cyclist stops pedaling and is progressively reduced and ultimately cut off when the vehicle speed reaches a certain threshold, are included in the scope of this Strategic Paper. They are subject to fiscal and non-fiscal incentives outlined in Sections 8.1 and 8.2, which have been adopted by the government of Rwanda to promote electric mobility.”

“This applies to the vehicles and corresponding spare parts, batteries, and charging equipment. Vehicles using lead-acid batteries will not benefit from the incentives since these batteries have serious negative environmental and health impacts. Companies importing electric bicycles, as well as other electric vehicle types, should specify how batteries will be collected at the end of their automotive use, reused or refurbished if possible, and finally recycled. This may be done by the importer itself, or through a third party contracted by the importer.”

Recommendation 2: Plan safe cycle networks

The Government of Rwanda can adopt the following measures to improve the safety and convenience of cyclists, for both electric and conventional bicycles:

- Expand the protected cycle network (accessible to electric bicycles with electric assist up to 25 km/h).
- Increase the number of car-free zones.
- Review road safety strategies and regulations for the usage of electric bicycles.
- Expand secure parking options for bicycles and electric bicycles.
- Support the development of maintenance and repair facilities for electric bicycles, in partnership with educational and training institutions.
- Establish minimum bicycle parking requirements for new buildings when reviewing the Building Code as planned in Section 8.2 of the Strategic Plan on Electric Mobility Adaptation in Rwanda.

Recommendation 3: Scale up e-bikeshare

Bikeshare can expand mobility options for short trips and improve last-mile access to public transport. At present, the Kigali bikeshare system serves a limited area in the CBD and Remera. Bikeshare should be expanded to at least 900 cycles over 15 sq. km in central Kigali. Financial support to bikeshare companies should be tied to well-defined system requirements (including but not limited to coverage area, payment mechanisms, safety, etc.) and service level standards.

Recommendation 4: Facilitate the development of the electric bicycle sector

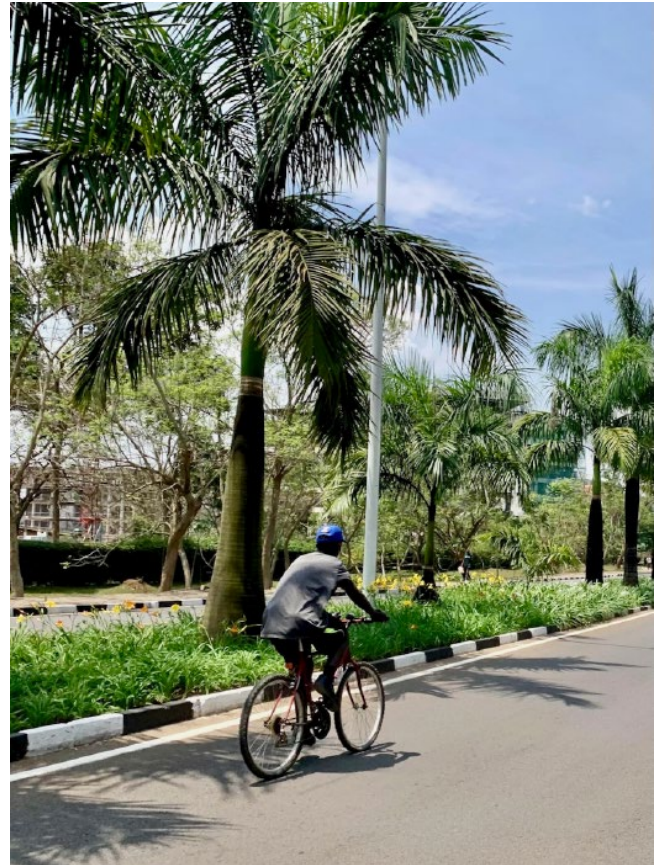
The Government of Rwanda can further strengthen the economic potential of electric bicycles by creating incentives for the development of the electric bicycle and related economic sectors. Government can extend financial and incubator support for electric bicycle companies and start-ups via RBD, including companies active in the maintenance and repair and battery reuse, repurposing, and recycling. Depending on the availability of funds, these latter aspects may be supported by national, local and/or international, donor-based financial involvement.

Recommendation 5: Expand the scope of the incentives to cover all micromobility modes

Aside from electric bicycles, the incentives can be expanded to cover standing electric scooters and other micromobility modes. Micromobility refers to vehicles that are low-speed, small, lightweight, and typically used for short-distance trips (ITDP, 2019). Per the International Transport Forum (2020), a broad definition of micromobility includes vehicles as the use of vehicles with a mass of less than 350 kg and a design speed of 45 km/h or less. Common micromobility modes include bicycles, electric bicycles, standing electric scooters, and other small electric devices. Micromobility vehicles can be shared (e.g., in the context of a bikeshare system) or personally owned.

Recommendation 6: Extend fiscal incentives to all bicycles

All fiscal incentives applied to electric vehicles (see Recommendation 1) should be granted to regular (manual) bicycles. Use of bicycles in place of ICE vehicles reduces fuel imports, household expenditures for transport, and greenhouse gas emissions. Bicycles offer affordable mobility, especially for low-income households. For the fiscal regime to reflect an inclusive approach, incentives for non-polluting vehicles should be extended to those vehicles that are used most by low-income citizens.



© Cyclist in Kigali (Martin, 2021)

5. Conclusion

Electric bicycles have the potential to transform Rwandan cities and towns by expanding access to personalised, low-cost, and convenient transport. Global experience has shown that electric bicycles can attract trips from private vehicles, helping to reduce congestion and pollution. Similar benefits are expected in Rwandan cities if the government takes prompt action to support the role of electric bicycles. Fiscal incentives that are currently available to large electric vehicles including electric cars, motorcycles and buses — namely exemptions from VAT, excise duty, import duty, and withholding tax — should be extended to electric bicycles, given their potential benefits for climate and mobility.

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