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# The case for impact investment in Sustainable Mobility in developing countries

JULY 2021



*“We seek tough problems, apply business thinking, prize resilience, value innovation, accept risk, leverage partnerships and believe markets can empower people of all incomes.”*

Sam Parker – Shell Foundation Director

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Enea Consulting is a strategy consultancy that maximises energy transition opportunities for public and private organisations globally. Through dedicated consulting services and pro bono support to NGOs and social entrepreneurs, Enea is also committed to improving energy access, especially in developing countries.



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## Shell Foundation |

Shell Foundation (SF) is a UK-registered charity, founded by Shell in 2000, that creates and scales business solutions to enhance access to energy and affordable transport. We exist to serve the low-income communities most affected by these issues. We provide patient support to social enterprises and institutions capable of delivering social change at scale across Africa and Asia via disruptive technologies or business models without long-term reliance on charitable support or subsidy.



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# Executive summary

## Introduction

Sustainable Mobility is a unique and budding sector for which solutions are critical given projected demographic growth in developing countries. By definition, mobility comprises the free movement of people and goods and services from one location to another. Mobility investment in developing countries typically involves public investment in large transport infrastructure projects, whilst impact investment is categorised under other impact sectors such as health, agriculture and energy.

**USD 250 bn**

Annual mobility investment required gap in emerging markets by 2030

Going beyond known transport solutions, Sustainable Mobility ventures involve entrepreneurial B2C solutions in rural and urban settings, targeting low-income populations and remedying key challenges of mobility in developing countries. They seek to alleviate multiple mobility challenges in emerging markets, including; **accessibility**, through improving geographical access, inclusion of low-income populations through affordable mobility, and gender inclusion; **health and safety**, through reducing accidents and improving security for passengers; **efficiency**, through reducing time in transit and traffic congestion and improving the reliability of mobility solutions; and **climate change and the environment**, through reducing GHG emissions and pollution.

It is a unique sector in which solutions are critical given projected population growth in emerging markets. Developing countries, and particularly sub-Saharan Africa, host 98% of the 1 bn people in the world without access to transport (other than walking). Additionally, 2.4 bn more people are expected to live in cities in non-OECD countries

by 2050, indicating the urban population will likely increase by 6.75 mn every month. There is a compelling need and opportunity for investment in creative Sustainable Mobility solutions that have potential for significant impact, particularly in achieving **United Nations Sustainable Development Goals (SDGs)**.

**93%**



Of the 1.25 mn fatalities in transport occur in **low & middle income countries**

**91%**



Of 4.2 million premature deaths caused by outdoor air pollution are in **low & middle income countries**

**200%**



Increase in transport-related CO<sub>2</sub> emissions in **developing countries** between 1990 and 2016

## This report

Combining the results of an investor survey with an impact materiality analysis of the whole sector and several case studies, this report presents the case for impact investment in Sustainable Mobility. It is divided into three parts: Part 1, on Sustainable Mobility and how it presents a **significant investment opportunity** with a proven funding gap; Part 2, on the different impact types the sector presents, with a focus on the **UN SDGs**; and Part 3, on seizing **the investment opportunities** presented and how the range of solutions and potential impacts make for a compelling opportunity for a range of investor types.

## Key findings

*Sustainable Mobility entrepreneurs require significant seed and growth capital, and the sector retains strong potential to generate social impact*

Entrepreneur-led Sustainable Mobility services and solutions require significant capital as many rely on new assets or infrastructure whilst others involve technical innovation, which entails high development costs. Furthermore, political and financial risks render it difficult to raise funds, as enterprises and investors navigate various obstacles including the lack of legally binding, long-term mobility targets at the national level; a lack of consistent regulatory frameworks; technology risks; and the lack of mobility sector data and information.

Notwithstanding this, Sustainable Mobility has the potential to generate extensive impact on customers of the mobility solution, employees, and the community the venture serves. Furthermore, it encompasses a diverse array of ventures at varying levels of maturity, providing opportunity to various investor types. Sector solutions can also feed investment mandates on energy, climate change, and other socio-economic objectives. Ultimately, regardless of the investor type or focus, there is **substantial opportunity to generate impact**, especially with respect to:

### *Improving health and safety:*

Sustainable Mobility has a core and direct impact on health and well-being through three levers: a reduced number of deaths and injuries from transport accidents, improved safety within different means of transportation, and a reduced number of deaths and illnesses caused by air pollution. *See Tugende Case Study Pg. 43 and SafeBoda Case Study on Pg. 29*

800,000



*deaths could be avoided annually if all countries reduced their road traffic fatalities to OECD levels*



### *Enhancing socio-economic development and inclusion:*

Sustainable Mobility solutions advance this objective via four main levers: increased mobility of low-income populations, increased access to basic resources, increased purchasing power resulting from more affordable transportation, and increased income for mobility employees. *See Tugende Case Study Pg. 43*

### *Reducing carbon footprint from transportation:*

Most Sustainable Mobility solutions have a core and direct positive impact on climate change, even if they do not rely directly on “green mobility” solutions like electric vehicles. Indeed, they can decrease the negative environmental impact of transport through replacing polluting vehicles with cleaner ones. Mobility services enable non-motorized transport, improve traffic circulation resulting in shorter trips, and reduce the number of trips through reduced individual transport. *See WaterBus Case Study on Pg. 38, and Ampersand Case Study on Pg. 30*

### *Gender inclusion:*

Women often have lower access to mobility solutions, which negatively impacts economic, health and education outcomes. Sustainable Mobility solutions can have positive impacts on gender inclusion by providing women access to safe mobility and employment. See “Sustainable Mobility’s Impact on Gender Inclusion” Pg. 35

# 83%



*Of women in Chennai, India walked to work, compared with 63% of men*

*Going forward, Sustainable Mobility avails investors an opportunity to overcome investment barriers and support an emergent and impactful sector*

As a sector gaining traction, Sustainable Mobility requires continued and increased investment from the full spectrum of investor classes if enterprise solutions are to be seeded and scaled effectively in developing countries. However, it requires a concerted effort by investors to tackle **current hurdles to funding**, by:

### *Raising awareness within the investor community:*

As a nascent sector, there is limited literature and data on Sustainable Mobility, even if this report attempts to add to it. The investor survey conducted for this report indicated a low level of awareness on both the concept and impact of Sustainable Mobility. Some investors intuitively assume that Sustainable Mobility offers a lot of potential for impact, but lack literature and data to back such instincts.

### *Better identifying and strengthening the investment pipeline of enterprises fitting investment criteria:*

Investor mandates constrain funds to opportunities in specific sectors. Investors focused exclusively on low-carbon solutions will restrict funding to electric vehicles and associated infrastructure, whilst investors focused on poverty alleviation will mainly target rural populations. Understanding the impact of Sustainable Mobility will help make the sector’s case as a major investment theme and permit investors to widen their existing investment criteria to fit Sustainable Mobility or create dedicated funds for it, effectively encouraging early-stage sector support.

### *Refining business models and strengthening financial attractiveness:*

Mobility is capital-intensive. The success of entrepreneur-led solutions is highly dependent on public infrastructure development, particularly for solutions that rely on infrastructure that does not exist or that is in a poor state. This is often the case for any logistics or transport services in rural areas, where proper roads to a town may not exist. Highly price-sensitive customers also have to be taken in to account in business modelling of mobility services such as ride-hailing. Public-private partnerships and DFI involvement could make for investment in high-risk and capex-intensive ventures.

### *Building a healthy funding ecosystem:*

The working capital funding ecosystems, such as the one in the energy access space, is not yet in place for Sustainable Mobility. It is thus difficult for investors to share risks and get sufficient return on their investment portfolio. For Sustainable Mobility to reach its full potential, it is incumbent upon all investors (DFIs, Donors, Impact Funds, etc.) to work together to blend different types of capital necessary to help both seed and scale sector solutions.

Despite these challenges, Sustainable Mobility is a unique and emerging sector within which solutions are critical, and for which significant impact investment opportunities exist that can meet different investment mandates.

# Table of Contents

## INTRODUCTION

7

1

## UNDERSTANDING THE INVESTMENT GAP IN SUSTAINABLE MOBILITY IN DEVELOPING COUNTRIES

8

Mobility represents a multi-trillion dollar investment opportunity, especially in low- and middle-income countries, where the need is greatest

8

To meet the challenges mobility is facing in developing countries, entrepreneur-led solutions are needed that often require large upfront investment

11

Impact investment in Sustainable Mobility is needed but investors are facing barriers to enter the sector

14

2

## PROVING THE IMPACT CASE FOR SUSTAINABLE MOBILITY

21

Sustainable Mobility enterprises, through their variety, generate a wide range of direct and indirect impacts contributing to various SDGs

21

Sustainable Mobility generates core impacts in terms of health and safety, economic development and social inclusion

28

Sustainable Mobility has a key role to play in the fight against climate change, even if internal-combustion engine (ICE) solutions will be needed in the short-term

37

3

## SEIZING THE INVESTMENT OPPORTUNITIES OF SUSTAINABLE MOBILITY IN DEVELOPING COUNTRIES

45

## BIBLIOGRAPHY

52

# Figures

<b>Figure 1</b>	<b>Transport investment in low- and middle income vs. high income countries compared to share of global population</b> —● 8
<b>Figure 2</b>	<b>Definition of mobility</b> —● 9
<b>Figure 3</b>	<b>Maximum share of household income spent on mobility in developing countries</b> —● 9
<b>Figure 4</b>	<b>Evolution of transport emissions in OECD and non-OECD countries</b> —● 10
<b>Figure 5</b>	<b>Sustainable Mobility conditions</b> —● 12
<b>Figure 6</b>	<b>Segmentation of Sustainable Mobility solutions</b> —● 13
<b>Figure 7</b>	<b>Investment in pay-as-you-go solar solutions 2012–2019</b> —● 15
<b>Figure 8</b>	<b>Case Study – SMV’s impact across all dimensions of Sustainable Mobility (Case Study)</b> —● 19
<b>Figure 9</b>	<b>United Nations Sustainable Development Goals</b> —● 21
<b>Figure 10</b>	<b>Illustration of potential impacts of Sustainable Mobility among different beneficiaries in developing countries</b> —● 22
<b>Figure 11</b>	<b>Core identified SDGs of Sustainable Mobility enterprises</b> —● 23
<b>Figure 12</b>	<b>Key impacts of Sustainable Mobility</b> —● 26
<b>Figure 13</b>	<b>SDG target related to the core impacts of Sustainable Mobility on health and safety</b> —● 28
<b>Figure 14</b>	<b>SafeBoda’s impact on health and safety (Case Study)</b> —● 29
<b>Figure 15</b>	<b>Ampersand’s impact on health and safety (Case Study)</b> —● 30
<b>Figure 16</b>	<b>SDG target related to the core impacts of Sustainable Mobility on poverty alleviation</b> —● 31
<b>Figure 17</b>	<b>Case study – Tusker’s impact on poverty alleviation (Case Study)</b> —● 32
<b>Figure 18</b>	<b>SDG targets related to the core impacts of Sustainable Mobility on economic growth and formalization of businesses</b> —● 33
<b>Figure 19</b>	<b>MAX’s impact on economic growth (Case Study)</b> —● 34
<b>Figure 20</b>	<b>Waterbus’s impact on climate change mitigation (Case Study)</b> —● 38
<b>Figure 21</b>	<b>Smart Freight Centre’s impact on climate change mitigation (Case Study)</b> —● 40
<b>Figure 22</b>	<b>Waterbus – Evolution from traditional canoes via diesel ferries towards a hybrid solar-diesel solution</b> —● 41
<b>Figure 23</b>	<b>Tugende’s impact on poverty alleviation, economic growth and health and safety (Case Study)</b> —● 43
<b>Figure 24</b>	<b>Relevance of different Sustainable Mobility enterprises by investor type</b> —● 46

# Introduction

Sustainable Mobility has gained traction over the past years, but large amounts of investment are required for the sector to develop further. Investors have frequently overlooked the sector due to various barriers, notably a lack of knowledge on the sector, its wide range of solutions and their significant impact on society.

The Shell Foundation supports start-ups in the Sustainable Mobility sector in developing countries, providing patient capital and enterprise development support. Through its endeavours, the Foundation seeks to raise awareness on Sustainable Mobility, encourage investors to enter the sector and ultimately develop an investment ecosystem around the sector.

In this context, the Shell Foundation commissioned Enea Consulting to study the sector and derive a case for Sustainable Mobility investment in developing countries. In commissioning this study, the Shell Foundation expects to increase awareness and help remove barriers to investment in Sustainable Mobility.

Enea Consulting leveraged a three-phased sequential approach for this study, the core methods of which included the following:

## *Desk research*

During this phase, Enea conducted a review of relevant data and literature to size the challenges of mobility and the corresponding investment need. The literature review further allowed Enea to refine the scope of the study, particularly the type of solutions covered.

## *Survey and interviews*

In order to understand the current state of impact investment in Sustainable Mobility and the barriers investors face, Enea conducted 10 interviews and a survey involving 20 investors.

## *Materiality analysis*

Enea conducted a materiality analysis, scrutinising the contribution of the different types of Sustainable Mobility solutions to the UN SDGs. This analysis is the core of the study and served to identify core impacts of Sustainable Mobility which can be considered intrinsic to any Sustainable Mobility solution as well as impacts specific to certain types of solutions or enterprises.

## *Validation of methodology*

Enea validated its materiality analysis on a selection of companies from the Shell Foundation portfolio, providing case studies outlining the various impacts of Sustainable Mobility via concrete examples.

## *Evaluation of solutions*

Enea identified, evaluated and prioritized appropriate solutions for different investor types, providing insight on relevant Sustainable Mobility enterprises investors could consider.

This report is aimed at impact investors. It outlines the variety of Sustainable Mobility solutions in developing countries and their impacts.

1

# Understanding the investment gap in Sustainable Mobility in developing countries

*Mobility represents a multi-trillion dollar investment opportunity, especially in low- and middle-income countries, where the need is greatest*

**Mobility represents a multi-trillion investment opportunity with a proven funding gap**

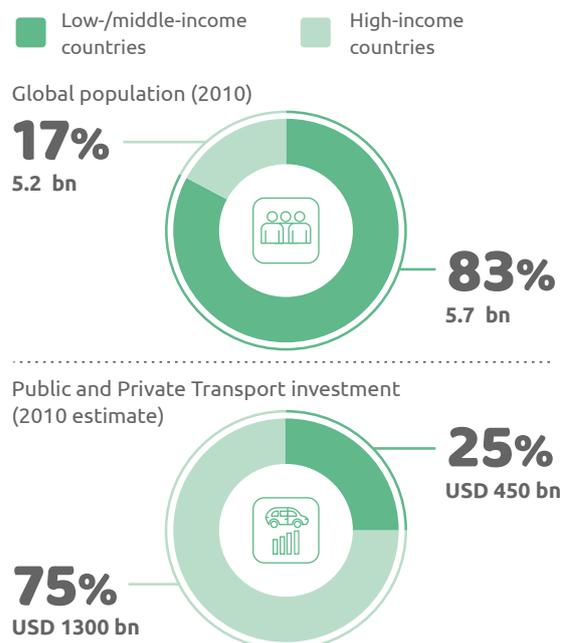
Mobility is a major investment opportunity for the private sector. The worldwide annual investment in transport was estimated to be between USD 1.4 and USD 2.1 trillion in 2014, of which public investment accounted for less than half *Bib.1*. New technologies are further driving this opportunity. In electric mobility alone, USD 3.7 trillion is expected to be invested between 2018 and 2030 in new infrastructure (Enea analysis based on *Bib.2, Bib.3, Bib.4, Bib.5, Bib.6*).

However, there remains a significant funding gap to be addressed. Transport is one of the key sectors of investment contributing to the UN Sustainable Development Goals (SDG). The investment gap of private investment required to meet the SDGs is estimated to be around USD 2.5 trillion annually, with the investment gap for transport accounting for 10% of this total (USD 250 bn) *Bib.7*.

**Low-income countries face the largest mobility challenges but are not receiving adequate funding**

Transport investment in low- and middle-income countries was estimated to account for only 25% of global transport investment in 2010, or between USD 350 and USD 525 billion annually, despite them hosting over 80% of the world’s population. Whilst mobility challenges are greatest in developing countries, especially low-income countries, the majority of existing investment remains concentrated in large upper-middle income countries, particularly Brazil, Russia, and India *Bib.1*.

**Figure 1**  
**Transport investment in low- and middle-income vs. high-income countries compared to share of global population**



While the figures presented above refer to transport investment, the terms mobility and transport are often used interchangeably. However, a distinction between transport and mobility has emerged in recent years (Figure 2) *Bib.8*. Mobility encompasses not only the act of moving, but also the importance of the ability to move freely. With advances in technology, solutions are emerging which provide access to mobility, from ride-hailing applications to digitalized goods transport solutions that are different from traditional transport investment. Mobility is therefore a term that better fits the context of impact investment. The focus of this report will therefore be on mobility. A definition is provided in *Figure 2*.

The challenges of mobility in developing countries can be broken down into four categories: access to mobility, safety of mobility solutions, efficiency and environmental impact. These are each discussed in the subsections below.

**Figure 2**  
**Mobility vs. Transport**

The terms mobility and transport are often used interchangeably. However, a differentiation has emerged over the past years.

**Mobility**

The ability of people and goods to move or be moved freely between locations.

**Transport**

The act of moving people or goods from one location to another *Bib.8*.

*Accessibility*

Lack of geographical access to mobility affects populations in both urban and rural areas. In 2016, one third of the world’s rural population did not have sufficient access to all season roads, while in Africa more than 70% of the rural population lacked access to all season roads and transport *Bib.9*.

In many urban areas population growth exceeds public transport system investment. As the urban poor are increasingly concentrated in the peri-urban areas, they suffer more from insufficient availability of affordable mobility options *Bib.10*, increasing their need for mobility solutions. The result is that most

trips commuting to work or school as well as for other daily needs are made using non-motorized means, i.e. walking or cycling *Bib.11*.

>70%



Rural population in Africa without access to all season roads

65%



Rural population in Africa without access to electricity

While geographical proximity to mobility solutions is important, affordability also limits access. In some areas in Africa and Asia, the ownership rates of motor vehicles are as low as three vehicles per 1000, meaning that poor households only have access to informal mobility solutions, which are subject to price instability. The poorest often spend up to 30% of the household income on mobility that is largely informal, unsafe, unreliable and inconvenient, compared to 8–16% of income in developed countries *Bib.11*, *Bib.12*.

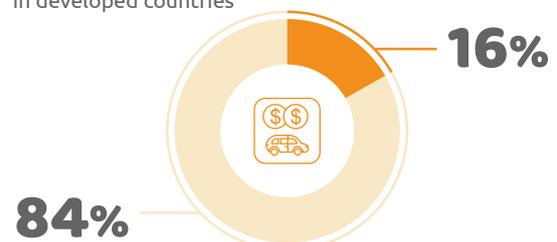
**Figure 3**  
**Maximum share of household income spent on mobility in developing and developed countries**

■ Transport      ■ Other

Maximum share of household income spent on mobility by poorest households in developing countries



Maximum share of household income spent on mobility in developed countries



### Safety

Mobility safety is a constraint in developing countries due to the large informal and unregulated nature of the sector. This leads to increased fatality rates compared to developed countries: 1.4 million fatalities occur in transport yearly, with 93% of them located in low- and middle-income countries, which have only 60% of the world’s registered vehicles *Bib.13, Bib.10.*

**1.25 million** 

**Yearly number of road fatalities in low and middle income countries = 93% of global road fatalities**

The poor are especially affected by safety concerns, as walking is often their only means of transportation and pedestrians are particularly exposed to road accidents. In Kenya, pedestrians are the largest group of reported road traffic fatalities, accounting for 47% *Bib.14.*

Another aspect of safety is the risk of falling victim to crime, especially for female passengers. Women are among the most vulnerable, with globally three in five women report experiencing sexual harassment on public transport *Bib.15.* It is estimated that in developing countries limited access to safe mobility solutions might be the greatest obstacle for women to participate in the labour market *Bib.16.*

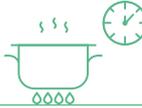
### Efficiency

Efficiency of mobility is a challenge for low-income users who rely on inefficient public transport systems. Often these systems run on a “fill and run” basis rather than relying on a schedule. The average time low-income commuters spend commuting one way in South Africa is 150 minutes *Bib.12.* Excessive time spent in transit is a concern especially for the poor, as it significantly reduces the time they can spend on income-generating activities.

In urban areas, the issue is accelerated by the rapid increase in car adoption, leading to rising congestion levels in most cities in Sub-Saharan Africa, Asia and the Middle East. This further increases time spent on mobility and leads to additional negative impacts due to increased fuel consumption and air pollution *Bib.17.*

**2.5 hours** 

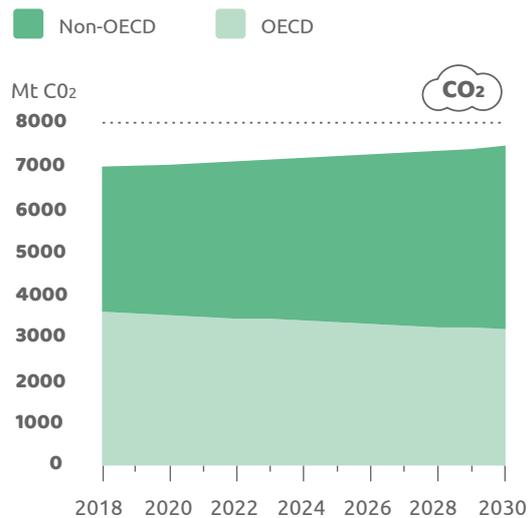
Average amount of time low income users spend commuting one way in South Africa

**1.4 hours** 

Time households that rely on biomass for cooking dedicate to collecting firewood per day

### Environmental impact

**Figure 4**  
Level of transport emissions in OECD and non-OECD countries 2018-2030



To date, transportation accounts for only 20% of total CO<sub>2</sub> emissions in non-OECD countries compared to over 30% of total CO<sub>2</sub> emissions in OECD countries. In 2018 OECD transport emissions were 7% higher than non-OECD emissions. However motorized transportation is growing in emerging and developing countries, and while transport emissions are expected to decrease by 1% annually up until 2030 in OECD countries, they are expected to grow by 2% annually in non-OECD countries *Bib.18.* This means that non-OECD transport emissions will be 35% higher than OECD emissions, by 2030, as shown in **Figure 4** and set to rise further *Bib.19.*

Air pollution is a significant problem in urban areas, with 98% of cities with more than 100,000 inhabitants in developing countries not meeting WHO air pollution limits, compared to 56% in high-income countries. Africa and Asia rank highest in PM2.5 exposure, a particulate matter generated primarily by road traffic *Bib.20*.

These challenges are going to be exacerbated by ongoing demographic trends in developing countries, making the financing gap of mobility even larger. Global population is expected to rise to almost 10 billion by 2050 of which 85% will be in non-OECD countries. Urban areas will host about 7 billion people, meaning that urban population will rise by 2.7 billion, of which 90% will be in developing countries, putting additional pressure on underfunded transport systems *Bib.21*. The global annual funding gap for transport infrastructure alone, not taking into consideration other fields like mobility services, is estimated to be up to USD 250 bn *Bib.22, Bib.23, Bib.19*.

As presented above, mobility faces specific challenges in low- and middle-income countries and therefore needs to be paid special attention. Thus mobility in developing countries will be the focus of the report.

*To meet the challenges mobility is facing in developing countries, entrepreneur-led solutions are needed that often require large upfront investment*

**In addition to large public infrastructure projects, entrepreneur-led solutions are needed to tackle the challenges of the mobility sector**

Today, mobility investment in developing countries, especially public investment, is largely focused on large infrastructure projects. While improved infrastructure is an important step towards addressing mobility challenges, it can only address some of them, for example geographical access. Other challenges such as affordability can be effectively resolved through entrepreneur-led mobility solutions. Other issues, such as the environmental impact of mobility will also not be addressable through infrastructure alone, and will require new vehicles, innovative business models and behavioural changes.

A parallel can be drawn with other sectors. For example, in the energy sector, off-grid solutions such as solar home systems and mini-grids complement large-scale power grid investments. Solar home systems and mini-grid firms are typically entrepreneur-led, private sector firms, who are much more agile than highly regulated utilities. In financial service access, microfinance institutions, agency banking and digital banking options complement the existing services of incumbent banks by reaching poorer households with little access to formal banking services.

In emerging and developing economies facing a lack of public transport, the informal sector provides the majority of mobility services, representing a large, on-demand mobility solution that brings significant employment benefits to the population. For these reasons, informal mobility services are usually tolerated by public authorities, even if they often do not comply with any quality or safety standards. In 2008 an estimated 80% of all collective transport in Sub-Saharan Africa was provided by the informal sector *Bib.24*.



**CO<sub>2</sub> emissions related to transport** in non-OECD countries



**CO<sub>2</sub> emissions related to electricity and heat production** in non-OECD countries



Informal mobility solutions generally consist of a fleet of small, independent vehicles collecting passengers “without set timetables, routes or fares, especially in low-income areas” *Bib.25*. Informal mobility providers usually operate without permits or official licences to drive passenger vehicles, and in many cases without insurance. The conditions for passengers and other road users are often dangerous, as drivers may not abide by road laws and care for passenger safety and comfort. Moreover, these services are a major contributor to increasing road congestion and air pollution.

There is a huge opportunity for the private sector to provide formal mobility solutions that are safe, efficient, reliable, and clean to those members of the population underserved by public transport, thus replacing or integrating informal mobility solutions for the benefit of final consumers.

**The Sustainable Mobility sector encompasses those entrepreneur-led solutions, with a wide range of technologies and business models**

A growing number of entrepreneurs and organizations are working on providing better mobility solutions, and through them the concept and understanding of Sustainable Mobility is emerging. It can be defined as a range of solutions for the transport of both people and goods, in rural and urban context, targeted primarily towards low-income populations, and solving the key challenges of mobility in developing countries:

- **Accessibility:** improving geographical access, inclusion of low-income populations through more affordable mobility and gender inclusion.
- **Health and safety:** reducing accidents and improving security for passengers, e.g. better protection for women, as well as impacts on health.
- **Efficiency:** reducing time spent on transport, congestion levels and improving reliability of mobility solutions.
- **Environment:** reducing greenhouse gas (GHG) emissions and pollution.

Figure 5

**Sustainable Mobility objectives**

**Accessibility**



improving geographical access, inclusion of low-income populations through more affordable mobility and gender inclusion in transportation

**Health and safety**



reducing accidents and improving security for passengers, e.g. better protection for women

**Efficiency**



reducing time spent on transport, congestion levels and improving reliability of schedule

**Environment**



reducing GHG emissions and pollution, decreasing negative environmental impact

Sustainable Mobility covers a wide range of different solutions and enterprises addressing mobility challenges. In order to better understand the wide variety of solutions covered by the definition of Sustainable Mobility, a segmentation can be used based on the key characteristics of each solution:

- Vehicle<sup>1</sup> and infrastructure-based solutions that rely on assets.
- Mobility services that capture the service offering to the client and are not focused on the underlying asset.
- Technology and software solutions which are integrated in a mobility solution.

The full segmentation serving as a basis for further analysis in this report is displayed in **Figure 6**.

<sup>1</sup> For the purpose of this report the term vehicle is not limited to road transport but can refer to any mean of transportation: motor vehicles (car, bicycle, motorcycle), watercraft (ship, boat), railed vehicles (train, tram) etc.

Figure 6

### Sustainable Mobility enterprise segmentation

SECTORS	TYPES OF SOLUTIONS	EXAMPLES
Technology and software	Traffic coordination solutions	Digital panels coordinating traffic, integrated solutions for navigation applications
	Navigation and mapping tools	Mobile application for navigation, mapping areas not covered by traditional providers
	Security systems	Cameras, GPS tracking
	Emissions measurement	Emissions measurement in urban areas
Mobility services	Shared mobility	Car sharing, bike sharing
	<b>Ride-hailing</b>	Taxi-like solutions based on mobile application
	<b>Delivery services</b>	Logistics, urban solutions combined with ride hailing
Vehicles and infrastructure	Connecting isolated communities	Transport solutions (e.g. buses, ferries) in remote areas
	<b>Vehicle finance</b>	Financing solutions for drivers of ride hailing or deliver services
	<b>Improved roads</b>	All-season roads in rural or peri-urban areas
	<b>Mass-movement systems</b>	Public transport, minibus services, logistics
	Non-motorised transport	Bike sharing
	<b>Cleaner vehicles and infrastructure</b>	Improved ICE vehicles or vessels, e-mobility



These solutions currently receive the majority of funding in the Sustainable Mobility sector.

The segmentation presented above does not consist of mutually exclusive segments. Sustainable Mobility enterprises can fall into one, two or more categories, depending on their business model. For example, a solution that offers vehicle finance for rickshaw drivers that offer their service to clients

via a mobile application: these can be categorized as vehicle finance, ride-hailing and traffic coordinating solutions. If a solution of this type is focused on financing electric rickshaws, it would also be the category of cleaner vehicles and infrastructure.

While the segmentation introduced above will be used for the purpose of this report, there is no agreed segmentation of the Sustainable Mobility market. Other segmentations of Sustainable Mobility are possible and used by other stakeholders, e.g.

- the targeted market: urban vs. rural, people vs. freight, targeting low-income households vs. middle class.
- type of solution: asset based vs. service only, means of transportation: walking & cycling, motorized transport, public transport, etc.
- type of stakeholder developing the enterprise: public vs. private vs. NGO, formal vs. informal.

When discussing Sustainable Mobility, electric vehicles are often the first thing that comes to mind. But as the segmentation of Sustainable Mobility enterprises shows, there is more to Sustainable Mobility than only electric mobility. Sustainable Mobility solutions tackle challenges related to climate change and the energy transition in different ways (see part 2 of this report). Sustainable Mobility covers a wide range of solutions positioned along the entire value chain of mobility and bringing multiple types of value.



## Impact investment in Sustainable Mobility is needed but investors are facing barriers to enter the sector

**In emerging and developing countries, it is likely that Sustainable Mobility will require support from impact investment, as other sectors have benefited from, but today few impact investors are actively targeting the sector**

Entrepreneur-led Sustainable Mobility solutions, as with large-scale infrastructure, require significant amounts of capital:

- Many mobility services and solutions rely on new assets or infrastructure. While the lifespan of vehicles and infrastructure assets can be 20–30 years and more, the upfront investment is significant. This is the case for electric mobility, where charging infrastructure requires major investment, and the upfront vehicle cost is higher than an Internal Combustion Engine (ICE) solution. New business models such as ‘mobility-as-a-service’ are also capital-intensive as the enterprise holds all assets required for the service. Bike- or car-sharing solutions require firms to invest in significant assets and the associated infrastructure. In developed countries these infrastructure investments are often partly funded with public money.

- For example, London’s bicycle rental scheme continues to receive public financial support of ~£8.4m per year Bib.26.

- The UK government has committed ~£300 million to support e-vehicle charging infrastructure Bib.27.

- Other solutions are based on technical innovation, e.g. innovative digital platforms that are adapted specifically to the requirements of developing and emerging countries’ markets, or electric vehicles or vessels. While innovative digital solutions may not require capital intensive assets, the development costs can be high; however, once established, tech platforms have raised significant funds in the past. Global ride-hailing and delivery service Uber has raised a total of USD 25.2 billion since their creation, despite owning few infrastructure assets.

Looking at the challenging markets Sustainable Mobility enterprises in developing countries operate in, the need for impact investment is evident. Political and financial risks make it difficult to raise funds, as enterprises and investors navigate a number of obstacles, e.g.

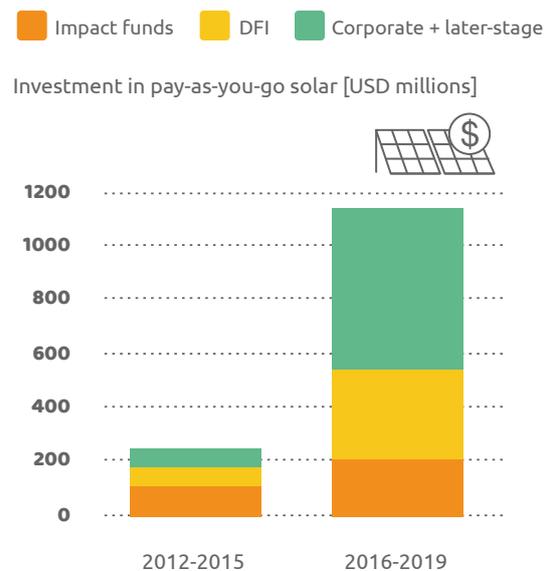
- a lack of legally binding, long-term mobility targets at the national level.
- a lack of consistent legal and regulatory frameworks.
- a lack of cooperation between the private and public sector (public procurement, partnerships, etc.).
- a lack of public research and publication of leverageable mobility data.
- technology risks for some Sustainable Mobility solutions.

The need for impact investment to foster the development of Sustainable Mobility is all the stronger as investment in private sector enterprises is not focused on low-income countries and rural areas, where the need for Sustainable Mobility solutions is, however, the highest. In 2016, USD 16 billion was invested in entrepreneur-led transport solutions worldwide. However, while a high level of funding is targeted towards China, there is very limited investment into other parts of Asia and Africa. Most investment is made in developed markets and focused on cities *Bib.12*. Impact investment is therefore particularly needed to seed early-stage investments in peri-urban and rural mobility in underserved countries.

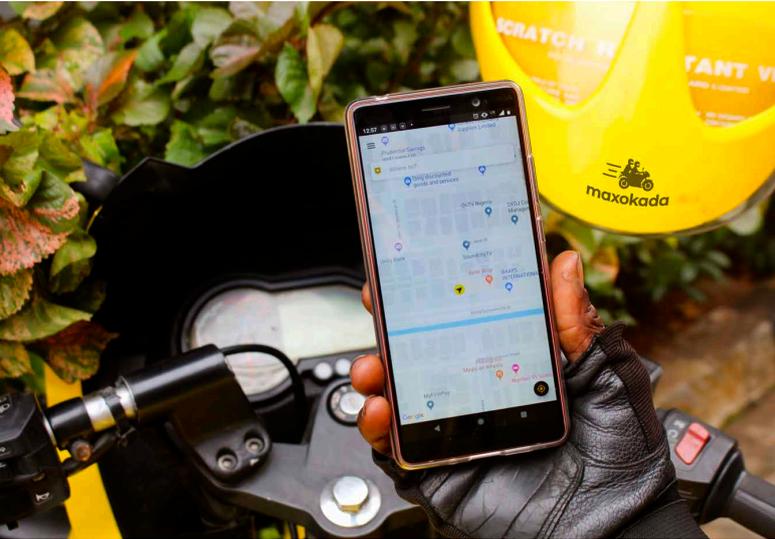
Impact investment has played an important role in driving access to energy, access to financial services and access to agricultural technologies. In the off-grid solar lighting sector, where most customers are found in rural sub-Saharan Africa, many of the earlier investors were impact investors, and the sector attracted minimal commercial funding. Indeed between 2012 and 2015, 45% of investment in energy access came from impact investors, 29% from DFIs and only 26% from commercial and later stage sources (see **Figure 7**). However, in the period 2016–2019, commercial and later-stage financing actors represented the majority of investments at 52%, with impact investors only accounting for 18%. This demonstrates the key catalytic role of impact investment to spur sectors in their

early stage *Bib.28*. Similarly, it can now drive the development of the Sustainable Mobility sector and help provide adequate mobility solutions to currently underserved communities.

**Figure 7**  
Investment in pay-as-you-go solar solutions 2012–2019



By contrast, impact investment in mobility is thought to be limited. However, providing an exact estimate of the level of impact investment needed in the Sustainable Mobility sector is difficult. There is no shared definition of Sustainable Mobility, and Sustainable Mobility as an investment theme is new to most impact investors. Indeed, when asked about their investment in the sector during interviews for this report, many investors believed they did not have any investment in Sustainable Mobility, despite having an investment in a Sustainable Mobility business. This is because they are either unaware of the concept of Sustainable Mobility or categorize investments that match the definition as being related to other impact sectors. In the case of electric vehicles, these solutions are often categorized by investors as part of their work on energy access. Delivery services for different sectors are often categorized based on the sectors they serve: e.g. solutions connecting rural farmers to urban vendors would be labelled as *agriculture*, while a delivery service improving the distribution of drugs and medical supplies to pharmacies would be labelled as *health*.



Even looking at the mobility sector more broadly, impact investment in mobility is poorly measured, and low compared to other impact investment areas. Principles for Responsible Investment (PRI) does not measure mobility/transport impact investment, even if the organization has stated they will measure mobility/transport investment in the future *Bib.29*. Meanwhile, according to the World Bank, only 20% of transport projects funded by the private sector receive DFI support, compared to 70% in the energy sector *Bib.30*.

A survey conducted among 30 investors for the purpose of this report also indicates a low level of investment in Sustainable Mobility as well as a low-level of awareness on the concept and impact of Sustainable Mobility. Among the investment firms surveyed for this report, energy and financial services remain the core investment sectors. While almost two thirds of the participants have made investments that can be considered Sustainable Mobility within our framework, it is typically a minority within their overall investment portfolio and they are often not categorized as a Sustainable Mobility investment. Only four survey respondents currently have dedicated Sustainable Mobility mandates. By contrast, energy access, agribusiness and access to finance are common mandates among impact investing firms; these sectors thus remain the focus of funding from impact investors.

Further sector definition and data collection will be needed to establish the exact level of impact investment in Sustainable Mobility, but we can conclude investment is at an earlier stage than other more established impact sectors such as energy access and financial services.

While investors are interested in Sustainable Mobility, there are several barriers to investment in the sector. The impact of Sustainable Mobility investments needs to be better understood to allow for more dedicated investments in the sector

Investors seem, however, to be increasingly interested in Sustainable Mobility.

- Around 65% of respondents to the investor’s survey stated that they have noticed an increased interest among investors in the sector, and many investors would like to become more active in the Sustainable Mobility sector.

65%



Respondents of investor survey stating they have noticed an increased interest in the sector

- When hearing about the range of Sustainable Mobility solutions, 100% of the survey respondents that are not restricted to a specific sector by their investment mandate stated an interest in investing in Sustainable Mobility in the next three to five years, even those investors that have not made any Sustainable Mobility investment in the past.

100%



Interest in investing in SM in the next 3-5 years among survey respondents without specific sector restriction in their mandate

- Some investors stated having Sustainable Mobility as a sector of focus in the near future is a possibility.

However, they also identify several barriers that currently make it harder to invest in the sector.

Reasons keeping investors from investing in Sustainable Mobility are interconnected: lack of information on the sector, a perceived lack of investment pipeline and a lack of financial attractiveness.

*Reason 1: A lack of information on the Sustainable Mobility sector and its impact*

The investor survey conducted for the purpose of this report shows a lack of awareness around the Sustainable Mobility sector as a whole. Having been introduced to the definition of Sustainable Mobility, investors seem to intuitively assume that Sustainable Mobility offers a lot of potential for impact but lack literature and data to back their intuition. Investors view missing impact metrics and indicators as a challenge to investing in Sustainable Mobility and would like to see standardized impact frameworks that would help them better understand the sector and allow better comparison against other investment opportunities.

**FMO**

*“It is not yet clear to us how to measure the impact of Sustainable Mobility – it would help to have more insights on how other institutions are approaching this. We are at an early stage of developing an investment thesis, from a business model and impact point of view.”*

As Sustainable Mobility becomes better known to investors and interest is growing, more data will be available on the sector both from external research as well as investors own internal data. The data will help other investors understand the impact the sector can generate and foster additional investment.

*Reason 2: Lack of investment pipeline and enterprises fitting investment criteria*

Another barrier to Sustainable Mobility investment mentioned by investors is a perceived lack of pipeline. This may, in part, be caused by investment criteria that do not fit with the range of Sustainable Mobility opportunities.

- Investors focused exclusively on low-carbon solutions or renewable energy are restricted to the funding of electric vehicles and associated infrastructure, which is still a limited market in developing countries. Therefore, investors willing to invest in the sector are facing a small pipeline of investment opportunities that fit their existing investment criteria.
- Investors focused on poverty alleviation will mainly target rural populations. For these investors, finding the right investment opportunity in Sustainable Mobility may be difficult due to the limited number of rural Sustainable Mobility businesses.

Understanding the impact of Sustainable Mobility will help make the case that it should be a major investment theme and drive investors to adapt their investment criteria to fit Sustainable Mobility or create dedicated funds for Sustainable Mobility, encouraging early stage support to the sector. With additional funding, the number of early-stage enterprises can develop further, building a growing pipeline for other investors to follow.

**Finca Ventures**

*“We are not active in mobility so far, as we originally thought it might be outside of our scope. But we recently have started to rethink that.”*



*Reason 3: Lack of financial attractiveness due to capex-intensiveness, lack of proper funding ecosystem and infrastructure investment challenge*

Mobility is capital-intensive. The working capital funding ecosystem such as the one in the energy access investment space (e.g. with specialist debt providers like Sunfunder, Trine) is not yet in place for Sustainable Mobility. It is thus difficult for investors to share risks and get sufficient return on their investment portfolio.

**Gala Impact Fund**

*"It's a capex-intensive business that hasn't at the moment the right type of working capital ecosystem we find in energy access. This should be changing quite rapidly as leasing majors are getting interested in the sector."*

The success of entrepreneur-led solutions is also highly dependent on public infrastructure development, especially for solutions that rely on infrastructure that currently does not exist or is not in a good state. This is often the case for any logistics or transport services in rural areas, where proper roads connecting the region to cities may not exist. Before proper mobility services can be developed, roads must be in fit for the vehicles to reach their destination relatively independent from weather conditions.

**CDC**

*"There is a first mover disadvantage in e-mobility investment due to non-existent infrastructure. As a DFI, we are able to take on higher-risk transactions to help accelerate the transition, and to crowd in more private capital."*

These issues can be tackled through public-private partnerships and investment from DFIs, allowing investments with a higher risk and capex-intensity.

In addition, financial attractiveness for businesses that focus only on low-income customers is challenging. Finding sustainable models will likely require much testing and iteration, so grants and other 'softer' financial instruments are likely to be required by early stage entrepreneurs. Energy access businesses have been supported by a wide range of grant facilities (e.g. Africa Enterprise Challenge Fund, USAID's Scaling Off-grid Challenge) to test early-stage business models.

By providing a better understanding of the impact of Sustainable Mobility, and making the case for increased impact investment, this report aims to play a small part in resolving some of the barriers currently holding back impact investment into Sustainable Mobility.





## TYPES OF SOLUTIONS

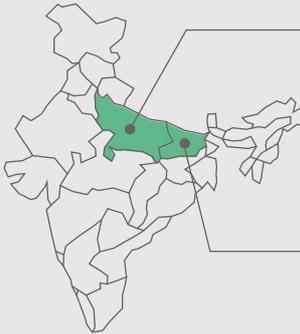
Security systems

Vehicle finance

Electric/fuel-efficient/  
clean-fuel vehicles

Figure 8

# SMV's impact across all dimensions of Sustainable Mobility



### Uttar Pradesh:

- Varansi: E-rickshaw + smart charge
- Allahabad: E-rickshaw + Vahini
- Lucknow: E-rickshaw

### Bihar

- Batna: E-rickshaw



Established in 2015 and SF partner from 2017-2021



India (Uttar Pradesh and Bihar)



78 employees



Seed Round / \$2.2 million raised (2020)



\$1.5 million revenue (FY2018-19)



1,500 e-rickshaw drivers (2020)



Poverty alleviation



Gender inclusion



**Up to 350%**

increase in drivers' daily income in the last 3 years, from \$3 to \$11-13

## Marginalised communities

SMV targets rickshaw pullers, unemployed youth and low-income women



**180%**

average income growth for women drivers, with up to 350% increase for some of them

## Women entrepreneurs

are provided with driving training, license and financial support to become owners and drivers of e-rickshaws



Health and safety



## Safety

E-rickshaws equipped with camera and GPS tracking, ensuring safety of both women drivers and passengers



Climate change



**3k Mt CO<sub>2</sub>**

Avoided compared to combustion engines thanks to SMV's e-rickshaws in the last 5 years

## E-mobility in high pollution areas

4 of the 6 cities SMV operates in are in the top 15 most polluted cities worldwide in 2018

## Battery swap

stations provide SMV drivers with high-mileage batteries, enabling a 30% additional income increase for drivers

### Pioneering e-rickshaw ownership in India

SMV Green Solutions was founded in 2015 and works with low-income communities across *Bib.7* cities in India to enable them to own e-rickshaws as livelihood generating assets. As a distributor for e-rickshaws, SMV's primary revenue channel is B2C rickshaw sales, as well as also providing allied services: access to asset financing and a pay-per-use battery swap service, helping drivers avoid long charging times.

SMV have supported 1,800 traditional rickshaw drivers to become e-rickshaw owners, improving their business and health while providing safe, clean and affordable mobility to their customers. Access to vehicle financing from formal financial institutions allows drivers to leave the informal rental system, receiving vehicle registration, insurance and license support and training on road safety, business and financial literacy.

Additionally, as part of its scale-up strategy, SMV is seeking equity funding and intends to raise \$ 2 million in 2021 for branding, expansion, and new product development.

### Gender at the heart of e-mobility

SMV's project "Vahini" supports women to become e-rickshaw owner drivers transporting exclusively female passengers. The Vahini program is a step to drive gender parity in the transport sector in India, empowering women from low-income communities and helping reduce inequalities within Indian cities. SMV provides access to financial services, business and financial literacy training and measures to ensure women's safety (e.g. equipping rickshaws with surveillance cameras), all to address specific barriers and social taboos that have constrained gender inclusion in the sector.

## *Offering decent work conditions to drivers*

SMV Green Solutions has improved the lives of over 1,800 electric rickshaw drivers to date, contributing significantly to poverty alleviation through improving their financial earnings. Receiving support from SMV enables drivers to access formal financial services required to acquire a rickshaw without having to rent their rickshaw through informal providers at a much higher cost. The daily instalments for rickshaw loans are on average around 1/3 lower than the daily rent for a rickshaw, enabling drivers to significantly increase their income while becoming owners of the underlying asset.

SMV helps to improve drivers' **health and safety** through the specific nature of the enterprise. Upgrading drivers from manual rickshaws to e-rickshaws relieves them from the strenuous physical labour they were formerly undertaking, and driver training courses help reduce the risk of serious accidents for both driver and passengers.

— Gender focus: SMV's project Vahini provides **decent work** to women, allowing them to generate an income whilst offering a high level of work flexibility. By the end of 2019 SMV had **trained 98 Vahini (female rickshaw drivers)**, of which ~23% were previously unemployed and 55% underemployed (earning 3k-5k INR/Month). The project focuses not only on training and supporting the Vahini during the often bureaucratic application processes for licenses, bank credit etc, but by having in place adequate means to ensure their safety while they are working.

## *Making transport safer and more affordable for male and female passengers*

Customers of SMV Green Solution benefit from the formalisation of a driver-based business model that is more regulated and offers more stable and transparent fares improving the customers' own **economic stability**. A survey among SMV passengers shows that young commuters in general feel safer and more comfortable riding with a Vahini.

— Gender focus: The security system installed in Vahini rickshaws **increases security in transportation** for both female drivers and passengers. The security system both acts as a key enabler for women to sign up to be Vahini, as well as reduces the common concerns of female passengers being transported on their own by a male driver, indirectly improving their access to mobility. Survey results show

security concerns are a key issue that commonly prevents women from using mobility services, with young women between 15-35 years preferring to travel with female drivers where available. At present female passengers constitute 60% of the Vahini's e-rickshaw users.

## *Generating positive economic and environmental impact beyond customers*

SMV's support for registration enables drivers to act as a formal business. Where formerly drivers were renting rickshaws from informal providers, they now purchase their vehicle from a formal vendor through bank financing, which in itself represents a positive **economic impact**. Authorities are able to better regulate a market of formal businesses and generate tax and other revenues, ultimately stabilising the local economy.

Pedestrians are among the most vulnerable to **safety issues** linked to road traffic accidents. Driving and safety training can help reduce the number of deaths and injuries for the local community that is impacted by a means of transportation even if they are not actively using it. The average yearly accident rate in male drivers is around 5% while in the case of female e-rickshaw drivers it is 2% (estimates based on SMV's customer base of 1,800+).

While the e-rickshaws provided by SMV directly replace ICE-based rickshaws, they also prevent the upgrade of manual rickshaws to ICE-based vehicles and by providing charging infrastructure and a battery swap service, pave the road for greater adoption of **cleaner vehicles** in the future. SMV has piloted both on-grid and off-grid battery swapping stations with off-grid smart charge stations powered by bio-gas, whilst using grid power in urban areas.



2

# Proving the impact case for Sustainable Mobility

According to a survey of 30 impact investors, 100% stated that a lack of information on the impact of Sustainable Mobility is currently hampering investment in the sector. This section examines the different impacts of different types of Sustainable Mobility solutions.

*Sustainable Mobility enterprises, through their variety, generate a wide range of direct and indirect impacts contributing to various SDGs*

Sustainable Mobility solutions have been analysed in order to identify the impact they generate on the 17 SDGs

Covering a wide range of issues, from poverty to environmental protection, the SDG framework enables a comprehensive approach to impact assessment and is already globally and widely acknowledged by impact investors<sup>2</sup>.

Each type of Sustainable Mobility solution has been analysed in order to identify its potential contribution to the 17 SDGs and 169 associated SDG targets. Impacts are categorized as core, direct, indirect or project-specific<sup>3</sup>:

- **Core:** material impact and directly relevant to the **core mission** of the solution.
  - All Sustainable Mobility enterprises have “core” impact contributing to Sustainable Cities and Communities (SDG 11), especially providing access to safe, affordable, accessible, and sustainable transport systems for all (11.2).

Figure 9

United Nations Sustainable Development Goals



**FMO**

*“We work with SDGs internally and communicate on them and the broader story [of our investments].”*

<sup>2</sup> The Global Impact Investing Network (GIIN), a non-profit organization and worldwide network dedicated to impact investing, assessed in its 2020 Annual Impact Investor Survey [43] that the majority of impact investors use the SDGs to set impact objectives (52% of impact investors), measure (37%) and report (48%) on impact performance. The use of this framework is even more predominant among the investors interviewed for this report, two thirds of them using it as main impact assessment framework and/or adapting it to adjust for specific investment mandates.

<sup>3</sup> This approach is in line with what is referred to as ‘materiality analysis’ in impact evaluation methodology literature

- Impacts on other SDGs may also be considered as “core” if they are directly and materially linked to the **enterprise’s core mission** (e.g. financial solutions for vehicle ownership have a core impact on SDG target 1.4 Ensure equal rights to economic resources and basic services).
- **Direct:** direct and material impact brought by the existence of the solution. As an example, navigation and mapping tools have a direct impact on SDG Target 7.3 Increase substantially the global rate of improvement in energy efficiency, because their existence leads to reduced traffic jams and shorter distances travelled by vehicles, thus improving energy efficiency of the transportation sector, **even though it may not be the core mission of companies providing such tools.**
- **Indirect:** less material impact and/or indirectly brought by the existence of the solution. For instance, traffic coordination solutions tend to reduce time on transport and clear valuable time, which can be used for more productive purposes, but not necessarily. This is why they have an indirect impact on SDG target 8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation.
- **Project-specific:** potential material impacts that only occur when specific criteria are met by the underlying enterprise (location, context, company actions). These criteria can be met by some enterprises, and will thus have specific impacts, while other enterprises within the same type of solution will not meet them. Here are a few illustrating examples:
  - A ride-hailing company may propose low fares in a relatively poor geographical area and thus have an impact on SDG 1.4 Ensure equal rights to economic resources and basic services;
  - A company may take specific actions to promote women’s leadership and thus have an impact on SDG target 5.5 Ensure women’s participation and equal opportunities for leadership at all levels of decision-making in political economic and public life.

Sustainable Mobility enterprises also generate impacts for different types of beneficiaries: customers of the solution, employees of the company, local community and lastly society (see Figure 10).

**Figure 10**  
Illustration of potential impacts of Sustainable Mobility among different beneficiaries in developing countries

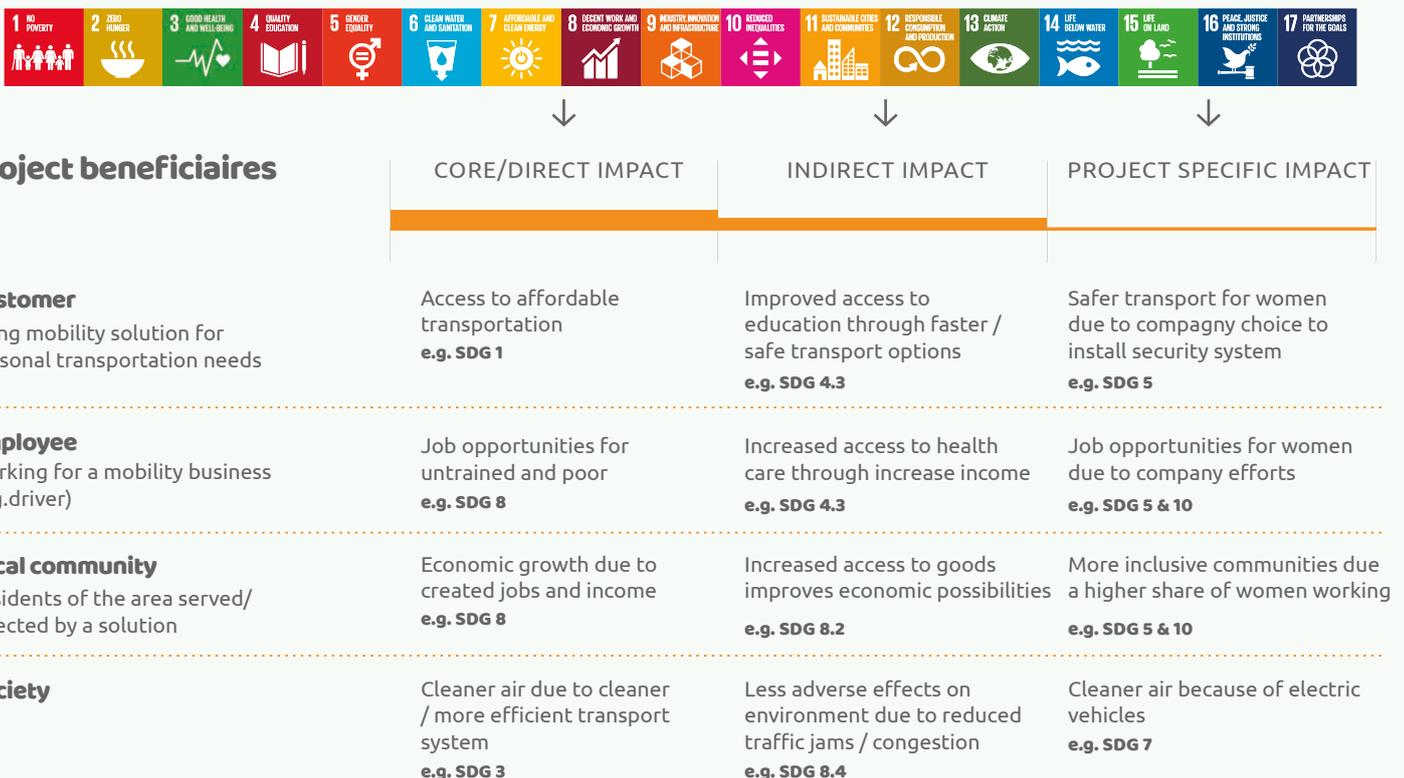


Figure 11

**Core identified SDGs of Sustainable Mobility enterprises**

SDG	Target
<p><b>1 NO POVERTY</b></p>	<p><b>1.4</b></p> <p>Ensure equal rights to economic resources and basic services</p>
<p><b>3 GOOD HEALTH AND WELL-BEING</b></p>	<p><b>3.6</b></p> <p>Substantially reduce the number of global deaths and injuries from road traffic accidents</p>
	<p><b>3.9</b></p> <p>Substantially reduce the number of deaths and illnesses from (...) pollution and contamination</p>
<p><b>8 DECENT WORK AND ECONOMIC GROWTH</b></p>	<p><b>8.1</b></p> <p>Sustain economic growth in least developed countries</p>
	<p><b>8.3</b></p> <p>Support decent job creation and formalisation</p>
	<p><b>8.6</b></p> <p>Reduce proportion of youth not in employment</p>
<p><b>11 SUSTAINABLE CITIES AND COMMUNITIES</b></p>	<p><b>11.2</b></p> <p>Provide access to safe, affordable, accessible and sustainable transport systems for all</p>
	<p><b>11.2</b></p> <p>Reduce the adverse environmental impact of cities</p>

The results of the materiality analysis show that Sustainable Mobility has a core positive impact on health and safety, socio-economic development, and the environment, across all solution types

Three main types of impact concern all Sustainable Mobility solution types:

- **Improved health and safety:** from reduced road traffic accidents and improved individual security to reduced air pollution, Sustainable Mobility solutions improve health outcomes.
- **Enhanced socio-economic development and inclusion:** by providing increased or improved access to mobility, Sustainable Mobility enterprises contribute to economic development, business formalization and job creation.
- **Reduced carbon footprint of transportation:** many Sustainable Mobility enterprises reduce the impact of transportation on greenhouse gas (GHG), either replacing or decreasing the use of more polluting solutions.

These core positive impacts of Sustainable Mobility contribute to four main SDGs and associated targets, which are presented in Figure 11.

However, Sustainable Mobility enterprises have many potential additional impacts which vary according to the type of solution

In addition to the core impacts that can be found across the entire range of Sustainable Mobility solutions, the different Sustainable Mobility solution types (see segmentation presented in Figure 6) can generate different impacts that are inherent to the solution type, but not Sustainable Mobility as a whole. These impacts vary between the solution types, according to their:

- **Target customers:** e.g. ride-hailing companies mostly have a B2C model while vehicle asset finance companies target ride-hailing entrepreneurs within a B2B model.
- **Underlying assets:** innovation based on software (e.g. navigation and mapping tools) or hardware technology (e.g. cleaner vehicles and infrastructure), activity requiring a large number of employees (e.g. ride-hailing platforms, delivery services and other driver-based businesses) or not (e.g. GHG emissions measurement solutions), etc.
- **Business model:** solutions that favour a low-cost high-volume model (e.g. mass-movement transit systems), or that favour a high-cost and lower-volume model (e.g. ride-hailing), etc.
- **Funding source:** solutions that mostly develop publicly funded projects (e.g. mass-movement public transport, improved roads, etc.) or privately funded projects (e.g. delivery services, bike-sharing stations, ride-hailing, etc.).

As a result, the impacts generated by Sustainable Mobility, which can be both direct or indirect, are quite diverse and go far beyond the four SDGs identified as core to Sustainable Mobility. Below are a few examples of Sustainable Mobility solution types having strong impacts:

- Security systems (e.g. security cameras on vehicles, used by SMV Green Solutions in India) increase safety for both drivers and passengers and thus tend to increase socio-economic inclusion especially for women (both drivers and passengers).
  - > Indirect impact on SDG target 5.1 End all forms of discrimination against all women and girls everywhere.
- Mass-movement transit systems for both people (e.g. public transport, Matatu services like Easy Matatu in Uganda) and goods (large logistics companies aggregating large amounts of freight like Twiga in Kenya) as well as shared mobility typically replace individual motorized transport by more collective mobility solutions.
  - > Generate energy efficiency gains (contributing to SDG target 7.3 Increase substantially the global rate of improvement in energy efficiency).
- Affordable mobility solutions like ride-sharing services or mass-movement systems (public transport) can overcome the geographical barriers that reduce access to education, providing students with an affordable way to commute to school.
  - > Indirectly contribute to SDG target 4.3 Ensure equal access to affordable and quality education for all.



In addition, Sustainable Mobility enterprises can also generate impact due to their specific context or actions, such as management’s pursuit of an impact goal

Finally, several impacts generated by Sustainable Mobility enterprises are specific to the enterprise and its location, context, customer segment or internal company policy. Some examples are listed below:

- An agribusiness logistics company (traffic coordination for goods) that coordinates food transportation will tend to increase agricultural productivity and reduce food losses along production and supply chains, thus contributing to the following SDG targets
  - 2.A Increase investment in rural infrastructure and agricultural systems to enhance agricultural productive capacity in developing countries
  - 12.3 Substantially decrease per capita global food waste and reduce food losses along production and supply chains.
- A waterborne transport solution (e.g. ferry or water taxi), if designed in a way that generates less pollution than a previous solution, can have a positive impact on marine biodiversity and thus contribute to the following SDG targets
  - 14.1 Prevent and significantly reduce marine pollution of all kinds
  - 15.1 Ensure the sustainable use of terrestrial and inland freshwater ecosystems and their services.
- Companies that focus on women’s employment and participation in management positions within the organisation, thus contributing to SDG target
  - 5.5 Ensure women’s participation and equal opportunities for leadership at all levels of decision-making in political economic and public life.
- Companies that strive to provide the same work conditions and wage to all workers, both men and women, contributing to SDG target
  - 8.5 Achieve full and productive employment and decent work for all women and men, and equal pay for work of equal value.



- Companies that provide better protection of labour rights for mobility workers, contributing to SDG target
  - 8.8 Protect labour rights and promote safe and secure working environments for all workers.
- Newly formalised businesses generate a new source of tax revenues for local governments, contributing to SDG target
  - 17.1 Strengthen domestic resource mobilisation to improve domestic capacity for tax and other revenue collection.

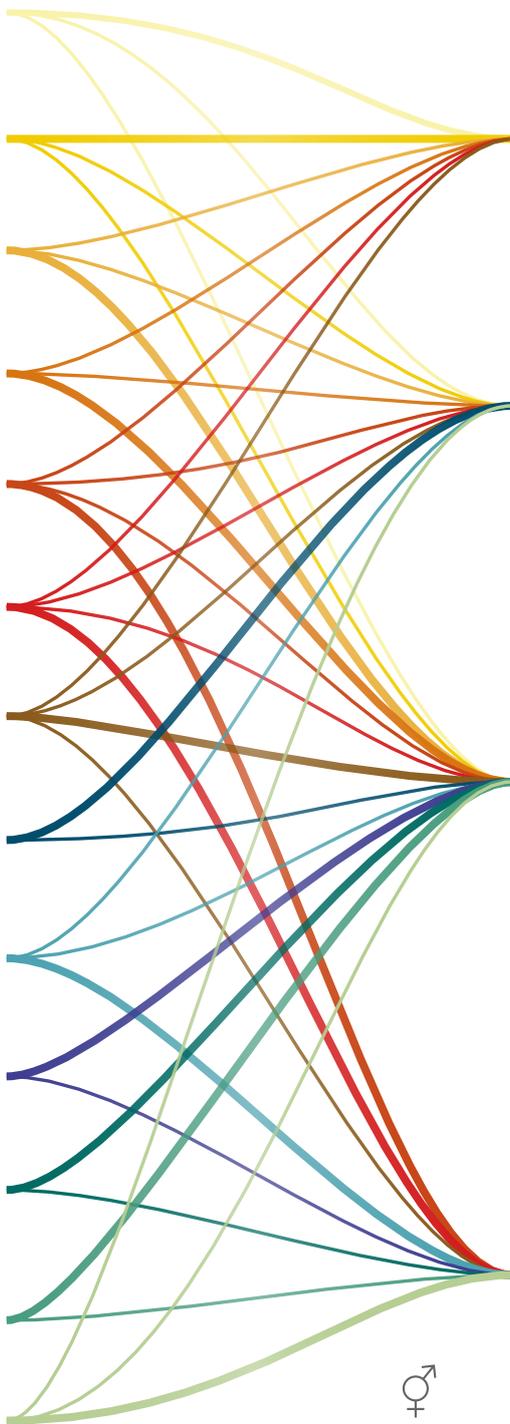
Sustainable Mobility enterprises thus generate a wide range of impacts contributing to the SDGs presented in Figure 12.1 and 12.2 and offering investors a variety of solutions to fit their investment criteria.

Figure 12.1

# Sustainable Mobility, key impacts

## TYPES OF SOLUTIONS

- Emissions measurement
- Cleaner vehicles and infrastructure
- Traffic coordination solutions
- Navigation and mapping tools
- Non-motorised transport
- Shared mobility
- Mass-movement systems
- Security systems
- Improved roads
- Ride-hailing
- Vehicle finance
- Delivery services
- Connecting isolated communities



— Main targeted impact  
— Other key impacts

## Key impacts<sup>1</sup>

Climate change

- 7
- 8
- 9
- 11
- 12

Health and safety

- 3

Economic growth and formalisation of businesses

- 8
- 10
- 11

Poverty alleviation

- 1
- 2
- 4
- 8
- 10
- 11

♀  
What about Gender inclusion?

5  
Gender inclusion is a topic that is gaining significant momentum among all types of investors. Many enterprises in the Sustainable Mobility sector and beyond are launching initiatives to better support women, who are often among the most vulnerable groups. Across the Sustainable Mobility, Gender impact is delivered mostly through project specific interventions taken directly by the enterprises, rather than necessarily due to the underlying solution itself (i.e. a ride hailing enterprise that purposefully hires female drivers). This approach allows significant gender impact to be generated across almost all Sustainable Mobility solutions. Thus gender impact is critically imbedded within Sustainable Mobility at a project level as detailed in Figure 12.2.

SDG

1 No poverty	10 Reduced inequalities
2 No hunger	11 Sustainable cities and communities
3 Good health and well-being	12 Responsible consumption and production
4 Quality education	13 Climate action
5 Gender equality	14 Life below water
6 Clean water and sanitation	15 Life on land
7 Affordable and clean energy	16 Peace, Justice and strong institutions
8 Decent work and economic growth	17 Partnerships for the goals
9 Industry, innovation and infrastructure	

<sup>1</sup> Key impacts cover the core, direct and indirect impacts of Sustainable Mobility enterprise types

Figure 12.2

## Sustainable Mobility, key and project-specific impacts

— Main targeted impact  
 = Other key impacts

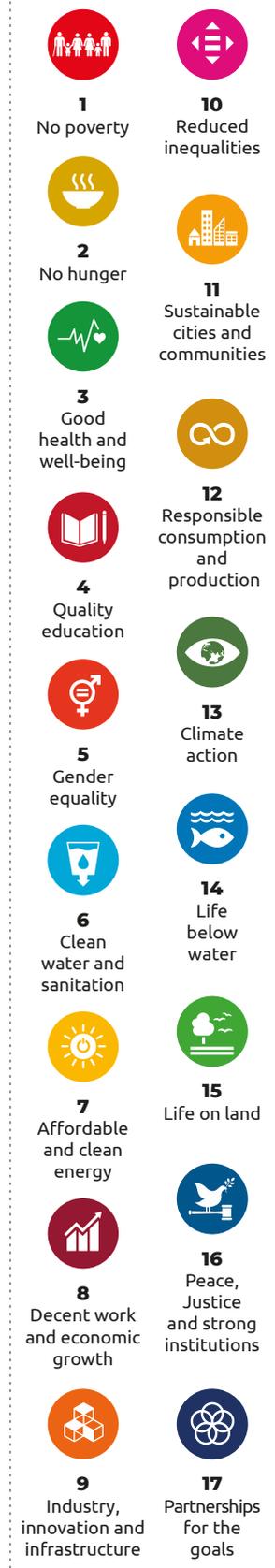
### TYPES OF SOLUTIONS

#### Key impacts<sup>1</sup>

#### Project-specific impacts<sup>2</sup>



### SDG



<sup>1</sup> Key impacts cover the core, direct and indirect impacts of Sustainable Mobility enterprise types

<sup>2</sup> Project-specific impacts cover the impacts that are specific to the enterprise and either its location, context, customer segment or internal company policy. SM can have both key impact and project-specific impact related to one SDG via the different SDG targets that it covers. In that case the SDG will be represented in the key impacts only.

## Sustainable Mobility generates core impacts in terms of health and safety, economic development and social inclusion

Sustainable Mobility solutions are helping tackle public health and safety challenges in developing countries

Figure 13

### SDG target related to the core impacts of Sustainable Mobility on health and safety



Sustainable Mobility has a core and direct impact on health and well-being through three levers: a reduced number of deaths and injuries from transportation accidents, improved safety within different means of transportation, and a reduced number of deaths and illnesses caused by air pollution

### Reduced number of deaths and injuries caused by traffic accidents

Globally, 800,000 deaths could be avoided per year if all countries reduced their road traffic fatalities to OECD level, according to Sustainable Mobility for All *Bib.10*. The following types of Sustainable Mobility enterprises directly contribute to decreasing the number of fatalities, injuries and crashes from accidents across the different modes of transport, road transport being the main source of transportation accidents:

- **Mass-movement transportation** enterprises, whether for **people** (public or private transport service providers, e.g. Easy Matatu in Uganda)

or for **goods** (large freight transportation companies), as well as any other solution aggregating multiple passengers (**shared mobility** solutions, e.g. WiiMove in Brazil) or goods, have a direct impact on the decrease of traffic by reducing the use of private cars for passengers and smaller freight transportation vehicles for goods. The decrease in traffic reduces the risks of accidents and entailed deaths and injuries.

- **Traffic coordination systems and navigation and mapping tools** regulate traffic by providing guidance for vehicles, thus reducing the risk of traffic jams and accidents resulting from over-congestion. Moreover, those same solutions can also warn drivers when an accident has occurred, via a physical warning sign or via a community-powered notification for GPS navigation tools, reducing the risk of follow-on collisions.
- Enterprises developing or integrating **security systems** for individual or public transportation such as speed cameras that are among the most critical components in road safety enforcement technology, collision avoidance systems or brake assist in cars as well as personal safety equipment as provided by SafeBoda in Uganda and Kenya (see case study in *Figure 14*) reduce the incidence of traffic-related injuries and deaths.
- **Solutions improving road conditions and access pathways** for motorized and non-motorized transport (roads, pavements, bicycle lanes, bridges, etc.) decrease the risk of vehicle, bicycle or pedestrian accidents. According to WHO *Bib.31*, more than half of all road traffic deaths are among vulnerable road users: pedestrians, cyclists, and motorcyclists. The creation of appropriate roads or dedicated lanes for them has a significant impact on their safety.

93%



28

of worldwide road traffic fatalities occur in low- and middle-income countries *Bib.13*

Figure 14

## SafeBoda's impact on road safety

SafeBoda motorcycle is a motorcycle taxi ride-hailing platform that allows the end consumer of the taxi service to order a ride performed by drivers who are trained in road safety, first aid, bike maintenance and customer care and who are tracked by GPS.

The platform also manages customer payments and driver commissions. SafeBoda passengers benefit from the increased reliability and standard of service, as well as visibility on pricing and usage. Online payments allow the customer to build a credit history which can benefit them in the future.



Established in 2014 and SF partner since 2015



\$28 million raised (by 2020)



Uganda



\$5 million per annum revenue



200 employees



16,000 motorbike drivers (2020)

39%

Less likely to be involved in road traffic accidents than regular drivers



2+ million

App journeys per month



670,000

Customers of safer motorcycle taxi rides



- Drivers are trained in road safety, first aid, bike maintenance and customer care.
- Drivers are provided with hairnets and a spare helmet.
- Drivers are identifiable and trackable through a GPS system.



### Increased security in transportation for both customers and drivers

Enterprises developing or integrating **security systems** for driver-based businesses (e.g. SafeBoda in Uganda and Kenya, see [Figure 14](#)) have significant impact over the security of drivers and passengers, generating greater confidence that can prompt more people to take ride-hailing or collective transportation solutions. Security systems can provide both riders and passengers security through transparent data, driver tracking or digital payments. Other security items like on-board cameras can deter potential violent assaults and robberies, which can occur in public transportation and driver-based businesses.

60%



of women in major Latin American cities have been physically harassed in public transport *Bib.44*

These systems are particularly vital in order to reduce women's exposure to violence and harassment in transportation and thus reduce the perception of travel risks that could otherwise impact women's social and economic ambitions and inclusion.

### Reduced number of deaths and illnesses caused by air pollution

Transport is a significant contributor to air pollution, which generates major health issues in developing countries particularly in densely populated urban areas. Globally, it is estimated that an additional 1.6 billion people would breathe cleaner air if transport pollution alone was halved *Bib.10*. Various types of Sustainable Mobility enterprises directly or indirectly contribute to decreasing air pollution from GHG and small particles caused by fossil-fuelled vehicles:

- **Traffic coordination systems and navigation and mapping tools**, acting as traffic regulators, reduce the risk of congestion and the significant emission of air pollutants. Vehicles burn the most fuel while accelerating to get up to speed, and thus stop-and-go congested traffic leads to higher quantities of pollutants released into the air.
- Solutions that tend to decrease road traffic by aggregating passengers or freight—such as **mass-movement transportation** enterprises for people and goods or **shared mobility** solutions—decrease air pollution caused by this traffic.

- **Cleaner vehicles and infrastructure**, including fuel-efficient, electric, biofuelled and other clean-fuel vehicles (cars, trucks, motorcycles, scooters and other soft mobility vehicles) emit less or no pollution locally compared with fossil-fuelled vehicles. Examples of Sustainable Mobility enterprises relying on cleaner vehicles and infrastructure include Ampersand, an electric motorcycle taxi enterprise in Rwanda (see [Figure 15](#)), or Waterbus, a Kenyan enterprise operating fuel-efficient ferries on Lake Victoria (see [Figure 20](#)).

**4.2 million** 

Outdoor air pollution in both cities and rural areas was estimated to cause 4.2 million premature deaths worldwide in 2016, 91% of which in low- and middle-income countries *Bib.45*

Sustainable Mobility plays an important role in improving health and safety directly, making transport safer for drivers, passengers and the public, reducing the risk of accidents as well as improving the general safety while on transport. It contributes indirectly to improved health, through the reduction of air pollution, not only when cleaner vehicles and infrastructure are deployed, but also because Sustainable Mobility solutions can reduce the total number of trips taken. Lastly, Sustainable Mobility enterprises have proven their relevance in light of the COVID 19 pandemic, offering their services to improve access to health services, transporting drugs and medical supplies as well as other essential goods. For example, during the lockdown in Uganda, SafeBoda drivers ensured access to reproductive health products, delivering them directly to consumers.

**45 tons**

avoided CO<sub>2</sub>-equivalent emissions resulting from the use of Ampersand's e-motorbikes



**-75%**

lifecycle greenhouse gas emissions produced using grid power, compared to petrol motorbikes



**157,000 tons**

CO<sub>2</sub>-eq emissions each year that could be avoided converting Kigali's 30,000 motorbikes to electric



**100M**

people transported by motorcycle taxis everyday in East Africa



- Lifecycle greenhouse gas emissions of Ampersand's motorcycles are reduced by 98% compared to petrol motorbikes when using renewable power.
- Rwanda's e-motorbike market is bolstered since its government's announcement to transition Rwanda's 100,000 motorbikes to electric.
- Ampersand motorbikes cost less to acquire and operate than fuel motorbikes, saving each driver over \$500 a year.

Figure 15

## Ampersand's impact on health

Ampersand is introducing electric motorcycles to the motorcycle taxi market in East Africa, with an initial focus on the Rwandese market. By using a battery swap model, Ampersand makes it cheaper to buy and operate an electric motorcycle than a petrol motorcycle. The company also partners with asset finance companies to enable scaling and uptake by boda (motorcycle taxi) drivers.

Ampersand's long term vision is to become a vehicle-to-grid pioneer in emerging markets, leapfrogging East Africa to a low-carbon future. The company aims at expanding to Kenya and Uganda in 2021-2022, targeting 5 million potential customers in East Africa.



Established in 2016 and SF partner since 2019



Seed / \$1.75 million raised (2020)



East Africa (Rwanda)



\$8.3 thousand per month revenue



43 employees



40 motorbikes in operation (2020)

### TYPES OF SOLUTIONS

Cleaner vehicles

Ride-hailing



Sustainable Mobility solutions have a major impact on socio-economic development and inclusion

*Sustainable Mobility is a driver for poverty alleviation*

Figure 16

**SDG target related to the core impacts of Sustainable Mobility on poverty alleviation**



Another core impact of Sustainable Mobility enterprises is an improved access to affordable mobility, which is a major lever to lift low-income populations out of poverty. According to Sustainable Mobility for All *Bib.10*, an additional one billion people would be connected to education, health and jobs if we close the access to mobility gap in rural areas. To close this gap and fight poverty, Sustainable Mobility solutions can rely on four main levers: increased mobility of the low-income populations (“bottom of the pyramid”), increased access to basic resources, increased purchasing power resulting from more affordable transportation, and increased income for mobility employees.



*Increased mobility for low-income households*

Increased access to mobility is an essential impact of Sustainable Mobility, as it is an enabler for opportunities contributing to socio-economic development and inclusion, from access to basic resources and services to education and employment, all contributing to improvements in the overall standard of living of low-income populations. The types of Sustainable Mobility enterprises providing increased mobility for the bottom of the pyramid are the following:

- Enterprises providing passenger transportation solutions, such as **mass-movement transportation systems** like Easy Matatu in Uganda which allows passengers to pre-book their seat on a matatu, **shared mobility** (e.g. WiiMove in Brazil) **non-motorized transport** e.g. solutions offering bike rental infrastructure or supporting entrepreneurs opening bike shops, **ride-hailing** (e.g. MAX, vehicle financing provider for motorcycle taxis in Nigeria) or **transport solutions connecting isolated communities** (e.g. Waterbus on the Lake Victoria, providing efficient and reliable transport to passengers across the lake). To have an impact on the low-income populations, particularly in rural areas, enterprises can either propose lower transport fares compared to existing solutions and/or expand their geographical coverage to underserved areas.
- **Vehicle financing** solutions e.g. motorcycle financing enterprise Tugende in Uganda (see **Figure 23**) or e-rickshaw financier SMV in India (see **Figure 8**) enable both private individuals and entrepreneurs access to vehicle ownership, which they can then use for personal use and/or to open a driver-based business. These solutions offer their financing services to previously unbankable clients not only helping them own a vehicle, but also build credit history for the future.

**70%**



31

In 2016, one third of the rural population in Africa lacked access to all season roads and transport services *Bib.9*

*Increased access to basic resources and services*

Sustainable Mobility can provide low-income populations who lack available mobility solutions with increased access to basic resources, including both goods—food, water, essential consumer goods—and services (education, employment, healthcare, etc.), through:

- Enterprises providing increased mobility to the bottom of the pyramid (see paragraph “Increased mobility for low income households” for the different types of enterprises concerned), improving their access to education centres (schools and universities), healthcare (hospitals, doctor surgeries, etc.) and widening the range of economic activities available to them. The depth of this impact is particularly visible in rural and urban underserved areas, where long travel distances isolate populations from basic resources and services.

- Enterprises transporting goods, such as **delivery services** (e.g. Tusker in India, see **Figure 17**) or **mass-movement transportation systems for goods** (freight transport, e.g. East African Twiga), as well as enterprises providing itinerant services (e.g. mobile healthcare units of Riders for Health in Sub-Saharan Africa).

**263 million**



people worldwide spend **over 30 minutes per trip collecting water from sources outside their home**

All these solutions contribute to SDG 1 “No poverty” but, as the examples above show, can also contribute to additional SDGs such as SDG 2 “Zero hunger”, SDG 4 “Quality education”, or SDG 6 “Clean water and sanitation”, which are all essential impacts to alleviate poverty.

Figure 17

**Tusker’s impact on poverty alleviation**

Tusker is a last-mile delivery solution aggregating demand of freight transportation from rural businesses (pharmaceuticals, agriculture inputs, consumer goods, industrial goods, etc.) and crowdsourcing rural transporters through a mobile platform powered by machine learning algorithms that reduce distribution costs.

Tusker enhances access to affordable products in rural regions of India for underserved communities, while creating jobs for local transporters.

- Established in 2015 and SF partner since 2015
- India
- 35 employees

- Seed Round / \$2.3 million raised (2020)
- \$320 thousand revenue (FY2019)

**TYPES OF SOLUTIONS**

Delivery services

Connecting isolated communities

**3,000**

underserved rural villages served by Tusker



**643**

jobs created for Tusker’s rural transporters



**60%**

of orders moved are essential (pharmaceutical, agricultural, etc.) products



**20k**

orders shipped per month through Tusker’s digital platform



- Rural freight is hindered by poor infrastructure and dispersed and disaggregated demand, limiting low-income consumers’ access to affordable essential products.
- Goods moved include pharmaceutical products, agriculture produce, arts & craft and clean energy products.

*More purchasing power for households as a result of more affordable mobility solutions*

Sustainable Mobility includes affordable mobility solutions that aim at providing access to mobility for all. These solutions can typically be expected to lower the financial burden that transportation represents for populations in low-income countries, and create more purchasing power to improve their quality of life. The solution types concerned are:

- **Mass-movement transportation systems** (e.g. Easy Matatu in Uganda) and **ride-hailing** (MAX in Nigeria), which tend to be more affordable when they are formalized, due to more transparent, stable and predictable fare prices, resulting in improved expenditure management.
- **Vehicle financing solutions** (e.g. SMV in India) make vehicle ownership more accessible by providing loans or multiple payment solutions to customers, reducing upfront cost and providing a revenue-generating asset.

**30%**



Low-income populations in Africa spend about **30% of their income for transportation** *Bib.12*

*Increased income for mobility employees*

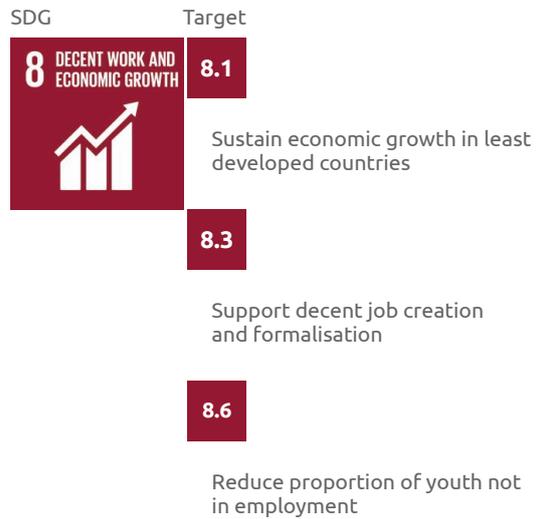
Sustainable Mobility includes solutions that provide access to better livelihood opportunities for mobility employees, enabling them to earn higher revenues than previously. This impact is a global outcome of the formalization of businesses (see below), but it can also be achieved through specific solutions like **vehicle finance solutions** (e.g. SMV in India), which enables asset ownership and greater income generating opportunities for ride-hailing or informal public transport drivers.



*Sustainable Mobility is a driver of economic growth and formalization of businesses*

Figure 18

**SDG targets related to the core impacts of Sustainable Mobility on economic growth and formalization of businesses**



Sustainable Mobility enterprises generate positive impacts on the economy, creating new jobs and providing work within formalized mobility businesses, generating indirect economic opportunities for their customers, and improving local transport infrastructure.

*Job creation*

The creation of jobs within the mobility sector can be inherent to Sustainable Mobility enterprises. For example, **driver-based businesses** (e.g. Ampersand in Rwanda, see **Figure 15** or MAX in Nigeria, see **Figure 19**) are labour-intensive enterprises which create many jobs especially for young people.

Job creation can also result from the mobility enterprise's business and value proposition. As an example, **vehicle financing solutions** can help drivers create their own ride-hailing business (e.g. SMV in India (**Figure 8**), or Tugende in Uganda (**Figure 23**) by providing them with loans and other facilitating services (e.g. driving training, formal documentation, digital payment support, etc.).

*Formalization of driver-based businesses*

Sustainable Mobility enterprises change the

**175,000**

Jobs supported by MAX



**500,000**

Livelihoods improved



**2+ million**

Trips completed by MAX drivers



— During the COVID-19 pandemic MAX provided targeted interventions to law enforcement officials, local residents and transport industry workers by providing hygiene products, facemask and food to over 5,000 beneficiaries in Akure, Ibadan and Lagos.



Figure 19

## Metro Africa Express (MAX) impact on economic growth

Metro Africa Express (MAX) uses technology to make urban mobility safer, more affordable and inclusive. They provide a ride-hailing platform that connects end-consumers for passenger trips and deliveries with trained motorcycle taxi drivers.

All drivers undergo a screening process and use the same motorcycle model and drivers can receive a loan to purchase their motorcycle over a 12-18 months period. They can also receive financing for smartphones and in addition to helmets for the driver and passenger, branded clothing and first aid equipment are provided as well as accident insurance.



Established in 2015 and SF partner since 2018



Nigeria



2000+ drivers (2020)



\$8.5 million raised (2019)



\$500,000 per month revenue

### TYPES OF SOLUTIONS

Ride-Hailing

Security systems

Vehicle finance

landscape of collective transportation, which is dominated by informal solutions. All types of driver-based businesses are concerned, such as **mass-movement systems for people** (e.g. Easy Matatu in Uganda), **ride-hailing** (e.g. MAX in Nigeria), **delivery services** (e.g. Tusker in India, see Figure 17) or **solutions connecting isolated communities** (e.g. Waterbus, which replaces informal and unsafe boat transit services on Lake Victoria, see Figure 20).

**80%**



In 2008, about 80% of all collective transport in Sub-Saharan Africa was provided by the informal sector *Bib.24*

Formalization of driver-based businesses generates positive outcomes for every type of mobility stakeholder:

- Customers benefit from collective transport solutions that are more regulated and potentially safer, as well as from more stable transport fares.
- Drivers in formal businesses can benefit from more stable revenues, improved labour conditions and social protection.
- Public authorities benefit from more tax revenues from formalized businesses.

### Indirect job creation for customers

Increased mobility can enable job seekers to find more employment opportunities, enabling them to pursue employment opportunities outside of walking distance from their homes or that require employees to make regular trips. The types of Sustainable Mobility enterprises which contribute to this impact are listed in the paragraph "Increased mobility of the bottom of the pyramid".

### Increased economic growth through improved infrastructure

Enterprises that develop infrastructure as part of their business contribute to local efforts in developing the economy and reducing inequality, for instance **mass-movement transportation systems** (metro or railway projects), **improved roads and access pathways**, and **shared mobility** (e.g. bike-sharing stations or electric vehicle charging stations for a car-sharing service). Those Sustainable Mobility enterprises create economic value in the short term, by creating jobs for the construction of the infrastructure, and in the long term, by building lasting infrastructure on which various uses and services can rely. As an example, a car-sharing service that relies on electric vehicles will probably partner with a third-party company to build electric charging infrastructure, which can benefit other private individual vehicles.

As a conclusion, Sustainable Mobility enterprises are crucial to answer some of the main economic challenges in developing countries. First, they answer the challenge of accessibility with affordable transport solutions that increase users' purchasing power and provide them with an improved access to various economic opportunities. Sustainable Mobility's impact, however, goes beyond the transportation sector alone and brings solutions to the broader challenges of developing and emerging economies, by creating jobs within formalized businesses, increasing income for mobility employees, and creating lasting infrastructure.

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Women often have lower access to mobility solutions which negatively impacts economic, health and education outcomes. Sustainable Mobility solutions can have positive impacts on gender inclusion

In developing countries, women are underrepresented and discriminated against in the mobility sector: as users, as workers and as decision makers in the planning and operation of mobility systems.

**Access**—Women have lower access to mobility, particularly in developing countries. In a survey in Chennai, 83% of women walked to work, compared with 63% of men. In a study in Vietnam, women were 3 times less likely to travel by motorbike, but were 30% more likely to walk. This lack of access to mobility has a particularly negative impact on health and education, as explained below *Bib.32, Bib.33*.

SDG	Target
	<p><b>5.1</b></p> <p>End all forms of discrimination against all women and girls everywhere</p>
	<p><b>5.5</b></p> <p>Ensure women's participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life</p>
	<p><b>5.1</b></p> <p>Promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status</p>

- **Health impacts due to a lack of mobility access:** 50%–60% of people in poor countries live more than 8 km from a healthcare facility. Maternal and infant mortality is particularly affected by substandard or unaffordable transport links, as evidenced in studies in Tanzania and Kenya. In a study in the Philippines, a 10% increase in distance from a hospital was associated with a 2% increase in all three mortality rates *Bib.34, Bib.35*.
- **Education impacts due to lack of mobility access:** In many developing and emerging countries, girls' education is less prioritized than their male counterparts, and therefore when travelling to school is expensive and time-consuming, girls' education suffers. Offering improved mobility access can therefore improve girls' education outcomes. A scheme in Bihar India offered bicycles to secondary school female students which reduced the gender gap in age-appropriate secondary school enrolment by 40%. A rural roads project in Peru increased enrolment in primary education for girls by 7% *Bib.36, Bib.37*.

**Employment**—Women are underrepresented in mobility employment throughout the world. ILO/World Bank estimates that only 5–15% of employees in the transport sector are female, compared to (a still low) 19–25% in developed countries *Bib.10*. Sustainable Mobility for All estimates that an additional 20 million women would work in transport if the sector achieved gender parity in employment *Bib.10*. Key barriers to gender inclusion in transport are the lack of safety in transportation, the lack of proper access to financial resources, restrictive social norms, gender stereotypes and discrimination, the lack of supportive corporate policies, and the lack of driving training and licences among women *Bib.38*.

Sustainable Mobility enterprises can tackle this issue of gender inclusion by creating safer mobility systems, providing mobility solutions that are inclusive for women and by empowering women through economic inclusion. Sustainable Mobility thus contributes to SDG 5 “Gender equality” and SDG 10 “Reduced inequalities” and their underlying targets displayed above.

- Sustainable Mobility enterprises can have a great impact on gender inclusion through the development of safer means of transportation by creating or integrating **security systems** for driverbased businesses. These enterprises increase safety for both drivers and passengers, generating a sense of confidence that can prompt more women to take ride-hailing or collective transportation solutions.
  - In India for example, SMV Green Solutions has developed a dedicated Project Vahini to provide low-income female rickshaw drivers (Vahinis) with electric rickshaws fitted with a cloud-based camera and smartphone, to enhance safety for both women drivers and passengers. Such systems contribute to reducing women’s exposure to violence and harassment in transportation and strive to minimize the perception of travel risks that could otherwise impact women’s social and economic ambitions and inclusion (see [Figure 8](#)).
- Individual enterprises can also take specific actions or adopt specific policies to target women inclusion specifically, by hiring more women at the company level (e.g. M-Auto in India) and/or by targeting female customers (e.g. SMV in India). A higher share of women in the transport workforce is a critical step towards more inclusive transport systems. Indeed, a greater representation of women in driver-based businesses can improve the perception of safety and equality for women in public spaces, which can reinforce a sense of safety for female passengers and help counter stereotypes of “men’s work” vs. “women’s work” *Bib.38*.

*Sustainable Mobility has a key role to play in the fight against climate change, even if internal-combustion engine (ICE) solutions will be needed in the short-term*

Over the last 3 decades, the growth of transport-related GHG emissions occurred mainly in developing countries due to demographic growth, with the trend expected to continue

The majority of the increase of transport-related CO<sub>2</sub> emissions was generated in non-OECD countries (see part 1), with their share growing from 31% in 1990 to 56% in 2016. This trend is expected to be exacerbated further over the next decade, leading transport to account for a growing share of non-OECD countries' CO<sub>2</sub> emissions with an estimated growth of 2% annually.

200%



Between 1990 and 2016, transport-related CO<sub>2</sub> emissions increased by 200% in developing countries, while the increase was 30% in OECD countries *Bib.1*

To understand the source of this steep increase in transport-related CO<sub>2</sub> emissions in developing countries, two complementary macroeconomic effects should be noted:

1. Demographic development: the population of developing countries has grown over 50% since 1990. The need for individual and collective motorized transport solutions as well as the associated transport infrastructure can be expected to develop accordingly.
2. GDP growth: As the GDP in developing countries has grown by close to 800% since 1990, infrastructure and vehicle fleet have been catching up to the new economic possibilities.

The increase of transport-related CO<sub>2</sub> emissions in developing countries is thus not only based on an increased number of people requiring transport solutions, but also on the availability of better

transport solutions and increasing means to provide them. As a result, it can be expected that the share of transport in overall CO<sub>2</sub> emissions remains stable at 30% or decreases in OECD countries while it rises above 16% in non-OECD countries *Bib.39, Bib.40*.

In addition to GHG emissions, small particles emitted from combustion engines are important contributors to degrading air quality, especially in densely populated urban areas in developing countries, affecting not only the environment, but posing a significant health risk for the inhabitants. The rate of cities not meeting WHO air pollution limits is almost twice as high in developing countries, than in high-income countries.

98%



In developing countries, 98% of cities with more than 100,000 inhabitants do not meet WHO air pollution limits *Bib.45*

With the knowledge of this challenge, investment in Sustainable Mobility is today largely driven by concern for its environmental impact

For many impact investors, decreasing the negative environmental impact is considered a priority for the Sustainable Mobility sector. The investors' survey conducted for the purpose of this report shows that 50% of respondents consider a reduced negative environmental impact to be a necessary criterion for a mobility enterprise to be considered 'sustainable' at all. Most of these investors would not pursue an investment opportunity that relies on combustion engines, even if the enterprise generates other positive impacts.

50%



In 2019, the French DFI Agence Française de Développement (AFD) targeted 50% of their new financing in the transport and mobility sector towards enterprises with a "co-benefit for climate" and "almost all of urban mobility financing targeted projects with a co-benefit for climate".

**The good news is a large part of Sustainable Mobility solutions are helping decrease further GHG emissions of the transportation sector and fight climate change**

Most Sustainable Mobility solutions have a core and direct positive impact on climate change, even if they do not rely directly on “green mobility” solutions such as electric vehicles. Indeed they can decrease the negative environmental impact of transport through four levers:

1. Cleaner vehicles and infrastructure replacing more polluting options.
2. Infrastructure and mobility services enabling non-motorized transport solutions.
3. Improved traffic circulation resulting in shorter trips.
4. Reducing the number of trips through reduced individual transport (collective transport solutions, car sharing, etc.)<sup>4</sup>.

4 Several SDGs are related to reducing climate change and preserving the environment, however it remains challenging to make a direct link. SDGs targets that have been identified in this study as related to climate change in the context of Sustainable Mobility with a direct impact are

*\_7.2 Increase substantially the share of renewable energy in the global energy mix.*

*\_7.3 Increase substantially the global rate of improvement in energy efficiency.*

*\_8.4 Improve global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation.*

*\_9.4 Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of environmentally sound technologies.*

*\_11.6 Reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management.*

*\_12.4 Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, and significantly reduce their release to air, water and soil.*

These targets largely refer to energy efficiency, resource efficiency or the reduction of pollutants. However, these targets fail to establish a direct link to the positive impact that Sustainable Mobility solutions can have on climate change, which is the reduction of GHG emissions.



**400 tons**

avoided CO<sub>2</sub>-equivalent emission resulting from the use of Waterbus's ferries



**-95%**

hydrocarbons emitted per passenger compared to smallest commercial outboards on Lake Victoria



**1.8m**

passengers of Waterbus benefit from improved air quality during transport



- Populations around the lake suffer from a lack of convenient, safe and clean transportation infrastructure.
- In contrast to a traditional outboard engines that propel one canoe with several passengers, the technological configuration of Waterbus ferries and their engines leads to a significant reduction in carbon emissions and preserves air quality for passengers.

**WATER BUS**

Figure 20

**Waterbus' impact on climate change**

Waterbus builds and operates fuel-efficient catamaran ferries transporting passenger and goods on Lake Victoria (Uganda, Kenya), linking the residents of East Africa's islands and other water-isolated communities to the larger towns on the mainland.

Waterbus replaces wooden canoes and small polluting boats that were the cause of many drownings and hippo attacks on Lake Victoria, leading to improved safety as well as significantly reduced carbon emissions and preserved air quality for passengers.



Established in 2005 and SF partner since 2016



Kenya



52 employees



Growth / \$2.7 million raised (2020)



\$711 thousand revenue (FY2019)



1.8 million passengers (2020)

**TYPES OF SOLUTIONS**

Cleaner vehicles

Mass-movement system

Connecting isolated communities

*Cleaner vehicles and infrastructure replacing more polluting options*

The most commonly recognized solution when talking about **cleaner vehicles and infrastructure** reducing GHG emissions of transport is the replacement of combustion engines by electric vehicles or vessels. Electric mobility produces no direct GHG emissions and if paired with renewable electricity, leads to significantly less overall GHG emissions as well as reduced small particle and noise pollution (e.g. SMV Green solutions in India, see **Figure 8**, Ampersand in Rwanda, see **Figure 15**).

However, more fuel-efficient combustion engine solutions can also replace more polluting alternatives (e.g. Waterbus, operating fuel-efficient catamaran ferries on Lake Victoria, Kenya, replacing small boats with outboard engines). Alternative fuel types such as biofuels or hydrogen<sup>5</sup> are still under development and have the potential to replace fossil fuels in the future.

*Infrastructure and services enabling non-motorized mobility solutions*

**Infrastructure** projects, when making room for or even targeting non-motorized mobility solutions can help reduce GHG emissions, by limiting the increase of motorized mobility (e.g. bicycle lanes providing a safe space for cyclists who are vulnerable to road traffic accidents). This infrastructure can enable non-motorized mobility solutions which are often neglected in urban planning as they are perceived as inconvenient and unsafe, or simply less of a priority than motorized mobility.

If adequate infrastructure counteracts issues, solutions such as bike shops or bike **sharing** solutions that offer rentals from numerous locations around a city can develop as an alternative to traditional motorized transportation that is not only reducing GHG emissions but also accessible at a low cost.

<sup>5</sup> The costs for hydrogen mobility being still very high currently, development of hydrogen mobility is more likely to take place in developed countries first and in developing countries only in more than 10 years.

*Software solutions providing traffic coordination, live road congestion insights and mapping of public transport solutions and emissions measurement*

Software solutions that can guide the traffic, i.e. **navigation and mapping tools** and **traffic coordinating solutions** are important tools to reduce GHG emissions from ICE. They regulate traffic, reducing congestion, where drivers wait with their engines running, as well as decreasing the length of trips, e.g. where a delivery is made on the shortest route or where a motorbike taxi does not drive around waiting for the next passenger, but instead goes straight to the pick-up location of their next customer. This effect can, of course, only be expected if the number of vehicles remains the same, while an increased number of vehicles may counteract the effect.

**Emission measurement** solutions enable the control of emissions through public regulation as well as engaging companies to work towards reducing their emissions on a voluntary basis, as the globally active Smart Freight centre (see **Figure 21**) which offers a globally recognized framework for harmonized calculation and reporting of the logistics GHG footprint across the multimodal supply chain..



**Figure 21**

## Smart Freight Centre's impact on climate change

Smart Freight Centre, the only global NGO working exclusively on improving freight transport, develops measurement frameworks and best practices for multinational freight companies to reduce their carbon emissions and improve fuel efficiency, with a goal to halve freight-related carbon emissions of 100 companies by 2030.

They collaborate with existing initiatives, international institutions, partner organisations and experts worldwide and have created the GLEC Framework as the only globally recognized methodology for calculating and reporting logistics GHG emissions by companies across the multi-modal supply chain.



Established in 2013 and SF partner since 2013



Global



12 employees



20+ expert advisory council



50+ Partners in Global Logistics Emissions Council

### 3 Million tons

of CO<sub>2</sub> were avoided between 2016-2018 by companies that adopted their framework



### 40+

multinationals are using the GLEC Framework to calculate and report global logistics emissions consistently



### 116

Road freight carriers take concrete action with trained fleet managers and action plans for fuel efficiency



### 80+

Smart Transport Managers were trained in China since 2017



— Smart Freight Centre brought the global logistics community together & formed two councils: Global Logistics Emissions Council (GLEC) and the Smart Truck Fleet Management Council.

— The Smart Freight Procurement Framework, 2 partners, helps buyers of freight services make zero-emissions freight an integrated part of their procurement practices and was released in summer 2019.

— In China, Smart Freight Centre brought multinational companies together with their carriers, the government and other stakeholders in a series of Smart Freight Forum workshops to drive action and supportive policy.

### Shared mobility solutions that replace individual transport

Any solution that replaces a trip taken individually by a shared trip will reduce the GHG emissions of transport per passenger and trip (if additional trips are undertaken after starting to use a solution that aggregates trips, that implies an increase of total trips taken). An efficient way are **mass movement** systems such as public transport, but also van pooling services, often called matatus, operating without official routes. Other solutions that can reduce individual trips is **shared mobility**, such as ride-sharing solutions, where private users offer to take along other people in exchange for a compensation for gas and vehicle use.

In addition to reducing the number of trips taken, the replacement of individual transport also reduces congestion as fewer vehicles are on the roads, subsequently reducing the GHG emissions of vehicles that are stuck in traffic and improving efficiency.

**While they have many other positive impacts, some Sustainable Mobility solutions do not contribute specifically to fight against climate change, and some of them might even generate negative environmental externalities**

A positive environmental impact can be expected from a large share of Sustainable Mobility enterprises. However, it is possible that certain Sustainable Mobility enterprises do not provide any positive environmental impact or even generate negative externalities. Mobility can generate different types of pollution (GHG emissions, small particles, light and noise) that can disturb entire ecosystems if not properly managed. Negative externalities that can be attributed to the transport sector can in some cases be displaced to other sectors, where they originally occur.

The production of batteries for electric vehicles can in some cases be based on fossil fuels and the underlying industrial processes are energy intensive and consume significant amounts of water, metals and other raw materials and end-of-life processes for batteries need to be properly managed. The impact of electric mobility also depends on the energy mix it is powered by. In some cases, it may be powered purely by renewable energies, e.g. through a local mini-grid. However, in other cases, dependency on grid electricity may mean that it is using the local electricity mix, which is often based on fossil fuels.

However, the true impact of a solution needs to be determined on a case-by-case basis and cannot be generalized, as it depends strongly on the nature of each specific solution and the local context. Furthermore, solutions that have a negative environmental impact now (e.g. solutions relying on ICE vehicles, which represent the large majority of vehicles today in developing countries) may pave the road to achieving a positive impact in the future.

**The improving economic viability of low-carbon mobility solutions will provide a route to an overall greener Sustainable Mobility sector**

While many of the Sustainable Mobility enterprises today rely on ICE, there are opportunities for them to switch to low-carbon solutions. Mobility service providers and asset-based enterprises (vehicles and infrastructure) that currently rely on ICE can change towards electric vehicles according to their business model: urban ride-hailing and delivery services are already being developed with electric vehicles (e.g. SMV Green solutions in India) or transitioning from ICE solutions towards electric vehicles (MAX in Nigeria), some offering solar charging already (e.g. Ampersand in Rwanda). These early adopters are setting an example for other providers to follow, proving that the business model can be attractive. With successful e-mobility businesses in the market, providers might consider retrofitting ICE-based vehicles with batteries, converting existing vehicles and further driving e-mobility. This transition to low-carbon mobility solutions is possible for both individual and mass transport systems in urban and rural locations, as well as for the transportation of goods.

The example of Waterbus (Figure 22), first transitioning from traditional canoes to ferries as a mass transport solution, which then enabled the transition of first vessels to a hybrid solar-diesel solution shows how ICE-based solutions can already significantly reduce emissions compared to inefficient solutions that are in place, and pave the road to cleaner solutions in the long run.

**Figure 22**  
**Waterbus – Evolution from traditional canoes via diesel ferries towards a hybrid solar-diesel solution**

**Canoes with outboard engine**



Traditionally, passengers moved across lake Victoria in small canoes with outboard engines. These boats transport ~15-45 passengers at a time

Total		
	CO2 emissions [kg/PAX]	0.52
	Fuel loss [L/PAX/h]	0.018-0.026

**Waterbus with diesel engine**



Waterbus has introduced ferries that offer mass transport across lake Victoria with water-cooled inboard engines, decreasing not only CO2 but also water pollution due to fuel

		Total	Reduction <sup>1</sup>
	CO2 emissions [kg/PAX]	0.21	-59%
	Fuel loss [L/PAX/h]	0.001	-95%

**Waterbus with hybrid solar-diesel**



Waterbus is proposing a hybrid solar-diesel drive which will further reduce fuel consumption, decreasing both the cost, as fuel makes up 50% of operation costs, and CO2 emissions

		Total	Reduction <sup>1</sup>
	CO2 emissions [kg/PAX]	0.17	-67%
	Fuel loss [L/PAX/h]	0.001	-95%

<sup>1</sup> Reduction compared to traditional outboard engine canoes

Ride-hailing as well as delivery services are often linked with a **vehicle finance service**. Indeed, financing solutions are independent from the fuel type and can be developed with different kinds of fuels or vehicles, depending on the local context. Financing solutions can help asset owners transition from ICE to other solutions that require a larger upfront investment, primarily electric vehicles. They can support adoption of **cleaner vehicles and infrastructure** where possible, while also supporting other solutions so as to include customers, that might not be able to adopt e.g. electric vehicles, due to geographic location or other reasons. The Ugandan enterprise Tugende, providing a vehicle financing solution for traditional bodas and other assets, has recently developed plans for electric motorcycle financing, paving the road to cleaner vehicles in East Africa (see Case study–Tugende’s impact on poverty alleviation, economic growth and health and safety (Figure 23).

**Technology and software enterprises** are largely independent from the type of vehicle and in many cases already contribute to a more efficient transport system. As certain solutions can be expected to reduce emissions through the improved guidance of traffic, this effect will likely be paired in the future with cleaner vehicles emitting less GHG, serving as an example for the impact of Sustainable Mobility being amplified when different solutions work together.

Collectively these solutions lead to a lower carbon mobility sector:

- Motorized transport is switched to clean vehicles, e.g. electric vehicles for cars and motorcycles or hydrogen for heavy-duty vehicles.
- Widespread adoption of car sharing solutions where motorized transport is needed
- Non-motorized transport (i.e. soft mobility like walking and cycling) will be enabled by adequate infrastructure like sidewalks, bike lanes or bike sharing stations.
- Public transport will be available and accessible to populations of all income levels and provide transport at affordable rates that corresponds to people’s needs, to prevent the switch to individual transport solutions, especially cars whenever possible.
- The existing traffic, both public as well as individual will be managed through navigation and mapping tools, providing people with up-to-date information on the best solution for their journeys.

If these solutions work together, transport systems can efficiently serve people, enable income generation and improve the lives of the entire population.

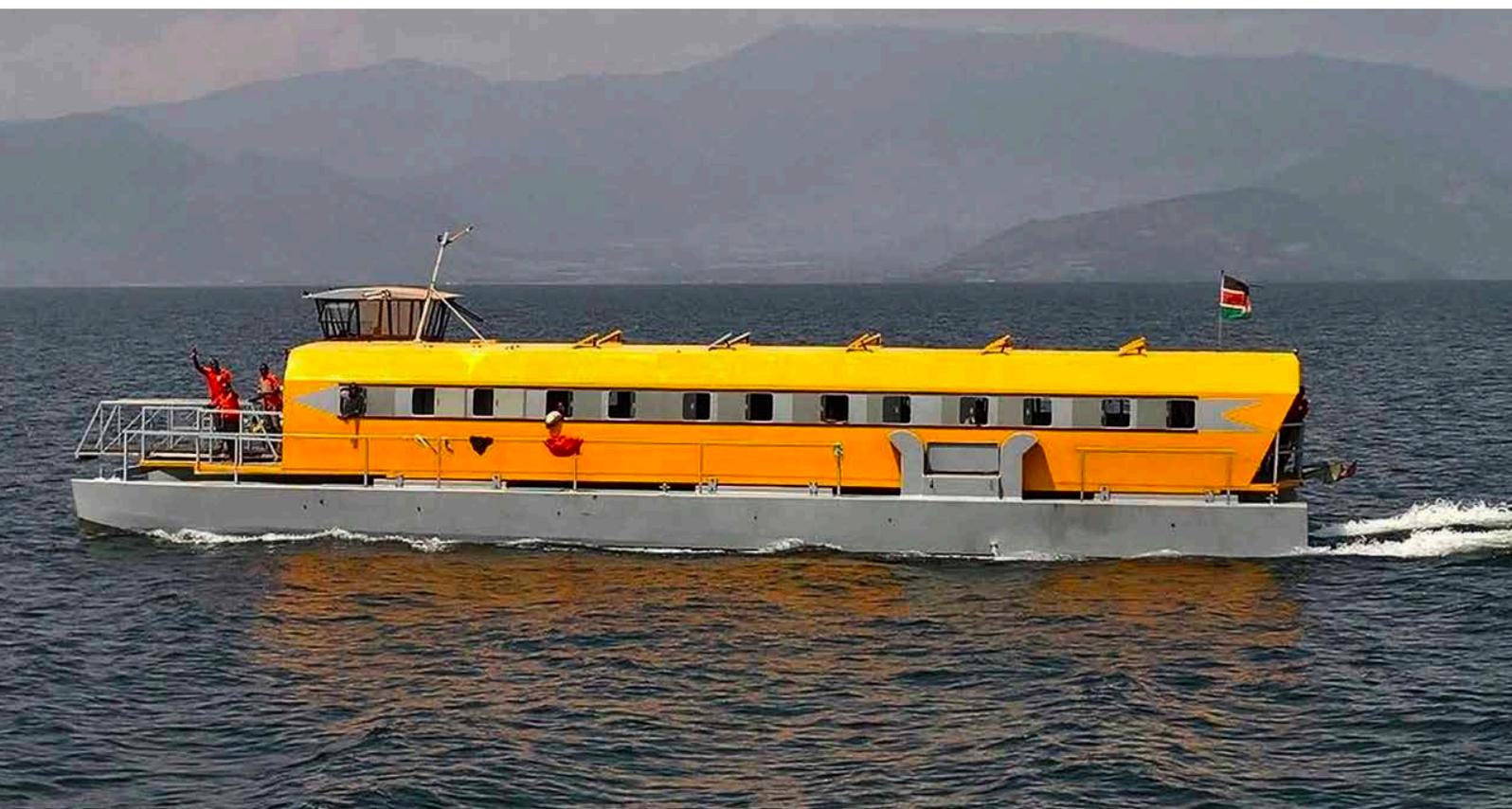
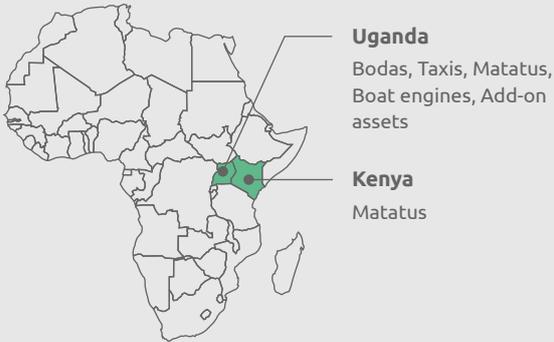


Figure 23

## Tugende's impact on poverty alleviation, economic growth and health and safety



### Enabling vehicle ownership among the urban poor

Tugende provides a lease-to-own boda (motorcycle taxi) service, providing financing, HSSE equipment and training, financial literacy, insurance, boda maintenance and GPS relocation support to drivers, creating a path to asset ownership for low income boda drivers in the informal transportation sector. While motorcycle taxis are the most common product financed by Tugende, they have expanded their product portfolio to offer "micro-assets", e.g. sewing machines, laptops, mobile phones, etc. to existing customers in good standing. Tugende will further expand its product portfolio to include other productive use assets portfolio (e.g. milling machines, small scale industrial equipment, etc.) in the near to mid-term.

In order to generate future opportunities for their clients, Tugende creates digital credit profiles and scores for their clients, who build up credit history, improving security and cost-effectiveness for future loans. Once clients have built a credit history they have the possibility to acquire additional assets that can help generate income like laptops, sewing machines or shop fridges.



### Poverty alleviation

**100%**

annual income increase for Tugende's customers (+ \$840 according to 2018 survey)



**55%**

of Tugende's customers used their income increase to invest in business, land, agriculture or new houses



### Economic growth and formalisation of businesses

**22,000 jobs created**

by 2019, enabling customers to be independent entrepreneurs



**Financial track record**

Drivers built a financial track record that helps them access additional formal financial and economic opportunities



### Health and safety

**Safety**

Driver training, helmets for drivers and passengers and GPS tracking ensure the safety of passengers and drivers



**E-mobility roll-out**

Roll-out of electric motorcycle leasing planned in highly polluted urban areas in Uganda

### Driving impact expanding product range and geographic reach

Tugende was founded in 2012 in Uganda where it currently operates 17 branches, and a successful pilot has since been launched in Kenya where expansion is planned for 2021. A registration has also been filed in Tanzania.

The company's primary revenue stream is from financing income, i.e. principle and interest payments on the asset (currently primarily motorcycles) and passing through fees on helmets, licensing, etc. Financing of other productive assets will help expand Tugende's reach, with assets like sewing machines and farm equipment reaching more women than the male dominated motorcycle taxi sector.

The company is also expanding into clean mobility: Tugende is piloting a partnership with Zembo, an electric motorcycle hardware manufacturer, to finance at least 100 electric motorbikes in Kampala, Uganda. The charging infrastructure for the pilot will be provided by Zembo's existing 8 sites with a mix of grid connected and solar back up charge systems. If the pilot is successful, Tugende could play an important role in bringing e-mobility to East-African cities.

### *Investment potential and commercial scale-up*

With a strong existing asset base, Tugende closed a \$6.3 million Series A investment round in October 2020, including \$4m from Mobility 54, the investment fund for Toyota Tshusho Corporation. With continued plans to expand its existing motorcycle mortgage business, grow its new motor vehicle financing product, pilot e-vehicles and enter new markets in the region, Tugende offers significant growth potential and a means to help reduce the financing gap for micro, small and medium enterprises in sub-Saharan Africa.

### *Enabling drivers' economic development*

Tugende has 23 000 active leases today, enabling their customers to become entrepreneurs and providing them with **decent work and increased income**. The lease of a motorcycle costs roughly the same or even less than renting a motorbike, enabling drivers to invest into and ultimately own their own assets.

Many customers do not only lease one motorcycle as part of their relationship with Tugende, they lease additional vehicles or other assets after having demonstrated their credit worthiness. Multiple leases allow customers to build an asset base that they can then utilise to generate equity for other economic activities, e.g. investing in a business, land or a new house, while continuing

to earn income as a boda driver. Leasing of agricultural and other productive use assets can further help them expand other income opportunities.

### *Improving safety for both drivers and passengers*

Tugende helps to improve driver's **health and safety**, providing safety training, helmets, which are often neglected, GPS tracking and insurance. These measures increase drivers safety in congested urban areas where motorcycle riders are among the most vulnerable road users.

With drivers being provided driving training and being equipped with an additional helmet for their customers, passengers benefit from improved **safety** in a sector, where helmets are often neglected and are not readily available for passengers.

### *Generating positive economic and environmental impact beyond customers*

The support Tugende provides to their customers with boda registration enables drivers to act as a formal business. Building a formal credit history for formerly unbanked drivers and online payments recording the activity of both drivers and passengers drives **economic growth** as it provides them with access to additional financial services and economic opportunities within or outside of Tugende's offering.

The training drivers receive does not only benefit drivers and passengers, but also pedestrians, who are among the most vulnerable to **safety** risks like road traffic accidents. If the number of accidents can be reduced, they will be the primary beneficiaries.

With recent plans to lease electric motorcycles, Tugende will pave the road for the adoption of **cleaner vehicles** in East Africa where electric or alternative fuel vehicles are practically non-existent. This will help to mitigate both GHG emissions contributing to climate change and air pollution, e.g. small particles such as PM2.5 which in Uganda are currently at a level that is five times higher than the WHO guideline *Bib.1*, posing a serious health risk in dense urban areas in Eastern Africa.



3

# Seizing the investment opportunities of Sustainable Mobility in developing countries



Sustainable Mobility requires continued, and increased investment from the full spectrum of investor classes if enterprise solutions are to be scaled effectively in developing countries. Sustainable Mobility can allow a diverse range of investors to meet their impact and return goals, and there remains a need for multiple investors to collectively address the diverse challenges of mobility

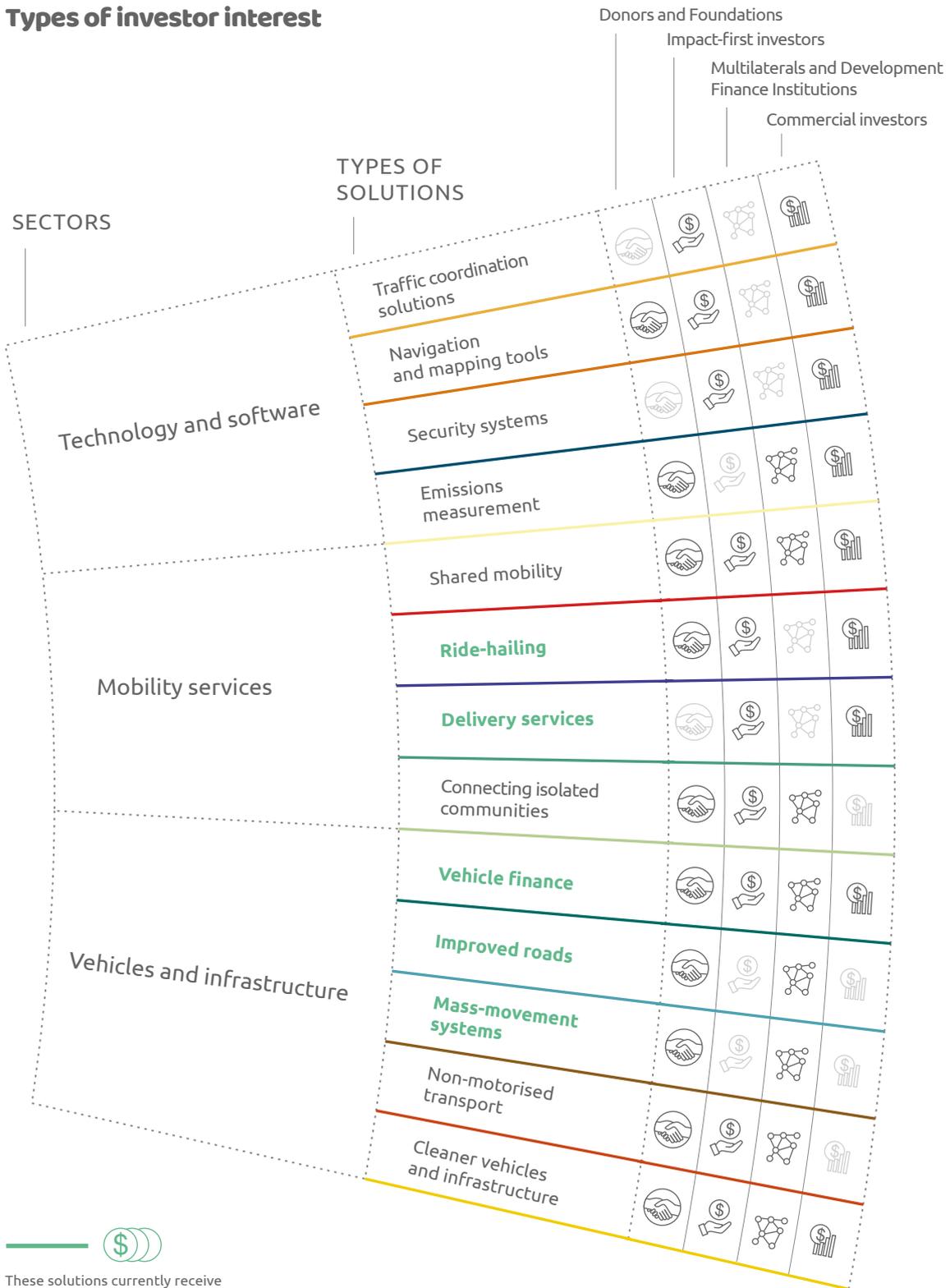
The wide range of Sustainable Mobility solutions and their diverse impacts make the sector a compelling investment opportunity for many types of investors, and a blend of capital is required across the Sustainable Mobility ecosystem if it is to effectively scale.

The relevance of the different types of Sustainable Mobility enterprises for different investors is presented in Figure 24. While the wide range of impacts that different types of Sustainable Mobility enterprises can have is presented in detail in chapter 2, this section highlights to investors the types of Sustainable Mobility investments and the potential value that they can deliver, as well as the need for their specific type of investment in order to help catalyse the sector and the diverse range of enterprise solutions within it.

The Sustainable Mobility sector remains a nascent industry for investors and has received comparatively little investment compared to other impact sectors at an enterprise level. The sector requires significant concessional financing, longer-term patient capital, as well as equity and commercial funding to help both seed and scale enterprises. Fundamental change and collaboration among investors is, however, required in order to effectively mobilise capital into the sector.

Figure 24

**Types of investor interest**



These solutions currently receive the majority of funding in the Sustainable Mobility sector.

Whilst the majority of investors will have a range of impact areas that they focus on, many of which are homogenous across different investor types, the below presents a compelling case of the need for

different investors to participate in the Sustainable Mobility sector, and how Sustainable Mobility can deliver against the impact and return requirements across investor classes.

### Donors and Foundations

Given the early stage nature of the Sustainable Mobility sector, as well as the need to continue to incubate innovative enterprise models that can continue to deliver against multiple SDGs, grant funding remains essential to catalyse the sector and support a range of new business solutions. Across multiple sectors grant funding has played a transformative role to nurture new ideas, individuals and organizations who disrupt the way the world works, and there is a clear need for this in the Sustainable Mobility sector.

Key innovations that have delivered lasting impact would not exist without extensive grant funding, yet few foundations fully leverage this ability to test disruptive solutions or back promising yet unproven business models. For donors (and local governments), businesses who deliver essential services can enhance education and healthcare and spur economic growth in low-income communities and yet early interventions from the public sector have been small in line with uncertainty around the potential of such businesses to deliver lasting public benefit.

Both foundations and donors are required to build investor confidence within the Sustainable Mobility sector, and models of “private-public” partnerships, in which foundations can carry “pioneer risk” and government agencies work to “validate” promising models can both identify and validate new opportunities that can deliver significant public benefit. In a nascent sector such as Sustainable Mobility, where new, innovative business models are critical to support a wide range of social and environmental challenges, increased support from both Foundations and Donors is required.

For donors and foundations who are often focused on supporting economic growth, the Sustainable Mobility sector can generate significant impact through;

- Driver based businesses such as **ride-hailing** which enable economic growth through the creation of decent job opportunities, often supported by **navigation and mapping tools**.
- Public transport service providers like Matatu services or logistics companies (**mass-movement systems**) as well as **improved infrastructure like roads, access pathways and bridges, shared mobility** like private

ride-sharing or **non-motorized mobility** like public bicycle sharing and **transport services connecting isolated communities** where few and mostly informal solutions exist. Those solutions, as they improve access to mobility especially to marginalized communities, have a strong catalyst effect in terms of access to economic opportunities.

- **Vehicle finance**, enabling vehicle ownership among the bottom of the pyramid, which, in addition can lead to job creation in the field of driver bases businesses. Other software-based solutions with digital payment enhance customers’ access to financial services through payment traceability.
- Solutions that can help decrease the environmental impact of mobility and improve air quality like **emissions measurement and cleaner vehicles and infrastructure**.

### SIEMENS | Stiftung

#### Investor zoom: Siemens Stiftung

*As a non-profit foundation, Siemens Stiftung promotes sustainable social development, which is crucially dependent on access to basic services, high-quality education, and an understanding of culture. Siemens Stiftung’s efforts are focused on the feasibility of electric mobility for small businesses, trade, and agriculture in rural Africa. Its efforts create conditions for their technologies to enter the pilot phase while also providing a testing ground for new business models, such as loan and leasing methods.*

*Siemens Stiftung conduct data analysis and studies during each stage of the process and connect start-ups with partners for financing and cooperation. In rural Western Kenya, they operate their own e-mobility incubation programme (WeTu) with a network of different user groups, public sector stakeholders, and local start-ups providing e-mobility technology solutions for production and charging infrastructure with a direct impact on the labour market. They also work with and provide support directly to various e-mobility enterprises including Opibus, Bodawerk, anywhere. berlin, Asobo, Evum Motors and GreenPack.*

### Impact-first investors

Similar to donors, a range of impact focused investors are required to provide critical early-stage capital to the Sustainable Mobility sector. As with all early stage enterprises, but particularly within Sustainable Mobility where there is often a greater requirement for longer-term, asset-backed financing for a number of the enterprise solutions, the requirement for long-term patient capital is critical to help support businesses

Impact-first investors ultimately want a steady flow of viable early-stage enterprises which can deliver outsized development outcomes at scale, however given the inherent risk and uncertainty involved in pioneering such models, and the fact that in their stable state they may still be marginal return businesses, some combination of grant funding and long-term patient capital will typically be required to unlock investment on commercial terms.

Impact investors are therefore required to play a vital role in deploying early-stage, patient capital alongside grant funding to mitigate risk and enhance financial and social and environmental return, as well as to collaborate to create and scale specialist financial vehicles that deploy appropriate funding to inclusive Sustainable Mobility businesses at different stages of growth.

For impact-first investors, Sustainable Mobility solutions can provide a range of investable opportunities, whether it be through health and safety, gender, climate, or poverty alleviation.

- **Cleaner vehicles and infrastructure**, be it electric vehicles or vehicles based on more fuel efficient ICE, reducing GHG emissions.
- **Shared mobility** solutions (e.g. ride-sharing solutions, where private users offer to take along other people in exchange for a compensation for gas and vehicle use), which reduce the number of individual trips, hence the number of cars on the road and consequently air pollution and GHG emissions, reducing the contribution of mobility to climate change and improving public health.
- **Navigation and mapping tools and traffic coordination solutions** like platform based agribusiness logistics companies that improve traffic efficiency and as a result emissions per trip and road safety.

- **Ride hailing or delivery services**, which play an important role in poverty alleviation, creating job opportunities for low-income populations or employing women as a result of specific company policies.
- Passenger transport (**ride hailing** or **mass-movement**) deploying **security systems** (e.g. GPS, cameras) that can protect both passengers and drivers in case of emergency.
- Enterprises providing mobility that is accessible to the poorest, providing transparency, stability and a better utilization of vehicles, (e.g. **ride-hailing** or **mass-movement**) which may allow to lower costs in the long run, but also **shared mobility** which can reduce the cost of transport while offering time savings and improved safety compared to walking.
- **Vehicle finance** solutions, enabling vehicle ownership (often motorcycles) by providing access to financial institutions and microfinance both for private use and income generation.
- **Transport services connecting isolated communities** to larger towns, be it on land or on water, where few and largely informal and inefficient options existed before and **non-motorized transport**. These solutions have the potential to significantly improve mobility for low-income populations.

### dob equity

#### Investor zoom: DOB Equity

*DOB Equity invest in businesses that positively contribute to a more social and sustainable society and deliver long-term profitability. They work with entrepreneurs to mitigate potential risks related to environmental, social and governance matters, whilst creating value and social impact for the company and its communities. DOB Equity is an evergreen fund with all proceeds from investments being reinvested, making DOB Equity a true long-term growth partner for its portfolio companies. DOB Equity invest across multiple sectors, and have made a number of investments in the Sustainable Mobility sector including Waterbus, Senny and Twiga.*



### Multilaterals and Development Finance Institutions

Multilateral banks, such as the World Bank, IFC and the African Development Bank, and national development finance institutions (DFIs) including the UK's CDC or Germany's KfW, bring significant financial resources that have the ability to support key sectors and fuel sustainable long-term growth in emerging markets.

In 2018 alone, the world's six largest multilateral banks deployed \$43 billion to support climate finance in low- and middle-income countries. The goal of these organizations is to leverage private finance into areas or sectors which can deliver greatest public value. To put this important scaling power into perspective, private climate financing totalled \$39.9 billion in 2018 *Bib.41*.

Development banks who commit to inclusive businesses bring legitimacy that draws commercial investment far more quickly than impact investors alone, leading to the amplification effect that is needed to scale a nascent sector such as Sustainable Mobility. For a number of Sustainable Mobility business models, where significant infrastructure or asset-based investment is required to effectively scale solutions that provide long-term public benefit, the role these funders play is vital alongside impact investors and foundations—not to mention the potential symbiotic relationship that earlier stage funders can play in acting to offset risk for development banks as well as better understanding of the markets.

- **Cleaner vehicles and infrastructure**, be it electric vehicles or vehicles based on more fuel efficient ICE, **mass-movement systems** (especially public transport) and **improved roads and infrastructure** and certain types of non-motorized transport (e.g. bicycle sharing) require significant infrastructure finance, which impact investors often are not able to provide.
- **Shared mobility and emissions measurement solutions** which have the potential to contribute to reduce emissions and improve air quality especially in urban areas.
- **Vehicle finance solutions and mobility solutions connecting isolated communities** can have a significant impact, but may come with a higher level of financial risk that development finance institutions (DFIs) are able to take on.



#### Investor zoom: UNEP

*UN Environment's Electric Mobility Programme (UNEP) supports developing and transitional countries shift from fossil fuel to electric vehicles. UN Environment is currently active in five African countries working on the introduction of electric two and three wheelers and the e-Mobility programme is currently the only global programme that supports electric mobility for developing and transitional countries. UN Environment is supporting electric two- and three-wheeler projects in eight countries in Africa and Asia, and recently launched a new pilot of 49 electric bikes in Nairobi.*

### Commercial Investors

Whilst still a nascent sector, a number of Sustainable Mobility enterprises have already begun to attract interest from a range of commercial investors, and with the growing sophistication of the social investment sector and the evolution of new tools and structures to direct differentiated capital from a range of social and commercial investors toward inclusive markets, there is growing opportunity to unlock significant investment from commercial sources—made more desirable by the significant social and environmental impact they can unlock across different Sustainable Mobility solutions.

There remains a way to go before widespread commercial capital can be deployed across the Sustainable Mobility sector, however, and as across other more mature impact sectors, innovation in business models, products, services and solutions can allow one to address an underserved market, create large-scale impact and at the same time deliver steady medium-term returns—which should be attractive to institutional investors in particular.

For commercial investors, a number of innovative and tech-based Sustainable Mobility solutions can provide investable opportunities that can offer expected return requirements whilst still delivering significant impact.

- Technology and software-based enterprises such as **traffic coordination** solutions and **navigation and mapping tools**, security systems (e.g. tracking systems, security cameras) and **emissions measurement** (e.g. measuring pollution in cities) as well as **vehicle finance, shared mobility** and **ride-hailing** applications based businesses.
- In addition, **logistics companies** and **delivery services** are seeing a strong uptake, as demand for consumer goods is growing along with the economy and the emergence of middle classes in developing countries.
- In certain emerging economies **cleaner vehicles and infrastructure** can already present interesting opportunities for commercial investors.

Significant capital inflows can already be demonstrated in the logistics and vehicle finance sector, where platform-based solutions have to date received funding from a range of commercial investors.



**Investor zoom: Mobility 54**

*Mobility 54 was established in October 2019 as a mobility-dedicated Corporate Venture Capital (CVC) for Africa under Toyota Tsusho Corp and CFAO group. Mobility 54 invests in partners with innovative technology and services, invests “With Africa For Africa” helping solve the social and industrial challenges in Africa and invests with win-win synergies providing its Pan-Africa footprints and businesses to its partners. Mobility 54’s investment scope includes logistics to help revolutionize operations with digital platform technologies, transport through innovative services and digital transport management, finance through digital technologies and transformative mobility solutions (electrification, mobilitycare etc.). To date Mobility54 have invested in 7 mobility enterprises including Sindy, Tugende, Data Integrated, Moja Ride.*

**Table 1**  
**Recent funding results of mobility enterprises in Africa**



**Kobo** \$20 million (Series A)

**sindy** \$20 million (Series A)

**Twiga** \$30 million (Series B)

**TUGENDE** \$6.3 million (Series A)  
Own your future

Sustainable Mobility can offer significant investment opportunities whatever the impact and return focus of investors, however, requires all investors to work together for the Sustainable Mobility sector to achieve its potential

Sustainable Mobility encompasses a wide range of solutions and as such can be present a compelling opportunity to a variety of investors with different impact and investment return priorities. Due to mobility’s inherent characteristic of being a catalyst and a lever through which people get “access” to a wide range of services, goods and economic opportunities, Sustainable Mobility enterprises can be of interest for almost any type of investor. As detailed in this paper, whether an investor is focused on gender, agriculture and food or energy, more impact driven or focused on commercial returns, they can all find relevant investments in the Sustainable Mobility space.

Sustainable Mobility remains a nascent sector offering many opportunities that are currently under the radar of a large part of the funding and investment ecosystem. However, a joint effort from different types of finance actors is needed to meet the important funding needs and catalyse the growth of the sector across multiple interventions. Grant funding from donors and foundations can help catalyse growth and innovation in the Sustainable Mobility sector through a wide range of solutions that have the ability to foster economic growth. Their commitment needs to be backed by impact-first investors that are able to provide patient capital for solutions with a wide range of impact, that offer innovative opportunities for investors' various investment and impact themes. Multilateral banks and DFIs can bring credibility to the sector to scale private investment in the long term. This is especially important for Sustainable Mobility business models that require significant infrastructure or asset-based investment to effectively scale solutions that provide long-term public benefit. All of these investors can pave the road to increase and broaden the scope of commercial investment, which is currently largely focused on logistics and technology based Sustainable Mobility enterprises.

The diverse range of Sustainable Mobility solutions offer a unique opportunity to investors to pioneer in entering a sector with a significant potential for growth and innovation, that will have multiple and deep social, economic and environmental impacts on their customers, their employees as well as the broader community they touch. Sustainable Mobility solutions can also be complementary and when combined multiply the overall impact generated. This can provide even greater options for investment strategies into the Sustainable Mobility sector, for instance combining investments in several solutions located in the same area and thus able to generate synergies for each type of investor.

It therefore remains imperative that all types of investors understand the diverse range of Sustainable Mobility solutions currently deployed in the market and the importance that they play in helping to solve a multitude of challenges related to reaching the Sustainable Development Goals. Only through all investors working together in order to blend the different types of capital necessary to help both seed and scale these solutions, will the Sustainable Mobility sector be able to reach its potential.



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## CONCLUSION

### The case for impact investment in sustainable mobility in developing countries

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