



Urban
Pathways

STEPS to ACTIONS

FIJI Mobility



Wuppertal
Institut

UN HABITAT
FOR A BETTER URBAN FUTURE

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Environment Programme



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URBAN PATHWAYS

The Urban Pathways project helps delivering on the Paris Agreement and the NDCs in the context of the New Urban Agenda and the Sustainable Development Goals. It has established a facility in close cooperation with other organisations and networks active in this area to support national and local governments to develop action plans and concrete implementation measures to boost low-carbon urban development. This builds on UN-Habitat's role as "a focal point on sustainable urbanisation and human settlements including in the implementation and follow-up and review of the New Urban Agenda". The project develops national action plans and local implementation concepts in key emerging economies with a high mitigation potential. The local implementation concepts are being developed into bankable projects, focusing on the access to urban basic services to create a direct link between climate change mitigation and sustainable development goals.

PROJECT CONCEPT

The project follows a structured approach to boost Low Carbon Plans for urban mobility, energy and waste management services that deliver on the Paris Agreement and the New Urban Agenda. The project works on concrete steps towards a maximum impact with regards to the contribution of urban basic services (mobility, energy and waste management) in cities to global climate change mitigation efforts and sustainable and inclusive urban development. This project makes an active contribution to achieve global climate change targets to a 1.5°C stabilisation pathway by unlocking the global emission reduction potential of urban energy, transport and resource sectors. The project will contribute to a direct emission reduction in the pilot and outreach countries, which will trigger a longer term emission reduction with the aim to replicate this regionally and globally to make a substantial contribution to the overall emission reduction potential.



PROJECT AIMS

This project implements integrated urban services solutions as proposed in the New Urban Agenda providing access to jobs and public services in urban areas, contributing to equality and social coherence and deliver on the Paris Agreement and the Sustainable Development Goals. This is the first dedicated implementation action oriented project, led by UN-Habitat to deliver on inclusive, low-carbon urban services. Securing sustainability and multiplier effect, the project aims to leverage domestic and international funding for the implementation projects that will follow from this initiative.

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Pathways Paper: Steps to Actions

Identify opportunities for further action with a focus on cross-sectoral synergies and policy interactions between the local and national level

Fiji is an island country in the South Pacific Ocean consisting of 330 islands and 500 islets, out of which 110 islands are inhabited (Worldatlas, 2017). The country lies 1,850 km north of Auckland, New Zealand; and 2,800 km north-east of Sydney, Australia (The Commonwealth, 2018). The total land area of Fiji is about 18,700 square kilometres bounded by a huge economic zone of ocean covering 1.3 million square kilometres (Ministry of Strategic Planning, National Development & Statistics, 2014). The country has a total population of 898,760 as at 2016 growing at an annual rate of 0.73%. The share of the urban population in 2016 was estimated to be 54% with an upward growth rate of 1.4% (World Bank, 2018). Fiji's capital, Suva, is the largest metropolitan area; and is located on the Viti Levu island which hosts about one third of the national population. Other large cities in Fiji include: Lautoka, Nadi, Labasa, Ba and Levuka. The country's economic performance over the last decades has been oscillating due to global economic and financial shocks and natural disasters (Republic of Fiji, 2015). The Gross Domestic Product (GDP) of Fiji was projected at 4.7 Billion USD in 2016 with a growth rate of 0.3% and a GDP per capita of 5,233 USD (World Bank, 2018). As a country whose economy has experienced unstable growth as a result of natural shocks possibly caused by climate change, Fiji has committed to promoting a sustainable development that inures to the general wellbeing of its citizens.



Overview: Transportation in the City of Suva

Suva is the capital of Fiji and the largest metropolitan area. The city is located on the Viti Levu island which hosts about one third of the national population. The 2014 population of Suva is estimated at 182,140 with an annual growth rate of 0.8% (Atlas of Urban Expansion, 2016). According to Phillips and Keen (2016), the urban population of Suva had increased by 5% between the years 2002 and 2010. As the administrative and political capital of Fiji, Suva is experiencing the pressure of rapid urbanization with resultant effects such as unemployment, inadequate socio-economic services and growing formation of informal settlements.

City overview



Transport Policy

Transport Policy:

In order to promote sustainable transportation in Suva, the Fiji Roads Authority in collaboration with relevant national and local stakeholders has formulated the Greater Suva Transportation Strategy with the vision “to have an integrated and sustainable transport system that contributes to an inclusive, prosperous and environmentally responsible region” for the period 2015 to 2030 (Fiji Roads Authority, 2014). The strategy is expected to address the following key issues: traffic congestion, enforcement and regulation, bus infrastructure and routes, quality transport infrastructure, road safety, driver education and awareness (Fiji Roads Authority, 2014). Also, the government of Fiji in partnership with the World Bank is implementing the Transport Infrastructure Investment Project with the objective of improving resilience and safety of land and maritime transport infrastructure in the country (World Bank, 2015).

Transport in Suva:

In Suva public transport provided by buses, mini-buses and taxis forms an integral part of the city's transport system with bus services being the most used. The buses are reported in the Greater Suva Transportation Strategy, as old-aged vehicles which are noisy and emit substantial emissions that are environmentally detrimental to city dwellers. Like many other developing countries, Fiji is experiencing increasing vehicle ownership with a 43% increase in vehicle registration from 2002 to 2012 (Fiji Roads Authority, 2014). The road transport sector in Fiji is under the oversight of the Fiji Road Authority which was established in 2012 by a Government Decree. The Authority has the responsibility to develop all roads used for public transport as well as public jetties. Other stakeholder institutions relevant for the overall development of the transport sector in Fiji include: The Ministry of Finance; the Ministry of Works, Transport and Public Utilities; and the Ministry of Local Government, Urban Development, Housing and Environment (Fiji Roads Authority, 2014).



Pedestrian Zones

Good pedestrian infrastructure improves the safety and comfort of pedestrians and increases their visibility. It helps reduce traffic speed and the likelihood of serious accidents. Improving traffic safety in towns is predominantly a matter of managing speed and implementing safety elements into road design. Appropriate speed is the cornerstone of safety, and wherever the cars often meet vulnerable road users, the speed limit should not exceed 30 km/h. Managing speed in built-up areas then typically comprises of engineering measures that calm traffic, supported by public education.

Adjusting the design of a road reduces speeds and makes walking more comfortable for pedestrians. Measures include:

- **narrowing carriageways**
- **arranging appropriately the proportions of traffic space**
- **suppressing long views of roads**
- **and supporting the impression of the presence of life**

Engineering measures such as:

- **optimising the width of road lanes**
- **installing central islands to protect pedestrians**
- **and islands at town gates**
- **extending pavements; creating small roundabouts**
- **elevating surfaces**

and installing greenery can affect a driver's behaviour psychologically and physically so that they reduce their speed and remain alert.

These structural adjustments have a positive impact not only on traffic safety, but also on the aesthetics and humanisation of public space, in some cases consequently to general safety.

Many towns have introduced various ways to calm traffic in their residential areas. The most popular are "Zone 30" areas, which limit the speed at which cars can travel to 30km/h. Other forms include the "Residential Area" and "Shared Space" concepts, the latter of which is a relatively new concept in managing speed and urban design.

Studies show that the safety benefits of traffic-calming engineering measures and area-wide traffic calming differ considerably. Area-wide measures on average reduce the number of accidents by about 15 % (by 25 % on local roads, and 10 % on main roads). However, sometimes a properly applied, simple engineering measure changes the black spot to a place without accidents.

Beside safety benefits, good pedestrianisation can also prevent crime and improve the comfort of pedestrians. Its ability to reduce noise and improve the aesthetics of public space contributes to quality of life of local residents, and in some cases, increases the price of nearby real estate.

Finances

Fiji can apply pedestrian-friendly measures separately or in various combinations, ways and extents according to a municipality's specific situation, needs and financial possibilities. The technical and financial demands of the measures, however, differ considerably.

For example, applying a basic form of Zone 30 is highly effective and low-cost (the costs include only traffic signs at each entrance to the Zone, and small local information campaign). On the other hand, traffic-calming measures that include physically reconstructing a street and use of various structural elements (central islands, elevated surfaces, extended pavements, greenery...) is highly effective as well, but requires more time, effort and financial resources. Prices also differ by chosen material, accessories and initial state of the road. Using a residential area as an example, the cost of 1 m² can range from about €55 – €185, according to type and quality of road surface and street furniture.

Policy/legislation

A basic condition for successful traffic calming and pedestrian-friendly measures is national and municipal policies oriented to the needs of vulnerable road users instead of individual car traffic. Traffic safety must be an integral part of an efficient and sustainable urban traffic system. Municipalities should revise legislation and technical norms so that they support modern forms of arranging streets and public spaces, and enable safe pedestrian traffic and humanising urban space. First, municipalities should consider the proportions of traffic space (the width of road lanes and pavements). Legislation must also define various modern forms of traffic space (e.g. shared space).

Dedicated Bus lane



According to the Greater Suva Transport Strategy (2015-2030) a list of 137 priority projects for the transport sector was developed. One of the identified key projects for the Suva region are **dedicated bus lanes**.

This could involve “dedicated sections of road for use by bus only, including bus jump lanes at intersections to give buses priority over other vehicles”. This measure is meant to use the available road space more efficiently. Public buses are an integral part of Fiji’s transport system, yet the bus fleet tends to be old, noisy and generally outdated. Mobility impaired users are excluded from public transportation, as the bus fleet does not cater for them (Fiji Roads Authority, 2014).

There is a wide range of bus priority measures, and their implementation depends on the problems that a city might have. The main aim is

- **to improve the movement of buses**
- **and protecting access to bus stops.**

Introducing exclusive bus lanes on streets with heavy traffic is one option and can save commuters time.

This also makes:

- **the service more reliable**
- **attracts more passengers**
- **and reduces costs because fewer buses are required to run the service.**

Other related measures include:

- **bus priority signals**
- **own bus lanes**
- **bus-only streets**
- **parking restrictions**
- **and enforcement cameras.**

To have a comprehensive and coherent strategy for Suva, it is important to introduce improvements to public transport together with measures to discourage the use of private vehicles.

Bus priority measures allow some bus services to increase their speeds. In some cases, buses using a mix of exclusive lanes and bus priority signals may reach up to 30 km/h - similar to a metro system.

Bus priority measures in Suva can:

- **reduce travel times by up to 10%**
- **optimizing their services and attracted more passengers.**
- **Exclusive lanes and special signal phases help bus services have more control over times and frequencies.**

To ensure bus priority measures are successful, Suva could apply them with other priority measures, spreading the benefits to wider bus services. If these measures are linked to other improvements - such as:

- **more frequent services**
- **improved waiting facilities**
- **passenger information systems**
- **and even Park-and- ride facilities - the results may be even better.**

In combination, these measures improve the image of bus services and attract more passengers.

Financial

The costs of bus systems are significantly lower than other public transport systems. This applies to most aspects, such as construction, operation and vehicles. Maintenance and fuel represent the highest long-term costs. While public rail can cost from \$20 million to \$180 million per kilometre, bus systems cost between \$1 million to \$10 million. In cities in developing countries, prioritised bus systems are very appealing due to their ability to recover the money invested in them, and because they take a relatively short time to construct.

Applying in Suva

Suva’s population is using buses more frequently than other citizens in urban areas worldwide. This is a great chance for Suva to apply a regulated, well planned bus system, rather than relying on the existing, unplanned bus infrastructure currently available (Fiji Roads Authority, 2014).

Electric Taxis

According to Fiji's Roads Authority, Fiji has an estimated taxi fleet of 7,000 conventionally fueled vehicles. Electric taxis could help reducing CO2 emissions, therefore achieving Fiji's NDC target and bring greater awareness to the possibility of vehicle electrification.

The in Fiji used gasoline- or diesel-powered taxis cause severe problems. They pollute the air, emit greenhouse gases, produce noise and consume increasingly expensive fossil fuels. Electric vehicles (EVs) are a promising alternative that can address these problems and contribute to a sustainable transport system. Taxis are highly visibility in cities and switching the fuel on which they run can raise awareness of how electricity can be an alternative to fossil fuels. They can serve as role models and bring consumers and customers into closer contact with the technology.

EVs offer several advantages compared to gasoline or diesel vehicles:

- Zero exhaust emissions – EVs do not produce any exhaust emissions during operation
- Reduced noise pollution – As EVs generate no propulsion noise, these vehicles are very silent at low speeds (usually below 30 km/h).
- Increased independence from fossil fuels – A variety of resources can produce electricity, including renewable sources (solar, wind, geothermal heat, water).
- Reduced greenhouse gas emissions – EVs can help mitigate the effects of climate change. This potential is highest if the electricity comes from renewable sources.



Technical & financial considerations

Technical & financial considerations

High prices, and immature supporting infrastructure and service facilities are currently stopping the taxi industry from using EVs. Local governments need to actively improve the framework conditions for electric taxis and encourage taxi operators to use them. Due to charging requirements, the daily operating time of electric taxis is usually lower than regular taxis. In addition, the limited battery capacity causes electric taxis to lose some long-distance customers.

As EVs may need up to 8 hours to fully charge, this can be problematic for taxi drivers and businesses as they might need a vehicle to operate 24 hours a day, or according to unpredictable schedules. With taxi drivers only earning money when the vehicle is being used, and because EVs have a limited range, EVs may not be for them. To minimize these disadvantages, it is important to create a good network of quick-charging points. Swapping batteries can also reduce the problem of long charging times, and taxi operators can use the method if their electric taxi fleet consists only of a specific model, or models using the same batteries. Innovative business models can reduce up-front costs for taxi operators. For instance, several vehicle manufacturers can offer the option to buy the vehicle and rent or lease the battery. A third party can also function as battery provider. This business model is recommended especially in the case of battery swapping.

Implementation

Fiji's government can support electric taxis by providing financial incentives such as subsidies or low-cost loans for investments in vehicles or infrastructure. They also need to coordinate the development of charging infrastructure. In China, for example, due to its franchise system for the taxi industry in cities, local governments have a strong control over taxi operations. Initially, cities can also reduce charges or introduce free licenses for electric taxis. Operating taxis in certain areas, which are very sensitive to noise or local air pollution, can be restricted to electric taxis. In the long-term, licenses might be only attributed to EVs.

Electric Two-wheeler in Suva



Electric two-wheelers in Fiji, such as motorcycles, scooters, pedelecs (pedal-assisted electric bikes) and mopeds, can have many positive characteristics compared to their petrol equivalents. In particular, they produce less air pollution and CO2 emissions, and less noise. Also, two-wheelers, when they are used instead of cars, improve overall safety in the city and can increase the mobility of low-income citizens. Smart use of measures can foster an increase in the share of electric two-wheelers in a city amid growing overall numbers of petrol-powered two-wheelers (PTWs).

To help replace fossil-fuelled two-wheelers (or passenger cars) with electric two-wheelers, Suva can write a plan with appropriate goals based on an examination of the role and implications of electric two-wheelers in the entire local transport system.

Measures could include:

- **banning non-electric powered two-wheelers (PTWs)**
- **providing dedicated parking**
- **creating charging areas and separate lanes for electric two-wheelers**
- **and special waiting areas at intersections for motorcycles, or excluding electric two-wheelers from city tolls.**

Conventional two-wheelers contribute substantially to pollution in cities. When switching from conventional to electric two-wheelers emission of hydrocarbons and carbon monoxide can be largely avoided. Promoting electric two-wheelers can help raise awareness and change the behaviour of citizens and tourists in favour of using more sustainable forms of transport. Electric two-wheelers provide a more affordable, and more sustainable, alternative to fossil-fuelled cars, especially for low- and middle income groups.

Financing

In contrast to electric cars, charging electric two-wheelers is relatively easy and requires less infrastructure, and to date a number of small projects have demonstrated that there is potential for electric two-wheelers (in China they are gaining popularity). However, in many cities their benefits are diminished because of insufficient regulations and enforcement, and because they are not integrated properly within the transport system. In addition, cities should develop or improve charging infrastructure and guarantee charging sites.

Increasing the amount of energy that batteries can store is important in allowing electric two-wheelers to travel further distances between charges, although less so than for electric cars. Regulations should be implemented to enforce the use of sustainable lithium batteries instead of the cheaper, short-life sealed lead acid (SLA) batteries. Technological improvements are also necessary to improve the affordability of electric two-wheelers. Electric bicycles have the potential to cause accidents due to their higher speeds (for unaccustomed riders) and traffic regulations and infrastructure not designed with them in mind. Similarly, as they also have no turn indicators or horn and are noiseless, are further points of accident potential. In the past, some cities have implemented isolated measures regarding electric two-wheelers such as an integrated citywide electric two-wheeler plan. Improving the regulation of their use can reduce safety issues. Kuala Lumpur (Malaysia) and Taipei (Taiwan) have reduced accidents by introducing motorcycle lanes and waiting boxes at junctions (Hook and Fabian, 2009).

Electric two-wheelers face the same challenges and have the same benefits for most urban areas. Travel is increasing in cities, and with that typically comes increased congestion, discouraging people from using buses. Where private transport is favoured, two-wheelers provide a sensible alternative to cars, albeit with many negative side-effects (e.g. air pollution and noise). Electric two-wheelers mitigate many of those negative effects, and can be charged with standard electrical outlets, avoiding the need for new and dedicated infrastructure.



Car-Pooling in Suva

The advantage of owning a car means that there is always a vehicle available, but this comes with considerable drawbacks. Besides the initial costs of buying a vehicle, there are running costs, the need for a parking space, driving a car much larger than necessary for the trip, and general upkeep and services.

In the 1990s, private car-sharing schemes started in Europe, promoting the idea of a car used by more than one person, thus utilising it much better, and sharing fixed costs between those involved. It would sometimes even eliminate the need for a second car and reduce the need for parking spaces.



Car-sharing schemes are particularly popular in urban/ semi-urban areas with adequate public transport and short distances between destinations. Depending on the number and types of cars available, users can select vehicles based on the purpose of travel. These grassroots initiatives were normally non-profit and could only work as long as people were willing to organise them in their spare time. Nowadays, larger organisations have taken this over which has also led to a greater availability of different car-sharing schemes. In general, there are two types of car-sharing schemes: floating and stationary. Floating car-sharing (e.g. car- 2go, DriveNow) allows the driver to park the car anywhere within a designated zone so that the next user can pick it up. Mobile applications show the car's location, and allow the next driver to book and find it. With stationary car sharing (e.g. Zipcar), users return vehicles to designated parking areas.

Both systems have their advantages and disadvantages and very often, legal constraints and city regulations will favour one system over the other. Payment can be time- and/or distance-based and apps usually have an option to comment on the status of the car. Payments cover all costs including fuel, making it very easy for customers to calculate the expected fee.

People that use car-sharing services have more flexibility with their choice of transport, and can benefit from the convenience/advantages of a car without having to own one. The availability of cleaner models means that drivers can choose lesser polluting cars and, depending on individual travel patterns, car-sharing can be considerably cheaper than owning a car. It also reduces the pressure on cities to provide more parking spaces. The number of cities having one or more car-sharing scheme available has increased considerably in the past few years, as have the number of companies offering such a service. In some cases, established transport operators offer this as an additional service to customers (e.g. Flinkster by Deutsche Bundes- bahn).

Finances

The financial burden on cities depends on the kind of agreement the city and the car-sharing company make and if infrastructure measures (e.g. for stationary sharing) are necessary. Ideally, as mentioned above, other transport providers would integrate car-sharing and offer it together with their service.

Implementation

Implementation very often depends on coming to an agreement between a car-sharing company and city administration, especially regarding parking policies. Car- sharing is also an opportunity to have more environmentally friendly technology, such as electric vehicles, more widely used by the public. Introducing more cars into a city with scarce parking spaces can initially increase pressure. However, if popular, people will own fewer cars in the future thanks to the availability of car-sharing services. Cities may also have to revise building codes (e.g. requirements for a parking space for each housing unit) to make car-sharing attractive.

Normally a car-sharing organisation approaches a city to agree how to establish a service. Both stationary and floating car-sharing services need decisions on where to park their cars and how they fit in any existing parking regulations. One way to attract car-sharing companies is to create packages that allow them to utilise public space at a reduced or no cost for a certain time.

Electric Bike-Sharing in Suva

Cycling can be a great possible solution for the first mile/last mile connectivity to public transportation. Bike infrastructure is nearly not existent in the city of Suva, leaving cycling as a recreational activity but not encouraging a non-motorized commute in urban areas (Fiji Road Authority, 2014).

As an alternative public transport mode, bike-sharing has in recent times seen rapid growth in most cities of the world. Electric Bike sharing systems allow users to rent a bike at a self-service station and return the bike at any other station near the destination. The systems facilitate quick and convenient movement of users usually on short distances. The implementation of a successful bike-sharing system is dependent on a strategic policy and regulatory framework through a well-planned, coordinated process that involves all necessary stakeholders.

Bike sharing, especially e-bike sharing is rapidly becoming a sustainable transport option with potential benefits of reducing traffic congestion, minimizing energy consumption and consequently reducing environmental pollution and improving the health of city dwellers (Qiu and He, 2018). Another benefit of bike sharing systems is that they are less expensive and quick to roll out (City of Wilmington, 2016).

Some key elements in the implementation of a bike-sharing system include equipment, installation, maintenance and operation; where equipment comprises of bicycles, kiosks, docking pads and card readers; installation consists of a Radio Frequency Identification (RFID) system, card-wipe systems. Operation costs is made up of repair, redistribution and customer services (Heda, 2012).

Financing

Pilot project level (10.000 – 100.000 EUR)

The major cost components in executing a bike sharing system according to Heda (2012) include the cost of equipment, installation and maintenance. The author estimated that the implementation of a typical bike sharing system costs about 30,000 EUR per station (20,000 EUR for equipment including 6 bikes and installation; 10,000 EUR for annual maintenance).

With these cost elements in mind and considering that a pilot deployment of e-bike sharing system in the city of Suva will involve the procurement of e-bikes which are usually more expensive than the regular bicycle, the project can start with:

- The procurement of equipment including 20 e-bikes and installation of solar-powered charging infrastructure at 3 transport stations,
- Establishment of user information systems, and
- Technical capacity building for key stakeholders and operators of charging infrastructure.

Implementation project (3 – 300 million EUR)

The expansion of the system after a successful piloting phase can potentially include the following:

- Procurement of more e-bikes and setting up of more stations,
- Extension of solar-powered charging infrastructure for city-wide coverage, and
- Upgrading of user information systems to support the expanded city coverage.

Barriers

- Inadequate bicycle parking facilities including public charging infrastructure for e-bikes,
- Multiple institutions and organisations involved in promoting cycling activities in Colombian cities; as such the level of coordination and collaboration is usually low, and
- Inadequate expertise in the management and operation of e-bike sharing systems especially at the city level.



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