

ENERGY OFFICE

eThekwini. The green economy hub.

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Project Summary Document: Metro Police Electric Bicycle Pilot Project

Synopsis

The eThekwini Metro Police Electric Bicycles Pilot Project aims to test alternative modes of transport for city departments. Traditional petrol and diesel engines contribute significantly to the overall carbon footprint of the city and electric bicycles could offer an alternative mode of transport that could reduce the number of vehicles in the city.

The Metro Police Electric Bicycles Pilot project has just been launched and sees 10 electric bicycles being used by the

eThekwini Metro police to patrol the Durban Beach front. The bicycles that were procured for this pilot are the Zebike Berg model and are a standard mountain bike frame. They can be ridden off and on road, which is ideal for the beachfront environment. The bicycles include a lithium ion battery that will last for approximately 45 km, depending on the amount of pedalling the cyclist does. The battery supplied power to a small motor which is situated within the back wheel. The bicycles batteries are charged with a standard electricity charger and not by pedalling the bicycle. The bicycle has a throttle, so the cyclist can choose how much electric assistance is required from the motor.



Fig 1: eThekwini Metro Police on Electric Bicycles

This pilot is part of larger program in the city to test the potential of electric bicycles within various departments of the municipality. The municipality has a number of building complexes within a short distance to each other within the city centre. Officials mostly drive between buildings, but could potentially cycle if the appropriate cycles and infrastructure (cycle lanes and bicycle racks) were in place. If there is broad uptake of the electric bicycles by city staff, the municipality will consider a broader public electric bicycle program that could see roll-out with business and the hospitality sector in the city.



Aims of the Project

The aim of this program is to test alternative modes of transport for city departments. Traditional petrol and diesel engines contribute significantly to the overall carbon footprint of the city and electric bicycles could offer an alternative mode of transport that could reduce the number of vehicles in the city.

Problem Statement

The greenhouse gas emissions as a result of transport with the eThekwini Municipal Area (EMA) is significant, at almost more than 4.7 million tonnes CO 2 per annum. The eThekwini Municipality is also well aware of the constraints and pressures being placed upon the existing transport infrastructure by the ever-increasing demand for convenient public transport, and its Integrated Transport Plan attempts to provide some solutions to this difficult problem. Public transport, however, is deemed unsafe and under-utilised, and under present trends traffic volumes are expected to continue to rise in the foreseeable future. Commuters will continue to use road-based vehicles at the expense of more environmentally sound alternatives - until such a time that those alternatives become easier, cheaper and safer. It is therefore essential that alternative modes of transport be investigated in the city.

Arguably one of the cleanest forms of transport is the standard bicycle. However, eThekwini Municipality is one of South Africa's hilliest urban areas with sudden and varied changes in heights and a limited number of flat areas namely the flat central business district and the industrial areas adjacent to the harbour. This proves a challenge for everyday cycling as the hilly areas make it difficult for would-be cyclists to commute to and from work and other destinations.

The technology of the electric bicycles could prove vital in overcoming this challenge as cyclists would find it easier to traverse these hills on an electrically-driven bicycle.

Local Policy Context

The eThekwini Energy Office is tasked with identifying and packaging innovative renewable energy and energy efficient projects for the city of Durban. The broader vision of the Energy Office is to "Position the eThekwini Municipality as the Sustainable Energy Manufacturing Hub for the SADC region". With this in mind, the Energy Office has identified the potential of electric bicycles (e-bicycles) as an energy efficient transport option as well as a potential new market for development in the city.

eThekwini Municipality's Integrated Transport Plan (ITP) for 2005-2010 places emphasis on halting the trend of increased private vehicle usage in the city when compared to the use of public transport. The figures in the ITP show that between 2005 and 2020 there will be a 50% increase in trip by cars and a 3% decrease in public transport. This is a scenario that is seen by the Municipality as unfavourable as increased private car usage will lead to increased carbon emissions but also due to the fact that traffic congestion in the city will result in inefficiency of the city's road networks. The ITP alludes to cycling being a favourable mode of transport for commuters but does not specifically set any targets as it does with regards to public transport. As part of the city's public transport policy, more specifically as a combination to promoting sustainability, the eThekwini Transport Authority (ETA) lists the promotion of non-motorised transport (NMT) including walking and cycling. Apart from this, cycling is also seen as key issue to be addressed in the city's rural transport policy, however, no recommendations or targets are made to this end¹.

¹ eThekwini Municipality Integrated Transport Plan 2005-2010



To date there is no known study on the effectiveness, feasibility or usage of e-bicycles in Durban, nor has there been a publicly available study on the e-bicycle market in Durban. With an exception of a few target areas, the transport network throughout the eThekwini Municipality is geared almost exclusively for motorized vehicles.

Program Design

This Metro Police Pilot project is a part of a broader electric bicycle program which was first initiated by the Energy Office in May 2010 when three electric bicycles were purchased for testing within the Durban city centre. In the first phase of the project three e-bicycles were rotated among city departments and officials with a view to assessing the technical performance of the electric bicycles as well as the users' experiences given the local conditions. One group of city officials that the electric bicycles were tested on was the city's Metro Police Department. The technical report that was produced from the first phase showed that users were responsive to the new bicycle technology but that the city's roads were still not sufficiently configured for electric bicycles (bicycle usage in general). The 3 e-bicycle Pilot showed that electric bicycles could be used for specific groups such as eThekwini staff including the Metro Police.

In mid 2011 the eThekwini Transport Authority (ETA) together with the support of the Energy Office began working with the eThekwini Metro Police to develop the phase two of the Electric Bicycle Project and by late September 2011 ten electric bicycles were procured for exclusive use by the Metro Police on the Durban Beachfront. The project has just begun and the main expected benefits resulting from this project are increased mobility of the police force as well as the "mobile advertisement" for electric bicycles that the police provide on Durban's most famous public space location. The Metro Police Electric Bicycles Pilot Project can be seen as both a testing phase of the broader e-bicycle project as there is scope for more replication throughout other sectors of the city, but also as an implementation phase of the project since it has directly gained from the experience of the 3 e-bicycle Pilot.

Technology

Electric bicycles are a category of two-wheeled bicycles which combines human propulsion with electrical power from a storage battery. The battery may be charged in a standard electrical outlet which is beneficial as no new infrastructure would need to be built. The e-bicycle can take two separate forms, the first is a bicycle style electric bicycle (BSEB) and the second is a scooter style electric bicycle (SSEB). The SSEBs have many of the features of the gasoline-powered scooters e.g. the horn, headlights, brake lights, turn signals and speedometers. Most SSEBs rely on electric power, not human peddling. SSEBs have a 48V battery and 350-500W motors. In China, e-bicycles are regulated to not reach speeds above 20km/h but SSEBs often reach speeds of up to 40km/h. BSEBs are more similar in terms of function and appearance to standard bicycles including functioning pedals. BSEBs typically have 36V batteries with motors of 180-250W².

The types of Electric Bicycles being used by the Metro Police are the Zebike Berg model³. These bikes have an aluminium alloy frame in the style of a standard mountain bike. The motor is 24V/250W with a 24V 10Ah lithium ion battery. The battery is waterproofed. The bicycle has a speed sensor controller (throttle) and a recharging time of between 4-6 hours. The range of the bicycle per charge is 45KM depending on the amount of peddling that takes place.

³ <u>http://zebike.co.za/#panel-10</u>



² Weinart, J., Ma, C., Cherry, C. (2006). The Transition to Electric Bikes in China: History and Key Reasons for Rapid Growth. *Springer Transportation*, Vol. 34(3), pp. 301-318.



Figure 2: Zebike Berg Model

In addition to this, the bicycles and helmets were branded in accordance with the Metro Police logos and branding in order to make the bicycles look recognisable, striking and trendy. As part of the RFQ, Metro Police officers received training on how to use an electric bicycle as well as how to repair a flat tyre.

Impacts

The project area is the Durban Beachfront where 10 electric bicycles patrol up and down the beach promenade. The project is currently in its first month and has thus far been received well by both police officers and the public. More experiences and learning of success and failure will be documented further into the projects life. The project replaces police officers driving vehicles on the beachfront and assists officers that usually walk, to cover greater distances. The electric bicycles also make police officers more mobile, increasing the area they cover (if usually on foot) and allowing access to areas not usually accessible by vehicles. Unlike ordinary self-propelled bicycles, electric bicycles will allow police officers to move faster into an area of suspected criminal activity.



The Metro electric bicycles will use standard grid electricity to be charged, which, in South Africa is predominantly coal based. However the carbon footprint of a single occupancy electric bicycle is significantly lower than a single occupancy petrol or diesel pickup truck (bakkie).

The project is expected to create awareness about electric bicycles mainly through the police officers riding throughout the promenade on a daily basis. This is hoped to captivate the public's imagination who would be curious about the new technology of bicycle.

Lessons Learnt

As the project has just begun the main lessons are yet to be learnt. A detailed assessment of the project is currently being established. The following criteria will be tested:

- 1. Potential for carbon emission reduction
- 2. User friendliness of the bicycle
- 3. Public Interest
- 4. Mobility of bicycles

Way Forward

The project will produce a report detailing the viability of procuring more e-bicycles for the police department as well as documenting lessons that may be replicated for other departments. The next step for the broader electric bicycle project is to identify other areas where electric bicycles may be used as well as to identify user groups who would use them.

