

## Electric Vehicles in Kathmandu

### 1. Introduction

Air pollution is a major problem in Kathmandu, primarily because of the increasing number of vehicles on narrow and congested streets. Over the past five years, the number of vehicles in Kathmandu Valley has been increasing at approximately 17 percent per year. Therefore an efficient transport system with clean vehicles is urgently required to combat Kathmandu's air pollution. In this context, electric vehicles (EV), which use domestic fuel and has zero emission, has proven to be the one of the most suitable means of transportation in Kathmandu, and there is a clear need to further promote these environment friendly vehicles.

EVs were introduced in Kathmandu in 1975 when the Chinese Government set up the trolley bus system along the 13-km route between Tripureswor and Surya-Binayak. After that, the EV movement took off in 1989, when a fuel crisis resulting from the India imposed trade embargo prompted a group of engineers to find an alternative arrangement for transportation. The group called the Electric Vehicle Development Group converted an old car into an EV in 1992.

In 1993, the Global Resources Institute, with assistance from USAID, began a program to develop EVs as a profitable industry. The project converted 7 polluting diesel operated three-wheelers into EVs (Safa Tempos), and successfully operated them as public vehicles for six months. At the end of the pilot project in early 1996, a group of Nepali professionals and entrepreneurs bought the 7 EVs and started the first EV Company, Nepal Electrical Vehicle Industry (NEVI), in

Kathmandu. Currently, over 600 Safa Tempos are plying on the streets of the valley and there are five EV manufacturers.

Following rapid growth in the late 1990s, the EV industry has been unable to grow further in the last few years mainly because of conflicting government policies and high operation costs.

#### **Technical Aspects of EV:**

EV technology is relatively simple. The driving component is a motor with variable speed and power. In a Safa Tempo, a 72-volt pack consisting of 12 deep cycle batteries provides traction power. An electronic controller governs the regime based on which the DC motor operates at variable speed and power.

A fully charged battery set can drive a three-wheeler EV to average distance of 60 kms. Commercial operation of EVs requires at least two sets of batteries and battery charging and exchange stations at convenient points along the routes.

Safa Tempos are manufactured in Kathmandu by assembling imported components from India and US. The main body and chassis is imported from India, while electric components such as the battery, converter, motor, controller, fuel gauge, connector contact, carbon brush etc are imported from the US. The gross vehicle weight of Safa Tempo currently in production is 1000 kg. The chassis can bear the weight of 12 persons and one set of batteries.

#### **Why Kathmandu Needs EVs**

- No emission.
- Low noise level.
- Appropriate for Kathmandu where streets are narrow, traffic speed is low and travel distances are short.
- Batteries can be recycled.
- They use off peak electricity because the batteries are charged at night.
- Tourist attraction
- Government gets revenue from the sale of electricity.
- Being a local industry, it provides jobs to the local people.
- EV technology represents an example of how a hydroelectricity rich country like Nepal can utilize its resources to promote sustainable development and reduce dependence on imported fossil fuels.

## 2. Status of EVs in Nepal

### Safa Tempo

Presently, more than 600 Safa tempos operate in Kathmandu. Most of these are used for public transportation along 17 routes within the city. Kathmandu perhaps has more battery-powered commuter electric vehicles than any other urban centers in the world. Around 100,000 passengers benefit from the service provided by Safa Tempos on a daily basis.

The EV industry in Nepal consists of 5 manufacturers, 37 charging stations and several hundred vehicle-owners who have invested over Rs. 450 million in this industry. However, because Safa Tempo's operating cost is higher than petrol or LPG operated three wheelers, entrepreneurs are struggling to survive. The high operating cost for EVs is mainly due to the high electricity tariff and high cost of batteries.

Safa Tempo owners say they need Rs. 6000-7000 per month for charging and Rs. 10,000 per month for depreciation of the batteries. The batteries are not giving 750 cycles, as they should and the lifetime is now about 18 months. When the batteries are new, the Safa Tempos can get a range of 70 or more kms. But, due to aging, the capacity of the battery is reduced and the Safa Tempo can cover only about 55 kms before the batteries need to be charged again. Poor handling of batteries during charging and operation is the main cause for the poor performance of batteries in many cases.



Now with increased awareness on battery handling practices, problems of poor battery performance are decreasing. This, together with, implementation of systems such as battery banks, will reduce the cost of operating Safa Tempos.

### Trolley Bus

Kathmandu's trolley bus system has witnessed many ups and downs in over 25 years. In the initial days, the trolleys operated quite successfully and were providing services to over 80% of the people travelling between



Bhaktapur and Kathmandu. The buses were making substantial profits till 1990. After that, however, the system became a victim of political interference, over staffing, mismanagement and low employee morale. The operational losses of the unit, which was Rs. 3.85 million in 1996/97, reached 13.13 million in 2000/01 (almost four fold increase in four years). On 18 December 2001, the government shut down the trolley bus system because of high losses. During the period it was closed, the system deteriorated further due to theft and damage of infrastructure such as overhead copper wires.

In August 2003, the government handed over the trolley bus system to the three municipalities along its route, i.e. Kathmandu, Madhyapur Thimi and Bhaktapur. The municipalities got the trolley buses back on the road but only three buses are operating and that too on a short section of the route between Tripureshwor and Koteswor within Kathmandu Metropolitan City.

Due to limited number of buses running on a short route and increased competition from other vehicles, the trolley bus system is currently operating at a loss of about Rs. 200,000 per month. In order to improve the situation, Kathmandu Metropolitan City is now exploring possibilities for involving the private sector in managing and expanding the trolley bus system.

A study done by Winrock International (WI) in May 2002 concluded that revival would require a total investment of Rs. 30.84 million to operate 22 buses. Now Kathmandu Electric Vehicle

Alliance (KEVA) is assisting KMC in developing a business plan to operate the trolley bus in a sustainable manner with participation from the private sector.

In 1999, WI had commissioned another study to evaluate the feasibility of the expansion of the trolley bus system around Ring Road. The study had indicated that the system would be feasible with a little support from the government. WI has also indicated that funds can be mobilized through the Clean Development Mechanism (CDM) to expand the trolley bus system.

### **3. Government Policies**

Government policies are in general favourable towards EVs. Expansion of the trolley bus system has been mentioned in all the Five -Year plans since the 6<sup>th</sup> Plan. The National Transport Policy, 2058 has also mentioned that environment-friendly electric vehicles will be promoted. The government does not charge any Value Added Tax (VAT) and only one percent custom duty for import of Safa Tempo's chassis, engine, motor, battery, and battery charger. Similarly electric vehicles are not required to pay annual vehicle tax.

The government has also included some policies favourable to EVs in its budget for 2003/4. These include exemption of custom duty for the import of trolley buses and parts and reduction of electricity tariff.

Implementation of these policies is, however, a different story. The trolley bus system was never expanded and even the existing system was closed down. Similarly, registration of new Safa Tempos in Kathmandu was stopped while hundreds of diesel buses and other vehicles entered the city every day. The government also created unnecessary problems for private companies wanting to introduce four-wheeler EVs. Similarly imposition of 10% VAT on locally manufactured EV is still a matter of dispute between the manufacturers and the Department of Revenue.

The Ministry of Population and Environment (MoPE), with the assistance of DANIDA is implementing a project to support the EV sector. The project has established a Clean Vehicle Fund to support research, development and

promotion of EVs. In the past, MoPE with the support of DANIDA also provided some soft loan (up to 70%) to establish two battery-charging stations in Lalitpur and to procure 48 EVs for private owners.

### **4. Future Trend**

In the future we can expect to see expansion of the trolley bus system, new types of EVs and improved batteries, provided that the government supports the development of this industry.

Electric Vehicle Association of Nepal (EVAN) is set to introduce a new model of the Safa Tempo, which will be more attractive and efficient than the existing one.

Himalayan Light Foundation (HLF), in collaboration with Lotus Energy has recently modified a milk float from the UK to make a new electric-bus. According to the manufacturers, the electro-bus has a capacity to carry 18-22 passengers (2500 kg). The vehicles can go at a speed of approximately 45 km/hr and can reach this speed faster than a Safa Tempo. Currently HLF has manufactured one Electro Bus, and plans to make two more.



A private company has also tried to import electric cars called "Reva" from India. According to manufacturers, the car has a range of 80 km (fully loaded) per charge and has a running cost of Rs. 1 per km. The cars are currently stuck at the customs due to lack of government support.

In the future, there are also possibilities for introducing electric motorcycles and cycles in Kathmandu. Hybrid vehicles (both diesel/petrol and electricity operated) are also possibilities in the future. With improvements in vehicle and battery technologies, it is expected that electric vehicles will be cheaper and more popular in the future.

## 5. The Way Ahead

Electric vehicles are one of the most suitable means of transportation for Kathmandu Valley. With a little bit of government support the EV industry can flourish and become a model for clean urban transportation. CEN urges the government to take the following steps to promote EVs in Kathmandu:

- Operate the trolley bus between Tripureshwor and Suryabinayak in partnership with the private sector
- Construct the necessary infrastructure to expand the trolley bus system around Ring Road
- Reduce night time tariff on electricity for EVs
- Provide special routes to EVs.
- Reduce custom duty and other tax on EVs
- Support research and development in the field of EVs to make them more competitive and expand niche markets.

## 6. For more information:

**Electric Vehicle Association of Nepal (EVAN)** is an umbrella organization consisting of EV manufacturers Association (EVMAN), Clean Locomotive Entrepreneurs Association of Nepal (CLEAN) and Nepal Electrical Vehicle Charging Association (NEVCA).

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**Environment Sector Program Support (ESPS)** is a Danish government supported project that includes activities to control Kathmandu's air pollution and promotion of EVs.

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**Kathmandu Electric Vehicle Alliance (KEVA)** is a programme initiated by Winrock International, PADCO, San Francisco Clean Cities Coalition, and Electric Drive Transportation Association with the support of USAID to promote EVs in Kathmandu. Its main objectives are to improve competitiveness of EV industry and expand the use of EVs.

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**Himalayan Light Foundation** is involved in manufacturing four-wheeler Electro-Bus as a pilot project.

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