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Electric Drive  
Transportation  
Association

# The Kathmandu Electric Vehicle Alliance (KEVA)

## Final Program Performance Report

(Covering October 1, 2002 through March 31, 2006)

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## I. Purpose of the Program Performance Report

This *Final Program Performance Report* of KEVA is prepared as one of the deliverable under USAID Cooperative Agreement No. 367-A-00-02-00203-00 with PADCO. This report discusses program objectives, its components, major activities undertaken and results achieved by KEVA. It also provides a brief comparison of actual accomplishments with the indicators and targets established for the period. This is done by comparing actual achievement against planned targets. The indicators, targets and performance measures were established by the *KEVA Monitoring and Evaluation (M&E) Plans* prepared during the initial stage (2003) of the KEVA program. Activities, accomplishments and findings reported in this report are compiled from various document already prepared during the program period such as, progress reports, evaluation reports and M&E plans.

## II. Summary of KEVA Objectives

The KEVA is a program supported by USAID's Clean Air Initiative and Asia and Near East Bureau Mission Incentive Fund. The Alliance Partners are Planning and Development Collaborative International (PADCO), Winrock International (WI), the San Francisco Clean Cities Coalition (SFCCC), and Electric Drive Transportation Association (EDTA). The Alliance sought to bring new ideas, new partners, and new resources to support key interventions for the promotion of electric vehicles in Nepal. The Alliance worked with municipalities, His Majesty's Government of Nepal (HMG/N), national and international development agencies and donors, local electric vehicle (EV) industry business groups, EV operators, international and local non-government organizations (INGOs and NGOs) to identify and eliminate constraints to the expansion of the electric-based vehicles for Nepal in general and Katmandu in particular.

KEVA program started in September of 2002 and ended in March 2006. Despite the turbulent political and socioeconomic situation in Nepal during this period, KEVA has been able to operate efficiently and achieve its results, which are discussed below. KEVA has four components; catalyzing an alliance, policy and regulatory dialogue, public awareness and technology & business promotion.

**Objective** of the KEVA is to:

- Identify and eliminate constraints to the wider expansion of the electric vehicle industry and promote the spread of electric vehicle operational systems and technologies.

This objective will contribute to the goal of reduced air pollution and improved health for the residents of Katmandu. However, achievement of goal level results is beyond the manageable interest of KEVA and is not be tracked by the project. The objective level indicator and targets are for overall performance of the program and are used to evaluate at the end of the program, whereas component-level indicators were used as intermediary targets for annual monitoring and evaluation.

## Objective-Level indicators target and end Results

### Expected Result

#### 1. Sustain and/or increase number of in-use electric vehicles in Katmandu

**Baseline:** Less than 600 three-wheelers (*safa tempos*) are operating and numbers are declining.

**Target:** Stabilize EV Industry by at least sustaining the number of three wheelers at 600 and improving the technical and financial operations of EV businesses.

#### Findings of Final Evaluation (March 2006)

- Results from KEVA are good, surpassing the planned target.
- EV industry was stabilized in year two and started to grow again in year three, so that currently there are 635 registered *safa tempos* in Katmandu.
- New technologies were introduced; operations improved and financial returns are now very good; better than those for Diesel microbuses.
- Prospects for expansion of EV industry inside and outside Katmandu Valley are good.

#### 2. Increase variety of EVs in Katmandu, including reactivation of trolley buses.

**Baseline:** Only one type of electric three-wheeler is now used and the existing trolley is not operating.

**Target:** At least one additional type of EV is operating in Katmandu.

#### Findings of Final Evaluation (March 2006):

- Results from KEVA are good, surpassing the planned target.
- Hulas Motors with KEVA support has produced a prototype four-wheeled electric van with a seating capacity of 5-10 depending on the model that will open new market segments to EVs.
- Redesigned *safa tempo* for tourism is being manufactured by Shree Ecovisionary Pvt. Ltd. (SEV) as well as a *safa tempo* with an AC drive system that will boost performance.
- Katmandu-Bhaktapur electric trolley began limited service on September 1 2003, but further policy changes and investment needed for full operations are still being pursued.
- Testing of a new four-wheel EV bus (Electro Bus) continues by Himalayan Life Foundation.

### **III. Comparison of Accomplishments with Targets at component level.**

The four **component strategies/approaches** of program are:

- A. Catalyzing an Alliance:** KEVA identified activities to be undertaken and the corresponding key partners that include government, donors, local NGOs, and EV entrepreneurs. The Alliance was planned to be dynamic and expanding. Communications and outreach to new potential members, as well as cooperation with associated partners became an important responsibility of all the founding partners. The communications and outreach were done both in Nepal and in the US. Effort was made to seek support from US environmental and tourist organizations that operate in Nepal.
- B. Policy and Regulatory Dialogue:** The Government of Nepal's policies regarding the EV sector have been inconsistent and management of facilities has been poor. Support was needed to encourage formulation of positive regulations (to increase coverage and effectiveness), enforcement standards, and develop other forms of non-polluting transportation such as bike routes, walking zones, etc. In particular, support was provided to study the feasibility of new approaches and to stimulate the participation of EV industry associations and public interest groups in policy dialogue for clean air.
- C. Public Awareness and Advocacy:** As identified above, increased awareness of the public, including the introduction of health impacts and related costs of air pollution and the strengthened involvement of EV operators in public debate was needed promote the growth and effectiveness of the EV business. In addition to general public awareness efforts, the Alliance forged partnerships with local NGOs to enhance the existing awareness campaigns, and initiate a process of public discussions on new regulations and policy decisions being made on the transportation sector in Nepal. EV entrepreneurs associations were supported through various activities to have greater collective inputs into public policy.
- D. Technology and Business Promotion:** EV businesses and entrepreneurs were supported to adopt the most appropriate business models for the growth of EV industry. Most of the EV businesses are run in a traditional way. This activity has helped reduce operating costs and consolidate the industry as well as make EV business more viable for institutional financing. Concepts like daily leasing of batteries and cooperative service centers are being implemented. The program also explored technological options to improve the battery life and performance and to adapt EV technology in other vehicles, for example four-wheel mini-buses.

#### **A. Catalyzing Alliance - Alliance Building and Coordination by KEVA Secretariat**

**Objective:** Improve the impacts of KEVA by coordinating and focusing the efforts of multiple partners and donors that support the spread of electric vehicle operational systems and technologies.

##### **Expected Results:**

#### **3. Mobilize broad support for EVs and the EV industry through KEVA with inclusion of additional national, donor agencies and US partners.**

**Baseline:** Scattered support to EV industry, unable to channel resources in a focused manner.

**Target:** Efforts are focused and channeled through KEVA and mechanisms are established to sustain activities.

**Year 1:** at least 4 activities are implemented with joint resources from partners and 50% of total cost is leveraged.

**Program End:** At least 8 activities are implemented with joint resources from partners that meet or exceed leveraged costs planned in the CA with USAID.

#### **4. Establish U.S.-Nepal partner relationships for electric vehicles (government and private) between Nepalese and US partners.**

**Baseline:** No partnerships exist, only a commercial relationship for battery dealers.

**Target:** At least two partner relationships are formed, one government partnership between Nepal municipalities and San Francisco, and one partnership between EVAN and a U.S. association.

**Year 1:** Potential partnerships are identified.

**Program end:** Two partnerships formed, as mentioned in target above.

#### **Findings of Final Evaluation (March 2006)**

- Results from KEVA are good, surpassing the planned target.
- All of KEVA's activities, approximately 20 in each of the three work plans, were conducted with some form of joint resources.
- Joint resources from partners and leveraged costs were two and a half times more than the resources provided by USAID, exceeding the requirements of the Cooperative Agreement with USAID.
- KEVA has engaged local organizations as stakeholders in planning, implementing and reporting on activities through a participatory process appreciated by Government, EV industry, and NGO partners.
- Core KEVA partnership relationships were effective:
  - San Francisco Clean Cities Coalition (SFCCC) with Katmandu Metro City and other organizations;
  - Electric Drive Transportation Association (EDTA) and the Electric Vehicle Association of Nepal (EVAN) and its members; and
  - Winrock International (WI) with the Nepal Coalition for a Clean Environment (CCE) and other NGOs.
- Several KEVA partnership activities with local members were successful. These include:
  - public clean air awareness media campaign with Clean Energy Nepal (CEN);
  - school clean air awareness program with The World Conservation Union (IUCN) and World Health Organization (WHO);
  - *Safa tempo* improvement activities with EVAN and MOPE/ESPS;
  - EV technology improvement program with private sector (EVAN, Hulas Motors, SEV) and Katmandu University, and others
  - tourism sector EV awareness program with Katmandu Environmental Education Project (KEEP) and others;
- The KEVA Secretariat is staffed by PADCO and WI and is located in WI Offices in Baneswhor. The staff is high caliber and has provided efficient project administration and effective coordination.

- PADCO management maximized stakeholder inputs, utilized transparent annual planning, and leveraged partner funds two and a half times the amount provided by USAID.
- WI procurement, small grant and financial management have been good. WI effectively managed the KEVA small grant program and provided 21 grants to NGOs and other local organizations to support the implementation of KEVA activities.
- KEVA use of workshops to get inputs from stakeholders, to review studies, and to disseminate results has been effective and media coverage is good. Public acceptance and support for EVs is growing.

## Summary of Performance:

### A.1: Work Plan Preparation

In the beginning of each year KEVA secretariat organized workshop with the purpose of involving a wide range of stakeholder and partner in the planning of activities for the entire year. All of the workshops were attended by more than forty participants representing more than 30 organizations. These organizations included national & local government, donors, environmental NGOs, academia, EV industry and media. The planning workshops for the second & third year and the final workshop were also useful in getting feedback on the activities carried out by the KEVA program in the previous year. All of the KEVA workshops were attended by wide range of stakeholder and partners.

#### **KEVA Planning Workshops:**

- First Planning Workshop: December 4, 2002
- Second Planning Workshop: November 4, 2003
- Third Planning Workshop: October 7, 2004

#### **Some Special Guest at the Planning Workshop Sessions:**

- Minister of Environment
- Member of National Planning Commission
- Secretary of Ministry of Transport
- Secretary of Ministry of Environment

Preparation leading up to the workshop included separate meetings with local partner and government official. Suggestion and comments from the partner were used to facilitate discussions during the workshop with the partners. The outcome of the workshops was used to draft a Work Plan for further discussion among the alliance partners of KEVA. The partners discussed all of the activities to evaluate the relevance of each activity vis-à-vis the overall program objective. The outcome of these discussions was submitted to USAID for approval.

### A2. KEVA Monitoring

The KEVA Secretariat in Katmandu and PADCO staff in Washington, DC submitted quarterly financial reports and semi annual progress reports throughout the project duration. The semi annual reports were based on activities carried out as per the approved Work Plan.

Annual internal evaluation was carried out at the end of each year. The evaluation reviewed the progress of the activities and monitored the local grants that were used to support KEVA activities. The evaluation process included separate meeting with EV industry representatives, partners and donors to assess how the KEVA program activities were viewed by various stakeholders. These

meeting were also used to discuss future KEVA program activities, which would lead to draft Work Plan for the following year. The evaluation report was included in the KEVA annual report at the end of the year.

### A3. KEVA Alliance Building

An important reason for the success of the KEVA program has been the emphasis on developing strong partnership with local organizations. In the three and half years of the project duration, KEVA secretariat has implemented activities in close coordination with the local environmental organizations, local & national government agencies, EV industry & transport entrepreneurs, financial sector, private sector and the academia. Bringing the right partners to proceed with the activities has been the core strategy to achieve the KEVA program objectives. There are many examples of such coordination with local organization from various sectors throughout this report. Some of these examples are:

#### Establishment of Clean Air Network-Nepal (CNN)

One of the goals of this activity was to help establish a network of organization that will continue to advocate for clean air after the end of the KEVA program. KEVA and partner organization have established Clean Air Network Nepal (CANN). This is a network of professionals involved in air quality management in Nepal, which was formed in 2004. The goal of CANN is to increase the ability of professionals and other interested stakeholders to effectively address the problems of air pollution in Nepal

#### **Some of the examples of KEVA working with partners:**

- World Environment Day exhibition booth: *with Clean Air Network Nepal (CAN-N), Clean Energy Nepal (CEN)*
- School Awareness Programs: *with Clean Energy Nepal, IUCN, WHO, Environmental Camp for Conservation Awareness (ECCA)*
- Awareness Campaign in the Tourism Industry: *with Kathmandu Environmental Education Program (KEEP)*
- Training on operations and maintenance of Electric *with Vehicles: with Kathmandu University and Electric Vehicle Association of Nepal*
- Promoting Owner-Driver business model among electric vehicle operators: *with Bank of Kathmandu (BoK), Vibor Investments, Nepal Electric Vehicle Industry (NEVI)*
- Design and Development of Electric Van in Nepal: *with Hulas Motors Pvt. Ltd., The Swiss Agency for Development and Cooperation (SDC)*

## **B. Policy and Regulatory Dialogue**

**Objective:** Build upon the successes of previous years to change the Government of Nepal's policies towards EVs to encourage the formulation of positive regulations (to increase coverage and effectiveness), the creation of enforcement standards, and the development of multiple forms of non-polluting transportation.

### **Expected Results:**

- 5. Establish understanding of Nepalese Government policies and regulations affecting the EV industries, air pollution and public health and options for change.**

**Baseline:** Little existing analysis of policies and impact on EV industry. This impedes discussion of changes to strengthen the EV industry.

**Target:** Prepare a comprehensive analysis of Nepalese Government policies and guide the development of new regulations to stimulate the EV industry and provide a cleaner environment for Katmandu Valley.

Year 1: A comprehensive analysis of policies related to EVs is completed and disseminated through a policy workshop.

Program end: Policy/regulatory changes are identified and measures are drafted working with appropriate national and local government entities.

**6. Facilitate a dialogue between government and EV stakeholders on policy and regulatory changes to strengthen EV industry, reduce pollution, and improve public health.**

**Baseline:** Only limited ad hoc dialogue is taking place.

**Target:** Dialogue takes place through workshops (1 per year) and meetings (4 per year) and is focused on policy and regulatory changes recommended by KEVA policy studies.

Year 1: Key issues discussed in at least 1 workshop and 4 meetings between stakeholders focusing on key issues, including reactivation of Katmandu – Bhaktapur trolley bus.

Program end: Key issues discussed in at least 1 workshop and 4 meetings annually between stakeholders.

**7. Adoption of policy/regulatory changes by national government and municipalities.**

**Baseline:** Policies and regulations have become less supportive of EV industry since 1999 (EV industry started to experience stagnation and then decline since 1999, due to number of policy changes supportive towards diesel micro busses and LPG three wheelers).

**Target:** Four key national and local policy/regulatory changes are recommended by KEVA and adopted and implemented by Government.

Year 1: Identification of key policy/regulatory issues through policy study, advocacy, and dialogue.

Program end: HMG and/or municipal governments act to adopt and implement at least four key policy changes recommended by KEVA.



### Findings of Final Evaluation (March 06)

- Results from KEVA are good, surpassing the planned target.
- KEVA defined needed policy regulatory changes through two studies; a comprehensive analysis of policies related to EVs in year one, and a cost-benefit analysis of EVs versus Diesel transport in year two.
- KEVA has disseminated its policy analyses through workshops and through its web site.
- The Government made several policy/regulatory changes including opening registration to new EVs in Katmandu Valley and reduce import duties on EVs that have assisted the EV industry.
- KEVA's partnership approach of analysis, stakeholder workshops, and one-on-one meetings with key HMG officials has been an effective approach for advocating policy change.
- KEVA worked closely with members that are analyzing policies.
- KEVA public awareness program helped increase general public support for the EV industry and for policies to support its expansion.
- HMG approved six key policy changes advocated by KEVA, but these were not systematically implemented due to the security, political, and economic uncertainties in Nepal.
- For electric vehicles (*safa tempos*) HMG agreed to (1) remove registration restrictions, (2) provide lower off-peak rates for electricity to charge batteries, and (3) reduce import duties. New vehicles are starting to be registered (35 since KEVA started), but the lower off-peak rates for electricity have not been approved by the Tariffs Commission, and only a few EVs have been imported.
- For electric trolleys, HMG agreed to (4) exempt customs duties for the coming 5 years on the import of electric equipment and vehicles, to (5) revive the Katmandu-Bhaktapur trolley line with the involvement of the private sector, and to (6) study the feasibility of new electric trolley routes, but the trolley was only partially revived and is struggling, and the Ministry of Finance has not requested donors for assistance for funding new electric trolley routes.

### Summary of Performance:

#### B1. Analysis of HMG Policies and Regulations Affecting EVs

KEVA has been using research based advocacy to illustrate the negative impact to the public health and the economy because of air pollution. During the program period KEVA commissioned studies & surveys to illustrate the impact of air pollution. In the first year Nepal Environment and Scientific Services (NESS) reported on the impacts of government policies and regulations that were affecting the electric vehicle industry. The report tabulated all of the policies and regulations introduced by the Nepali government and the provided recommendations, which if implemented would help promote cleaner transportation in Nepal. In the second year Integrated Development Society (IDS) added to the NESS report by analyzing the cost and benefit to the society of promoting EV through government incentive.

#### **KEVA Policy Studies**

- "Analysis of HMG Policies and Regulations Affecting Electrical Vehicles" July 2003, by Nepal Environmental & Scientific Services (NESS).
- "Are Electric Vehicles Viable in Kathmandu? A Cost-Benefit Perspective" July 2004, by Integrated Development Society (IDS).
- "Import Policy Reform for Promoting EVs in Nepal" July 2005, by Dilli Raj Joshi

IDS, which is an independent entity, illustrated that net benefit to the society was positive when the government promotes electric three wheeler, electric trolley buses and electric cars instead of fossil fuel vehicles. In the third year, KEVA commissioned a study to specifically look at import regulations and duties that were the bottleneck to the expansion of electric vehicle industry.

The KEVA secretariat in Katmandu met government official to encourage the formulation and implementation of positive regulations for the expansion of EV industry and services in Nepal. Meeting and submissions of policy recommendations were based in the studies commissioned by KEVA every year. In all of the three years KEVA used reach based advocacy to make recommendation to the government for policy and regulation changes. The government recognized the KEVA studies and responded with several regulatory and fiscal policy changes that should have a positive impact towards the promotion of cleaner transportation.

## B2. KEVA EV Policy Workshop and Policy Dialogue

KEVA program used workshops and meeting with key government officials in various ministries and departments to disseminate finding and recommendations of the policy studies commissioned by KEVA. The workshops and some of meeting were organized just before the annual budget speech by the Ministry of Finance. However the secretariat continued to meet government

### **KEVA Policy Workshops**

- *On June 12, 2003 to discuss the draft of the study titled “Analysis of HMG Policies and Regulations Affecting Electrical Vehicles”*
- *On June 14, 2004 to discuss the draft of the study titled “Are Electric Vehicles Viable in Kathmandu? A Cost-Benefit Perspective”*

### **Policy Meeting with Government**

- Finance Minister, Dr. Prakash Chandra Lohani: June 19, 2003
- Secretary of Ministry of Water Resources, Mr. Kishore Babu Aryal: June, 2003
- Secretary of Ministry of Finance, Mr. Bhanu Prasad Acharya: July 2, 2003
- Secretary of Ministry of Labor and Transport Management, Mr. Narayan Prasad Silwal: July 9, 2003
- Vice Chairman of National Planning Commission, Dr. Shankar Sharma: July 11, 2003
- Secretary of Ministry of Population and Environment, Mr. Mohan Bahadur Karki: February 20, 2004
- Secretary of Ministry of Labor and Transport Management, Mr. Narayan Prasad Silwal: February 24, 2004
- Secretary of Ministry of Finance, Mr Bhanu Prasad Acharya: June 9<sup>th</sup>, 2004
- DG of Department of Transport Management, Mr. Shankar Prasad Dhungana: September 13, 2004
- Finance Minister, Mr. Madhukar Samsheer J.B. Rana: March 18, 2005
- Joint Secretary, Ministry of Finance, Mr. Deep Basnet June 30, 2005.
- Secretary of Ministry of Environment, Dr. Swayambhu Man Amatya June 30, 2005
- Assistance Minister of Finance, Dr. Roop Jyoti: December 2, 2005

### **Positive Policy Impacts**

- Removal of registration restrictions on new Safa Tempos (electric three wheeler) that are used as public transport vehicles: Ministry of Labor and Transport Management & Ministry of Finance
- Reactivation of the Kathmandu Bhaktapur trolley bus services and tax exemption on the import of trolley bus components: Ministry of Labor and Transport Management, Ministry of Finance and Ministry of Local Development
- Exemption duty was increased from 33 % to 50% on import of electric and battery driven passenger cars and delivery vehicles-Ministry of Finance
- Exemption of exercise duty on Safa Tempos: Ministry of Finance
- Endorsement for the proposal to develop a Comprehensive Transport System Management Plan for Kathmandu Valley with the assistance of GEF fund: Ministry of Finance, Ministry of Environment Science and Technology, Ministry of Labor and Transport Management.
- Policy to allow the registration of electric bicycles to operate in Kathmandu: Ministry of Labor and Transport Management

officials throughout the year to influence policy decisions. The workshops were attended by stakeholders (EV industry, government officials, environmental organizations, academia, and media) and the authors of the various policy studies presented the finding to solicit comments from the participants. The final report would incorporate the comments from the workshop participants.

Following the workshop the KEVA secretariat met with key government officials to influence the new policy announcements made by the government. The workshop and the meeting were effective some policy measures that will help the expansion of electric vehicle industry.

### B3. Trolley Expansion Study

A pre-feasibility study to expand the services of the trolley bus in the ring road has been done by Winrock International, an alliance partner of KEVA. The study has estimated that a total of 125 trolley buses would be required to displace the diesel buses and mini buses in the ring road. Based on the business analysis, high upfront investment requirement for the infrastructure is a deterrent to private investors. However the study recommends that some of the project development cost has to be supported by the donor funds to make financial indicators attractive for the private sector investment.

Winrock International (WI), an alliance partner of KEVA has built on the pre-feasibility study from a Clean Development Mechanism (CDM). As part of a Promotion of Renewable Energy and Green House Gas Abatement (PREGA) project, which was funded by the Asian Development Bank, WI developed a This study carried out a pre-feasibility study to replace some of the diesel vehicles in the Katmandu Valley with trolley buses. The study approximates that a total of 128,927 ton CO<sub>2</sub> equivalent can be reduced in the total project lifetime alone (2005 – 2025). The total investment will be: US\$ 15.08 million for imported trolleybuses and US\$ 12.93 million if locally assembled are to be used instead. The project would require an incremental cost of US\$ 2.06 million as an initial lump sum grant in the case of imported trolley bus, and US\$ 0.84 million in case of locally assembled buses to maintain a minimum financial return of 14%. If the economic costs are considered, the project is beneficial to the society but would require additional income through selling of CERs to be financially feasible.

**Key Meetings with development partners & government representatives**

- European Commission Representative-Feb 14 & April 11, 2003
- UNDP-GEF Small Grant for feasibility study Feb 24, 2003
- National Planning Commission 23<sup>rd</sup> & 26<sup>th</sup> April, 2004
- Chinese Embassy, Economic and Commercial Section
- Japanese Embassy
- British Embassy

To follow up on the suggestions by the bilateral partners KEVA met with the Member of National Planning Commission and the secretary of Ministry of Transport to request the government to start discussions with bilateral partner to develop a trolley bus system. As per the request of the National Planning Commission and the Ministry of Transport, KEVA submitted a letter and pre-feasibility reports related to the ring road trolley bus system development. However due to the continuous change in the government and the key official in the ministry the government has not been able to pursue this matter any further.

#### B4. Comprehensive Transportation System Management Plan

KEVA prepared a GEF/UNDP PDF-A proposal on Katmandu's Environmentally Sustainable Comprehensive Transportation System Management Project (KTRAMS). The proposal conceptualizes comprehensive management of Katmandu's transportation system as means to cut GHG and other polluting gas emissions. The major components include traffic demand management, clean transport technologies and fuels, non-motorized modes, demonstration projects, private-public participations, public awareness, monitoring and documentation, transport and land use surveys for integrated planning, etc. Several meetings and in-house consultations were made to draft the proposal. The draft proposal was circulated around mid 2004 to the UNDP local staff for comments. The draft proposal was well received by the UNDP staff. Letters of endorsement for the proposed activity were obtained from Ministry of Labor and Transport Management (MOLTM) and Ministry of Environment, Science and Technology (MoEST) after several follow-ups. The Ministry of Finance (MOF) provided the final endorsement letter for the proposed activity as the focal ministry a year later in July 2005.

KEVA submitted the revised KTRAMS proposal along with the MOF endorsement letter to UNDP, which was then forwarded to GEF for evaluation. After this the proposal has been refined through several revisions. The proposal, as per UNDP, is currently being submitted to GEF head office for final evaluation/approval. KEVA secretariat has been continuing to follow up with UNDP on this matter.

KEVA also drafted another PDF-A proposal for "Bus Rapid Transit and Non-Motorized Transport: Demonstration projects for Katmandu" which was planned to be submitted to GEF through UNEP. The proposal centered on non-technology driven approaches to transport management and GHG emission reductions. Demonstration of Bus Rapid Transits, Traffic Demand Management, Non-Motorized Transportation, Public awareness, monitoring, etc. were the major components of this proposal. The proposal does not stress on new technologies but rather focuses on managing available transport modes. 'Sajha Yatayat' was proposed as the primary proponent for the activity and 'Soaltee Group' was proposed as lead for public-private partnership efforts.

The proposal has been forwarded to UNEP and to GEF. No formal comments have been made by both the organizations. Time constraints have also limited follow-ups on this activity.

#### B5. Health Impacts of Transportation

Clean Energy Nepal (CEN) and Environment and Public Health Organization (ENPHO) were awarded a grant to conduct the base line study on The Health Impacts of Transportation. A joint team from CEN and ENPHO made a presentation on June 11, 2003 at the office of Winrock International. This was a progress review of the study. KEVA was pleased with the comprehensive analysis and overall high quality of the report. The consultants presented a draft of the report on 13 August 2003. KEVA organized a workshop on 8 September 2003 to solicit feedback from stakeholders on the draft report. The workshop was attended by 45 participants from 30 different organizations. There were participants from the medical community, as well as those involved in environmental programs. The participants provided feedback to the consultant. There was excellent press coverage of the workshop.

The consultant incorporated the comments from the workshop and submitted a final report on 23 September 2003. The study concluded that Katmandu's deteriorating air quality has serious negative health implications on its residents. The report is available on the KEVA web site. The report used the data from air quality monitoring station. Ministry of Population and Environment (MoPE) with the support of Environment Sector Program Support (ESPS), ambient air quality monitoring towers at seven different locations. The baseline study was to depend on the data made available by MoPE.

The health impact report has been useful for policy advocacy and "clean air" campaigns. KEVA secretariat disseminated the report to medical schools in Katmandu and encouraged the schools to do further research on health impacts of air pollution.

#### B6. EV Study Tour to San Francisco

KEVA organized a study tour from November 15-22, 2003. The study tour included participation by the Nepalese delegation in EVS 20 (The 20<sup>th</sup> International Electrical Vehicle Symposium and Exposition) in Long Beach and a visit to San Francisco. The Nepali delegation included the Secretary of Ministry of Labor and Transportation Management, Joint-Secretary of Ministry of Population and Environment, Deputy Managing Director of Nepal Electricity Authority and three participants from Nepal's EV industry, as well as representation of KEVA partners.

At EVS 20, Surendra Bhatta, KEVA Program associate from PADCO, presented a paper in the short lecture series titled "*Impact of Policy, Technology and Business Environment on the Electric Vehicle Industry in Katmandu*". He also arranged a meeting between Nepalese EV industry participants and the Director of International Marketing of Trojan Batteries, the most widely used batteries in the EV industry in Nepal. The ground realities and ways to improve efficient distribution of batteries in Nepal were discussed in the meeting.

In general, the government representatives of the delegation had an opportunity to witness the steps that are being taken by the motor vehicle industries and policy makers to reduce the contribution of vehicular emissions to air pollution during the EVS 20. The technologies that were presented in the EVS20 were advanced by Nepal's standards, but a clear need to use policies tools to promote less polluting vehicles was presented by several countries and was acknowledged by the HMG/N officials.

The study tour of the City of San Francisco municipal transportation services was an eye opener to the government officials. They saw that the public transportation services used several types of electric vehicles in their fleet. Participants were presented with a comprehensive approach to transit operations and planning which takes into account fleet operations in the development of transportation policy.

#### B7. EV Study Tour to China

An Electric Vehicle (EV) Study Tour to China was organized by KEVA from May 14<sup>th</sup> to 24<sup>th</sup>, 2005. A total of eight persons participated in the study tour. The study group was represented by Mr. Surendra Bhatta (Program Associate/KEVA) and Mr. Bibek Chapagain (In-Country

Coordinator/KEVA) from PADCO, Mr. Suman Basnet (Director/REPSO) and Mr. Megesh Tiwari (Program Associate/KEVA) from Winrock International, Mr. Hridaya Narayan Manandhar (Chairperson) and Mr. Ashok Raj Pandey (Member) from Electric Vehicle Association of Nepal (EVAN), and Mr. Cabinet Shrestha (First Vice President) and Mr. Sunil Khetan (General Secretary) from Nepal Automobile Dealers Association (NADA).

During the study tour, nine different EV companies including two trolley bus companies were visited in five different cities of China namely Beijing, Tianjin, Qingdao, Shanghai and Suzhou.

A mini car named "Happy Messenger" manufactured by Tianjin EV Company was of interest to the participants representing NADA. This EV had excellent finishing, was technically sound and competitively priced. Mr. Cabinet Shrestha of NADA showed willingness to import one such EV to Nepal. He was confident that, this EV would be able to generate market in Nepal.

Several other electric cycles, electric scooters, electric tricycles, electric waste collection vehicle, electric golf carts, electric sightseeing vehicle, electric airport freight trolleys, etc. were found to be manufactured with simple design in China. The tour participants got the opportunity to have a close look at the manufacturing process and components used in all of these EVs. At some places, they were also able to take a ride or test drive the EVs. The participants also took this opportunity to learn more about batteries, motors and controllers developed by the Chinese companies.

A workshop was organized on July 1<sup>st</sup>, 2005 to disseminate information collected during the study tour in China. The participants of this workshop were members of EVAN and NADA. The workshop was also attended by members of Independent Power Producers of Nepal (IPPAN). The objective was to disseminate information gathered during the study tour to EVAN and NADA members.

Also included in the workshop was a presentation by Mr. Dilli Raj Joshi, a consultant working on the policy report. He presented the areas where the tariffs had to be cut down to create more favorable economic environment for the growth of EVs. His analysis focused on policy advocacies that would focus on reducing such tariffs.

## C. Public Awareness and Advocacy

**Objective:** Promote the growth and effectiveness of the EV business through increased awareness of the public and strengthened involvement of EV businesses and operators in public discussion.

### Results:

#### **8. Establish an Electric Vehicle Information Resource Center that operates at the KEVA Secretariat.**

**Baseline:** There is no single source in Katmandu for good EV information.

**Target:** Resource Center established and used by industry and general public.

**Year 1:** Resource Center established with basic information and its website.

**Program end:** Resource center fully functional and has facilitated at least 2 educational campaigns

**9. Facilitate EV public awareness through pro-environment and public health groups like Martin Chautari and CEN, university institutes, and others.**

**Baseline:** None available.

**Target:** 3 public meetings and 4 papers on EV and air pollution,

Year 1: At least 2 separate activities are supported with these organizations geared towards creating public awareness on EVs and air pollution, to meet the target (as mentioned above) by year 2.

Program end: 3 public meetings and 4 papers on EV and air pollution.

**Findings of Final Evaluation (March 2006)**

- Results from KEVA are good, surpassing the planned target.
- KEVA EV Resource Center is fully functional at its Secretariat Office. It has 273 books and reports as well as 192 periodicals. The center effectively facilitated the school and public educational campaigns.
- KEVA has its own website ([www.keva.np.org](http://www.keva.np.org)) to disseminate KEVA's publications as well as other information on Nepal's EV industry. There have been 1,136 visitors who have accessed the website.
- KEVA organized three school awareness programs: one with City Volunteers covering 20 schools, a second with IUCN for another 20 schools, and a final one with WHO for 20 private schools.
- KEVA organized a four-month long environmental awareness program through FM radio and TV public service announcements and participated in numerous environmental events and expositions.
- KEVA facilitated numerous public awareness activities working with a broad group of NGOs and university institute members including: the Coalition for a Clean Environment (CCE), Clean Energy Nepal (CEN), Environment Camps for Conservation Awareness (ECCA), The World Conservation Union (IUCN), and Katmandu Environmental Education Project (KEEP).
- KEVA invited NGO, university institutes, and others to participate in KEVA sponsored workshops and meetings and has distributed all its studies and papers on air pollution via its Internet web site.
- KEVA's activities for public awareness have been effective and have helped to build support for the EV industry in key constituencies and the general public.

**Summary of Performance:**

C1. Outreach to Katmandu Tourism Industry

Several activities were carried out by KEVA to promote the use of electric vehicles in the tourism industry. KEVA collaborated with Katmandu Environmental Education Project (KEEP) and Shree Eco-Visionary (SEV) Pvt. Ltd. to carry out these activities.

KEVA signed an agreement with KEEP on 22<sup>nd</sup> March 2005 to conduct awareness activities to promote electric vehicles in tourism industry. The agreed program included four major activities: (i) Survey among 2,800 tourists visiting Katmandu between April-June on Katmandu's Air Quality and electric vehicles, (ii) Awareness program to hotel staff on air quality and electric vehicles, (iii) Publishing of tourism brochure entitled "clean air map" containing comprehensive map of Katmandu with Safa Tempo routes and major tourist destinations, and publishing "clean air map" in large flex to

be hoarded at tourism hot spots, and (iv) Final workshop to disseminate findings, stakeholder consultation, and launch tourism electric vehicles.

As incentive for the tourists taking part in the tourism survey, 250 t-shirts and 250 caps were produced with the message “Be part of solution, not pollution”. Tourists getting scratch cards with t-shirt or cap were gifted. 35 dinner-for-two prizes were also given. 5,000 pieces of “clean air maps” (tourism brochures) were produced and distributed to tourists at airport, Annapurna Conservation Area Project (ACAP) counter, KEEP office, during surveys, etc. Four hoarding boards displaying “clean air maps” were hoarded at Thamel junction, ACAP counter, KEEP and KEVA offices. Final workshop was organized on 23<sup>rd</sup> March 2006 to disseminate findings of the activity. Distinguished guests from Nepal Tourism Board and most of the tourism related agencies participated in the workshop. During the workshop, KEVA’s tourism activities were highlighted and a presentation was made on the findings of the tourism survey. An interaction program between the tourism and electric vehicle industries was also conducted to clarify doubts and get a better understanding of future prospects. Brief features of Hulas Mini EV, tourism safe tempos, and HLF electro-bus were highlighted by respective organizations. These vehicles were also displayed during the workshop. Special ceremony was held to introduce Hulas Mini EV to the tourism industry and test drives were also entertained. KEEP compiled a detailed report on the activities conducted under the agreement. The report is posted on the KEVA website.

## C2. Awareness of Health Benefits of Zero-Emission EVs

Media Awareness Activities: - KEVA secretariat worked with local environmental NGOs and media houses to design and organize public health awareness campaigns throughout the duration of the program. Clean Energy Nepal (CEN) and KEVA developed awareness material for school, college and media campaigns. KEVA encouraged Kathmandu Metropolitan City (KMC), IUCN, EcoHimal and World Health Organization (WHO) to support the awareness campaigns. These organizations supported the campaign. CEN & KMC were part of school awareness and media campaigns. IUCN and WHO each supported awareness campaign in twenty different schools. The school awareness campaigns included multimedia presentations in classrooms, short quiz contests, and essay and art competitions. The media campaigns included radio jingles, public service announcements on radio and television, information programs on radio and television and signature campaigns. The campaign material was developed based on information made available by Ministry of Environment from the data collected from air monitoring stations in Kathmandu Valley.





KEVA also trained volunteers from Himalayan white House College, environment science students from Tri Chandra College, Rato Bangala School and Budhanilkantha High School. These students helped as volunteers in various school awareness campaigns.

WHO and KEVA: - KEVA submitted a proposal to Healthy Environment for Children's Alliance (HECA), a program of WHO. In January 2005, WHO confirmed the approval of the proposal.

### **Public Awareness Campaign**

#### **Clean Air Campaigns in Media**

- Discussion on Revival of Trolley Bus Services on Ankur Radio-September 30, 2003.
- Discussion on Air Quality Program on Ankur Radio-September 6, 2003.
- Discussion on two stroke engines-September 20, 2003
- Five hoarding boards with clean air messages in major traffic junctions-March-May 2004
- Clean Air Campaign message and radio jingles were aired in Metro FM station-January-May 2004
- Radio Sagarmatha carried 9 episodes on air-pollution with the support of EcoHimal and in coordination with KEVA-November 20, 2004 - January 15, 2005.
- KEVA supported 13 episodes in Radio Sagarmatha-January - June 2005
- Himalayan Broadcasting Corporation (HBC) carried 9 episodes and PSAs on air pollution issues: January - April 2005.
- Kantipur FM ran 13 weekly episodes and PSAs on air pollution-February - May 2005.
- 30 second PSAs on Kantipur Television for 60 days-February - May 2005.
- Four episodes of weekly business news on "Artha to Artha" program that is aired on Nepal Television-March 2005 - March 2006

#### **Interaction programs**

- CEN organized program to discuss pollution by two stroke engines and issues related to Type Approval and Conformity of Production decisions by the government.
- Training program to environmental science students who were volunteering in the school awareness campaign.
- Awareness campaign in 35 schools affiliated to KMC nature club.
- One day workshop to environmental science students.
- 1000 copies of informative booklets, 3000 stickers, and 9000 flyers were distributed to school students, media personnel, teachers and general public during the campaign.
- IUCN & KEVA jointly organized school awareness campaigns in 25 schools. The program also included a workshop for Principals and teachers of the schools.
- CEN & KEVA organized an additional campaign in 20 schools in Kathmandu.
- KEVA made a presentation at a program organized to mark the 11<sup>th</sup> Anniversary of Society of Environmental Journalists (SEJ).

After the school program students were requested to complete an evaluation forms that were collected from the students and analyzed.

**Evaluation and some data of School Awareness Programs**

- There was an even ratio of male and female students.
- 73% of thought the awareness program was excellent
- 50% of the students thought the multimedia presentation and the quiz was the most interesting part of the presentation.
- 79% of the students thought the program was helpful in understanding issues on air pollution
- 97% thought they can make a difference in reducing air pollution.

**C3. Resource Center for NGO Public Awareness Activities**

KEVA secretariat has established a comprehensive resource center at Winrock International office In Katmandu. The resource center has publications under three categories: clean transportation, air pollution, and climate change. KEVA also has a website ([www.keva.org.np](http://www.keva.org.np)) with relevant information on air quality, clean transport, and electric vehicles. The website includes reported and studies commissioned by KEVA and public awareness campaign materials. The website is timely updated for news, activities, achievements, etc. School awareness campaigns have used material available in the resource center.

The KEVA Secretariat worked closely with the NGOs that are working to promote EVs in Nepal to provide resources to public awareness campaigns. The resource center has been used by students fro research. The Secretariat has had a good rapport with NGOs such as Electrical Vehicle Association of Nepal (EVAN), Clean Energy Nepal (CEN), Martin Chautari. KEVA approach has been also to take the resource material to the audience such as schools, teachers, development partners and journalists.

**Activities and services by the resource center**

- A website ([www.keva.org.np](http://www.keva.org.np)) with information relevant to air pollution, clean transportation and KEVA activities.
- A library with resource material for students, journalists or others who are interested in research on air quality and clean transport.
- Provided a three day social marketing training to local NGOs by an expert from American Lungs Association
- Awareness campaigns in schools
- Workshops for journalists and media campaign
- Training sessions for environment science teacher
- Awareness campaign targeted towards tourism industry
- Published and disseminated books titled "Ropeways in Nepal" and "Are Electrical Vehicles Viable in Kathmandu? A cost Benefit Perspective"
- Participated in an exhibition during the Nepal Development Forum with USAID & partners
- Conducted a demographic survey of Safa Tempo Industry worker
- Exhibitions on Earth Day and Environment Day programs
- Exhibition on the occasion of Engineering and Development EXPO

#### C4. Use of Data from Municipal Air Monitoring

KEVA used the MOPES/ESPS air pollution data for both its Health Impact Study and its social marketing workshop. In addition, KEVA used the data to develop materials for all of the public awareness campaigns. KEVA used the air monitoring data during the discussions with the government officials.

#### C5. EV Marketing and Market Diversification

Electric Vehicles in Katmandu, particularly, Safa Tempos and Trolley buses, mostly operate as public transportation. KEVA has been working with the EV industry and local vehicle manufacture to diversify the product to reach different market segments to increase the use of electric vehicles. Some of the markets explored by KEVA were schools, outside Katmandu valley, tourism, offices, and utility vehicles etc.

#### C6. EVs for the Tourism Industry

KEVA secretariat has been working with Shree Eco Visionary, a company that operates battery charging stations for electric vehicles, to develop electric vehicles for the tourism industry. KEVA worked with Shree Eco Visionary and Katmandu Universities Engineering team to discuss an appropriate redesign of the Safa Tempo (electric three-wheeler) to suit the needs of the tourism industry. KEVA secretariat also facilitated discussions between Shree Eco Visionary and Mr. Bharat Basnet a tourism entrepreneur, who would be willing to use the EV to ferry his guests around Katmandu. Shree Eco Visionary is finishing up the redesign of the vehicles, which will be used by the tourism sector.



#### C7. EVs for Schools

An agreement was signed between KEVA and Environment Nepal on January 25, 2005 to carry out a feasibility study of Safa Tempo for school transportation. The study included conducting a social and economic analysis of using Safa Tempo for school transportation. The study also included one month demonstration where Safa Tempos carried children of three schools in Katmandu. In these schools, perceptions of students, school staff, and parents were recorded and used as input for socio-economic



analysis. The study showed that most respondents accepted the fact that Safa Tempos were environment-friendly and good for the students and the society, however to be accepted for school transportation the EV had to be more comfortable, better looking and safe (four wheeled EV was preferred). A report based on the activities and study finding was prepared and has been posted on the KEVA website.

**Major findings of the feasibility study**

- Students, teachers and the school administrations were well aware of the poor air quality in Kathmandu and the need for cleaner vehicles in schools.
- All parties were aware that children are more susceptible to hazards of air pollution inside a diesel vehicle, so there is a need to use clean vehicles.
- Safa Tempos can be used but hiring Safa Tempos was found to be costlier than hiring buses at current rates.
- Owning Safa Tempos by the schools for the sole purpose of transporting students was not found to be economically feasible.
- The Safa Tempos need to be better designed for acceptability by schools.
- The small size of Safa Tempos could pick children right in front of their house gates and also significantly reduced the travel time.
- Parents were willing to pay some premium in transportation charges if schools were to provide more safe and comfortable EVs.

**C8. Hulas Mini EV**

Based in the feed back from the tourism industry, schools and other potential market segments KEVA secretariat initiated a development of an electric four wheeler in Nepal. Most of the potential market segment suggested that a four wheeler EV would be more likely to be accepted by a wider customer base. Therefore KEVA provided development and project coordination assistance to Hulas Motors, a Nepali vehicle manufacturer, to build the prototype electric van. This product will also help extend the current use electric vehicles in Nepal.

**C9. EVs for Rural Areas**

As most electric vehicles concentrate inside the Katmandu valley, KEVA made an effort to study the prospects for electric vehicles outside Katmandu and in the rural areas.

An agreement was signed between Environment Nepal and KEVA on February 15, 2005 to explore rural transportation prospects for EVs. To carry out the study, five locations were

**Potential Markets for EVs**

- Office staff pick up and drop off and mail delivery vehicle
- School pick up and drop off vehicle
- Redesign to pick up garbage from narrow streets of Kathmandu
- Tourism sector-Air port pick up & drop off, sightseeing, staff pick up drop off
- Utility vehicle for high volume low density products like bread, light bulbs, clothes

selected based on various criteria. The selected five locations were: Pokhara, Jomsom, Jumla, Lumbini & Syangja. The study team visited all of these five locations and consulted with various stakeholders such as public, transport entrepreneurs, transport associations, local institutions, etc. to find out their perception on electric vehicles. The study team also evaluated the conditions of roads, availability and reliability of electricity, passenger flow, ability of people to pay, transport demand and uses, etc. Based on the responses, the study team evaluated the prospects for electric vehicles in these locations and also recommended effective ways to introduce electric vehicle there. The final report of this study is posted on the KEVA website.

## **D. Technology and Business Promotion**

**Objective:** Improve the operation of the EV industry by exploring technological options to improve the battery life and performance, and business management options to improve business performance.

### **Results:**

#### **10. Increased knowledge of and access to improved technology by EV industry.**

**Baseline:** Little current innovation or access to new technologies.

**Target:** Provide greater access to improved technologies through training (10 persons per year in local training and/or study visits.

Year 1: At least 2 training and 2 assessment/workshop on EV technologies (battery or vehicle related) are held to improve knowledge and skills of EV entrepreneurs.

Program end: At least 2 training and 2 assessment/workshops on EV technologies (battery or vehicle related) are held to consolidate knowledge and skills of EV entrepreneurs.

#### **11. EV businesses are run on more effective and efficient fashion.**

**Baseline:** NA

**Target:** Analyze current business model, prepare at least one business model, and at least one enterprise adopts the model.

Year 1: Assessment of current business practice completed and recommendation disseminated.

Program end: At least 1 enterprise is facilitated to adopt the recommendation.

#### **12. Quality and quantity of EV support services (battery charging and vehicle maintenance) are improved / increased.**

**Baseline:** Services of poor quality, customer service weak (long waiting times).

**Target:** Shorten the waiting days for maintenance and train at least 4 repair shops technicians,

Year 1: Assessment of support services industry situation completed with recommendation.

Program end: At least 4 repair shops are supported by training and resources to reduce average waiting time by 25 % by the end of second year.

### **Findings of Final Evaluation (March 2006)**

- Results from KEVA are good, surpassing the planned target.
- KEVA facilitated EV industry access to
  - international technologies through a study tour with EDTA and San Francisco for EV industry and Government representatives and
  - regional technologies through participation in the New Delhi conference of SIAM (Society for India Automobile Manufacturers), and in the Asia Better Air Quality Conference in Agra, India, and study tour with EDTA to visit Chinese EV manufacturers.
- KEVA also provided several technical consultancies for EV technologies.
- KEVA facilitated the design of a new tourist *safa tempo* by the engineering staff of Katmandu University. Shree Ecovisionary is manufacturing 5 vehicles for transporting tourists around Katmandu.
- KEVA worked with Hulas Motors to define specifications of a four-wheel EV (the Hulas Mini-V) and a prototype has been developed and successfully tested by Hulas.
- KEVA analyzed EV businesses and offered support for several pilot demonstrations including: battery operations and battery financing; route management for better revenue collection by owners; and an innovation fund to finance women driver-owners.
- The innovation fund to finance women drivers to buy existing *safa tempos* has been successfully implemented by the Bank of Katmandu with NEVI, a charging station. This model can be scaled up to include all drivers and new vehicles.
- EVs in Katmandu (*safa tempos*) are now financially sound and more profitable than diesel microbuses. There is strong interest in the EV industry to expand operations both inside Katmandu Valley and to other parts of Nepal.
- KEVA completed an analysis of EV battery performance and charging station operations and assisted with improvements that have extended battery performance and life to up to 25 months.
- KEVA developed manuals for *safa tempos* EVs and charging stations and organized a training workshop for all charging station operators. The workshop was conducted by a Katmandu University engineering team that developed the manuals.
- KEVA facilitated research on *safa tempos* batteries by Osaka Sangyo University of Japan, the Institute of Engineering, and World Eco Tempo.
- The average operational life of the batteries has been extended several months, most batteries are now purchased through leasing schemes and the efficiency of repairs has been improved

### **Summary of Performance:**

#### D1. Re-activation of the Katmandu-Bhaktapur Electric Trolley

KEVA discussion with the government contributed to decision by the government to reactivate the Katmandu-Bhaktapur electric trolley, which had been shut down since December 16, 2001. KEVA had been advocating for the revival of the trolley bus system with the involvement of the local municipalities and the private sector. The government had handed over the management of the Trolley Bus System to the municipalities. The municipalities have since started the partial operation of the Trolley Bus System from September 15, 2003.

KEVA secretariat has been working to involve the private investors and private management company to set up a fully operational trolley bus services from Katmandu to Bhaktapur. The KEVA program

has worked with the Katmandu Metropolitan City and the other two municipalities to develop a business plan, organize an interaction session and disseminate the information to potential investors.

KEVA played an active role in the reactivation of once shut-down Katmandu-Bhaktapur Trolley Bus system. The system was reactivated on September 2003. The reactivated system was to be managed by a consortium of Katmandu, Bhaktapur and Madhyapur Thimi municipalities as per the MOU signed with MOLTM. The MOU stated that the consortium of municipalities could also invite private parties to invest in rehabilitation and also manage the system.



With this provision in hand, KEVA proactively proposed to prepare a business plan for the trolley bus and submit to Katmandu Municipality, the principal stakeholder. KEVA made several approaches to the concerned government agencies to incorporate recommendations of the business plan and the private sector. Even then, as the government has not been able to address the recommended issues, private sector has been reluctant in pouring stakes in the trolley bus. The business plan submitted to the KMC has been posted on the KEVA website.

One of the draw backs of investing in the trolley bus services in the existing route was the congestion in the current route of the trolley bus. However, the government is planning to widen the rode, which can incorporate a trolley bus lane for public commuters. Furthermore the ever increasing fossil fuel prices will improve the commercial viability of the trolley bus operations under the right institutional set up.

## D2. Trolley Bus rehabilitation cost appraisal

Sajha Yatayat was one of the institutions willing to invest and manage the trolley bus. To appraise the spare parts requirements to rehabilitate the trolley buses and overhead infrastructure and associated costs, an agreement was signed between Sajha Yatayat and KEVA on the first week of May to carry out a study on "Trolley bus rehabilitation cost appraisal". A study team of three technicians of Trolley bus office were contracted to identify the status of electrical and mechanical parts of buses and machinery, and the overhead infrastructure. The team was to also identify the status of existing and additional spare parts necessary to rehabilitate the buses, workshop & machinery and the overhead infrastructure so that the trolley bus service can be extended to its original destination in Bhaktapur.

The study team prepared an extensive list of spare parts required. This list was submitted to Sunwin Bus Company in Shanghai that had manufactured the trolleys granted to Nepal 30 years ago. However, the company was not able to provide the spare parts as the model of trolley bus used in Katmandu had already been obsolete. So, the study was concluded by listing the spare parts and

equipments necessary to reactivate the trolley bus as per the business plan. Spare parts necessary to rehabilitate the overhead infrastructure can be made available. But for the trolley buses, the only option is to purchase new ones.

KEVA suggested MD of Sajha Yatayat, Mr. Mukunda Raj Satyal, to approach the relevant ministries to take over management of Trolley buses and also to initiate dialogues with the Chinese government for providing new trolley buses as grant. New buses would remove the need for rehabilitating old buses. Chinese government is also keen on providing support if the Nepalese government sends a formal request.

KEVA continued to work with Sajha Yatayat to initiate dialogues with the government to seek Chinese government's assistance in importing new trolley buses and also to take over the trolley bus management. However, this action has not moved ahead as yet.

### D3. Demonstration of New Technologies

KEVA secretariat has initiated several activities to help demonstrate and encourage new EV technologies. The KEVA program has supported the following projects:

1. An electric Mini EV by Hulas Motors
2. Tourism electric vehicles which are redesigned of the current electric three wheelers.
3. Introduction of AC-drive system on a Safa Tempo
4. Design of the proto type of Electro-Bus by Himalayan Light Foundation with the support of British, SDC and UNDP.
5. Cable Car in Katmandu.

### D4. Hulas Mini EV

A MOU signing ceremony between KEVA and Hulas Motors to develop an electric van "Mini EV" was held on May 4, 2005 and the formal agreement was signed on June 23, 2005. According to the agreement, the electric vehicle will be manufactured by Hulas Motors in its Biratnagar based factory. KEVA will provide R&D costs necessary to develop the EV and also pay for an EV consultant and EV technician to support design, fabrication, and installation of electrical components. KEVA will also procure all necessary electrical parts and provide the cost of mechanical components of the vehicle to the company.

The prototype vehicle was completed in March 2006. The chassis and most of the





mechanical parts for the EV were manufactured by Hulas Motors. AC motor, inverter, and battery charger were imported from an Italian company – ZAPI (Best Motors). Batteries (Trojan 125), dc-dc converter, e-meter and other electrical accessories were procured locally.

The Hulas Mini EV is the first electric four wheeled van manufactured in Nepal. The EV has already passed the road worthiness test and is in final stages of being registered. This EV will be ideal for inside-valley transportation and also within other cities in the country. Hulas Motors is all set to commercially manufacture the EV and is finalizing the price for the vehicle. Several orders have already been placed for the EV.

#### D5. Tourism Safa Tempos

KEVA also supported manufacturing of four upgraded Safa Tempos fit for tourism purposes. These Safa tempos have front facing comfortable seating arrangement, increased roof height, better suspension, bigger windows, sleeker look with fiber-body, etc. One of these tourism safa tempos also has regenerative braking, in-built charging, and ac drive system. These Safa tempos are in the final stages of completion and will cater to the tourism industry once on the road.

One of these Safa Tempos will have an AC-drive system, which is considered advancement in the current technology of the Safa Tempos. The design will provide the manufacturers of Safa Tempo to choose from a more current design, which is considered to be more energy efficient,

#### D6. Electro-Bus prototype by Himalayan Light Foundation

Himalayan Light Foundation has developed and demonstrated three prototype Electro-Buses. Two of there are passenger carrying vehicles in the category of a mini bus. These buses carry 14 passengers and are currently in the process of being road tested. The third vehicle is designed to be a utility vehicle. KEVA secretariat was involved in supporting the project whenever policy and regulatory issues impeded the progress of the project.



#### D7. Cable Car in Katmandu Valley

Mr. Resham Dhakal, a cable car expert, was hired to conduct a pre-feasibility study of a cable car system for Pashupatinath Temple Area. The proposed cable car system would provide safe and alternative transportation for all visiting pilgrims and tourists.

KEVA provided partial financial support to Mr. Bal Ram Neupane, an entrepreneur who is interested in developing this project. Mr. Dhakal completed the study and submitted the report on September 23, 2005. The report has suggested a 2.1 km cable car system with 19 Gondola with a capacity of 600 passengers per hour. The cable car system will circle the temple and the vicinity in a clockwise direction. The total cost of the project is estimated to be 453.63 million rupees (US\$ 6.29 million).

The cost is estimated on the quotation received from POMA, French manufacturer of Cable Car Technologies.

Mr. Neupane has submitted the document to Pashupatinath Development Committee, the body responsible for development of the Pashupatinath Temple and the surrounding vicinity. Mr. Neupane is holding talks with financial institutions to seek financing required for developing the project. After approval from the committee is received, Mr. Neupane will register the company and proceed with the project.

#### D8. Analysis of Batteries Used by Electric Tempos

Batteries are the on board source of energy and major determinants of operating costs for electric vehicles, KEVA conducted extensive analysis of batteries used by Safa Tempos in Katmandu. Three different analyses of Safa Tempo batteries were carried out: (i) Statistical analysis of factors influencing battery life (based on 15 month data collected by the EV industry) in 2003, (ii) Battery longevity analysis based on 282 sets of batteries in 2004, and (iii) Effect of chemical activator on battery performance based on 13 sets of old batteries in 2005.

The statistical analysis was carried out to find factors that have greatest influence over life of batteries used by Safa tempos. The analysis showed that battery life used by Safa tempos had shortened with increase in number of idle/unused/uncharged days, increase in depth of discharge, inconsistency in type of charger used, and drawing of excessive amount of energy/current from the batteries during operation (by over-speeding or overloading). The study report has been posted on the KEVA website.



Battery longevity analysis based on 282 sets of batteries identified lives of these batteries and correlated them to historical information of the batteries categorized into type, maintenance quality, charging pattern, etc. From the study, it was inferred that lives of Trojan 125 was longer (20 months) than other batteries, specifically 3 months longer than US 125 batteries (another widely used batteries). Again batteries charged with different charger had shorter lives. More number of idle days had again shortened battery life. Lesser power available per charger ( $< 2\text{kVA}/\text{charger}$ ) resulted in reduction in battery life. Life of batteries also depended on route of operation and frequency of battery balancing. The study report has been posted on the KEVA website.

KEVA also conducted another study on batteries in collaboration with Osaka Sangyo University, Japan. This study was conducted to test the effect of chemical activator (that was supposed to remove lead plate sulphation) on the batteries used by safa tempos. The test was conducted in 13 sets of batteries with ages ranging from 12-24 months, charged in 13 different charging stations, charged with 4 different types of chargers, operating in 8 different routes, and used in three different models of safa tempos. However, the test did not result positive outputs. The objective of the test was to improve the performance of degraded batteries and improve their life. But in most of the batteries there was no change in performance even after addition of the chemical activator. In most cases, the performance deteriorated after some time and the batteries were scrapped.

#### D9. Safa Tempo Maintenance Manuals

The engineering team of Katmandu University (KU) completed five maintenance manuals related to the Safa Tempo industry. One of these manuals is titled "Battery care manual for charging stations" was to help the EV industry take better care of the batteries they were using. This manual was translated to Nepali language for the charging station operators. KEVA in coordination Electric Vehicle Association on EVAN (EVAN) and KU organized three training sessions for the operators of the charging stations. The experts from KU provided the training for the operators.

#### D10. Development of Battery Leasing Systems

KEVA secretariat commissioned a study to determine the best business model to implement the battery leasing system for the Safa Tempo industry. Mr. Ajay Ghimire, was the consultant hired by KEVA to develop the business model. Mr. Ghimire discussed the draft of the report various stakeholders from the EV industry, banks, EV battery manufacturer and suppliers. This meeting was organized on November 7, 2003. The meeting was attended by 28 participants from 15 different organizations. Mr. Ghimire presented his report on "Battery Financing of EVs". His presentation was followed by a discussion and comments by the participants of the meeting. Mr. Ghimire incorporated the comments received during the consultative session and submitted the final report.

The business model suggested that the batteries of the Safa Tempo should be jointly owned by the driver and the charging station to ensure better care.

Battery leasing is a success story in the EV industry. With many operational battery-leasing schemes, most batteries used in Safa Tempos today are leased. This has resulted in distribution of the high upfront battery replacement costs into easy and affordable installments spread over the lifetime of the batteries. This has made Safa Tempos more competitive in the market with installments for batteries equivalent to refueling of gasoline in ICEVs. Battery leasing schemes have revived many grounded Safa Tempos that were unable to come up with the high upfront costs for battery replacement.

Battery leasing system is being further developed as part of the promotion of women owner drivers of Safa Tempo. Bank of Katmandu and Nepal Electric Vehicle Industry have entered into an agreement to provide financing to electric vehicles and batteries to promote women owner-driver. This is a result of KEVA's initiation to pursue lease-purchase opportunities through local financial instituting to aspiring EV owner.

Some initial discussions are underway between Mr. Umesh Raj Shrestha and Bank of Katmandu to develop a battery banking concept.

#### D11. Analysis of Technology Improvements for Electric Tempos

Safa Tempo Maintenance Manuals: - Operation of Safa tempos for the last ten years has shown that quality of maintaining batteries and other parts plays an important role in the profitability of the business. However, no specific manuals (not even by the manufacturer) had been developed detailing

the maintenance procedures, information of vehicle parts, guide for drivers, electrical and electronics repair and maintenance procedures, etc.

With demand for support from the EV industry to compile necessary maintenance manuals, KEVA made an agreement with Power and Energy Group of Katmandu University (KU) to compile five different maintenance manuals for the EV industry.

All of these manuals provide detailed information on respective topics. The battery care manual has also been translated in Nepali to allow easy reference for the charging station crew. This manual has also been posted on the KEVA website. Apart from these five manuals, the KU team also compiled a Safa Tempo parts manual.

**KU team compiled the following five maintenance manuals for Safa Tempos**

- “Driver’s Manual” to explain the controls and assist in the longevity and reduced maintenance of the vehicle by good driver habits.
- “Maintenance and Fault Finding Manual” for minimizing and identifying faults early on before major problems arise.
- “Workshop Manual” to explain how to disassemble parts, test, adjust, repair and reassemble.
- “Battery Care Manual”
- “Electrical and Electronics Manual”

D12 Training on maintenance manuals

Three half-day trainings were organized to inform the charging station technicians on the maintenance manuals and also to provide basic knowledge on how to use the manuals. These trainings were provided at three different locations as requested by EVAN. 25 technicians from different charging stations participated in the training. The training focused on following areas:

- General discussion on battery
- Tips on keeping battery safely
- Measuring Instruments
- Role of drivers on battery’s safety
- Tips for keeping battery in good condition
- Effects of poor battery
- Battery charging
- Steps on checking fault battery
- Safety and precautions
- How to use electrical manuals?



The participants of the training were also provided with a copy of Nepali battery care manual each. Feed back on the training was also collected from the participants. The training report has been posted on the KEVA website.

D13. Tourism Safa Tempos

KEVA supported Shree Ecovisionary Pvt. Ltd. (SEV), a company providing Safa Tempo and battery services to development of four 3-wheeled EVs appropriate for tourism. KEVA secretariat considers this a technological improvement in the design of the Safa Tempo designs. Shree Ecovisionary is also developing one of the four Safa Tempos with an AC drive system, which is a more efficient technology and therefore improvement on the current design. The activity "Tourism EV development support" included the following activities.

- Studying import tariff structure for EVs
- Carrying out engineering design and product development works
- Performing business analysis
- Market testing of prototype
- Developing and implementing marketing strategies
- Supporting commercialization of these EVs

SEV has import parts from Scooters India Limited (SIL) and are completing the design and assembling process in Katmandu. The tourism EVs will have comfortable front seating arrangements with high and wide windows suitable for better viewing. Apart from looks, these EVs will also have improved suspensions for smoother ride.

#### D13. Support to EVAN to Access the ESPS Clean Vehicle Promotion (CVP) Fund

Matching grant funds from Winrock International (WI), a KEVA alliance partner was provided to pay for the services of Mr. Ved Raj Acharya to write proposals to help EVAN access CVP fund. Mr. Acharya's term with EVAN will be extended under direct KEVA support. Mr. Acharya is helping EVAN in proposal writing and solicitation.

EVAN received support from matching grant funds of WI for the services of Mr. Ved Raj Acharya to write proposals to help EVAN access CVP fund. EVAN has written a letter to KEVA that states from the support they received from WI, they were able to access Rs. 1,713,860.00 (approximately US\$ 21,972.00) from the CVP fund.

Although KEVA secretariat continued to support the EVAN office throughout the duration of the project, this particular activity was completed during the first year of KEVA.

#### D14. Business Management Assistance for EV Owners

KEVA Secretariat has been worked with EVAN to improve their operations, market expansion and lobbying strategies. During the implementation of the program, KEVA has supported the EV owners on the following:

1. Reduce import tariff on electric vehicles
2. Reduce electricity tariff for Safa Tempos
3. Priority in route permits for EVs in public transportation services
4. Planning and consultation on daily battery leasing program for Safa Tempos.
5. Market diversification strategies for Nepal
6. Promotion of owner driver concept in the operations of EV in the public transportation sector.

D15. Reduce import tariff on electric vehicles

KEVA has worked with EVAN to prepare documentation and strategies to discuss specific policy initiatives with government officials. These meetings were organized to precede the government's annual budget preparation. Based on these meetings several favorable import policies and regulations have been the result of this coordinated exercise with EVAN.

D16. Reduce electricity tariff for Safa Tempos

KEVA secretariat and EVAN jointly prepared a presentation for Nepal Electricity Authority (NEA). The presentation was made during a joint meeting of NEA, EVAN and KEVA. The presentation was to facilitate the discussions on the possibilities to reduce electricity tariff for the EV sector. Based on this interaction and individual meetings, NEA board forwarded the recommendation to revise tariff to all of the NEA customers. The recommendation included a reduction on night time tariff for EVs. This recommendation was never approved by the Tariff Fixation Committee because of the disagreement on the amount of available energy in the grid.

D 17. Priority in route permits for EVs in public transportation services

EV operators have received preferential route permits of specific routes based on organized lobbying with the government. KEVA has assisted and supported EVAN's effort by providing a consultant to organize the effort on behalf of EVAN. KEVA secretariat also took the initiative to open discussions with Technical Director of Department of Transport management to support EVAN's request for special route permits for EVs only.

D18 Planning and consultation on daily battery leasing program for Safa Tempos

KEVA secretariat commissioned a study by Mr. Ajaya Ghimire to analyze the operating cost, revenue and overall profitability of Safa Tempo industry. Mr. Ghimire also provided recommendations to improve the actual revenue generation to the entrepreneurs. These recommendations included the institutionalization of battery leasing scheme through bank financing, joint ownership of batteries and promotion of owner driver concept. These recommendations have been implemented by EVAN as well as by some initiatives undertaken by KEVA secretariat.

D 19 Market diversification strategies for Nepal

KEVA secretariat has worked with EVAN members to encourage market diversification for EVs. Development of Safa Tempos for the tourism sector is one of the exercises taken up by EVAN members to reach out to new market segments. KEVA secretariat also facilitated a discussion between Katmandu Metropolitan City, Nepal Electric Vehicle Industry & Katmandu University engineering team to discuss the possibility of introducing an EV for garbage collection. KEVA secretariat's initiative to develop an electric four wheeler will also provide market diversification opportunities for the EV sector.

D20. Promotion of owner driver concept in the operations of EV in the public transportation sector

Winrock International (WI) had requested proposals for innovation ideas from its business units. KEVA took the initiative to submit a proposal. The proposal was to help provide financing for twenty women driver who are interested in owning a second-hand Safa Tempo. The proposal was accepted by WI. Based on this initiative Bank of Katmandu and NEVI, a charging station, has disbursed loans to the first group of 9 women driver-owners to purchase Safa Tempos. The total loan amount is slightly over Rs. 2.2 million. The women drivers have put in Rs. 0.7 million. The concept which includes a guarantee fund has already leveraged about 3 times the amount in loans. This is just the beginning, and this exercise will have a snowball effect. This model has been replicated by other financial institutions, which have started to finance women drivers. The model incorporates suggestions made by Mr. Ajaya Ghimire in his study to improve the profitability of the Safa Tempo industry.

D21. Access to Off-Peak Loads for Battery Charging

KEVA secretariat organized an interaction program that included NEA, EVAN and ESPS representatives. NEA representatives included Managing Director of Nepal Electric Authority and his team working on new revenue tariff structure on April 21, 2003 to discuss tariff with proponents of the EV industry. Mr. Lal Bahadur Ghising of EVAN gave a presentation to the Managing Director that had been prepared by KEVA. The meeting discussed the installation of Time Of Day (TOD) meters without installing transformers, reduction of Off Peak Tariff and Normal Tariff, reducing the demand charge collected by Nepal Electric Authority and increasing the charging capacity of the charging stations. Currently NEA only accepts TOD meter reading from customers with transformers. There is no technological reason (that we know of) that would require a transformer for the installation of TOD meter. This is something that will be brought up during further discussions with NEA.

KEVA met with the Managing Director of Nepal Electric Authority and his team working on new revenue tariff structure on April 21, 2003. Mr. Lal Bahadur Ghising of EVAN gave a presentation to the Managing Director that had been prepared by KEVA. The meeting discussed the installation of Time Of Day (TOD) meters without installing transformers, reduction of Off Peak Tariff and Normal Tariff, reducing the demand charge collected by Nepal Electric authority and increasing the charging capacity of the charging stations. Currently NEA only accepts TOD meter reading from customers with transformers. There is no technological reason (that we know of) that would require a transformer for the installation of TOD meter. This is something that will be brought up during further discussions with NEA.

Based on the government decisions and the proposal by EVAN, the board recommended a revised tariff for the EV industry. The recommendation was submitted to The Tariff Fixation Committee which is an independent body that reviews and approves NEA tariff changes. Tariff revision for the EV industry had been proposed as a part of a larger proposal, which includes seasonal tariff, by Nepal Electricity Authority (NEA) to the Tariff Fixation Committee. There is a disagreement between the NEA and TFC on the specifics of the initial beneficiaries of the seasonal tariff and available energy in

the wet season. A separate approval off peak rates for the EVs is not possible without the resolution of the disagreement between NEA and TEC.

#### D22. Regional EV Technologies Workshop

EVAN Participates in SIAM Conference in Delhi: - KEVA supported the participation of delegates from Nepal and from EDTA to attend a seminar in Delhi in January 2004. Society of Indian Automobile Manufacturers (SIAM) organized the seminar in partnership with USAID, Transport Department Government of NCT of Delhi, Ministry of Petroleum & Natural Gas, Gail (India) Ltd. and ICICI Bank. The seminar and technical visits started on January 18, 2004 and ended on January 21, 2004. The Technical Visits & Seminar were well attended with participation from Bangladesh, Iran, Japan, Nepal, Singapore, Thailand and the United States. The participants included delegates from Transport Departments, Municipal Corporations, Pollution Control Board, Environment Departments and other stakeholders both from Government and Private organizations in India. The EV sector in Katmandu was well represented by KEVA and EVAN. An instructor from Center for Pollution Studies (CPS) of Institute of Engineering (IOE) and three students also participated in seminar.

Participation at a Better Air Quality (BAQ) conference, a regional conference on air quality: - KEVA delegates attended the Better Air Quality (BAQ) Workshop organized in the city of Agra in India from December 6 through December 8, 2004. The theme of the conference was air quality management in Asia. Clean Air Initiatives-Asia and Society of Indian Automobile Manufacturers were among the organizers of the conference. USAID/USAEP, World Bank, Asian Development Bank, USEPA were some of the supporting organizations of the event.

KEVA presented on public awareness efforts during a side event workshop on December 5, 2004. The workshop was on Public Awareness Campaigns for Improving Air Quality. The presentation highlighted the partnership approach to organize school and media campaign. Nepal was represented by a larger delegation during the BAQ conference. There was a meeting between the delegates of the countries that were represented in the conference.

Internet for Advocacy” organized by Center for Science and Environment (CSE):- KEVA participated in the Internet for Advocacy from January 18-21 2005 in New Delhi, India. CSE Delhi organized the training program. The training was aimed at helping information and campaign managers understand and effectively deploy various Internet based tools in their campaign and information dissemination initiatives. As a part of the training the participants were asked to review the websites of the participating organizations and provide their feedbacks. During this course the training moderators and participants reviewed KEVA website as well. The general feedback for the KEVA website was good.

Electric Vehicle Symposium 21 (EVS 21):- Rick Ruvolo of City and County of San Francisco and San Francisco Clean Cities Coalition and Bibek Chapagain represented KEVA in the EVS 21, which was held in Monaco in April 2-6, 2005. KEVA had an opportunity to discuss the progress of Nepal's electric vehicle industry during the workshop on “Best Practices in Cities” on April 5, 2005. The facts that there are 600 electric vehicles most of which operate as public transport vehicles were intriguing to the participants of the workshop. Rick Ruvolo highlighted the achievements of the Nepali EV



industry to the workshop during in presentation at the workshop and during the closing session of EVS 21 when he was accepting an award on behalf of the City and County of San Francisco for promoting clean and sustainable transportation.

Based on the presentation of the EV industry and the KEVA activities during EVS 21, the KEVA program was nominated to be the winner of the next E-Visionary award representing the Asia Pacific Region. On September 27, 2005 KEVA was formally selected by EVAAP for the next WEVA E-Visionary award winner. The award will be presented during the closing session of EVS 22, which will be held in Yokohama City on October 28, 2006.

#### **IV. Evaluation Plans**

Three internal evaluations of KEVA performance were planned. The first two evaluations have been undertaken near the end of the first year and second years. The third evaluation was carried out at the end of KEVA program in March of 2006. These evaluations have assessed progress in carrying out the activities planned during the year and the progress made toward achieving the objective and component target results for KEVA. The results of evaluations have been reported to KEVA's international and local partners and used for a planning workshop with local stakeholders to establish the KEVA subsequent year work plan.

**Internal Evaluators:** Mr. Ben Stoner (2003/04/05), Mr. Harsha Bajracharya (2003/04), Mr. Surendra Bhatta (March, 2006)

**Some of Key Meetings:**

- Electric Vehicle Association of Nepal (EVAN)
- Clean Energy Nepal
- Himalayan Light Foundation
- Ministry of Environment-Danish supported ESPS program
- Ministry of Transportation
- USAID
- Nepal Electricity Authority
- European Commission in Nepal
- IUCN
- Kathmandu Environmental Education Program
- Nepal Water Conservation Foundation

A third evaluation has focused on how well KEVA has achieved its objectives and component results and will identify lessons learned from KEVA that can be applied to other municipalities in Nepal in order to guide the development of less polluting urban transportation in other cities. KEVA supported a workshop to dissemination information and to highlight the application of KEVA's lessons to other cities. Recommendations from the evaluation and the workshop will provide USAID and other interested donors ideas for potential follow-on projects.