Electric Vehicle as Resilient Solution

Knowledge Sharing of E-vehicle development in Nepal
Innovative Technology & Solutions for Resilient & Smart Integrated Transportation System

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Asian Development Bank/NRM
Lumbini Clean Public Transport Project
under
South Asia Tourism Infrastructure Development Project

EV-based Clean Public Transport
+ Decentralized Renewable Power Generation
+ Vehicle to Home (V2H) Power Supply
+ Tourism Promotion
Bhairahawa SEZ

Bhairahawa (Gautam Buddha) Airport (expected to become Nepal’s second international airport)

Kapilvastu SEZ

Lumbini UNESCO Cultural World Heritage Site (Tange Master Plan Area)
Cross-Border Tourism Circuits
LUMBINI MASTER PLAN

Lumbini Master Plan was prepared in '70s with the support of United Nations

Total Area 777 hectares

north-south 3 miles x east-west 1 mile

Master plan covers an area of 3 sq. miles, comprising three zones of 1 sq. mile each, including:

New Lumbini Village (north)
International Monastic Zone (middle)
Sacred Garden (south)
Sacred Garden, Birthplace of Lord Buddha
Introduction of E-Vehicle Tourism

• Integrated e-mobility introduced to promote tourism
• E-Vehicles introduced to transport tourist from airport to Lumbini heritage site and its surrounding
• E-pedicabs inside heritage site
Transformation to E-vehicle based Transportation System
Create a design for a modern, efficient, and low-cost pedicab that will transform the image and functionality of rickshaws in Asia as well as improve the lives of rickshaw workers.
Today’s perception of cycle rickshaws

- Poor quality
- Heavy
- Slow
- Unsafe
- Insecure
- Uncomfortable
- Inconvenient
- Inefficient
- Low status
Indonesia
Nepal
The possibilities...
In April 2013, ADB brought together a group of international rickshaw design specialists to develop a modernized rickshaw applicable to countries in Asia and the Pacific.
The Challenge: Can we achieve this at an affordable price for Asia and the Pacific?
1. **Low cost**
   - Under $750 for pedal version
   - Under $1,500 for electric-assist version

2. **Efficient**
   - Minimize effort and caloric requirements of driver

3. **Quality**
   - Durable and low-maintenance

4. **Modern**
   - Aerodynamic shape

5. **Simplicity**
   - Robust design for developing-nation application
Safety and security

- Highly visible in traffic
- Lights: turn signals, brake lights, retro-reflectors
- Rearview mirrors
- Secure, reclined seat base with lap belt
- Speed limited e-assist
- Vehicle and driver ID
- Powerful, reliable all-weather brakes
- Stable cornering
- Impact resistant
- Covered moving parts
- High rider position to improve visibility
- Locking system
Key design objective: Climate resiliency

NMT vehicles are often used as the only means of transport, emergency services, and supply provision during floods.

Design considerations
1. Floor height and wheel size options
2. Protected enclosure of components and electronics
3. Tradeoff between universal accessibility and climate resiliency
Initial results of ADB design charrette
Modernizing with technology

- **LCD device**
  - Information, customer feedback, advertising, and revenue

- **Lighting system**
  - Vehicle availability, awareness publicity, and safety

- **Driver telematics**
  - Speed, battery level, distance, routing, and location
Final conceptual design of ADB modernized pedicab
First factory unit of ADB modernized pedicab
Driver training program in Lumbini, Nepal
Lumbini pedicab fleet
Enhancing the cultural heritage of Lumbini with e-pedicabs
Transforming mobility... transforming lives
Recent Development/Effort

• Government is purchasing 300 electric buses
• Charging stations are established widely
• Private sectors investing on e-buses
Challenges

- Initial investment of e-buses are very high
- Charging stations are not easily available
- Takes longer time to charge
For More Information

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