Bhutan Sustainable Low-emission Urban Transport Systems

IEA Energy Efficiency in Emerging Economies Training Week for Southeast Asia

16–20 July, 2018
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Brief Background
There is a car for every eight people in the country.
50% of the country’s vehicle fleets to clean and eco-friendly technology by 2030
Contd…
Linkages with the Priorities
United Nations Development Assistance Framework

Bhutan One Programme 2014-2018

Thimphu
2014
Objective and Outcomes

Promotion of low emission public transport (e.g. hybrid and electric) systems as the preferred choice for urban mobility in Bhutan

- Strengthened policy environment
- Strengthened capacity in the adoption and implementation of low emissions transport plans
- Increased investments and private sector participation
## Key Activities

### Selection Criteria for EVs

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Description</th>
<th>Thresholds</th>
<th>Possible importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Suitable for operating conditions of Bhutan (e.g. climate (temperature, humidity), altitude)</td>
<td>n.a.</td>
<td>[Yes / No]</td>
</tr>
<tr>
<td>B2</td>
<td>Equipment age</td>
<td>New</td>
<td>[Yes / No]</td>
</tr>
<tr>
<td></td>
<td><em>We assume EVSE should be new.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>Compatible with selected EV and its fast charging protocol and mode of communication</td>
<td>n.a.</td>
<td>[Yes / No]</td>
</tr>
<tr>
<td>B4</td>
<td>Capability of fast charging (DC)</td>
<td>n.a.</td>
<td>[Yes / No]</td>
</tr>
<tr>
<td></td>
<td><em>All EVs should be capable of using fast charging to be suitable for taxi service operation.</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Charging infrastructure

<table>
<thead>
<tr>
<th>Type</th>
<th>AC level 1 charging</th>
<th>AC level 2 charging</th>
<th>DC fast charging</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>3–8 Km per 1 hour of charging</td>
<td>16–32 Km per 1 hour of charging</td>
<td>100–130 Km per 20 minutes of charging</td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td>120 volt (V) AC plug</td>
<td>240V (residential) and 208V (commercial)</td>
<td>208–480 V. Requires three phase input</td>
</tr>
</tbody>
</table>

Source: Alternative Fuels Data Center (2017), McDonald (2016)
<table>
<thead>
<tr>
<th>Single Standard</th>
<th>Multi-standard</th>
<th>Multi-port/vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only one standard and only one EV at the same time</td>
<td>Allows charging of different types of EVs (e.g. CHAdeMo and CCS) but only one EV at the same time</td>
<td>Charging 2 or 4 EVs at the same time but only one standard</td>
</tr>
<tr>
<td>Only one standard supported</td>
<td>Cheapest version if only one EV is charged at the same time at one location</td>
<td>Only one standard supported</td>
</tr>
<tr>
<td>Different EV types / charging standards are supported</td>
<td>Cheapest version if only one EV is charged at the same time at one location</td>
<td>Cost effective for charging several EVs of the same standard at one location</td>
</tr>
</tbody>
</table>

Proposed for current project!
Improving Safety and Capacity Building
Implementation Modality

Project Organisation Structure

Project Board/Steering Committee

Senior Beneficiary: GNHC
Executive: MoIC
Senior Supplier: UNDP/GEF

Three Tier Project Assurance:
UNDP Bhutan, Bangkok Regional Hub, UNDP-GEF HQ New York

Project Unit:
Project Manager (RGoB funded), Project Assistant, Project Technical Support, UNDP

Project Support: Project Technical Committee

TEAM A:
Policy and regulatory short-term experts

TEAM B:
Awareness and capacity building, including gender (short-term experts)

TEAM C:
Financial Support Mechanism (short-term experts)

Proposed Project Board Members:
- Ministry of Information & Communication
- Gross National Happiness Commission
- Ministry of Finance
- Road Safety and Transport Authority
- National Environment Commission
- Thimphu Municipality
- Bhutan Power Corporation
Figure 7 Process diagram for implementation of the financial support mechanism

MOIC (UNDP-GEF PMU)

A. Selection and signature of Long-Term Agreements with qualified EV suppliers
B. Taxis select and purchase “qualified” EVs from “qualified” suppliers with discount
C. MOIC reimburse EV supplier the agreed amount of discount for each EV
<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Risks</th>
<th>Type</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inadequate E–waste management &amp; disposal of used batteries</td>
<td>Env</td>
<td>Enabling regulation on e–waste management and its enforcement</td>
</tr>
<tr>
<td>2</td>
<td>EV Technology failure</td>
<td>Operational</td>
<td>The project will introduce technical qualification criteria for qualified EV suppliers</td>
</tr>
<tr>
<td>3</td>
<td>Low uptake of financial support mechanism</td>
<td>Market</td>
<td>The project proposes staged approach to EV Discount</td>
</tr>
<tr>
<td>Quality Rating Level</td>
<td>Requirements for overall project rating</td>
<td>Actions if overall project rated at this level</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Exemplary</td>
<td>All criteria rated high. At least three criteria rated exemplary.</td>
<td>Proceed with project</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>All criteria rated satisfactory or higher</td>
<td>Proceed with project</td>
<td></td>
</tr>
<tr>
<td>Satisfactory</td>
<td>At least six criteria are satisfactory or higher.</td>
<td>Proceed with project, with minimal revisions if necessary.</td>
<td></td>
</tr>
<tr>
<td>Needs improvement</td>
<td>At least three criteria rated satisfactory or higher.</td>
<td>Proceed only if substantial remedial action is taken to improve quality.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-All issues requiring management action must be addressed</td>
<td></td>
</tr>
<tr>
<td>Inadequate</td>
<td>One or more criteria rated inadequate</td>
<td>Do not proceed with project (rejected, suspended until action is taken/cancelled).</td>
<td></td>
</tr>
</tbody>
</table>
Way Forward

Project idea
PIF submission/approval
ProDoc submission
Inception Phase
Project Midterm
Project Closure

Date: March 2018
Date: August/Sept 2018
Thank You