Overview and market perception of consumers towards electric mobility in Ghana

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OUTLINE

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3. DEVELOPMENT ISSUES IN GHANA’S TRANSPORT SECTOR
4. CONCEPT/ RATIONALE FOR ELECTRIC MOBILITY
5. RATIONALE FOR ELECTRIC MOBILITY
6. KEY CONSIDERATIONS FOR ELECTRIC MOBILITY
7. RECOMMENDATIONS
Urban Transport System

- Population: 28.0 million
- Vehicles: 2.2 million
- Area: 239,460 km²
- Road: 73,000 km

Past 7 years

(Persons) (2010y) 24.6M
(P2017y) 28.0M

(Vehicles) (2010y) 1,372,287
(2018y) 2,2M

Fuel Types

- Petrol: 61%
- Diesel: 28%
- LPG: 11%

Modal Split

- Trotro: 46.9%
- Car/Taxi: 42.9%
- Bus: 10.1%
- Railway: 0.1%

Source: DVLA
Development Issues of the Sector

- Lack of operational standards for public transport services
- Poor transportation management particularly in urban areas
- Inadequate facilities for PWDs in the transport system
- Weak enforcement of road traffic regulations
- High incidence of road accidents
- Congestion and poor air quality within urban areas
Development Issues of the Sector
Severe congestion occurs in AM/PM on major arterial roads.

- **Travel Speed(AM) : to CBD**
- **Travel Speed(PM) : to Outskirts**
• 2012 Air quality data available indicate that 75% of the samples collected at roadside locations in Accra exceed the national 24-hour mean limit value of 70 μg.m$^3$ for PM$_{10}$.

• For NO$_2$, 40% of the samples collected exceeded the annual WHO guideline of 40 μg.m$^3$. 
Development Issues of the Sector
• Ghana Nationally Determined Contributions support promotion of sustainable mass transportation systems
• Potential CO$_2$ emission reduction
• Improved fuel economy - Improved fuel efficiency
• Local air pollution - Avoided NOx, PM or black carbon
• Low carbon technology transfer – development of local skills (artisans, operators, garage)
• Contribute to Paris Agreement limiting Global Warming (<2 C)
CONCEPT OF ELECTRIC MOBILITY

• Electric vehicle (EV) is a relatively new concept in the sub-region.
• Traditional conventional vehicles produce a high amount of carbon emissions that contribute to pollution, greenhouse gases and climate change.
• The cost of running a fossil fuel vehicle is higher (cost per mile)
• Electric Mobility policies have been largely on the following:
  ❑ Purchase cost
  ❑ Charging infrastructure
  ❑ Maintenance
  ❑ Creating public awareness and acceptance
CONCEPT OF ELECTRIC MOBILITY
ELECTRIC MOBILITY

Proven, reliable system
Up to 250km per charge

Aluminum body
Control panel
Recharging system
AC electric motor
Battery packs
<table>
<thead>
<tr>
<th></th>
<th>ICE Vehicle</th>
<th>Electric Vehicle*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>~300 miles per refuel</td>
<td>~100 miles per charge</td>
</tr>
<tr>
<td></td>
<td>(~480 km)</td>
<td>(~160 km)</td>
</tr>
<tr>
<td>Time to Refuel</td>
<td>5 minutes</td>
<td>35~40 minutes (Fast Charging)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 hours (Slow Charging)</td>
</tr>
</tbody>
</table>
Charging Technologies

1. **Conductive charging technology**

   - **Plug-In**
   - **Overhead Wires**
   - **Pantograph**

   Power: < 650 kW
   Efficiency: > 99.5%

2. **Inductive charging technology**

   Power: < 300 kW
   Efficiency: 80-95%
ELECTRIC BUSES: OPTIONS FOR CHARGING OF VEHICLES

Continuous charging
- Expensive infrastructure
- Loses flexibility

Overnight charging
- Heavy vehicles
- Reduced capacity

Opportunity charging
- Expensive vehicles
- Magnetic shielding
- Expensive installation
- Low energy transfer efficiency

Inductive charging
- Expensive infrastructure
- Loses operational flexibility?
KEY CONSIDERATIONS FOR ELECTRIC MOBILITY

• Fiscal and non fiscal policy measures
  - Charging infrastructure for EVs at public places
  - Home charging application
  - Cost of EVs: US$25,000 to US$85,000 for a standard electric car
  - Fuel efficiency
  - Emission standard
  - Maintenance and service cost,
  - Comfort features
  - Maintenance and after sales services support cost (replacement and disposal of batteries)
  - Purpose (private/ commercial)
KEY CONSIDERATIONS FOR ELECTRIC MOBILITY

• **Buyer’s Preference**
  - Affordability (cost of EVs is around 2 to 2.5 times more than a comparable conventional vehicle)
  - Performance (depends on battery capacity, higher range result in higher price)
  - Durability

• **User Friendliness**
  - Ease Of Charging (does not require dedicated)
  - Maintenance (EV offer a significant advantage on operating cost (running plus maintenance cost) which could be as low as 1/4th of that of a conventional vehicle)
  - EV for commercial operations reduces operating cost
  - Low mileage for personal mobility (high investment cost)
• Ghana Customs, Excise and Preventive Service (CEPS) (Management Law) PNDCL 330 of 1993
• CET Act of 2015, Act 905
• HDL and valuation of Imported vehicles under section 60 Of Customs Act, 2015 (Act 891)
• Over aged vehicle import penalty: impose penalties on vehicles older than 10 years
• Luxury Vehicle Tax
• Vehicle financing by Banks in Ghana
• Fleet Renewal Policy, 2010
• Low Sulphur Reduction Strategy
### Consumer Awareness and Knowledge

#### Concerned about Air Pollution

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Never</td>
<td>10</td>
</tr>
<tr>
<td>Occasionally</td>
<td>20</td>
</tr>
<tr>
<td>Often Times</td>
<td>40</td>
</tr>
<tr>
<td>Always</td>
<td>80</td>
</tr>
</tbody>
</table>

#### Knowledge on EV

<table>
<thead>
<tr>
<th>Knowledge Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good knowledge on electric vehicles</td>
<td></td>
</tr>
<tr>
<td>Moderate knowledge on electric</td>
<td>20</td>
</tr>
<tr>
<td>Little knowledge on electric</td>
<td>40</td>
</tr>
<tr>
<td>No knowledge on electric vehicle</td>
<td></td>
</tr>
</tbody>
</table>

#### Knowledge/Ownership

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</tbody>
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*No*: Red bar, *Yes*: Blue bar.
CONSUMER AWARENESS AND KNOWLEDGE

CO2 Emissions
Key Features
Brand
Performance
Fuel Efficiency

- Very Influential
- Influential
- Not very Influential
- Not Influential
- Indifferent
Potential Barriers to Electric Mobility

- Range: 11%
- Price: 15%
- Design: 3%
- Finding charging points: 12%
- Having to plan journeys: 12%
- Cost of maintenance: 12%
- Electricity Consumption: 16%
- Expertise to repair: 4%
- Lack of knowledge of electric vehicles: 13%
- Others: 13%
- Others: 1%
Potential Barriers to Electric Mobility

**Cost**

- Very Influential: 70%
- Influential: 17%
- Not very Influential: 8%
- Not Influential: 3%
- Indifferent: 2%

**Finance Options**

- Personal Loans: 21%
- Bank Loans: 64%
- Hire Purchase: 15%
- Not Influential: 8%
SUMMARY OF KEY BARRIERS

• Cost
• Performance (range, fuel efficiency)
• Interest on loans
• Local taxes
• Maintenance
• Operating Cost (stable supply of electricity and tariff etc.)
• Charging Infrastructure
• Knowledge Gap and awareness creation
• Replacement and disposal of batteries
Policy Recommendations

• Policy measures have different level of impact on the market
  - Cost: revision of Import levies in favour of EV
  - Interest: Government to collaborate with banks to offer cheaper or interest free loans to finance EV. (Similar to Car loan offered to Public Servants by MOF)
  - Rate of depreciation of 80% instead of 40% for vehicles older than 3 years in favour of EVs
  - Tax waivers
  - Road tolls, exemptions
Policy Recommendations

- Non-fiscal measures fiscal sustained over a longer term to have a greater impact on adoption
  - Performance: Depending on battery capacity but improves with technology
  - Maintenance: Encourage the Private Sector to build capacity for aftersales service support
  - Operating cost: negotiated tariffs for public charging facilities, Options to also use solar charging- low operating cost for commercial usage
  - Charging Infrastructure: Support for the private sector to invest develop and manage public charging facilities. Encourage property developers to include EV infrastructure in designs
  - Battery production, Leasing and swapping (cylinder circulation)
  - Congestion charging with Permits for EVs
  - Education and awareness creations on EVs
  - Phased introduction into existing public transport fleets
THANK YOU