Western Michigan Electric Vehicle Charging Infrastructure Case Study

In spring 2015, Western Michigan University is set to revise its current electric vehicle charging policy, which currently allows for free charging to staff and public. This document summarizes the key findings, identifies areas of further research, and proposes policy that is conducive to further acceptance and use of electric vehicles.

**Electricity vs. Gasoline**

<table>
<thead>
<tr>
<th></th>
<th>Miles per Lb CO₂</th>
<th>Miles per Dollar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric - Avg</td>
<td>0.94¹</td>
<td>14.38²</td>
</tr>
<tr>
<td>Electric - Min</td>
<td>0.60¹</td>
<td>9.13²</td>
</tr>
<tr>
<td>Electric - Max</td>
<td>1.49¹</td>
<td>22.75²</td>
</tr>
<tr>
<td>Gasoline</td>
<td>1.02³</td>
<td>5.71³</td>
</tr>
<tr>
<td>E10</td>
<td>1.06³</td>
<td>5.71³</td>
</tr>
</tbody>
</table>

**Charging Statistics - Time and Energy Use by Staff and Public**

- 19% > 16 hrs
- 31% > 5 hrs < 16 hrs
- 35% > 30 min < 5 hrs
- 15% < 30 min

81% Staff Use

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- 19% Public

**Pricing Model**

- Suggested Maximum⁴ 1.33$ per hour
- WMU Public Costs⁵ 0.58$ per hour
- 2.64$ per session

**Costs of Energy Generation**

- National Average Cost⁶ 0.13$ per kWh
- WMU’s Average Cost² 0.08$ per kWh

**Other Facts:**

- Average occupancy over the last year: 32% Occupancy
- Average sessions per day over past two years: 9 per day
- Unique users per day: 7 per day average, 17 max

**Final Recommendations**

1. Certain chargers should be removed from the network, while maintaining their charging capability to decrease annual costs.
2. If a charging scheme should be implemented, costs should be shared over public and staff, since staff are the primary users.
3. Alternative charging systems besides Chargepoint should be investigated, to further reduce costs.
4. Stations should be better distributed to maximize charging coverage over campus.
5. Station users should be interviewed or polled to discuss station redistribution and provide feedback on proposed changes.
1. Energy generated using natural gas (1.22 lbs CO₂ per kWh) http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11
2. Cost of 0.08$ per kWh as provided by Facilities Management
5. Assuming staff will be charged 0.10$ per kWh
6. US Total Average http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a
7. ChargePoint Pricing Data