Electromobility Modelling

by

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Green eMotion project (GeM)

Big European Project monitoring cars in 2011-2013 in Ireland, Denmark, Sweden, Spain.
A total of 457 vehicles were monitored on 65800 trips

<table>
<thead>
<tr>
<th>Vehicle Make-Model</th>
<th>Number of trips with non-zero Length</th>
<th>Number of trips with non-zero Length and Energy Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>no make-no model</td>
<td>533</td>
<td>305</td>
</tr>
<tr>
<td>Citroen-Zero</td>
<td>141</td>
<td>137</td>
</tr>
<tr>
<td>Mitsubishi- i-MiEV</td>
<td>31,428</td>
<td>19,594</td>
</tr>
<tr>
<td>Peugeot-iOn</td>
<td>25,453</td>
<td>24,080</td>
</tr>
<tr>
<td>THINK-City</td>
<td>8,244</td>
<td>7,911</td>
</tr>
</tbody>
</table>
Is autonomy an issue? (GeM data)

1. 80% trips < 50 km/day
2. trips/day ~5 (80% of all trips)
Is parking important (GeM data)?

1. Frequent short stops -> fast charging?
2. No particular preference for time of parking (during the day). Duration?

**Beginning of Parking**
- Average = 13.7
- Median = 13.4
- Mode = 16.5

**Parking Time Duration** (valid stops=60,977)
- Average = 3.32
- Median = 0.11
- Mode = 0.5
Energy consumption (GeV data)

EC ~ 18.32 kWh/100 Km (based on experimental data) Used in DIONE

Energy consumed VS Trip Distance for cars with BEV (number of trips=51,604, number of vehicles=357)

Fit histogram (and red line): 
\[ E = 0.1832 \times d \]

\[ R^2 = 0.9977 \]
Power requested from the Grid per time of the day (GeM data)

Combination of slow and fast chargers, most car not privately owned.

Power requested per charge

- Average = 1.45 KW

Total power requested

- Average = 20 MW
State of charge at beginning and end of charge (GeM data)

State of Charge at Start of Charging
(recs: 25607)

Percent of charge (%)
Relative frequency
0.00 0.02 0.04 0.06 0.08 ... 10 20 30 40 50 60 70 80 90 100
Average = 61.61
Median = 65.06
Mode = 72.5

State of Charge at End of Charging

Percent of charge (%)
Relative frequency
0.0 0.1 0.2 0.3 0.4
0 10 20 30 40 50 60 70 80 90 100
Average = 79.67
Median = 85.72
Mode = 97.5
Analysis of consumption per country

Patterns of consumption linked with weather and use of A/C

DK: North
ES: South
IE: better correlated to ES?
SE: North
Next steps

- GeM data are a source of data for European Electric Vehicle Mobility
- Define what is needed from EVE in order to define typical ageing patterns
- Agree with JRC if they can do further analysis according to EVE specs
THANK YOU FOR YOUR ATTENTION.