21st Meeting of the Electric Vehicles and the Environment Informal Working Group (EVE IWG)
Outline

- 2015-16 mandate and progress
- Communication with WLTP
- Battery performance and durability
- Determining the powertrain performance
- Method of stating energy consumption
- Battery recycling/recyclability
- Schedule & locations of past & upcoming meetings
- Next Steps
2015-16 Mandate

- A two-part mandate was approved by WP.29 in November 2014
  - Part A: 2015-2016
  - Part B: potentially 2017 and beyond
- Four work topics in Part A
  - Battery performance and durability
  - Determining the powertrain performance
  - Method of stating energy consumption
  - Battery recycling/recyclability
2015-16 Progress and Results

- 8 meetings (Geneva, Canada, China and teleconference)
- Formal document for WP.29
- Expanded knowledge base about factors affecting EV performance and durability
- Status report describing work completed during the mandate
- Excel model and supporting Word document for method of stating energy consumption
- Part B of mandate approved by AC.3 in November 2016
Battery Recycling/Recyclability

- **2015-16 details**
  - Leadership: Secretary
  - Key Outcomes: Highlight reasons why battery recycling may not be an appropriate topic for WP.29 in general and the EVE specifically

- **Proposed 2017-18 (or 19) details**
  - Leadership: none
  - Key Outcomes: item is removed from the EVE mandate
Battery Performance and Durability

- **2015-16 details**
  - Leadership: Canada and United States
  - Key Outcomes: Expanded knowledge base of factors which impact battery durability

- **Proposed 2017-18 (or 19) details**
  - Leadership: Canada and United States
  - Key Outcomes: Further expanded knowledge base with the goal of a plan/recommendation for development of an EV durability GTR or a determination that the EVE IWG will not be capable of developing a procedure in 2018 or 2019
Battery Performance and Durability

- Key considerations
  - Coordination with WLTP IWG and prescribed durability criteria (age, km, temperature range, etc.)
  - Variety of battery chemistries
  - Variety of xEV architectures
  - Variety of battery management systems (i.e. SOC and temperature controls)
  - Influence on future battery designs (i.e. possible future batteries which are regularly replaced like tyres)
  - Degradation in both battery power and capacity are possible
Battery Performance and Durability

- **Ongoing work**
  - Impact of level 2 vs level 3 charging (Canada)
  - Low temperature durability testing (Canada)
  - Testing capacitor based regenerative braking (Canada)

- **Existing needs**
  - Interested in non-confidential information from manufacturers about methodologies they are using to determine EV battery durability
  - Interested in ideas from EVE group members on key research areas or on-going projects of interest at the national level
Method of Stating Energy Consumption

- **2015-16 details**
  - Leadership: China
  - Key Outcomes:
    - Excel model & supporting Word document for method of stating energy consumption
    - Identified need for additional experts in electricity generation and distribution

- **Proposed 2017-18 (or 19) details**
  - Leadership: China?
  - Key Outcomes: Transferring leadership to another UNECE group such as the Group of Experts on Energy Efficiency (GEEE), and supporting that group moving forward
Method of Stating Energy Consumption

- **Key considerations**
  - Approaching GEEE about taking on a leadership role for this project
  - Approaching UNECE Executive Secretary if GEEE is unable to continue work on this topic
  - Ratio between EV and conventional power for plug-in hybrid vehicles
  - Global variation in infrastructure for the generation and distribution of electrical power
Method of Stating Energy Consumption

- Existing needs
  - Confirm subgroup leadership
  - Develop plan to approach GEEE
  - Develop backup plan to approach UNECE Executive Secretary
Determining the Powertrain Performance

- **2015-16 details**
  - Leadership: Germany & Korea
  - Key Outcomes: Draft plan and timeline to develop GTR on determining xEV powertrain performance

- **Proposed 2017-18 (or 19) details**
  - Leadership: ???
  - Key Outcomes: GTR for determining powertrain performance of xEV in 2018 (or 19)
Determining the Powertrain Performance

- Key considerations
  - Coordination with WLTP IWG
  - Comparability to power rating of ICE vehicles

- Two possible methods
  - Reference method - chassis dyno
  - Candidate method - component testing and calculation
Workplan for Determining the Powertrain Performance

- I. Consideration of the concepts:
  - Reference Method – Chassis dyno testing and calculation
  - Candidate Method – Component testing and calculation

- II. Consideration of the open points
  - Load Collectives and Maximum Power
  - Reference Method => Chassis Dyno Testing with completed vehicle and calculation to determine System Power
  - Candidate Method => Component Testing and calculation to determine System Power
  - Customer Information and other information with added value
Workplan for Determining the Powertrain Performance

III. Determination of work plan with task list and including allocation of work load

IV. Proof of concepts: Studies with different types of HEVs including series HEV, REX and PEVs

V. Test, refine / improve and validation of the method(s)

VI. Drafting of the gtr

VII. Proposal for a draft amendment to GTR No. 15

VIII. Approval at GRPE, voting at WP.29 AC.3
Battery Performance and Durability

- Ongoing work
  - Coordination with WLTP SG-EV

- Existing needs
  - Confirm subgroup leadership
  - Continue coordination with WLTP SG-EV
  - Develop and draft GTR, based on plan approved in Formal Document
  - Find laboratories willing to conduct validation testing necessary to confirm validity of Candidate and Reference Methods
# Past Meetings

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<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Location</th>
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<tbody>
<tr>
<td>EVE-13</td>
<td>12 January 2015</td>
<td>Geneva, Switzerland</td>
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<tr>
<td>EVE-14</td>
<td>20 April 2015</td>
<td>Teleconference</td>
</tr>
<tr>
<td>EVE-15</td>
<td>08 June 2015</td>
<td>Geneva, Switzerland</td>
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<td>EVE-16</td>
<td>19-20 October 2015</td>
<td>Ottawa, Canada</td>
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<td>EVE-17</td>
<td>11 January 2016</td>
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<tr>
<td>EVE-18</td>
<td>11-12 April 2016</td>
<td>Shanghai, China</td>
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<tr>
<td>EVE-19</td>
<td>08 June 2016</td>
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<tr>
<td>EVE-20</td>
<td>26 July 2016</td>
<td>Teleconference</td>
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# Upcoming Meetings

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<tr>
<td>EVE-21</td>
<td>11 January 2017</td>
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<tr>
<td>EVE-22</td>
<td>Spring 2017</td>
<td>United States</td>
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<tr>
<td>EVE-23</td>
<td>June 2017</td>
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<tr>
<td>EVE-24</td>
<td>Fall 2017</td>
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<tr>
<td>EVE-25</td>
<td>January 2018</td>
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<tr>
<td>EVE-26</td>
<td>Spring 2018</td>
<td>TBD?</td>
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<tr>
<td>EVE-27</td>
<td>June 2018</td>
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</tr>
<tr>
<td>EVE-28</td>
<td>Summer/Fall 2018</td>
<td>TBD?</td>
</tr>
<tr>
<td>EVE-29 (if needed)</td>
<td>January 2019</td>
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<tr>
<td>EVE-30 (if needed)</td>
<td>Spring 2019</td>
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<td>EVE-31 (if needed)</td>
<td>June 2019</td>
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<tr>
<td>EVE-32 (if needed)</td>
<td>Summer/Fall 2019</td>
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Next Steps

- Invitation to EVE-22 in the United States is likely to come soon
  - Possible locations include Michigan and California
- Identify and confirm subgroup leads
- Identify host countries/organizations for upcoming meetings
- Conduct workplans of three subgroups