

Japan Comments for EC Proposal about Battery Durability

12.December.2019

Japan basically agree on the EC's proposal.

In addition,

Japan would like to supplement the Japanese guideline proposal, confirm the content of the EC proposal and explain the points of concern; in order to prevent regulation from the excessive requirements.

1. Supplement to the Japanese guideline

1 -1: Definition of SOH

2. Confirmation of the Contents of EC proposal

2 -1: Severe usage vehicles can be removed from SOH distribution and ISC vehicles

2 -2: 3rd party verification

2 -3: SOH based upon the capacity

2 -4: How SOH Information Is Collected

2 -5: Statistical methods

2 -6: DF definition for OEMs with Limited Market Experience

3. Concern

3 -1: DF definition by CP to promote Better Technology

1. Supplement to the Japanese guideline

1 -1: Definition of SOH (quoted from guideline text)

2. Case 2. Indication of the state of health based on **the battery capacity**

- ① This method provides how much proportion of the battery capacity preserved in an EV and PHV against the capacity referred to in the catalogue.
- ② The State of health is measured by using Electronic Control Unit in vehicles.
- ③ The State of health through Vehicle diagnostic tools shall be indicated on this tool, the instrumental panels, or the portable information terminals such as smartphones upon request of users.
- ④ The State of health is indicated in 10% increments.

$$\text{SOH_capacity} = (\text{Capacity_current} / \text{Capacity_initial})$$

$$\text{SOH_range} = (\text{Range_current} / \text{Range_initial})$$

The following method can be assumed to verify reliability of indication.

A verification scheme for third party institutions need to be developed in future.

- 1) The automaker shall disclose a measurement method of **battery capacity** described in catalogue to the third party institutions.
- 2) Battery capacity is measured by the third party with the similar measurement method.
- 3) Reliability of indication is verified by comparing results of the measurement and catalogue specs.

2. Confirmation of the Contents of EC proposal

2 -1: Severe usage vehicles also can be removed from **SOH distribution**

Discussion at coffee break . (Refer to the next slide)

1. Since there is no description at DF definition in the EC proposal (EVE -32 -14 e), we would like to request additional wording on next proposal.

The definition of "Severe usage" should be discussed during and after EVE33.

Example:

Battery temperature information, DC charge frequency information etc....

(Attention to protect Personal Information).

Individual company's judgment

(known conditions such as OEM recommended for use).

2. Function of selection is required to exclude vehicles that are used severely.

Battery Health Ind

Algorithm

Capacity is calculated by a function of each company

$$f = (Time, Temp, Dis, Charging, \dots)$$

$$f' = (\#F, A, V, \dots)$$

OSD

$$Temp = 0-1$$

Dependability

$$Dis = 0-1$$

Screened by conditions of use. How?

Rech

$$Time = SOH = \frac{Current\ Ah \times 1000}{1st\ Ah}$$

Basic definition of the SOH

200g = New

Severely used batteries' Data can be removed

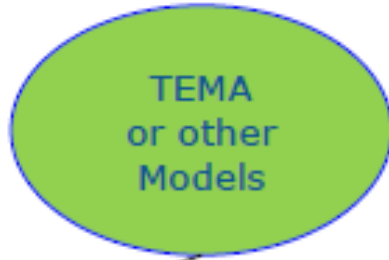
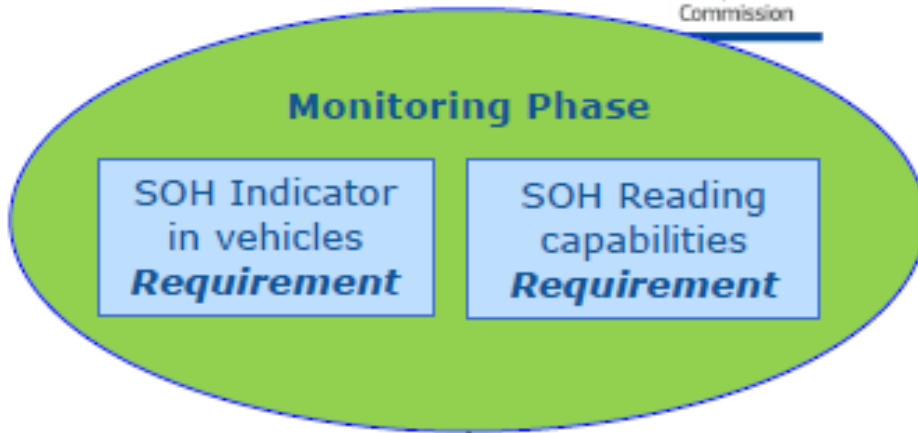
$$DF < 1 \\ = 0.9$$

Firstly distribution are needed. Then decide DF.

Options

1. (1) battery life ind
- Internal Algorithm
2. Multiple exposure data
- External Algorithm
- 3.

IUC
(LTC
Beh)



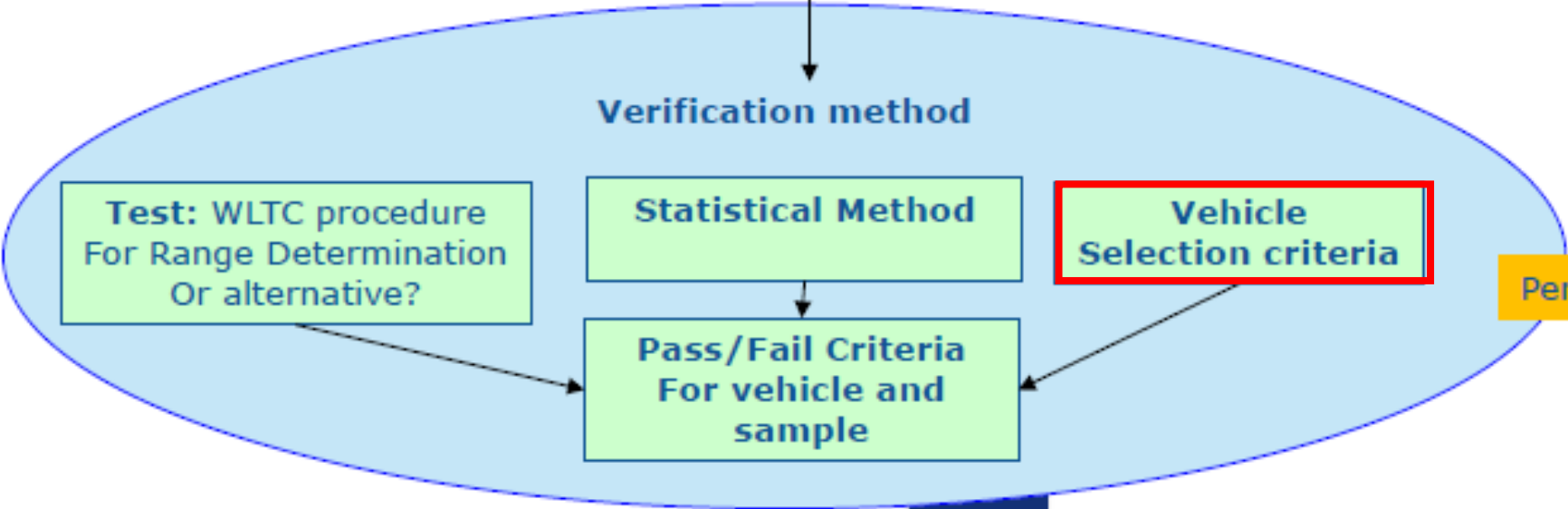
Information gathering

Request to add

Vehicle Selection Criteria



Performance Definition



Performance Verification

2 -2: 3rd party verification

State of health proposal

- *The proposal needs to clearly define how the state of health is measured*
 - **Battery capacity?**
 - **All-electric driving range?**
 - (values in CoC are the correct one to use, not information package)
- *Possibility to read by third party does not mean verification is made*

Verification

- *Should include the possibility to check via independent means the range (not simply reading an ECU signal)*
- *Testing according the WLTC is currently the only option*
- *Rules are obviously needed on sample size, tolerances, etc..*

Both below written are needed?

1. Verify the accuracy of the ECU and/or the display system.
 - < Difference between actual vehicle DF and ECU readings.>

OBFCEM; verify the difference between Calculated fuel consumption value of ECU and measured value by carbon balance method in CDY

2. Verify the declared DF and ECU reading DF
 - <Difference between the declared DF and the DF by the ECU calculation>

<Concern>

Calculated values by the ECU are highly variable.

2 -3: SOH based upon the capacity

Alternative approaches

➤ *Allow manufacturers to define and declare a capacity fade, or range deterioration*

or

- *Those CPs that want to promote better technology, may decide to define a maximum range deterioration*
- *Verification checks (during ISC) should be developed based on WLTC*

Is it possible to check the SOH by capacity other than EV range of WLTC driving?

We would like to confirm the possibility of Japan's guideline method 1 -1 .(previous slide)

2 – 4 : How SOH Information Is Collected

What the measures we should consider ?

1. Build a centralized collection network system in each country and region
2. Collected by OEM and provided to the authorities
3. Ask consultants to collect

2 – 5 : Statistical methods

What statistical methods we should consider?

2 – 6 : DF definition for OEMs with Limited Market Experience or Data

In a situation where the data size is small,
for example,

It is considered that the deviation or error may become large.

3. Concern

3 -1: DF definition by CP to promote Better Technology

Alternative approaches

➤ *Allow manufacturers to define and declare a capacity fade, or range deterioration*

or

➤ *Those CPs that want to promote better technology, may decide to define a maximum range deterioration*

➤ *Verification checks (during ISC) should be developed based on WLTC*

CP will be allowed to set DF

1) It might not be properly operated to differentiate the production for the market according to each CP's intended DF.

2) Considering the collected SOH distribution in the market, CP should define DF that will promote technology.

What we should promote is the spread of EV, and, it should not lead to a high-cost product by setting a high DF.

Better technology development for EVs is not to achieve a high DF but to improve DF by a more reasonable cost, which leads to the development of sustainable EV market.