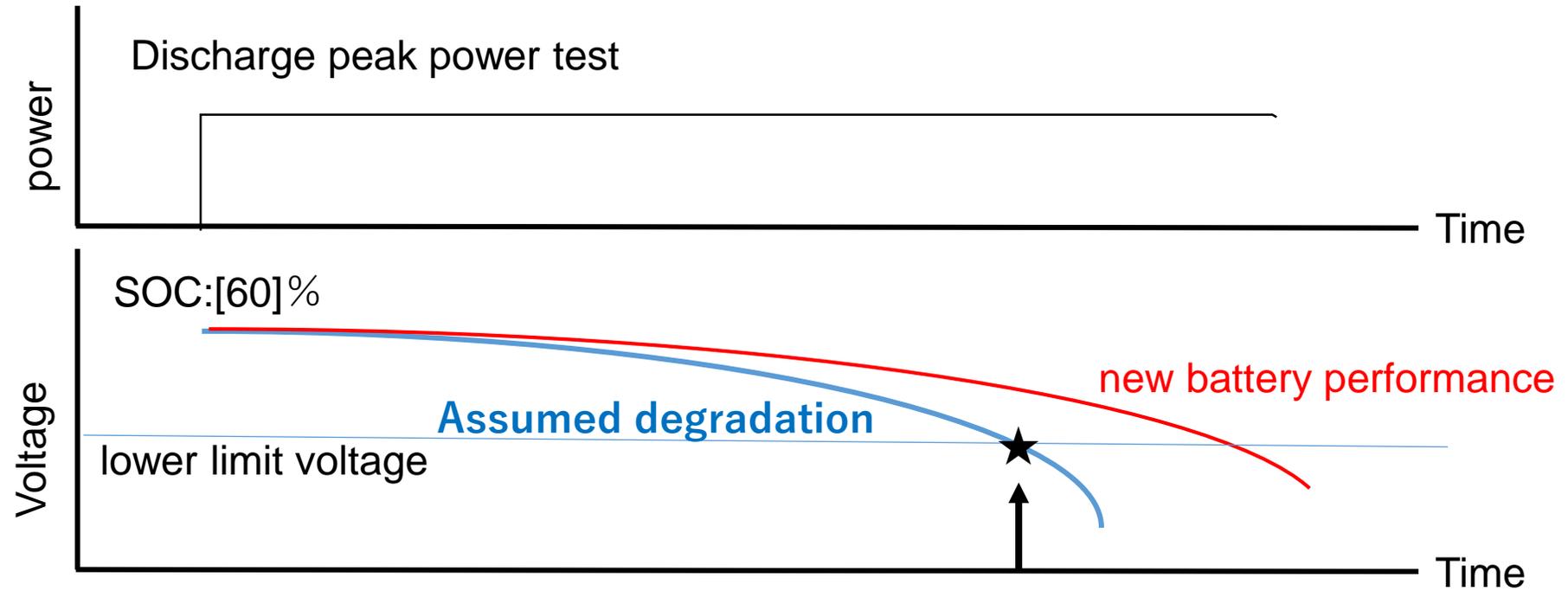


JAPAN comment on “ power fade”
Of HD Battery durability
@EVE55

26. April.2022

OEM decision concept in BMS for Battery power output



1. The battery output values are decided for each conditions (SOC, temperature, etc.) by the assumed battery degradation in the market.
 2. The values vary depending on battery characteristics: capacity-oriented battery (BEV), power-oriented battery (HEV and PHEV)
- The battery output should be decided which the customer will not feel the power change during their usage period. (★).**

< JAPAN Position >

No need for SOH of battery power fade

We understood that The reason why EPA pointed out the necessity of power fade SOH is because of the customer's point of view . We would like to confirm the specific proposal on what the regulatory requirement will be described in the GTR.

APPENDIX

Battery Durability GTR for HD; Topics of battery power degradation (power fade)

< **Purpose of GTR** > Discussed at the beginning for LD .

For electric vehicles (BEV, PHEV) deployment, **the substandard batteries** should be eliminated from the market.

< Means >

1. Visualization of Battery SOH = > Definition of SOCE/SOCR and Monitor on-board values
2. Set the MPR = > Defined from Market data by utilizing "Geo-tab"
3. Verification of Performance = > ISC Part A: On-board SOCE Accuracy Verification
(Use of Certification Test Method) ISC Part B: Verification of Battery Degradation distribution

< **Battery power fade (Degradation)**>

1. Is it possible to define a indicator(*) of power fade (degradation)? (*State of Certified Power)

The reference certified value of the Battery power does not exist.

Do we develop the test procedure of in-vehicle battery power?

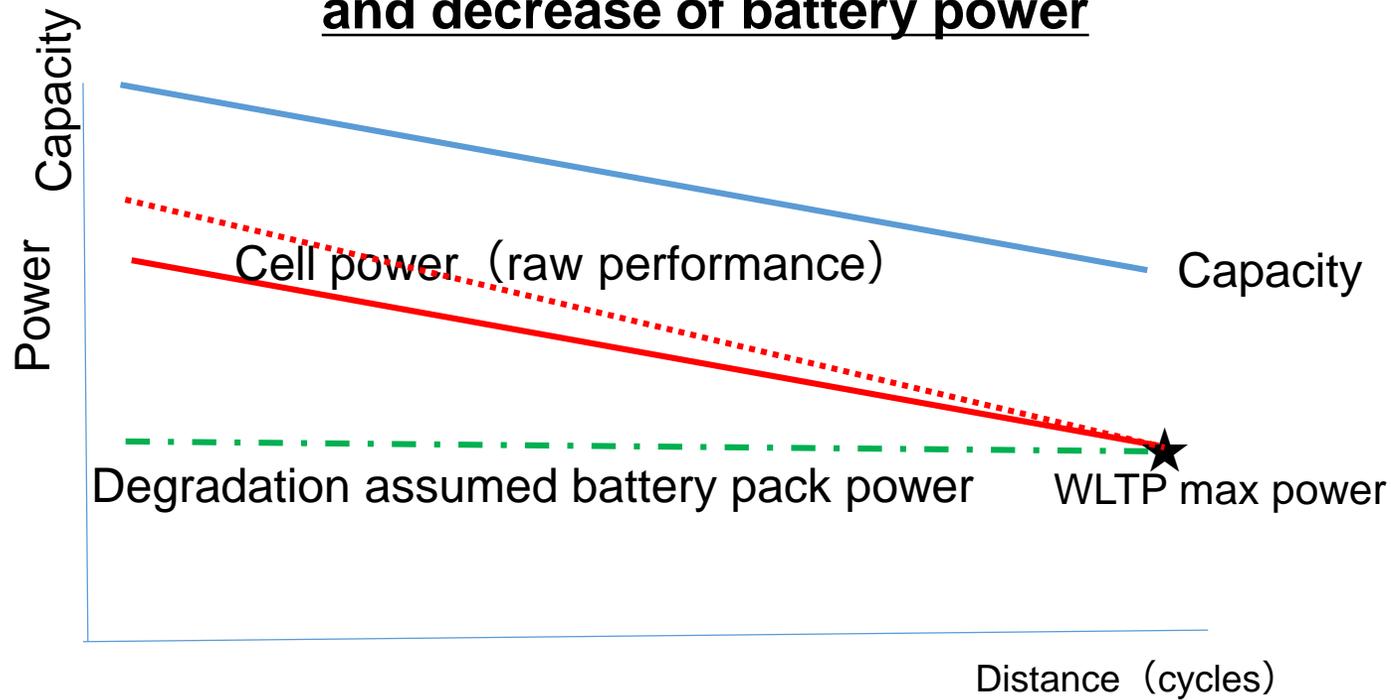
- Candidate 1: Peak power test under consideration by JRC
- Candidate 2: Revision of GTR 21

2. Can the substandard battery be defined (MPR for power fade)?

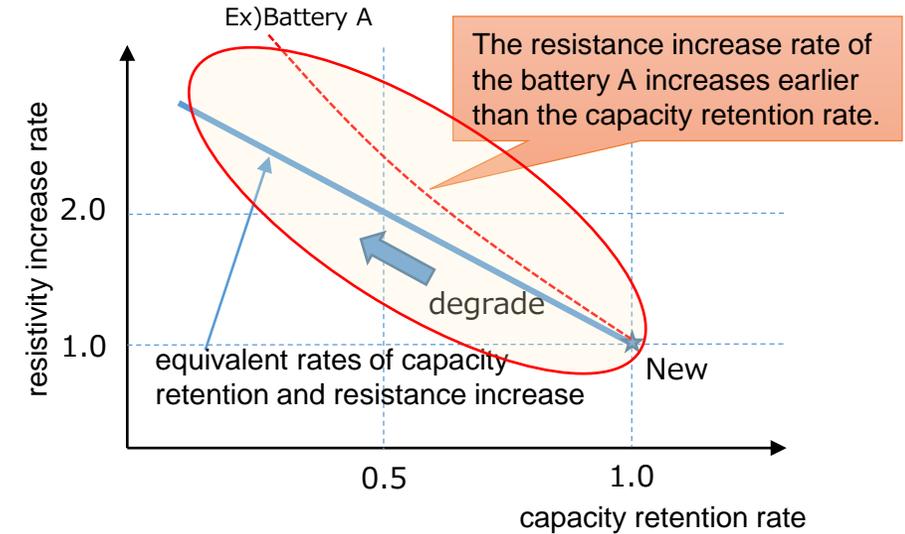
3. No test procedure to perform ISC; Part A : even if the certification procedure will be developed,
how will the maximum output test be conducted?

Part B : Operation near the maximum power is required at the market.

Correlation between degradation of capacity and decrease of battery power



Example of degradation (depending on the battery spec.)



< Discussion >

1. Correlation between capacity degradation and power degradation due to battery use (upper right)

There is a correlation that internal resistance also increases (= power decreases) as the capacity decreases, but the ratio is not likely to be the same (assuming that it varies depending on the battery specification).

In the case of LD (All JAMA companies):

The EV range is reduced due to a decrease in capacity, but there is no effect on the running power.

If **the output value is designed in the BMS based on assumed degradation**, there is no power fade from the certification.

2. What level (Output value, duration, etc.) of durability performance should be considered in the HD battery ?

It will depend on each OEM.