

Informal document GRVA-14-52
14th GRVA, 26-30 September 2022
Agenda item 8(b)

Submitted by the expert from CLEPA

UN Regulation No. 13 and Electro Mechanical Brakes

Introduction and recap

UN Regulation 13 defines:

- **Transmission** means the combination of components comprised between the control and the brake and linking them functionally. *The transmission may be mechanical, hydraulic, pneumatic, electric or mixed.*
- **Control Transmission** - means the combination of the components of the transmission which control the operation of the brakes, including the control function and the necessary reserve(s) of energy.
- **Energy Transmission** - means the combination of the components which supply to the brakes the necessary energy for their function, including the reserve(s) of energy necessary for the operation of the brakes.

→ *The transmission may be mechanical, hydraulic, pneumatic, electric or mixed.*

UN R13 was updated in 1990s to account for an electronic “Control Transmission” but still assumes Pneumatic “Energy Transmission” in the service braking system.

- **Pneumatic Energy limitation is shown in two ways:**

Design Specifications – E.g. Where limits are in kPa.

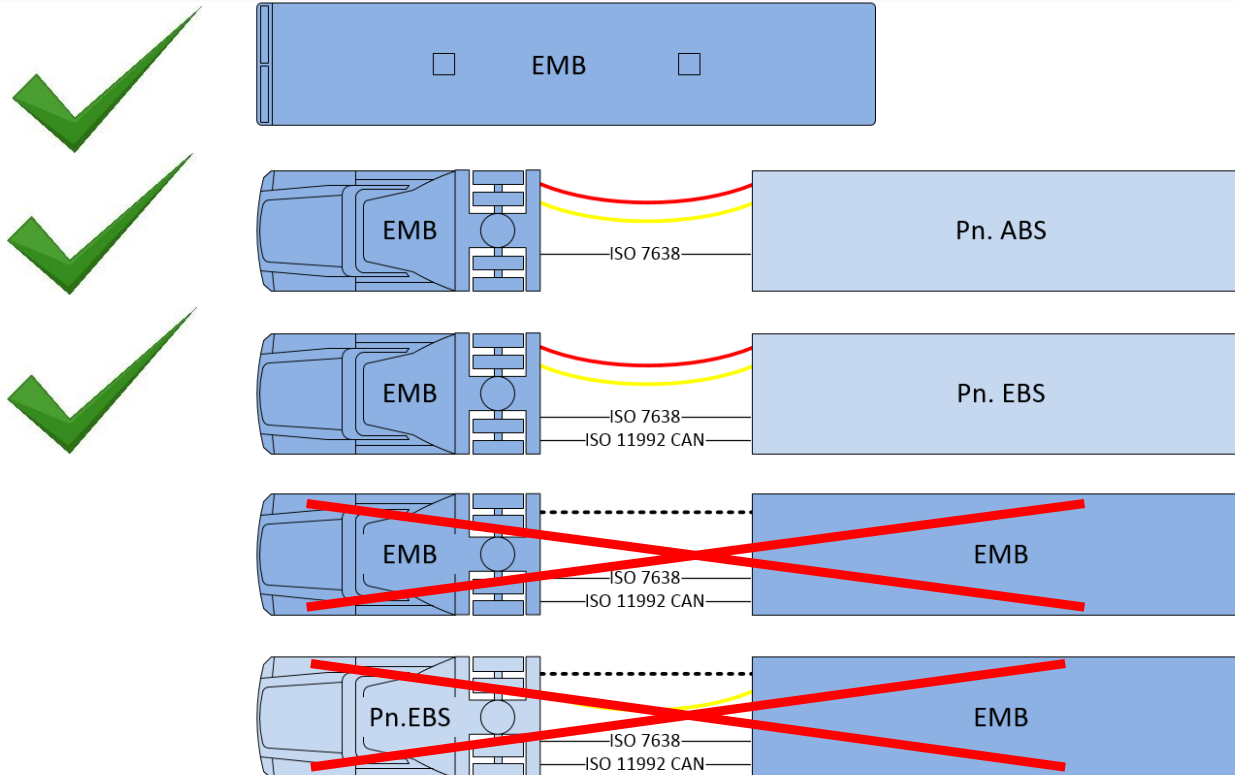
Design Limitations – E.g. Where it is assumed air is the medium.

- **Electro Mechanical Brake Technology** is being developed by the industry using *Electric Energy Transmission* in the service braking system and the UN R13 needs to be updated accordingly.

UN R13 and Electro Mechanical Brakes (EMB)

Amendment scope and motivation

- Motor vehicle with EMB brakes on all axles (not mixed with Pneumatic Or Hydraulic systems)
- Motor vehicle with EMB brakes with “conventional” trailer interface according to current UN R13
- Trailers with EMB excluded from scope
- UN R13-H not included but considered, in particular when creating new definitions

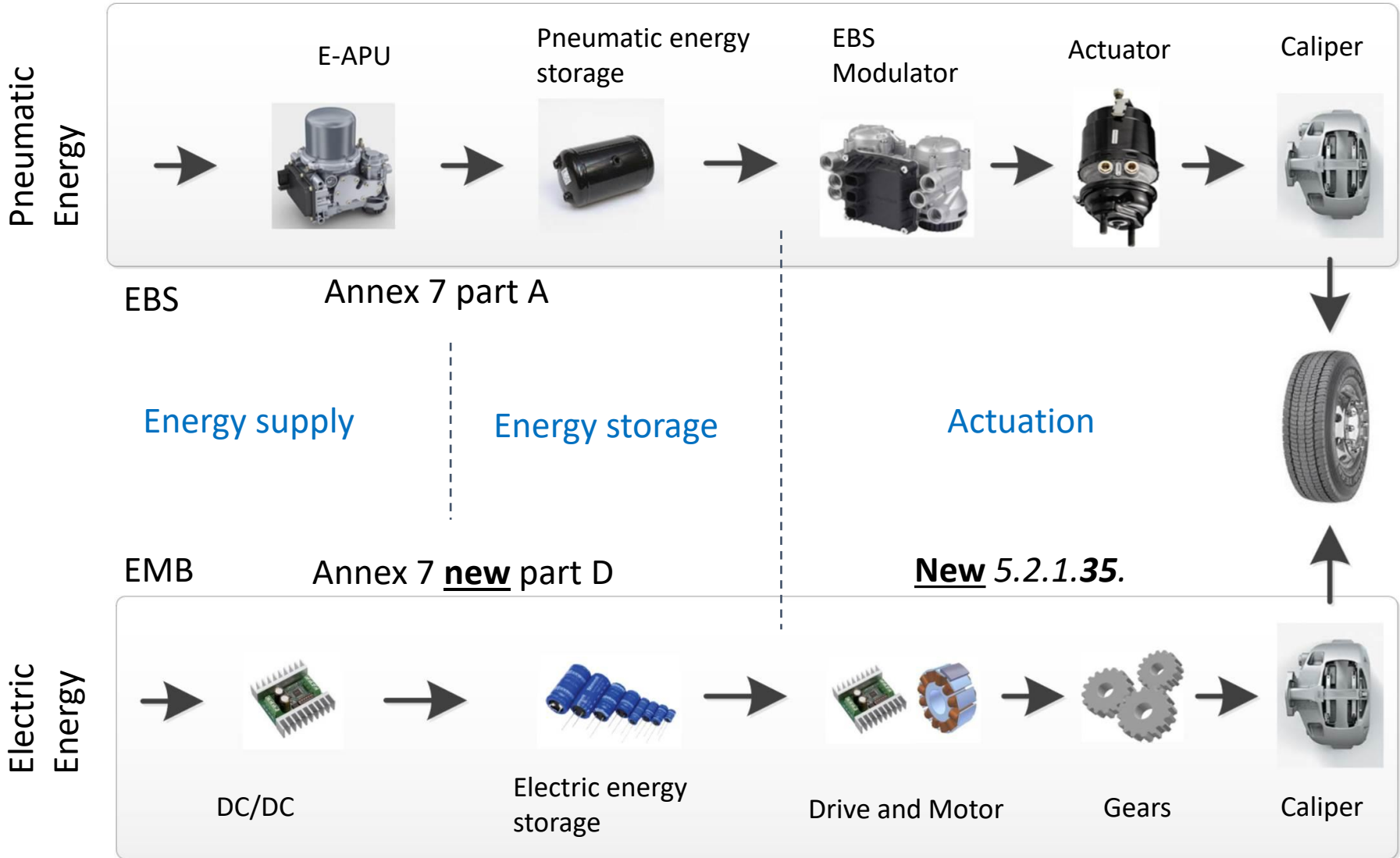


Advantages and possibilities by amending *Electric Energy Transmission* to UN R13

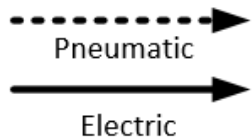
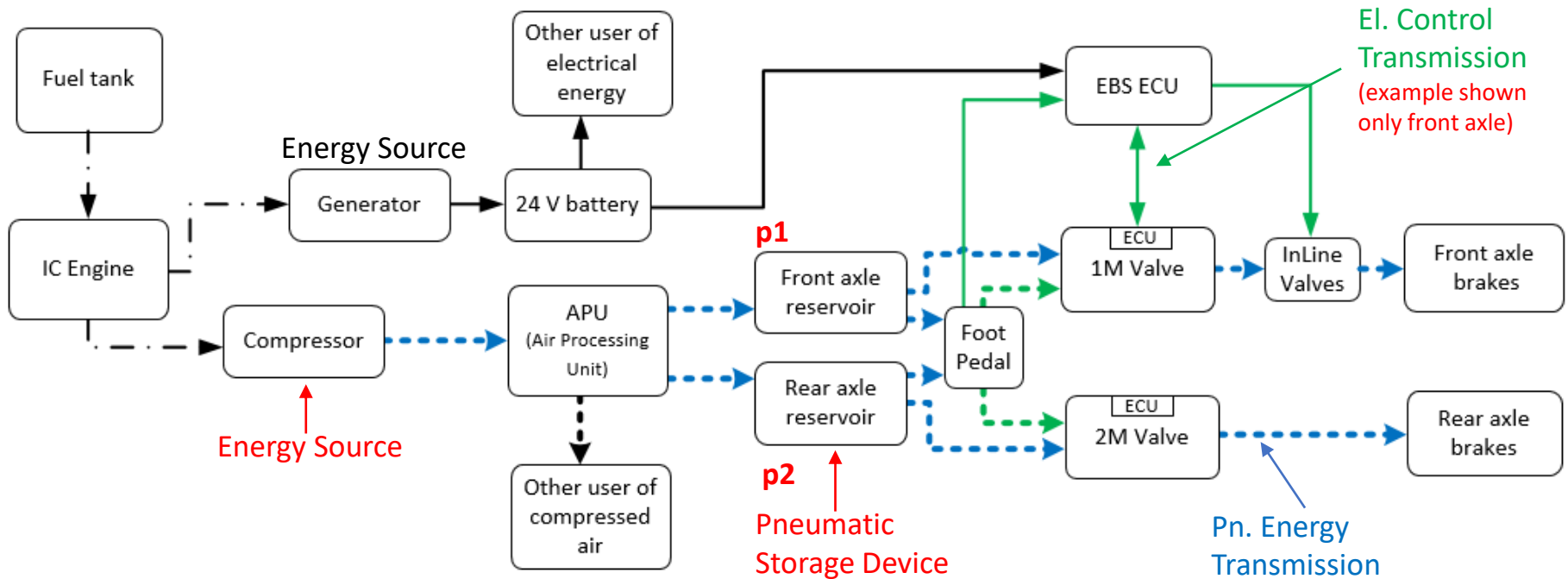
- Improved energy efficiency in EV's (vs. air compressor)
- Improved braking control
- Elimination of noise emissions from pneumatics

UN R13 and Electro Mechanical Brakes (EMB)

Energy Transmission principles (Pneumatic vs. Electric)

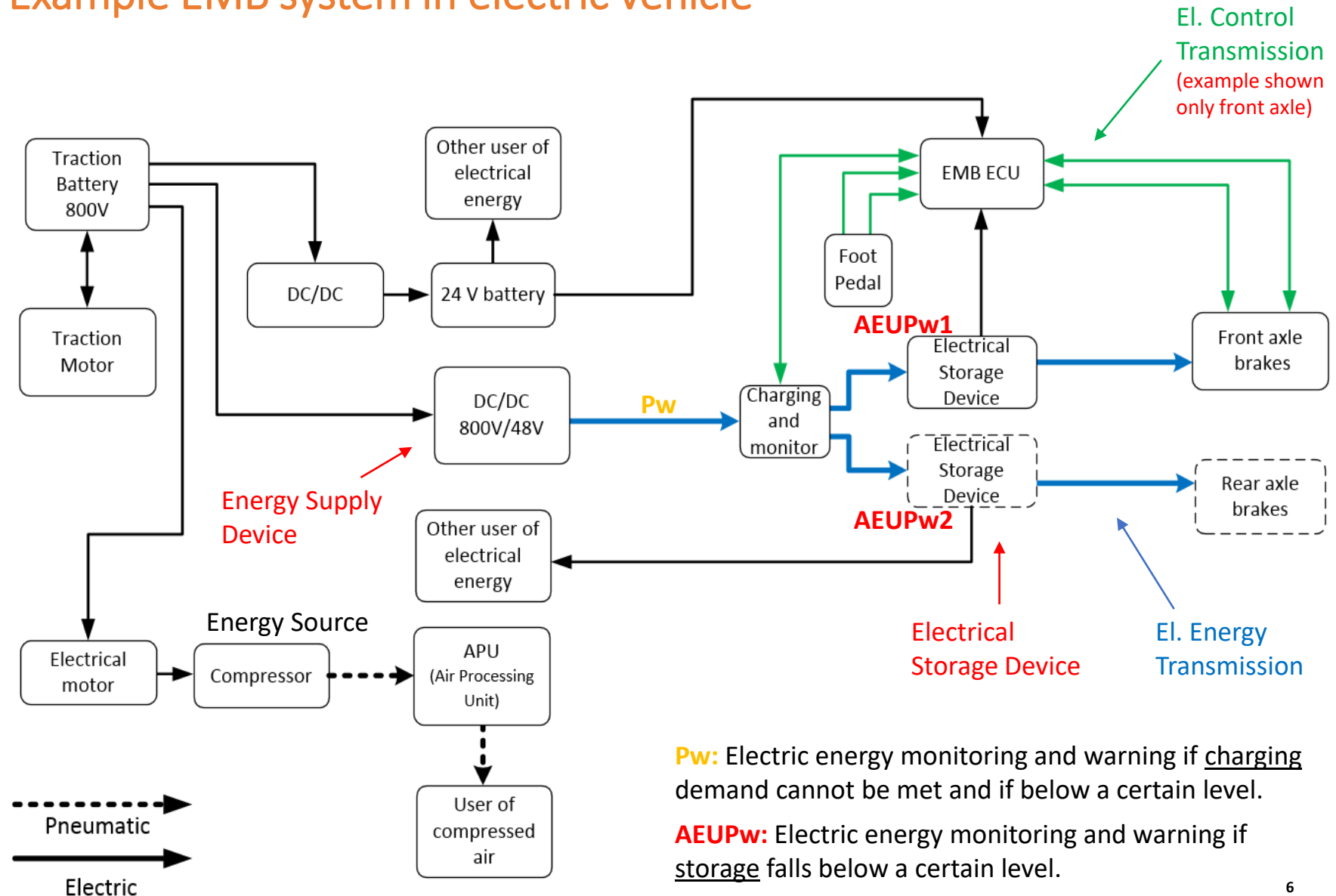


Example EBS system of today in vehicle with combustion engine



p1 and p2: Pneumatic energy monitoring and warning if storage falls below a certain level.

Example EMB system in electric vehicle



Electrical Energy Storage device

Addressing the effect of ageing

New definitions:

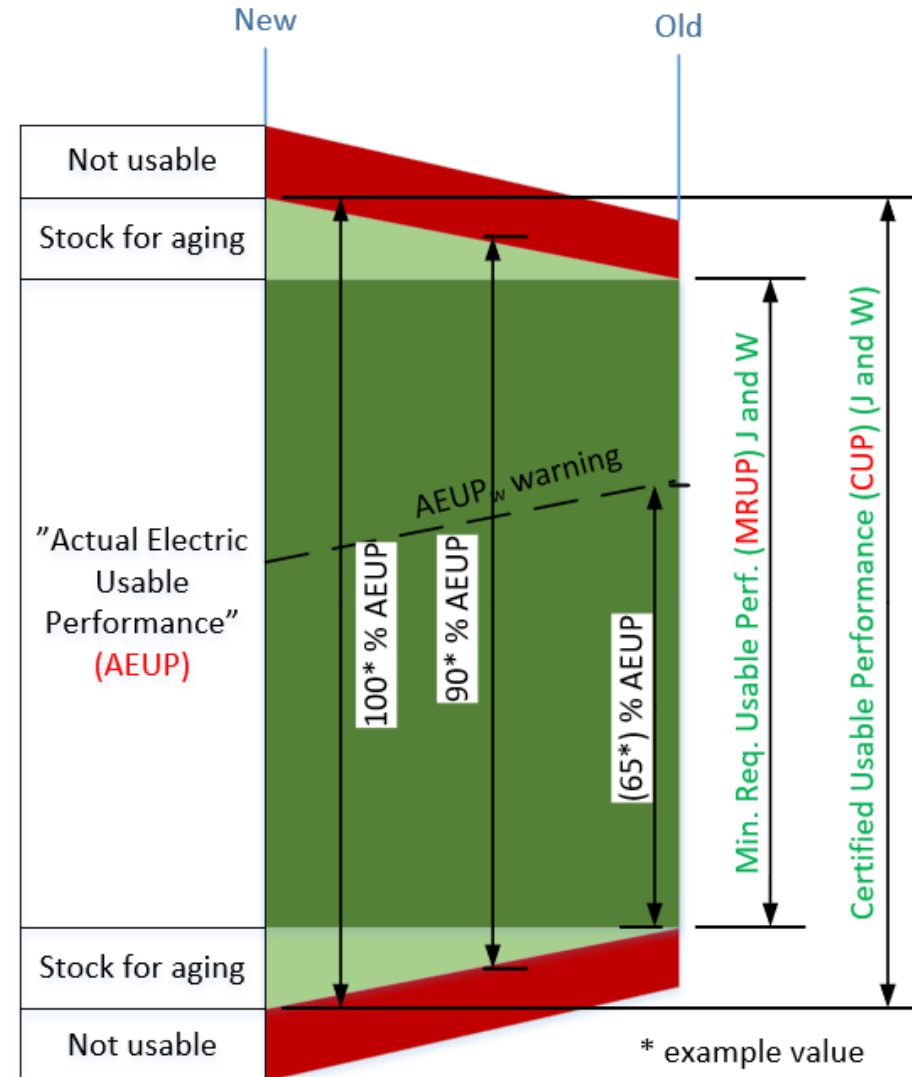
“**Certified Usable Performance (CUP)**” means the maximum usable performance of an electrical energy storage device available for an electro-mechanical braking system determined at the time of type approval.

“**Minimum Required Usable Performance (MRUP)**” means the minimum usable performance of an electrical energy storage device available for an electro-mechanical braking system to fulfil the relevant requirements of this Regulation.

“**Actual Electric Usable Performance (AEUP)**” is the level of energy stored in an electrical energy storage device, as well as its available power, at a given time. It is defined as a percentage of the CUP value.

New proposal

The “**usable performance**” means the portion of the performance of an electrical energy storage device that is actually available to the supplied system (e.g. the system may not use the maximum theoretical performance).



Status and open topics still to be discussed

Newly added definitions

→ Ref. former slide some definitions still in discussion.

New architecture proposal

→ 5.2.1.2.7.3 One EESD can supply one brake with energy transmission

Paragraphs still being updated

→ 5.2.1.13.x – Energy Storage device(s) and warning signal

→ 5.2.1.35.x – Special additional requirements for service braking systems with electro-mechanical braking system with electric transmission.

New proposed amendments to Annex 2

→ 17 - Additional information in the case of power-driven vehicle equipped with an electro-mechanical braking system ('EMB')

Status and open topics still to be discussed

Weekly meetings since February with both Industry Group representatives and Contracting parties.

Thursdays 16.00-17.30 CET, contact CLEPA to join.

New meetings set up for coordination of R13, R13H and BBW.

Next steps:

- Finalize the still open topics during fall and winter
- Prepare for an informal document to be presented at 15th GRVA in January.
- Present a formal document to 16th GRVA in May 2023