Comments and/or Proposals regarding to The Revision of GTR22

prepared by JAPAN

63rd EVE IWG

18th & 19th July 2023

Regarding “EVE-61-13er1-GTR22 working draft v3 with meeting revisions.doc” ,
Japan follows EVE IWG decision but has comment and proposal

1.Added Definition

3.24.“Energy throughput” means the total amount of energy in Wh discharged (and charged) from the battery.

3.25.“Total discharge energy for non-traction purposes” means the total amount of energy in Wh discharged from the battery for purposes other than traction to support the particular use case of a Category 2 vehicle and do not include air conditioning/heating for the cabin or other uses already present in categories 1-1 and 1-2.

2. Additions to ANNEX 2

11.Total discharge energy for non-traction purposes [Wh], if applicable

Optional values:

12.Total energy throughput

＜JAPAN Comment＞

1. Regarding the definition of "Energy throughput“, We would like to confirm the intent of (and charged).
   In the European Battery Regulation (see Appendix p20-22), it is described as "discharged". Therefore, we propose;
   “Energy throughput” means the total amount of energy in Wh discharged ~~(and charged)~~ from the battery.
   ・Considering the harmonization with CARB_ACC2 which was already published.
   The sum of the energy for on-board and off-board is appropriate, (see p.3 and 4 and Appendix p9-19)
2 .Regarding the intention of Optional values; Is it up to the OEM whether or not to output them?
3. #12 should be Energy Throughput, along with the definition of the term. The definition (above) includes total.。

＜JAPAN Proposal＞

Is it appropriate that Japan will submit the application of #11&12 of Annex2 to SAE?
EVE-61-14e - GTR 22 SAE J1979DA update can be used to avoid hard work.

SAE Definition

		Definition	specific example	propulsion system **non-active** operation	propulsion system **active** operation	**GTR22__Annex2**
usage	off-board	Battery energy consumed by external loads (outside the vehicle)	V2X、	0xF88B	0xXXXX	**V2X**
	on-board	Battery energy consumed by Traction and internal loads (on the vehicle)	Motor , HVAC, Aux. devices(PS , Safety…) PTO(Refrigerator, elevating cranes, mixers etc.)	N/A	0xF886	**Energy throughput**
	non-traction	Battery energy consumed by non-Traction purposes.	HVAC, Aux. devices(PS , Safety…) PTO(Refrigerator, elevating cranes, mixers etc.)			
		Battery energy consumed other than Traction and power applications that already exist in Category 1	PTO(Refrigerator, elevating cranes, mixers etc.)	0xYYYY For Category 2, this energy is subject to virtual distance.		**Total battery energy supplied to a non-traction usage (lifetime)**
	traction	N/A	Motor	N/A	N/A	

ITID	description(J1979)	description(GTR22)	Scaling/bit
0xF88B	Total battery energy supplied to an off-board usage during propulsion system non-active operation (lifetime)	Annex 2 Total discharge energy in V2X [Wh], if applicable	4 bytes 0.1 kWh per bit Min value:0 kWh Max value:429,496,729.5 Kwh
		"Total discharge energy during V2X" means the total amount of discharged energy during V2X which needs to be provided according to Annex 2.	
		"V2X" means the use of the traction batteries to cover external power and energy demand, such as V2G (Vehicle-to-Grid) for grid stabilization by utilising traction batteries, V2H (Vehicle-to-Home) for utilizing traction batteries as residential storage for local optimisation or emergency power sources in times of power failure, and V2L (Vehicle-to-Load, only connected loads are supplied) for use in times of power failure and/or outdoor activity in normal times.	
0xXXXX	Total battery energy supplied to an off-board usage during propulsion system active operation (lifetime)	Not specified.	4 bytes 0.1 kWh per bit Min value:0 kWh Max value:429,496,729.5 Kwh
0xYYYY	**Total battery energy supplied to a non-traction usage for power Take Off (lifetime)**	Annex 2 Total discharge energy for non-traction purposes [Wh], if applicable	4 bytes 0.1 kWh per bit Min value:0 kWh Max value:429,496,729.5 Kwh
		“Total discharge energy for non-traction purposes” means the total amount of energy in Wh discharged from the battery for purposes other than traction to support the particular use case of a Category 2 vehicle and do not include air conditioning/heating for the cabin or other uses already present in categories 1-1 and 1-2.	
0xZZZZ	**Energy throughput:** Total battery energy supplied to an off-board usage duringpropulsion system non-active operation(lifetime) <0xF88B> + Total net energy consumed in propulsion system active operation(lifetime) <0xF886>	Annex 2 Energy throughput	4 bytes 0.1 kWh per bit Min value:0 kWh Max value:429,496,729.5 Kwh
		“Energy throughput” means the total amount of energy in Wh discharged	

Proposals on On-board V2X (& PTO) Verification Method

1. General Process : please refer next slide

2. Concrete proposed text : please refer word document
   “EVE-61-13er1 - GTR22 working draft v4_virtual distance”
   with flow chart described in slide_7

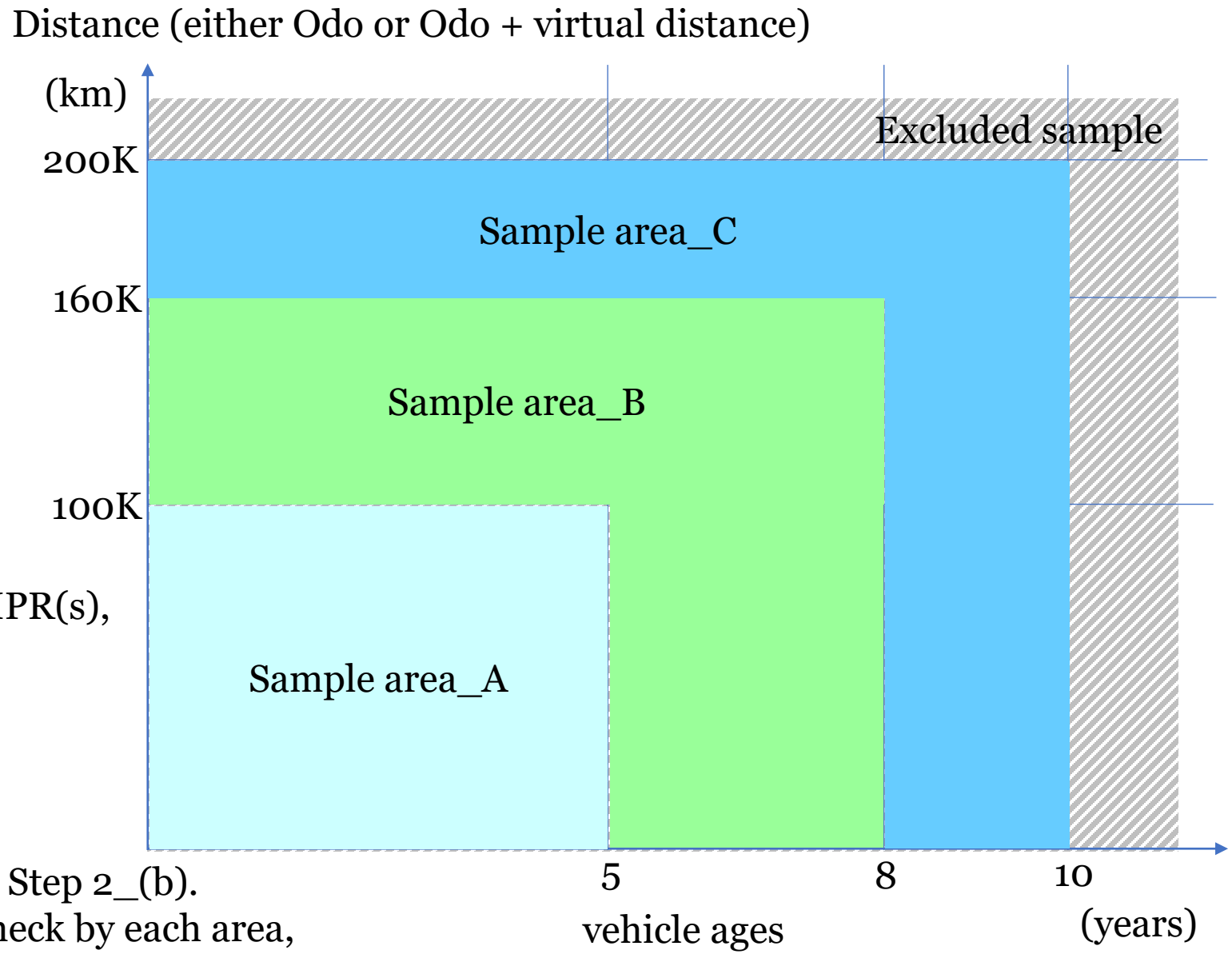
verification process of virtual distance

Step 1.
Check each sample area (A, B and C)
with vehicle odometer

→ If all sample areas comply with MPRs, the durability family shall PASS
→ If at least one of sample areas does not comply with MPRs, move to **Step 2**.

Step 2.
Check the failed area(s) under the Step 1.
with odo. + virtual distance

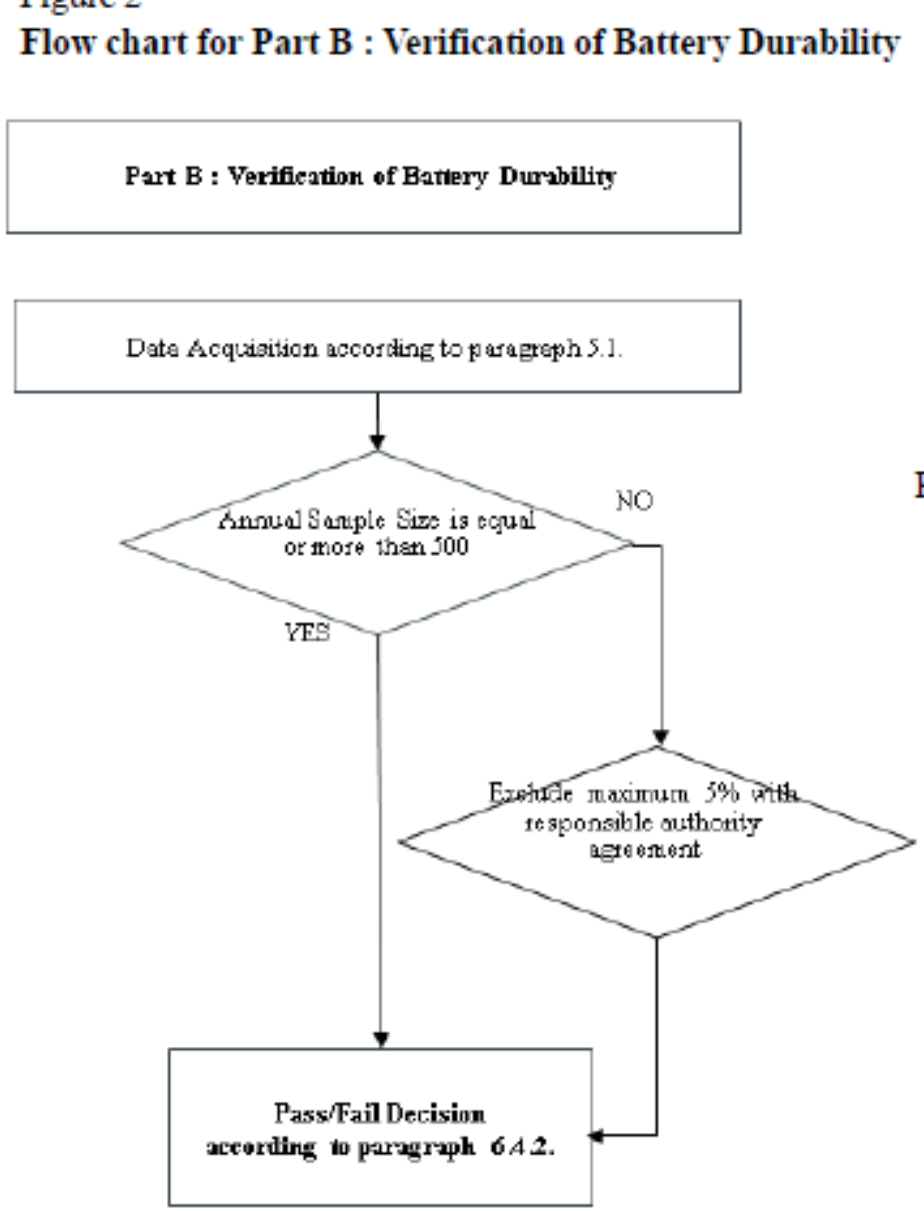
→ (a) If at least one of sample area(s) fail MPR(s), the durability family shall FAIL
→ (b) If all area(s) comply with MPR(s), move to **Step 3**.

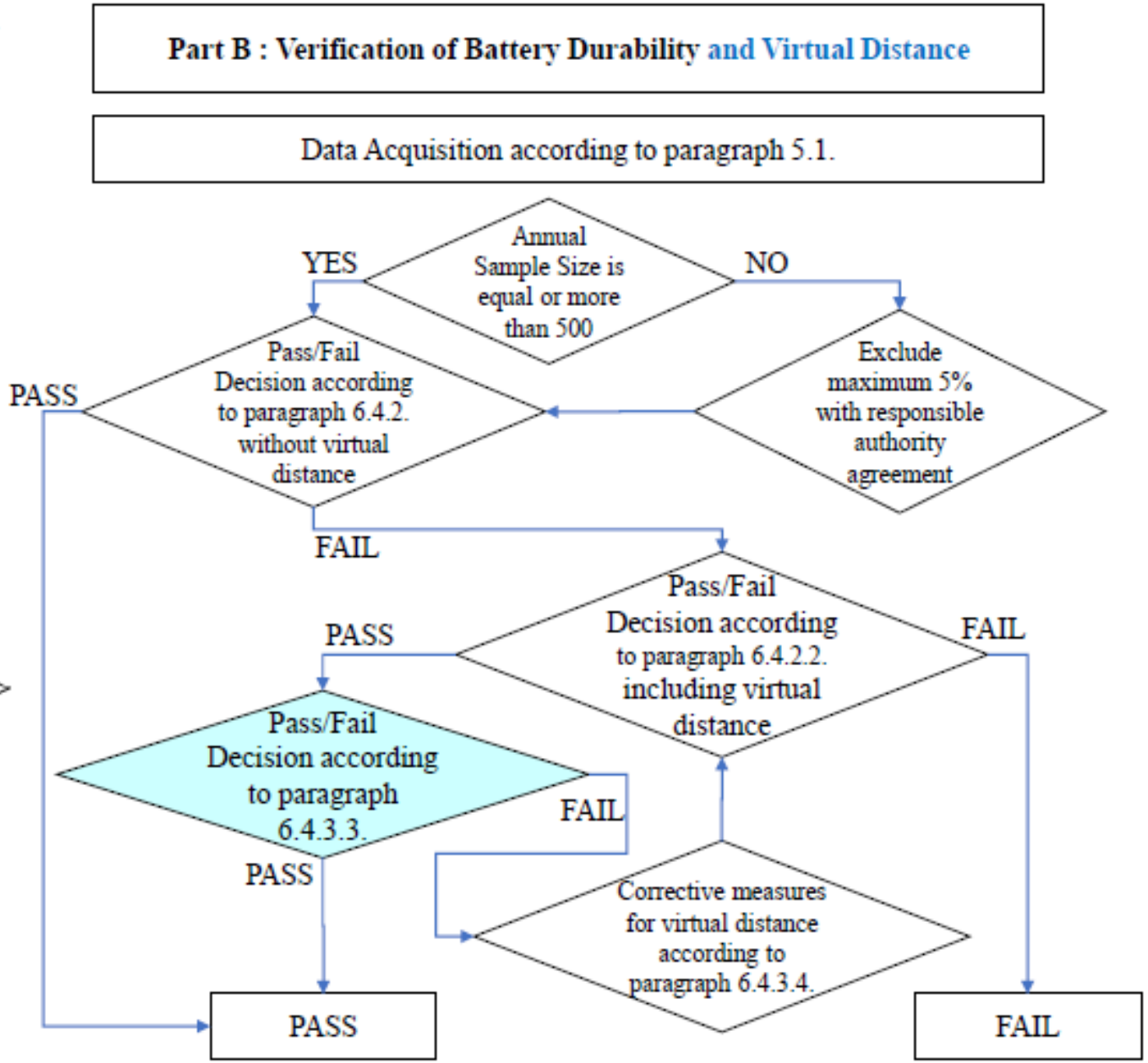


Step 3. "verification of virtual distance"
Verification area(s) shall be same area(s) as Step 2_(b).
In case of more than one area, no need to check by each area, but at least one vehicle shall be sampled from each area.

Figure 2

Flow chart for Part B : Verification of Battery Durability





Appendix

SAE Update for UN EVE GTR 22 Activities

J1979DA Ballot

April 23-24 2023

Version 3

Andrew Zettel

andrew.zettel@gm.com

Overview of ZEV Diagnostic and Repair Standardization - ZEVDRS (J1979-3)

- Focus is on Independent Data Support and Repair (ISO 14229 Reserved DID Range)
- Standardized DTC's (J2012)
- Standardized Connector (J1962 – Already allows for CAN and Ethernet)
- Standardized Protocol (elements of ISO 14229 (UDS)) to allow low-cost customer and vehicle communications (ensure no difference in communication method between propulsion and other vehicle ECU's for service)
- J1979-3 (provides a minimum number of required diag services)
  - Propulsion system functional response requirements
  - ZEV protocol discovery using traditional Service 0x22 – 0xF810 → 0xF41C (HD ZEV, etc.)
    - Aligns nicely with existing conventional vehicle scan tool validation framework
    - However! The vehicle may only respond to 0xF810 over Ethernet OR CAN.
      - It can still support diagnostics over both buses, but per ACC2 must only acknowledge "regulated ZEV" from 0xF810 over one bus or the other.

11. Total discharge energy for non-traction purposes [Wh], if applicable

New ITID with minor modifications to the following definitions

8. Total Discharge Energy in V2X (Lifetime)
[ITID REUSED 0xF88B, and NEW ITID PLANNED FOR NEXT RELEASE]

An existing ITID is provided that provides an accumulation of energy provided to V2X usage (Non-PSA). Additions are also coming to calculate the usage during PSA.

0xF88B	Total battery energy supplied to an off-board usage during propulsion system non-active operation (Lifetime)	4 bytes 0.1 kWh per bit Min value: 0 kWh Max value:429,496,729.5 kWh	RESS_V2X_EN_NONPSA-L: XXXXXXXXXX kWh
0x____	Total battery energy supplied to an off-board usage during propulsion system active operation (Lifetime)	4 bytes 0.1 kWh per bit Min value: 0 kWh Max value:429,496,729.5 kWh	RESS_V2X_EN_NONPSA-L: XXXXXXXXXX kWh

** See additional SAE presentation regarding complete V2X calculation*

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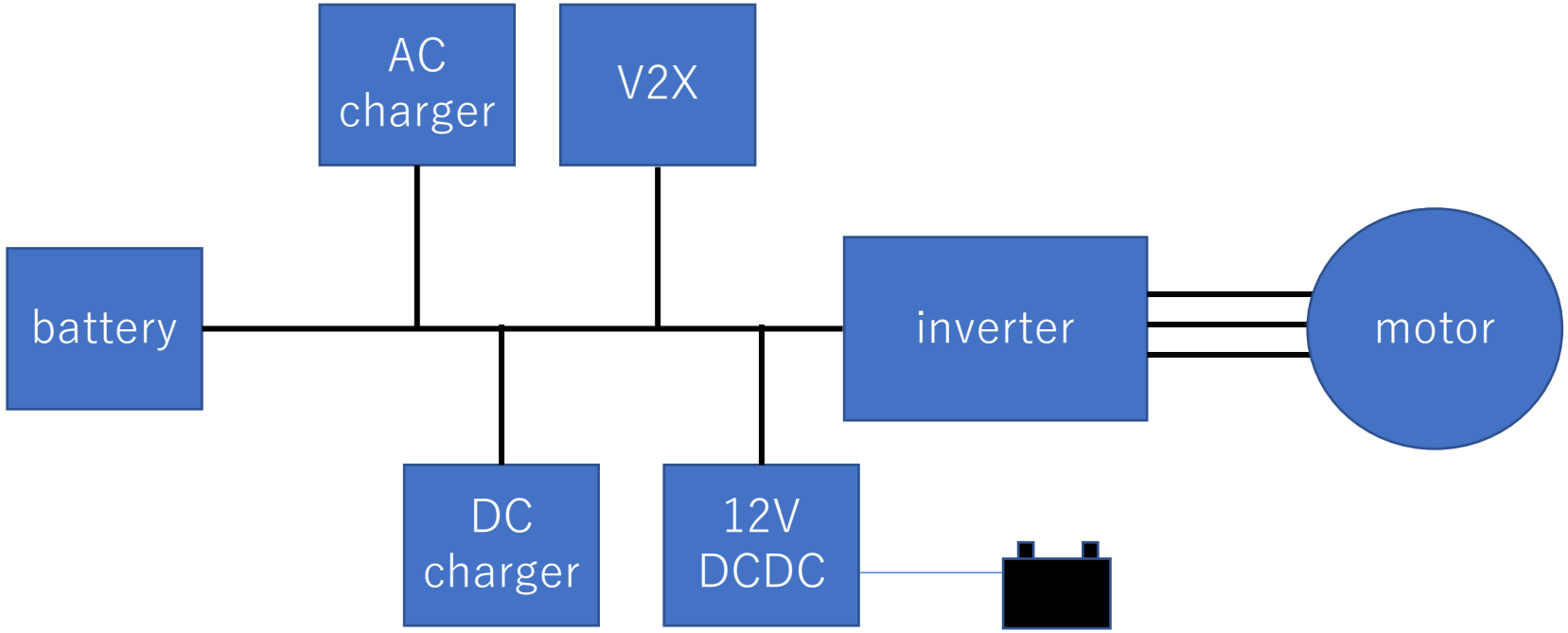
12 Energy Throughput [Using Existing ITID]

- Various options are provided within J1979DA, however the most simple is to assess the lifetime energy stored into the RESS:

0xF888	Total grid energy into the battery during off-board charging (Recent)	4 bytes 0.1 kWh per bit Min value: 0 kWh Max value:429,496,729.5 kWh	TGE_OVC-R: XXXXXXXXXX kWh
0xF888	Total grid energy into the battery during off-board charging (Lifetime)	4 bytes 0.1 kWh per bit Min value: 0 kWh Max value:429,496,729.5 kWh	TGE_OVC-L: XXXXXXXXXX kWh

- An alternative is to measure lifetime discharge energy:

0xF88B	Total battery energy supplied to an off-board usage during propulsion system non-active operation (Lifetime)	+	0xF886	Total net energy consumed in propulsion system active operation (Lifetime)



CARB defines various types of energy in the requirements for output from ECU by ACC2 . ：Defined in SAE J1979

c. Total positive kinetic energy

d. Total electric motor output energy

l. Total net energy consumed in the state of propulsion system active

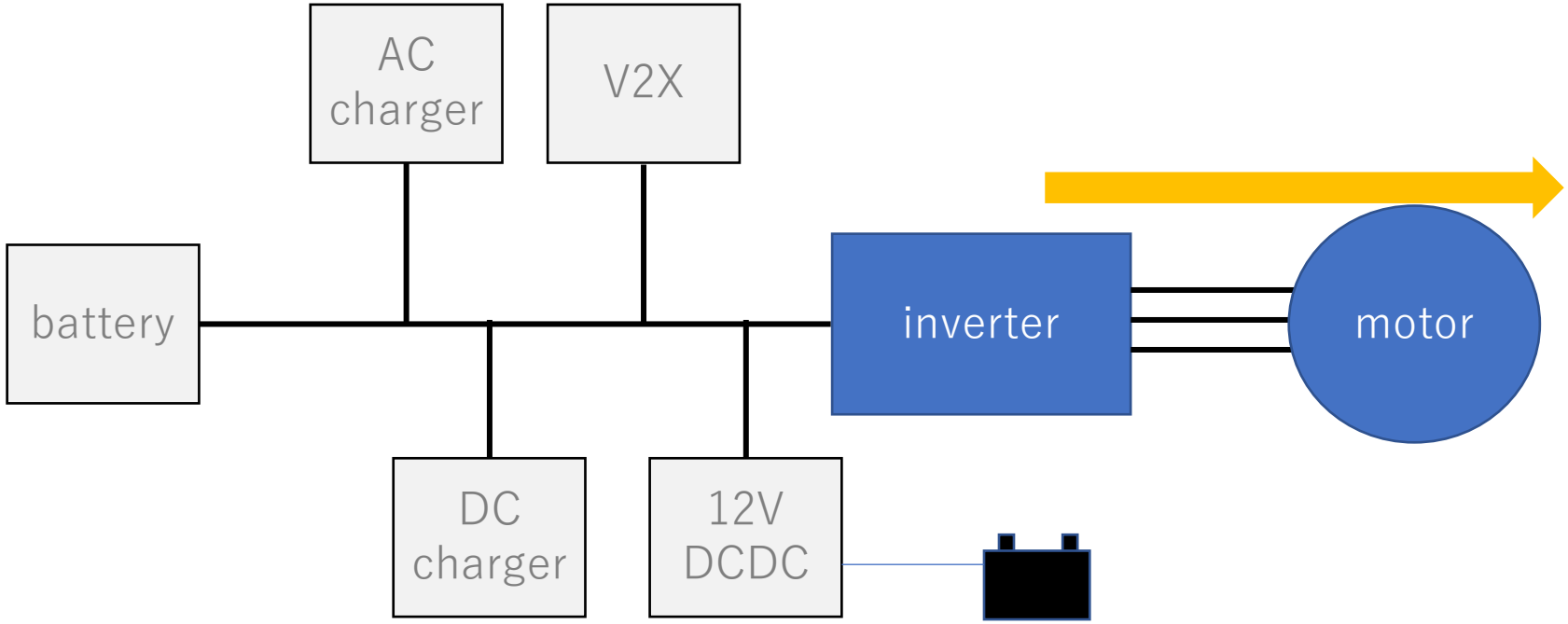
m. Total energy into battery (e.g., from regenerative braking) during the state of propulsion system active

n. Total grid energy into the battery during off-board charging

o. Total grid energy into the battery from off-board DC charging

p. If equipped with the capability to determine alternating current (AC) power into the vehicle or on-board charger during off-board charging, total grid energy into the vehicle from off-board AC charging

q. Total battery energy supplied to an off-board usage(e.g., grid, power port) during propulsion systemnon-active operation (e.g., vehicle to home)



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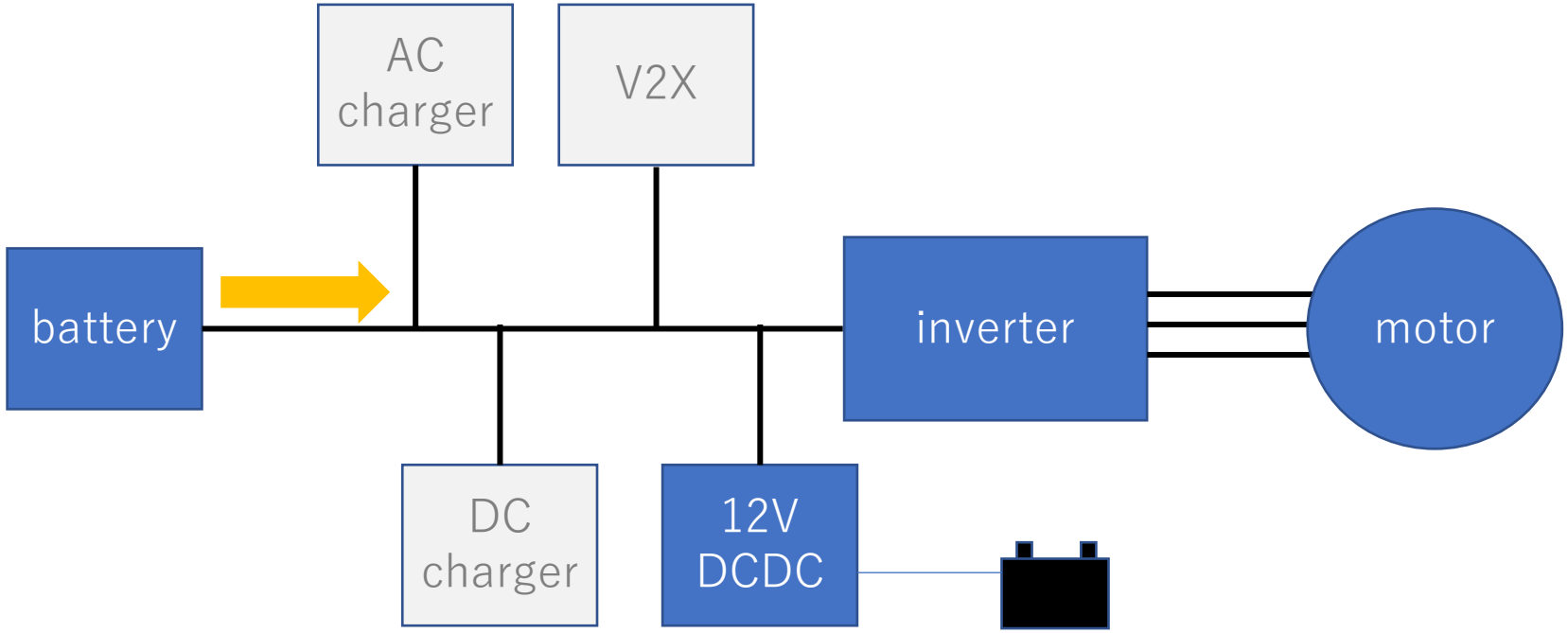

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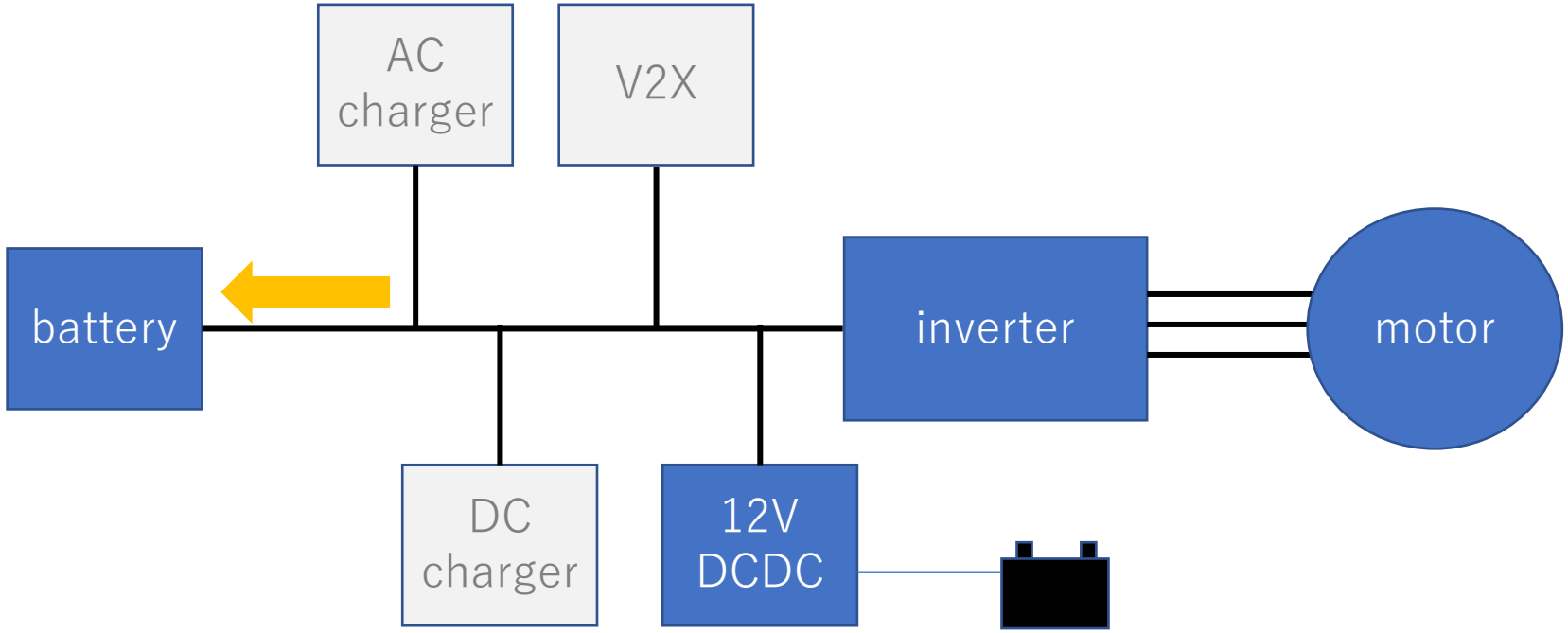

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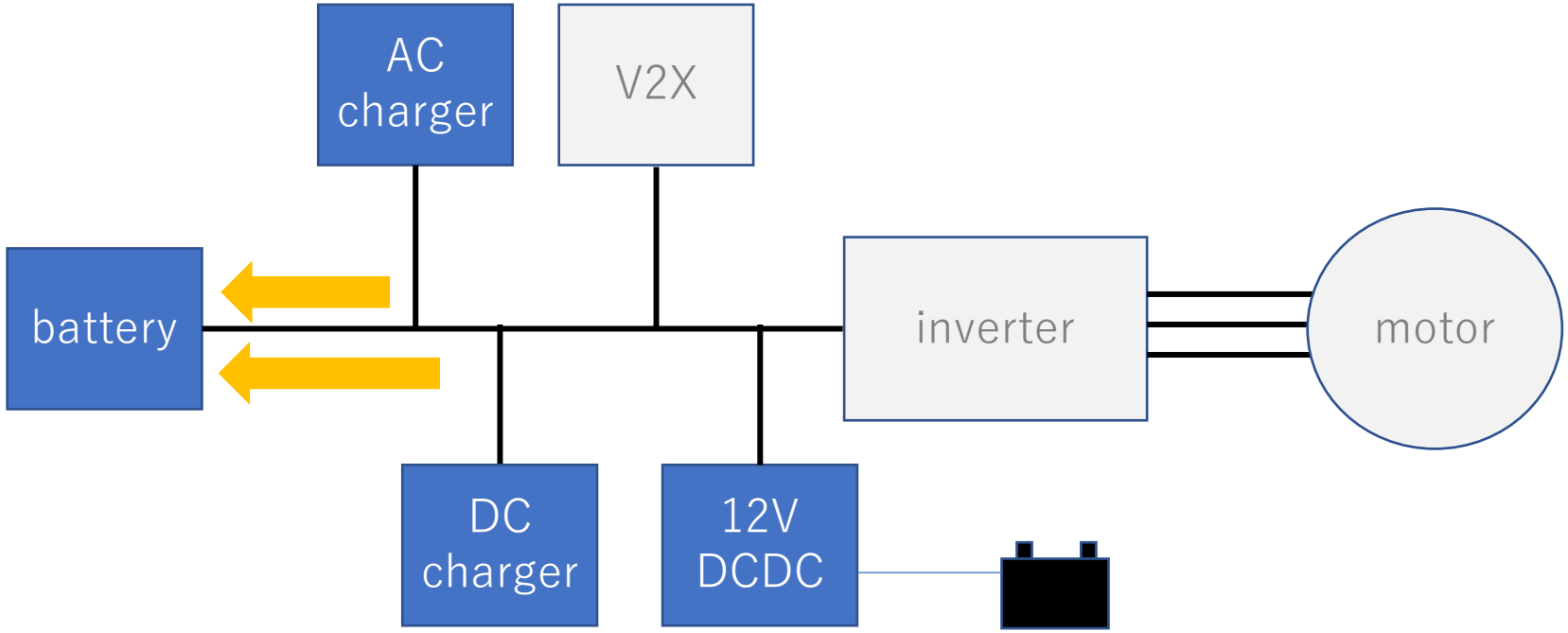

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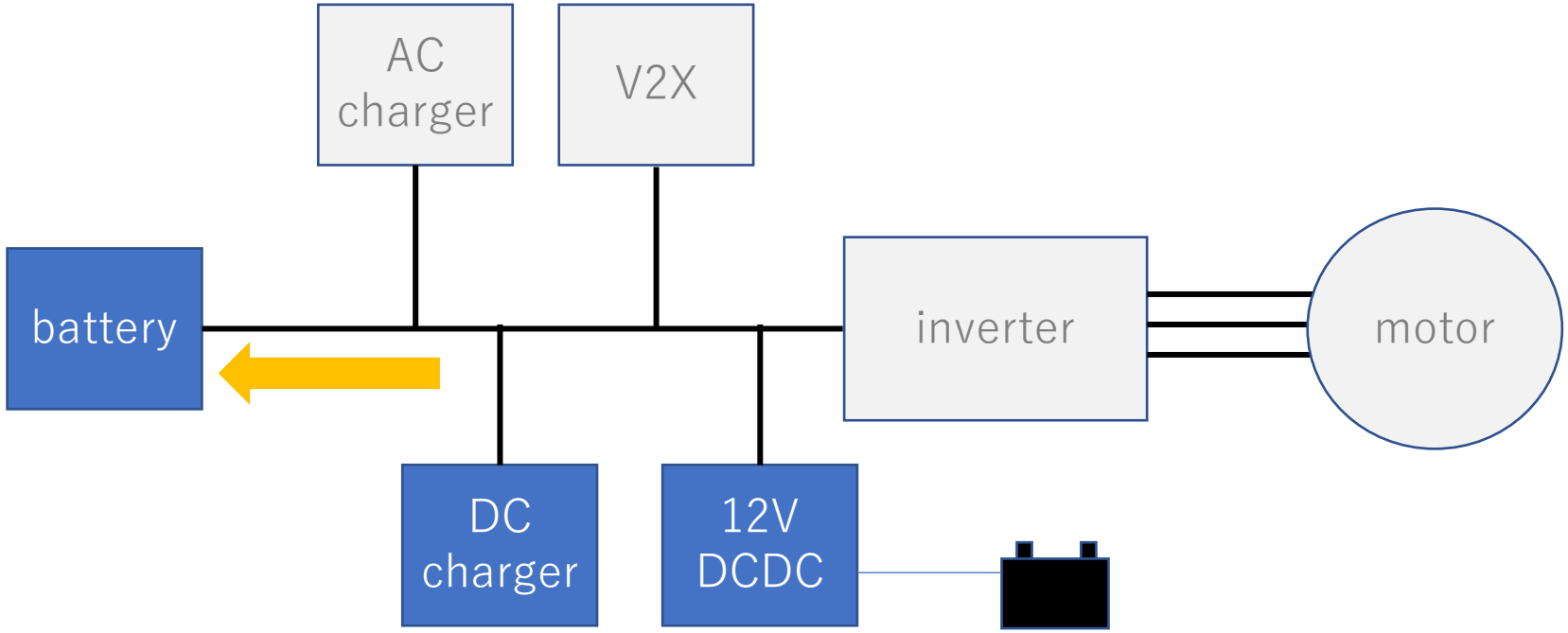

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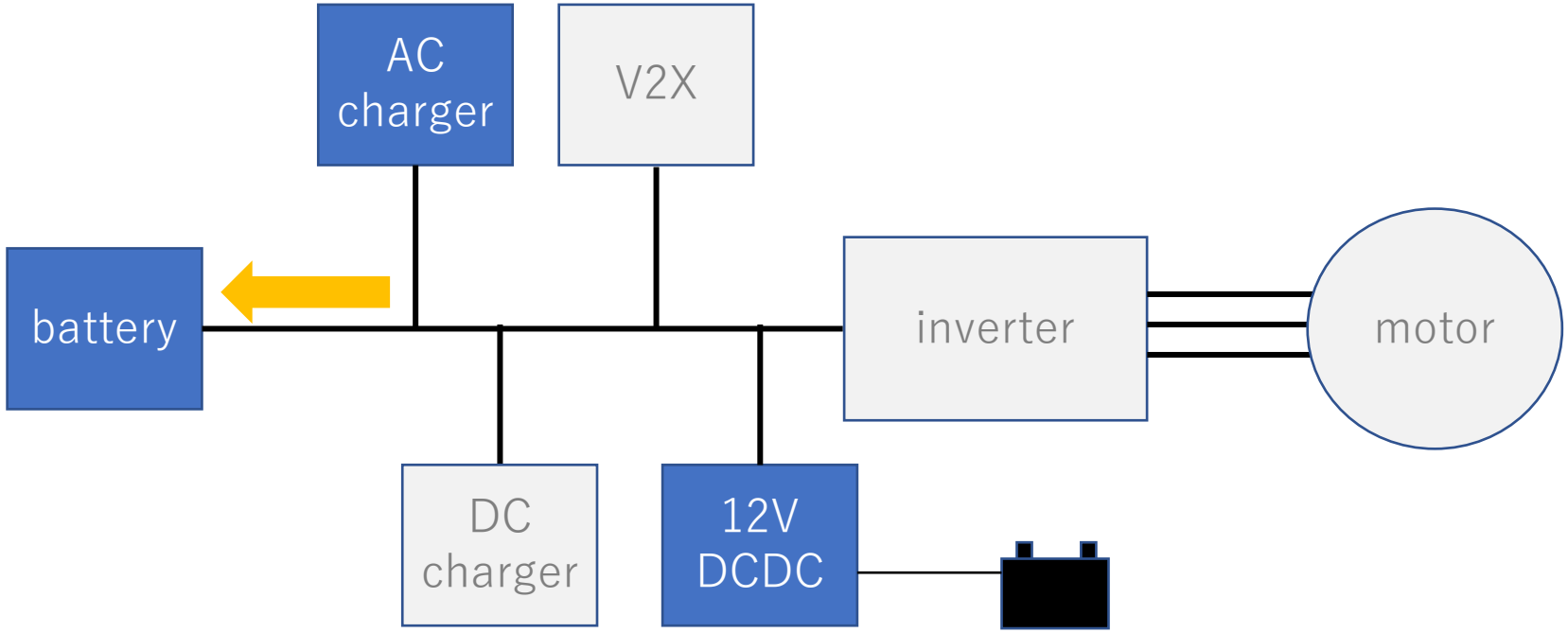

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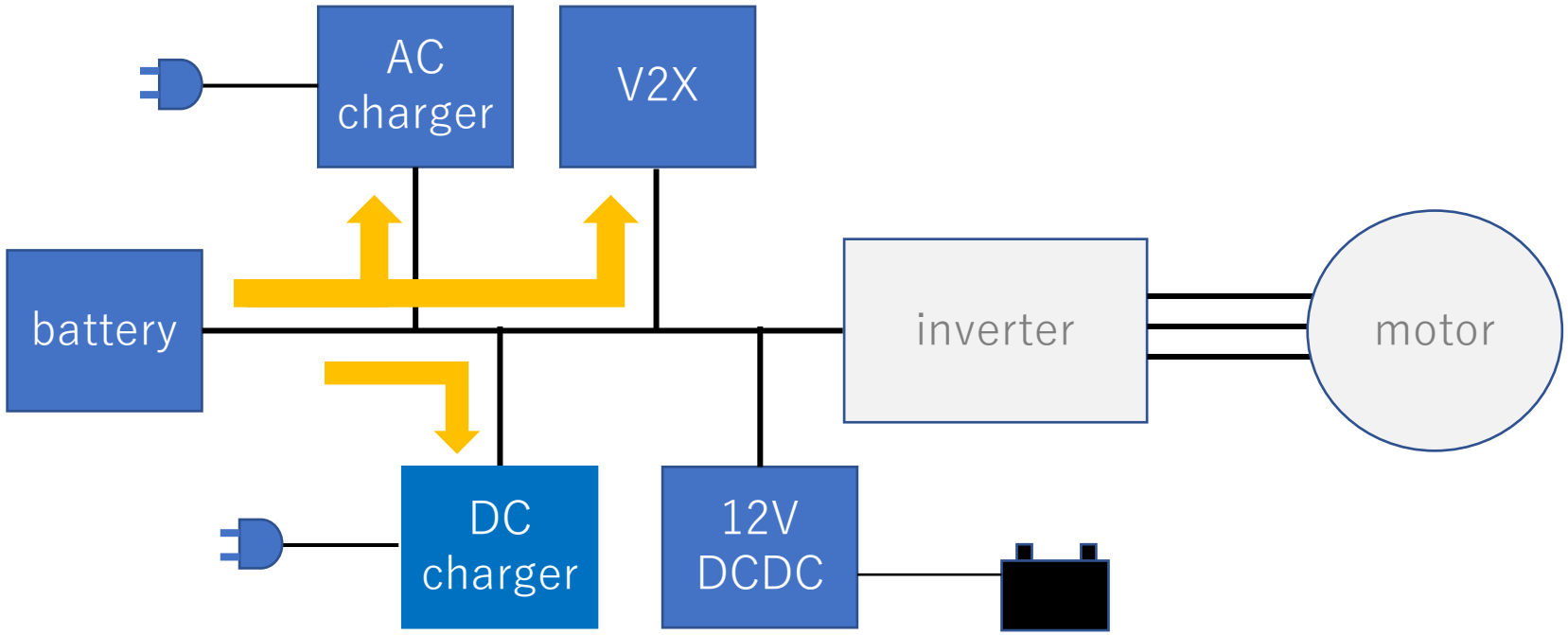

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Rules for the calculation of the Carbon Footprint of Electric Vehicle Batteries (CFB-EV)

Andreasi Bassi, S., Peters, J.F., Candelaresi, D.,
Valente, A., Ferrara, N., Mathieux, F., Ardente, F.

Official publication of the CFP bylaws is expected around January of 2024

3 Functional Unit and Reference Flow

3.1 Functional unit for energy-providing batteries

For energy-providing batteries such as EV batteries, the **functional unit** is defined (according to the Annex II of the Battery Regulation Proposal) as one kWh (kilowatt-hour) of the **total energy** provided by the battery over the battery's **service life**, measured in kWh.

The **total energy** (in kWh) is the total amount of electricity (in kWh) provided by the battery over its service life.

Four different approaches are used for quantifying the total energy provided over the service life by EV batteries, depending on the considered vehicle category:

— Light-duty EV batteries

— Category L (Motorcycle) EV batteries

— Medium-duty and heavy-duty EV batteries

— Other EV batteries

Additional services (e.g., fast charging, extended temperature range) are considered as secondary functions and shall not be measured in the functional unit. Information related to additional services may be separately disclosed in the CFB supporting study, including the type of additional service provided and related standards (if any), and the environmental impact that may be associated to these additional services.

3.1.1 Light-duty EV batteries

For light-duty electric vehicle batteries (vehicles belonging to categories M1 and N1 in the meaning of the Regulation (EU) 2018/858[6]), the total energy shall be calculated by multiplying (a) the service life (expressed in km) with (b) the energy discharged from the battery per unit of distance driven (expressed in kWh/km) measured during the type approval test.

NOTE: The minimum battery's service life is assumed to be 160,000 km (applying the same SOCE values for the end-of-life) also for NOVC-HEVs even if they are not included in the scope of the UN GTR No. 22. In fact, the minimum service life is also defined as a vehicle minimum durability requirement in UN Regulation No. 154 [12], as well as in the Annex IV of the Commission's Proposal for Euro 7.

The CFB declarant may declare a higher service life (expressed in km), providing documentation in support of the claim in the CFB supporting study. The declaration of a higher service life shall be expressed in number of km driven until the battery reaches a SOCE equal to 70% for category M1 vehicles and equal to 65% for category N1 vehicles. The declared service life and the corresponding total energy shall be consistent with the expected lifetime in terms of full cycles equivalents (as to be declared according to Annex IV of the Battery Regulation Proposal) and with the SOCE and total energy throughput values to be read from the BMS according to Annex II of the UN GTR No. 22.

The delivered energy (in Wh/km) is defined as the energy discharged from the battery (expressed in Wh), directly measured while performing the WLTP type approval tests (type I), divided by the applicable WLTP test distance (expressed in km). The delivered energy shall be provided with a minimum precision of 0.1 Wh/km. Specific provisions for performing these measurements and calculations are defined in Section 3.3 of this document and in Annex 8 of UN Regulation No. 154 and its following amendments[13]. Interpolation families as defined in UN Regulation No. 154 may be used for the determination of the delivered energy. If an interpolation family is