Battery Sustainability Regulation in context of redox-flow technology

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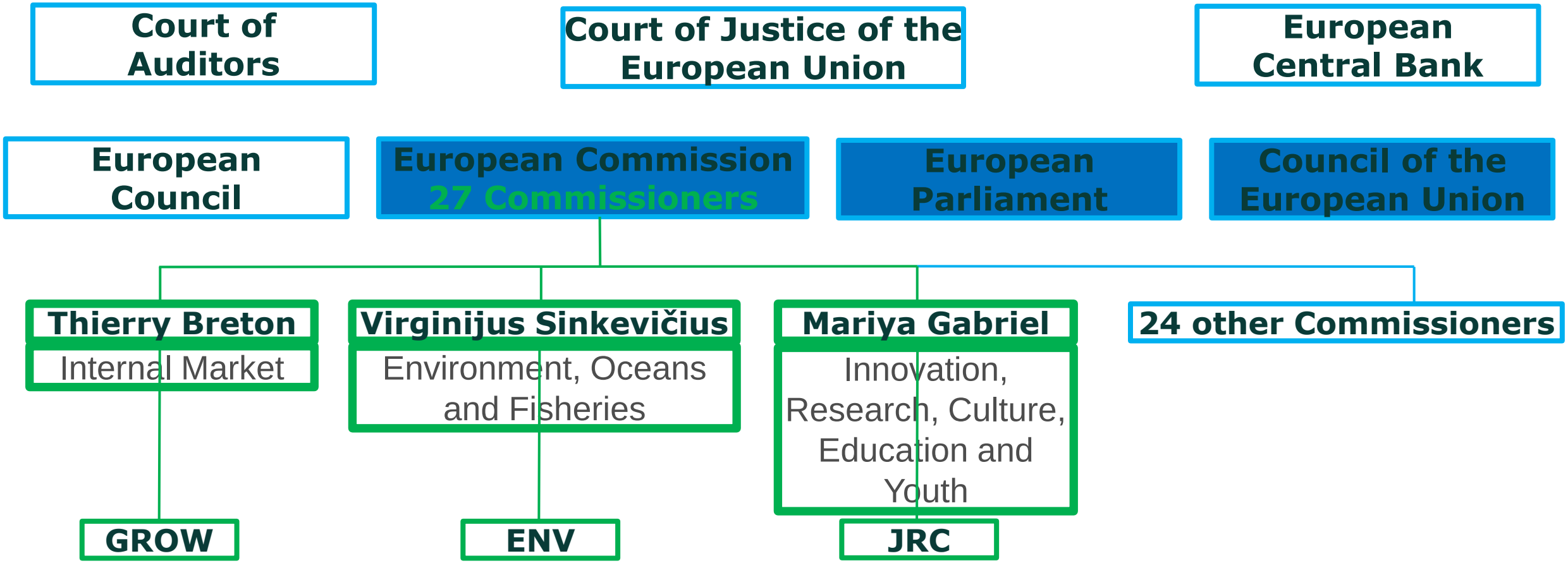

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Policy context

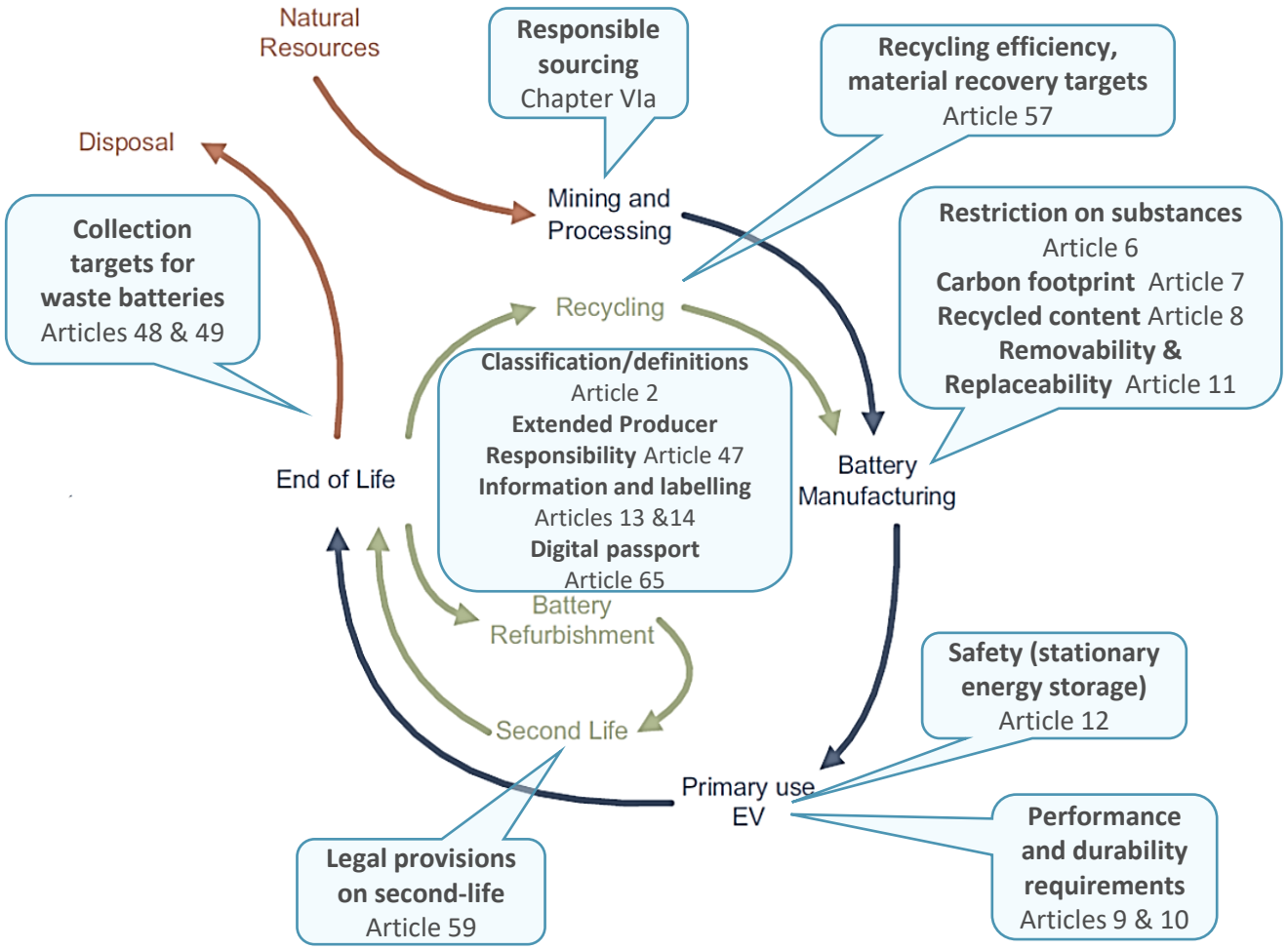
- Existing battery directive – back to 2006
- EC proposal for a new regulation – adopted in Dec 2020
- Political agreement by EU co-legislators – reached a in Dec 2022
- Adoption of final text of the regulation – expected in Q3-2023

  (provisional) text available at: https://data.consilium.europa.eu/doc/document/ST-5469-2023-INIT/en/pdf

- battery –> any device delivering electrical energy generated by direct conversion of chemical energy, having internal or external storage, and…

Objectives of the new regulatory framework

- Promote the EU's **production of** sustainable high-quality **batteries**
- Ensure appropriate **collection and recycling** of waste batteries
- Increase **use of secondary raw materials** and support development of **recycling**
- **Reduce the environmental and social impact** at all stages of the battery life cycle
- **Reduce the EU's dependence on imports of materials**, especially CRMs



On fast growing battery market

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Main elements of the new regulation

CHAPTER VII – MANAGEMENT OF WASTE BATTERIES

- EPR obligations for producers/PROs
- Collection of waste portable/LMT batteries
- Recycling efficiency targets
- Material recovery targets
- Shipment of waste batteries outside the EU
- Reporting obligations

CHAPTER VIa – DUE DILIGENCE

- Due diligence policy
- Management system
- Risk management plan
- Third-party verification
- Disclosure of information

CHAPTER II – SUSTAINABILITY AND SAFETY REQUIREMENTS

- Restrictions of substances
- Carbon footprint
- Recycled content
- Performance and durability
- Removability and replaceability
- Safety (only for SBESS)

CHAPTERS III & VIII – LABELLING AND INFORMATION REQUIREMENTS

- Labelling and marking
- Information via QR code
- Battery passport

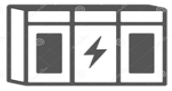
Battery categorisation: +2 -> 5; +2 sub-categories

- **Portable battery** means any battery that is sealed, weights less than 5 kgs, is not designed specifically for industrial uses, and is not an SLI nor a LMT battery.
- **Portable battery of general use** means a rechargeable or non-rechargeable portable battery specifically designed to be interoperable and with the following common formats: 4.5 V (3R12), button cell, D, C, AA, AAA, AAAA, A23, 9 V (PP3);

- **SLI battery** means any battery designed to supply electric power for starter, lighting, or ignition, and that may also be used for auxiliary or backup purposes in vehicles, other means of transport or machinery.

- **Light Means of Transport (LMT)** battery means any battery that is sealed and weighs below or equal to 25 kg, designed to provide electric power for the traction to wheeled vehicles that can be powered by the electric motor alone or by a combination of motor and human power, including type-approved vehicle of category L in the meaning of Regulation (EU) No 168/2013, and that is not an electric vehicle battery.

- **Electric Vehicle (EV)** battery means any battery specifically designed to provide electric power for the traction of hybrid or electric vehicles of L category as provided for in Regulation (EU) No 168/2013, and with a weight above 25 kg, or designed to provide electric power for the traction to hybrid or electric vehicles of M, N or O categories (as in Regulation (EU) 2018/858).



- **Industrial battery** means any battery designed specifically for industrial uses, or intended for industrial uses after being subject to preparing for repurpose or repurposing, or any other battery with a weight above 5 kg that is not a LMT battery, an electric vehicle battery or a SLI battery.
- **Stationary battery energy storage system (SBESS)** means a rechargeable industrial battery with internal storage specifically designed to store and deliver electric energy from and into the grid or store and deliver electric energy to end-users.
- Any battery does not fit in any of the four first definitions is, as a residual category, an industrial battery. In case a battery conforms to more than one battery category, where different requirements are applicable, the most restrictive requirements shall apply.

Provisions on restrictions of substances

- **The Commission may adopt restrictions of substances in case of an unacceptable risk to human health or the environment**, arising from the use of a substance in the manufacture of batteries, or from the presence of a substance in the batteries when they are placed on the market, or during their subsequent life cycle stages (including waste).

- **The procedure to adopt a restriction follows the REACH approach**. The Commission is required to request ECHA to prepare a restriction dossier in REACH format, which shall include a socio-economic assessment, including an analysis of alternatives. Member States are also allowed to initiate restriction dossiers.

- In any case, **by 31 December 2027, the Commission, assisted by the European Chemicals Agency, is required to prepare a report on substances of concern**, meaning substances having adverse effect on human health or the environment or hampering recycling for safe and high quality secondary raw materials, contained in batteries or used in their manufacturing.

- Annex I to the Regulation already includes existing and new restrictions:

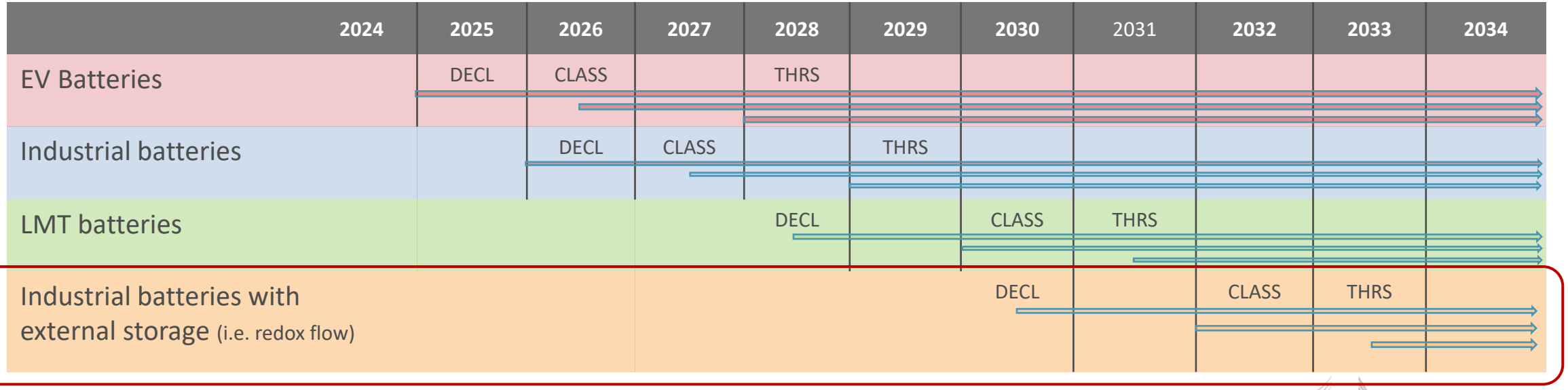
  All batteries shall not contain more than **0,0005% of mercury**

  Portable batteries shall not contain more than **0,002% of cadmium**

  From mid-2024, portable batteries, shall not contain more than **0,01% of lead** (expressed as lead metal) by weight (with a 5 years derogation for portable zinc-air button cells) – apply whether or not incorporated into appliances

Provisions on carbon footprint

- Applicable to: EV, industrial (>2 kWh) and LMT batteries, with different timelines
- Staged approach: 1) declaration of the carbon footprint, 2) performance classes, 3) maximum thresholds
- Carbon footprint – calculated as kg of CO_2 eq. per one kWh of the energy provided by the battery over its expected service life, **per battery model, per manufacturing plant**
- Methodology to be detailed by the Commission
- Feasibility study to extend to all batteries before the end of 2030



(assuming entry into force on 01.07.2023)

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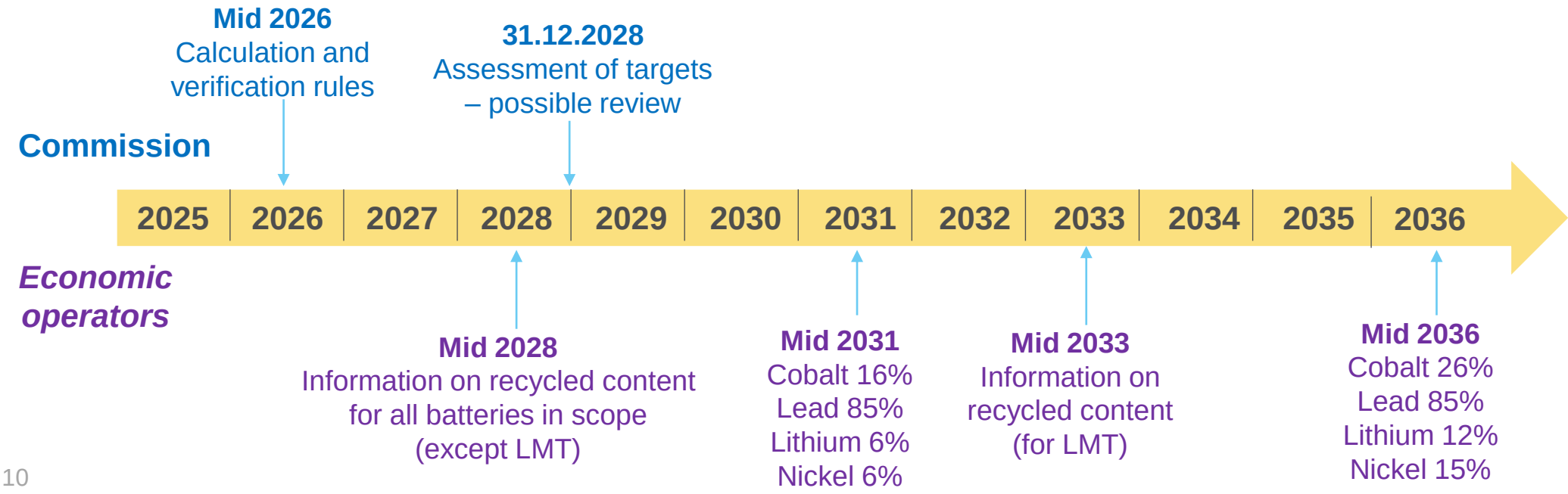
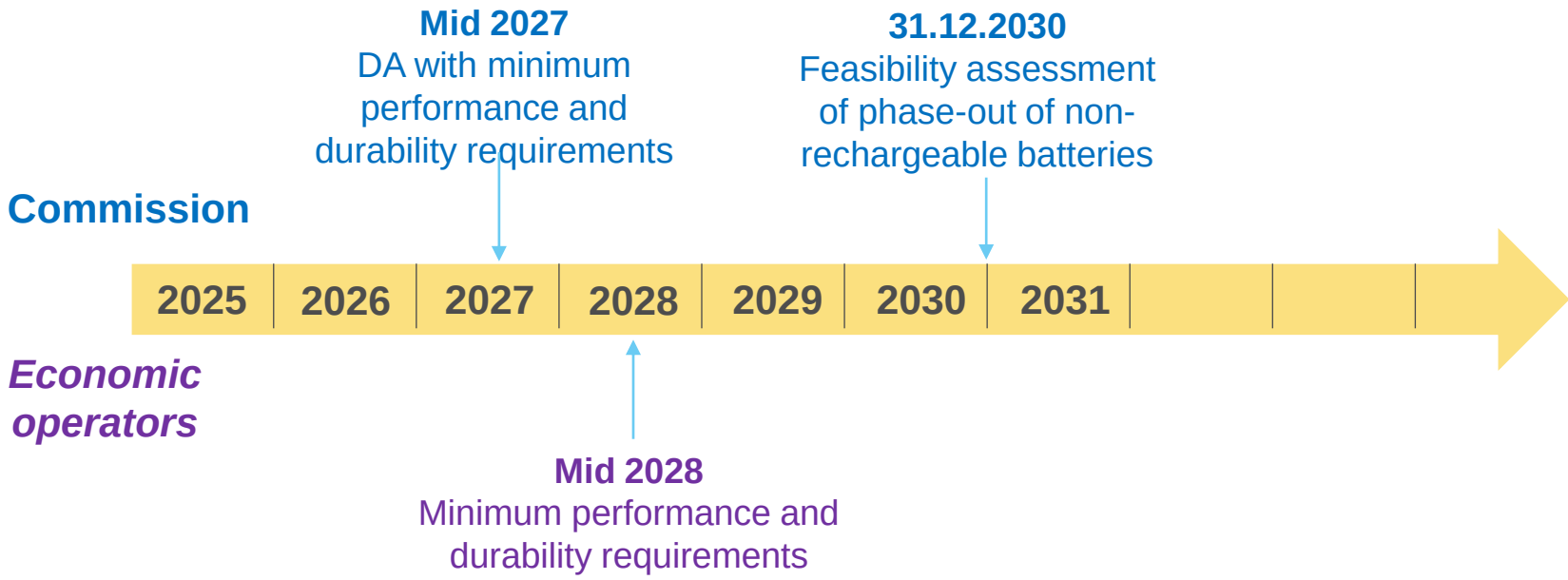
Provisions on recycled content

- Applicable to: EV, industrial except those with exclusively external storage, SLI (former automotive), and LMT (from 2036) batteries, **for each battery model per year and per manufacturing plant**
- Valid sources of recovered material: **battery manufacturing waste** and **post-consumer waste**
- Staged approach: 1) calculation methodology, 2) declaration of recycled content, 3) minimum targets for recycled content (cobalt, lead, lithium, nickel)
- Possibility to review minimum targets in 2028-2029



Provisions on performance and durability
Portable batteries of general use

- Applicable to all portable batteries of general use, **except button cells**
- Performance and durability parameters are specified in Annex III and are specific to rechargeable and non-rechargeable portable batteries of general use
- Commission can amend both the value and the parameters in Annex III themselves, in view of technical and scientific progress



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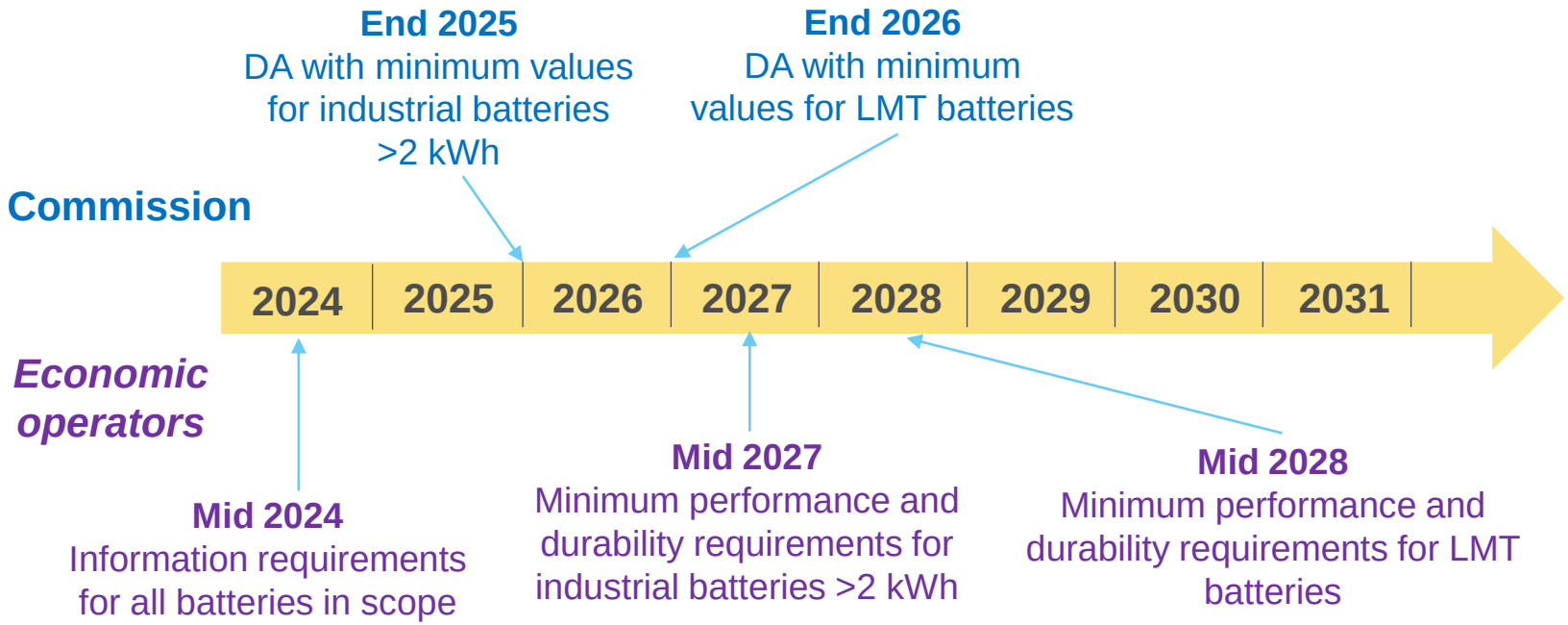
Provisions on performance and durability
EV, LMT and industrial batteries

- Applicable to: EV (**information only**, not to clash with proposed Euro 7/UNECE GTR 22 in-vehicle requirements), LMT and industrial **(>2 kWh)** (industrial with exclusively external storage - **information only**) batteries,
- Batteries that have undergone **preparation for re-use**, **preparation for repurpose**, **repurposing**, or **remanufacturing** are exempted (under certain conditions)
- Performance and durability parameters are specified in Annex IV, minimum requirements applicable



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Removability and replaceability of portable and LMT batteries 1/2

- ***From 2027**, any natural or legal person that places on the market products incorporating portable batteries shall ensure that those **batteries are readily removable and replaceable by the end-user** at any time during the lifetime of the product. The first sentence shall only apply to **batteries as a whole, and not to individual cells or other parts included in the batteries**.*

- The **obligation shall not apply where continuity of power supply is necessary** and a **permanent connection between the product and the respective portable battery is required to ensure the safety of the user and the appliance** or, for products that **collect and supply data as their main function**, for data integrity reasons.

- By way of **exemption**, the following products incorporating portable batteries may be designed in such a way as to make the **battery removable and replaceable only by independent professionals**:
  - (a) **appliances specifically designed to operate** primarily **in** an environment that is regularly subject to **splashing water, water streams or water immersion** and that **are intended to be washable or rinseable**
  - (b) **professional medical imaging and radiotherapy devices, and in-vitro diagnostic medical devices**

- **The Commission is empowered** to adopt delegated acts **to add further products to be exempted** from the removability and replaceability requirements laid down above.

Removability and replaceability of portable and LMT batteries 2/2

- ***From 2027**, any natural or legal person that places on the market products incorporating LMT batteries shall ensure that those **batteries, as well as individual battery cells included in the battery pack, are readily removable and replaceable by an independent professional** at any time during the lifetime of the product.*

- Any natural or legal person that places on the market products incorporating portable or LMT batteries shall ensure that **batteries shall be available as spare parts of the equipment they power for a minimum of 5 years after placing the last unit of the model on the market**, with a reasonable and non-discriminatory price for independent professionals and end users.

- **Software shall not be used to affect the replacement** of a portable or LMT battery or of their key components with another compatible battery or key components.

- **The Commission shall publish guidelines** to facilitate harmonised application of the provisions set out in this Article.

Labelling and marking of batteries

- From **mid-2026**, **all batteries will need to be labelled** with some general information (category, chemistry, weight, capacity, hazardous substances, manufacturing place and date).

- From **mid-2026**, **non-rechargeable portable batteries** will need to display their Minimum Average Duration (MAD) for specific applications and be labelled as “non-rechargeable”.

- From **2027**, **all batteries should be marked with a QR code** providing access to more detailed information. For EV, industrial (>2kWh) and LMT batteries, the **QR code shall provide access to the information included in the battery passport**.

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Access to BMS data and estimation of State of Health

- The regulation trying to reconcile the interests of different market players facilitating new business models on distributed energy storage and battery second-life.

- From **mid-2024**, **read-only access to the data in the Battery Management System** (BMS) of EV, LMT and industrial (stationary BESS) batteries, shall be provided to legal or natural persons with a legitimate interest, for the following purposes:

a) **making the battery available to independent aggregators or market participants** through energy storage;

b) **evaluating the residual value or remaining lifetime** of the battery and **capability for further use**, based on the estimation of the state of health;

c) **facilitating the preparing for re-use, preparing for repurpose, repurposing or remanufacturing** of the battery.

Digital Battery Passport

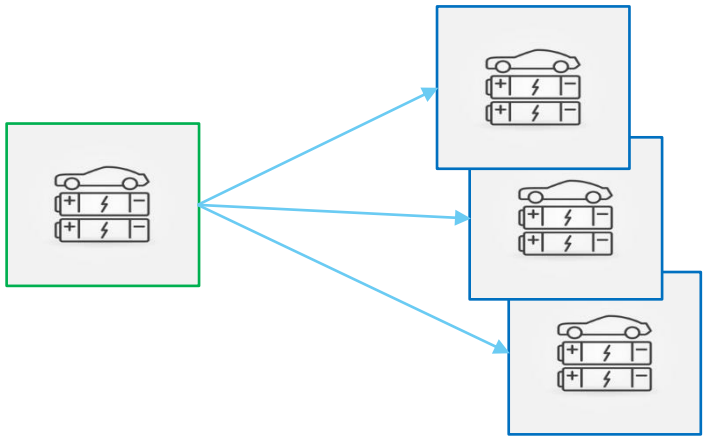
- Applicable to: EV, LMT and industrial **(>2 kWh)** batteries,

- **Decentralized architecture** relying on protocols developed through standardization; joint with the **digital product passport architecture** proposed in the **Ecodesign regulation**

- **The Commission will further detail access rights** to certain information of the passport

Information specific to each battery model

Information in Annex XIII Part A point 1



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Information specific to each physical battery

(a) information about the values for performance and durability parameters referred to in Article 10(1), when the battery is placed on the market and when it is subject to changes in its status;
(b) information on the status of the battery, defined 'original', 'repurposed', 'reused', 'remanufactured' or 'waste';
(c) information and data as a result of its use, including the number of charging and discharging cycles and negative events, such as accidents, as well as periodically recorded information on the operating environmental conditions, including temperature, and on the state of charge;
(d) information on the state of health of the battery pursuant to Article 14

https://thebatterypass.eu/

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Supply chain due diligence obligations

- From **mid-2025 companies that place batteries on the EU market will have to put in place a due diligence system** for lithium, cobalt, nickel, and natural graphite contained in those batteries:

a) Adopt company due diligence policy
b) Operate a system of controls and transparency over the supply chain
c) Identify environmental and social risks (list of risk categories included in the Regulation)
d) Implement a strategy to respond to the identified risks
e) Be verified by a 'notified body'

- **Companies with turnover of less than 40 million euro per year and not being a part of a large group are exempted**

- Also applies to **secondary raw materials** of the minerals concerned

- The **Commission will**:

a) adopt guidelines early 2025
b) assess any due diligence schemes that are submitted to the Commission (such submission is optional)

Green Public Procurement

- Once sustainability requirements on carbon footprint, recycled content and performance and durability have been fully fleshed out through complementary legislation, the **Commission will** (indicatively in **2028**) **adopt delegated act(s) establishing criteria for the award of procurement procedures** for batteries.

- **Contracting authorities and contracting entities** shall be obliged (indicatively from **2029**) to **include technical specifications and award criteria based on the sustainability requirements** to ensure that batteries (or products containing batteries) are chosen with significantly lower environmental impacts over their lifecycle.

EPR obligations for battery producers

- **Producers of batteries shall have extended producer responsibility** (EPR) for batteries that they make available on the market for the first time within the territory of a Member State that shall be in compliance with the requirements of Article 8 and Article 8a of Directive 2008/98/EC and of this Chapter.

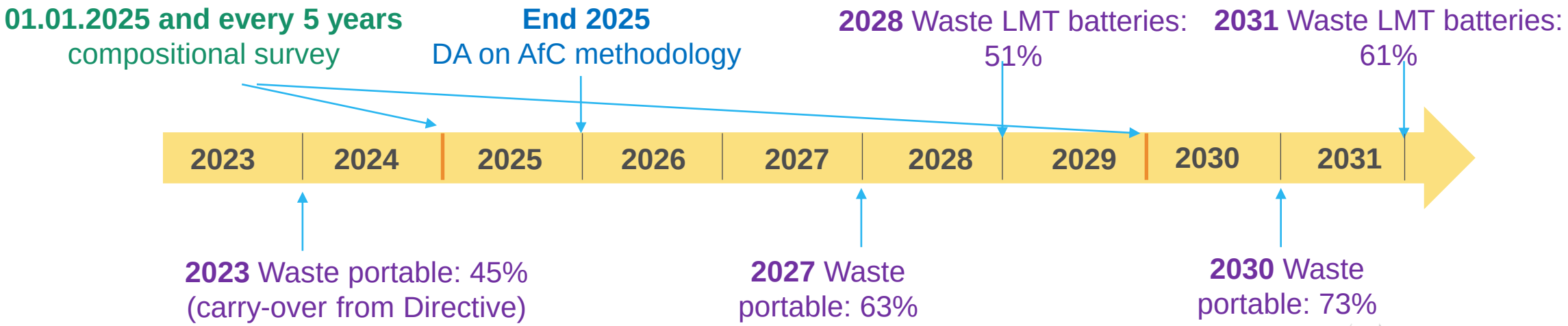
- **Producers shall pay financial contributions to cover the following costs**:
  - costs of separate collection of waste batteries and their subsequent transport and treatment (including recycling)
  - costs of carrying out compositional surveys of collected mixed municipal waste
  - costs of providing information on prevention and management of waste batteries
  - costs of data gathering and reporting to the competent authorities

- **Undertaking preparing for reuse, preparing for repurpose, repurposing or remanufacturing** (waste) batteries are subjected to **additional EPR obligations**. Producers may establish cost sharing mechanisms when a battery is subject to more than one EPR.

- **Producers may choose to entrust a Producer Responsibility Organisation** (PRO) **to carry out their extended producer responsibility obligations** on their behalf. PROs are subject to additional obligations.

Collection targets for waste batteries

- **Obligation** on producers **to have batteries** placed in the EU internal market **collected, once they become waste**.
- For waste industrial, EV and SLI batteries, an implicit **100% collection target remains**.
- For waste portable and LMT batteries, a **new methodology based on "Available for Collection"** (AfC) **will be developed to replace the existing methodology** based on the volume of batteries placed on the market (PoM).
- The **Commission is empowered to adopt rules for the calculation** of the collection rates based on the AfC methodology **and converting the targets in the regulation based on PoM to AfC**, while maintaining the timing and level of ambition.
- **By 01.01.2025 and every five years thereafter, Member States shall carry out a compositional survey** of collected mixed municipal waste and WEEE streams to determine the share of waste portable and LMT batteries therein.



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Targets for recycling efficiencies and material recovery

COM 2020	RECYCLING EFFICIENCIES BY 2025 AND 2030 (by average weight)	MATERIAL RECOVERY TARGETS BY 2027 AND 2031	COM 2020
75% (80%)	75 % for lead-acid batteries (80% in 2030)	90 % for cobalt (95% in 2031)	*90% (95%)*
65% (70%)	65% for lithium-based batteries (70% in 2030)	90 % for copper (95% in 2031)	*90% (95%)*
-	80% for nickel-cadmium batteries	90 % for lead (95% in 2031)	*90% (95%)*
50%	50% for other waste batteries	50 % for lithium (80% in 2031)	*35% (70%)*
		90 % for nickel (95% in 2031)	*90% (95%)*

31.12.2024
Rules on calculation and verification

01.07.2026
Review lithium recovery target (50%)

31.12.2028
Review all targets for recycling efficiencies and material recovery

No fixed deadline:
Add other battery chemistries and materials to the targets

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Shipment of waste batteries outside the EU

- Treatment (recycling) may be undertaken outside the Member State concerned or outside the Union, provided that the shipment of waste batteries, or fractions thereof, is in compliance with applicable legislation (inter alia, OECD Decision on the Control of Transboundary Movements of Wastes Destined for Recovery Operations).

- Waste batteries, or fractions thereof, exported out of the Union shall only count towards the fulfilment of obligations, efficiencies and targets if the exporter of the waste batteries, or fractions thereof, for treatment provides documentary evidence approved by the competent authority of destination that the treatment took place in conditions that are equivalent to the requirements of this Regulation.

- In order to distinguish between used batteries and waste batteries, shipments of used batteries suspected to be waste may be inspected by Member States for compliance (with the minimum requirements in Annex XIII) and monitored accordingly.

Reporting obligations for producers and recyclers 1/2

waste portable and waste LMT batteries

- Producers of portable batteries and producers of LMT batteries, or PROs, or, where relevant, waste management operators, shall report to the competent authority, at least, for each calendar year the following information according to battery chemistries:
  - (a) the amount of portable batteries (including a breakdown for portable batteries of general use) or LMT batteries made available on the market for the first time in the territory of a Member State, excluding batteries that have left the territory of that Member State in that year, before being sold to end-users;
  - (b) the amount of waste portable batteries or waste LMT batteries collected, respectively;
  - (c) the collection rate reached by the producer, or PRO acting on behalf of their members, for waste portable batteries or waste LMT batteries;
  - (d) the amount of collected waste portable batteries or waste LMT batteries delivered to permitted facilities for treatment or treated;
  - (e) the amount of collected waste portable batteries exported to third countries for treatment, preparation for reuse, preparation for repurposing or recycling;
  - (f) the amount of waste portable and LMT batteries collected and delivered to preparing for re-use or preparing for repurposing

Reporting obligations for producers and recyclers 2/2

waste SLI, EV and industrial batteries

- Producers of SLI, EV and industrial batteries, PROs, or, where relevant, waste management operators, shall report to the competent authority, at least, for each calendar year the following information according to battery chemistries:

  - (a) the **amount of** SLI batteries, **industrial batteries** and electric vehicle batteries **made available on the market for the first time in a Member State**, excluding batteries that have left the territory of that Member State in that year, before being sold to end users;
  - (b) the **amount of** waste **industrial batteries** or waste electric vehicle batteries **collected and delivered to** preparing for **re-use** or preparing for **repurposing**;
  - (c) the **amount of** waste SLI batteries, **waste industrial batteries** or waste electric vehicle batteries **collected and delivered to** permitted facilities for **treatment or treated**;
  - (d) the **amount of collected waste** SLI batteries**, industrial batteries** and electric vehicle batteries **exported to third countries for treatment, preparation for reuse, preparation for repurposing or recycling**.

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