Battery Regulation (EU) 2023/1542
Art. 8 Recycled Content

JRC study on calculation and verification rules

Stakeholder workshop

DG Joint Research Centre (JRC), European Commission

Wednesday, 27 November 2024

Final agenda

Please **mute** your microphone and **switch off** your video

Wednesday 27 November 2024	
09:00 – 09:15	Opening of the meeting room and time allocated to log-in
Introduction	
09:15 – 09:25	Introduction and housekeeping rules (DG JRC)
09:30 – 09:45	Article 8 of the Batteries Regulation and JRC mandate (DG ENV, DG GROW)
09:45 – 10:05	Overview of study objectives, methodology, guiding principles and elements, and timeline (DG JRC)
Block I: Traceability	
10:05 – 10:25	Background information and JRC recommendations
10:25 – 11:15	Stakeholder questions and feedback
11:15 – 11:30	*Comfort break*
Block II: Calculation	
11:30 – 11:40	Background information and JRC recommendations
11:40 – 12:00	Stakeholder questions and feedback
Block III: Verification	
12:00 – 12:10	Background information and JRC recommendations
12:10 – 12:30	Stakeholder questions and feedback
Meeting closure	
12:30 – 12:45	Conclusions, next steps of JRC study and instructions to fill in questionnaire

Housekeeping rules

- By default, please **mute** your microphone and **switch off** your video.

- Please write your comments (relevant for each session) in the **chat-box**.
  - When given the floor, you can switch on your microphone and camera.
  - Please clearly state your name and affiliation the first time you are given the floor.
  - Please mute yourself (and switch off your camera again) after your intervention.

- Please note that the (Webex) meeting **will be recorded** to help prepare the meeting minutes, but **will not** be livestreamed or made publicly available for replay

Project team

JRC-Seville - Unit B5
(Circular Economy and Sustainable Industry)

Dries Huygens

Pierre Gaudillat

Erika Pierri

Pelayo García- Gutierrez

JRC-ISPRA - Unit D3
(Land Resources and Supply Chain Assessments)

Martina Orefice

Silvia Bobba

Fabrice Mathieux

ENV B3
(Circular Economy – From Waste to Resources)

Nicolas Encausse

Cesar Gil Santos

GROW I3
(Net Zero Industries, Sustainable and Circular Products)

Kerstin Lichtenvort

Ewout Deurwaarder

Article 8 of the Batteries Regulation and JRC mandate (DG ENV, DG GROW)

European Commission

Article 8 in a nutshell
Scope and requirements

- **Scope**: Industrial batteries > 2 kWh, EV batteries, LMT batteries (from 2036) and SLI batteries
- **Requirements**:
  - 18.08.2028 - Declaration of % of cobalt, nickel, lithium **present in active materials** recovered from **battery manufacturing waste or post-consumer waste** and % of lead **present in the battery** recovered from **waste**
  - 18.08.2031 – Minimum % of cobalt (16%), nickel (6%), lithium (6%) and lead (85%)
  - 18.08.2036 - Minimum % of cobalt (26%), nickel (12%), lithium (15%) and lead (85%)
- These requirements are applicable for each battery model per year and per manufacturing plant
- Conformity assessment procedure must be Module D1 in Part B of Annex VIII, which includes third party verification by notified bodies

Article 8 in a nutshell
Commission empowerments and legal obligations

- **18.08.2026** – Delegated act with *the methodology for the calculation and verification of the percentage share of cobalt, lithium or nickel that is present in active materials and that has been recovered from battery manufacturing waste or post-consumer waste, and the percentage share of lead that is present in the battery and that has been recovered from waste, and the format for the documentation.*

- **No later than 31.12.2028** – Assessment of existing availability, and the forecasted availability for 2030 and 2035, of cobalt, lead, lithium or nickel recovered from waste + possible revision of RC targets

- **By 18.08.2029** – If justified, based on the above assessment, DA with revised RC targets for 2031 and 2036

- Possibility to adopt DAs to add minimum RC targets for other materials

Overview of study objectives, methodology, guiding principles and elements, and timeline (DG JRC)

European Commission

Science for policy

ANTICIPATE

INTEGRATE

IMPACT

Our purpose

The Joint Research Centre provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society.

European Commission

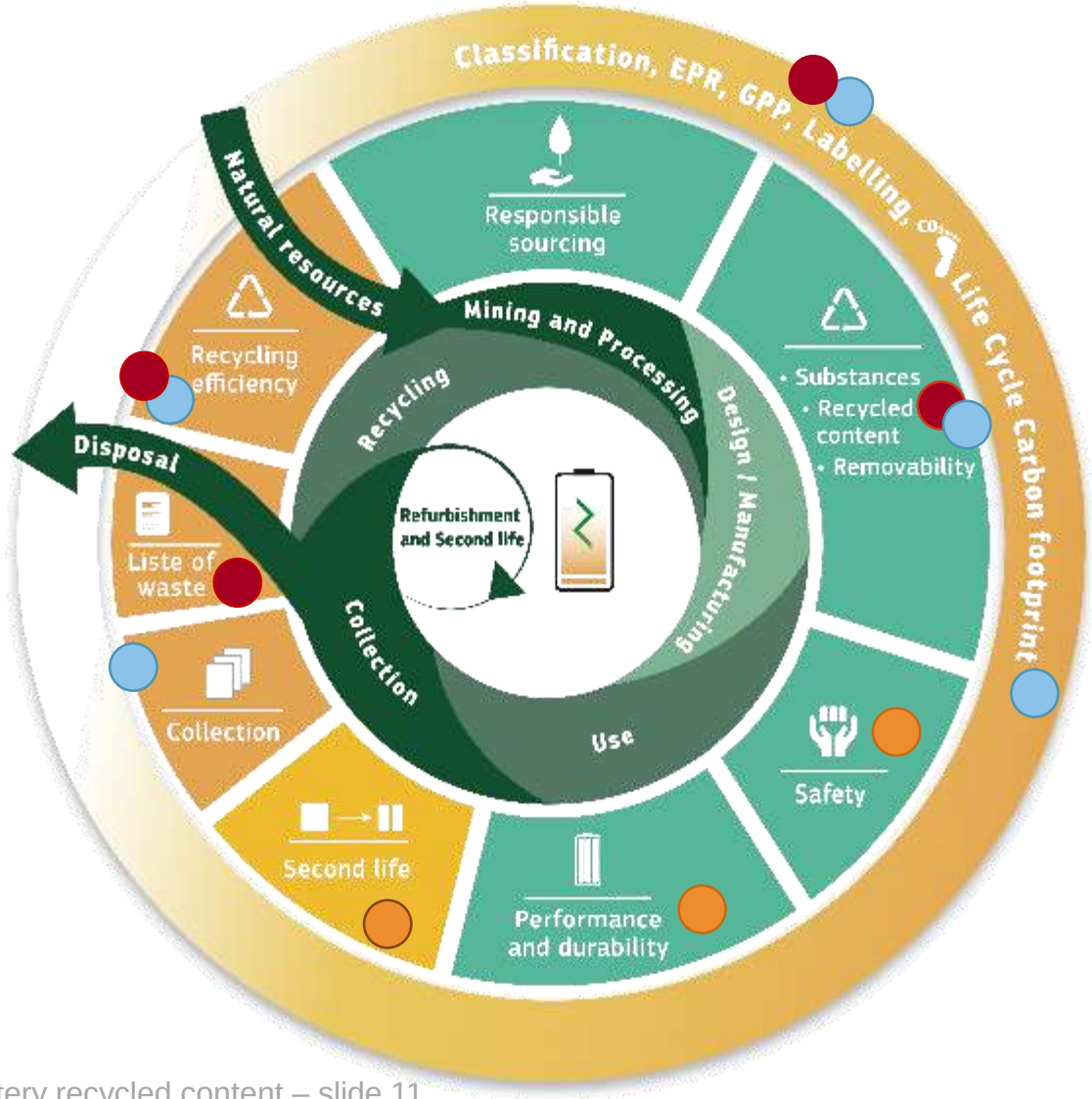
JRC sites

Headquarters in **Brussels** and research facilities located in **5 Member States:**

- Belgium (Geel)
- Germany (Karlsruhe)
- Italy (Ispra)
- The Netherlands (Petten)
- Spain (Seville)

European Commission

Support to the life-cycle based Battery Regulation (EU) 2023/1542



Ispra

Petten

Seville

European Commission

Objectives of the study

JRC will suggest calculation and verification rules for the percentage share of recycled content of Pb, Ni, Co and Li of batteries made available on market in the EU

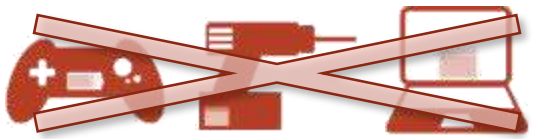
		By 2031	By 2036
Targets for recycled content	Pb	85%	85%
	Ni	6%	15%
	Co	16%	26%
	Li	6%	12%

Industrial batteries

EV batteries

SLI batteries

LMT batteries (2036)



not in the scope

Methodology

- Data collection, validation and analysis
- Technical workshops to bring together stakeholder data and opinions
- Build consensus
- Bilateral meetings, email exchange
- Visits to plants: analysis of (new) processes
- Iteratively develops consensus recommendations and reports

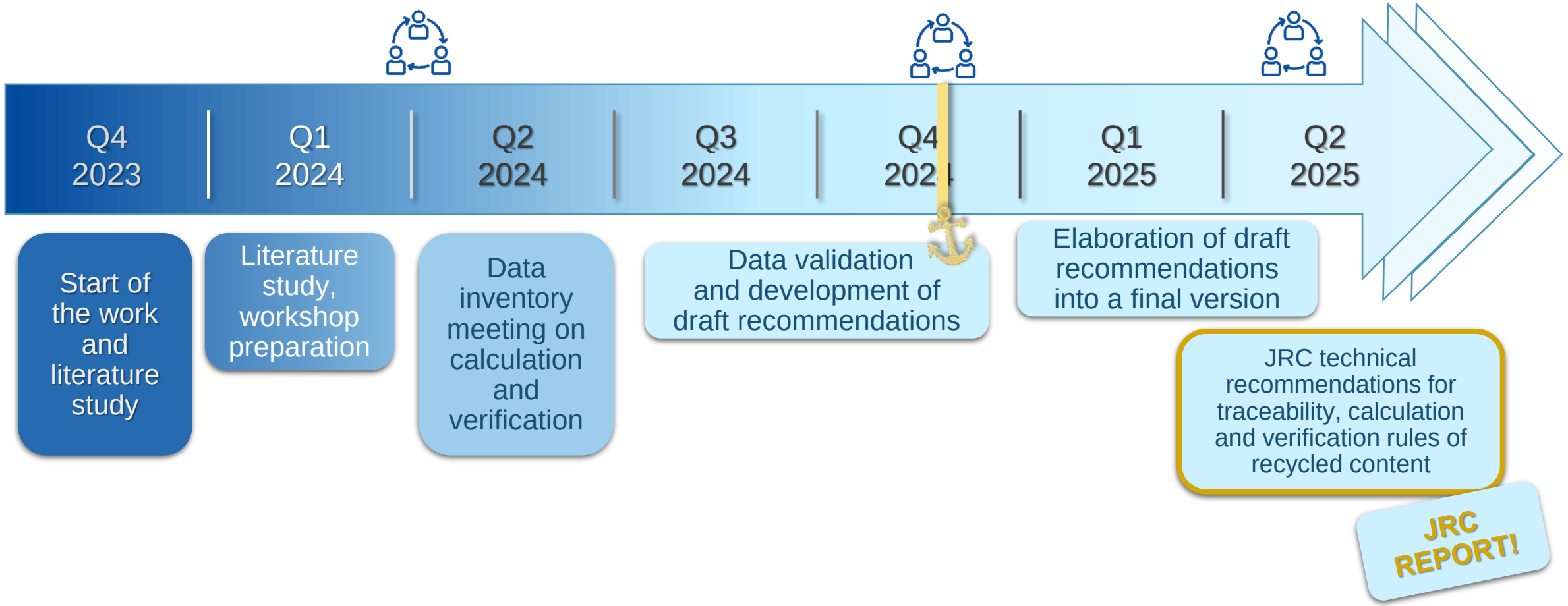
Expected deliverables:

Suggested rules supporting the implementation of the delegated act

JRC Science-for-Policy report

European Commission

Tentative timeline



= workshop

European Commission

Scope of today's workshop

In the scope today	Not in the scope today	Out of project's scope
ALL materials (Pb, Ni, Co, Li)		Target levels
Calculation and traceability		Review of targets
Traceability rules recommendations		Other materials than Pb, Ni, Co, Li
Calculation rules recommendations		Portable batteries and any other battery not in Art. 8
Verification rules recommendations		Other Articles
Your feedback by 08/01 COB		

Let's have discussion time...we listen to you!

Guiding principles

- **Coherence with relevant legislation**
  - ✓ Coherence with Article 8 of the Batteries Regulation, (EU) 2023/1542

- **Clear, accurate and verifiable**
  - ✓ Rules easy to understand, aligned to the legal text and designed to build customers trust
  - ✓ Clear, accurate, accessible information to industry actors and the wider public
  - ✓ Ensure product quality and full control of the material against lack of compliance or presence of impurities in the material

Guiding principles

- **Keep it simple**
  - ✓ Prioritise simplicity, avoiding intricate credit trading and complex accounting
  - ✓ Aligning declared to actual recycled content → potentially facilitate its future verification

Flexibility within the boundary conditions of the Regulation

- ✓ Benefit of certain levels of flexibility
- ✓ Mainly to accommodate processing techniques constraints if impossible to determine the physically present recycled content
- ✓ Also, to accommodate varying levels of process integration

Building on existing standards and certification schemes

- ✓ Some certification schemes already voluntarily implemented
- ✓ Impose minimal disruption to existing business processes when possible

Q&A

Introduction

Block I – traceability

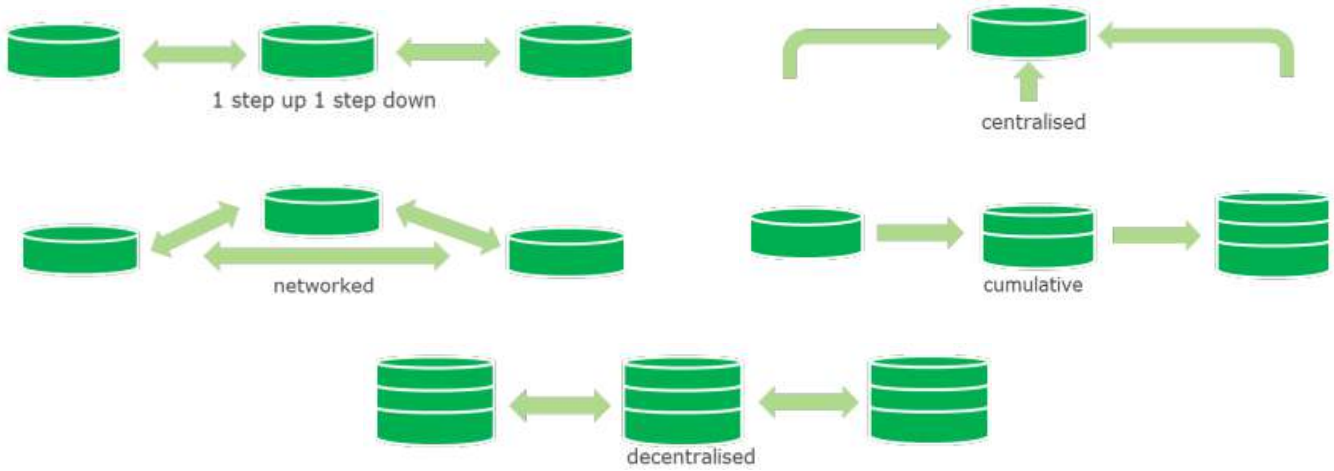
Background information and JRC recommendations

European Commission

Traceability

Traceability: "*ability to trace the history, application, location or source(s) of a material or product throughout the supply chain*". ISO 22095

Traceability system: "*manual or electronic system that provides the ability to access any or all information relating to the material or product under consideration throughout their life cycle, by means of accessing documented information*". ISO 22095



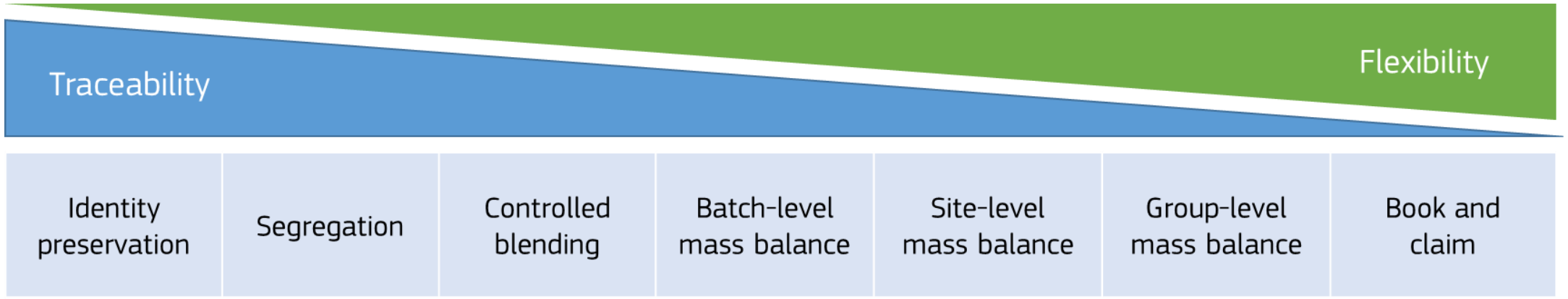
Global Traceability Standard, 2017

European Commission

Chain of custody models

Chain of custody: "*process by which inputs and outputs and associated information are transferred, monitored and controlled as they move through each step in the relevant supply chain*".

ISO 22095

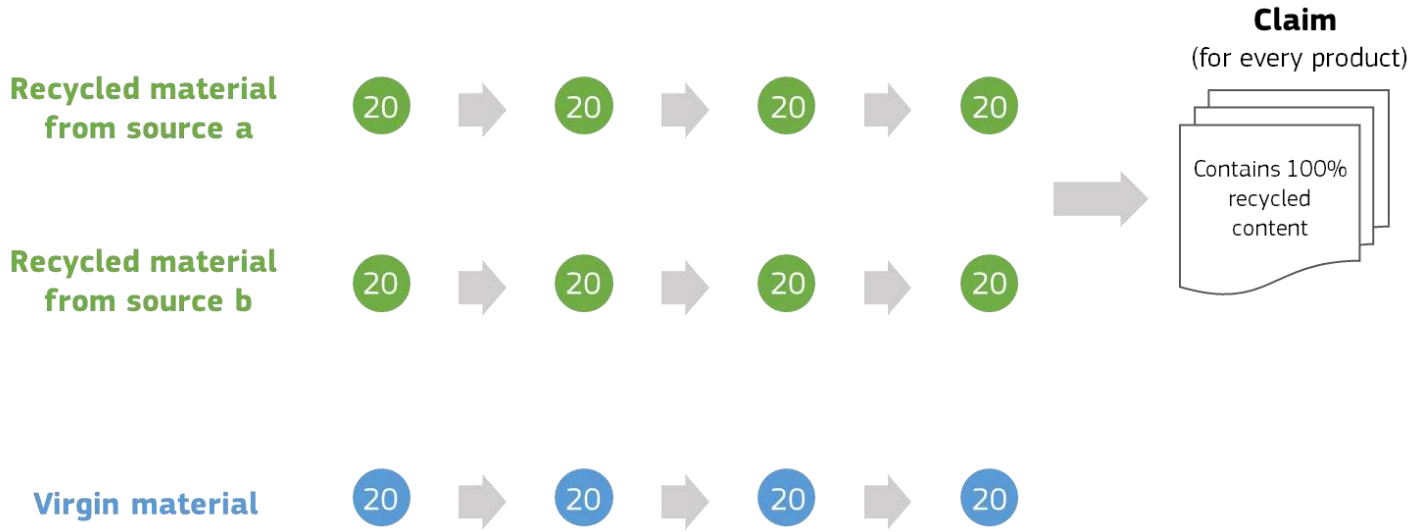


own elaboration based on ISO 22095

Chain of custody models
Identity preservation

"*chain of custody model in which the materials or products originate from a single source and their specified characteristics are maintained throughout the supply chain*".

ISO 22095

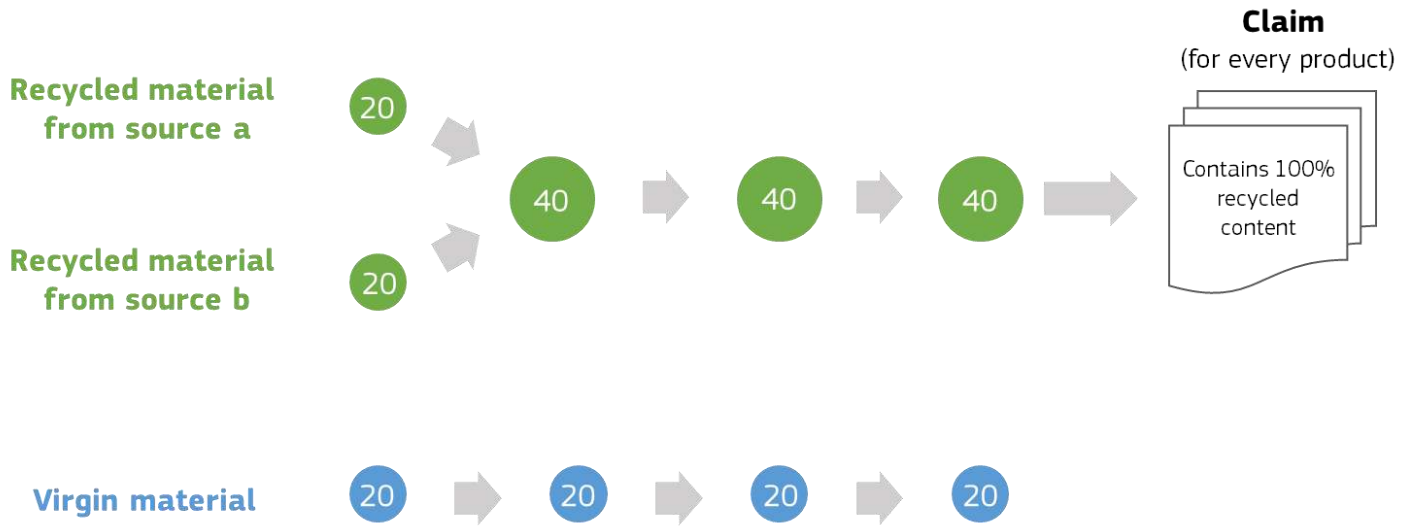


Not applicable to trace ReCo in batteries!

European Commission

Chain of custody models
Segregation

"*chain of custody model in which specified characteristics of a material or product are maintained from the initial input to the final output. […] Addition of material with different characteristics and/or grade to the input is not allowed*". ISO 22095



Could be suitable to trace ReCo at recycler step only (if no mixing with virgin material occurs).

European Commission

Chain of custody models
Controlled blending

"*chain of custody model in which materials or products with a set of specified characteristics are mixed according to certain criteria with materials or products without that set of characteristics resulting in a known proportion of the specified characteristics in the final output*". ISO 22095

Could be suitable to trace ReCo at any supply chain step, under certain conditions.

European Commission

Chain of custody models
Mass balance (1/2)

"*chain of custody model in which materials or products with a set of specified characteristics are mixed according to defined criteria with materials or products without that set of characteristics. The proportion of the input with specified characteristics might only match the initial proportions on average and will typically vary across different outputs*". ISO 22095

Implementation methods

Rolling average percentage method

The organisation shall calculate the average proportion of certified materials used as input and the average proportion of certified materials in the output during the accounting period. It allows to sell the average amount of recycled content present in the output.

Credit method

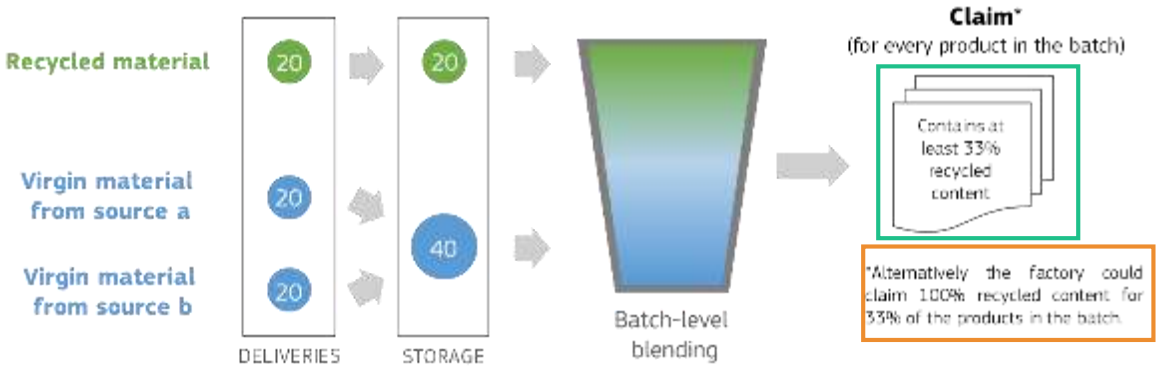
The organisation can allocate credits based on the mass of certified materials used in products. It allows to sell 100% recycled content material up to the amount that is used as input (taking into account losses).

Chain of custody models
Mass balance (2/2)

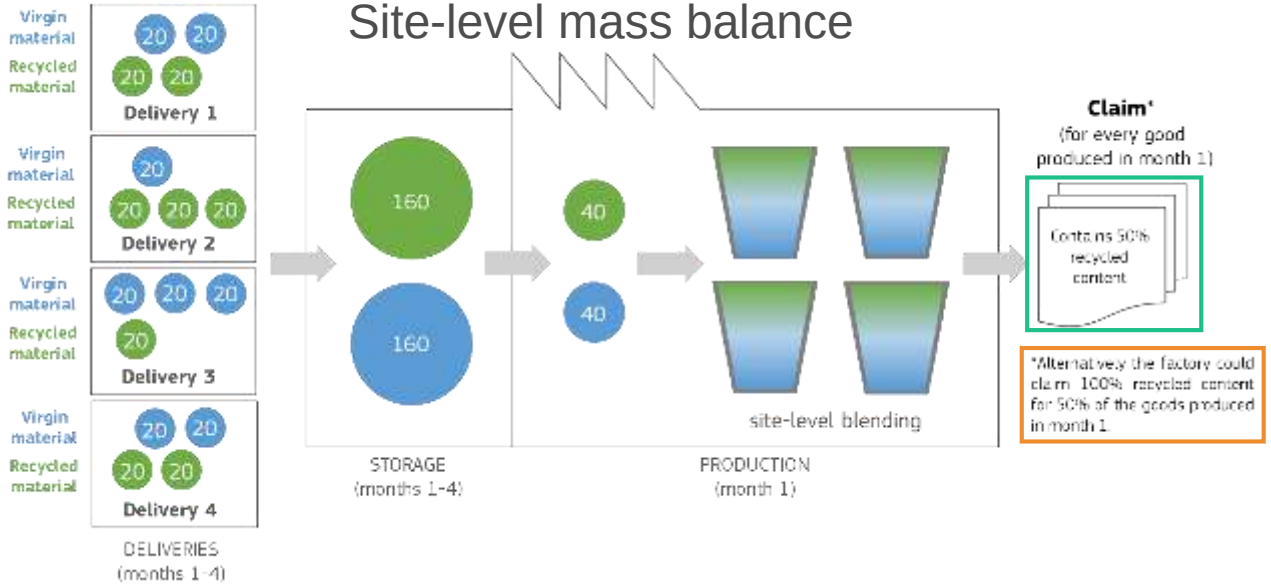
Rolling average percentage method

Credit method

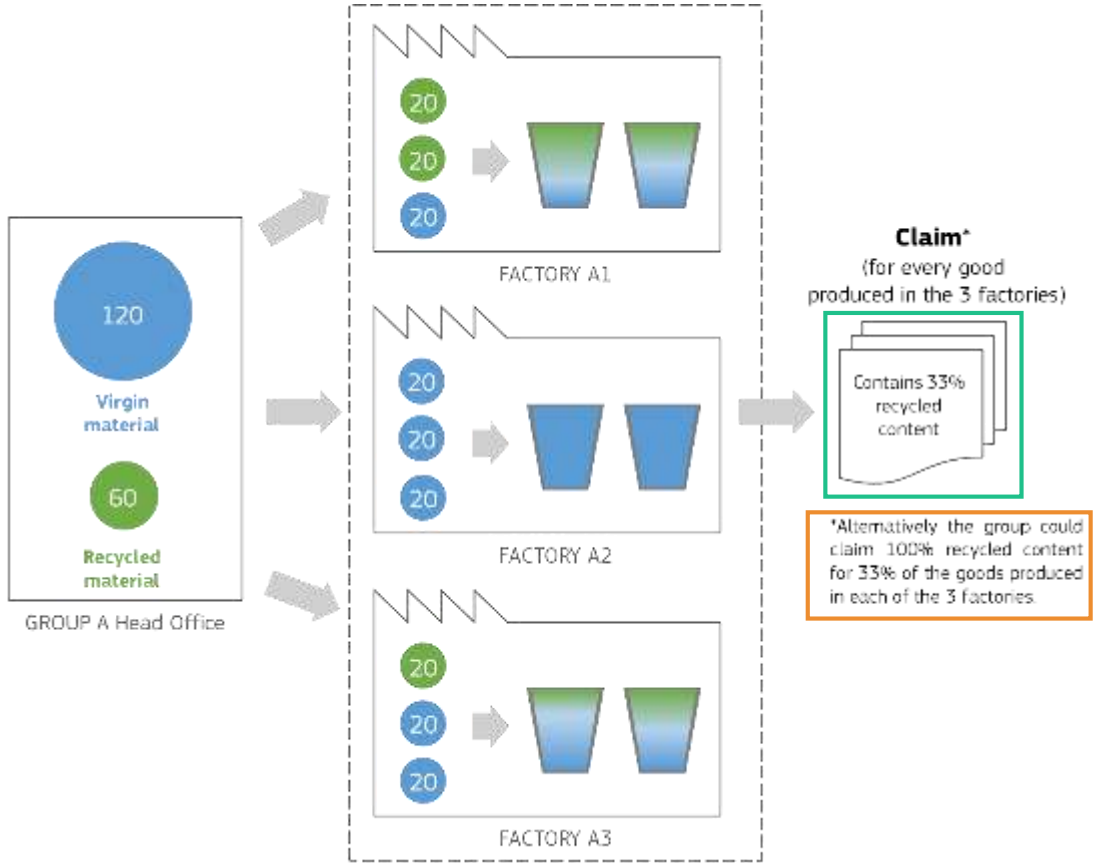
Batch-level mass balance



Site-level mass balance



Group-level mass balance

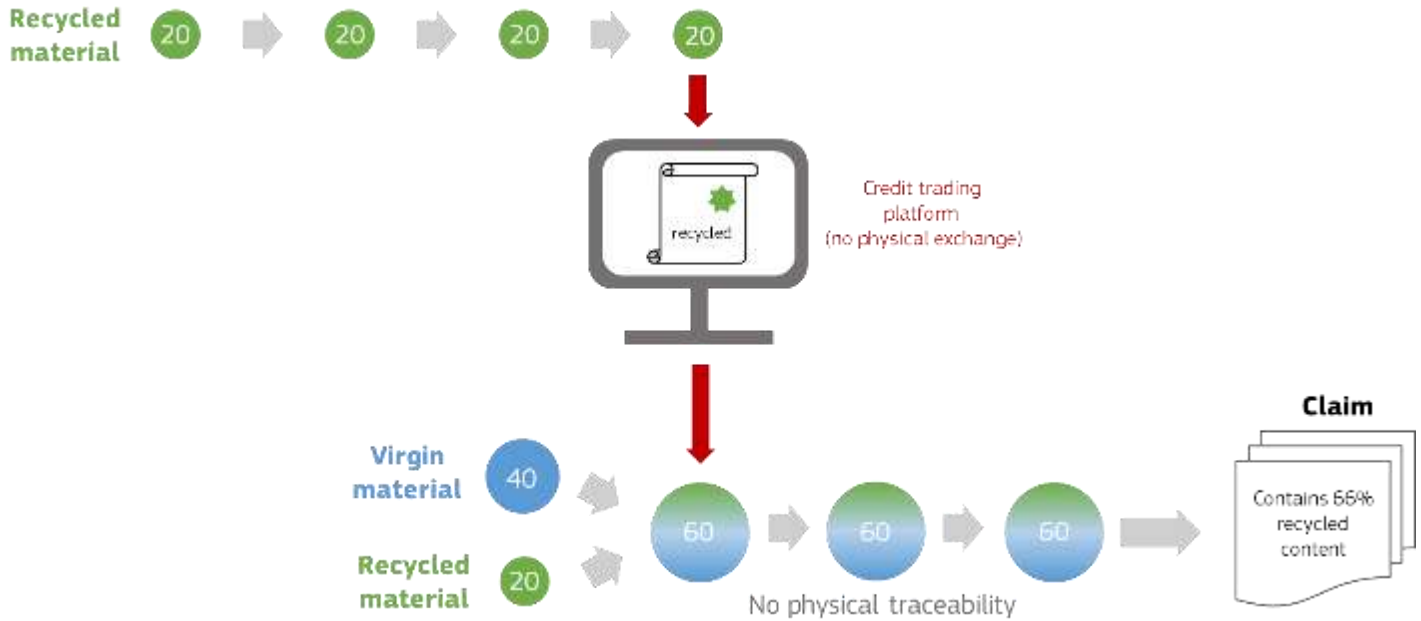


Could be suitable to trace ReCo at any supply chain step, under certain conditions and with certain restrictions.

Does not fulfil legal requirements → not applicable to trace ReCo in batteries!

Chain of custody models
Book & claim

"*chain of custody model in which the administrative record flow is not necessarily connected to the physical flow of material or product throughout the supply chain". […] often used where the certified/specified material cannot, or only with difficulty, be kept separate from the non-certified/specified material, such as green credits in an electricity supply*". ISO 22095



Does not fulfil legal requirements → not applicable to trace ReCo in batteries!

European Commission

Chain of custody models
Summary of the main properties

	Identity preservation	Segregation	Controlled blending	Batch-level mass balance	Site-level mass balance	Group-level mass balance	Book and claim
Mixing of recycled / virgin materials allowed	No	No	Yes	Yes	Yes	Yes	Yes
Physical traceability	Yes	Yes	Yes	Yes	Yes, to point of blending	Not always	No
Origin of recycled material can be identified in final product	Yes	Yes, but not always up to the specific point of origin	Yes	Not always, May be lost with physical blending	Not always, May be lost with physical blending	Not always, May be lost with physical blending	No
Volumes of recycled material sold match / do not exceed purchased volumes	Yes	Yes	Yes	Yes	Yes, over the accounting period	Yes, over the accounting period	No, it matches volumes and certificates purchased

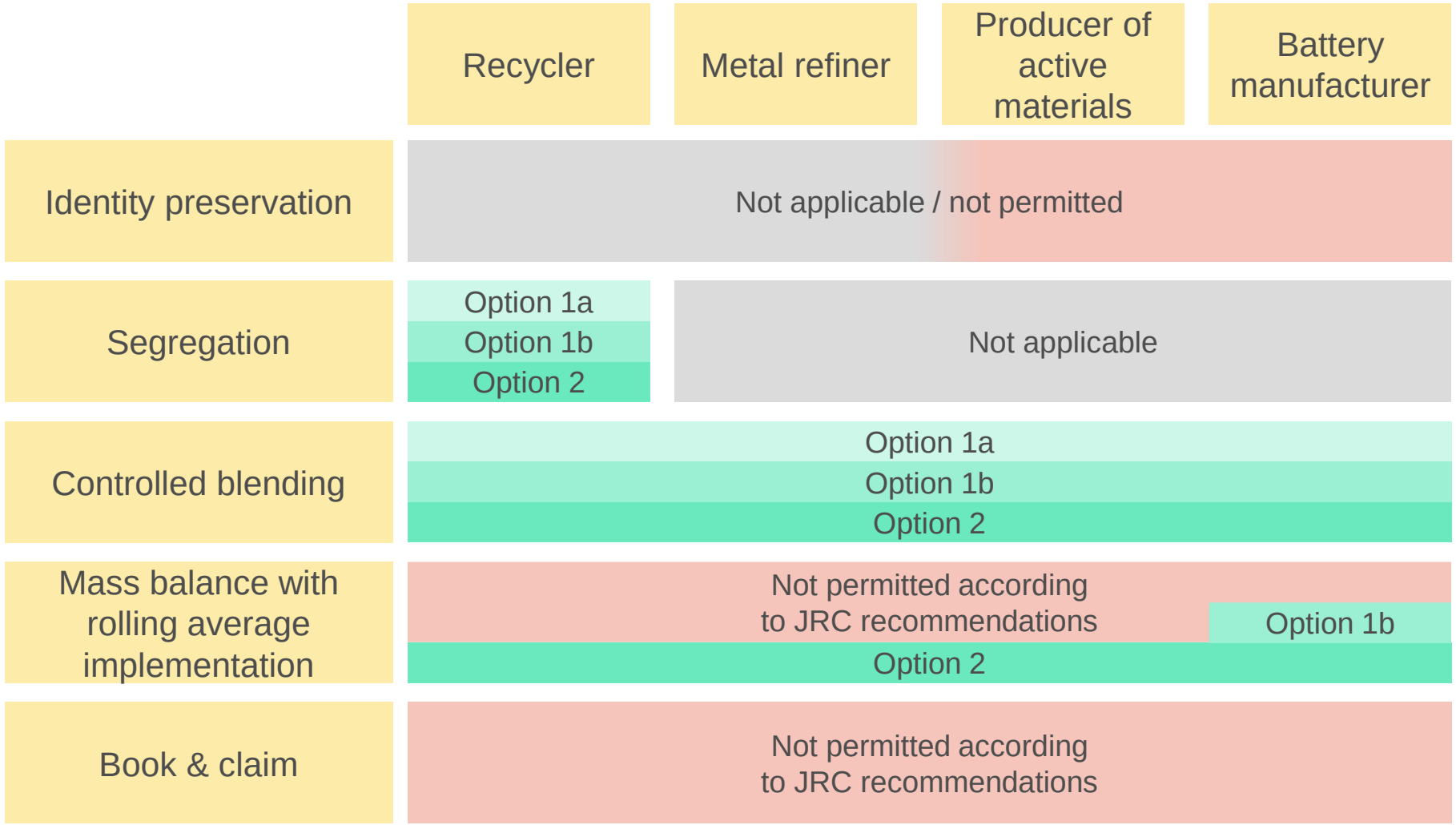
own elaboration based on (ISEAL, 2016)

JRC recommendations – Traceability approach Chain of custody (Point 1.1)

Monitoring input/output materials

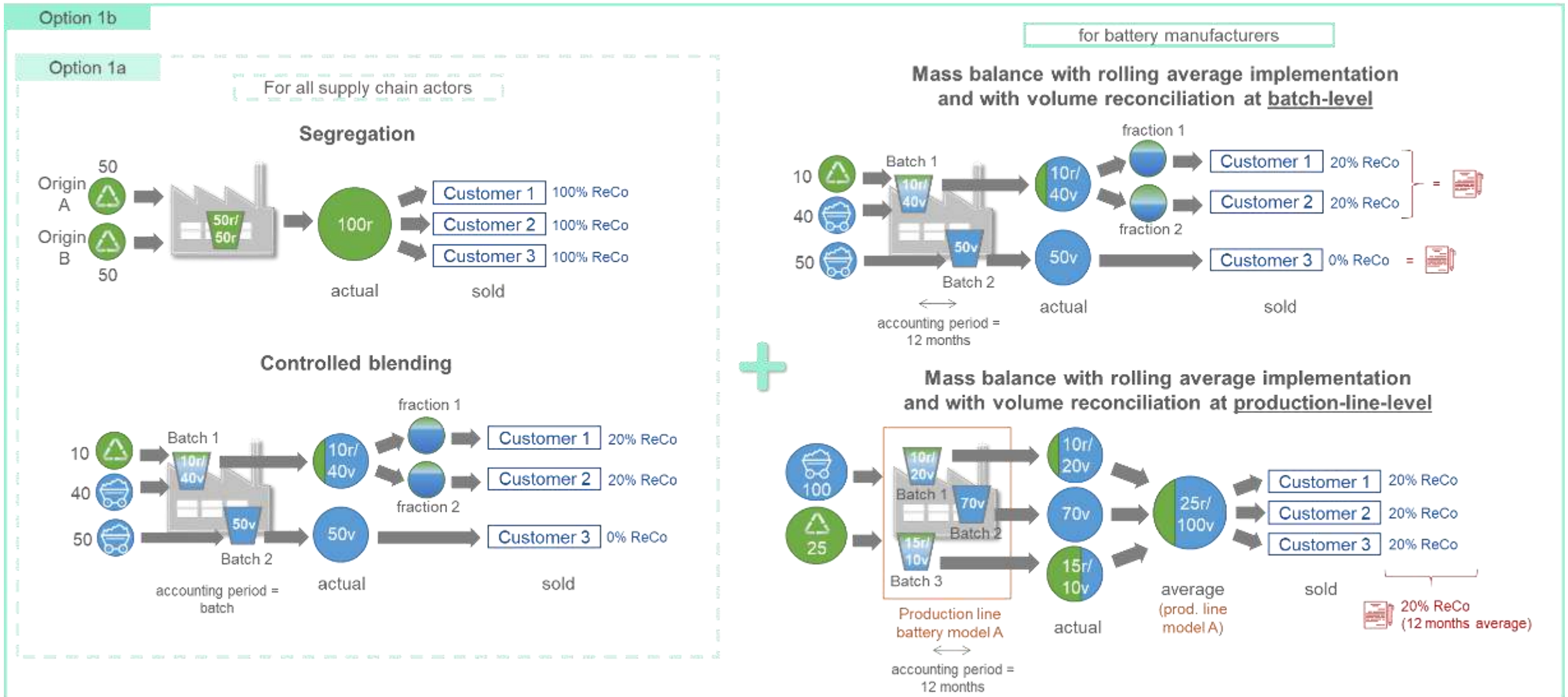
- All supply chain actors to monitor inputs and outputs at least at production plant level.
- Battery manufacturer to monitor inputs and outputs also at battery model level.

JRC recommendations – Traceability approach Applicable chain of custody models (Point 1.2)



European Commission

Applicable CoC models
Option 1

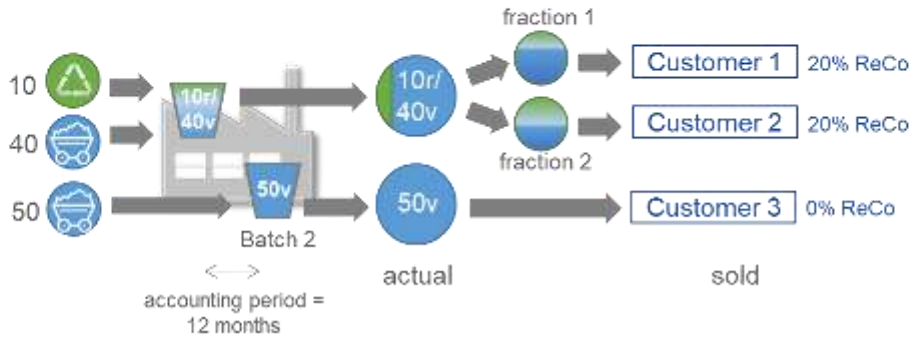


Applicable CoC models
Option 2

Option 2

for all supply chain actors preceding the battery manufacturer

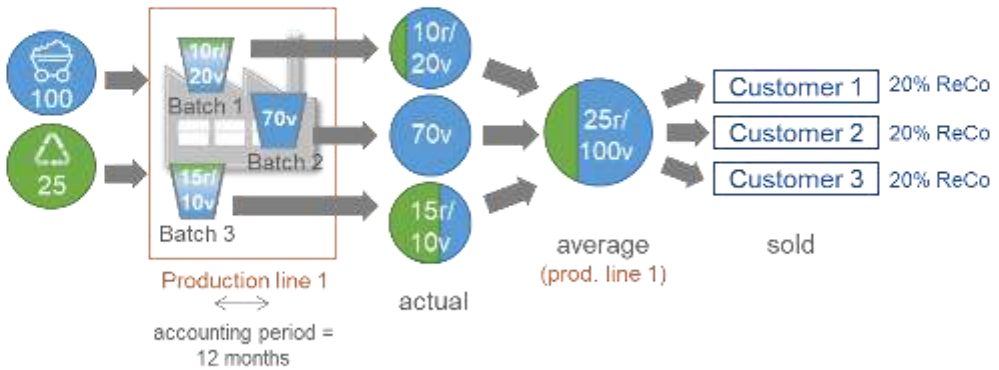
Mass balance with rolling average implementation and with volume reconciliation at batch-level



Option 1a

+

Mass balance with rolling average implementation and with volume reconciliation at production-line-level



for battery manufacturers

= Option 1b

JRC recommendations – Traceability approach
Traceability (Point 2)

Starting point for traceability

Ending point for traceability

Recycler → Metal refiner → Producer of active materials → Battery manufacturer

- ✓ ReCo in outputs
- ✓ CoC model

- ✓ ReCo in outputs
- ✓ CoC model

- ✓ ReCo in outputs
- ✓ CoC model

Minimum requirement for traceability

one step up, one step down

To be extended beyond direct trading partners as far as possible

European Commission

Back-up slide – JRC recommendations (1/3)

OPTION 1a

1. Chain of custody

1.1 Monitoring input and output materials

Each actor in the supply chain involved in the chain of custody shall ensure that the quantity of inputs and outputs are monitored at least at the production plant level. A battery manufacturer shall monitor inputs and outputs also at the battery model level.

1.2 Applicable chain of custody models

(I) The proportion of recycled material in the outputs shall be known for a contained volume (e.g. a batch, shipment). Recycled content shall be calculated for that volume using **segregation** or **controlled blending**.

(II) Each supply chain actor shall use the same chain of custody model as the previous actor or a model with a lower level of traceability[1] of recycled content in the output. **Mass balance and book and claim models cannot be applied** at any step of the battery supply chain.

1.3 Requirements for chain of custody

(I) When using segregation, the following requirements shall apply:

a) Recycled materials eligible to be used as input shall be kept physically separated from virgin materials and other materials non-compliant with the input requirements laid down in Article 8 throughout all steps of the manufacturing and the trading process.

b) The amount of recycled content in the output shall correspond to the amount of recycled content used as input, in line with an appropriate conversion factor[2].

(II) When using controlled blending, the following requirements shall apply:

a) Recycled materials eligible to be used as input shall be kept physically separated from virgin materials and other materials non-compliant with the input requirements laid down in Article 8 until the point of blending.

b) The amount of recycled content in the output shall correspond to the amount of recycled content used as input, in line with an appropriate conversion factor[3].

c) The quantities received and supplied to customers shall be reconciled within a defined accounting period, to verify that outputs relate to the inputs.

d) The accounting period shall correspond to the contained volume (e.g. batch) and shall not exceed twelve months[4].

2. Traceability

Traceability requirements shall apply to the whole supply chain, starting at the recycling step – including information on the origin of processed waste - and ending at the point at which batteries are placed on the market.

The amount of recycled content in the outputs that are passed on to the next supply chain actor shall be calculated at each step in the supply chain. Traceability information to be shared with downstream supply chain actors shall include at least the amount of recycled content in the outputs and the applied chain of custody model.

This information shall be shared using at least a "**one step up, one step down**" traceability approach. All supply chain actors shall strive to extend traceability beyond their direct trading partners, aiming to promote transparency throughout the supply chain.

1 Chain of custody models are ranked from higher to lower level of traceability as follows: identity preservation, segregation, controlled blending, mass balance, book and claim.

2 A conversion factor describes the change in quantity of a specific material due to processing. It shall be calculated for each processing step and shall be based on actual data.

3 See footnote **Error! Bookmark not defined.**.

4 The battery manufacturer can use information from different contiguous accounting periods to develop the documentation that shows compliance with Article 8 (for every battery model, per year and per manufacturing plant).

Back-up slide – JRC recommendations (2/3)

OPTION 1b

Option 1b would be equal to option 1a, with the following differences:

In point 1.2, it is added:

"(III) The battery manufacturer may also apply **mass balance with rolling average percentage implementation**. Credit methods are not applicable.

In point 1.3, it is added:

"(III) When using mass balance, the following requirements shall apply:

a) The quantities received and supplied to customers shall be reconciled within a defined accounting period, to verify that outputs relate to the inputs.

b) The accounting period shall not exceed twelve months[1]. The accounting period is representative for the production volume. Each accounting period shall be continuous in time and shall not necessarily fall within the same calendar year. Accounting periods shall be contiguous one to the other.

c) Within the defined accounting period the battery manufacturer may apply volume reconciliation of recycled materials at batch level or at production line level producing the same battery model within a single production plant.

d) Conversion factors[2] may be used to account for losses and for use of recycled materials for other applications.

e) A positive account of recycled content may be carried over into the next period, if at least the equivalent amount of the recycled material is physically in stock. Transferring negative balances beyond the accounting period is not permitted.

f) In case of multi-output processes (e.g. a battery manufacturer producing different battery models), recycling content shall be attributed proportionally to the different outputs (i.e. proportionally across the different battery models) within the accounting period. The rate of recycled content shall correspond to the calculated rolling average percentage.

g) Virtual allocation of recycled content is not allowed at any time.

1 The battery manufacturer can use information from different contiguous accounting periods to develop the documentation that shows compliance with Article 8 (for every battery model, per year and per manufacturing plant).

2 A conversion factor describes the change in quantity of a specific material due to processing. It shall be calculated for each processing step and shall be based on actual data.

European Commission

Back-up slide – JRC recommendations (3/3)

Option 2

1. Chain of custody

1.1 Monitoring input and output materials

Each actor in the supply chain involved in the chain of custody shall ensure that the quantity of inputs and outputs are monitored at least at the production plant level. A battery manufacturer shall monitor inputs and outputs also at the battery model level.

1.2 Applicable chain of custody models

(I) All supply chain actors shall strive to use a chain of custody model with the highest level of traceability possible, aiming to promote physical traceability of recycled content throughout the supply chain[1].

(II) If the proportion of recycled material in the outputs is known for a contained volume (e.g. a batch, shipment), recycled content shall be calculated for that volume using **segregation** or **controlled blending**.

(III) If it can be demonstrated that neither segregation nor controlled blending are favourable for technical or logistical reasons, **mass balance with rolling average percentage implementation** may be applied. Credit methods are not applicable.

(IV) Each supply chain actor shall use the same chain of custody model as the previous actor or a model with a lower level of traceability[2] of recycled content in the output. Once mass balance is applied at a given step in the supply chain, it shall be applied by all actors downstream. **Group-level mass balance and book and claim models cannot be applied** at any step of the battery supply chain.

1.3 Requirements for chain of custody

(I) When using segregation, the following requirements shall apply:

a) Recycled materials eligible to be used as input shall be kept physically separated from virgin materials and other materials non-compliant with the input requirements laid down in Article 8 throughout all steps of the manufacturing and the trading process.

b) The amount of recycled content in the output shall correspond to the amount of recycled content used as input, in line with an appropriate conversion factor[3].

(II) When using controlled blending, the following requirements shall apply:

a) Recycled materials eligible to be used as input shall be kept physically separated from virgin materials and other materials non-compliant with the input requirements laid down in Article 8 until the point of blending.

b) The amount of recycled content in the output shall correspond to the amount of recycled content used as input, in line with an appropriate conversion factor[4].

c) The quantities received and supplied to customers shall be reconciled within a defined accounting period, to verify that outputs relate to the inputs.

d) The accounting period shall correspond to the contained volume (e.g. batch) and shall not exceed twelve months[5].

(III) When using mass balance, the following requirements shall apply:

a) The quantities received and supplied to customers shall be reconciled within a defined accounting period, to verify that outputs relate to the inputs.

b) The accounting period shall not exceed twelve months[4]. The accounting period is representative for the production volume. Each accounting period shall be continuous in time and shall not necessarily fall within the same calendar year. Accounting periods shall be contiguous one to the other.

c) All supply chain actors may apply volume reconciliation of recycled materials at batch level within the accounting period.

d) In addition, within the defined accounting period:

(i) all supply chain actors preceding the battery manufacturer may also apply volume reconciliation of recycled materials at the production line level within a single production plant;

(ii) the battery manufacturer may also apply volume reconciliation of recycled materials at production line level producing the same battery model within a single manufacturing plant.

e) Conversion factors[5] may be used to account for losses and for use of recycled materials for other applications.

f) A positive account of recycled content may be carried over into the next period, if at least the equivalent amount of the recycled material is physically in stock. Transferring negative balances beyond the accounting period is not permitted.

g) In case of multi-output processes (e.g. a battery manufacturer producing different battery models), recycling content shall be attributed proportionally to the different outputs (i.e. proportionally across the different battery models) within the accounting period. The rate of recycled content shall correspond to the calculated rolling average percentage.

h) Virtual allocation of recycled content is not allowed at any time.

2. Traceability

Traceability requirements shall apply to the whole supply chain, starting at the recycling step – including information on the origin of processed waste - and ending at the point at which batteries are placed on the market.

The amount of recycled content in the outputs that are passed on to the next supply chain actor shall be calculated at each step in the supply chain. Traceability information to be shared with downstream supply chain actors shall include at least the amount of recycled content in the outputs and the applied chain of custody model.

This information shall be shared using at least a "**one step up, one step down**" traceability approach. All supply chain actors shall strive to extend traceability beyond their direct trading partners, aiming to promote transparency throughout the supply chain.

Q&A

Block I – Traceability approach

Coffee Break (15 min)

European Commission

Block II – calculations

Background information and JRC recommendations

European Commission

JRC recommendations – Calculation rules

$$ReCo(X) = \frac{\sum m(X)_{rec,output}}{\sum m(X)_{total,output}} \times 100, \text{ [mass \%]}$$

What

- ✓ Li, Ni and Co in battery active materials
  - ✓ $m(X)_{rec,output}$ = Li, Ni or Co in battery active materials recovered from battery manufacturing waste or post-consumer waste
  - ✓ $m(X)_{total,output}$ = total mass of Li, Ni or Co in battery active materials

- ✓ Pb in batteries
  - ✓ $m(X)_{rec,output}$ = Pb in batteries recovered from waste
  - ✓ $m(X)_{total,output}$ = total mass of Pb in batteries

Where = at the output of each step of the battery supply chain

JRC recommendations – Calculation rules

$$ReCo(X) = \frac{\sum m(X)_{rec,output}}{\sum m(X)_{total,output}} \times 100, \text{[mass \%]}$$

How #1 – data to be provided

- ✓ the recycled content of material X in the supplied material, ReCo(X);
- ✓ the total mass of supplied material, m_{tot}
- ✓ the chemical formula of the supplied material

example $m_{tot}(Co_2SO_4)$ → [chemical formula] → $m_{tot}(Co)$ → [ReCo(Co)] → $m_{rec,\ output}(Co)$

Chemical formula	m_{tot}	ReCo(Co)	Molar Mass of $CoSO_4$	Molar Mass of Co	$m(Co)_{tot,input}$	$m(Co)_{rec,input}$
[-]	[ton]	[%]	[g/mol]	[g/mol]	[ton]	[tons]
$CoSO_4$	18.0	20%	154.99	58.93	6.84	1.37
$CoSO_4$	5.0	0%	154.99	58.93	1.90	0.00

JRC recommendations – Calculation rules

How #2 – input fractions

- ✓ in case of mass balance rolling average method, take into account both inputs and changes in stock
- ✓ mass balance equation: Output = Input + Change in stock + Internal conversions – Losses

$$m(X)_{rec,output} = m(X)_{rec,input} * cf$$

How #3 – losses

- ✓ calculated plant-specific for each output along the battery supply chain and for any CoC model
- ✓ losses accounting: how much recycled material travels along the supply chain
- ✓ $m(X)_{rec,input}$ = mass of Li, Ni, Co or Pb (as defined in 'What') in input to a step of the supply chain
  cf = conversion factor as per traceability

Q&A

Block II – Calculation rules

Back-up slide – JRC recommendations (1/2)

Recommended formula for the calculation of recycled content of lithium (Li), nickel (Ni) and cobalt (Co) in active materials of batteries

1. The share for recycled content of lithium, nickel or cobalt in the active materials of a battery is calculated as follows:

$$ReCo(X) = \frac{\sum m(X)_{rec,output}}{\sum m(X)_{total,output}} \times 100, \text{[mass \%]} \qquad (1)$$

where:

X = lithium (Li), nickel (Ni) or cobalt (Co) in the battery active materials or lead (Pb) in the battery as defined in Article 8(2) and Article 8(3) of the Regulation (EU) 2023/1542;

ReCo(X) = calculated *share for recycled content* of the material X in the total mass of material (X) per its referring system for the purpose of Article 8(2) and 8(3) of Regulation (EU) 2023/1542 [in mass %]. In case of lithium, nickel and cobalt the referring system is the active materials in the battery; in case of lead the referring system is the battery;

$\Sigma m(X)_{rec,output}$ = *mass of material X (Li, Ni, or Co), in the active material (or precursors thereof) recovered from battery manufacturing waste or post-consumer waste or the mass of material X (Pb) in batteries (or precursors thereof) recovered from waste and all accounting for the share for recycled content, summed over the accounting period,* [in tonnes];

$\Sigma m(X)_{total,output}$ = *total mass of material X (Li, Ni, or Co), in active materials (or precursors thereof) or the total mass of material X (Pb) in batteries (or precursors thereof),* summed over the accounting period, [in tonnes].

2. The recycled content of a material X (Li, Ni, Co or Pb) is expressed in mass percentage, [mass %].

3. The calculation point of recycled content shall be at the output of each step of the battery supply chain.

Back-up slide – JRC recommendations (2/2)

4. The mass of recycled material, to be accounted for in the battery, shall be based on the following output data provided by the preceding supply chain actor(s):

- the recycled content of material X in the supplied material, ReCo(X);
- the total mass of supplied material, m_{tot};
- the chemical formula of the supplied material.

For each step, the $m(X)_{tot}$ is calculated from the m_{tot} via the chemical formula of the supplied material and the $m(X)_{rec}$ is calculated from the $m(X)_{tot}$ via the ReCo(X) as follows:

$$m(X)_{rec,output} = ReCo\ (X) * m(X)_{tot,output} \qquad (2)$$

5. The share of recycled content, if calculated per mass balance rolling average (4.2.1) shall take into account all the inputs and changes in stock to the step of the battery supply chain to which the calculation applies. Losses shall be calculated for each step of the battery supply chain and for any applied chain of custody model.

6. To account for losses of recycled material (X), the following formula shall be used:

$$m(X)_{rec,output} = m(X)_{rec,input} * cf \qquad (3)$$

where:

$m(X)_{rec,output}$ = as defined above.

$m(X)_{rec,input}$ = *mass of material X (Li, Ni, or Co), in the active material (or precursors thereof) recovered from battery manufacturing waste or post-consumer waste or the mass of material X (Pb) in batteries (or precursors thereof) recovered from waste; and used as input in a step of the supply chain,* [in tonnes];

cf = conversion factor, as defined in section 4.2.1

Block III – verification

Background information and JRC recommendations

European Commission

JRC recommendations – Verification rules Traceability system (Point 1)

Battery manufacturers shall establish a **traceability system** that

- ✓ ensures traceability across entire chain of custody
- ✓ ensures that all supply chain operators collect necessary documentation
- ✓ provides the notified body access to the documentation across the entire chain of custody

All supply chain actors in the chain of custody shall fulfill the requirements of the battery manufacturer, including the selected chain of custody model.

JRC recommendations – Verification rules Documentation (Point 2)

Starting point for traceability

Ending point for traceability

Recycler → Metal refiner → Producer of active materials → Battery manufacturer

Documentation

- ✓ Production process flowcharts
- ✓ Parts and characteristics of relevant inputs/outputs
- ✓ List of suppliers and customers
- ✓ Receiving records (with supplier details)
- ✓ Shipping records (with customer details)
- ✓ Calculations
- ✓ Plant-specific data for conversion factors and stocks

Documentation

- ✓ Production process description
- ✓ Parts and characteristics of relevant inputs/outputs
- ✓ Recycled content
- ✓ Receiving records (with supplier details)

Records to be kept for 10 years after the output leaves the production plant

JRC recommendations – Verification rules Verification (Point 3)

Minimum verification by notified bodies

- ✓ ReCo calculations by battery manufacturer
- ✓ Data and information used for the calculation and documentation
- ✓ Company-specific data used in the calculations
- ✓ Mass conversions and measurement units
- ✓ Balance of inputs/outputs, taking into consideration conversion factors

Identification of uncertainties and assessment of possible effects

Required assessment visit

premises of a manufacturer of batteries manufactured in series

Optional assessment visit

- ✓ manufacturer's premises of batteries not manufactured in series
- ✓ cell/anode/cathode production premises
- ✓ CAM production premises
- ✓ anode active material production premises
- ✓ metal refiner production premises
- ✓ metal recycling premises
- ✓ premises of one or more of any other production sites for which company-specific data were collected

Back-up slide – JRC recommendations (1/2)

1. Traceability system

Battery manufacturers shall ensure:

a) they develop a study supporting the recycled content share referred to in Article 8, as specified in the applicable conformity assessment modules (Annex VIII of the Regulation).
b) the reliability of data used for the calculation of the recycled content share referred to in Article 8 as well as the proper implementation of the relevant calculation methodology by having an established traceability system that:
   - ensures traceability across the entire chain of custody up to the finished battery model product;
   - ensures that all supply chain operators collect the necessary documentation as specified in point (2); and
   - provides the notified body access to the documentation that supports the data used for the calculation of the recycled content share, in an unrestrained manner across the entire chain of custody.

All supply chain actor in the chain of custody shall fulfill the requirements of the battery manufacturer, including the selected chain of custody model.

2. Documentation

To be compliant with the requirements described in the applicable conformity assessment modules (Annex VIII of the Regulation), battery manufacturers shall have at plant manufacturing level systematic, orderly and comprehensive documentation of at least:

a) a description of the production processes including chemical reactions of Li, Co, Ni and Pb containing materials, if material transformation or mixing takes place;
b) a description of the parts and characteristics of the relevant input and output materials containing recycled material at manufacturing plant level, if material transformation or mixing takes place;
c) information on the relationship between recycled content in the accounting periods and the percentage share of cobalt, lithium or nickel that is present in active materials and that has been recovered from battery manufacturing waste or post-consumer waste, and the percentage share of lead that is present in the battery and that has been recovered from waste, for each battery model per year and per manufacturing plant;
d) receiving records for contiguous accounting periods, including supplier name, supplier address, and supplier contact details, data of shipment, quantity of shipment specifying total mass and recycled content and product characteristics including chemical composition, and a unique identifier of the shipment. For inputs containing recycled material, also certificates of proof that inputs originate from eligible waste materials as specified in Article 8 of the Regulation, and information on the chain of custody model applied to trace and calculate their recycled content share in previous steps.

Upstream supply chain actors to the battery manufacturer shall have at production plant level systematic, orderly and comprehensive documentation of at least:

a) production process flowcharts and the production processes including chemical reactions of Li, Co, Ni and Pb containing materials, if material transformation or mixing takes place;
b) a description of the parts and characteristics of the relevant input and output materials containing recycled material at production plant level, if material transformation or mixing takes place;
c) a list of suppliers for and customers of recycled material;
d) receiving records for contiguous accounting periods, including supplier name, supplier address, and supplier contact details, data of shipment, quantity of shipment specifying total mass and recycled content and product characteristics including chemical composition, and a unique identifier of the shipment. For inputs containing recycled material, also certificates of proof that inputs originate from eligible waste materials as specified in Article 8 of the Regulation, and information on the chain of custody model applied to trace and calculate their recycled content share in previous steps;
e) shipping records for contiguous accounting periods, including customer name, customer address, customer contact details, shipping date, quantity of shipment specifying total mass and recycled content and product characteristics including chemical composition, chain of custody model and its implementation details including accounting period of the shipped material, and a unique identifier of the shipment;
f) the calculations, if material transformation or mixing takes place;
g) the details of all the plant-specific data in relation to conversion factors and stocks, including underlying documentation needed to establish the reliability of the company-specific data on conversion factors and information on mathematical treatments applied to the data, if material transformation or mixing takes place;
h) any other data required for the calculations.

Supply chain actors shall keep the documentation for 10 years after the output leaves the production plant.

European Commission

Back-up slide – JRC recommendations (2/2)

3. Verification

Notified bodies shall verify that:

a) calculations for the recycled content share in batteries referred to in Article 8 performed by the battery manufacturer are correct, reliable, appropriate, of acceptable accuracy, and performed in accordance with requirements laid down for traceability and calculation;
b) data and information used for the calculation of the documentation for the calculation of the recycled content share are accurate, complete, consistent, reliable and traceable;
c) all company-specific data used in the calculations are appropriate and in compliance with the requirements laid out in this Annex, addressing in the verification:
    - coverage, precision, completeness, representativeness, consistency, reproducibility, sources and uncertainty;
    - plausibility, quality and accuracy of the data;
    - quality and accuracy of the underlying documentation;
d) conversion of Li, Co, Ni and Pb mass in chemical reactions and measurement units are correctly applied; and
e) the output supplied to customers from production plants at each supply chain step does not exceed the percentage of input with containing recycled materials received at the production plant, taking into consideration plant-specific conversion factors for contiguous accounting periods.

The assessment shall include a review of the data used in the calculations. In addition to a required assessment visit to the premises of a manufacturer of batteries manufactured in series, it may include an assessment visit to:

a) the manufacturer's premises of batteries not manufactured in series;
b) the cell, anode, and cathode production premises;
c) the cathode active material production premises;
d) the anode active material production premises;
e) the metal refiner production premises;
f) the metal recycling premises; and
g) where considered important, the premises of one or more of any other production sites for which company-specific data were collected.

The notified body shall identify uncertainties that are higher than expected and assess the effect of the identified uncertainty on the total outcome of the documented recycled content.

Q&A

Block III – Verification rules

Meeting closure

Conclusions, next steps of JRC study and instructions to fill in questionnaire

European Commission

Conclusions

- **Mandate** of the JRC is to provide **recommendations for the** development of **DA**, based on legal text of Article 8:
  - Recycled content in the battery is model-specific, and “averaged” over a 12 month period;
  - **Recycled content** is **physically present** in the battery;
  - Conformity assessment procedures involves notified bodies

- Battery manufacturing entails a multifaceted **global supply chain**, with production processes that combine both batch and continuous methods, relies on existing infrastructure, with **multiple suppliers** coexisting and/or changing during the year

- **Traceability** and **chain of custody model** determine the content present in batteries with a documented recycled content**:**
  - **Segregation** and **controlled blending** ensure documented recycled content = **recycled content present**
  - **Mass balance** may imply a lower level of traceability of recycled content in the output
  - **Book and claim decouples** documented recycled content from **recycled content present**

- **International standards** and voluntary certification schemes provide guidance

Conclusions

Traceability: Different options for chain of custody models still under evaluation by JRC

- Relevant input received to evaluate and understand impacts of chain of custody model on business practices from a technical and logistical point of view
- Issues remain as there is not one chain of custody model that integrates all legal and technical requirements, the presented chain of custody may present challenges to accomodate industrial practice

Calculation

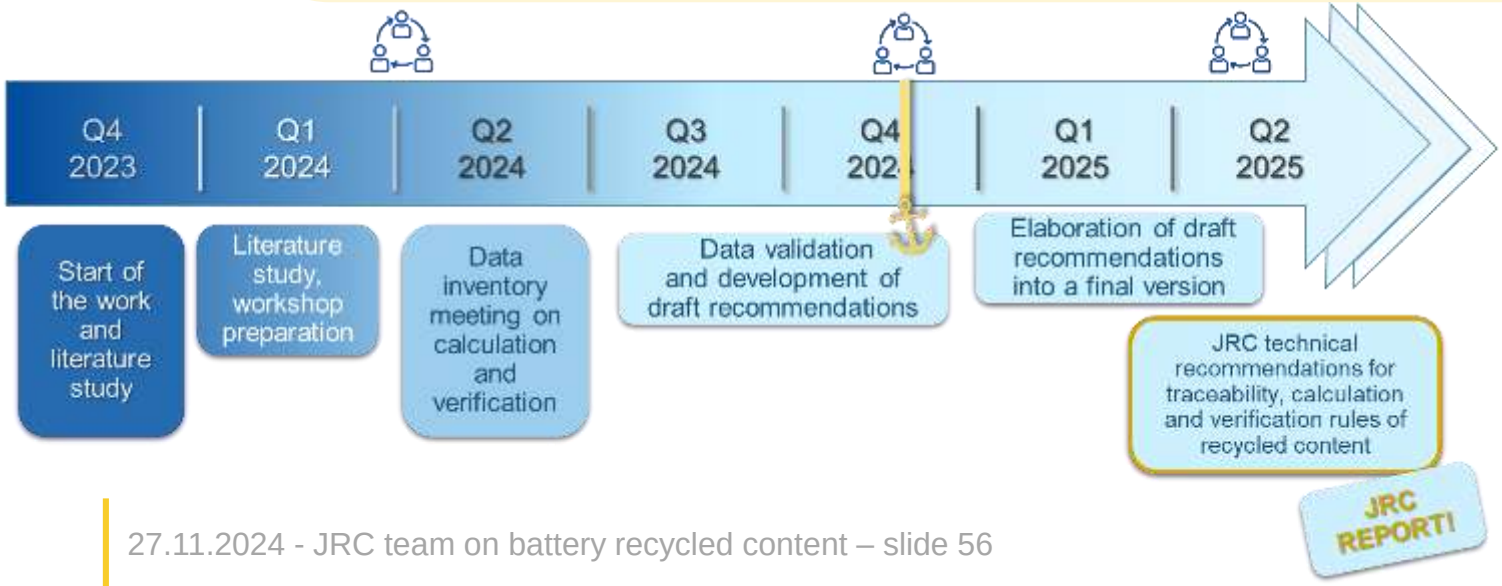
- Clarifications are provided on the origin of materials as per type of waste and to the geographic source
- Request for further specification on calculations of conversion factor
- Calculations will have to be done along all the battery value chain

Verification

- Verification out of the EU remains a challenge especially regarding visits on site

Next steps and timeline

- **Stakeholders**: submit feedback in written form via questionnaire by **8 January 2025**
- **JRC will assess** technical feedback received, and potentially make further adaptations to the report and recommendations
- A new **pre-final report** version will be shared with stakeholder in Q2 2025, for discussion at a final stakeholder workshop soon after
- Subsequent to the oral discussions at the **final workshop**, JRC will finalise and publish the report and its final recommendations



European Commission

Instructions to fill in questionnaire

deadline: 8 January 2025

JRC Recycled content calculation and verification rules:
https://ec.europa.eu/eusurvey/runner/305dcf7a-72a8-ef4f-1d0c-f1f6ec43596f

Password: jrc-batteries

European Commission

Questionnaire instructions

- JRC study to finalise in Q2 2025, process stakeholder feedback in a time efficient way
- Smaller national entities to share their input with Member State representatives or relevant industry umbrella organisations
- Member States and pan-European organisations to compile information from their daughter organisations into a single response
- One consolidated reply per organisation / MS
- Technical instructions (access, save, etc.) provided with invitation email

Thank you!

Thank you
and keep in touch

✉ JRC-BATT-RECYCLED-CONTENT-RULES@ec.europa.eu

EU Science Hub
joint-research-centre.ec.europa.eu

@EU_ScienceHub
EU Science Hub – Joint Research Centre
EU Science, Research and Innovation
EU Science Hub
@eu_science

European Commission