Webinar on the Certification of Co-processing under ISCC EU

04 June 2025

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Your Speakers

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Julia Nevares

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ISCC International Sustainability & Carbon Certification

Webinar Agenda

Introduction: ISCC and organizational aspect on co-processing

What is co-processing?

Delegated regulation on co-processing

Methodologies to determine bio-content of co-processed fuel

GHG methodology for co-processed fuel

Summary

02

Introduction: ISCC and organizational aspect on co-processing

ISCC certification ensures sustainability and GHG emissions reductions along global supply chains

ISCC certification ensures

Sustainability in feedstock production

Traceability of sustainable materials through the supply chain

Verified reduction of GHG emissions

ISCC
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ISCC offers three certification systems, application depending on the market

ISCC EU

- Applicable for **sustainable fuels used for transport, electricity, heating and cooling in the European Union**
- To demonstrate compliance with the EU's sustainability criteria for biofuels, bioliquids and biomass fuels set out in the RED

ISCC PLUS

- Application for **voluntary** and certain **regulated markets**
  - Energy and biofuels outside the European Union (e.g. Japan, Australia)
  - Industrial applications
  - Food and feed markets

ISCC CORSIA

- Applicable for **sustainable aviation fuels under ICAO CORSIA**
- To **demonstrate compliance** with the sustainability and GHG criteria for CORSIA eligible fuels

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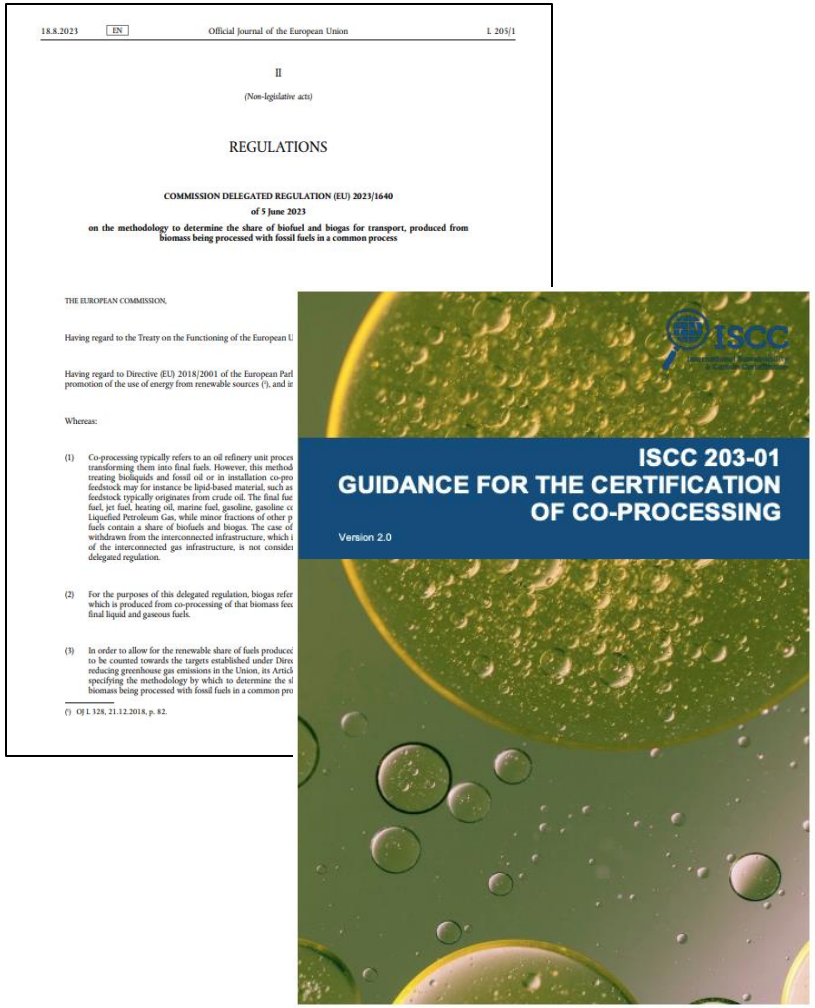
In the EU, Delegated Regulation (EU) 2023/1640 describes how bio-fuels produced through co-processing should be quantified



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II

(Non-legislative acts)

REGULATIONS

COMMISSION DELEGATED REGULATION (EU) 2023/1640
of 5 June 2023
on the methodology to determine the share of biofuel and biogas for transport, produced from biomass being processed with fossil fuels in a common process

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European U

Having regard to Directive (EU) 2018/2001 of the European Parl promotion of the use of energy from renewable sources (1), and ir

Whereas:

(1) Co-processing typically refers to an oil refinery unit proces transforming them into final fuels. However, this method treating bioliquids and fossil oil or in installation co-pro feedstock may for instance be lipid-based material, such as feedstock typically originates from crude oil. The final fue fuel, jet fuel, heating oil, marine fuel, gasoline, gasoline ce Liquefied Petroleum Gas, while minor fractions of other p fuels contain a share of biofuels and biogas. The case of withdrawn from the interconnected infrastructure, which i of the interconnected gas infrastructure, is not consider delegated regulation.

(2) For the purposes of this delegated regulation, biogas refer which is produced from co-processing of that biomass feec final liquid and gaseous fuels.

(3) In order to allow for the renewable share of fuels produced to be counted towards the targets established under Direc reducing greenhouse gas emissions in the Union, its Articl specifying the methodology by which to determine the sl biomass being processed with fossil fuels in a common pro

(1) OJ L 328, 21.12.2018, p. 82.

- Delegated Regulation (EU) 2023/1640 sets out rules as to how to calculate the bio-content of products from co-processing to be sold on European market
- ISCC 203-01 guidance on coprocessing translates the requirements of Delegated Regulation into practical certification procedures
- ISCC received positive technical assessment by the EC for complying with this legislation via the ISCC Guidance document → compliance needs to be in ensured

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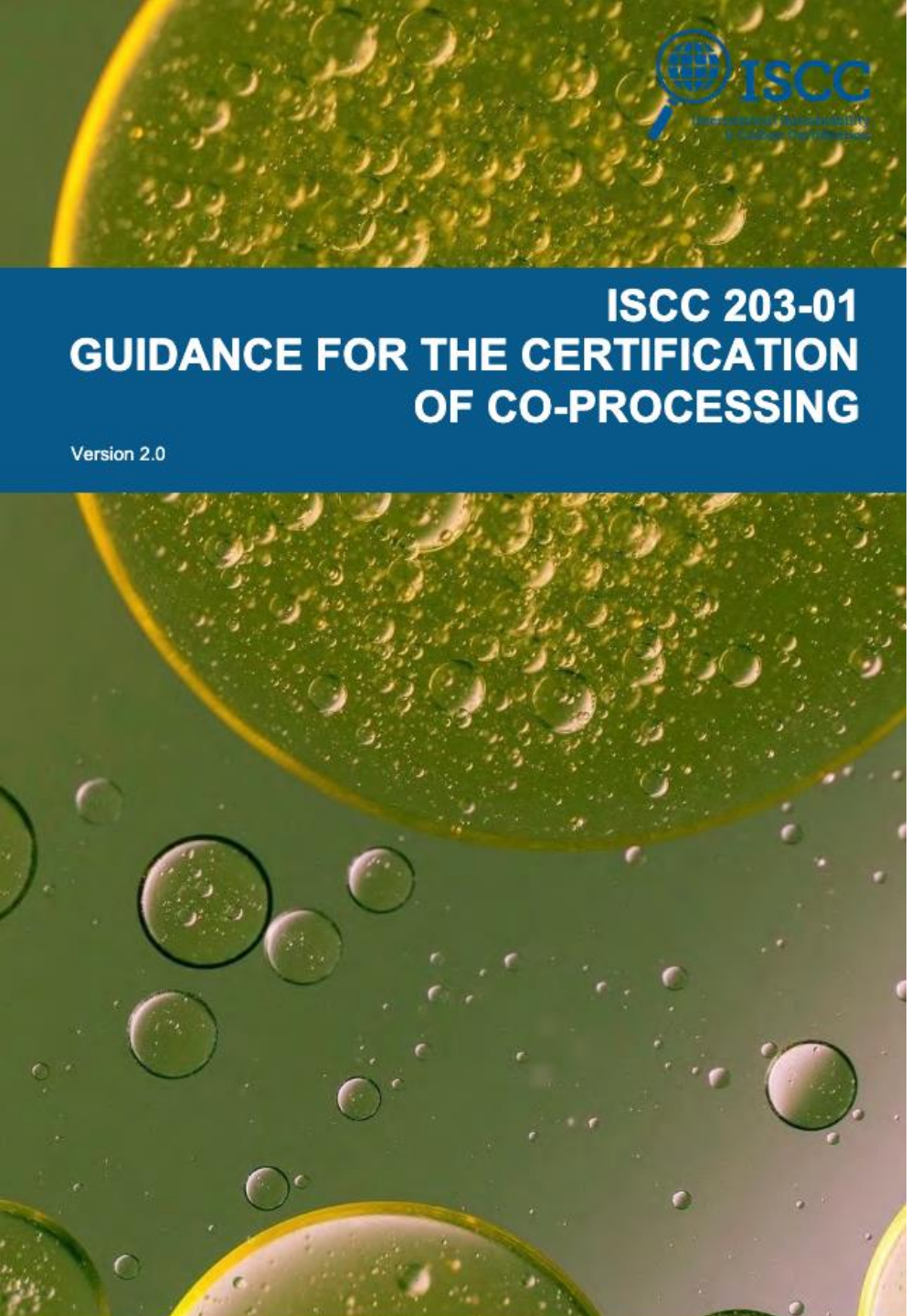


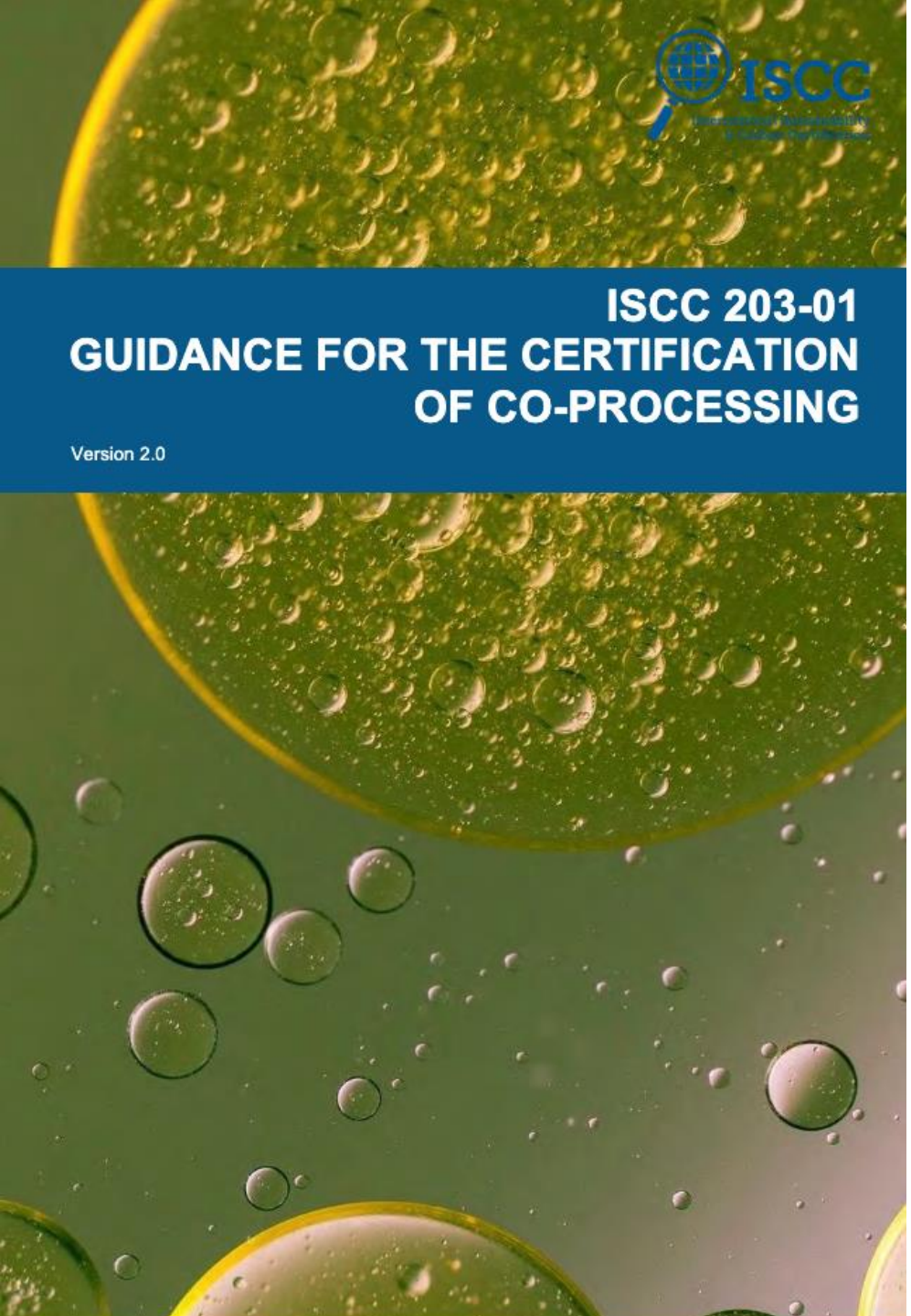
ISCC Guidance Documents and Training on Co-processing

- This guidance documents covers definitions, methodologies on **^{14}C testing** and **GHG calculation** in co-processing set-ups

- Additionally, a **Q&A document is in preparation**

- **ISCC has planned a training** on co-processing
  → first training on **September 25th 2025**
  → next training early 2026

- From May 2026 onwards **it will be mandatory** for auditors certifying co-processing setups to have attended a training and passed the auditor test

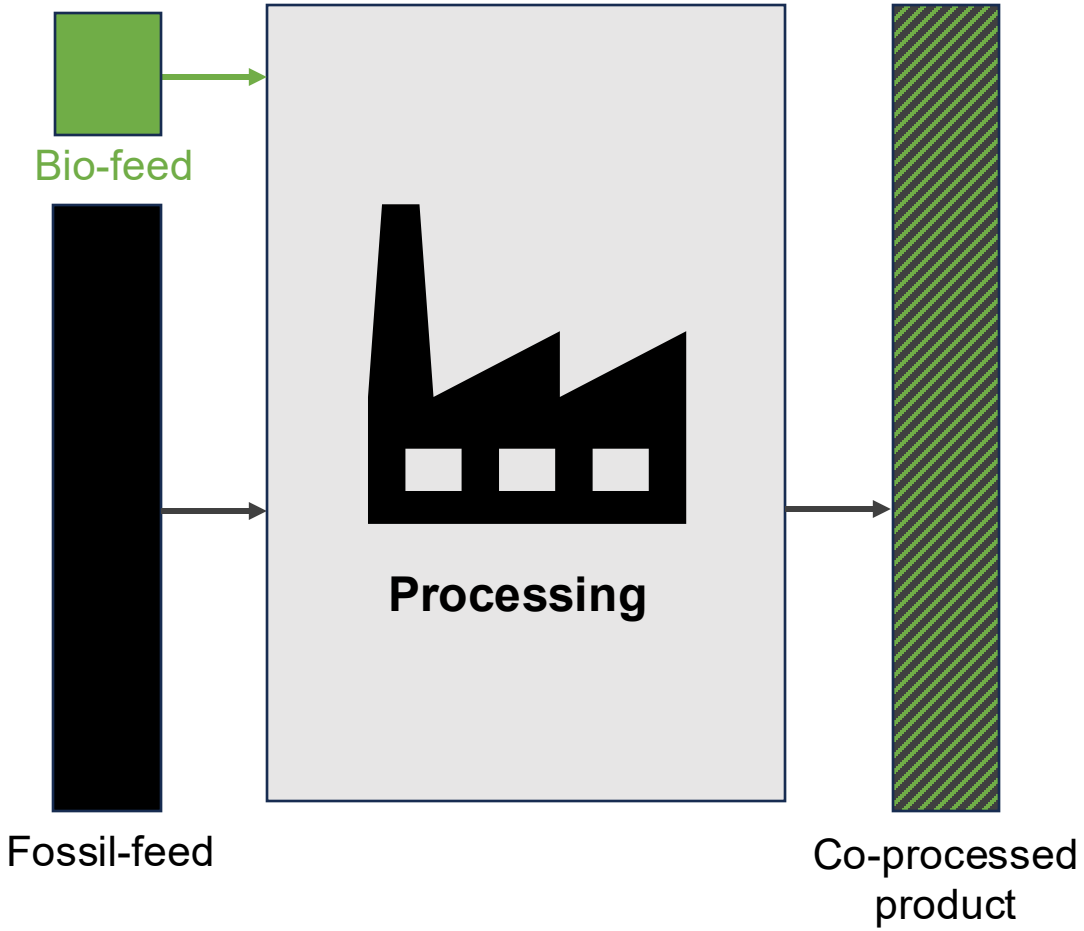


Approach for first audits against the new guidance

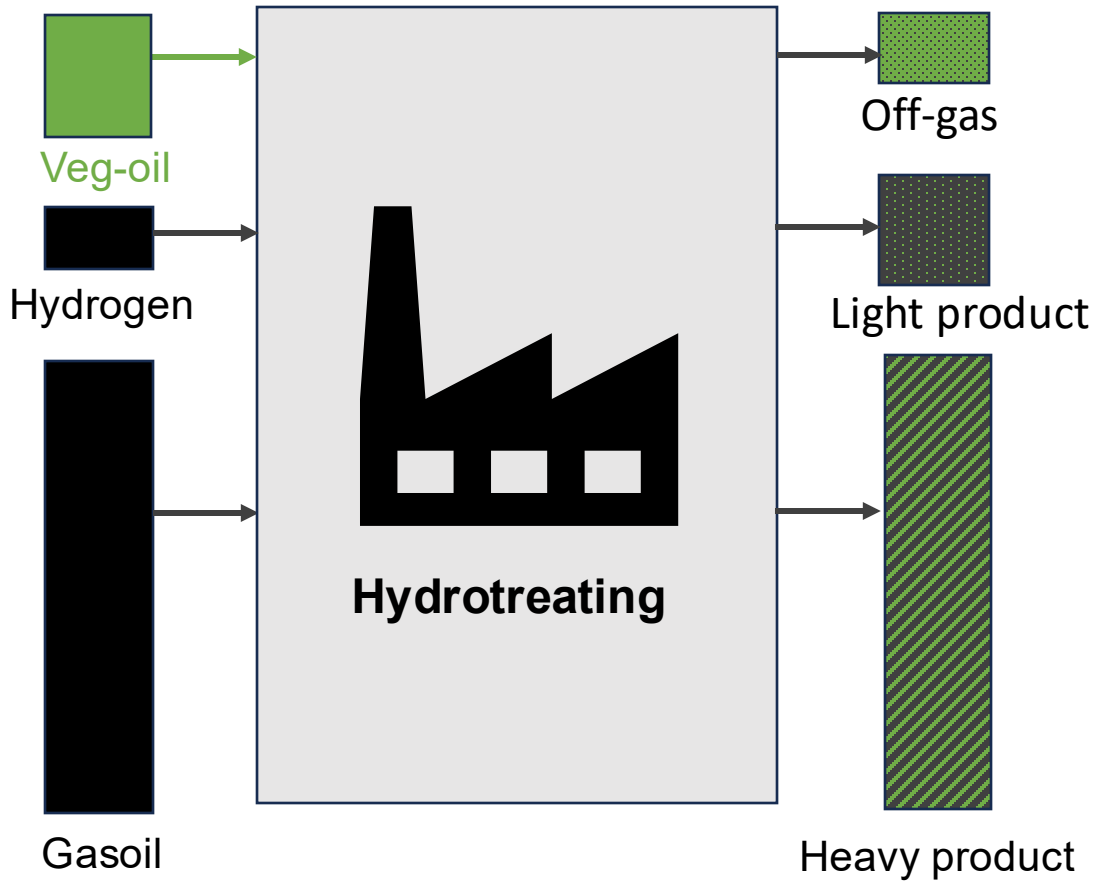
- The new guidance has been **applicable since April 3rd**
- If the System User faces challenges in proving compliance, they may **collaborate closely with their CB** and provide a pathway to the auditor on how to reach compliance
- Once all relevant **measurements and documentation** is in place, this must be **approved by the auditor** and the **PoS** with the conversion and GHG values **can be issued**
- Similarly to when a SU wants to use a new feedstock
- This approach avoids pausing or losing the certificate. However, **sales are only possible after the approval** and a potential extension of the certificate annex

What is co-processing?

Co-processing per Commission Delegated Regulation (EU) 2023/1640 refers to “an industrial operation where biomass and fossil feedstocks are physically mixed and processed together”



Hydrotreatment of vegetable oil and gasoil is an example of co-processing



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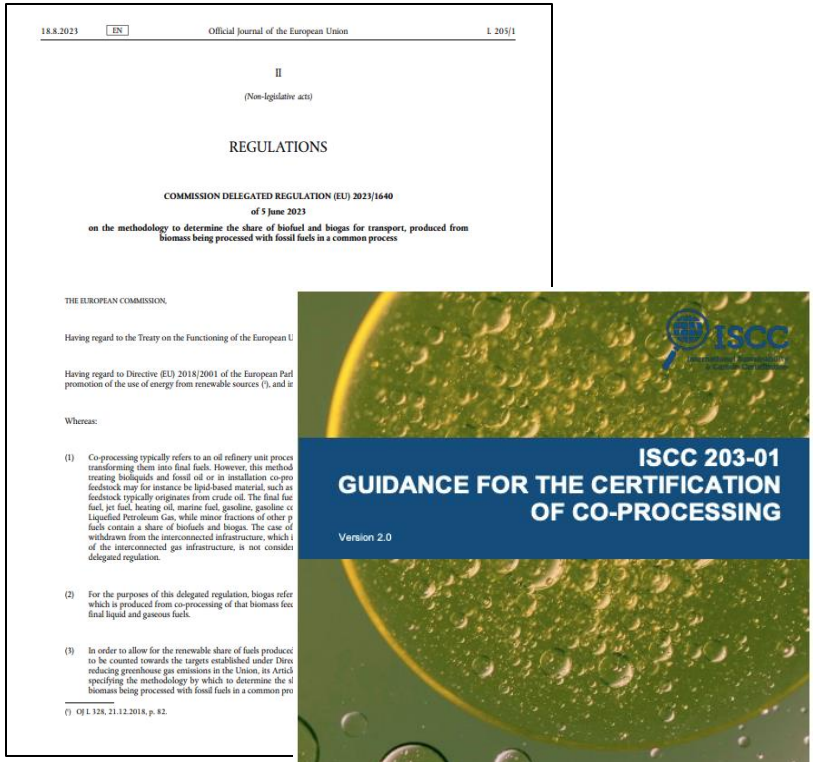

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- Delegated Regulation (EU) 2023/1640 sets out rules as to how to calculate the bio-content of products from co-processing to be sold on european market

- Highlights of the Delegated Regulation (EU) 2023/1640:
  - Usage of **^{14}C testing as a harmonized testing method** to determine the bio-content of co-processed fuel sold in the EU market
  - **Methodologies** to determine bio-content of a co-processed fuel
  - Testing and documentation **requirements**

- ISCC 203-01 guidance on coprocessing translates the requirements of Delegated Regulation into practical certification procedures

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The Delegated Regulation stipulates the use of radiocarbon (^{14}C) testing as a standard approach to ensure the carbon-based bio-content of outputs

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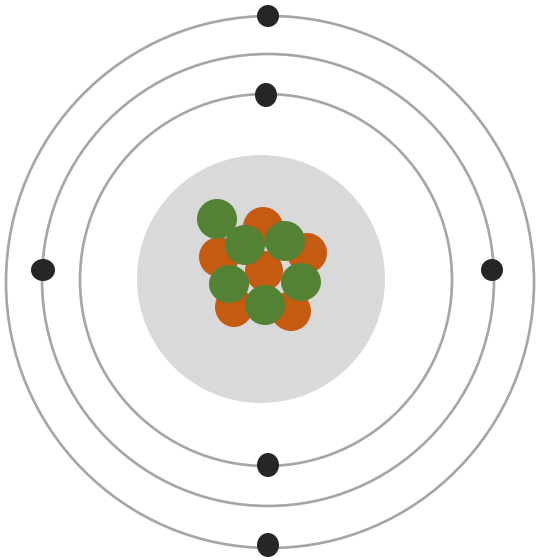
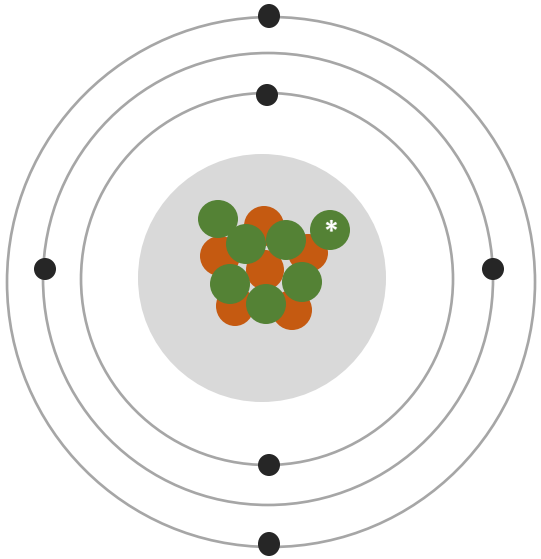
Carbon has three isotopes, but only fresh biomass and relatively young organic materials contain detectable amounts of ^{14}C



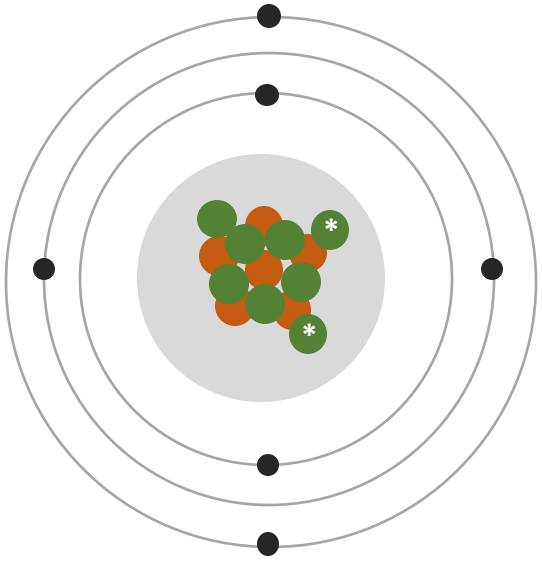
Carbon-12

^{12}C



Carbon-13

^{13}C

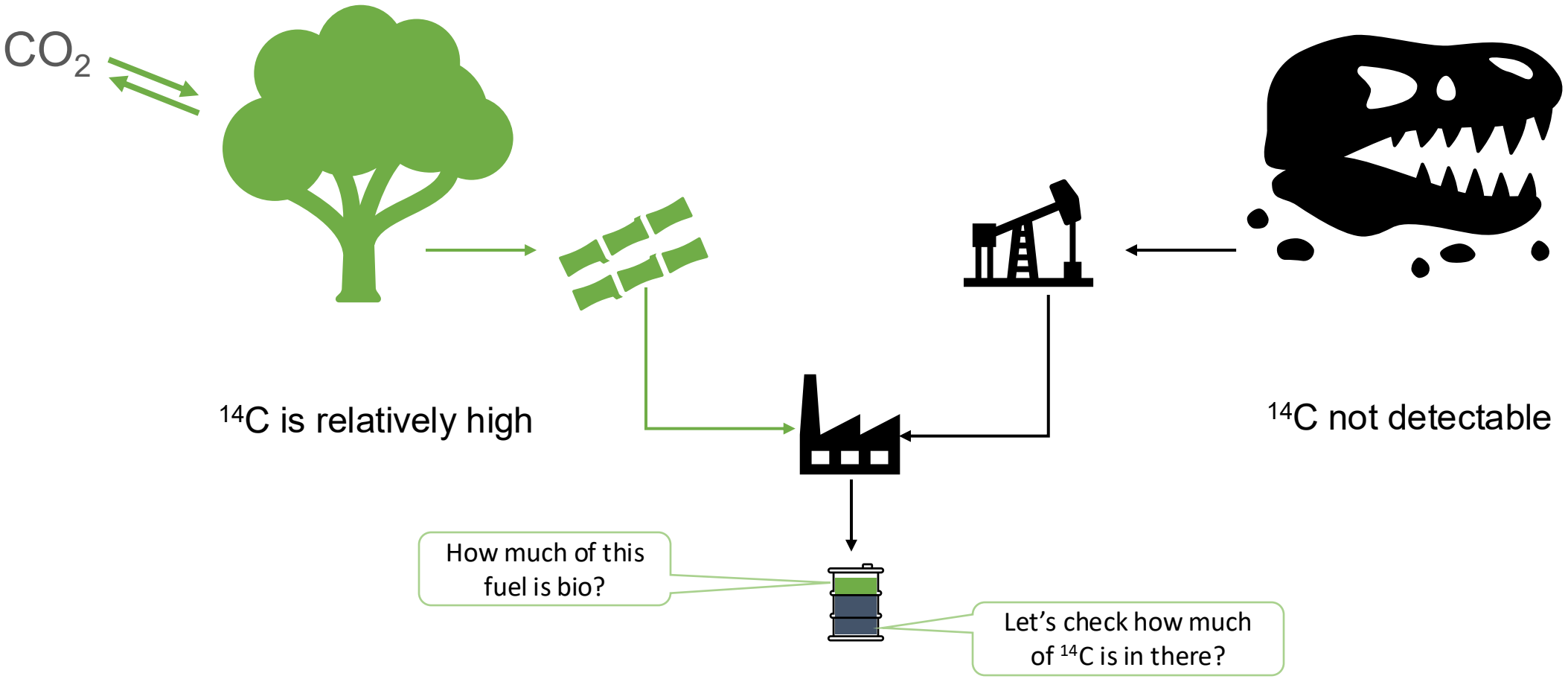


Carbon-14

^{14}C

electron proton neutron

Amount of ^{14}C can be used to determine the amount of carbon-based bio-content of co-processed fuel



The DR allows economic operators to perform ^{14}C testing using either AMS or LSC method

	Accelerator Mass Spectrometry (AMS) method	Liquid Scintillation Counting (LSC) method
Concept	Counts atoms of ^{14}C	Counts beta decay of ^{14}C
Cost	High	Low to moderate
Scope of testing method	AMS can handle solid, liquid and gaseous samples	Nature of the sample might affect the output signal due to chemical/light quenching
Sensitivity	Very high AMS can detect as low as one ^{14}C in 10^{15} C atoms	Moderate LSC is sutiable if the expected bio-content is atleast 1% by volume

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Economic operators can use other methods that are calibrated against ^{14}C testing to determine bio-content

Commission Delegated Regulation (EU) 2023/1640,

Art.1(1)

- **Economic operators** co-processing biomass **may** develop and **use a company-specific or process-specific testing method** to determine the carbon-based share of bio-content **that is adapted to their particular factory design and feedstock mix.**

Art.1(5)

- When economic operators report co-processing results using a main testing method other than one based on radiocarbon (^{14}C) testing, they **shall use radiocarbon (^{14}C) testing** of the outputs as a **regular way of verifying** the correctness of the performance of their system and the results of the main testing method used. Verification through radiocarbon (^{14}C) testing shall be required for all outputs claiming a carbon-based bio-content.

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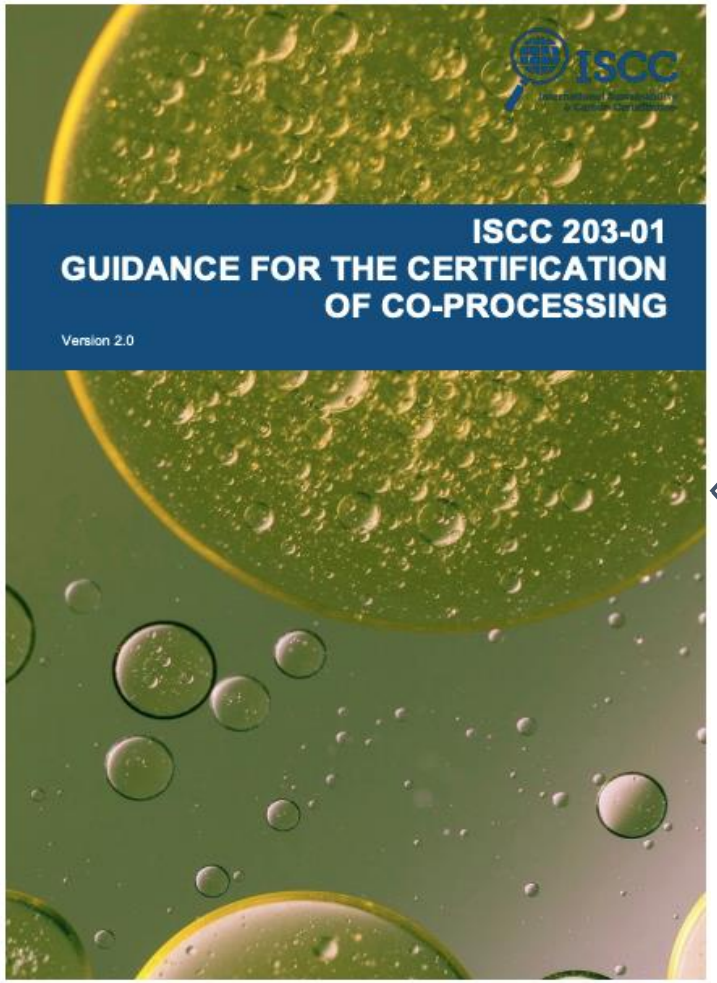
ISCC 203-1 guidance groups all the bio-content testing methods into two categories



Direct Testing Method

- ^{14}C testing of the output

Indirect Testing Method

- Mass balance
- Energy balance
- Yield method
- Other company-specific methods

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Apart from the ^{14}C testing, system users can use other methods calibrated against ^{14}C testing (indirect ^{14}C testing method)

In a **direct ^{14}C testing method**,

- samples of co-processed fuels are sent to a laboratory for ^{14}C testing
- bio-content is determined from ^{14}C testing results
- ^{14}C testing shall be based on **AMS** or **LSC**

In an **indirect ^{14}C testing method**

- model based on process data predicts the bio content
- bio-content values predicted by the model are **calibrated against direct ^{14}C testing results**
- Indirect ^{14}C methods shall be based on mass-balance, energy-balance or yield methods

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Process technology scope of DR 2023/1640

The Delegated Regulation 2023/1640 on co-processing has broad applicability with a few notable exceptions.

Process technology scope of DR 2023/1640

There are some additional/specific requirements around co-processing set-ups that need to be addressed

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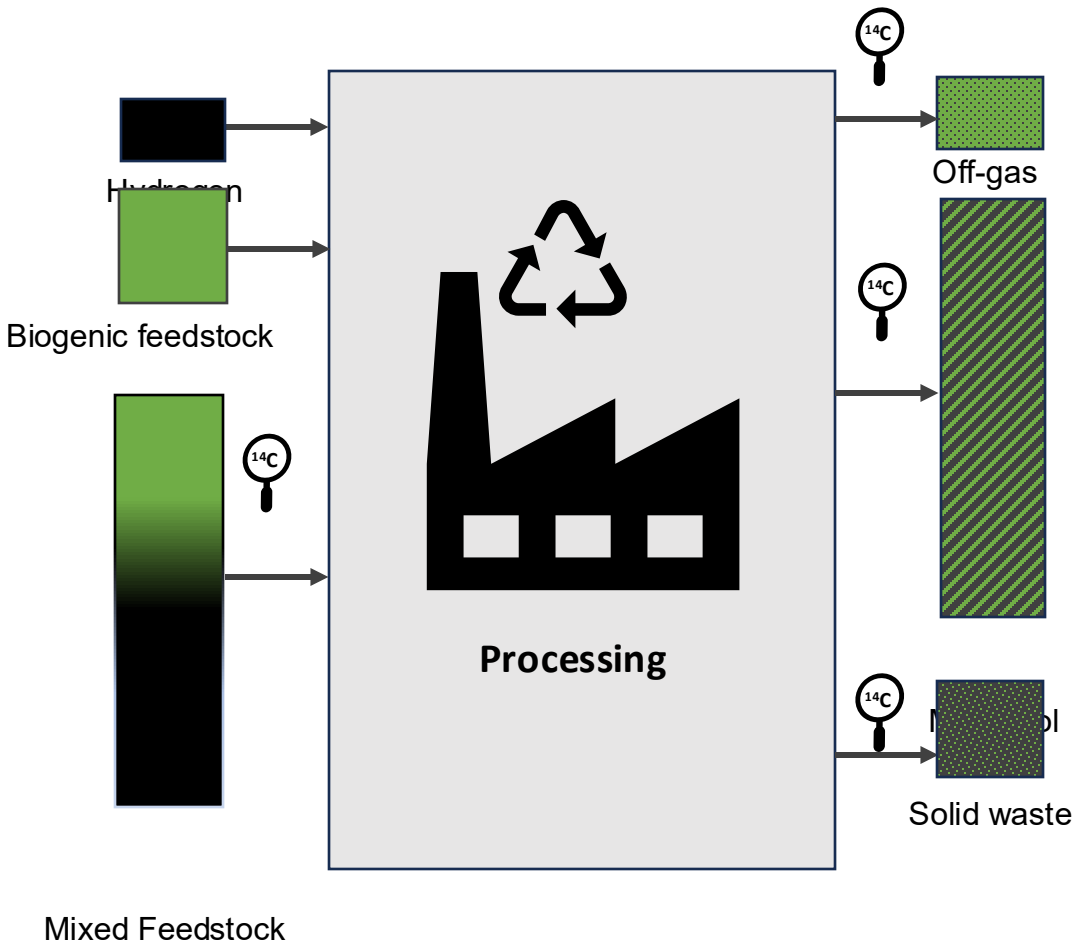
Specific ^{14}C testing requirements



- For installations **co-processing waste-based inputs**, ^{14}C testing of the biomass **input** is needed
- ^{14}C testing shall also account for any biogenic losses (e.g. CO, CO_2, wastewater, solid residues)
- Economic Operator (EO) shall apply the same testing method for all interconnected installations that are considered inside the co-processing boundary
- Deviation in bio-content values determined by indirect method and ^{14}C testing shall not be more than 3% (for the 1st year of co-processing) and 1% (from the 2nd year of co-processing)

The frequency of ^{14}C testing depends on the robustness of the bio-content testing methodology

Is there a method* that can map changes in the bio-content due to varying operating conditions?

Yes

^{14}C testing at least once every 4 months

No

^{14}C testing method every time there is a change > 5 % compared to the baseline conditions**

*method shall be based on real time plant data of the co-processing unit
**baseline conditions: feedstock composition, process temperature, pressure, amount of hydrogen and catalyst etc.,

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Documentation requirements for co-processed fuel

- Detailed **description of the process** and bio-content testing method
- The **amounts** of biomass entering and product leaving the co-processing unit
- An **overall mass balance system** in parallel to the main testing method to check and compare results on bio-share
- **CHN analysis**, water and solids content of the feedstocks and product
- Co-processed fuel **samples** should be kept for **at least two years**
- EOs provide full access to CBs on all documentation on co-processed fuel
- Record of the testing method used

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GHG method

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr}$$

RED II Annex V provides the GHG calculation formula

Where:

- **E** - Total GHG emissions from supply and use of the fuel (in g CO_{2eq}/MJ)
- e_{ec} - GHG emissions from the extraction or cultivation of raw materials
- e_l - Annualized (over 20 years) GHG emissions from carbon stock change due to land use change
- e_p - GHG emissions from processing
- e_{td} - GHG emissions from transport and distribution
- e_u - GHG emissions from the fuel in use
- e_{sca} - GHG emissions savings from soil carbon accumulation via improved agricultural management
- e_{ccs} - GHG emissions savings from carbon capture and geological storage
- e_{ccr} - GHG emissions savings from carbon capture and replacement

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$$E = e_{biogenic\ feed\ in} + e_p + e_{td} + e_u$$

GHG calculation formula following DR 2023/1640

Where:

E	-	emissions of a specific co-processed fuel, in g CO_2e/MJ
$e_{biogenic\ feed\ in}$	-	upstream emissions from the biogenic feedstock, calculated according to the RED framework
e_p	-	emissions from processing of the whole refinery, proportionally distributed among bio and non-biogenic feedstock, plus all additional emissions required for the biogenic feedstock, based on the benchmark
e_{td}	-	emissions from transport and distribution related to the co-processed biofuels
e_u	-	emissions from use of the fuel, where disaggregated default values from RED Annex V can also be used

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$$E = e_{biogenic\ feed\ in} + e_p + e_{td} + e_u$$

"What" and "how" it needs to be calculated?

$e_{biogenic\ feed\ in}$	-	This the e_{ec} of your agricultural or waste feedstock.
e_p	-	A three step procedure is implemented following the guidance document
e_{td}	-	This includes the upstream and downstream transport and distribution emissions of the produced bio-fuel.
e_u	-	emissions from use of the fuel, where disaggregated default values from RED Annex V can also be used

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$$E = e_{biogenic\ feed\ in} + e_p + e_{td} + e_u$$

How is e_p calculated?

A three-step process is implemented here:

Step 1 : Determination of excess (Δ) processing inputs consumed by biomass- based feedstock

Step 2: Proportional attribution of the remaining processing inputs

Step 3: Virtual split: bio-based plant

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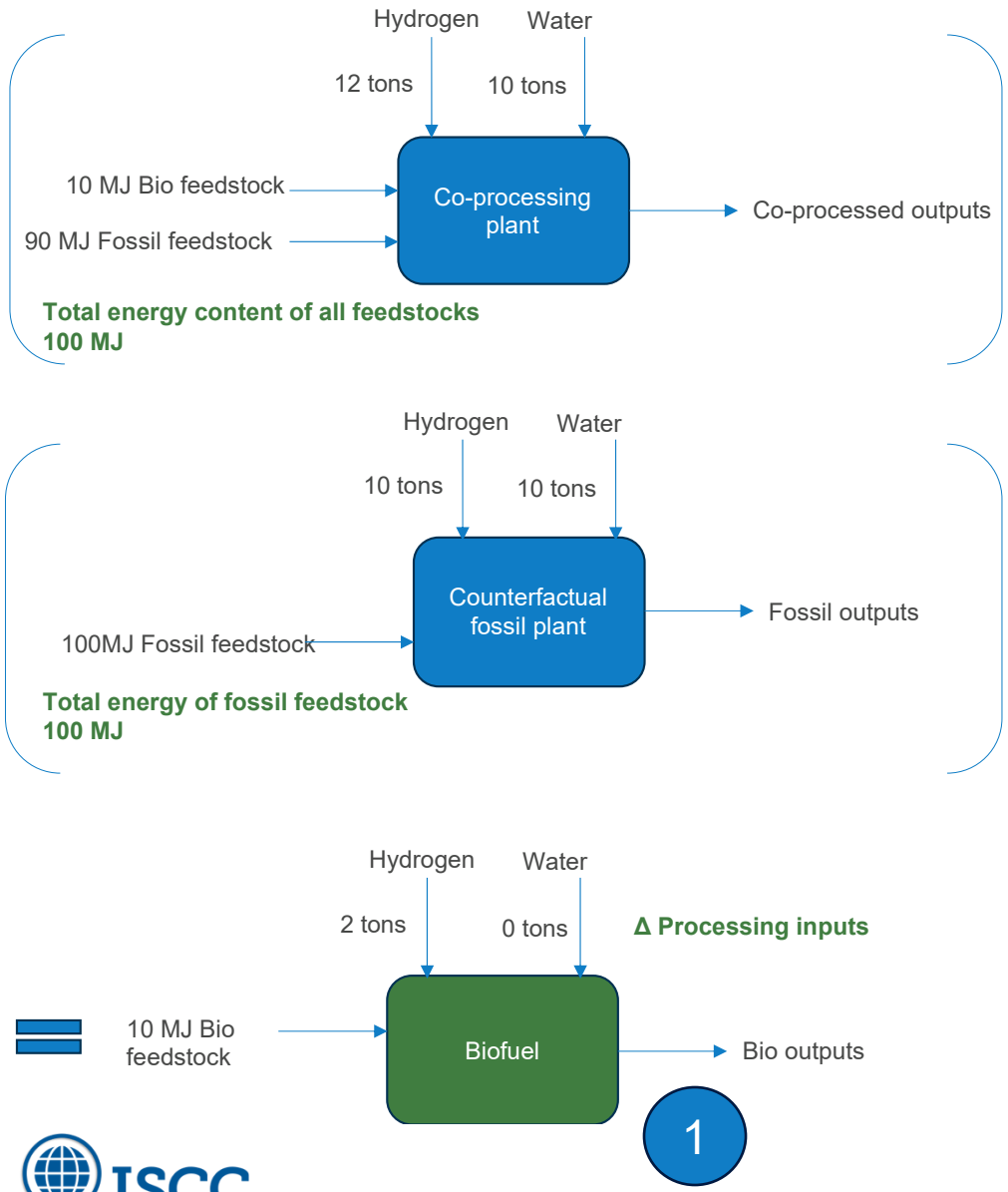
How is e_p is calculated following the guidance document?



Step 1: Determination of excess (Δ) processing inputs consumed by biomass-based feedstock

- A counterfactual plant should be modelled based on the existing co-processing facility, ensuring equivalent processing capacity. The processing inputs should align with those of a conventional fossil-based plant.
- The variance in processing inputs and waste generation must be systematically evaluated, considering factors such as hydrogen consumption, water usage, and wastewater generation.
- This comparative analysis will determine the additional processing inputs (Δ) required specifically for biomass-based feedstock utilization.

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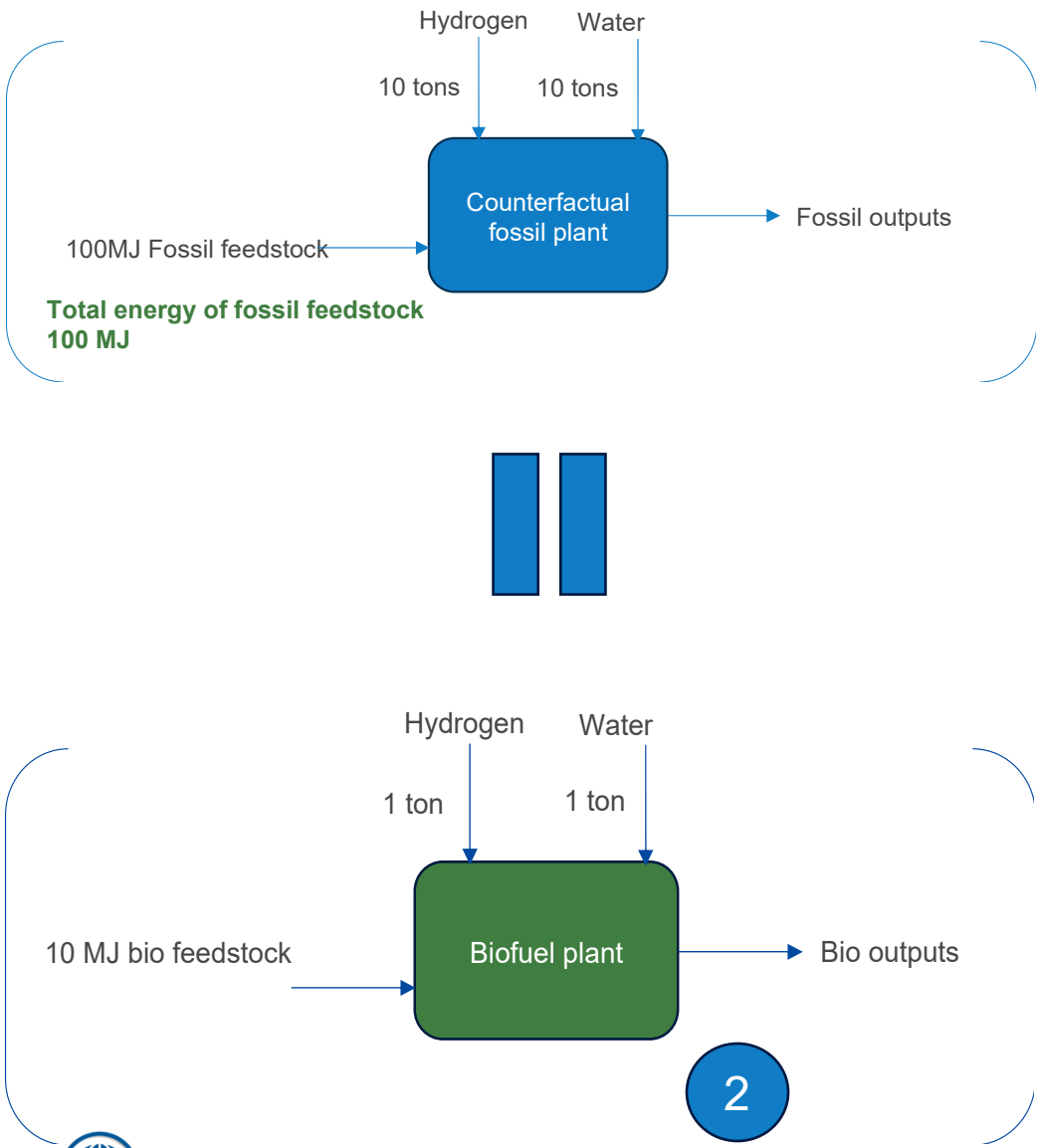

Step 2: Proportional attribution of the remaining processing inputs

- The remaining processing inputs from the counterfactual fossil plant are proportionally allocated to the biofuel production process.
- ***Example:*** Given a bio-feedstock energy input of **10 MJ**, the corresponding processing inputs are determined as follows:
  - If **10 MJ** of hydrogen is required to process **100 MJ** of fossil feedstock,
  - Then **1 MJ** of hydrogen is proportionally allocated for processing **10 MJ** of bio-feedstock.

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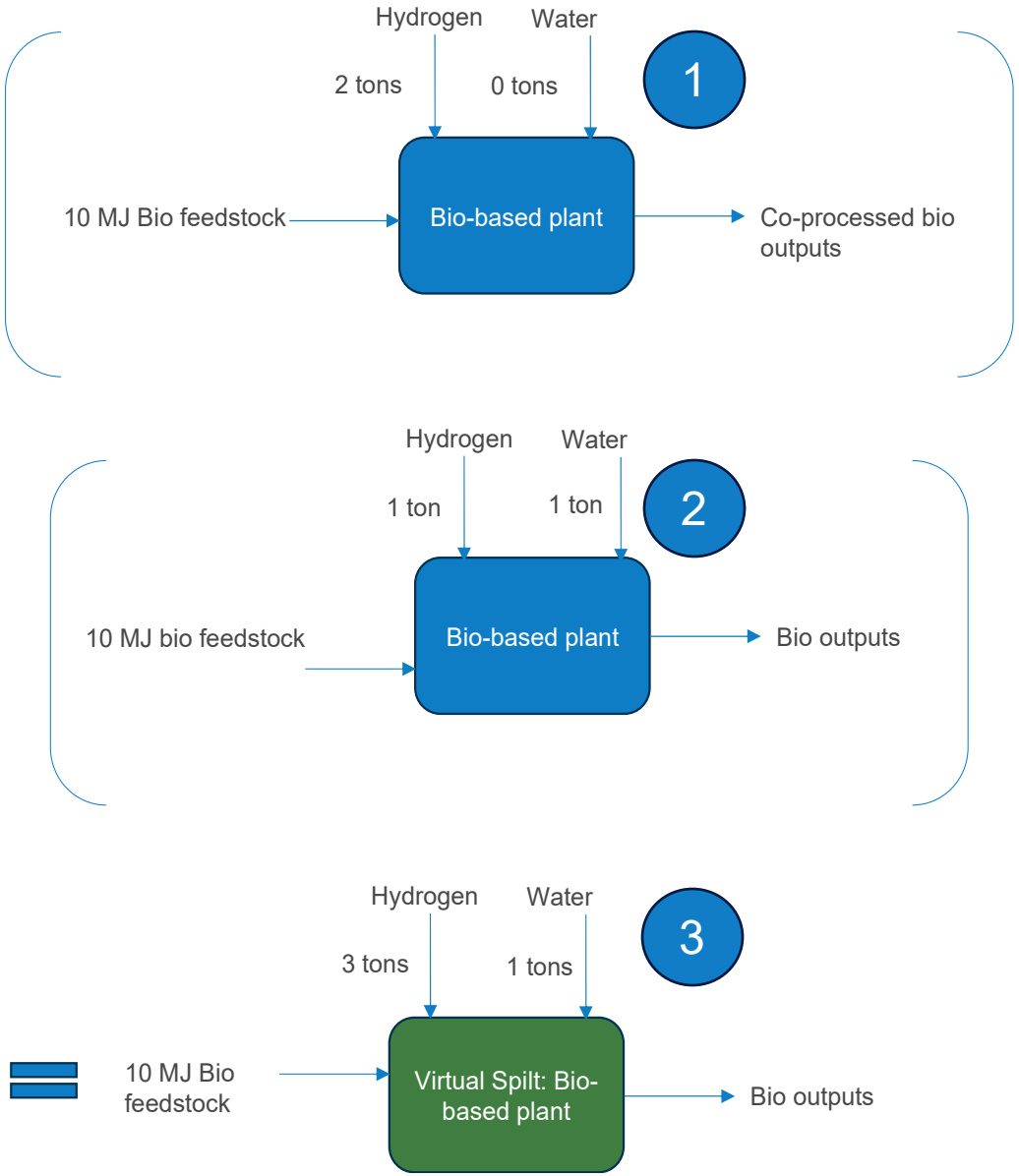

Step 3: Virtual split: bio-based plant

- The summation of **Step 1** and **Step 2** leads to the formation of a **virtually split bio-based plant**.
- In **Step 3**, processing emissions for the bio-based plant are calculated using the allocated processing inputs.

  Example:

  3 tons of H_2 × Emission Factor of Hydrogen

- The total **processing emissions** are exclusively allocated to the **bio-based outputs**, ensuring accurate attribution within the lifecycle assessment.

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Wrap up

Wrap up and reference to training

- Determination of the biogenic share using **14C testing** or a method calibrated against must be in place
- A **virtual separation** of the biogenic and fossil stream must be considered for **GHG calculations**
- **Compliance with** the new version of the ISCC **guidance document** on co-processing is required
- A **training on co-processing** will be provided in September
  → As of May 2026 it will be mandatory for auditors to have attended a training and passed the auditor test

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THANK YOU

ISCC System GmbH

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