



WIRTSCHAFTS  
UNIVERSITÄT  
WIEN VIENNA  
UNIVERSITY OF  
ECONOMICS  
AND BUSINESS



# ***CO2 Accounting***

*Alexander Prosser*

# IFRS S2 Climate-related Disclosures

## Objectives:

[...] disclose information about its climate-related **risks** and **opportunities** that is useful [...] in making decisions relating to providing resources to the entity

## What to disclose (excerpt): Governance (Standard 5ff)

- Governance and responsibilities (governing body)
- Information flow in the organisation to the body
- How the body uses the information in decision making
- Setting of targets related to climate-related risks and opportunities
- Monitoring of progress

# IFRS S2 Climate-related Disclosures

What to disclose (excerpt): **Strategy** (Standard 8f)

- Identify climate-related risks and opportunities (R&O)
- How do R&O affect business model and value chain?
- R&O effect on corporate strategy, financial results and situation
- Transition plan and the funding of the strategy change
- Climate resilience

# IFRS S2 Climate-related Disclosures

What to disclose (excerpt): **R&O** (Standard 10ff)

- Describe physical risks and their effect
- Describe transition risks and their effect
- Describe opportunities, particularly on financial results and cash flows (also for the above)

Effect on **business model** (Standard 13)

# IFRS S2 Climate-related Disclosures

Effect on climate-related R&O on **strategy and decision making** (Standard 14)

- Mitigation & adaptation
- Adaptation efforts to identified risks
- Changes to business model, value chain and resource allocation
- Changes in sourcing and any material changes necessary in coming period

# IFRS S2 Climate-related Disclosures

What to disclose (excerpt): **Financials** (Standard 15ff)

- Preview of effects on financial results of R&O and risk mitigation
- Can also be given as a range

What to disclose (excerpt): **Resilience** (Standard 22)

- Self assessment of climate resilience
- Identify areas of uncertainty in self assessment
- Scenario analysis carried out? If so, how?

# IFRS S2 Climate-related Disclosures

What to disclose (excerpt): **Risk Model**

- Inputs and parameters
- Scenario analysis?
- Are climate-related risks prioritised?
- Have processes changed since last reporting period?
- Climate-related risks integrated in general risk management?

# IFRS S2 Climate-related Disclosures

## Targets and Metrics – The quantitative side

- Cross-industry and industry-based metrics used (use or obliged to use).
- **greenhouse gases—the entity shall:**
  - (i) disclose its absolute gross greenhouse gas emissions generated during the reporting period, expressed as metric tonnes of CO2 equivalent (see paragraphs B19–B22\*), classified as:
    - (1) Scope 1 greenhouse gas emissions;
    - (2) Scope 2 greenhouse gas emissions; and
    - (3) Scope 3 greenhouse gas emissions

\* Aggregate all GHG into CO2 equivalents

\* Direct measurement or indirect methods (equivalents)



# IFRS S2 Climate-related Disclosures

## Set organisational boundaries:

<https://ghgprotocol.org/corporate-standard>

<https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

How to set the boundaries? p. 19

Equity-based vs. financial control-based boundaries

Avoid double counting, allow for syndication

Standard 29(iv) requires a disaggregation between the two types

⇒ However, there appears to be a choice: B27

Example p. 22f

# IFRS S2 Climate-related Disclosures

## Scope 1: Direct emissions

From sources owned or controlled by the company

- Direct emissions from stationary combustion (boilers, turbines, chemical plants, ...)
- Owned or leased mobile sources (vehicles of any kind, not travel)
- Industrial gases, AC and similar

⇒ Direct measurement (exhaust) or indirect equivalents (by the fuel etc.)

⇒ We will focus on discrete manufacturing, not chemical industry etc.

# IFRS S2 Climate-related Disclosures

## Scope 1: Direct emissions

Equation 1:

$$\text{Emissions} = \text{Fuel} \times \text{EF1}$$

Emissions = Mass of CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O

emitted Fuel = Mass or volume of fuel combusted

EF1 = CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emission factor per mass or volume unit

Source: <https://www.epa.gov/sites/default/files/2020-12/documents/stationaryemissions.pdf>

# IFRS S2 Climate-related Disclosures

## Scope 1: Direct emissions

Equation 2:

$$\text{Emissions} = \text{Fuel} \times \text{HHV} \times \text{EF2}$$

Emissions = Mass of CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emitted

Fuel = Mass or volume of fuel combusted

HHV = Fuel heat content (higher heating value), in units of energy per mass or volume of fuel

EF2 = CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emission factor per energy unit

Source: <https://www.epa.gov/sites/default/files/2020-12/documents/stationaryemissions.pdf>

# IFRS S2 Climate-related Disclosures

## Scope 1: Direct emissions

Equation 3:

Emissions = Fuel x CC x 44/12

Emissions = Mass of CO<sub>2</sub> emitted

Fuel = Mass or volume of fuel combusted

CC = Fuel carbon content, in units of mass of carbon per mass or volume of fuel

44/12 = ratio of molecular weights of CO<sub>2</sub> and carbon

Source: <https://www.epa.gov/sites/default/files/2020-12/documents/stationaryemissions.pdf>

# IFRS S2 Climate-related Disclosures

## Scope 1: Direct emissions

Hint: Allow for vaporisation (“boil off”) in storing liquefied gases. The boil off is either re-liquefied or used otherwise (eg, natural gas-powered gas tanker).

Material	Liquefied at*
Ammonia	-33 °C
Natural gas	-162 °C
H2	-252 °C

\* At normal pressure, source wikipedia

# IFRS S2 Climate-related Disclosures

## Scope 2:

- Organization buys energy, ie, ***electricity***, steam, distance heating or cooling  
<https://app.electricitymaps.com/map>

Specific supply contracts for export industry

# IFRS S2 Climate-related Disclosures

## Scope 3:

Emissions from the organisation's operations but not from its own resources:

- Purchased goods or services (incl. travel and transportation)
- Downstream emissions along the value chain

[https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard\\_041613\\_2.pdf](https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf)

P. 42f for example for the value chain calculation.



# IFRS S2 Climate-related Disclosures

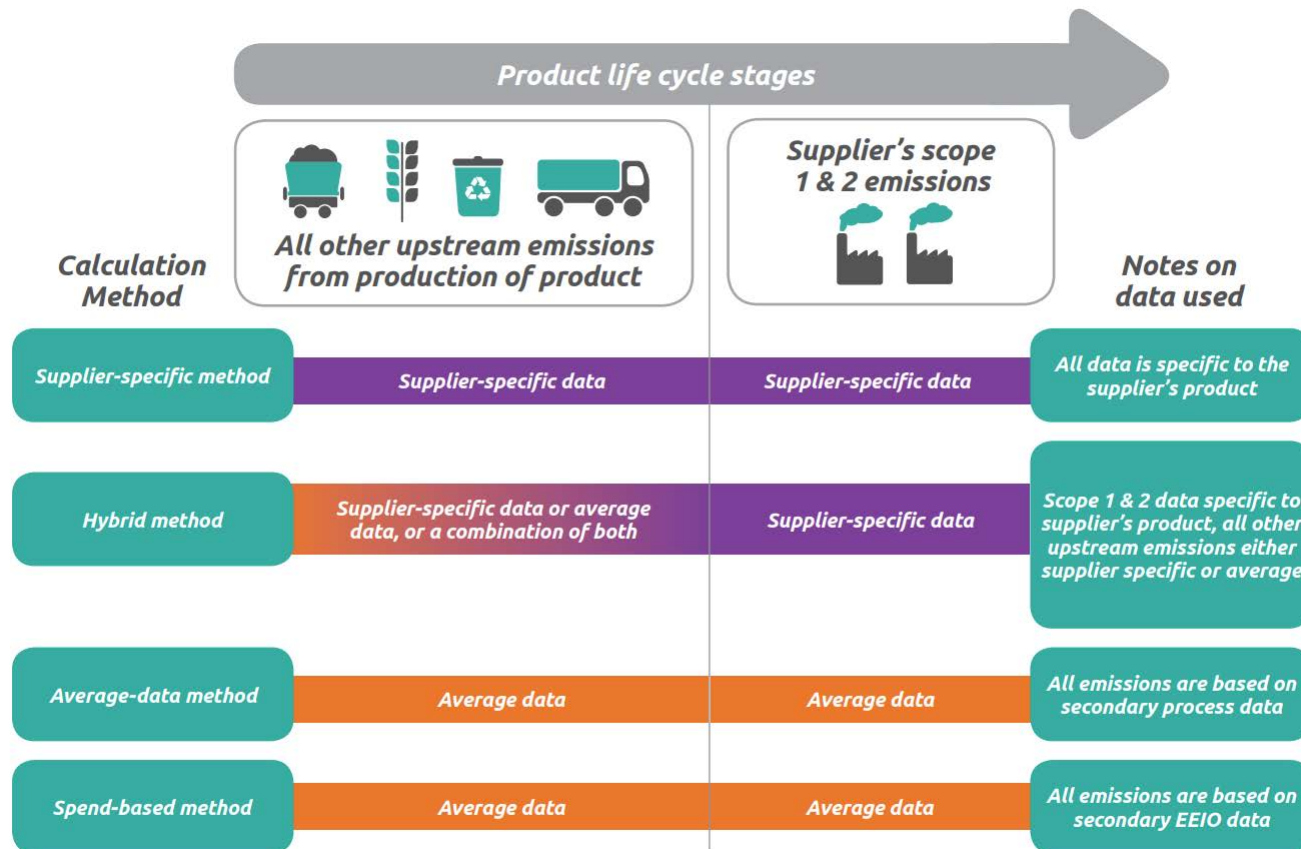
## Upstream Scope 3:

1. Purchased goods or services
2. Capital goods
3. Fuel/energy, other than Scope 1 and 2
4. Upstream transportation & distribution
5. Waste generated in operations
6. Business travel
7. Employee commuting
8. Upstream leased assets

## Downstream Scope 3:

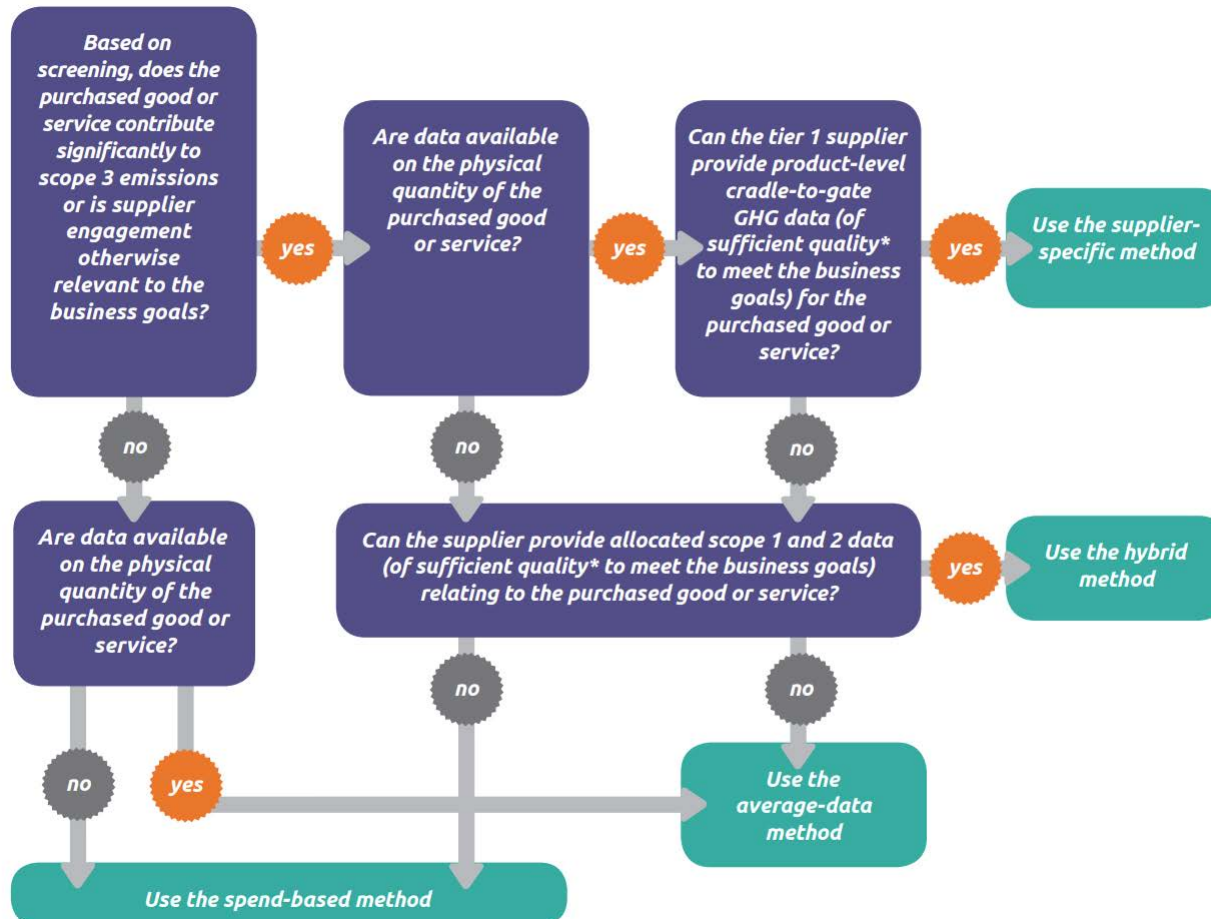
9. Downstream transportation & distribution
10. Processing of sold products
11. Use of sold products
12. End-of-life treatment of sold products
13. Downstream leased assets
14. Franchises
15. Investments

# IFRS S2 Climate-related Disclosures



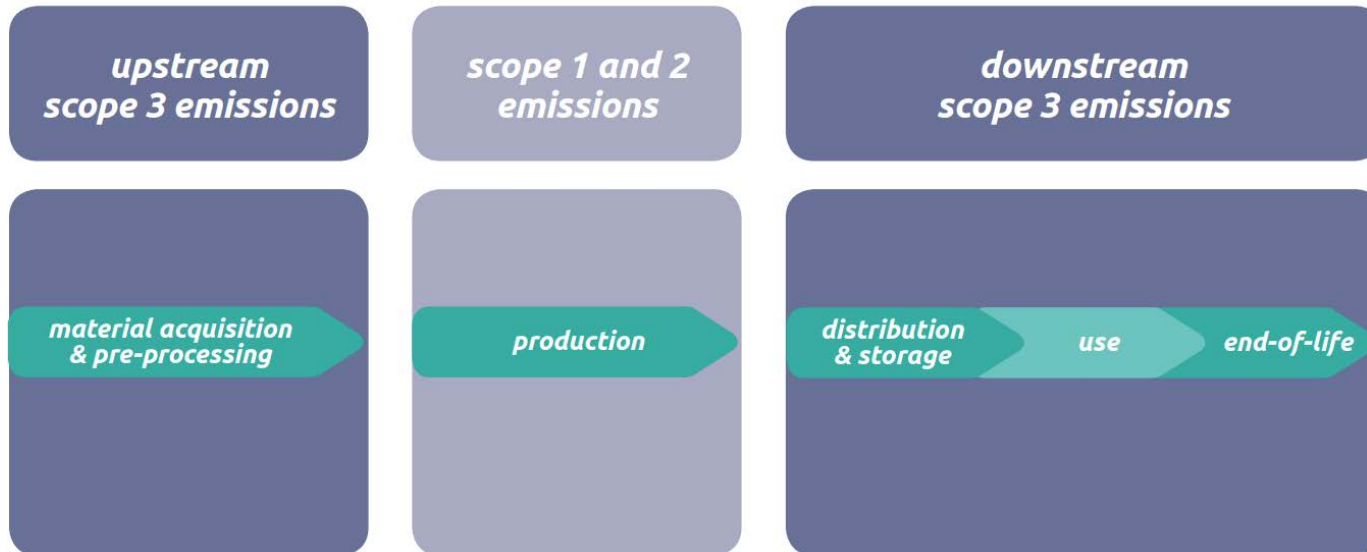
Source: [https://ghgprotocol.org/sites/default/files/standards/Scope3\\_Calculation\\_Guidance\\_0.pdf](https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf)

# IFRS S2 Climate-related Disclosures



Source: [https://ghgprotocol.org/sites/default/files/standards/Scope3\\_Calculation\\_Guidance\\_0.pdf](https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf)

# IFRS S2 Climate-related Disclosures



Source: See below

## Scopes 1-3:

Example for value chain calculation:

[https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard\\_041613\\_2.pdf](https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf)

p. 42f

# IFRS S2 Climate-related Disclosures

## An example for the issues:

Identify the measurement issues in the following statement

*Semiconductor devices manufactured in 2021 will have a lifetime CO<sub>2</sub>e footprint of nearly 500 megatonnes (Mt)—15% from materials and equipment (Scope 3 upstream), 20% from device design and manufacturing (Scopes 1 and 2), and 65% from device processing, use, and disposal (Scope 3 downstream).*

Source: <https://www.bcg.com/publications/2023/a-plan-to-reduce-semiconductor-emissions>

Being the CEO of TSMC, where would you start ... ?

# IFRS S2 Climate-related Disclosures

## Targets and Metrics – The quantitative side

- **greenhouse gases—the entity shall:**
  - (ii) measure its greenhouse gas emissions in accordance with the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2004)

[https://ghgprotocol.org/calculation-tools-and-guidance#cross\\_sector\\_tools\\_id](https://ghgprotocol.org/calculation-tools-and-guidance#cross_sector_tools_id)

- (iii) disclose the approach it uses to measure its greenhouse gas emissions
  - Measurement approach
  - Assumptions and why approach has been chosen
  - Changes in the approach

Software support => best practice

# IFRS S2 Climate-related Disclosures

## Targets and Metrics – The quantitative side

- **greenhouse gases—the entity shall:**

- (iv-vi) Disaggregate

- for Scope 1 and Scope 2 by accounting group
    - for Scope 2 by location
    - for Scope 3 by category from

[https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard\\_041613\\_2.pdf](https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf)

- additional information about the entity's Category 15 GHG emissions or those associated with its investments, if the entity's activities include asset management, commercial banking or insurance

# IFRS S2 Climate-related Disclosures

## Exercises for the Umbrella Case



# IFRS S2 Climate-related Disclosures

Exercise 1: Provide a data model for Scope 1 and 2 (discrete production, no chemicals) showing utility providers, meters, facilities, work centres and cost centres.

Link the requirements to SAP ERP.

# IFRS S2 Climate-related Disclosures

Exercise 2: Provide a data model Scope 3.1 and 3.4.

Link the requirements to SAP ERP.

How could you organise the material master if procuring a part from several sources with highly different footprints?

Include upstream transportation.

# IFRS S2 Climate-related Disclosures

Exercise 3: Provide a data model Scope 3.5.

Relate this to functionality in SAP ERP.

Allow for:

- Waste separation and/or purification
- Recycling
- Disposal
- Waste to energy

# IFRS S2 Climate-related Disclosures

Exercise 4: Provide a data model Scope 3.11.

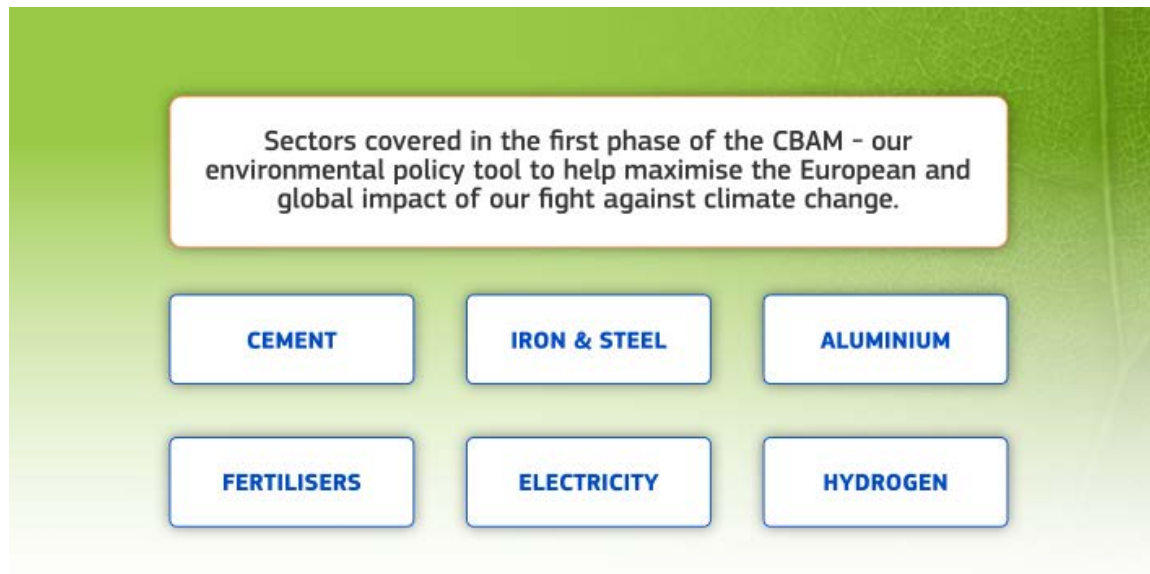
Relate this to functionality in SAP ERP.

Allow for electricity and other sources of emission.

# Carbon Border Adjustment Mechanism

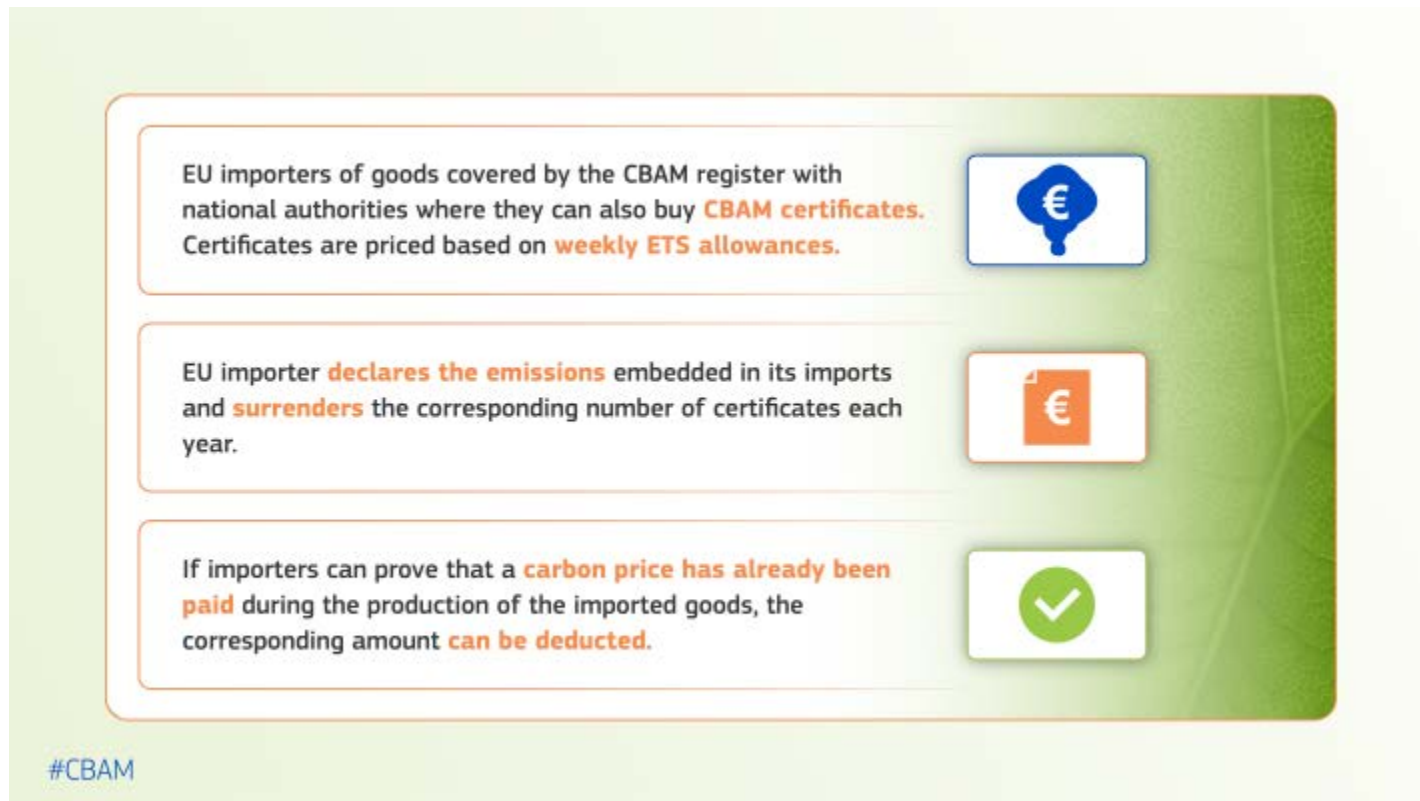
Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism

[https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism\\_en](https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en)



Source see above

# Carbon Border Adjustment Mechanism



Source see above

# Carbon Border Adjustment Mechanism

Enters into force on 1 January 2026

Annual reporting of goods imported into the EU in the preceding year and their embedded GHG

Importer supplies the corresponding number of CBAM certificates

Price: weekly average auction price of EU ETS allowances expressed in €/tonne of CO<sub>2</sub> emitted

[https://www.eex.com/fileadmin/EEX/Markets/Environmental\\_markets/Emissions\\_Auctions/20221220\\_Auctions-how\\_to\\_participate\\_Final.pdf](https://www.eex.com/fileadmin/EEX/Markets/Environmental_markets/Emissions_Auctions/20221220_Auctions-how_to_participate_Final.pdf)

<https://www.eex.com/en/market-data/environmentals/eu-ets-auctions>

# Carbon Border Adjustment Mechanism

Effects?

EU consumers

EU producers

Non-EU (non-EEA) suppliers