

The proxy inventory

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Obligations in terms of proxy

Context



Regulation (EU) 2020/1208

- Article 7
- GHG summary proxy inventory is required
- Reported by end July every year
- Proxy inventory for year X-1

The format

- Annex VI
- CRT summary 2 format
- If ETS available → including also the ETS and non ETS emission share
- Brief description of the key drivers

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALEN
(Sheet 1 of 1)

2024
FRA-CRT-2025-V0.1
France

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	N ₂ O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF ₆	NF ₃	Total
	CO ₂ equivalents (kt) ⁽²⁾						
Total (net emissions) ⁽¹⁾							
1. Energy							
1.A. Fuel combustion							
1.A.1. Energy industries							

Article 1: Subject matter



Regulation

- (b) Contracting Parties' reporting on approximated greenhouse gas (or GHG) inventories, greenhouse gas inventories and accounted greenhouse gas emissions and removals pursuant to Article 26 of Regulation (EU) 2018/1999 as adapted and adopted by Ministerial Council Decision 2021/14/MC-EnC

Article 7: Reporting approximated greenhouse gas inventories

The format

- (a) 1. Contracting Parties shall report their approximated greenhouse gas inventories pursuant to Article 26(2) of Regulation (EU) 2018/1999 as adapted and adopted by Ministerial Council Decision 2021/14/MC-EnC in accordance with the format set out in Annex VI, at a level of disaggregation of categories reflecting the activity data and methods available for the preparation of estimates for the year X-1;
- 2. Contracting Parties shall provide explanations including on the main drivers for the key changes in emissions and removals reported in accordance with the format set out in Annex VI compared to the most recent final greenhouse gas inventory reported.



The general method

The proxy in brief: what and how (reminder of January's webinar)



What is a proxy ?

- The proxy is the estimation of the emissions for the year (X-1)
- The proxy is estimated during the current year (X)

How to estimate a proxy ?

- Extrapolation of the last inventoried year (X-2)
- Use of available data (X-1)
- Use of monthly or yearly indicators (X-2 and X-1)

General equation

$$\text{Emissions (E)} = \text{Activity data (AD)} \times \text{Emission factor (EF)}$$

General method: How to estimate proxy emissions?



General proxy equation (with abbreviations):

$$\text{Proxy emissions (E}_p\text{)} = \text{Proxy Activity data (AD}_p\text{)} \times \text{Proxy Emission factor (EF}_p\text{)}$$

The estimate method depends on the sort of available data

Order of priority use:

1. Available proxy emission data (X-1)
2. Available proxy activity data (X-1)
 - ✓ With available EF (X-1), if not
 - ✓ With available EF (X-2)
3. Available indicators
 - ✓ With available EF (X-2)
4. Report emissions (X-2)

Best
estimates

1. Available proxy emission data



What you need

→ Proxy year (X-1) emissions by GHG and by full CRT sector



2. Available proxy activity data



What you need

Activity

Combustion

Proxy year (X-1) activity data by fossil fuel and sector

Production/
Quantity

Proxy year (X-1) production/quantity by CRT sector

Area

Proxy year (X-1) area by CRT sector

Emission factor

Proxy EF (X-1), if not available → EF inventoried year (X-2)

3. Available indicators (I) – general method?



Equation: $E_p = AD_{(X-2)} \times I (\text{trend ratio}_{(X-1/X-2)}) \times EF_{(X-2)}$

What you need (generalities)

- Indicators for two years X-1 and X-2
- Activity data of inventoried year (X-2)
- Emission factor data of inventoried year (X-2)

Emission estimation steps

Gather indicators
data for two years
(X-2 and X-1)



Calculate the trend
ratio of the
indicators between
the 2 years



Estimate the
proxy activity



Gather the
inventoried year
EF (X-2)



Estimate proxy
emissions



3. Available indicators (I) – the trend ratio



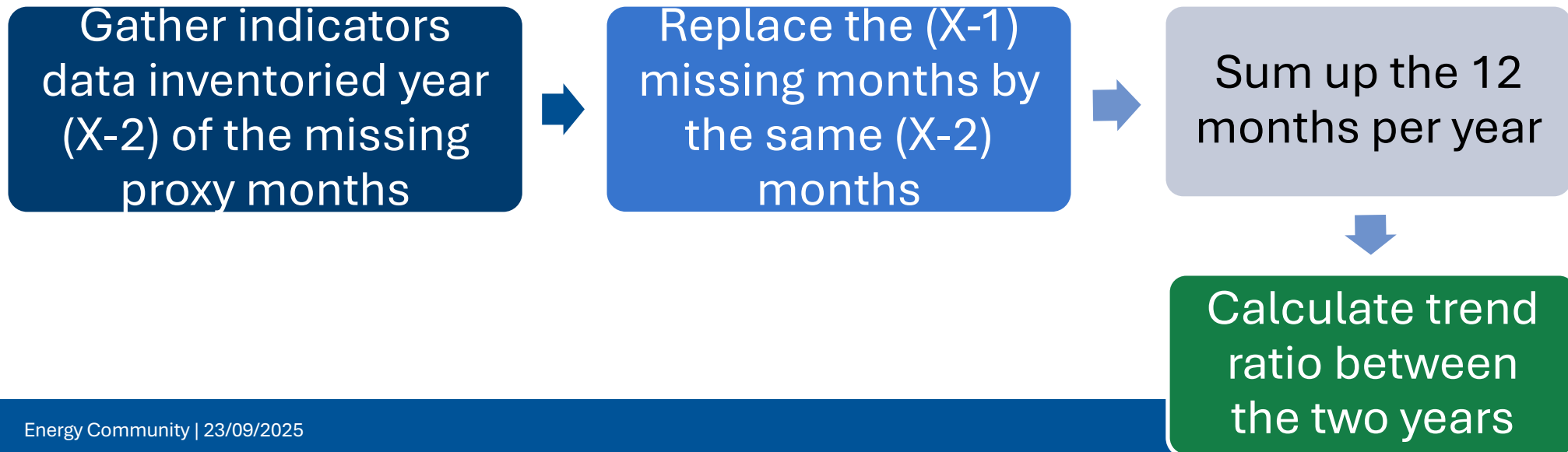
The calculation of the trend depends on the indicator frequency

Annual indicators → Calculate trend ratio between the two years

Monthly indicators → Depends on the months availability

12 months per year are available → Sum up the 12 months per year
→ Calculate trend ratio between the two years

Lack of months for proxy → have to fill the missing months



3. Available indicators (I) – Proxy emissions



Proxy activity

$$E_p = AD_{(X-2)} \times I(\text{trend ratio}_{(X-1/X-2)}) \times EF_{(X-2)}$$



What you need

- Activity data of inventoried year (X-2)
- Indicators trend ratio

$$AD_{(X-1)} = AD_{(X-2)} \times \text{trend ratio}_{(X-1/X-2)}$$

Proxy emission

What you need

- Proxy activity data (X-1)
- EF of inventoried year (X-2)

$$E_p = AD_{(X-1)} \times EF_{(X-2)}$$



4. No available data - Report emissions (X-2)



What you need

→ Inventoried year (X-2) emissions

Proxy emission = Inventoried emission





3

The French example

2023 French proxy results



Results by sector and gas

Implementing Regulation Article 7: Reporting on approximated Greenhouse Gas Inventories Member States shall report their approximated greenhouse gas inventories pursuant to Article 26(2) of Regulation (EU) 2018/1999								Year	2023		
								Submission	2024		
								Country	France		
								Geographical scope	EU scope		
GREENHOUSE GAS SOURCE AND	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Unspecified mix of HFCs and PFCs	NF ₃	Total	ETS	Effort Sharing ⁽³⁾
	CO ₂ equivalent (kt)									CO ₂ equivalent (kt)	
Total (net emissions) ⁽¹⁾	259340,46	58160,08	25378,46	8504,18	317,15	477,35	NO,NA	25,91	352203,59	70 598	280 411
1. Energy	252064,63	2681,72	2987,53						257733,88	44 506	213 228
2. Industrial processes and product use	25922,08	55,23	470,94	8504,18	317,15	477,35	NO,NA	25,91	35772,83	26 092	8 486
3. Agriculture	2029,46	40579,56	20169,98						62779,00		
4. Land use, land-use change and forestry ⁽¹⁾	-22295,04	756,11	884,37						-20654,56		
5. Waste	1619,33	14087,47	865,65						16572,45		
6. Other (<i>as specified in summary 1.A</i>)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo items											
International bunkers	19575,88	368,15	528,83						20472,86		
Aviation	16175,54	60,52	440,93						16677,00		
Navigation	3400,34	307,63	87,89						3795,86		

2023 French proxy results



Evolution with 2022 (last inventoried year)

GREENHOUSE GAS SOURCE AND	Total 2023	Total 2022	Trend
	CO ₂ equivalent		%
Total (net emissions) ⁽¹⁾	352203,59	376325,90	-6%
1. Energy	257733,88	276344,85	-7%
2. Industrial processes and product use	35772,83	38262,97	-7%
3. Agriculture	62779,00	63645,38	-1%
4. Land use, land-use change and forestry ⁽¹⁾	-20654,56	-18499,75	12%
5. Waste	16572,45	16572,45	0%
Memo items			
International bunkers	20472,86	17903,29	14%
Aviation	16677,00	14058,81	19%
Navigation	3795,86	3844,48	-1%

2023 French proxy against real inventory



LULUCF included	2024 submission			2025 submission			Differences (%)		
Mt	Inv. 2022	Proxy 2023	Evol %	Inv. 2022	Inv. 2023	Evol %	2022	2023	Evol
CO2	282	259	-8,1%	269	241	-10,6%	-4,7%	-7,2%	-2,4%
CH4	59,0	58,2	-1,4%	62,3	61,4	-1,5%	5,6%	5,6%	-0,1%
N2O	25,9	25,4	-2,0%	27,9	27,7	-0,5%	7,7%	9,3%	1,5%
Gaz F	9,9	9,3	-6,1%	10,0	9,0	-9,6%	0,3%	-3,5%	-3,5%
Total	377	352	-6,6%	369	339	-8,3%	-2,1%	-3,8%	-1,6%

Differences explanations

- Recalculations between editions
 - Not all the sectors are estimated in the proxy → GHG inventory underestimated
- ➔ Proxy in continuous improvement

2023 French proxy: available proxy data

Electricity production



- Bottom-up for CO₂ emissions
- Bottom-up on energy consumption by fuel

Calculation

- CO₂ 2023 emissions → Total of the electricity plants
- Other gases:

→ **Total E₂₀₂₃ = Total₂₀₂₃ energy consumption by fuel x EF₂₀₂₂ by fuel**

Refineries

- Bottom-up for CO₂ emissions

Calculation

- CO₂ 2023 emissions → Total of the refineries
- Other gases:

→ **Total E₂₀₂₃ = Activity₂₀₂₂ x CO₂ emission trend_(2023/2022) x EF₂₀₂₂**



Road transport

- Consumption by fuel
- Vehicle fleet
- Specific proxy EF calculated

Calculation

→ Use of COPERT model

2023 French proxy: available indicators



Buildings

- Consumption by (some) fuel of the sector

Calculation

$$\rightarrow \text{Total } E_{2023} = \text{Activity}_{2022} \times \text{Fuel consumption trend}_{(23/22)} \times EF_{2022}$$

Combustion in industry

- Consumption by (some) fuel by industry size (big/small)

Calculation

$$\rightarrow \text{Total } E_{2023} = \text{Activity}_{2022} \times \text{Fuel consumption trend}_{(23/22)} \times EF_{2022}$$

2023 French proxy: available indicators



IPPU

- Production index (by month) by industrial sector

Calculation

1. Index trend_(2023/2022) = 2023 Total 12 months / 2022 Total 12 months
2. **Total E₂₀₂₃ = Activity₂₀₂₂ x Index trend_(2023/2022) x EF₂₀₂₂**

Agriculture

- Livestock
- Crops

Calculation

Use of national model (made by Citepa)

2023 French proxy: no available data



Waste

Calculation

$$E_{2023} = E_{2022}$$

Major part of LULUCF

Calculation

$$E_{2023} = E_{2022}$$



From the Proxy (X-1) to monthly pre-estimations (X)



General method

- Approximately same general method but with monthly indicators for all the sectors
- If no indicator: annual emissions divided by 12 and report of the monthly emissions



National inventory
relative to (X-2)
emissions (edition X)

Proxy inventory
relative to (X-1)
emissions (edition X)

Indicators by month
relative to (X-1 and X)
years

Proxy calculated by
month => monthly
emissions (X-1) year

Trend of indicators by
month
X-1 -> X

Trends applied on proxy

Emissions by month /
sector relative to the year
X during current year

X = current year

How reliable are the monthly pre-estimations ?



GHG (Mt CO ₂ e)	Edition 2023			Edition 2024			Edition 2025 (dec. 2024)		
Emissions year	proxy 2022	Month baro. 2023	2023 VS 2022	Inv. 2022	proxy 2023	2023 VS 2022	Inv. 2022	Inv. 2023	2023 VS 2022
edition	inv. 2023	ed. mars 2024		Secten 2024	Secten 2024		déc. 2024	déc. 2024	
Total LULUCF excluded	404	385	-4,8%	396	373	-5,8%	404	377	-6,7%

Diff VS éd. 2023

Diff VS éd. 2024 2,0% 3,1% 1,0%

Diff VS éd. 2025 0,0% 2,1% 1,9%

Differences explanations

- Recalculations between editions
- Not all the sectors are estimated in the baro/proxy → GHG inventory underestimated
- 3 editions difference
- Improvement of the proxy during 2024 edition (aviation, agriculture,...)

Thank you for your attention

Citepa is an association that guides players in the ecological transition in France and around the world.

It assesses the impact of human activities on climate and air pollution. It produces reference data and develops solutions to encourage action to reduce emissions, improve air quality and adapt to climate change.

Our multidisciplinary team contributes to building a sustainable world.



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Annex: CRT sectors



1. Energy

- 1.A.1. Energy industries
- 1.A.2. Manufacturing industries and construction
- 1.A.3. Transport
- 1.A.4. Other sectors
- 1.A.5. Other
- 1.B.1. Solid fuels
- 1.B.2. Oil and natural gas and other emissions from energy production
- 1.C. CO2 transport and storage

4. LULUCF

- 4.A. Forest land
- 4.B. Cropland
- 4.C. Grassland
- 4.D. Wetlands
- 4.E. Settlements
- 4.F. Other land
- 4.G. Harvested wood products
- 4.H. Other

2. Industrial processes and product use

- 2.A. Mineral industry
- 2.B. Chemical industry
- 2.C. Metal industry
- 2.D. Non-energy products from fuels and solvent use
- 2.E. Electronic Industry
- 2.F. Product uses as ODS substitutes
- 2.G. Other product manufacture and use
- 2.H. Other

5. Waste

- 5.A. Solid waste disposal
- 5.B. Biological treatment of solid waste
- 5.C. Incineration and open burning of waste
- 5.D. Waste water treatment and discharge
- 5.E. Other

Memo items

- 1.D.1. International bunkers
 - 1.D.1.a. Aviation
 - 1.D.1.b. Navigation
- 1.D.2. Multilateral operations
- 1.D.3. CO2 emissions from biomass
- 1.D.4. CO2 captured
- 5.F.1. Long-term storage of C in waste disposal sites
- Indirect N2O

3. Agriculture

- 3. Agriculture
 - 3.A. Enteric fermentation
 - 3.B. Manure management
 - 3.C. Rice cultivation
 - 3.D. Agricultural soils
 - 3.E. Prescribed burning of savannahs
 - 3.F. Field burning of agricultural residues
 - 3.G. Liming
 - 3.H. Urea application
 - 3.I. Other carbon-containing fertilizers
 - 3.J. Other

6. Other Indirect CO2