

Calculating the GHG impact of RFNBOs – reflections on methodology and calculation

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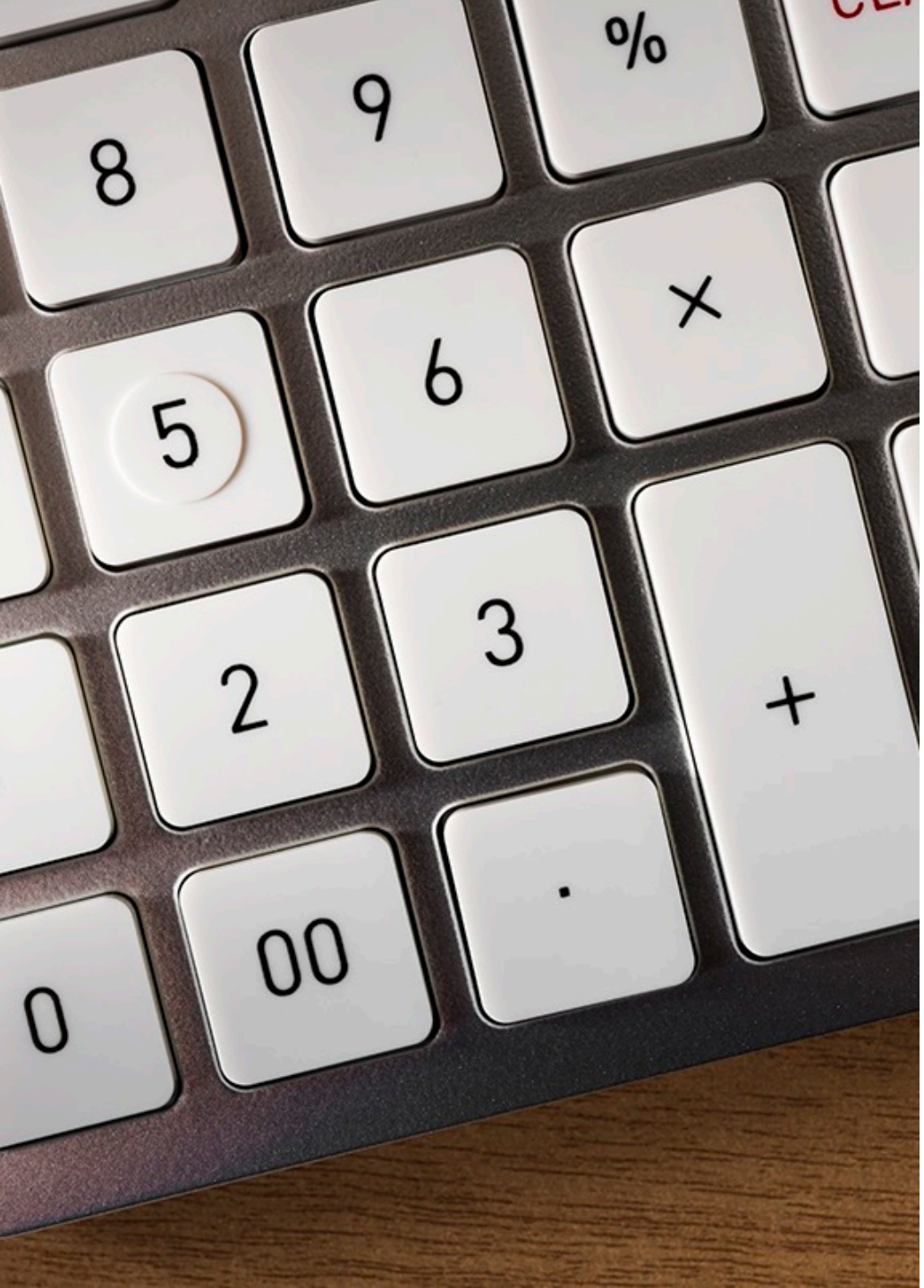
ISCC event: Renewable fuels of non-biological origin (RFNBOs)

Webinar, December 1st 2022



Our focus for today

1 General approach for GHG calculation

2 Methodology for RFNBOs

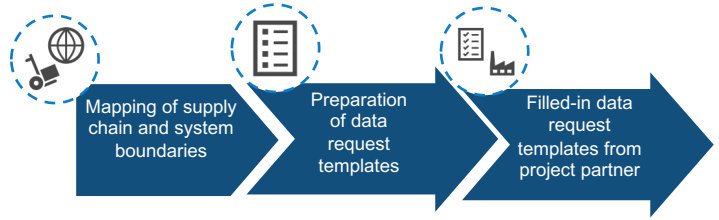
3 Emissions savings

Meo Carbon Solutions is a solution provider in areas of sustainability, renewable and circular resources, deforestation-free supply chains and certification

Working steps and information exchange to construct a GHG calculator

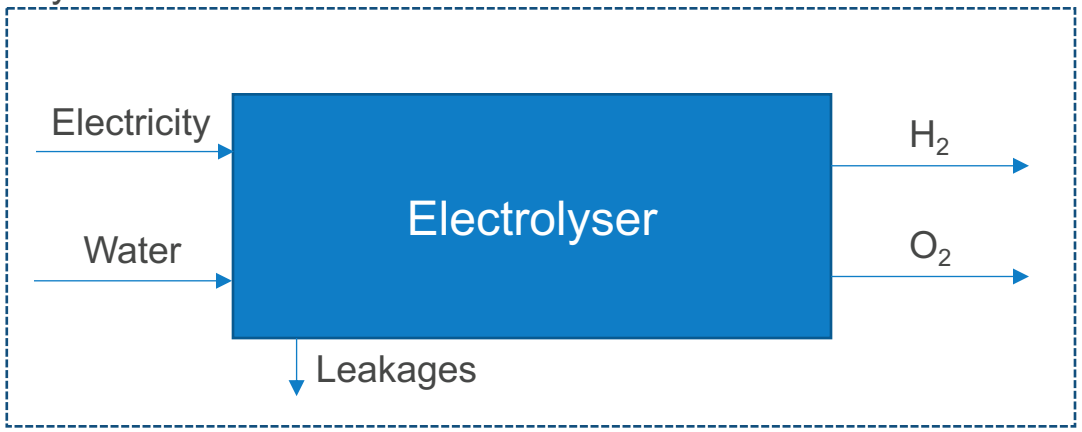
Provision of final fully transparent GHG calculator to project partner.
Identification of core impact categories and analysis of improvement potential.
Future updates possible.
Usable for certification audits

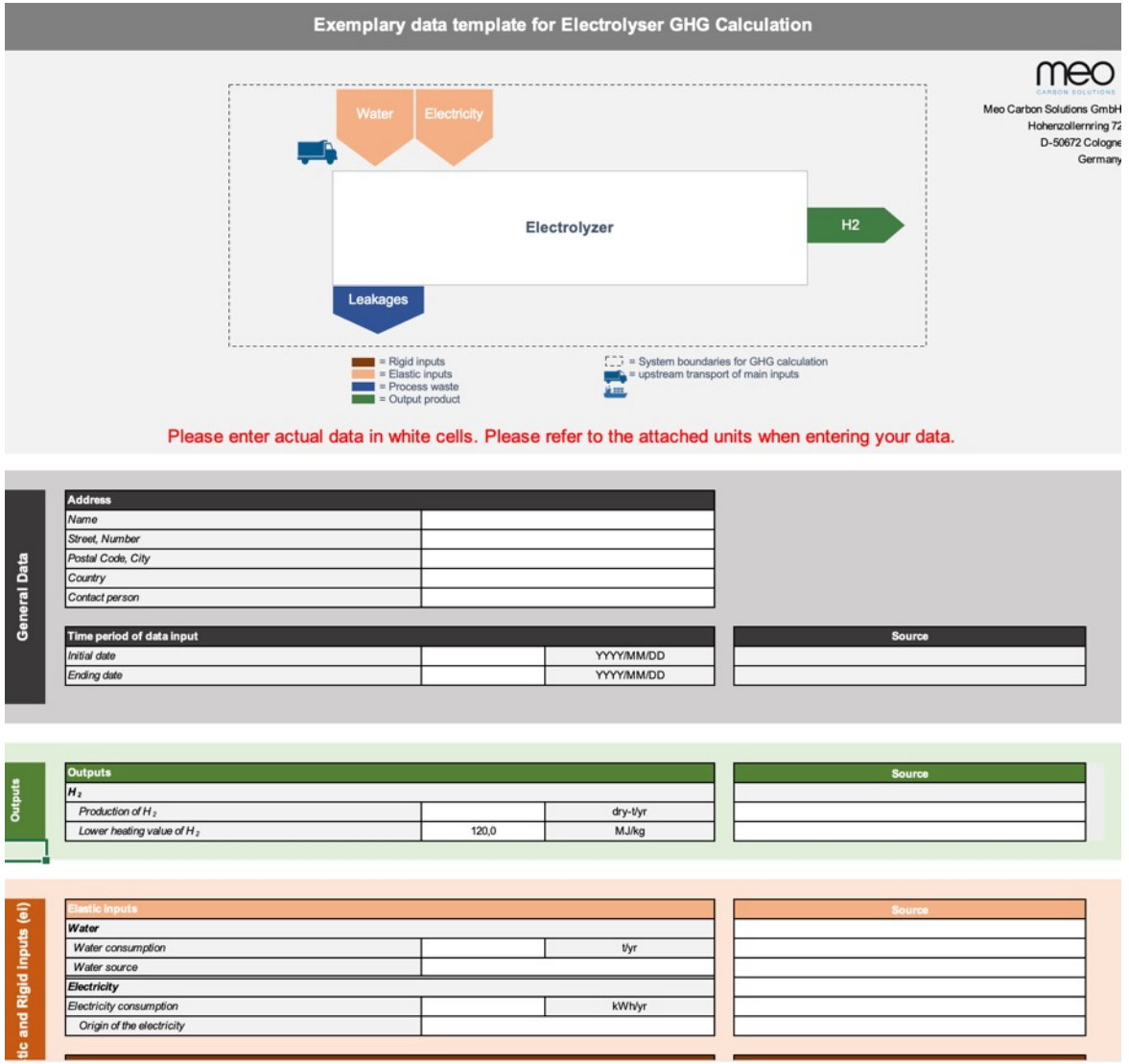
Definition of system boundaries and data collection



- Identification of all processes and inputs in the life cycle which result in GHG emissions or removals.
- Analysis of renewable electricity source and emission factors.

System boundaries





The methodology for GHG accounting is included in the Delegated Act on Renewable Fuels of Non-Biological Origin

Set up of first draft GHG calculator in Excel

$$E = e_i + e_p + e_{td} + e_u - e_{ccs}$$

Where:

E = total emissions from the use of the fuel in g CO_2/MJ

$e_i = e_{i\ elastic} + e_{i\ rigid} - e_{ex\text{-}use}$: supply of inputs

$e_{i\ elastic}$ = emissions from elastic inputs

$e_{i\ rigid}$ = emissions from rigid inputs

$e_{ex\text{-}use}$ = emissions from inputs' existing use or fate

e_p = emissions from processing

e_{td} = emissions from transport and distribution

e_u = emissions from combusting the fuel

e_{ccs} = emission savings from carbon capture and geological storage

Is the input rigid or elastic?

Source: Annex on Delegated Act on Renewable Fuels of Non-Biological Origin – GHG methodology

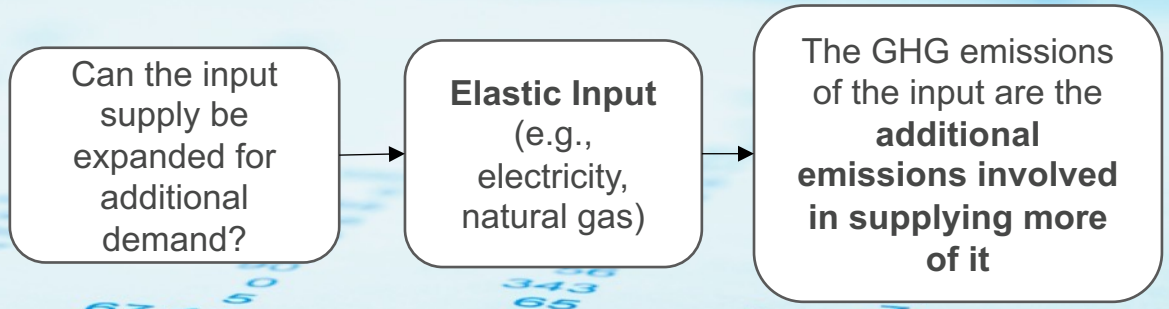
The new formula element e_i: elastic inputs

Set up of first draft GHG calculator in Excel

$$e_i = e_{i\ elastic} + e_{i\ rigid} - e_{ex\text{-}use}$$

Elastic inputs

- **Elastic inputs** are those whose supply can be increased to meet extra demand.
- Emissions should include all emissions arising due to their production over the whole supply chain.
- These emissions shall take in account the extraction of the primary energy required to make the input, processing and transportation of the input.



Source: Annex on Delegated Act on Renewable Fuels of Non-Biological Origin – GHG methodology

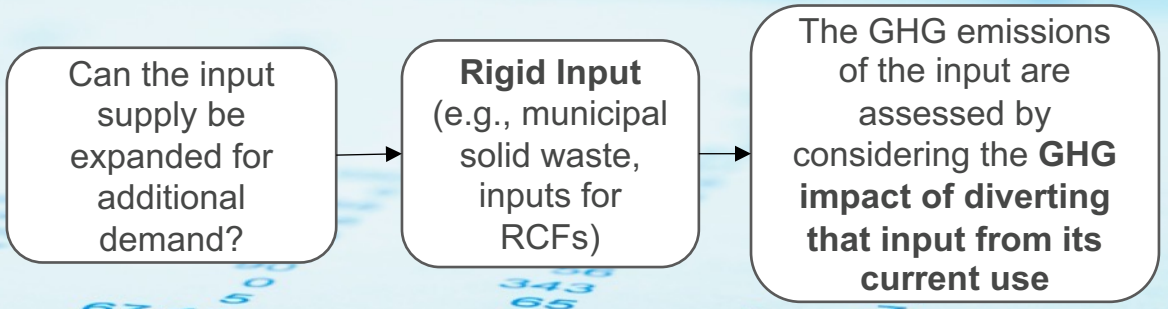
The new formula element e_i: rigid inputs

Set up of first draft GHG calculator in Excel

$$e_i = e_{i\ elastic} + e_{i\ rigid} - e_{ex\text{-}use}$$

Rigid inputs

- **Rigid inputs** are those whose supply cannot be expanded to meet extra demand.
- Emissions shall include the emissions resulting from the diversion of those inputs from a previous or alternative use.
- These emissions shall take into account the loss of production of electricity, heat or products that were previously generated using the input.



Source: Annex on Delegated Act on Renewable Fuels of Non-Biological Origin – GHG methodology

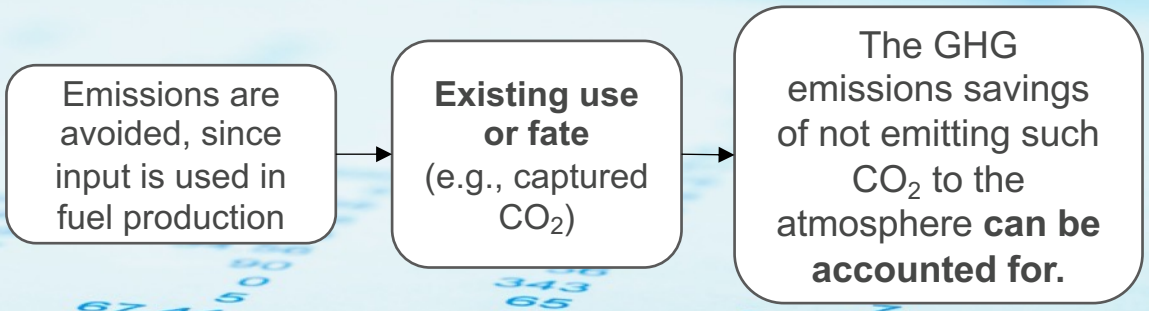
The new formula element e_i: existing use or fate

Set up of first draft GHG calculator in Excel

$$e_i = e_{i\ elastic} + e_{i\ rigid} - e_{ex\text{-}use}$$

Emissions from existing use or fate

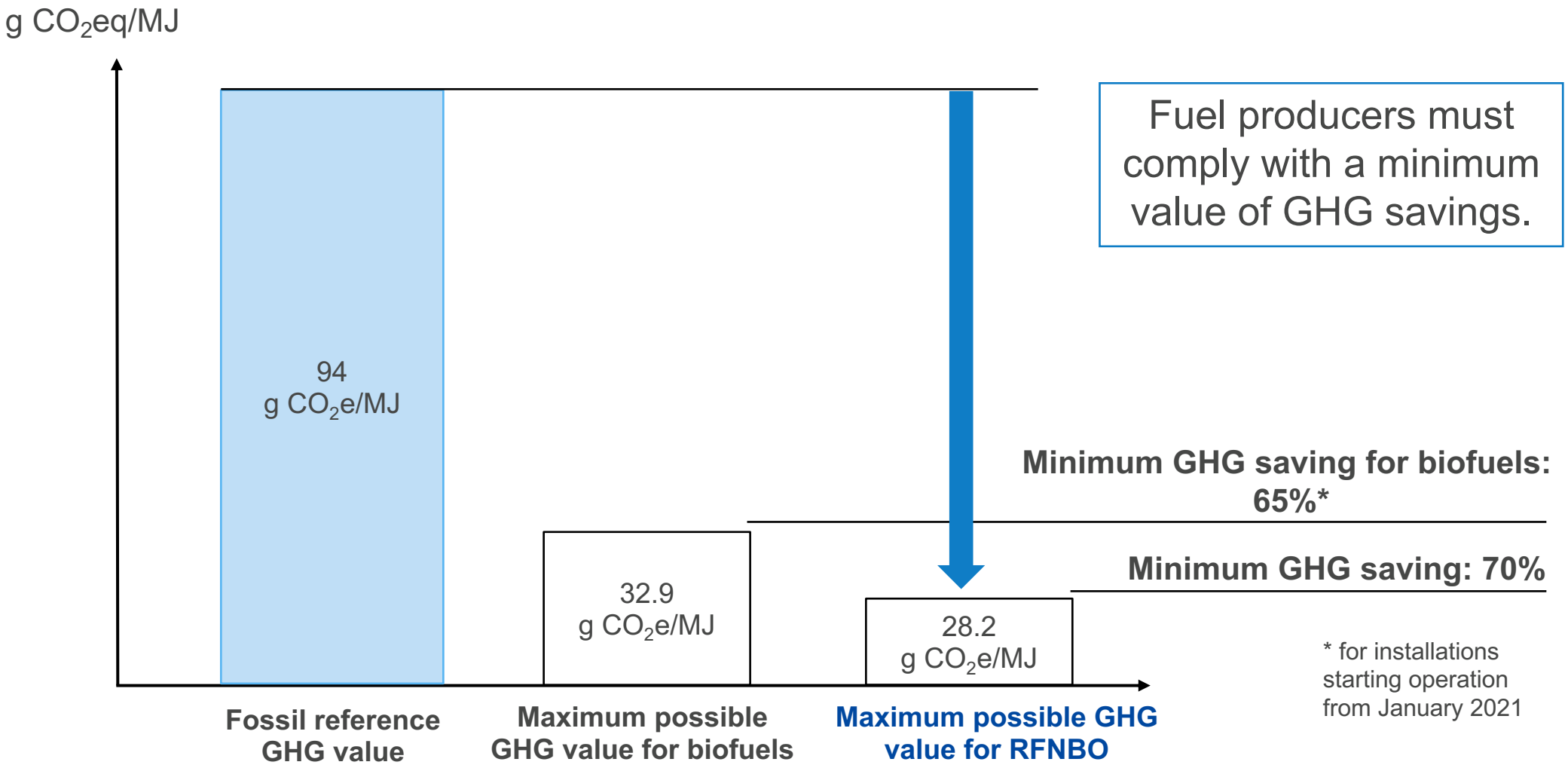
- **Emissions from existing use or fate** include all emissions in the existing use or fate of the input that are avoided when the input is used for fuel production.
- Include the CO_2 equivalent of the carbon incorporated in the chemical composition of the fuel that was or would have otherwise been emitted into the atmosphere.



Source: Annex on Delegated Act on Renewable Fuels of Non-Biological Origin – GHG methodology

Emissions savings must be calculated under the RED framework

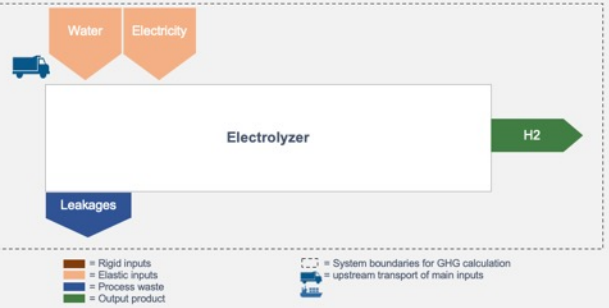
Feedback loops to finalize data and fill-in gaps



Meo supports companies with the calculation of GHG emissions savings for RFNBOs by developing customized GHG calculators

Provision of final fully transparent GHG calculator

Exemplary Electrolyser GHG Calculator



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Meo Carbon Solutions GmbH
Hohenzollernring 72
D-50672 Cologne
Germany

Please enter actual data in white cells. Please refer to the attached units when entering your data.

General Data

Address	
Name	Company ABC
Street, Number	Street ABC
Postal Code, City	ABC
Country	ABC
Contact person	ABC

Time period of data input			Source
Initial date	01.01.23	YYYY/MM/DD	Company ABC documentation
Ending date	01.01.24	YYYY/MM/DD	Company ABC documentation

Outputs

Outputs			Source
H_2			
Production of H_2	750	kg/yr	Company ABC documentation
Lower heating value of H_2	120,0	MJ/kg	REDII
Energy contentf H_2	90.000,0	MJ/year	Meo calculation

Rigid inputs (ei) Electrolyser

Elastic inputs			Source
Water			
Water consumption	5.000	ton/yr	Company ABC documentation
Electricity			
Electricity consumption	50.000	kWh/yr	Company ABC documentation
Origin of the electricity	Renewable sources from hydropower plant		Company ABC documentation

Elastic inputs emissions factors			Source
Water consumption	0,0003	kg CO_2eq/ton-water	ISCC 205: Ecoinvent v. 3.7, 2020: market for tap water

Processing Emissions (ep)

Waste treatment			Source
Wastewater	5,0	m^3/yr	Company ABC documentation
Hydrogen leakages	0,8	kg/yr	Company ABC documentation

Emission factors			Source
Wastewater	0,481	kg CO_2eq/m^3	ISCC 205: Ecoinvent v. 3.7, 2020: market for wastewater, average
Hydrogen leakages	5,800	kg CO2eq/kg H2	IPCC AR4

Emissions of process-specific inputs at methanol plant		
Wastewater	2,4	kg CO2eq/year
Hydrogen leakages	4,4	kg CO2eq/year
Process-specific emissions at electrolyser	**2,4**	**kg CO2eq/year**

Allocation

Process outputs		
Hydrogen	90.000	MJ/year

Allocation factors	
Hydrogen	1,00

Elastic and rigid inputs emissions for one MJ Fuel after allocation		
Elastic and rigid inputs emissions Hydrogen	0,02	gCO_2/MJ

Emissions from processing for one MJ Fuel after allocation		
Emissions from processing Hydrogen	0,03	kgCO_2/year

Downstream transport
Downstream transport are considered negligible.

Total Emissions Hydrogen

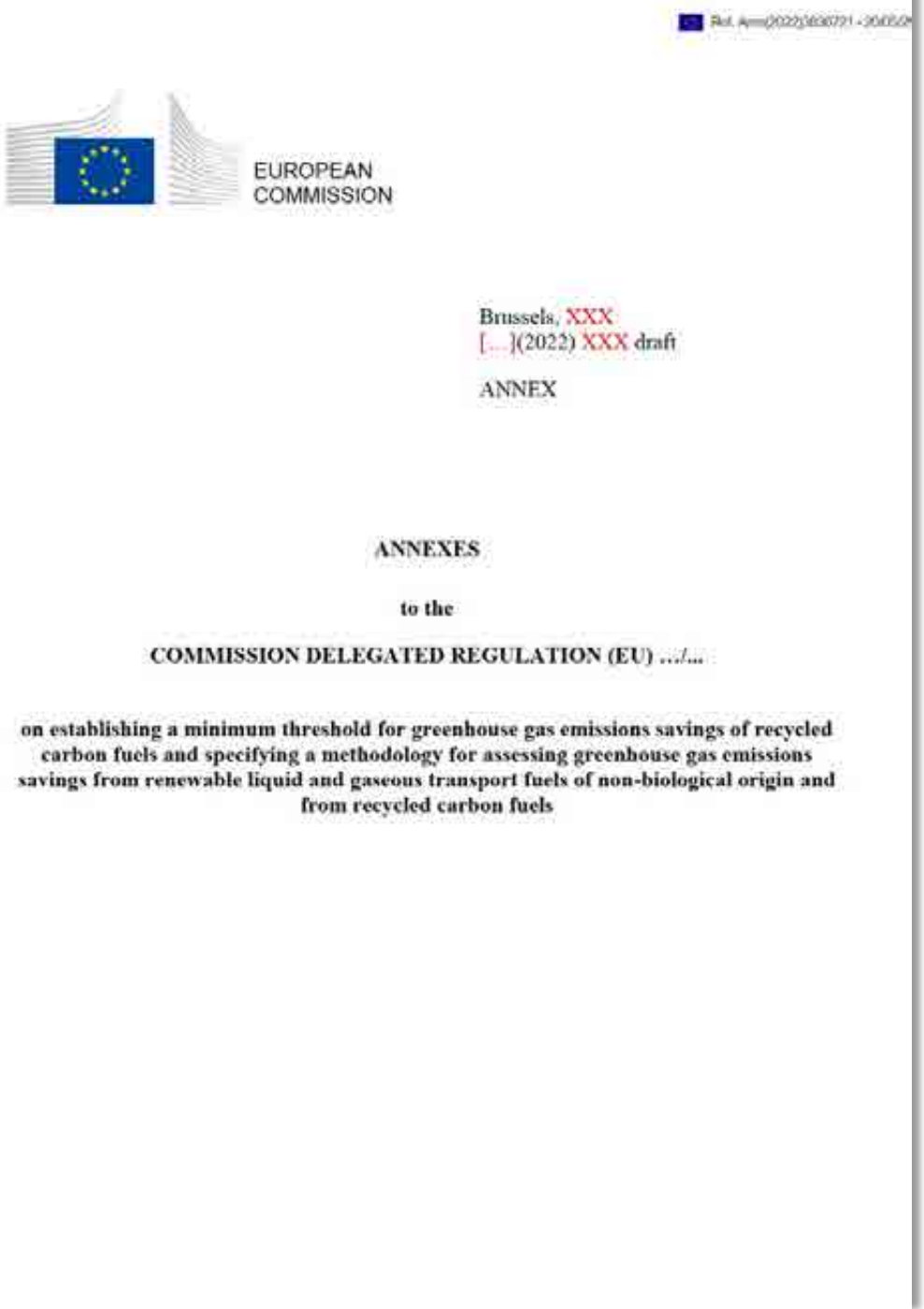
Total emissions Hydrogen		
Emissions from elastic inputs (Ei)	0,02	g CO_2eq/MJ methanol
Emissions from rigid inpus (E-ex_{use})	0,00	g CO_2eq/MJ methanol
Emissions from processing (Ep)	0,03	g CO_2eq/MJ methanol
Emissions from fuel in use (Eu)	0,00	g CO_2eq/MJ methanol
Emissions from downstream transport and distribution (Etd)	0,00	g CO_2eq/MJ methanol
Total emissions Hydrogen	**0,05**	**g CO2eq/MJ methanol**

Comment
No fuel in use emissions for biofuels, according to EU RED II:2018/2001/EC

GHG Savings

GHG reference value RED II		
GHG emissions fossil fuel	94,0	g CO_2eq/MJ

Comparison of Hydrogen savings		
Hydrogen emission reductions	**93,95**	**g CO_2eq/MJ**
Hydrogen GHG-savings as compared to fossil fuel comparator	**99,95**	**%**



EUROPEAN
COMMISSION

Brussels, XXX
[...](2022) XXX draft

ANNEX

ANNEXES

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COMMISSION DELEGATED REGULATION (EU) .../...

on establishing a minimum threshold for greenhouse gas emissions savings of recycled carbon fuels and specifying a methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and from recycled carbon fuels

Key takeaways

- Differentiation between **elastic and rigid inputs** is key, as it has an impact in GHG results.
- Emissions savings for RNFBOs are **70%.**
- Calculation of GHG emission savings for RFNBO will be mandatory under the RED framework.
- The documentation available is still a **draft**. Further requirements might be introduced and/or methodology might change once final documentation is available.
- Nevertheless, **GHG calculations can already be performed** based on available documentation.
- Identification of core impact categories and analysis of improvement potential is already possible today.

Feel free to get in touch with us!

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