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# PEFCR4Space
# Open Consultation 1st draft PEFCR4Space

## Online Q&A session

Virtual, 24/10/2025

# Housekeeping

- Meeting admin will turn off all cameras/microphones
- Please post your questions in the Q&A section (we will respond at suitable time)
- We will prioritise questions on an ad-hoc basis
- Q&A document and the slides used today will be published after this Webinar on the PEFCR4space website
- For any further questions, please consult
  - Our website: https://defence-industry-space.ec.europa.eu/product-environmental-footprint-category-rules-pefcr-space-sector
  - Or email PEFCR4space@vito.be

# Agenda for today

- Welcome
- Introduction to Life Cycle Assessment / Product Environmental Footprint
- Product Environmental Footprint Category Rules for the space sector (PEFCR4Space) in a nutshell
- 1st draft of the PEFCR4Space
- Q&A

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# Welcome!

# PEFCR
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# OPEN CONSULTATION

**The open consultation runs**

from **15 Oct 2025**

to **1 Dec 2025**


This is an opportunity to provide feedback on the first draft document of the Product Environmental Footprint Category Rules for the space sector – PEFCR4Space.

## Why participate?

Ensure the rules are workable in practice

Bring industry expertise and insights

## How to participate?

Via our EU Survey

Learn more at **PEFCR4Space**
For inquiries, contact us at **pefcr4pace@vito.be**

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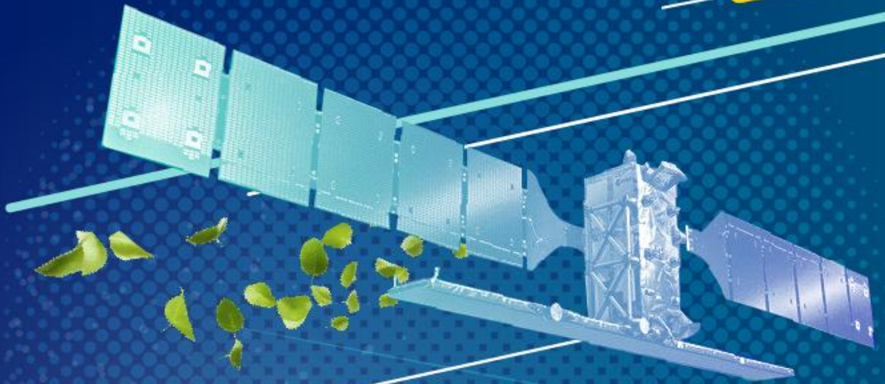

# Understanding
## Life Cycle Assessment (LCA)
## Product Environmental Footprint (PEF)

***A practical introduction***

# Why do we need Life Cycle Assessment in the Space sector?

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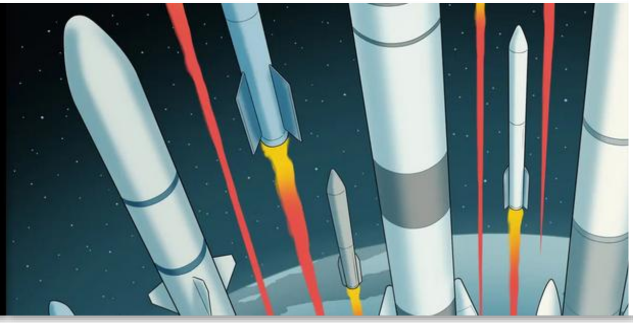
***The New Space Race Is Causing New Pollution Problems***

Earth's stratosphere has never seen the amounts of emissions and waste from rockets and satellites that a booming space economy will leave behind.

The New York Times



SpaceNews

## Growing risks in low Earth orbit demand more responsible space behavior

At this very moment, there are over 10,000 operational satellites in low Earth orbit, along with 3,500 decommissioned (or defunct) satellites,...

16 Dec 2024

## Dying satellites can drive climate change and ozone depletion, study finds

**Aluminium emissions from satellites as they fall to Earth and burn up is becoming more significant as their numbers soar**

There are more than 9,000 satellites circumnavigating overhead right now, with the number likely to increase to over 60,000 by 2040. Photograph: Lockheed Martin Space/Nasa

Nature

## Rocket launches threaten global biodiversity conservation

Satellite technologies are essential for global conservation actions through providing continuous, real-time Earth monitoring.

31 Dec 2024

The Economist

## Satellites are polluting the stratosphere

And forthcoming mega-constellations will exacerbate the problem | Science & technology.

05 Mar 2025

## Inuit worry about toxic splash from rocket debris in Canada's Arctic waters

Space junk could splash into one of the most biodiverse areas in Arctic

Ashley Burke · CBC News · Posted: Apr 25, 2018 3:00 AM CT | Last Updated: April 25

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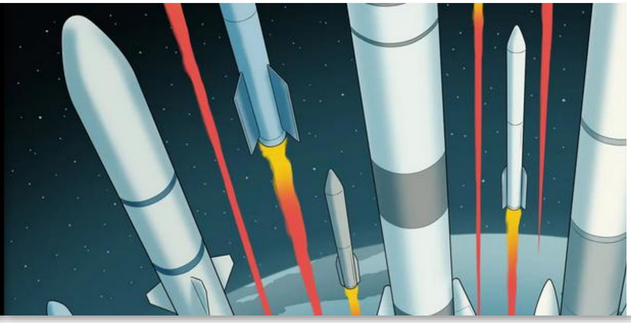

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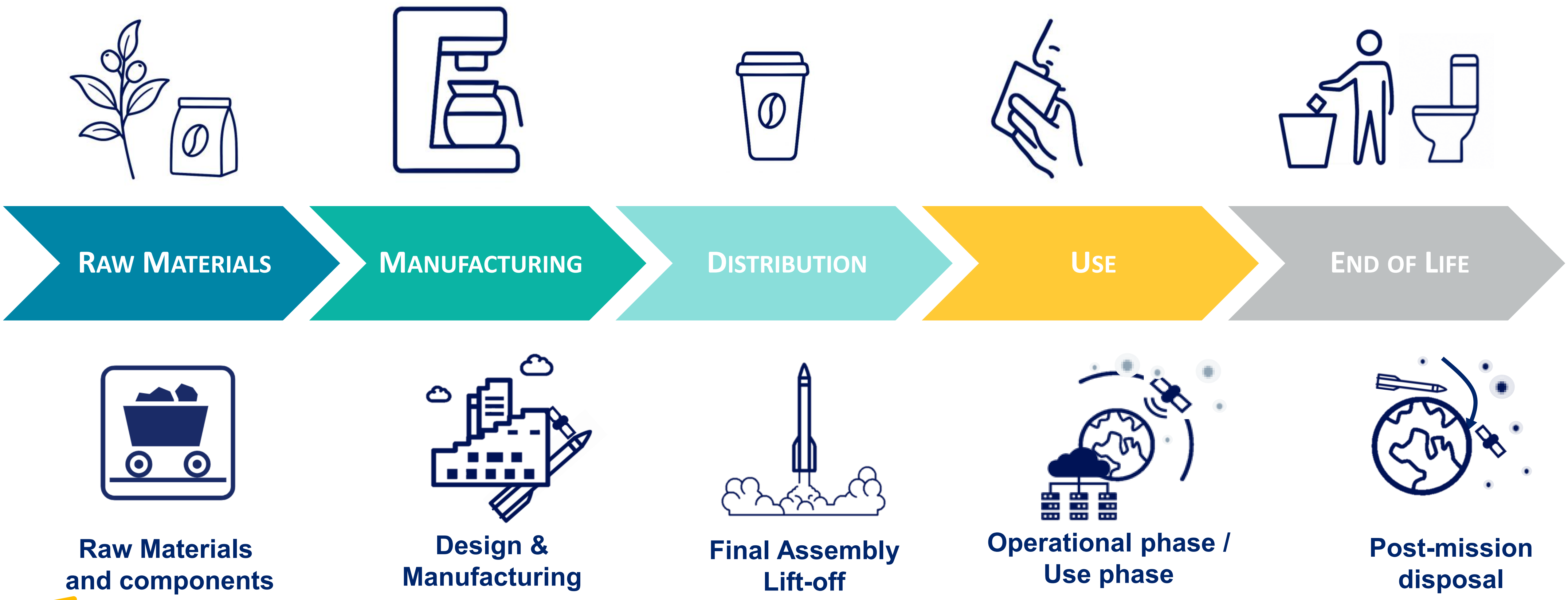
- **Substantiating green claims:** *on what basis?*
- **Transparent communication:** *how to build trust?*
- **A level playing field:** *how to ensure fairness and comparability?*

# Introducing the life cycle approach

# Introducing the life cycle approach



# Introducing the life cycle approach

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**FUNCTIONALITY PRINCIPLE:** *Delivery of 80 mg of caffeine to an adult consumer, sufficient to increase alertness for ~1h*

**MARKET REPRESENTATIVENESS:** *A representative product reflects the average characteristics of (similar) products on the EU market ➔ Coffee, Cappuccino, Vegan Cappuccino etc.*

# Product Environmental Footprint (PEF):

## the EU's recommended LCA method

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https://green-forum.ec.europa.eu/green-business/environmental-footprint-methods/pef-method_en

### Harmonisation

- EC recommendation
- ISO alignment
- Equal playing field

### Transparency

- Science based
- Consistency
- Comparability

### Multi-stakeholder initiative

- Bottom-up process
- EC coordination
- Technical secretariat

### Sector specific category rules

- General rules for the sector
- Market average (Representative) products
- Hotspot results

### Data

- Supporting studies
- Sector specific datasets
- Data quality rules

# The PEFCR4Space project in a nutshell

# Why PEFCR matters?

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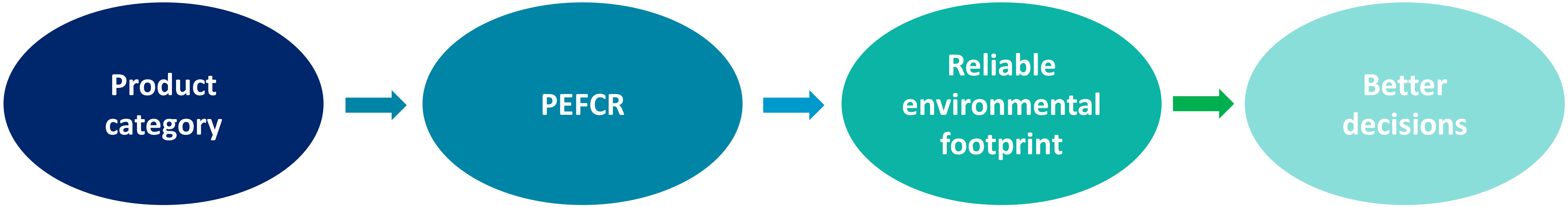
- Standardises how to measure the environmental performance of a product (/service)
- Ensures transparent and comparable default data across similar products (/services)
- Helps businesses, policymakers and consumers make sustainable choices
- Supports EU sustainability, Ecodesign and Circular Economy goals



# What is PEFCR4space?

🚀 **Developing Product Environmental Footprint Categories Rules for space-based services**
Supporting the European Commission in shaping sector-specific rules to measure the environmental performance of space-based services within the EU

📊 **Acquiring Environmental Footprint compliant datasets**
Reliable & comparable EF-compliant data for the application of the PEFCR4Space

🤝 **Engaging with stakeholders**
Active involvement and consultation to boost environmental performance in the space sector

- Technical Secretariat
- Expert Working groups
- Consultations during developing of the PEFCR4Space
- Involvement in the Supporting studies
- Involvement in the developing of the datasets

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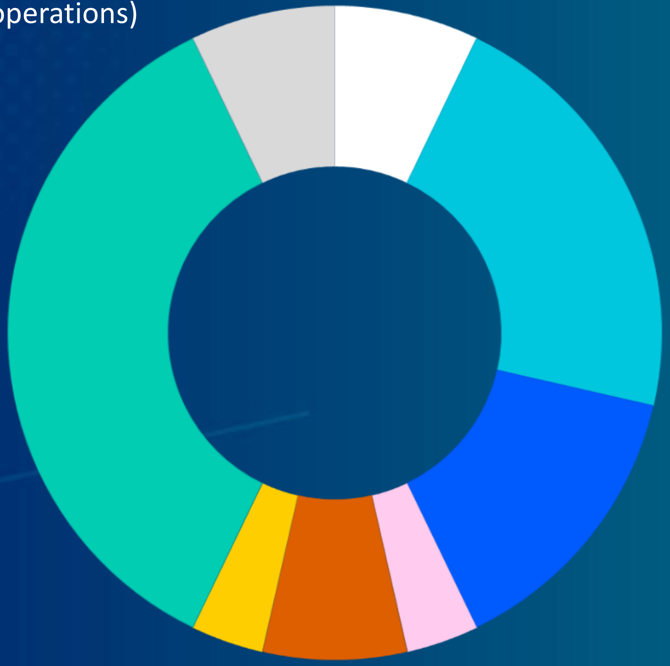
# WHO DEVELOPS PEFCR4Space

## Composition of Technical Secretariat

**28 organisations**, representing **>56% of the total European market share**
(only considering launch, manufacturing, and operations)

- DG DEFIS (chair) **2**
- Experts (co-chairs) **6**
- EC services **4**
- International organisations **1**
- National organisations **2**
- Non-governmental organisations **1**
- Private companies **10**
- Universities **2**



## Five PEFCR4Space Working Groups

- Earth Observation (EO) **21**
- Positioning, Navigation, and Timing (PNT) **16**
- Satellite communication **19**
  (video & connectivity services)
- In Space Transport (IOT) **25**
- Launch services **20**

Assisted by:
Consortium mandated by EC DG DEFIS

vito PRé ecoinnovazione spin off ENEA
ecomatters NOVASPACE GCU Glasgow Caledonian University

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# Strong EU and ESA cooperation

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**PEFCR for the EU Space**
Considering the sector specialties and focusing on most significant environmental impacts

**EF compliant datasets**
Allow for reliable, verifiable and comparable information

**Stakeholders engagement**
Incentivize industry to manufacture products with better environmental performance

**ESA LCA Framework**
Foundation for sustainability and circularity assessment in ESA programmes


**ESA LCA Handbook**
methodology and guidance for space sector LCA

**ESA LCA Database**
life cycle inventory data tailored to space applications

**Active cooperation** to harmonise practices and reduce burdens on space industry
**ESA's active involvement** in all phases of the **PEFCR4Space** development process

Example: *Harmonised Data Collection Template*
Common structure - Tailored to the specific scopes, even when requirements differ

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# ADVANCING SUSTAINABILITY

## Key Milestones

**October 2024**
Technical Secretariat established & definition of PEFCR4Space scope

**January 2025**
5 Sub-working groups formed

**February 2025**
Set-up of the external review panel

**April - June 2025**
Definition of modelling rules and data collection

**June - Sep 2025**
Call of expression to participate in the supporting studies of the PEFCR4Space

**Current Phase**
**15 Oct - 1 Dec 2025**
Open consultation on the first draft of the PEFCR4Space

**2026**
- Start the development of EF compliant datasets
- Conduct supporting studies
- Open consultation on second draft of the PEFCR4Space (2026-2027)

**2027**
Release of final PEFCR for the space sector

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# Introducing you to the 1st draft of the PEFCR4Space

# First draft PEFCR4Space: Scope

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| Product category: *(horizontal rules)* | Space-based services delivered to stakeholders in the EU | | | | | |
|---|---|---|---|---|---|---|
| Product sub-category: *(vertical rules)* | **Earth Observation Services** | **Positioning, Navigation & Timing Services** | **Sat. Video Services** | **Sat. Connectivity Services** | **In-Space Transport Services** | **Uncrewed Launch Services from Earth to Space** |
| Market average: | No | Yes | Yes | Yes | Yes | Yes, for 4 ΔV |
| Functional Unit *(draft)*: | To generate 1 GB of raw Earth Observation data, as prepared for transmission to Earth, relevant to the scope of the mission, with a defined accuracy, resolution and revisit rate. | To send/receive PNT as open service, with a minimum avail. of 90% under clear sky condition, over one yr with a min. horizontal location accuracy of 15m, vertical location accuracy of 7.5m and with a time accuracy of min. 31 Nsec. | To receive 1Mbps of broadcast services over 100km², at a min. availability of 99.7% under clear sky conditions, over one yr. | To exchange 1 Mbps of data at min. availability** of 99.5% under clear sky conditions, over one user terminal over one yr. | To transport 1 kg of cooperative object in space by providing a certain ΔV, with a defined precision. | To transport and release 1 kg of payload in orbit at certain ΔV, for 1 launch, at a defined minimum safety and precision. |

# First draft PEFCR4Space: System boundaries - SPACECRAFT

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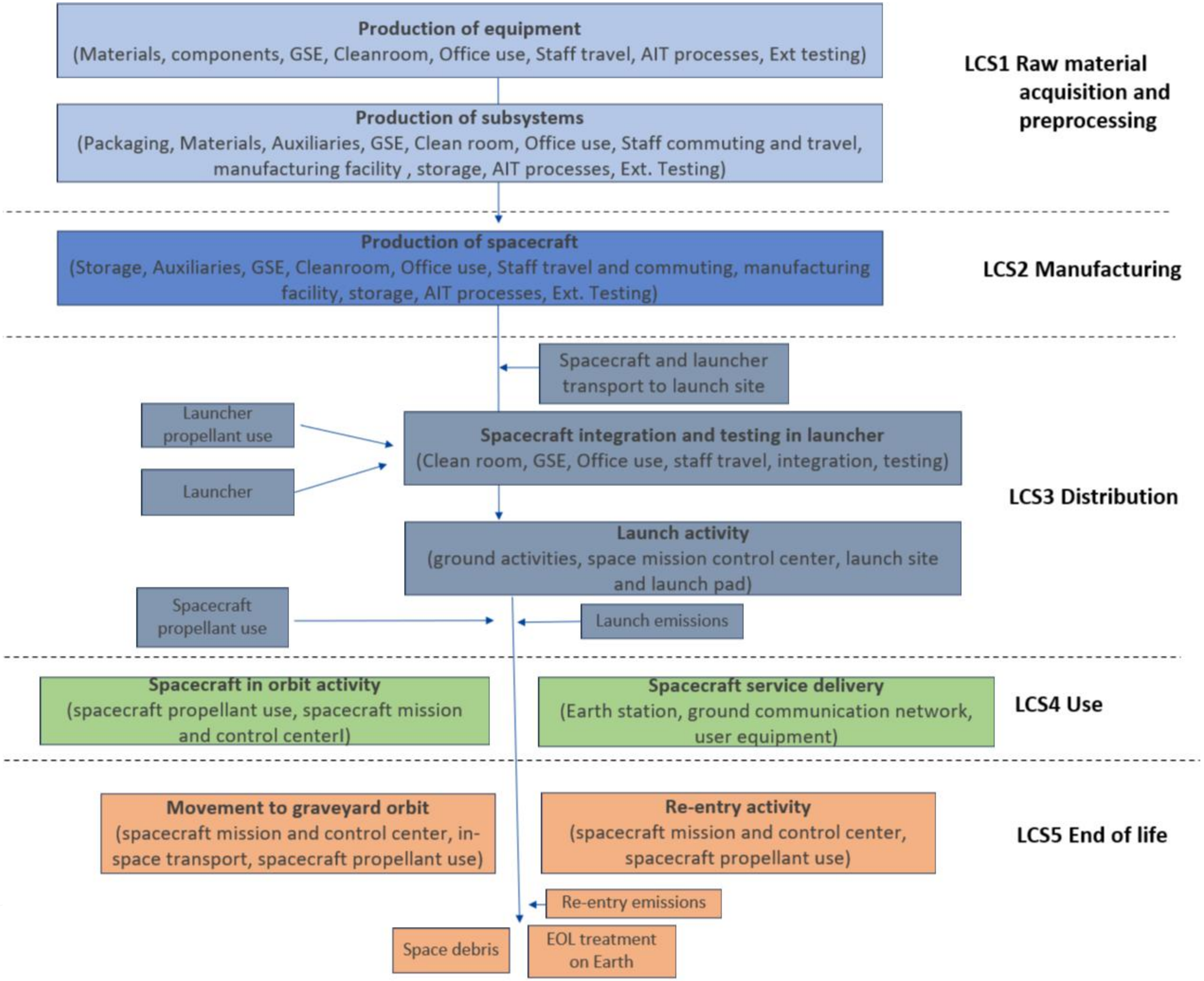
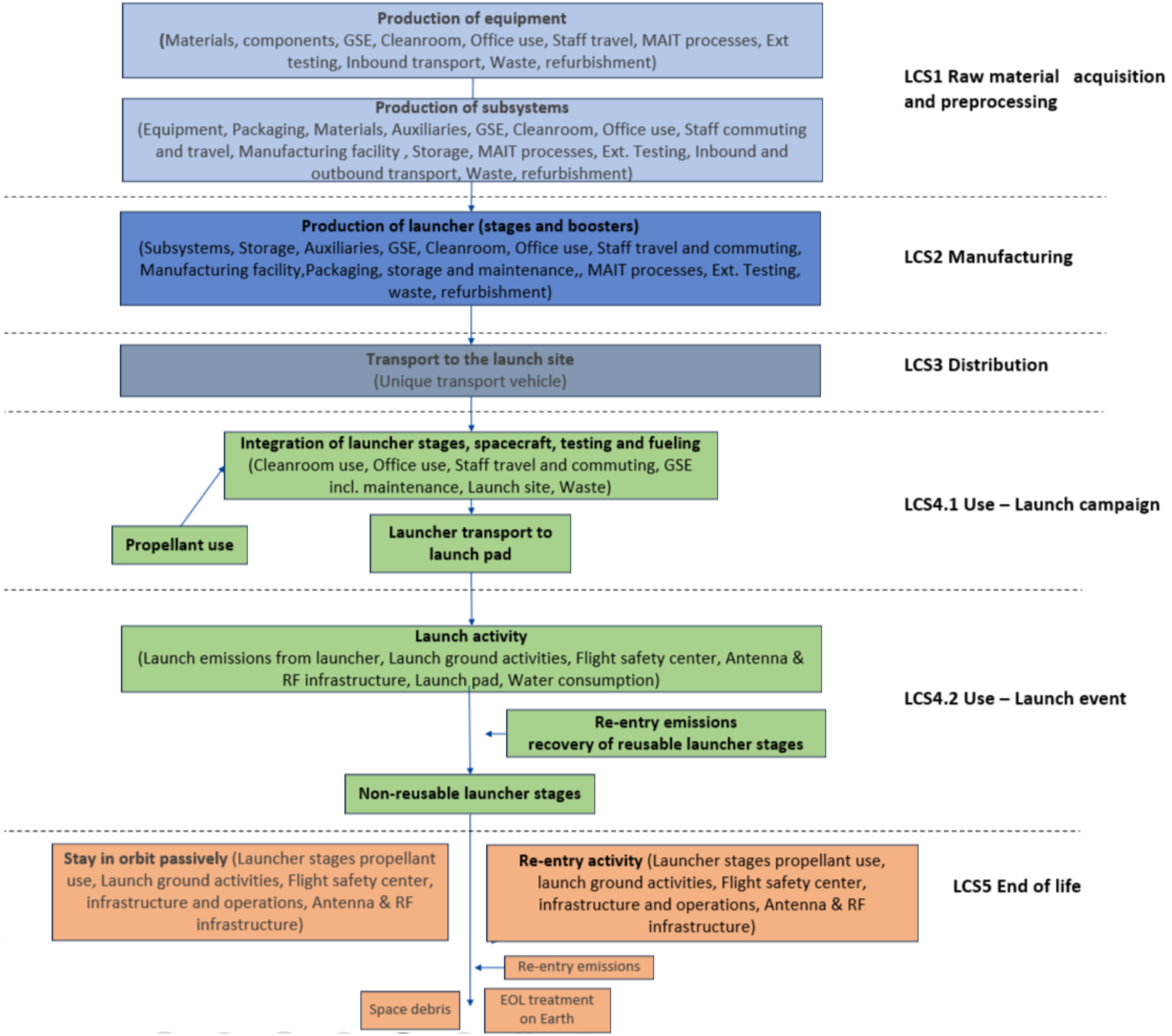
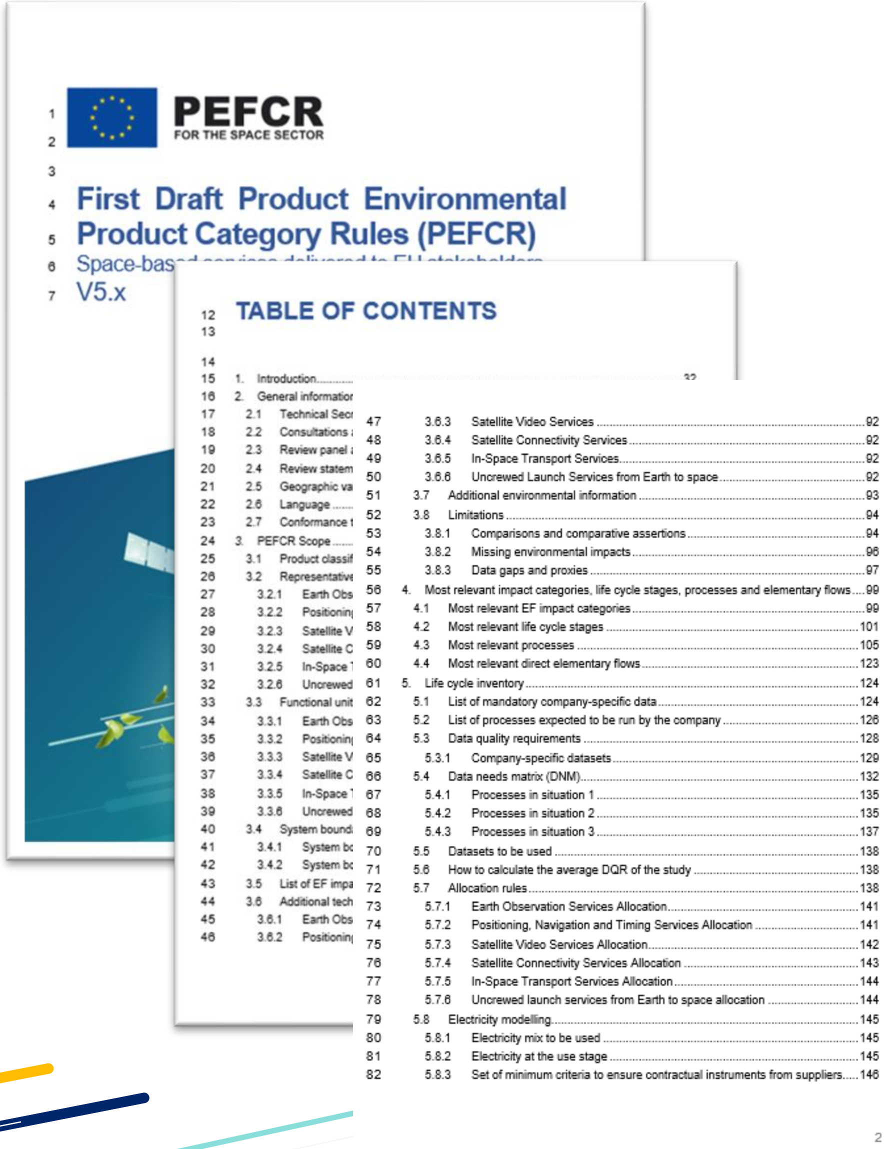


# First draft PEFCR4Space: System boundaries - LAUNCHER



# First draft PEFCR4Space: **Focus**



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First Draft Product Environmental Product Category Rules (PEFCR)
Space-bas...
V5.x

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- 1. Introduction: guidance to the reader

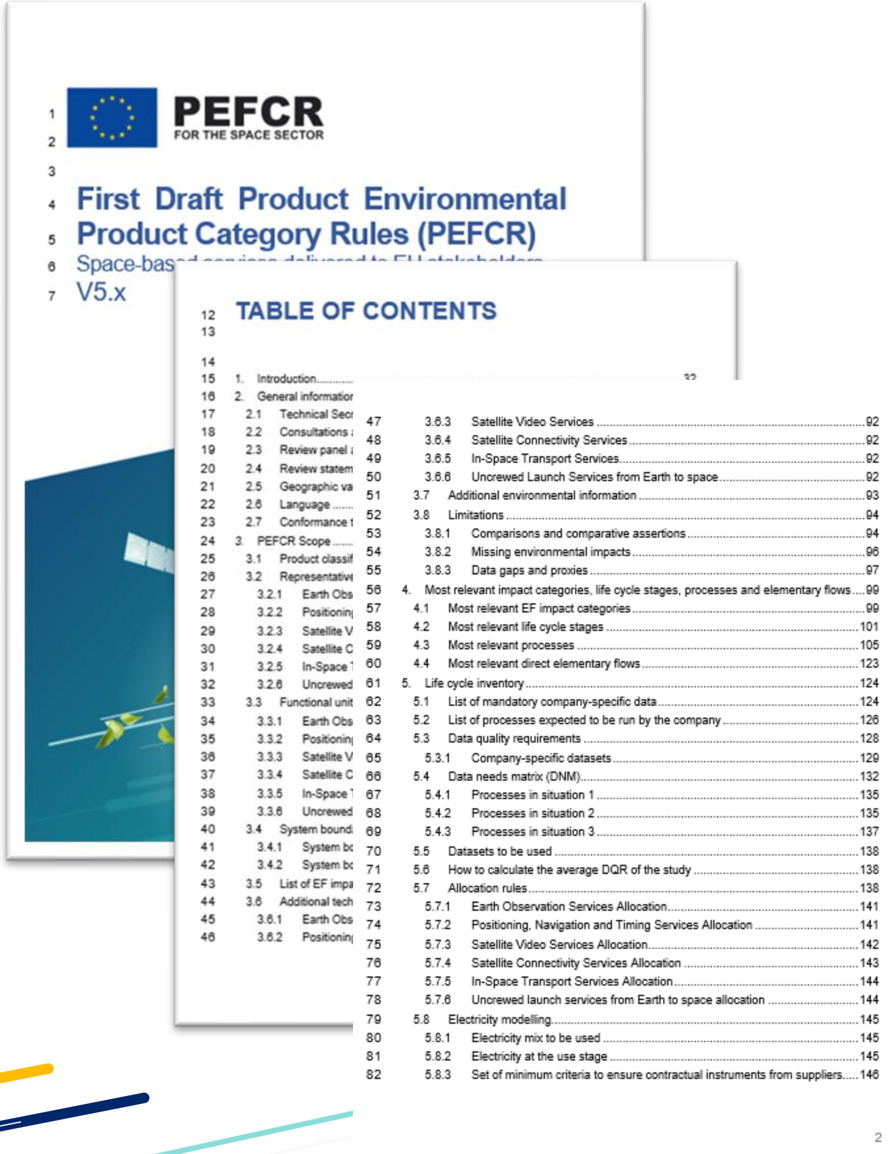
**Focus on modelling rules**

**Clear, complete, do you agree?**

**Main questions for feedback**

- Grey text: additional information for the reader and requests for feedback on detailed questions

# First draft PEFCR4Space: Current limitations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Some discussions are still ongoing (e.g. emissions from cleanroom)

Some minor modelling gaps are still to be filled in (e.g. end of life modelling)

(explained in grey text, input is highly welcome)

The modelling of the market average services

- Limited to the data received
- Annex 4.2: details on data limitations

# First draft PEFCR4Space: Current limitations

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| Market average: | No | Yes | Yes | Yes | Yes | Yes, for 4 ΔVs |
| Market average: modelling (Annex 4.2) | No market average, but two case studies:<br>- CO2M mission<br>- Altius mission<br>System boundaries: LCS1, LCS2 and part of LCS4 are modelled with primary data. LCS3 with proxy launch data, LCS5 only fuel. | No market average modelled due to the absence of data for global navigation satellite systems | One market average video satellite.<br>System boundaries: LCS1, LCS2 and LCS3 are modelled partly based on primary data. LCS 4 and 5 is based on proxy data. | Market average is only partly modelled.<br>System boundaries: LCS1, LCS2 and LCS3 are modelled partly based on primary data. LCS 4 and 5 is based on proxy data. | Market average with single use and multi use OTVs with chemical propulsion.<br>System boundaries: LCS1 and LCS2 are modelled with primary data. LCS3 with proxy launch data and LCS4 proxy fuel use. No LCS5. | Market average is only partly modelled with a mix of large + micro launchers.<br>System boundaries: LCS1, LCS2, LCS3 and LCS4 are modelled with partly primary data. No LCS5. |
| Results | No benchmark<br>**First hotspot results** | No benchmark<br>No hotspot results | **First benchmark results**<br>**First hotspot results** | No benchmark results<br>**First hotspot results** | **First benchmark results**<br>**First hotspot results** | **First benchmark results**<br>**First hotspot results** |

**Remaining gaps and limitations in data will be resolved in the second draft of the PEFCR4Space**

# Main questions for the reader (1. Introduction)

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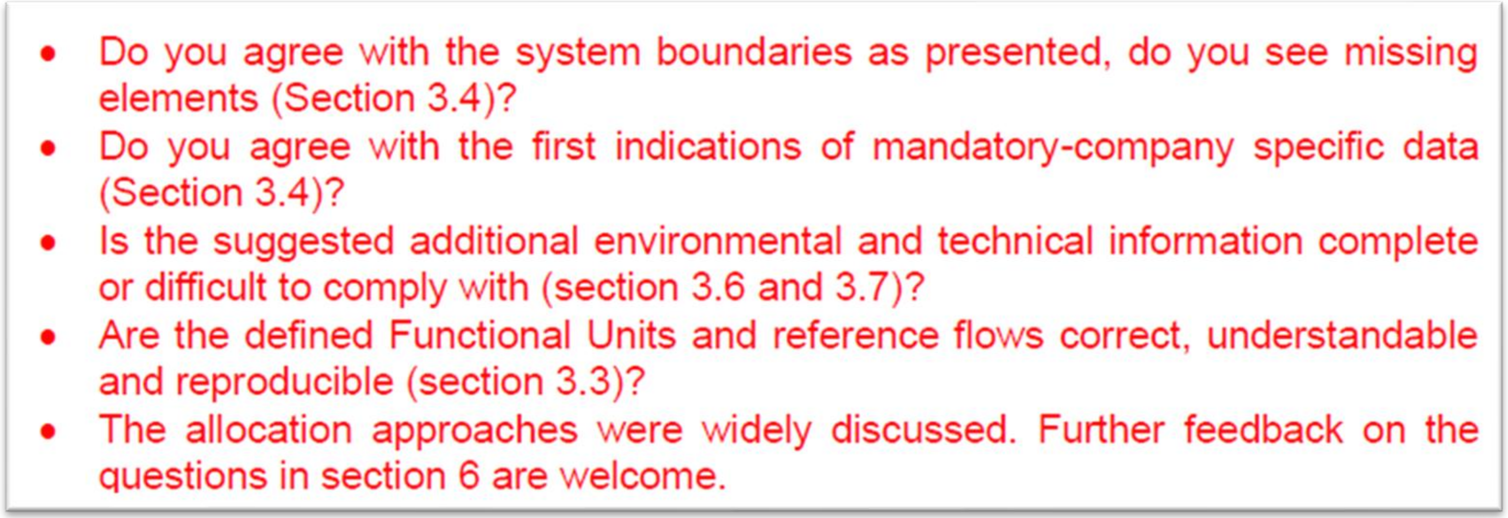
**If your time is limited or you like to focus on the most crucial points.**

We ask for explicit feedback on the following:



- Do you agree with the system boundaries as presented, do you see missing elements (Section 3.4)?
- Do you agree with the first indications of mandatory-company specific data (Section 3.4)?
- Is the suggested additional environmental and technical information complete or difficult to comply with (section 3.6 and 3.7)?
- Are the defined Functional Units and reference flows correct, understandable and reproducible (section 3.3)?
- The allocation approaches were widely discussed. Further feedback on the questions in section 6 are welcome.

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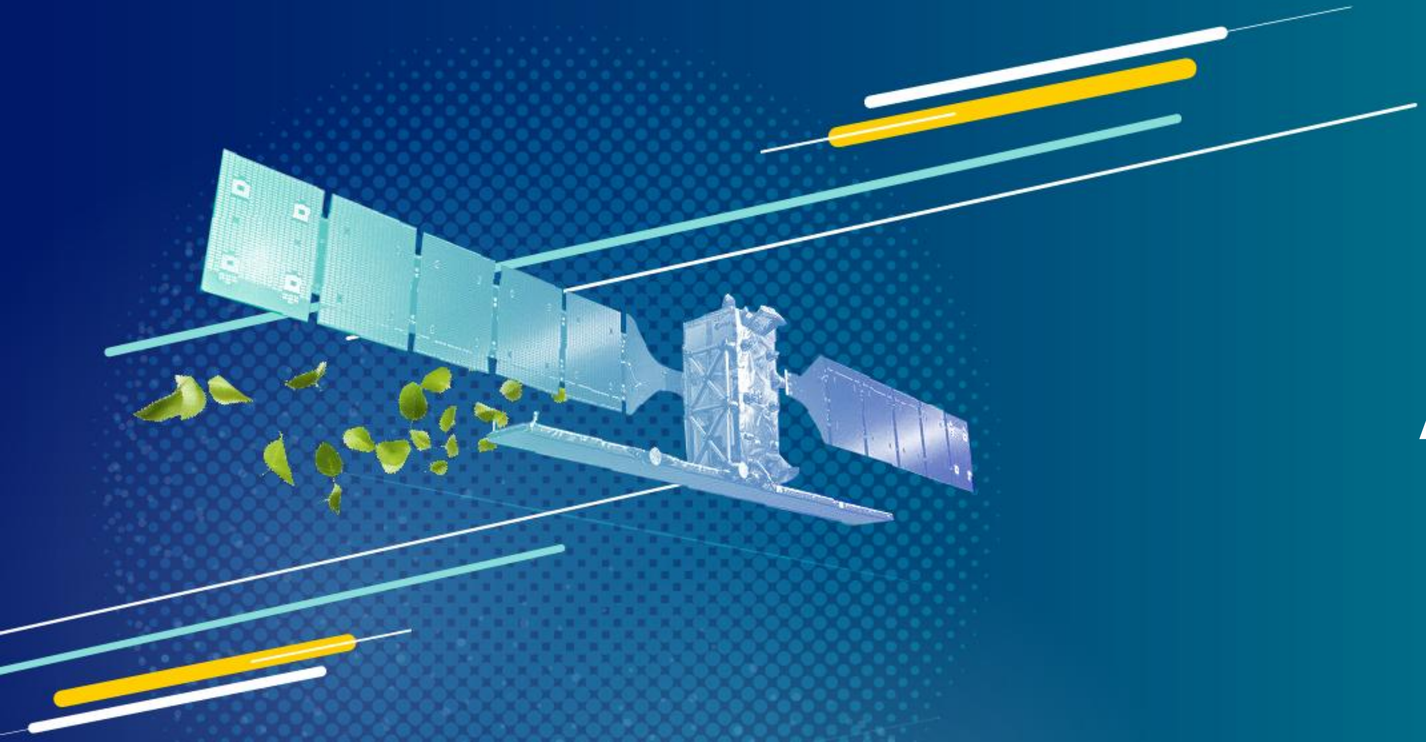

# Any questions?

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# HOW TO GET INVOLVED

**Sept-Oct 2024**
First call for expression of interest

**Jun-Sept 2025**
Open call to participate in the supporting studies

**Oct-Dec 2025**
Open consultation on the first draft of PEFCR4Space

**Jun-Aug 2027**
Open consultation on the second draft of PEFCR4Space

2024 — 2025 — 2026 — 2027

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Learn more at PEFCR4Space
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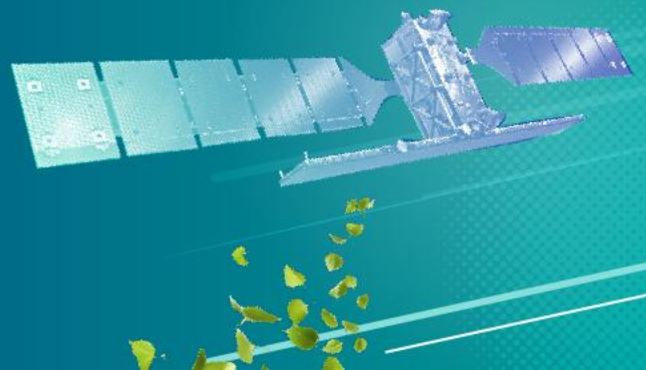
# Thank you!

**Contact us** pefcr4space@vito.be

**Follow us**



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