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Environmental sustainability of EU space activities

BEREC external workshop on environmental footprint of satellite constellations, 25/09/2025

BBC Science Focus

News Future tech Nature Space Health Everyday science Pla

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Can space exploration be environmentally friendly?

One SpaceX rocket launch emits 112 tonnes of refined kerosene.

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By Alexandra Franklin-Cheung

https://www.sciencefocus.com/science/environmentally-friendly-space-travel

ion Sport Culture Lifestyle The Guardian Eur

Wildlife Energy Pollution

Scientists call for action to address air pollution from space launches

Satellite mega-constellation missions behind threefold increase in emissions of climate-altering soot and CO_2

https://www.theguardian.com/environment/2025/aug/22/scientists-call-for-action-air-pollution-space-launches

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Commercial space race comes with multiple planetary health risks

Sean Mowbray

22 Jul 2025 Global Planetary Boundaries

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https://news.mongabay.com/2025/07/commercial-space-race-comes-with-multiple-planetary-health-risks/

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SPACE

The world's next big environmental problem could come from space

To stop them from becoming space junk, satellite operators send spacecraft to burn up in the atmosphere at mission's end. The environmental impacts are still uncertain.

By Tereza Pultarova December 9, 2024

https://www.technologyreview.com/2024/12/09/1108076/satellite-reentry-atmospheric-pollution/

abc NEWS Live Video Shows Shop

How global warming could threaten satellites, according to new study

Space junk is a "persistent hazard," scientists say.

By Julia Jacobo
March 10, 2025, 4:21 PM

https://abcnews.go.com/US/global-warming-threaten-satellites-new-study/story?id=119551716

Space Traffic Management approach

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STM is defined as the means and rules to access, conduct activities in, and return from outer space safely, **sustainably** and securely.

STM relates to the following elements:

a) Space Situational Awareness (SSA) activities, including SST;

b) orbital debris mitigation and remediation;

c) management of space orbits and radio spectrum;

d) the **entire life-cycle of space** operations including launch phase, in-orbit operations of spacecraft, and end-of-life de-orbit operations;

e) re-entry phase of spacecraft (both controlled and uncontrolled).

IRIS² regulation

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Article 8

Environmental and space sustainability

1. The Programme shall be implemented with a view to ensuring environmental and space sustainability. To that end, the contracts and procedures referred to in Article 19 shall include provisions on:

(a) the minimisation of greenhouse gas emissions generated by the development, production and deployment of the infrastructure;

(b) the establishment of a scheme to offset the remaining greenhouse gas emissions;

(c) appropriate measures to reduce visible and invisible radiation pollution caused by spacecraft, and that can hamper astronomical observations or any other type of research and observations;

(d) the use of appropriate collision-avoidance technologies for spacecraft;

(e) the submission and implementation of a comprehensive mitigation plan regarding space debris before the deployment phase, including orbital positioning data, in order to ensure the avoidance of space debris by the satellites of the constellation.

2. The contracts and procedures referred to in Article 19 of this Regulation shall include an obligation to provide data, in particular ephemeris data and planned manoeuvres, to the entities in charge of producing SST information as defined in Article 2, point (10), of Regulation (EU) 2021/696 and SST services as referred to in Article 55 of that Regulation.

3. The Commission shall ensure that a comprehensive database of the Programme's space assets, containing, in particular, data relating to environmental and space sustainability aspects, is maintained.

4. The Commission shall adopt delegated acts, in accordance with Article 45, in order to supplement this Regulation by specifying the characteristics of, and establishing the methodology and the processes to maintain and update the database referred to in paragraph 3 of this Article.

5. The scope of delegated acts adopted in accordance with paragraph 4 shall be limited to:

(a) the space assets owned by the Union, as referred to in Articles 5(2) and 19(10);

(b) the space assets owned by the contractors referred to in Article 19, as referred to in Articles 5(4) and 19(10).

Environmental LCA is not new in the space sector. However…

- there's **not a common standard LCA applicable to the space sector full life cycle**
- applying it to overarching EU space systems / programmes may **trigger** the development of **high environmental standards** and **good practices within the EU space market**
- EC **legally recognized schemes** (e.g. PEFCRs) will be more and more required in the frame of the **Green Deal** *(eg. **Access to Finance, R&D funding**…)*
- To succeed, there's the need for **better harmonisation of LCA practices**, access to robust inventory data (**allowing comparability**) and advanced impact assessment models.

EU Space Act: a proposal for a set of “rules of the road”

Space is congested

- Collision avoidance services
- Trackability
- Debris mitigation plans
- Coordination: air traffic/maritime authorities

Space is contested

- Risk Assessment
- Key Risk Management Measures:
  - Detection
  - Protection
  - Business Continuity
  - Supply Chain Measures

Building on NIS 2 Directive

Earth and space are polluted

- Environmental Footprint Declaration
- Calculation rules of environmental impacts
- Common database to use for calculation data

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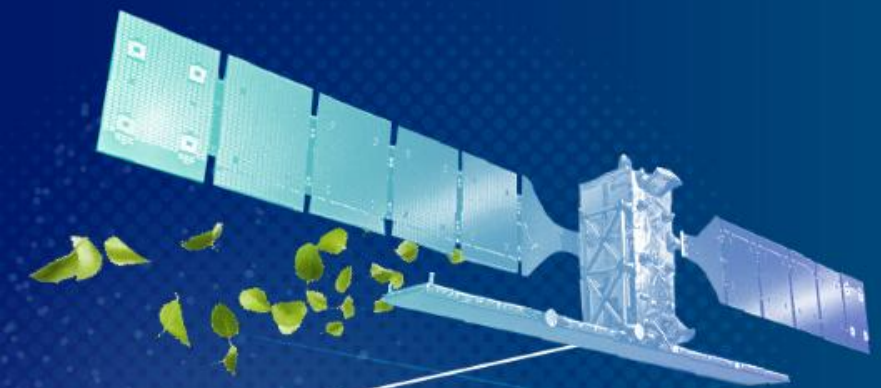
PEFCR4Space



Why PEFCR4Space matters?

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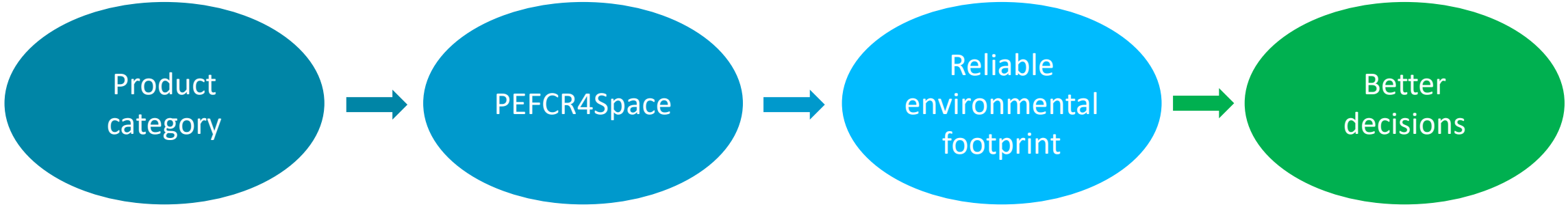
- Standardizes how to measure the environmental performance of a product (/service)
- Ensures transparent and comparable default data across similar product (/services)
- Helps businesses, policymakers and consumers make sustainable choices
- Supports EU sustainability, Ecodesign and Circular Economy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



Who develops PEFCR4Space?

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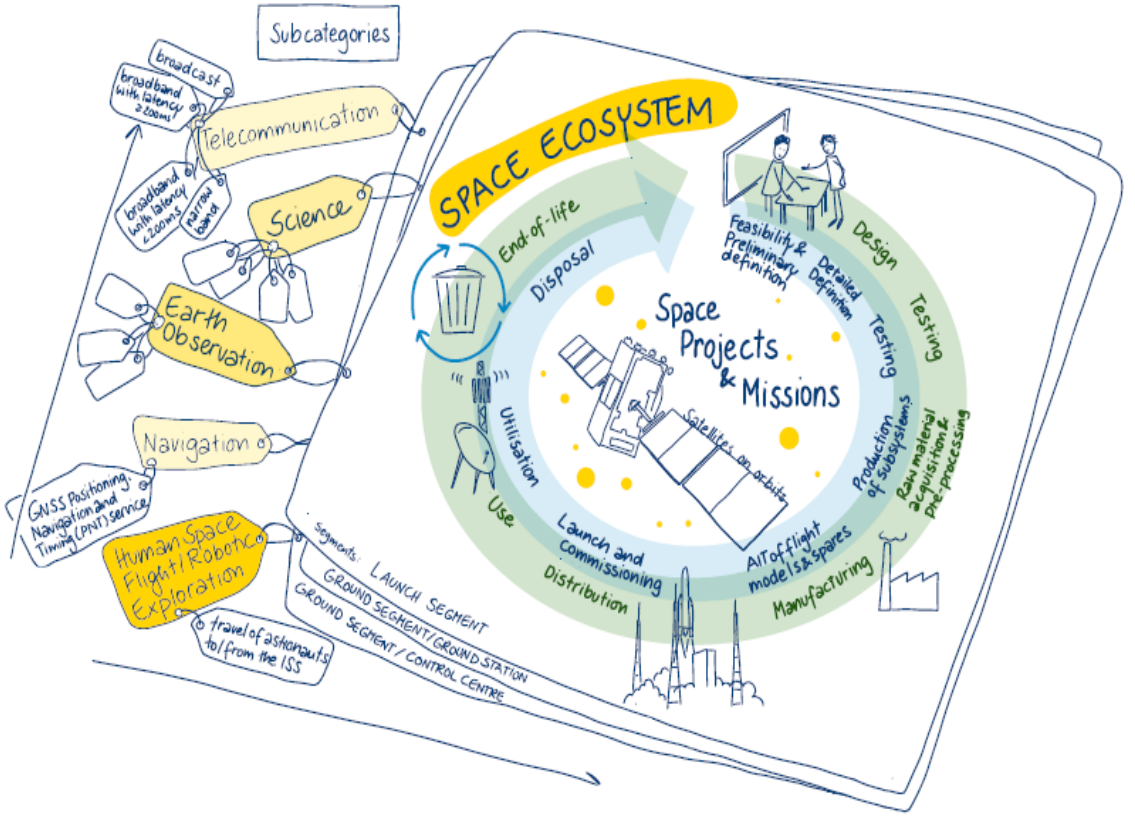
Representing **>56% of the total European market share**
(only considering launch, manufacturing, and operations)



Working Groups (TS members + external space experts):

- Earth Observation (EO)
- Positioning, Navigation, and Timing (PNT)
- Satellite communication (video & connectivity services)
- In Space Transport (IOT)

EU and ESA cooperation

ESA and EU active cooperation to harmonise practices and reduce burden on space industry. ESA involvement in all phases of PEFCR for space development.

Example: ESA - EC harmonised data collection questionnaire.

Note: even when ESA, EC requirements are different the questionnaire will be common and tailored for the scope of the different activities

Achieved Milestones

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November
Understood the technical requirements of the PEFCR.

December
Defined the PEFCR scope and the key subcategories within the space sector.

January 2025
Discussed the characteristics and representative products of each subcategory.

February
Modelled rules and data for the Life Cycle Stage 1 and 2.

March
Modelled rules and data for the Life Cycle Stage 3, 4, and 5.

April
Wrapped up the Life Cycle Stages, additional environmental and technical information.

May & June
Advanced data collection through the dedicated working groups.

July
Wrapped up the Life Cycle Stages, additional environmental and technical information.

September
Opened the expression to participate in the supporting studies.

PEFCR4space ROADMAP: next milestones!

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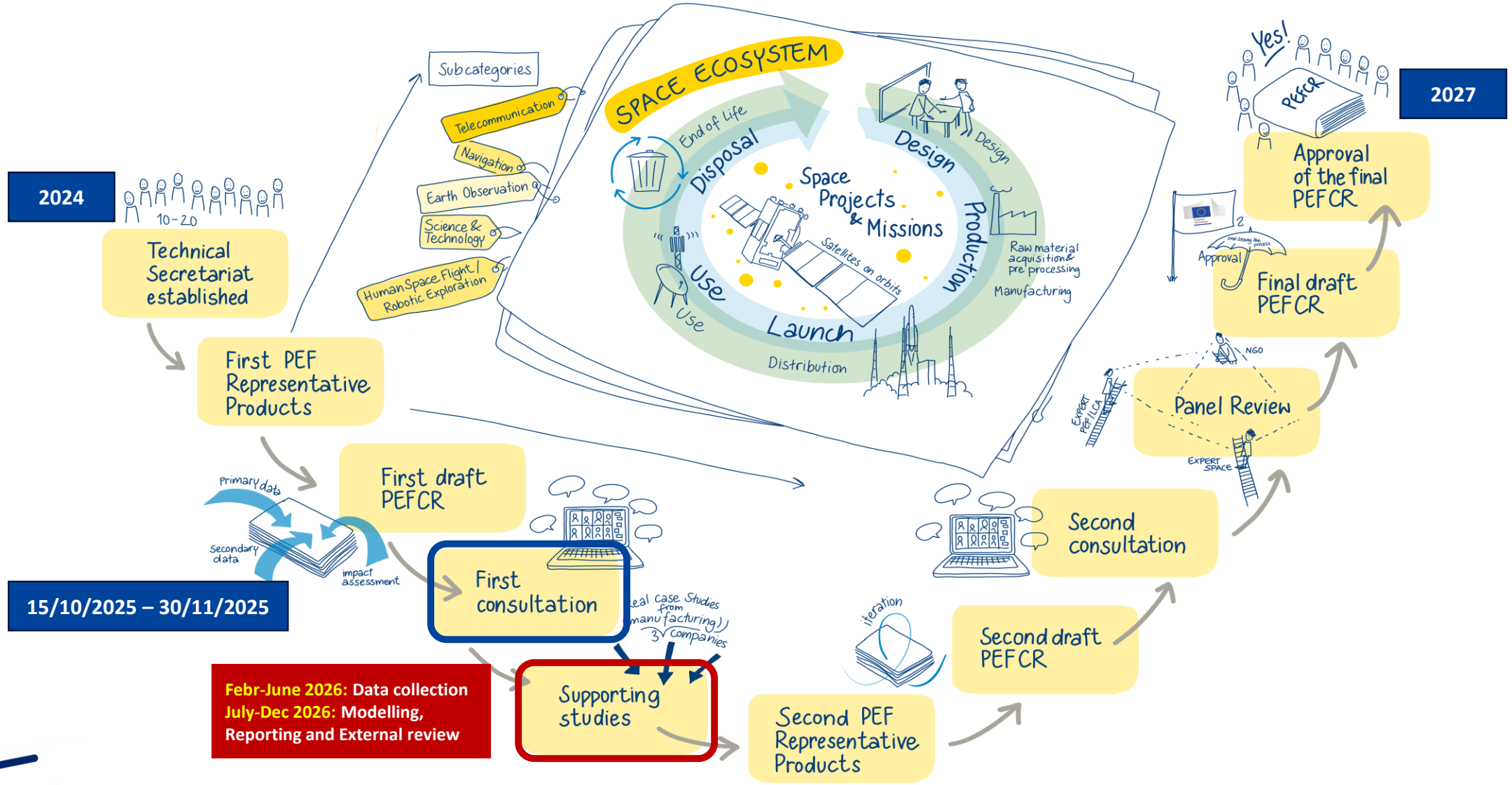

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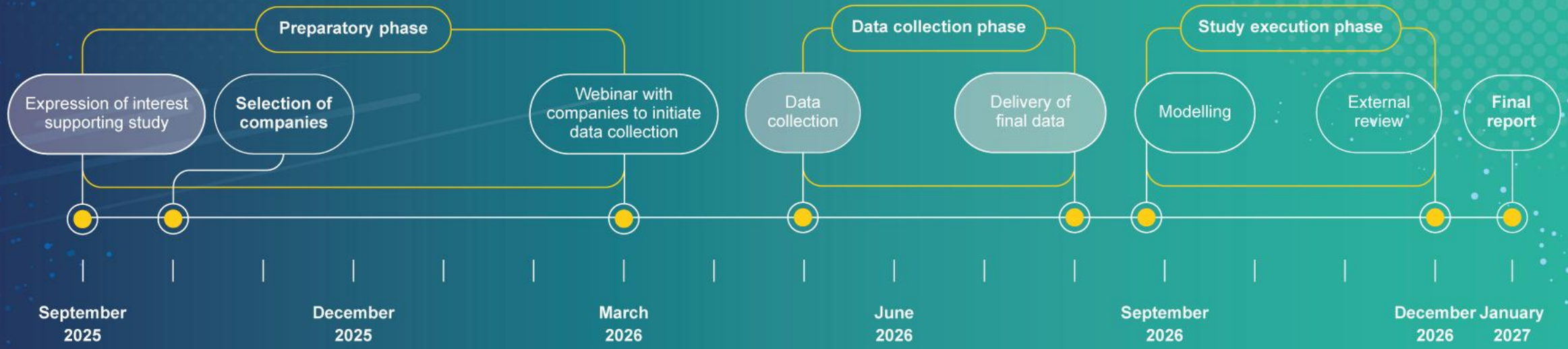
Have your say! Participate in the Supporting Studies

- Test and understand feasibility of modelling rules written in the draft PEFCR
- Provide feedback where roadblocks and implementation difficulties pop up
- Understand how your product's environmental impact performs in light of the PEFCR framework
- Provide valuable insights for the 2nd RP studies and 2nd draft PEFCR



#PEFCR4Space #EUSpace

Get involved!!!

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Supporting studies: Scan to apply!

Application period closes on 30 September!

Book in your calendar: First draft PEFCR4Space open consultation!

- Open consultation on first draft PEFCR for space **15 October to 30 November!**

- **Objectives of the First Draft PEFCR Public Consultation**
  - **Gather feedback** from a wide range of stakeholders (industry, NGOs, academia, public)
  - Ensure **transparency and inclusivity** in the development of the rules
  - **Identify gaps, ambiguities or missing data** requirements
  - **Refine the draft** ahead of pilot testing (supporting studies) and finalisation (PEFCR4Space 2027)

Thank you!

Contact us pefcr4space@vito.be

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