# The ESA Green Agenda
## *Building bridges between organizational GHG assessment and environmental footprint at system level*

**Cleanspace Industry Days**
**16-19 October 2023**

ESA - Climate and Sustainability Office
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Follow CSR Team at ESA - Responsibility & Sustainability

# Agenda

1. Engagement towards sustainability in the **ESA Agenda 2025**
2. **ESA Green Agenda** - From strategy to action
3. **GHG Assessment of ESA** – Baseline 2019
4. **Complementarity** on the approaches
5. **Focus on methodologies**
6. **Take-home messages**

# 1. Two lines of action in the ESA Agenda 2025

## 1 Increase the contribution of space projects to the sustainable development of society

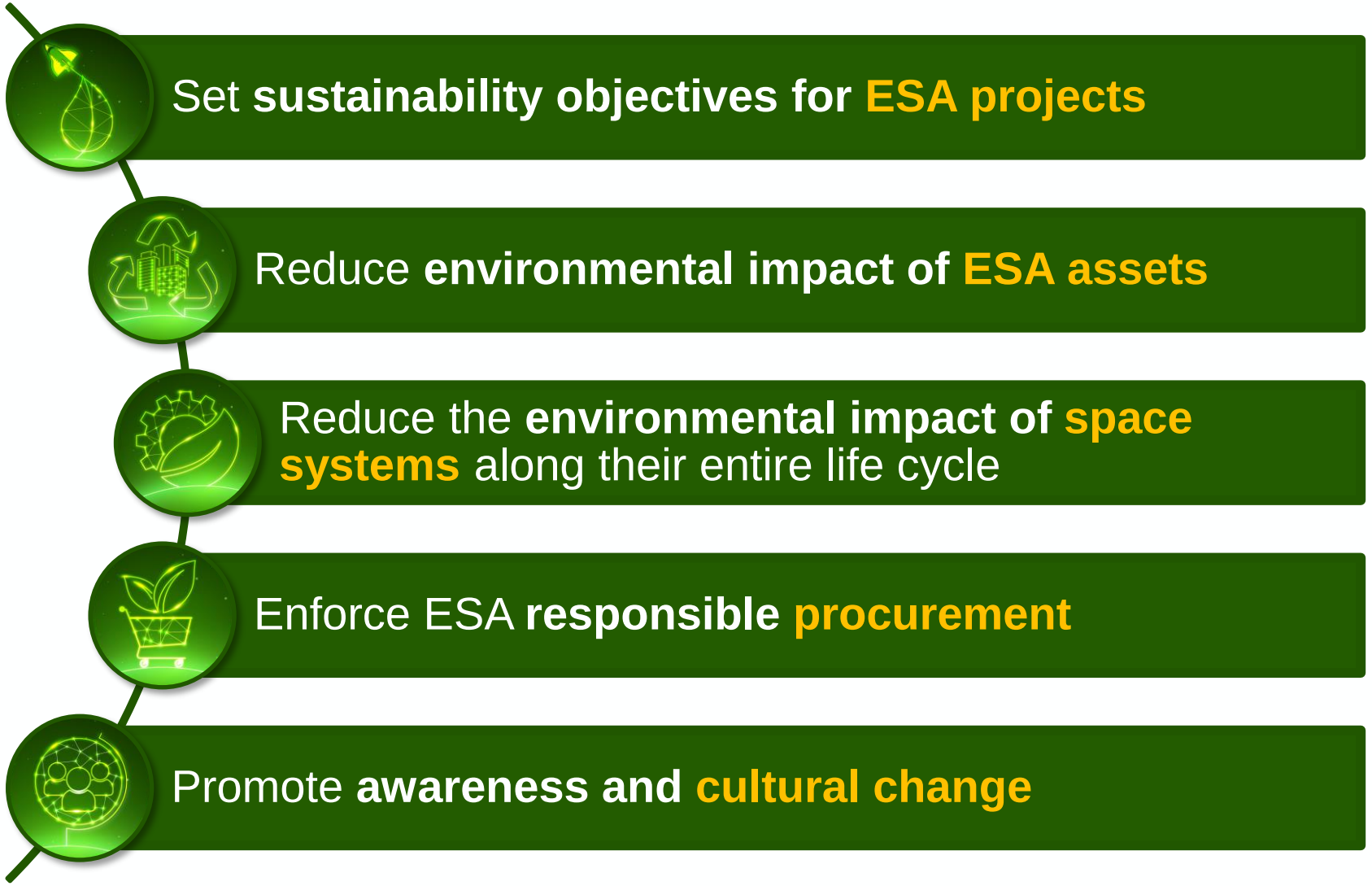
"(…) ensure that ESA and European space programmes can support the **implementation** of the **Paris Agreement and the European Green Deal** to the fullest extent."

## 2 Improve the socially & environmentally responsible management of space sector activities

"The Agency will improve its own environmental responsibility, to contribute to the climate neutrality of Europe." **By 2030, ESA's GHG emissions will be decreased by 46.2% for Scope 1,2 and by 28% for Scope 3** compared to 2019*."

# 2. ESA Green Agenda- from strategy to action

To achieve the Agenda 2025 targets, the **ESA Green Agenda** contains actions in five different areas that will lead to a **more sustainable Agency**



# 3. ESA GHG Assessment | Baseline 2019

The **vast majority of ESA's emissions come from Scope 3** (91%)

The majority of carbon impacts are the result of **projects funding and purchases** (69%)

***Color code – Project phases***

Cross-cutting activities | Core business activities | Use | Not relevant for ESA

**Upstream activities** — *« Upstream Scope 3 »*

**Company's activities** — *« Scopes 1 & 2 »*

**Downstream activities** — *« Downstream Scope 3 »*

**Upstream freight**
(Cargo launches)

**Travel**
Business travel
Commuting employees

**Mobile sources**
(Car fleet, launches from CSG)

**Leased assets***
(External laboratories power consumption)

Downstream freight

**Capital assets**
(Buildings, vehicles, IT equipment, ground stations ...)

**Purchases**
(Purchase of goods and services)

**Buildings**
(Fossil fuel consumption, electricity consumption, Refrigerant gas leakages)

**Processing** and **Use of sold products**
(Use of space systems)

**Waste** generated in operations
End-of-life of products

**69%**

# 4. Two complementary approaches towards ESA sustainability targets (Agenda 2025)

- ✓ Over **global life cycle**
- ✓ Inputs from industrial partners
- ✓ Inputs from specialized databases

- ➢ Define programs **environmental hotspots**
- ➢ Set **ecodesign key activities** roadmap
- ➢ Ecodesign as main lever for ESA Green Agenda


- ✓ Over **one year business** activity
- ✓ Inputs from ESA site
- ✓ Inputs from space systems/programs E-LCA

- ✓ Define **main organizational hotspots**

- ✓ Set ESA corporate targets for environmental protection / decarbonization trajectory

# 5.a. Methodological focus
# Emissions from ESA projects funding and purchases

Note: All ESA contracts placed in 2019 were considered

Note: Similar approach for **capital goods** emissions evaluation

**Calculation of Emissions factor**

Building **generic categories** with available **E-LCA** (kgCO2eq.)

**Price or cost** of the project (€)

$$Ratio_{ategory} = \frac{\mathrm{kgCO_2e}}{€}$$

**Activity data**

**Purchases record** 2019 (€ in 2019)

Project : x € in 2019

Each project is associated to a generic category

$$\mathrm{Emissions}_{project} = €^{2019}_{project\ P} \times Ratio$$

**STRENGHTS**

- ✓ First version of the methodology
- ✓ Use space specific data from ESA LCA
- ✓ Lower uncertainty on purchases emissions

**IMPROVEMENTS**

- X Refinement
- X Integrating new LCA results
- X Deepdive with main industrial partners

# 5.b. Methodological focus
# Emissions from processing of space programs & activities

## A 3-Step Approach

### Develop methodology to estimate downstream avoided/induced emissions

- Develop a **generic methodology** for estimating the **avoided and induced emissions** of a satellite downstream application

### Perform developed methodology on 2 case studies

- Perform the developed methodology on the application of **Oil Spill Monitoring for Sentinel-1**

- Perform the developed methodology on the application of **Variable Rate Application for Sentinel-2**

### Overview of Sentinel-1-2 downstream applications

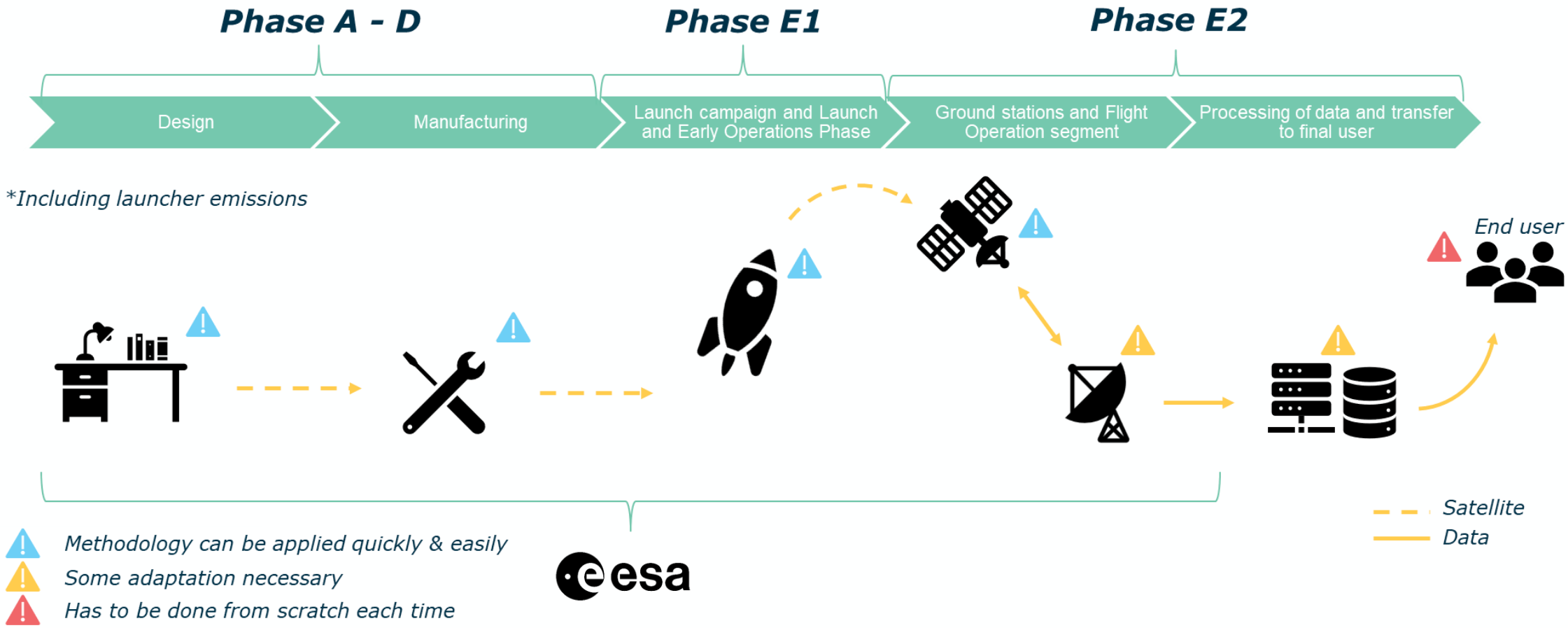
- **Identify** all Sentinel-1 and Sentinel-2 **downstream applications**
- Perform **qualitative evaluation** of impact on **climate**
- Perform **qualitative evaluation** of impact on **environment**

### Strategic Recommendations

- Actions to reduce GHG emissions
- Actions that help ESA better assess their carbon footprint and maximize sustainability and climate action

# 5.c. Methodological focus
# Emissions from processing of space programs & activities

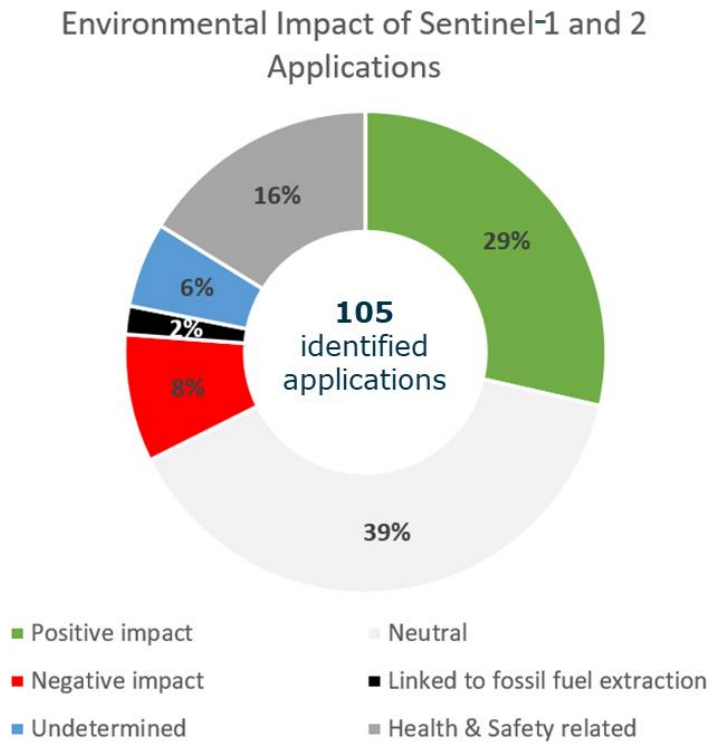
The Sentinel-1 and 2 programs can be split up into contractual phases as follows according to ESA Space Systems LCA handbook:



# 5.d. Methodological focus
# Emissions from processing of space programs & activities

Out of the 105 identified applications, 68% have a positive or neutral impact on the climate.

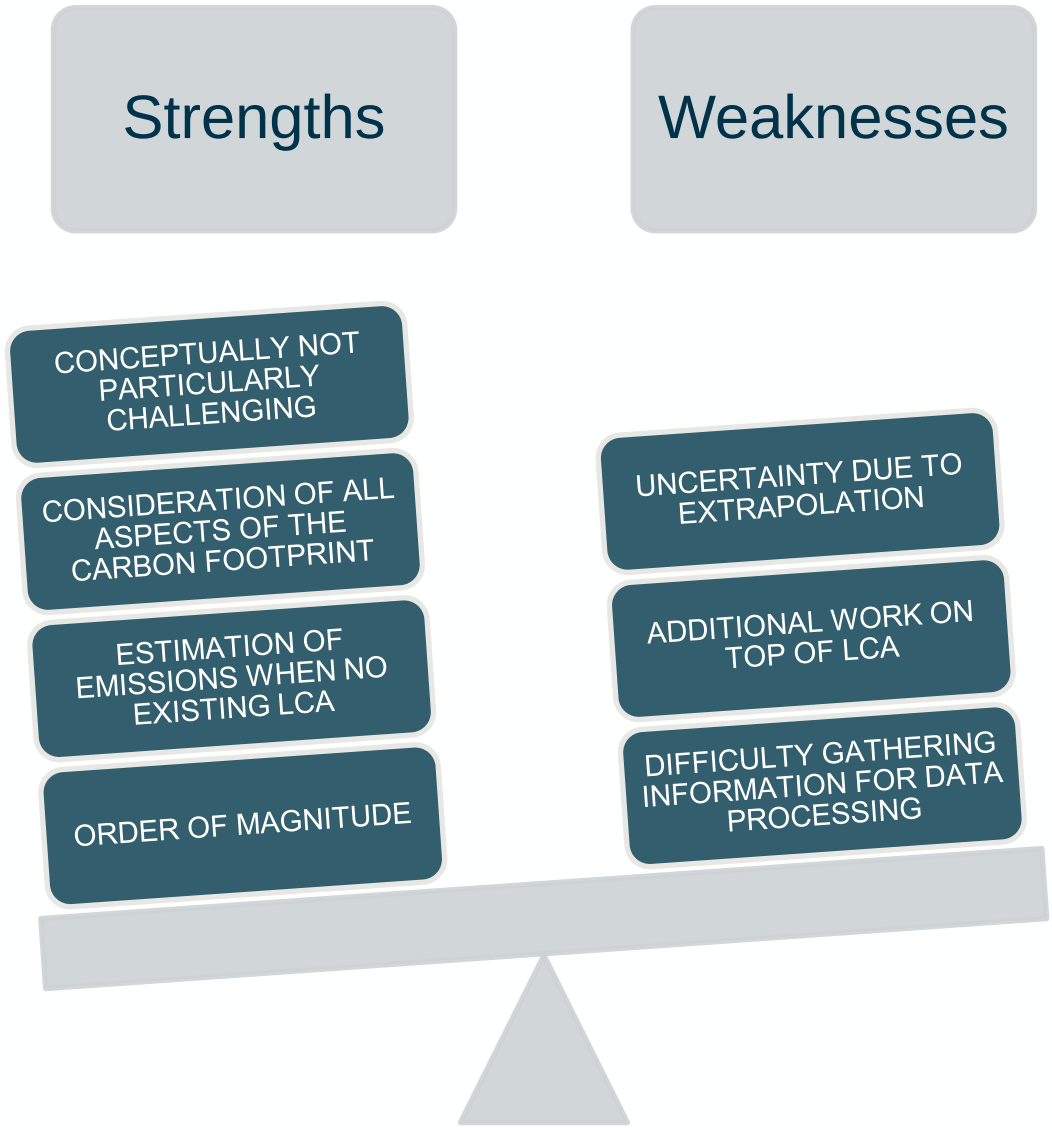
Most of them contribute to at least 1 SDG.




## Groups of Applications & Their Positively Influenced SDG

| | |
|---|---|
| Agriculture | Fisheries and aquaculture |
| Aviation and drones | Forestry |
| Biodiversity, ecosystems, and natural capital | Infrastructure |
| Climate services | Insurance and finance |
| Consumer solutions, tourism and health | Maritime and inland water |
| Emergency, management and humanitarian aid | Rail |
| Energy and Raw materials | Road and automotive |
| Environmental monitoring | Urban development and Cultural Heritage |

# 5.e. Methodological focus
# Emissions from processing of space programs & activities

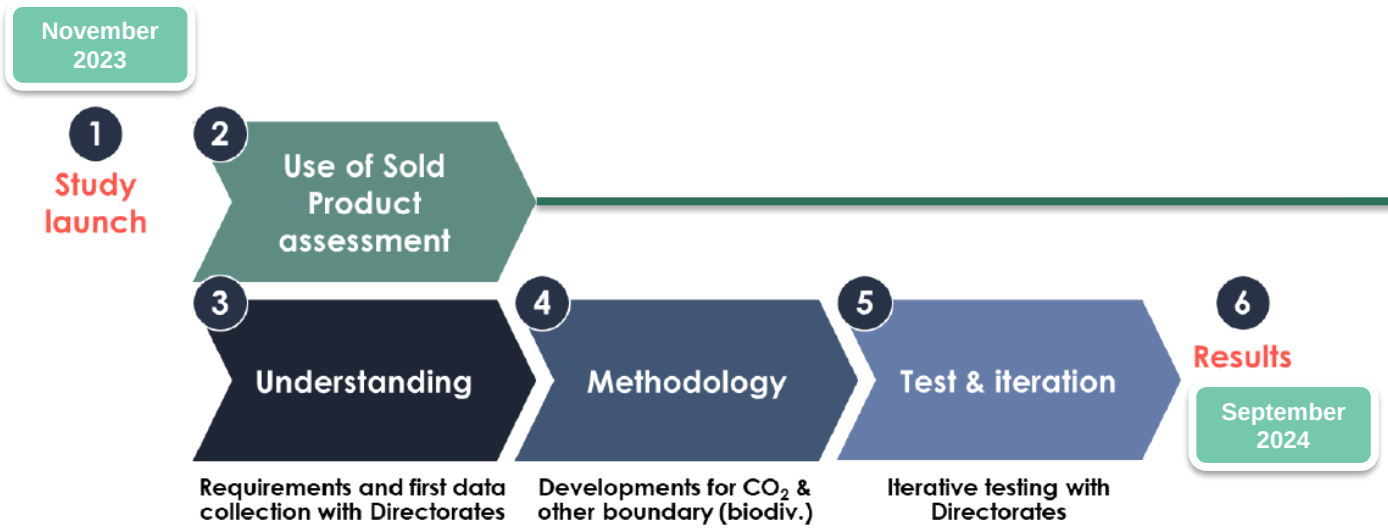



## RECOMMENDATIONS

- Uncertainty can be improved by performing a LCA of the studied satellites.
- Extremely important to be careful about the phases that are extrapolated and the phases that are estimated individually.
- Important to understand what will have an impact and what can be neglected to avoid doing some additional work for a low impact in the carbon footprint results.
- Collection of information concerning the processing of the data can be improved with internal expertise and a stable architecture.

# 5.f. Methodological focus
# Emissions from processing of space programs & activities

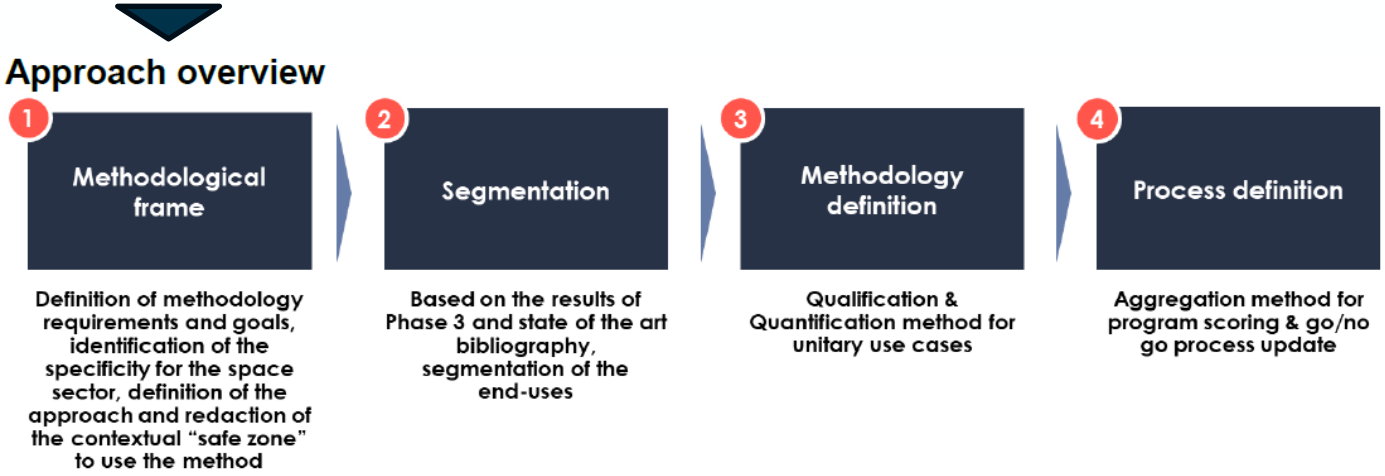
## Refinement of Methodology -> Scoring method robustness




**Focus on Use of Sold product (Scope 3)**

**Expected results of the assessment:**

- Description of the requirements for ESA's GHG assessment, compliant with the GHG Protocol
- Methodological note explaining the requirements and synthesising the output of the previous studies



# Join us on the Planetary Boundaries Fresk

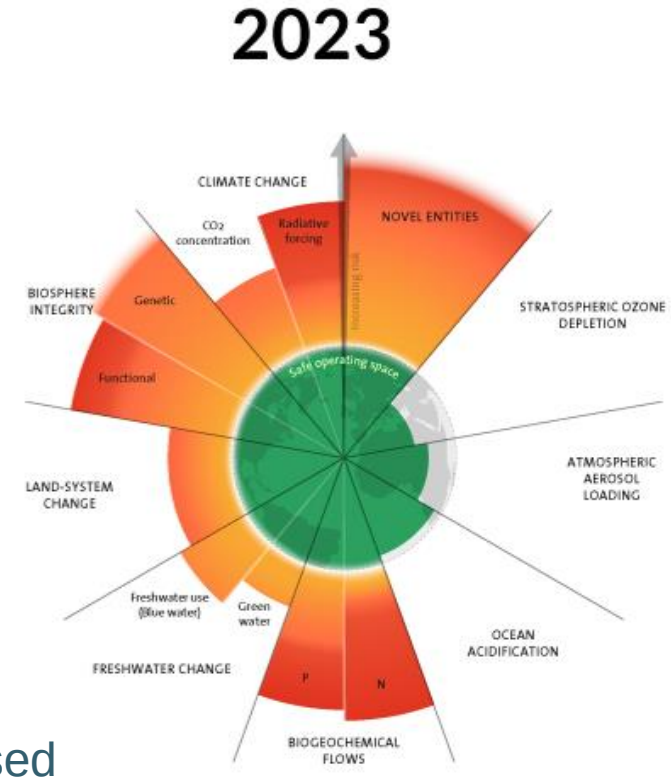
**Want to learn more about Planetary Boundaries ? Join us for a collaborative on-site fresk session !**

What is this Fresk about? The planetary boundaries concept presents a set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come. These boundaries are interrelated processes within the complex biophysical Earth system.

**When: 19th October 2023 – 9h30 / 12h30**

**Where:** ESTEC-NA213

**How: Please register directly to Aurélie GALLICE-TANGUY**




Scientific literature available : HERE
Last update from 2023 ➔ 6/9 boundaries crossed

# TAKE-HOME MESSAGES

**LCA and organizational GHG assessment are complementary methodologies**. Together it allows:

- Complete global standard GHG assessment reporting perimeter
- Lower the uncertainty of calculation of the GHG assessment Scope 3 emissions categories so called “Purchase of goods and services “ and “Use of sold products”
- Identify right levers at corporate levels
- Put into lights environmental impacts knowledge gaps
- Build a comprehensive sustainability policy at corporate level (better link CSR and eco-design targets)

**European space sector have built an extensive knowledge on environmental impacts of all space segment but results are fewly accessible**

- Better access to LCA results would benefit academia and industry for research and/or reporting purpose
- Could leverage funds for innovation in order to develop eco-design key targeted projects
- Could leverage collaboration at academia/industry level


# Thank you!

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