



Reference:

E. Tormena, *Ecodesign at ESA*, 4th ESA REACH Workshop, ESA HQ Daumesnil, Paris, 18th October 2022

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ESA 4th REACH Workshop

ESA Clean Space - Ecodesign Team

18/10/2022

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United Nations



General Assembly

Committee on the Peaceful
Uses of Outer Space

Scientific and
Technical
Sub-Committee
on the
Peaceful
Uses of
Outer Space
Fifty
Fifth
Session
Vienna
2019



27.3 States and international intergovernmental organizations should **promote the development of technologies that minimize the environmental impact of manufacturing and launching space assets** and that maximize the use of renewable resources and the reusability or repurposing of space assets to enhance the long-term sustainability of those activities.



ESA Agenda 2025

ESA Director General's Agenda 2025 reiterated that **making ESA “a greener organisation”** is a **priority**, to support the implementation of the Paris Agreement and the European Green Deal to the fullest extent

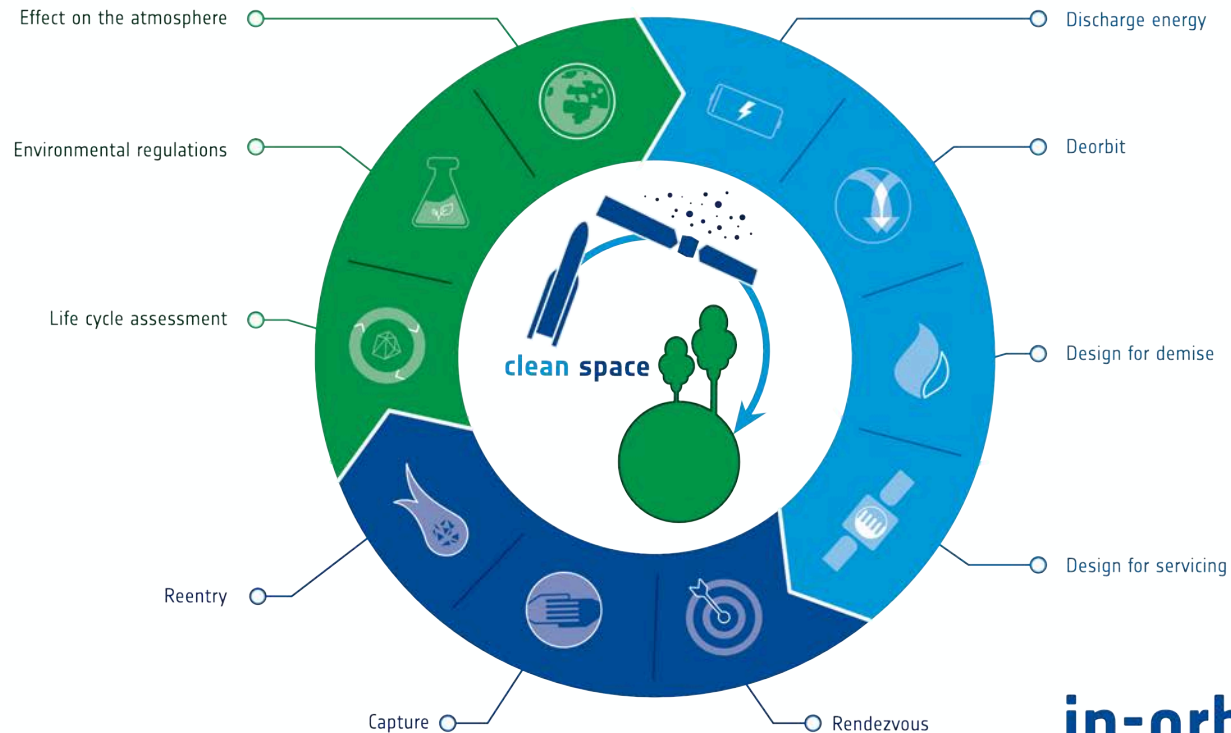


ecodesign

→ REDUCING IMPACTS

management of end of life

→ SPACE DEBRIS REDUCTION



in-orbit servicing

→ ACTIVE DEBRIS REMOVAL

Clean Space

ecodesign

→ REDUCING IMPACTS

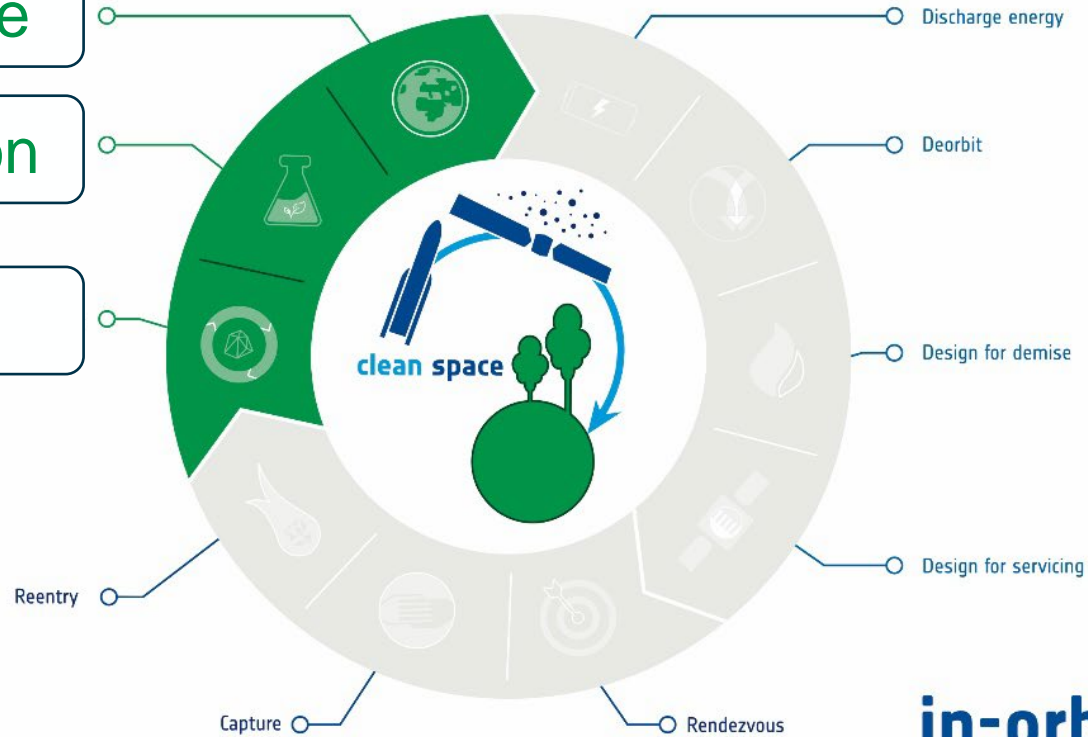
Effect on the atmosphere

Environmental Regulation

Life Cycle Assessment

management of end of life

→ SPACE DEBRIS REDUCTION



in-orbit servicing

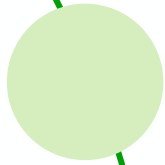
→ ACTIVE DEBRIS REMOVAL

EcoDesign Branch



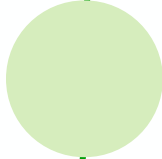
EcoDesign

Is necessary to understand how much space activities pollute on Earth and to identify alternatives to reduce the environmental impacts



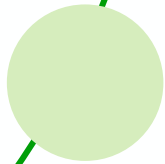
LCA (Life Cycle Assessment)

Assessing the environmental impacts of the whole life cycle of the space missions



Eco-design

Identifying alternative processes or technologies that can be used to reduce these impacts



Environmental regulation

Finding alternatives to abide by legislations and avoid costly disruptions

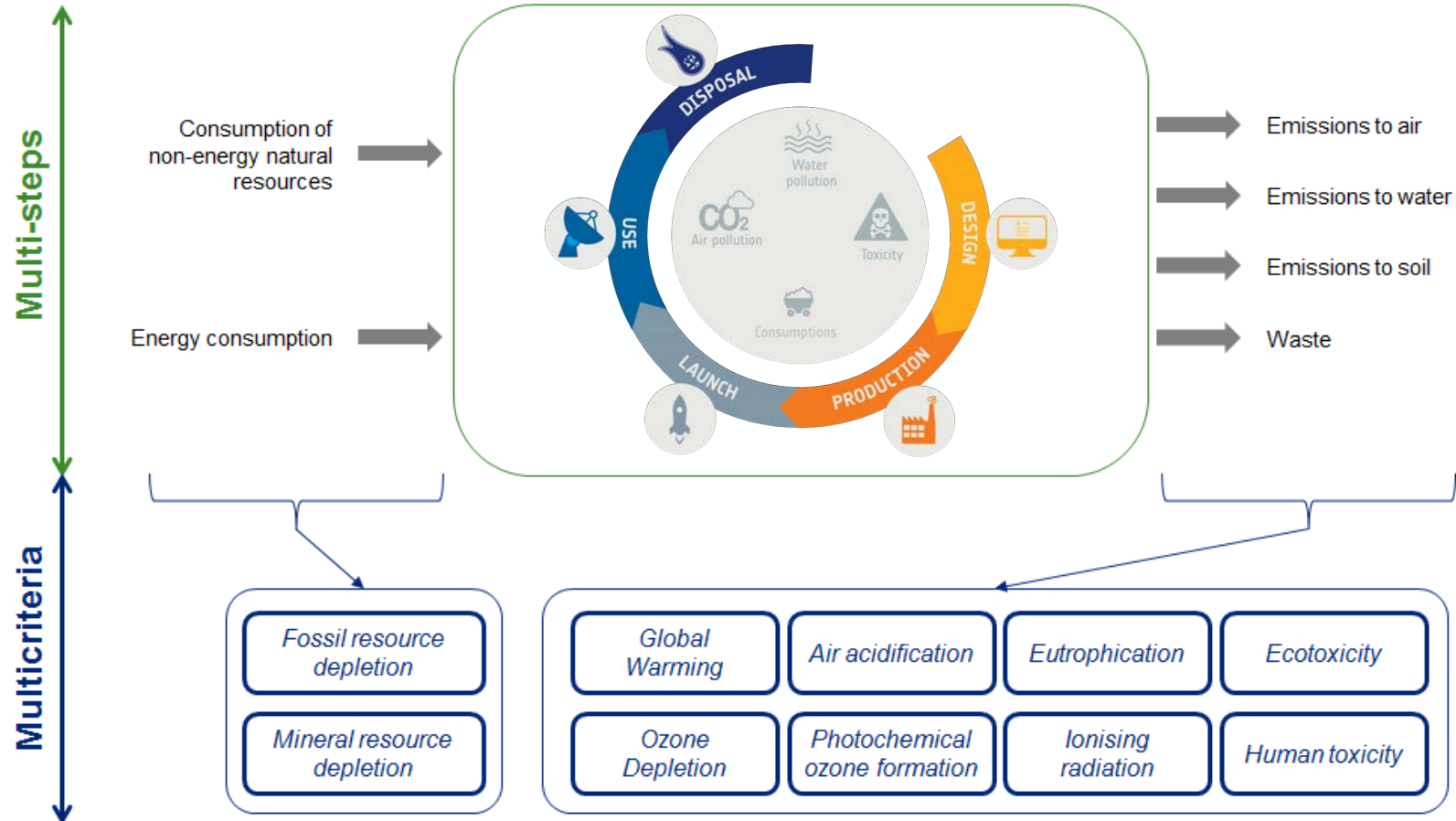
LCA is an ISO-standardised tool to quantitatively assess the potential environmental impacts of product, process or service

✓ **Multi-step analysis**

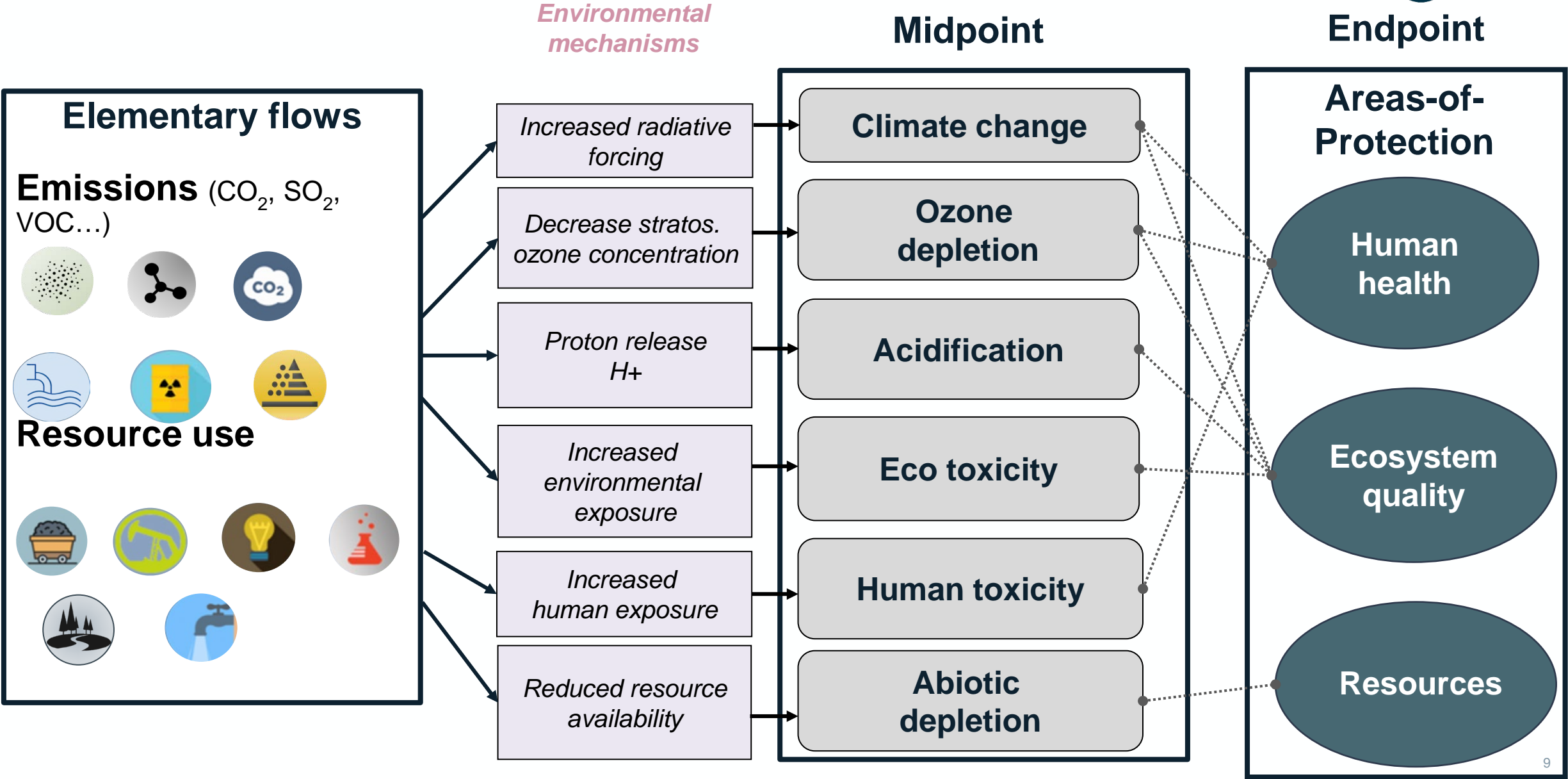
The environmental impacts are assessed across all stages of existence.

✓ **Multi-criteria analysis**

The outcomes are expressed with several quantified environmental indicators (impact categories).



LCIA Framework



Specificities of the space sector



Low production rates

Use of specific materials and components
not included in standard databases

Direct emissions into all layers of the
atmosphere

Specific and power demanding tests

Relatively short use phase

Long time needed for research and
development



**Adaptation of the LCA
had to be performed and
specific tools were
developed**

“Eco-design considers environmental aspects at all stages of the product development process, striving for products which make the lowest possible environmental impact throughout the product life cycle”

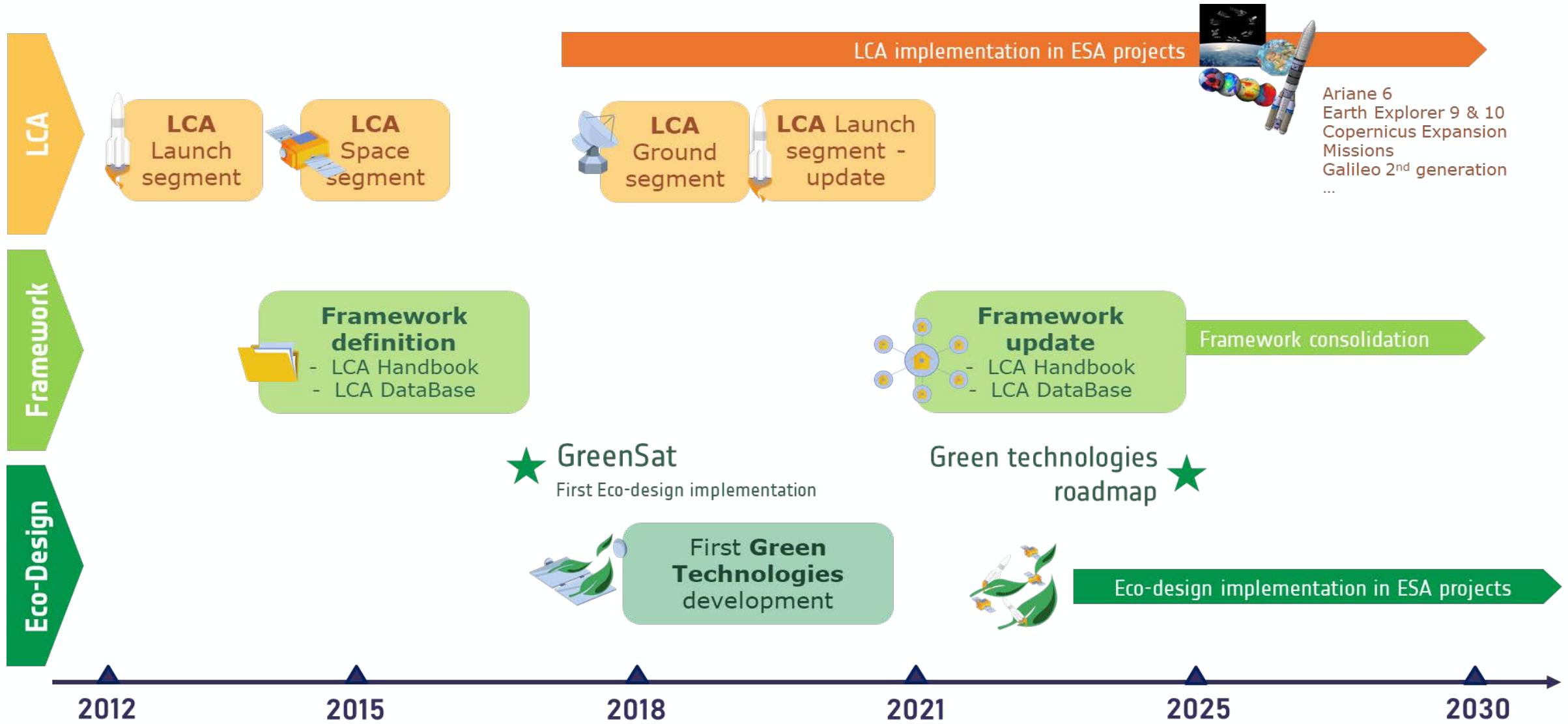
The main objective of eco-design is

- ✓ To **improve the environmental performances** of products and services through the assessment of their environmental impacts
- ✓ Starting from **the design phase** and this,
- ✓ **Without reducing their final quality or performance.**

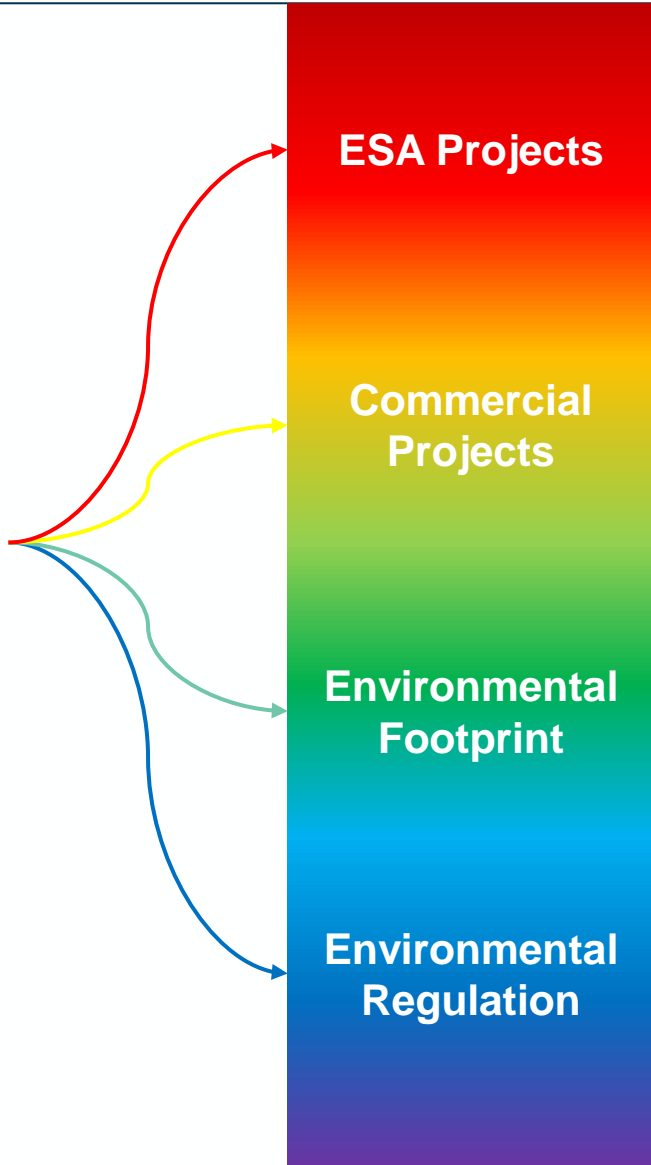
ecodesign

→ REDUCING IMPACTS

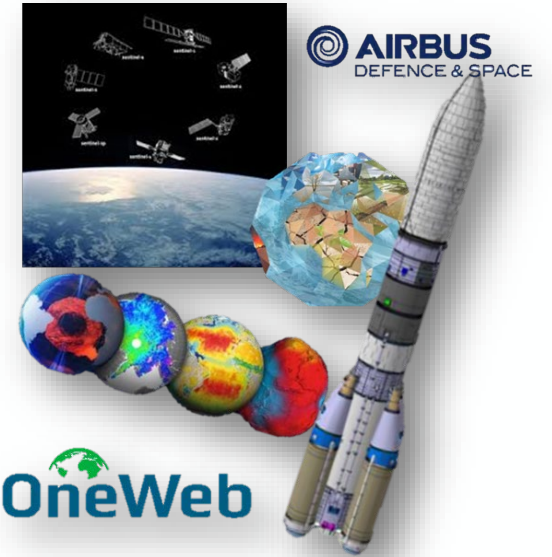




Green Technologies
Cover a wide spectrum of activities



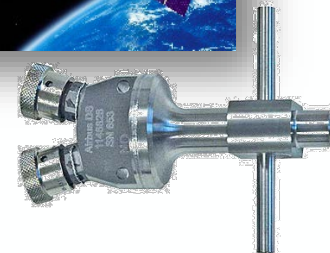
- Ariane 6
- Earth Explorer
- Copernicus
- Galileo 2nd generation
- OneWeb
- Ariane Next
- Airbus
- ...



Ex: Efficient use of Ge



Ex: Replacement of pyrotechnic powders



- REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry.
- Ecodesign aims to reduce the environmental impact of a system along all its life cycle.



- ❖ REACH compliancy do not imply directly that a system/technology/process is “sustainable”, however
- ❖ REACH compliancy **shall be included** in the performing of an EcoDesign process

Thank you for your attention!

ESA Clean Space Team