CSID 2024: EcoDesign introduction and welcome

ESA Clean Space - Ecodesign Team

08/10/2024

Welcome to 2024 edition of the CSID!

ESA Clean Space Team

The Ecodesign Team

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The Ecodesign Team - Newcomers

Rui Gomes Gondar
Clean Space System Engineer

Daniele Bella
Clean Space System Engineer

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Clean Space System Engineer

DQR contact point

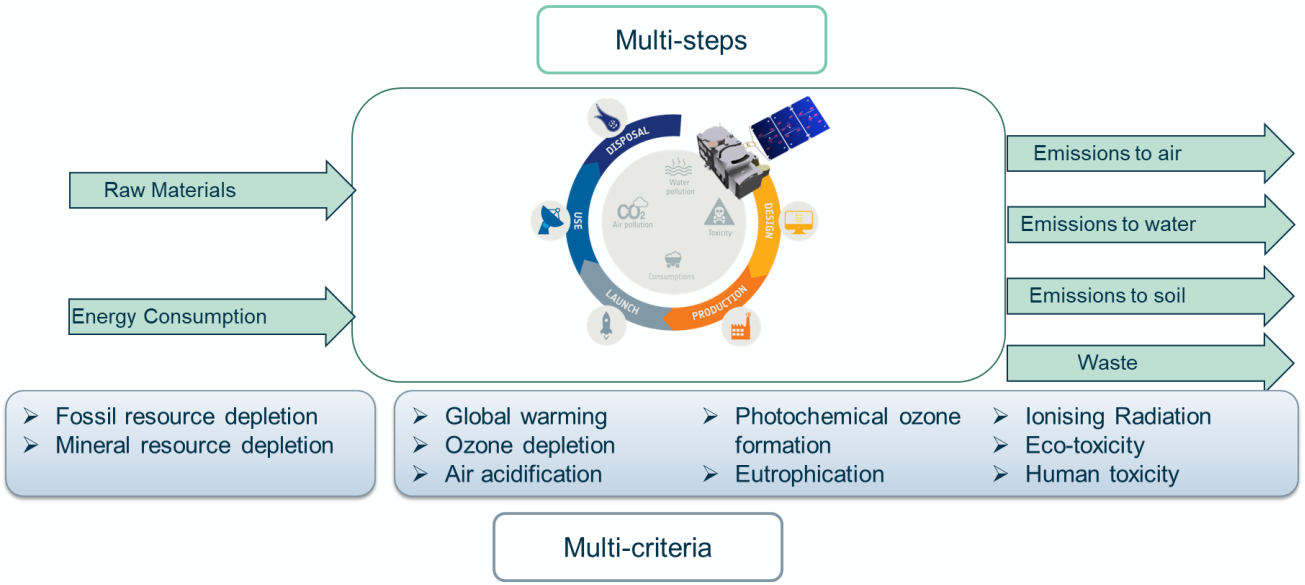
Lea Ruas
2024 Clean Space Intern

Tommaso Turchetto
2024 Clean Space Intern

+ Support from many other ESA experts (materials and processes, electronics, testing, etc)

Context - Life Cycle Assessment (LCA)

LCA is an **ISO-standardised tool to quantitatively assess** the potential **environmental impacts** of a product, process or service during its whole lifetime



- **ISO standardised** methodology recognised worldwide
- Being **adapted by ESA for space** systems
  - Space specific Handbook and Database available
- Serves to **quantify impacts** and **compare** environmental **performance** of **green solutions**

2024: A turmoil in Space LCA

ESA shall meet the 28% GHG reduction in project by 2030

→ Systematic implementation of LCA & Ecodesign in ESA Missions

→ Need to simplify implementation of LCA

→ Simplified LCA needs a strong & complete ESA LCA Database

↓

The ESA LCA Database requires data coming from projects

→ Projects implementation requires an update of ESA LCA guidelines

→ Methodology gaps:
- Data quality Rating
- Data questionnaires
- Alignment with Std.

→ Harmonised work from ESA and European Industry

2024: A turmoil in Space LCA

Impacts on the atmosphere?

ESA sha… 28% GHG re…uction in project by 2030

Systematic implementation of LCA & Ecodesign in ESA Missions

Need to sim… implementat… LCA

Green Technologies?

…CA needs …complete …CA Database

Impacts of launch vehicles?

The ESA LCA Database requires data coming from projects

…rojects implementation requires an update of ESA LCA guidelines

M…

- …

- Alignm…t with Std.

Simplified LCA? Tools?

Harmonised work from ESA and European Industry

Context - A simplified approach

Current situation

Systematic implementation of LCA

ISO leads to complex:

- data collection (Complex supply chain)
- Modelling (complex systems)
- High quality data bases

Significant efforts and specific expertise required in the entire the supply chain

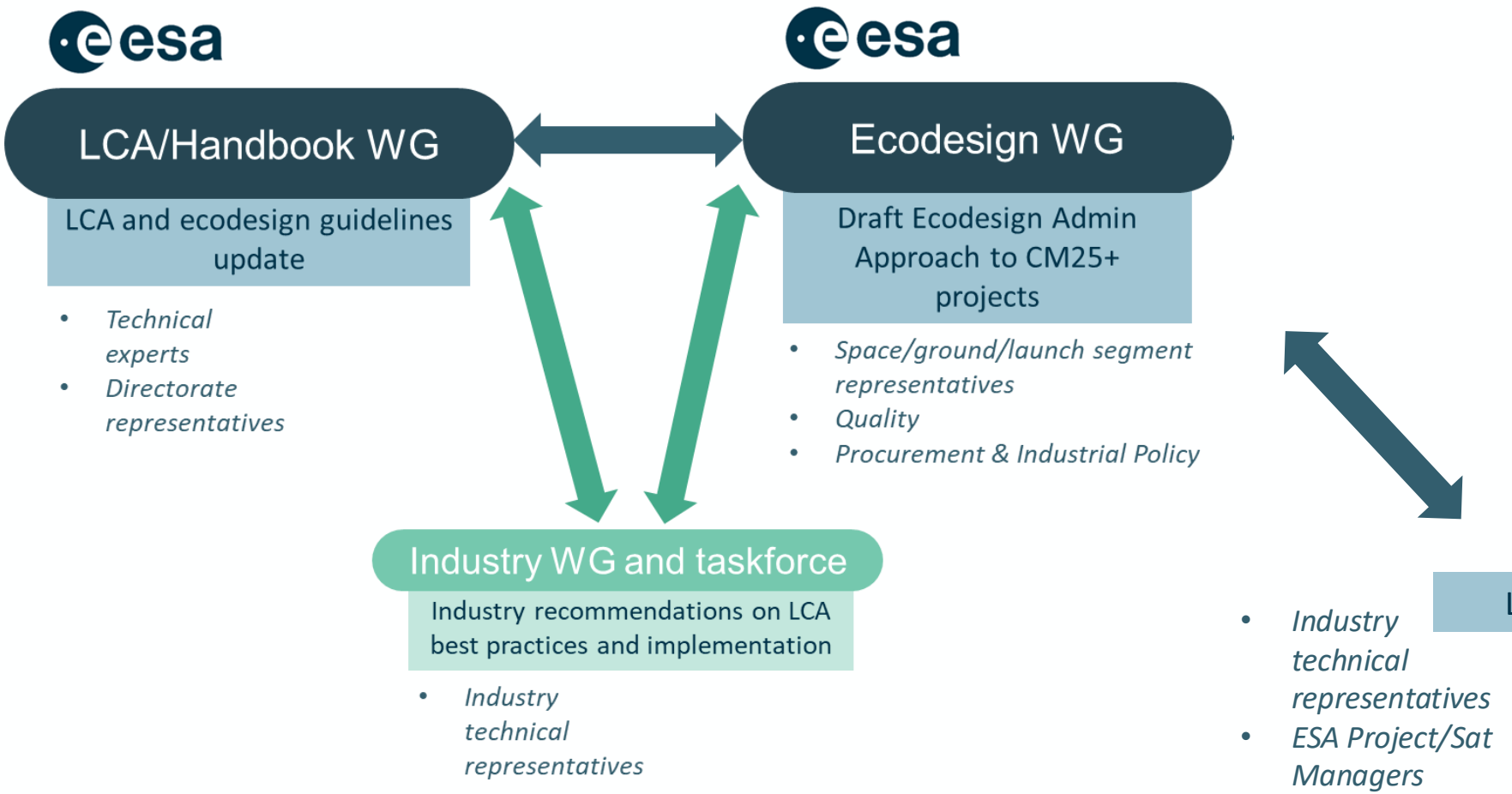
ESA Actions

Improve the environmental impacts assessment and maximise mitigation results while:

- Simplifying LCA approach
- Lower Cost impacts
- Lower effort and support scheme to SMEs

WGs on-going both internally and externally to improve product environmental assessment and mitigation approach for CM25 projects

Establishing the EcoDesign framework

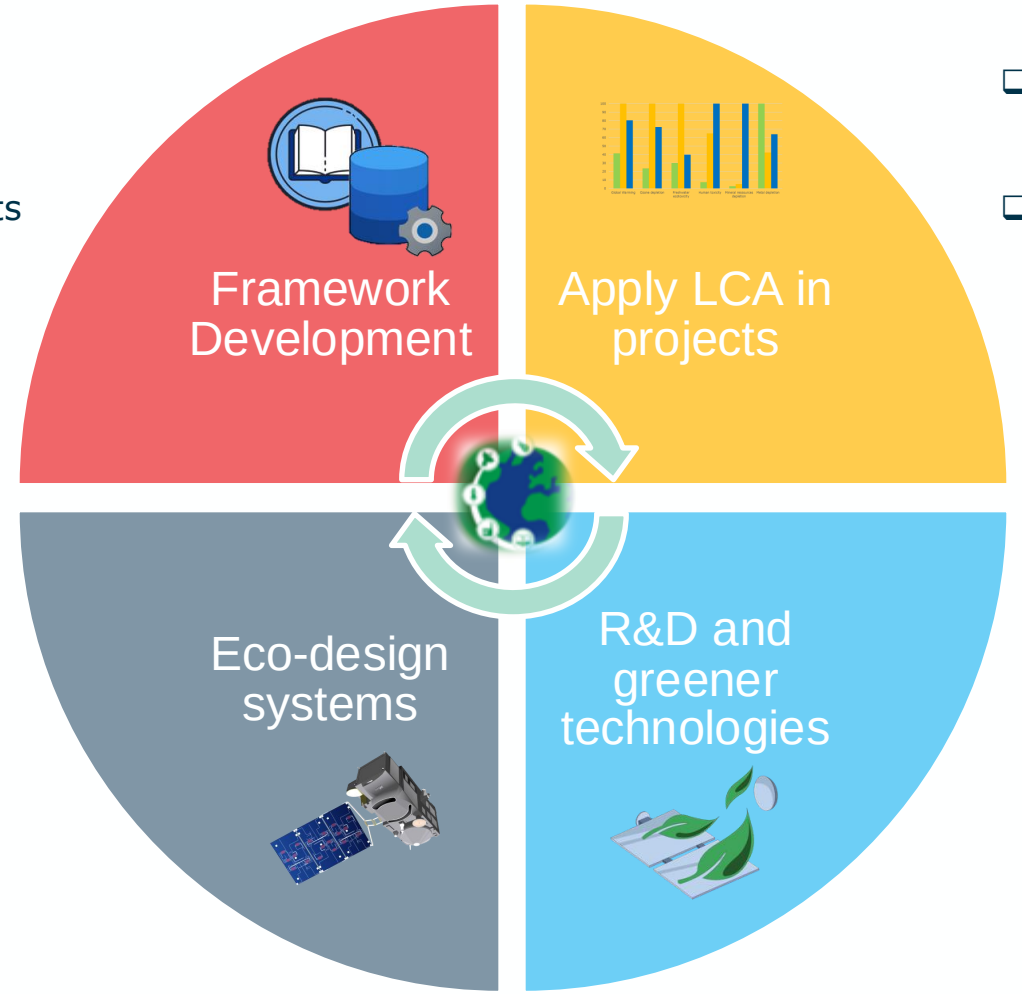


Duration: 9 months (March-Dec 2024)

Continuous work: 2024 overview

Programmatic and Technical framework: Ecodesign WGs

- **ESA LCA Database:**
  - Release of a new version!
  - Web: Space Debris Portal
  - Development of Generic Datasets
- **Handbook Update:**
  - Alignment to other Standards
  - Inclusion of feedback
  - DQR, questionnaires, etc
- **Simplified LCA**
  - 10 ESA study cases with LCA



- **Systematic application:**
  - All directorates
  - Early and later phases
- **Lessons learned and feedback:**
  - LL CDF
  - Improvement of process
  - PM forum consultation

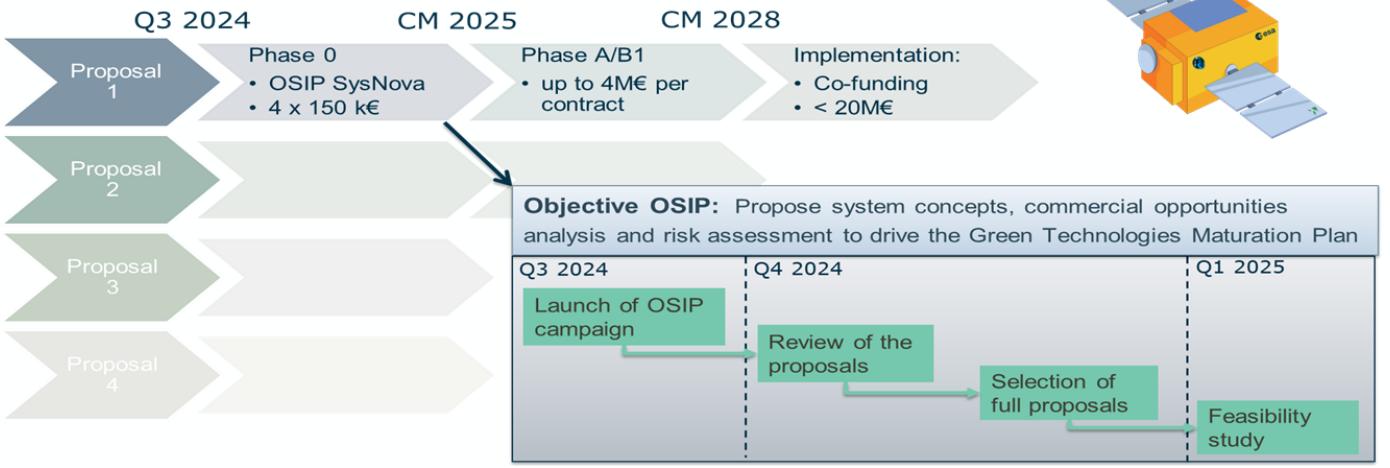
- **System:**
  - EcoStar SysNova Campaign
- **Technologies:**
  - Toward Greener MAIT

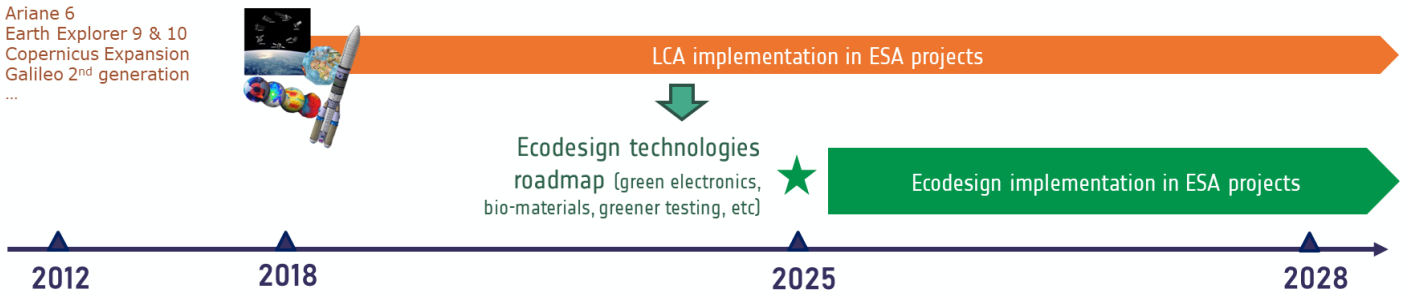
- **Atmospheric impacts:**
  - OSIP campaign
  - Dedicated Workshops
  - Roadmaps
- **Data gaps:**
  - Impacts of testing
  - Impacts of sat constellations
- **Greener Technologies**
  - Greener propulsion system

CM25 approach - EcoStar IOD & technology roadmap

ECOSTAR IOD

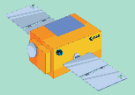
Objective: Breakthrough in development, integration and demonstration of green technology in European space product-lines





EcoSTAR: an ecodesigned platform
(a SysNova Campaign)

CM25 techno strategy:

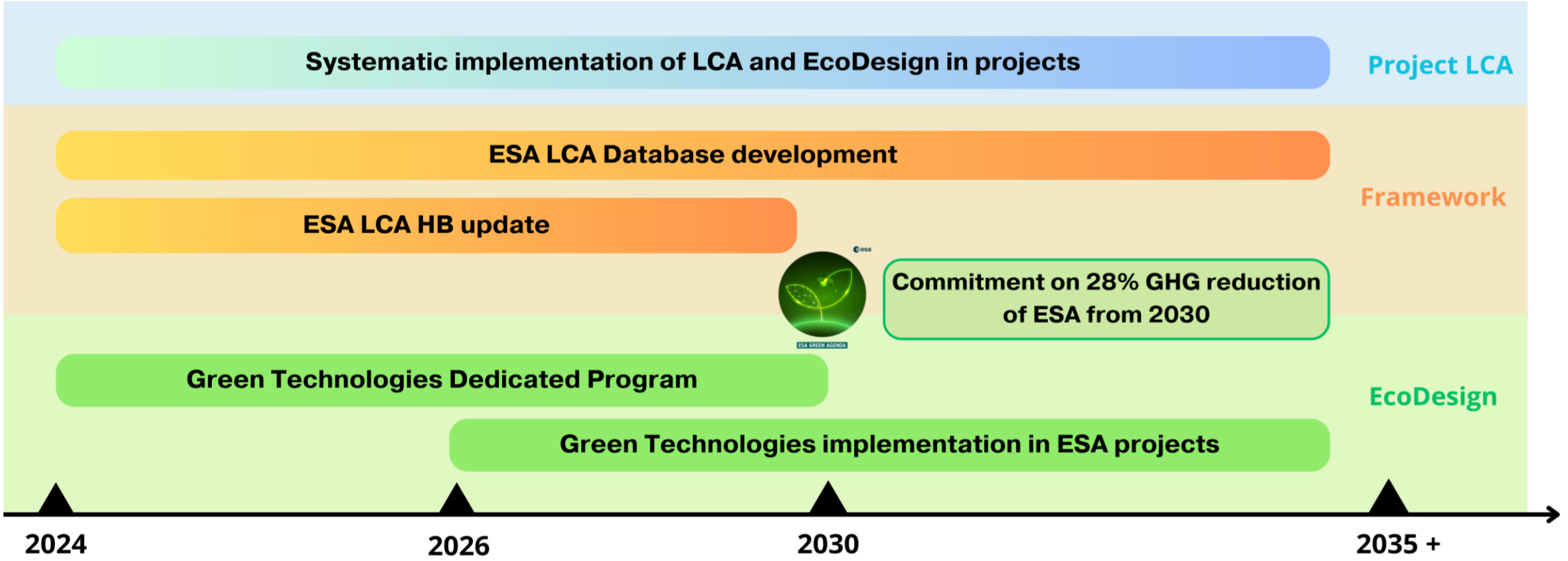


Top-down approach (industry led)

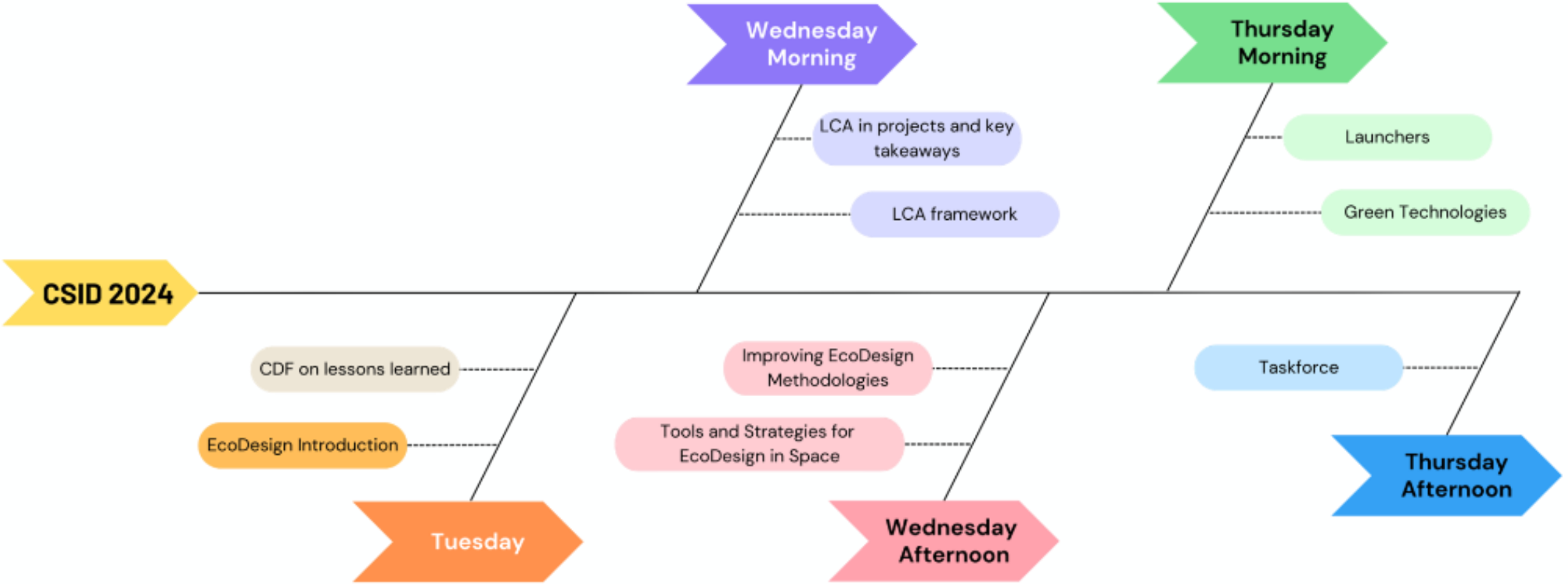
Green technologies

Possible funding programs (TBC): S2P, GSTP, TDE, etc

EcoDesign implementation roadmap



Agenda for Ecodesign at CSID 2024



Let's stay in touch!

Recordings of previous Clean Space webinars

https://blogs.esa.int/cleanspace/clean-space-webinars/

ESA LCA Framework material

ESA LCA Handbook (by email)

ESA LCA Database

Propose your ideas

Ideas.esa.int

Join us:

- **Taskforce 11th October**

Follow us and contact us!

https://blogs.esa.int/cleanspace/

@ESAcleanspace

https://fr.linkedin.com/showcase/esa-clean-space

Zero Debris:
https://www.linkedin.com/groups/12670558/

cleanspace@esa.int

UNOOSA training

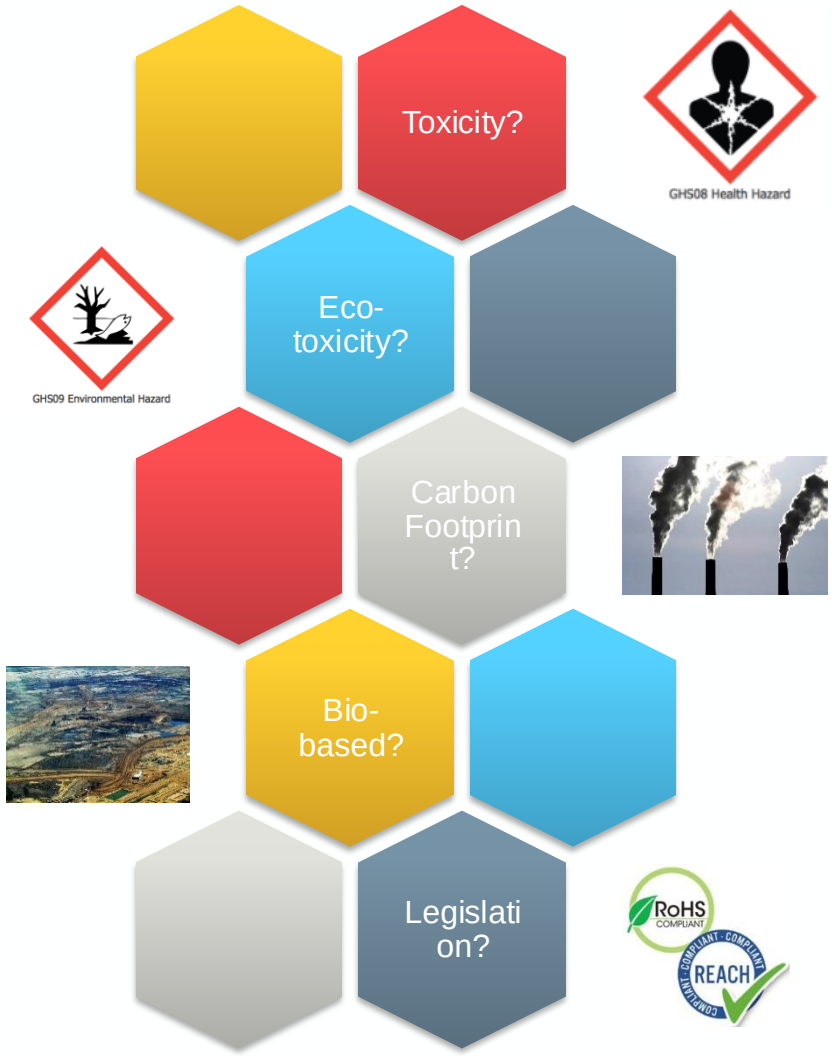
Thank you for participating!

Assessment of the environmental performance

Green initiatives!

Green materials!

Green propellants!



EUROPEAN GREEN DEAL

Reliable, comparable and verifiable information also plays an important part in enabling buyers to make more sustainable decisions and reduces the risk of 'green washing'. **Companies making 'green claims' should substantiate these against a standard methodology to assess their impact on the environment.** The Commission will step up its regulatory and non-regulatory efforts to tackle false green claims. Digitalisation can also

Brussels, 11.12.2019
COM(2019) 640 final

ESA LCA FRAMEWORK

ESA LCA Handbook

Published in 2016

New version to be published in 2025

Available under request

LCA launch segment

LCA space segment

LCA ground segment

ESA LCA Database

Available for ESA member states*

Visit the Space Safety Space Debris Portal

*under certain conditions

Life Cycle Assessment – Definition

Multi-steps

Raw Materials

Energy Consumption

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

Emissions to air

Emissions to water

Emissions to soil

Waste

- Fossil resource depletion
- Mineral resource depletion

- Global warming
- Ozone depletion
- Air acidification
- Photochemical ozone formation
- Eutrophication
- Ionising Radiation
- Eco-toxicity
- Human toxicity

Multi-criteria

Eco-design definition

*"**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**.

Summary of the Challenges

Defining the functional unit

Impact of testing

Impact of R&D

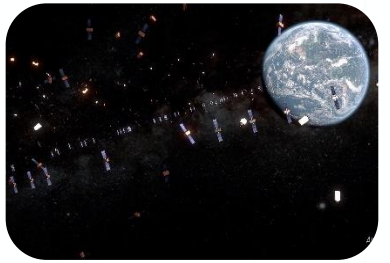
Data management

Spacecraft demise into the atmosphere

Impact of infrastructure

Impact of office work

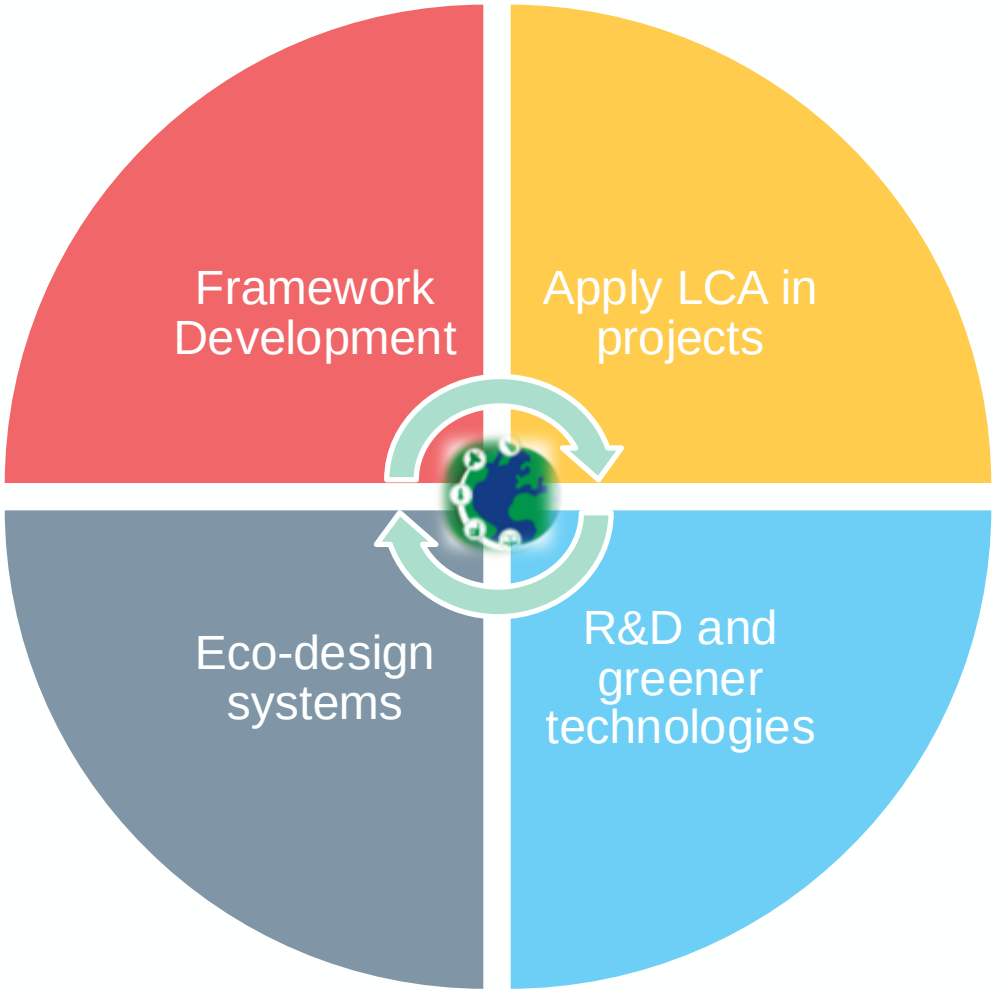
Launch event impact on the atmosphere

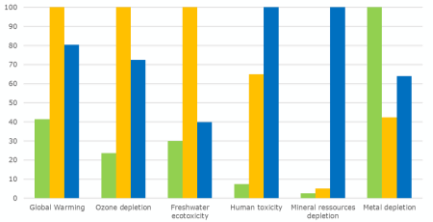


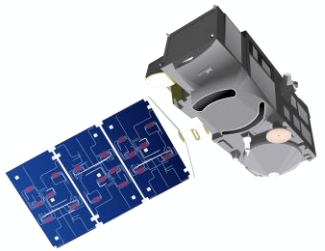
Impacts on space environment

Deep Sea Impact

LCA approach







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