

Ariane 6 and P120C – Process Improvement

Clean Space Industry Days

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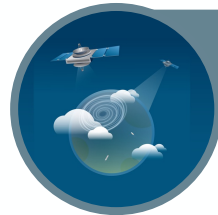
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Strengthen the ESA - EU relations



Boost green and digital commercialisation



Develop space for safety and security



Address critical programme challenges



Complete the ESA transformation


Ariane 6 and P120C Transition Programme

Support to industry during the transition phase.


Process Improvement is a programme sub-element.



 Reduce production costs / reference price

 Decrease lead time

 Decrease impact on global warming

 Stabilise processes → Reduce anomalies

 Enable industry to increase competitiveness

Budget

→ Roughly 100M€

Implementation

→ Contract PI → Implemented within the next 24 to 48 months

Perimeter *(1st batch)*

- Ground segment and MAIT processes
- No product modification and work limited concerned industrialist DDA

What

- To improve manufacturing processes
- To improve Manufacturing / Assembly / Integration / Test means
- To improve facilities / buildings



Priority 1

Achievement 1

To reduce manufacturing cost

Priority 3

Achievement 2

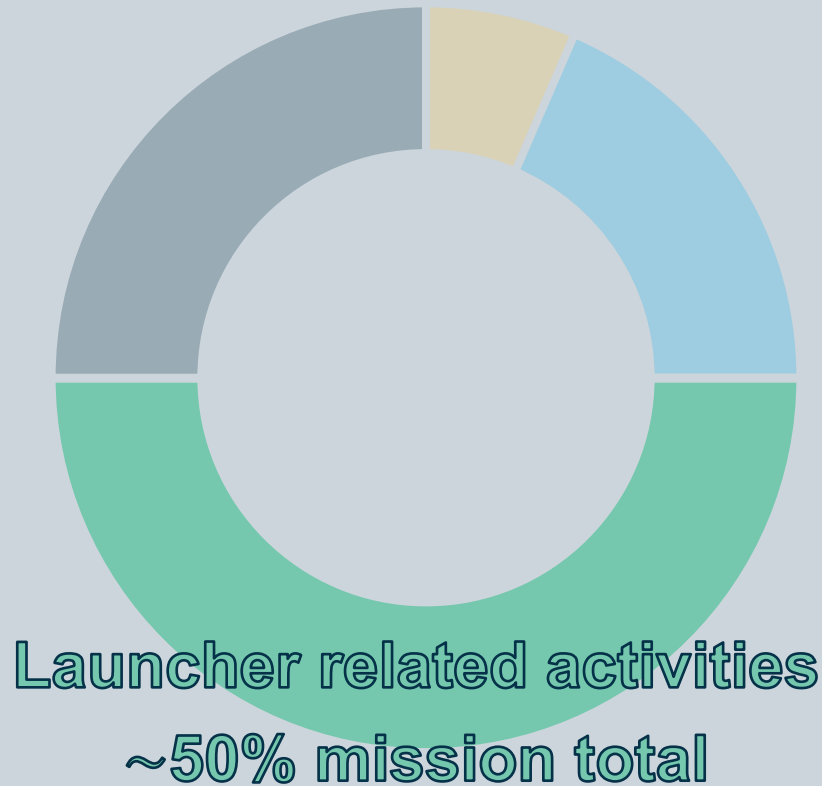
To reduce time to manufacture

Priority 2

Achievement 3

To reduce global warming impact

Global Warming Potential: EO Mission



Reference: Environmental impacts of launchers and space missions, Clean Space Industrial Days 2017, Augustin Chanoine

Space Mission:

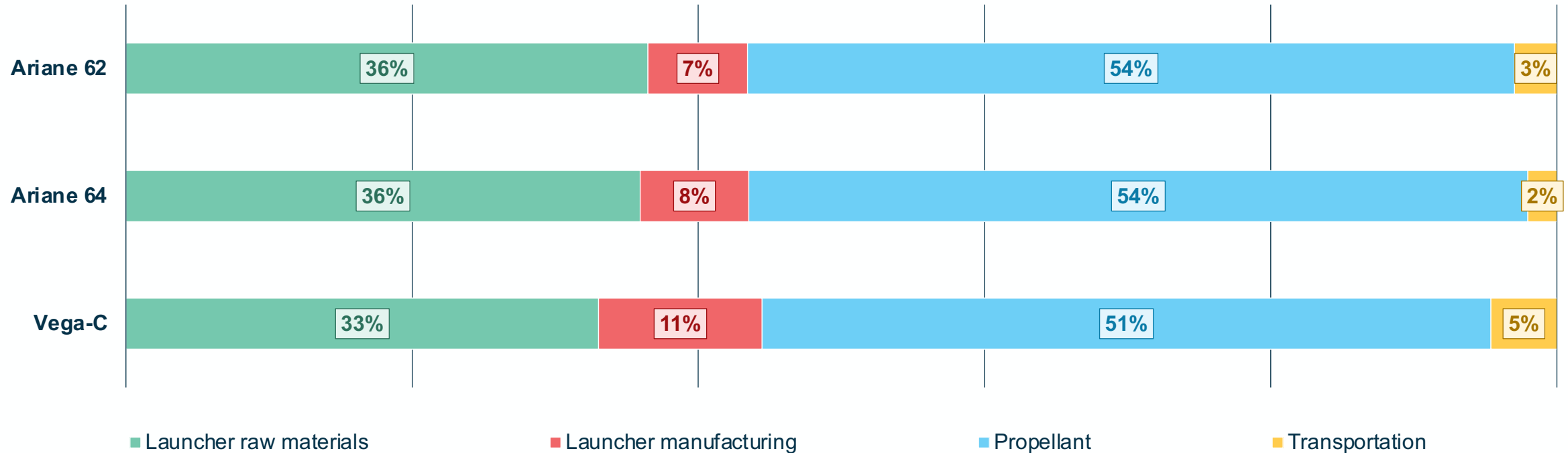
- Feasibility assessment
- Detailed mission definition
- Design, qualification and production
- Launch
- Operations and Disposal

Launch:

- Launcher vehicle production and assembly
- Propellant manufacturing
- Transport *Process Improvement perimeter (1st batch)*
- Ground operations (before flight) of launch campaign
- Flight event

Launcher Carbon Footprint assessment

Preliminary **GWE order of magnitude** of the new European launchers: breakdown of the relative impacts by launcher

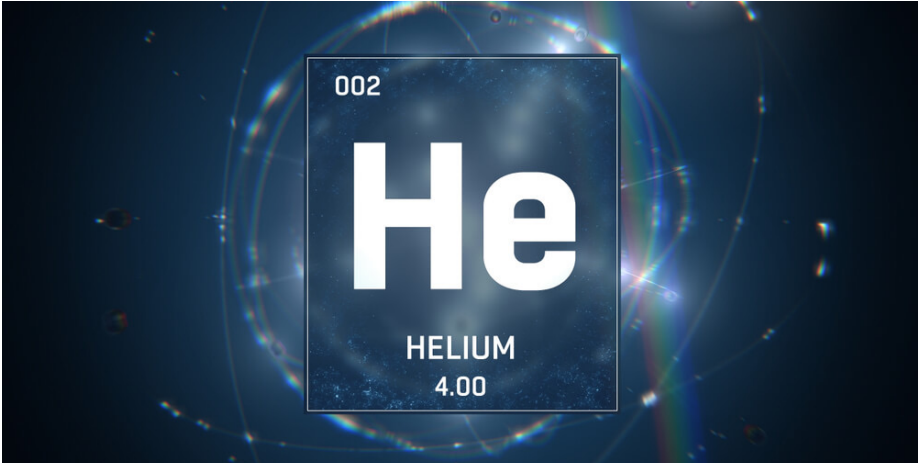


Reference: STS-IV preliminary carbon footprint assessment

→ Process Improvement activities will be mainly implemented in Europe

→ Focus of the 1st batch on **Launcher Manufacturing, Raw Materials** and **Transport**

Helium Recovery



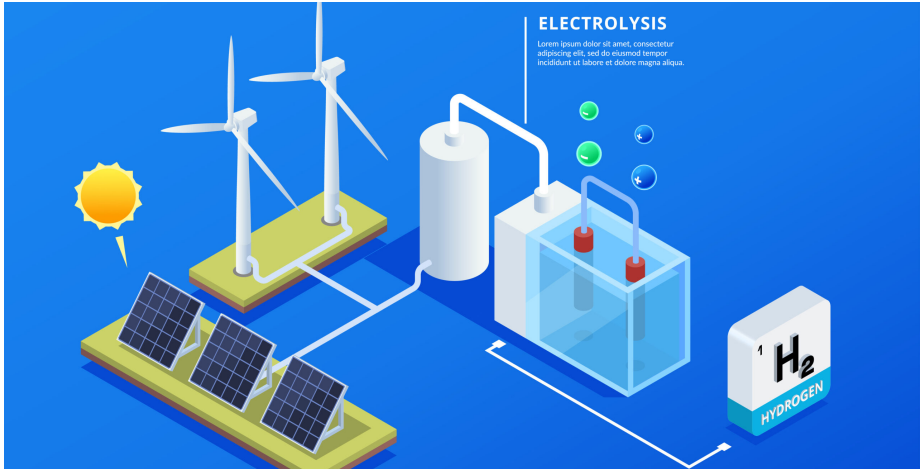
Supply chain optimisation



3D Printing



Green hydrogen



Objectives

- **Raise awareness** on global warming impact of launcher manufacturing activities
- **Learn** and **infuse** the monitoring of launcher activities global warming impact across industry
- Initiate a **bottom-up approach** to evaluate GWE impact of the launcher manufacturing facilities
- Set the basis to **expand Process Improvement** towards more activities along the launcher product life

Approach

- Acting on the **manufacturing facilities** (no launcher design changes)
- Evaluation of the impact based on **established standards and methodology**
- Focus on **global warming**, letting the possibility to report on other environmental impacts
- **Accompany** Industry when required

LCA parameters

- Global warming
- Energy consumption

Cost reductions generated by reduction of labour hours, energy consumption, material usage and transport often has a positive impact in diminishing the environmental footprint.

1 – Identify process step affected

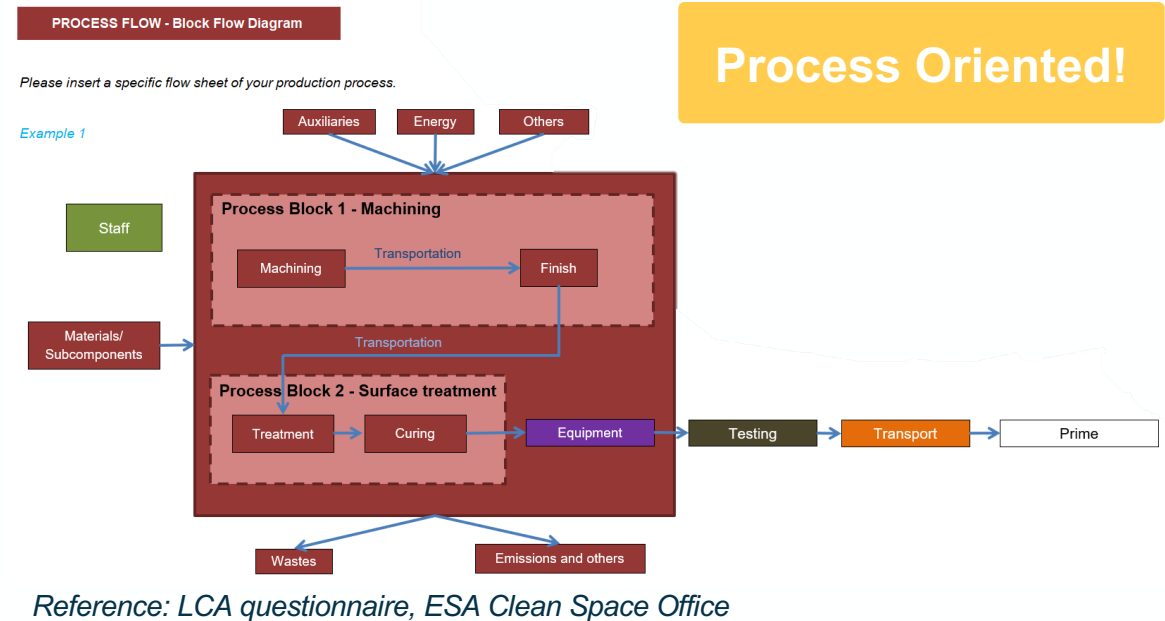
→ Identify the process(es) affected

2 – Provide baseline scenario

- Fill in the LCA questionnaire for the concerned processes
- Provide an estimate of greenhouse gases emissions
- Provide an estimate of energy consumption

3 – Assess parameters impacted by the activity

- Identify the parameters affected by the activity, and explain the impact
- Estimate the environmental impact of the activity (impact generated by acquisition of new means, disposal of existing ones, change in energy consumption, reduction of material usage, etc.)
- Propose additional LCA parameters to be assessed tailored to the concerned activities



4 – Confirm / Measure the updated parameters

- Once the activity is implemented and qualified
- Assess the real impact on affected parameters

How it is reported

- Objective: introduce the notion all along the project implementation
- Reporting is organised in several phases along the project:
 1. At KOM: with the identification of the perimeter and the assessment of the current situation
 2. After completing the design of the improvement: when the solution is defined with an estimation of impact
 3. After the qualification of the improvement: with an assessment of the real impact

Assessment of Process Improvement impact

Assessment of environmental impact of process improvement activities (focused on Global Warming).

Methodology

Customisation of the methodology after its **first implementation on the Launcher Ground Segment**. To be reused for further analysis.

Awareness & knowledge management

Introduction of the reporting on Environmental Impact assessment is expected to **raise the awareness** and **improve the related competences and knowledge**.

Data

Generates a first dataset representing at least **Global Warming impact** of the European launchers Ground Segment.

Status

- Most of the RFQs have been published
- First elements received in the offers show various maturity levels on the subject

Way forward

- Support industry in the assessment of environmental impact
- Customise the methodology to specificities of launcher ground segment processes if required
- First reporting on environmental impacts are expected within the next 12 months

Next steps

- Extend the Process Improvement to ground operations and launch campaign
- And beyond the suppliers DDA in close collaboration with the Prime