maiaspace

A review on the sustainability strategy in the development of a semi-reusable minilauncher

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Clean Space Days 2024

Agenda

1. On the previews editions
2. MaiaSpace environmental strategy – overview
3. Role of the environmental performance engineer – focus of the day
4. LCA model
5. Technical eco-design tool: correlation between environmental impact and environmental performance
6. Eco-design implementation strategy

On the previews editions

2021
- Preliminary LCA within ArianeWorks
- Ecodesign vision

2022
- Methodology for reusability (analysis of the environmental benefits/drawbacks)
- Preliminary methodology for ecodesign & sustainability strategy

2023
- Updated sustainability strategy and LCA
- Focus on the derivation of GWP-like coefficients for launch
- Ecodesign methodology update and first use case

2024
- Updated LCA
- Updated ecodesign tool
- Ecodesign implementation strategy

New person assigned to the topic

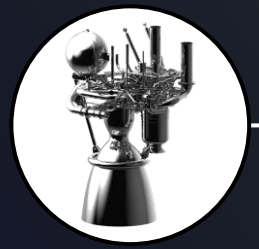
MaiaSpace's space transportation solutions

Reusable, eco-designed and dual-performance launcher

500kg SSO 500km (RLV) – 1500kg SSO 700km (ELV)

Regenerative in-orbit services

Last miles delivery, Debris Removal…



Prometheus engine

Colibri kick-stage

Start of commercial activities 2026

Main Ecodesign levers for MaiaSpace

Environmental performance engineering

Focus of this edition

1

Improve launcher LCA

- At local level: subsystem analysis and data quality assessment
- At global level: annual impact forecast & high-level consistency with costs and mass balance

2

Support decision-making

- Tradeoffs between designs and between suppliers
- System engineering perspective

3

Find new levers for impact reduction

- Define global parameters
- Reduce impacts according to targets

4

Internal knowledge sharing

- Raise awareness & teach on environmental strategy
- Learn system engineering

5

Transparency and ethical communication

- Methodological collaboration with zero greenwashing policy
- Data sharing

6

Collaboration with academia

- Participate to standardization effort
- Co-fund a PhD thesis (starting in 11/2024)
- Write scientific articles (IAC 2022, 2024)

Lifecycle phases of MaiaSpace's launch service

Manufacturing, Assembly, Integration and Test (MAIT)

Transport
Europe – French Guiana

Launch Campaign

Fluids production

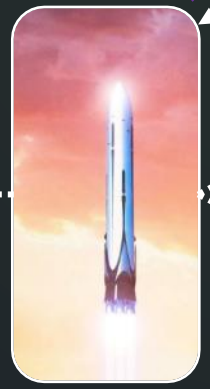
- Fluids
- Ground activities
- Launcher production
- Launch & reentry

Functional Unit: One year of operations

Lower stage Recovery & Refurbishment

Disposal of all stages

Expendable launch vehicle (ELV)



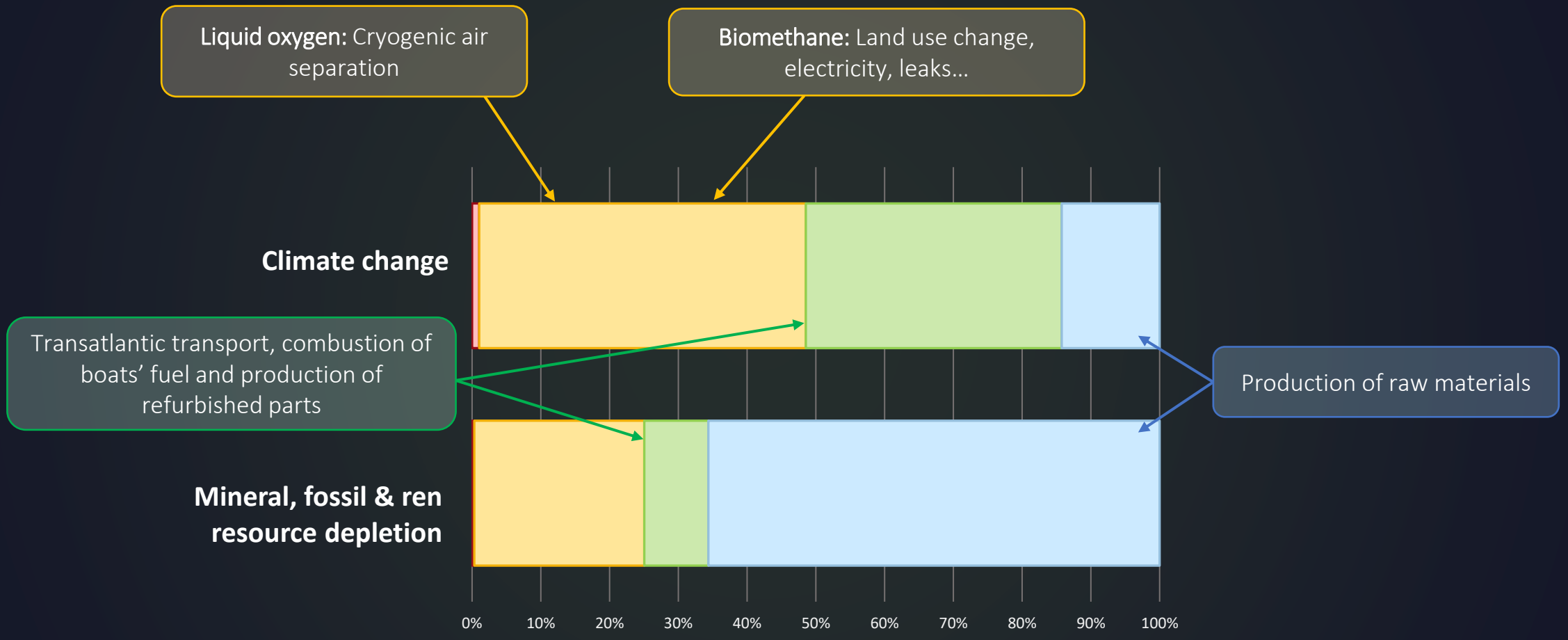
Launch Event

Recoverable launch vehicle (RLV)

Disposal of the upper stage

Preliminary LCIA results over one year of operations*

Life Cycle Impact Assessment



Non-recurring items
- ✓ Building construction, R&D...

Fluids
- ✓ Biomethane, liquid oxygen, nitrogen, helium

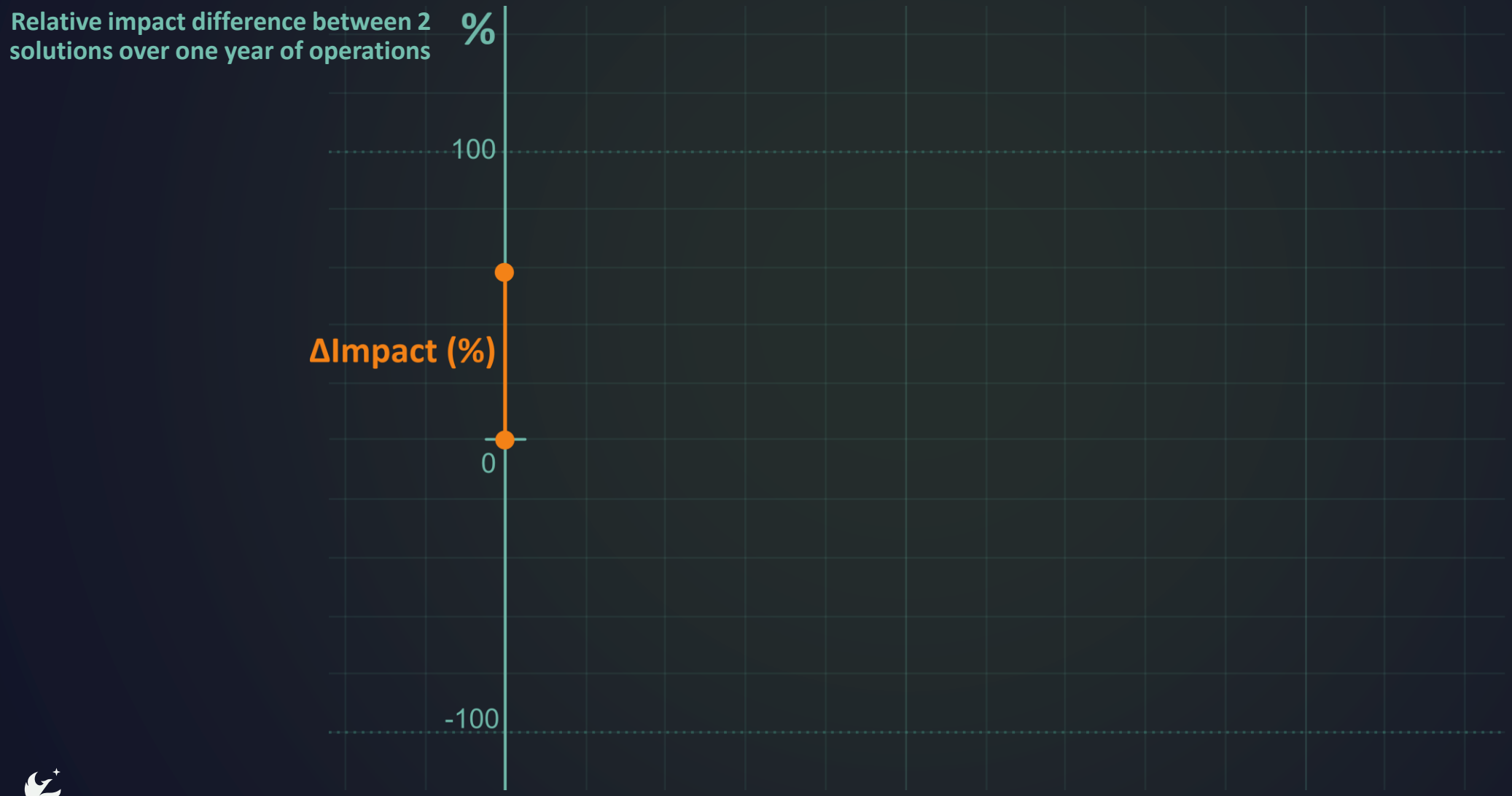
Ground activities
- ✓ Transatlantic logistics, launch campaign, recovery and refurbishment

Launcher production
- ✓ Manufacturing, assemblies, integrations and tests

**Launch phase excluded*

Eco-design tool

Correlation between environmental impact and environmental performance



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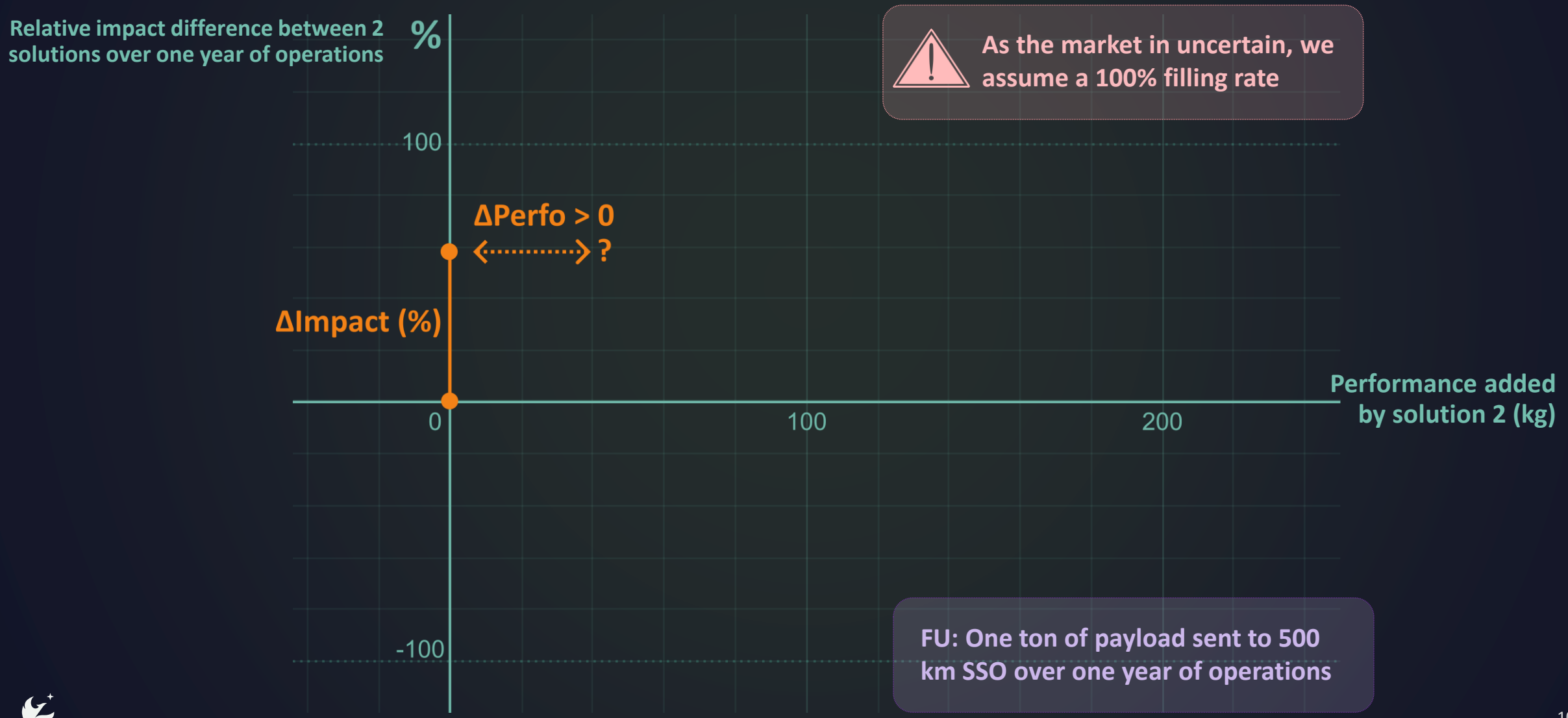

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FU: One ton of payload sent to 500 km SSO over one year of operations

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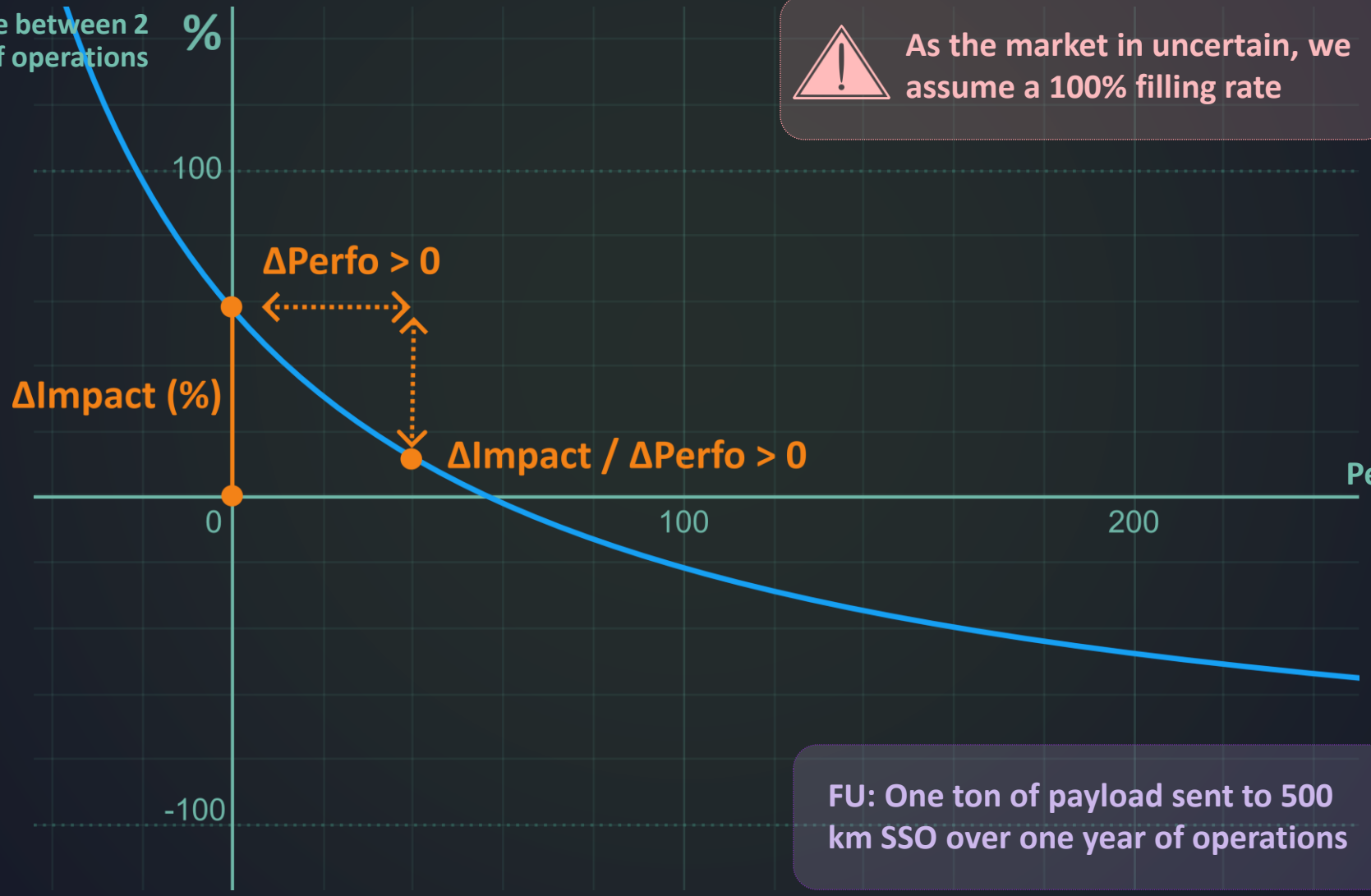

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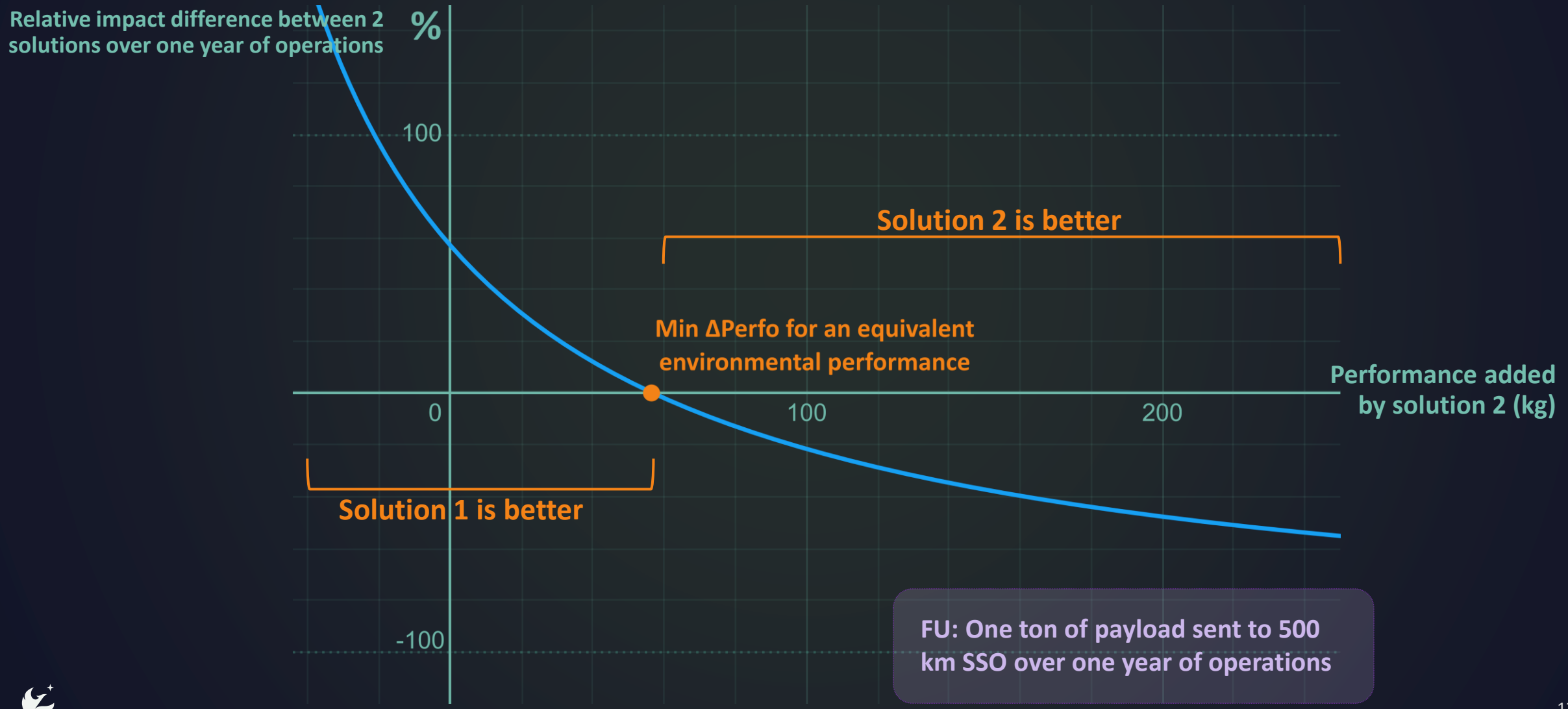

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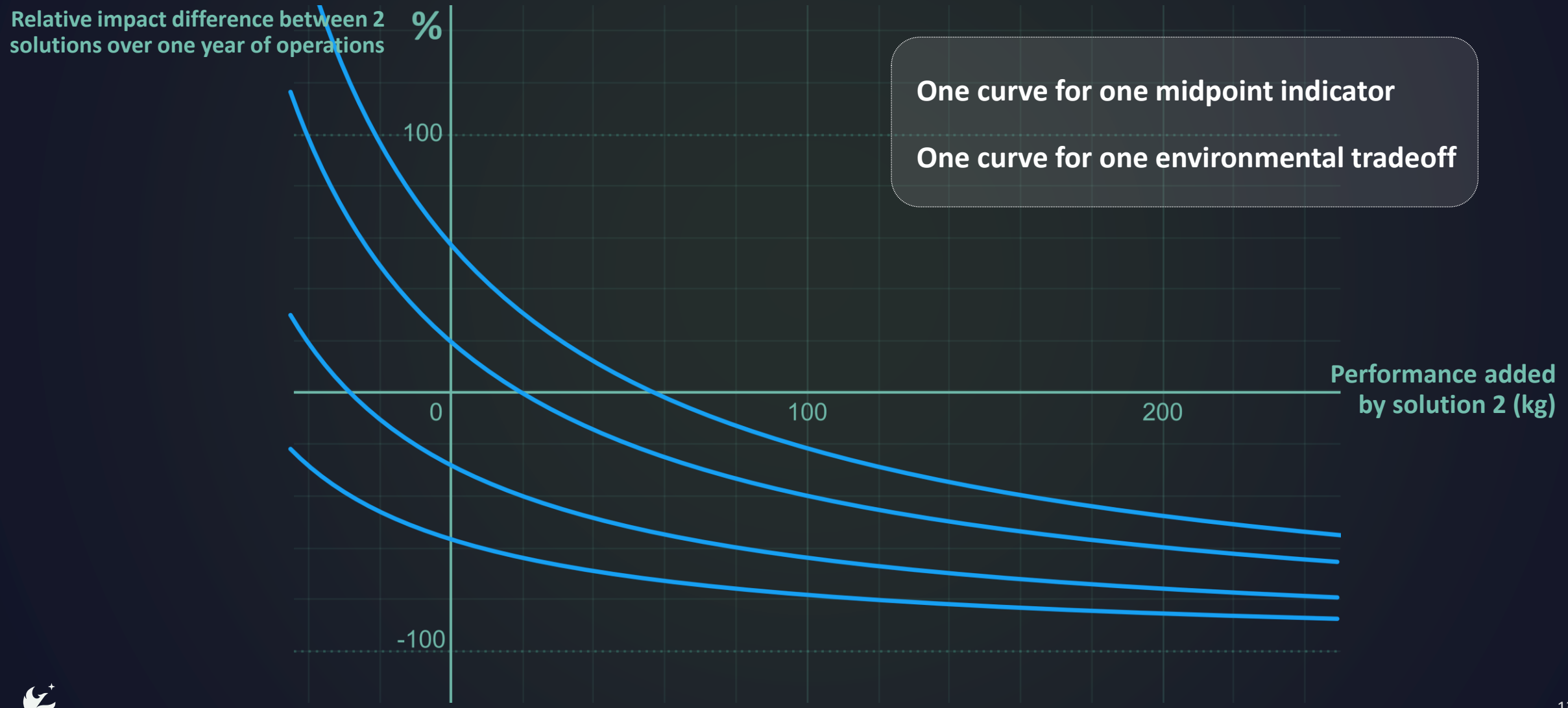
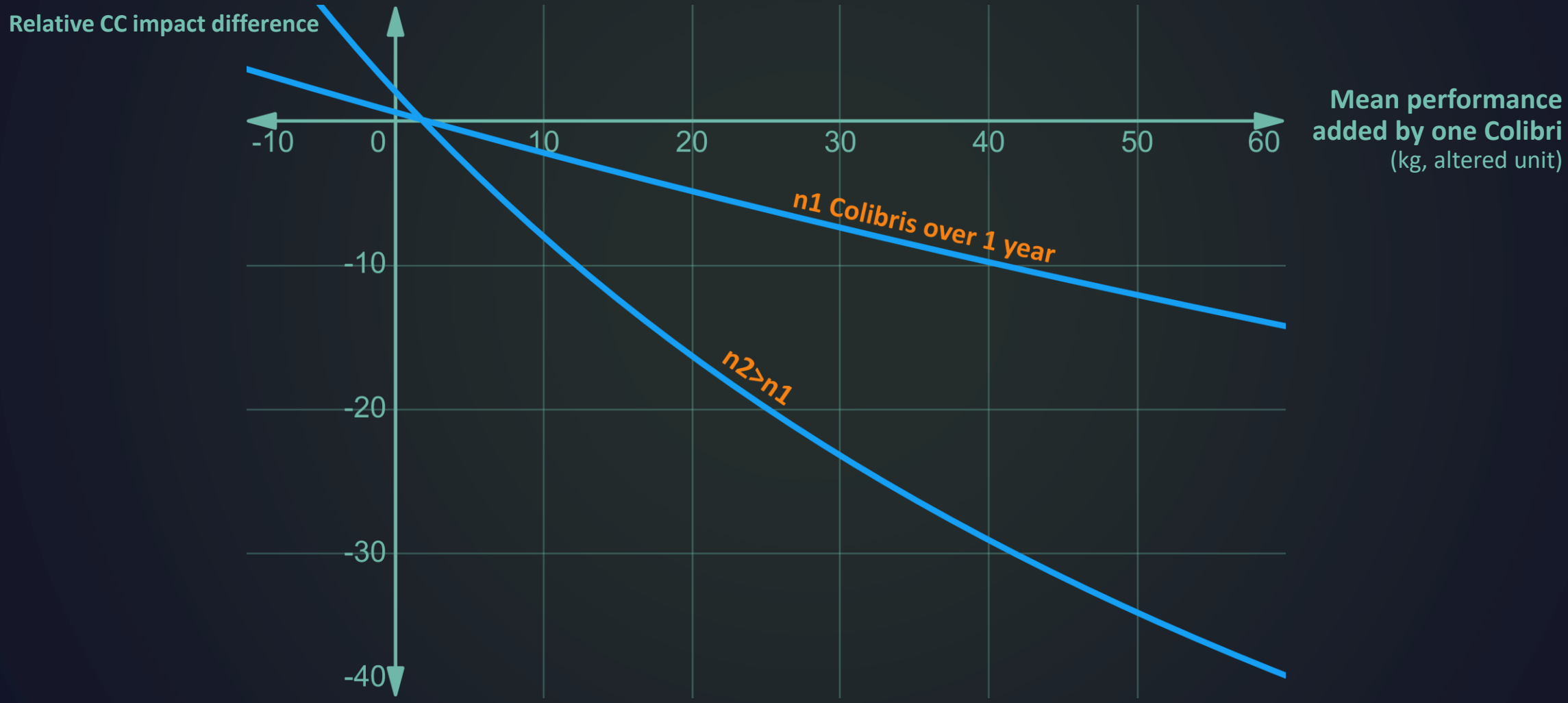
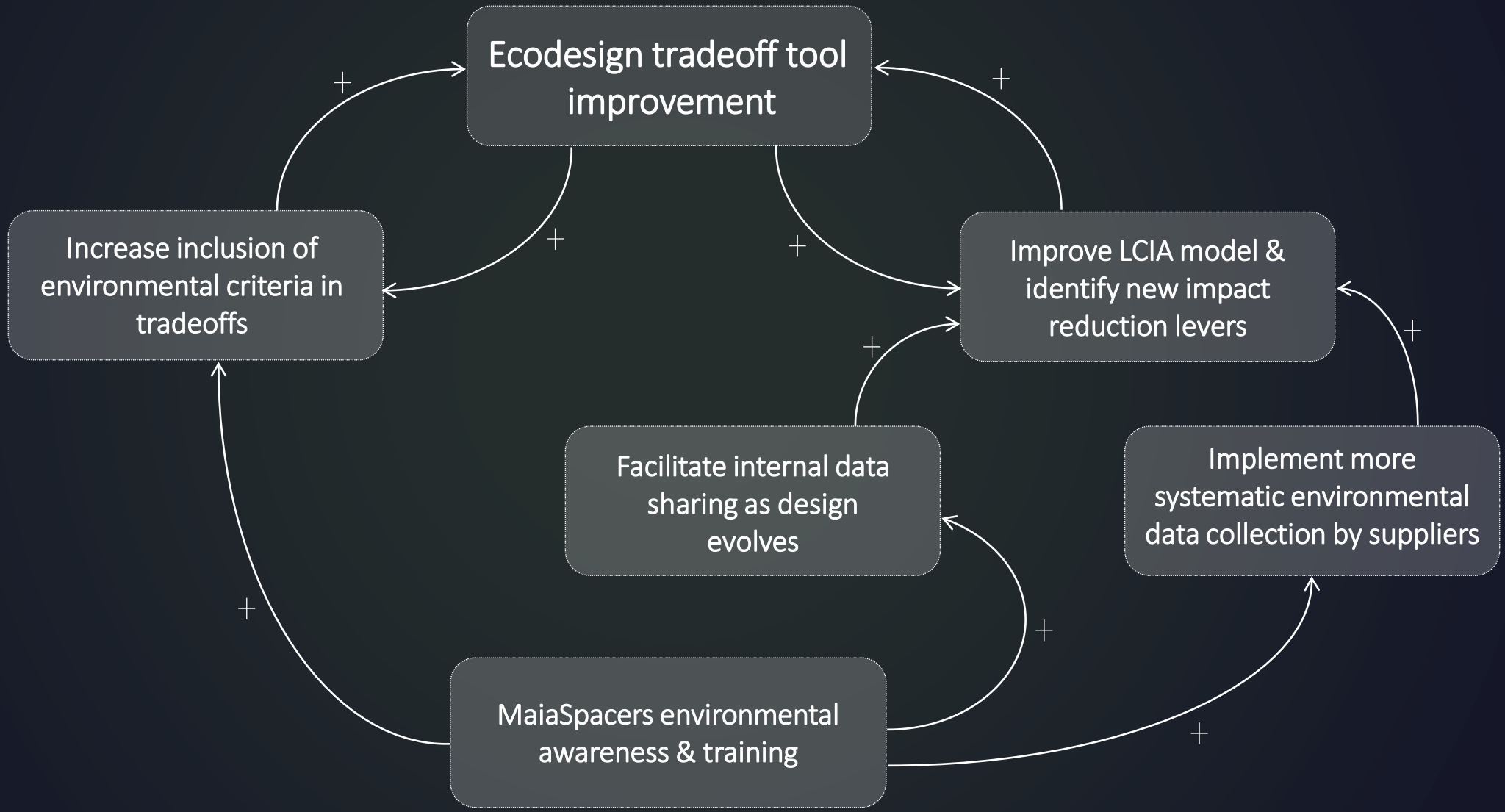


Eco-design tool

Example: Colibri added for performance



Eco-design implementation within MaiaSpace - strategy



Key takeaways

Environmental impact assessment is an iterative process

- Continous updates at local level: subsystems update
- Continous updates at global level: key parameters, adaptation to launch manifest changes & structure

Ecodesign requires a global perspective

- Solutions are compared over a reference year of operations
- Performance benefits must be included to calculate impact/payload ratio.

Successful ecodesign tool implementation needs internal involvment

- Environmental performance engineer needs a system engineer perspective
- Objective of increasing MaiaSpacers involvment through more training and awareness-raising

Contact information

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