



Green Policy

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ASTREO, an interdisciplinary, student-led aerospace research and development team, issues this Green Policy to embed environmental sustainability into its mission, practices and culture. This policy is intended to align our operations with the long-term health of Earth's orbital environment and to provide clear guidance for members, collaborators, volunteers, and stakeholders.

Distribution and applicability

This document applies to all ASTREO members, including students, researchers, volunteers, advisors, and external collaborators who participate in ASTREO projects, events, laboratory activities, or field operations. It shall be published on the ASTREO official communication channels and made available to members upon onboarding. Compliance with this policy is mandatory wherever ASTREO undertakes activities or partnerships.

Executive summary

ASTREO's Green Policy formalizes our commitment to responsible environmental stewardship in all facets of aerospace research and development. Recognizing the importance of preserving Earth's orbital environment, this policy establishes guiding principles, governance mechanisms, and operational procedures to reduce our environmental impact, promote sustainability literacy, and align our actions with the broader goals of space sustainability. Through the sections below, ASTREO defines its purpose, scope, governance structures, procurement practices, mobility strategies, digital methods, laboratory procedures, measurement frameworks, compliance processes, educational roles, and review mechanisms, ensuring coherence with our mission of long-term orbital sustainability.

1. Purpose and scope

1.1 Purpose of the Green Policy

The purpose of this policy is to institutionalize environmental sustainability across ASTREO's operations. It provides a formal framework that:

- Integrates sustainability considerations into decision-making processes.
- Promotes a culture of responsibility, efficiency, and scientific rigor in resource use.
- Ensures compliance with applicable environmental guidelines while advancing innovative aerospace research.
- Aligns daily practices with ASTREO's mission of safeguarding Earth's orbital environment and reducing space debris.

1.2 Scope (activities, projects, events, laboratories, partners)

This policy applies to all ASTREO activities, including research projects, prototyping, laboratory work, events, educational outreach, mobility, and partnerships. It covers:

- On-campus and off-campus research and development operations.
- Laboratories, workshops, and shared spaces utilized by ASTREO.
- Events organized or attended by ASTREO, including conferences, exhibitions, and outreach sessions.
- Procurement, operation, and disposal of hardware, electronics, and materials used in projects.
- Collaboration with third parties, sponsors, and institutional partners, where applicable.

1.3 Intended audience (members, collaborators, volunteers, stakeholders)

The intended audience includes:

- All ASTREO team members (students, researchers, advisors, and staff).
- Volunteers and interns supporting ASTREO's activities.
- Collaborators from other research groups, institutions, or industry partners.
- Sponsors, donors, and external stakeholders who engage with or support ASTREO projects.

Understanding and complying with this policy is required for all individuals and entities involved with ASTREO operations.

1.4 Principle of proportionality and operational constraints

ASTREO acknowledges that project requirements and resource availability may impose constraints on the full implementation of sustainable practices. Therefore, the principle

of proportionality shall guide the application of this policy: sustainability measures must be considered relative to the scale, scope, and urgency of each activity. Operational necessities and safety shall always be respected, but where feasible, environmental considerations must be integrated. Exceptions may be granted only if duly justified and approved through the governance mechanisms defined herein.

2. References, definitions, and acronyms

2.1 References and guidelines (if applicable)

ASTREO refers to internationally recognized environmental guidelines and best practices in aerospace, research, and sustainability. Specific laws or standards are not cited in order to maintain flexibility, but all activities shall adhere to applicable environmental regulations and university or institutional policies.

2.2 Definitions

- **Carbon footprint:** The total amount of greenhouse gas emissions, expressed as carbon dioxide equivalents, produced by a particular activity or organization.
- **E-waste:** Discarded electrical or electronic devices, components, or materials that require special handling and disposal.
- **Reuse:** The practice of using an item or component again for its original or a similar purpose without significant modification.
- **Prototyping:** The process of creating experimental models or early versions of systems and components for testing and refinement.
- **Asset register:** A controlled record of all hardware, equipment, and materials owned or managed by ASTREO, documenting their acquisition, maintenance history, and disposal.

2.3 Acronyms and terminology

Acronym	Term
R&D	Research and Development
HVAC	Heating, Ventilation, and Air Conditioning
CAPA	Corrective and Preventive Actions
KPI	Key Performance Indicator
PPE	Personal Protective Equipment
ESG	Environmental, Social, and Governance

ASTREO uses consistent terminology throughout this document. Terms such as “sustainability” refer broadly to environmental stewardship and responsible resource management in alignment with the team’s mission.

3. Astreo values, principles, and commitments

3.1 Guiding principles (responsibility, scientific rigor, transparency)

ASTREO commits to the following guiding principles:

- **Responsibility:** All members shall act with regard for the environmental impact of their decisions and activities. Responsible resource use, waste minimization, and pollution prevention are fundamental expectations.
- **Scientific rigor:** Sustainability initiatives shall be grounded in evidence-based practices. Data collection, measurement, and peer review guide the development and refinement of environmentally responsible procedures.
- **Transparency:** ASTREO shall maintain openness in communicating its environmental impact, challenges, and achievements. Reports shall provide clear information to stakeholders without overstating successes or underreporting shortcomings.

3.2 Sustainability decision hierarchy (avoid → reduce → reuse → offset*)

ASTREO adopts a decision hierarchy for sustainability considerations:

1. **Avoid:** Before undertaking any activity, ascertain whether the environmental impact can be entirely avoided (e.g., by eliminating unnecessary travel or procurement).
2. **Reduce:** If avoidance is not feasible, minimize resource consumption and emissions through efficiency and optimization (e.g., energy-efficient equipment, remote collaboration).
3. **Reuse:** Prioritize the use of existing or refurbished items over new purchases. Encourage reusing components and materials across projects.
4. **Offset:** *As a last resort, consider offsets for unavoidable emissions where applicable, with careful evaluation to ensure credibility and alignment with ASTREO’s mission.*

* Offsetting shall only be used after avoidance, reduction, and reuse options have been exhausted. Offsets must align with credible environmental initiatives where applicable and be documented.

3.3 Anti-greenwashing policy and rules for accurate communication

ASTREO shall communicate its sustainability actions truthfully and accurately. Greenwashing – the practice of misrepresenting environmental credentials or

overstating sustainability accomplishments – is prohibited. To ensure accurate communication:

- Claims regarding environmental performance must be substantiated by documented procedures, data, or verifiable practices.
- Public statements shall reflect the actual status of environmental initiatives without exaggeration.

3.4 Alignment with Astreo’s mission on space sustainability

ASTREO’s mission focuses on mitigating space debris and promoting the long-term sustainability of Earth’s orbital environment. This policy extends that commitment to terrestrial operations by establishing environmentally responsible practices. Sustainability on Earth and in space are interdependent: reducing resource consumption and waste in research activities strengthens ASTREO’s credibility as a leader in space sustainability and demonstrates a holistic approach to environmental stewardship.

4. Sustainability governance

4.1 Roles and responsibilities

- **Team Lead:** Holds ultimate responsibility for policy adoption, resource allocation, and ensuring compliance. Approves exceptions and reports to relevant institutional bodies on sustainability matters.
- **Project Leads:** Integrate sustainability considerations into project plans, and ensure adherence to this policy within their teams.
- **Members and Volunteers:** Adhere to the policy, participate in training, report potential non-compliance, and contribute to sustainability initiatives.
- **Advisory Board** (if applicable): Provides strategic guidance on sustainability and reviews annual reports.

4.2 Decision-making processes (procurement, travel, events)

Decision-making shall be structured and documented:

- **Procurement decisions:** Requests for new hardware or materials must be justified by necessity, include an evaluation of refurbished or reusable alternatives, and be approved by the Project Lead. Decisions shall consider lifecycle impacts and maintenance requirements.
- **Travel and mobility decisions:** Travel must adhere to the transport hierarchy (see section 7.2) and be authorized by the Project Lead or Team Lead based on necessity, available alternatives, and budget considerations.

- **Event organization:** Event plans shall include sustainability assessments covering venue choice, logistics, transportation, materials, and energy use.

4.3 Internal training and sustainability onboarding

All new members, volunteers, and collaborators shall receive sustainability onboarding that covers this policy, practical procedures, and reporting mechanisms. Training modules may include:

- Overview of ASTREO's environmental commitments.
- Introduction to sustainable procurement, mobility, and laboratory practices.
- Instruction on data collection and reporting for environmental indicators.
- Guidance on identifying and reporting non-compliance.

Refresher training will be offered periodically and when significant policy updates occur. Participation in training sessions shall be recorded.

4.4 Document management (archiving, approvals, versioning)

ASTREO shall maintain controlled documentation related to sustainability:

- **Archiving:** All policy versions, implementation guidelines, and reports shall be stored in a designated digital repository with restricted editing rights.
- **Approvals:** Policy revisions, major procurement decisions, and exception approvals require documented sign-off from the Team Lead.
- **Versioning:** Each policy iteration shall be assigned a version number and date. A revision record must document changes, authors, and approvers. Previous versions shall remain accessible for reference.

5. Management of resources and shared spaces

5.1 Rational use of shared spaces

Members are required to use laboratories, offices, and workshops responsibly. To minimize environmental impact and optimize utilization:

- Shared spaces shall be booked in advance where possible, with occupancy data recorded.
- Activities must be planned to avoid unnecessary use of facilities (e.g., consolidating experiments to reduce repeated equipment start-ups).
- Members shall ensure that lights, equipment, and systems are turned off when spaces are unoccupied, except where continuous operation is necessary for safety or technical reasons.

5.2 Energy efficiency (lighting, HVAC, devices, booth/stand operations)

- **Lighting:** Members must use natural light when feasible and switch off artificial lights when leaving a space. Energy-efficient bulbs and fixtures shall be prioritized.
- **HVAC:** Heating and cooling systems shall be set to moderate, comfortable levels to prevent energy waste. HVAC usage should be minimized during unoccupied periods, and settings must comply with any institutional guidelines.
- **Devices:** Computers, monitors, laboratory equipment, and other devices shall be set to energy-saving modes. Members must power down idle equipment at the end of the day or when not in use.
- **Booth/stand operations:** Event stands or booths shall use energy-efficient lighting and equipment. Operation schedules must be planned to avoid unnecessary energy consumption during setup and dismantling.

5.3 Shared infrastructure and duplication reduction

To avoid duplicate resource acquisition and redundant infrastructure:

- Members shall consult the asset register before requesting new equipment, verifying that existing resources cannot be shared or repurposed.
- Collaboration between project teams is encouraged to maximize utilization of shared tools and facilities.

5.4 Operational good practices

Members are required to adopt consistent routines to reduce waste and energy consumption:

- At the end of each day or activity, ensure that lights are off, devices are shut down, laboratory fume hoods and extraction systems are closed (where safe), and consumables are stored properly.
- Ensure that safety and environmental checks are conducted, including proper disposal of hazardous substances and securing any equipment that may pose a risk.
- Report any equipment malfunction, leaks, or irregular energy use to the responsible officer for prompt resolution.

6. Procurement and lifecycle of hardware/electronics

6.1 Purchasing criteria (necessity, efficiency, durability, modularity)

Purchasing decisions shall prioritize necessity and sustainability:

- **Necessity:** New purchases require justification based on project objectives, existing inventory, and the absence of suitable alternatives.
- **Efficiency:** Equipment shall be selected based on energy efficiency, lower environmental impact, and expected performance longevity.
- **Durability:** Preference shall be given to robust, reliable products with longer lifespans and good maintenance support.
- **Modularity:** Modular or upgradeable equipment shall be favored to facilitate future repairs, upgrades, and reuse.

6.2 Refurbished/second-hand priority and minimum requirements

Whenever possible, ASTREO shall source refurbished or second-hand equipment. Minimum requirements include:

- Certification or verification that refurbished items are in good working condition.
- Warranty coverage or clear return policies where applicable.
- Compliance with safety and performance standards required for research activities.

6.3 Maintenance, repair, and internal reuse

- **Maintenance:** Regular maintenance schedules shall be established for critical equipment to ensure optimal performance and longevity.
- **Repair:** Members must prioritize repairing equipment before considering replacement. Repairs shall be documented and, where appropriate, performed by qualified personnel.
- **Internal reuse:** Decommissioned equipment or components still suitable for use shall be recorded in the asset register and made available for reuse in other projects.

6.4 E-waste management and compliant disposal

E-waste must be managed responsibly:

- Members are prohibited from discarding electronic devices or components in regular waste streams. E-waste shall be collected and stored separately.
- Data storage devices must undergo secure data erasure or destruction before disposal to protect sensitive information.

6.5 Traceability (asset register, service life, decommissioning)

The asset register shall record:

- Acquisition date, supplier, and warranty information.
- Maintenance and repair history.
- Expected service life and condition assessments.
- Decommissioning decisions, including reasons and disposal methods.

Traceability ensures accountability, facilitates audits, and informs procurement planning to avoid unnecessary purchases.

7. Mobility, business travel, and events

7.1 “Remote-first” principle and participation criteria

ASTREO adopts a remote-first approach: whenever feasible, meetings, collaborations, and events should be conducted virtually. Physical attendance is justified only when remote participation is impractical or where in-person presence adds significant value (e.g., hands-on laboratory work, critical field tests). Participation criteria include the importance of the event, potential for knowledge exchange, and environmental impact of travel.

7.2 Transport hierarchy (rail/bus → car sharing → air as last resort)

To minimize transport emissions, ASTREO requires adherence to the following hierarchy:

- **Rail/bus:** Prioritize rail or bus travel for medium-range trips where available.
- **Car sharing:** If public transportation is not feasible, car sharing or pooling arrangements shall be used to minimize per-capita emissions.
- **Air travel as last resort:** Air travel is permitted only when no reasonable alternative exists or when it is essential for mission-critical activities. When air travel is unavoidable, direct flights are preferred to reduce total emissions.

7.3 Efficient planning (trip consolidation, delegation, minimum attendance)

Members shall plan travel to maximize efficiency:

- Consolidate multiple meetings or tasks into a single trip where possible.
- Delegate attendance to representatives who can cover multiple roles or report back to the team.
- Limit the number of attendees to the minimum necessary to achieve project objectives.

7.4 Sustainable logistics for booths/stands and materials

For events involving booths or stands:

- Use reusable or modular structures to minimize waste from single-use materials.
- Plan transport to minimize trips and maximize load efficiency (e.g., using shared vehicles or consolidated shipping).

- Ensure that promotional materials are designed for repeated use and printed in limited quantities when digital alternatives are not feasible.

7.5 Travel reporting (minimum data to be recorded)

Members must document travel for sustainability monitoring. Minimum data includes:

- Purpose of the trip and justification for in-person attendance.
- Mode(s) of transportation used and route details.
- Number of travelers from ASTREO.
- Distance traveled (approximate) or travel duration to allow estimation of emissions.
- Any constraints encountered that influenced travel choices.

8. Smart working and digital practices

8.1 Smart working and commuting reduction

ASTREO encourages remote work and flexible scheduling to reduce commuting and associated emissions. Members shall:

- Use telecommunication tools for meetings, collaboration, and problem-solving when possible.
- Limit commuting to instances where physical presence is essential for laboratory work, equipment operation, or team cohesion.
- Coordinate work schedules to reduce peak-time travel and enable public transport use.

8.2 Digital collaboration (tools, version control, archiving)

To enhance efficiency and reduce duplication:

- Use approved digital collaboration platforms for document creation, version control, and communication.
- Ensure that version control systems are used for code, data, and documents, with clear naming conventions and access permissions.
- Archive obsolete files and repositories according to documented procedures to maintain a manageable digital footprint while preserving knowledge.

8.3 Responsible data use (cloud, email, video conferencing)

- **Cloud services:** Choose providers with strong environmental credentials where feasible. Avoid unnecessary data duplication and remove outdated files from cloud storage.

- **Email practices:** Minimize large attachments by using shared links or collaborative platforms. Unsubscribe from non-essential mailing lists and delete obsolete messages.
- **Video conferencing:** For long meetings or frequent calls, encourage participants to disable video when practical to reduce bandwidth and energy consumption.

8.4 Printing and paper-based materials (criteria, exceptions, rules)

Printing must be minimized. Members shall:

- Use digital documents for internal and external communication.
- Print only when required for legal, safety, or specific technical reasons.
- Use double-sided printing and recycled paper when printing is necessary.
- Dispose of confidential printed materials via secure recycling channels.

Exceptions may be granted only if printing is essential for compliance or project needs, with approval documented by the responsible officer.

9. Prototyping, laboratories, and technical activities

9.1 Sustainable design (modularity, repairability, component reuse)

During design and prototyping:

- **Modularity:** Components should be designed to be replaceable and upgradable, facilitating repairs and reducing waste.
- **Repairability:** Designs should allow for disassembly without damaging parts, enabling repair and maintenance.
- **Component reuse:** Plan for future reuse of components by standardizing parts and connectors where possible.

9.2 3D printing and fabrication (waste reduction, iteration optimization)

For 3D printing and fabrication activities:

- Optimize design files to minimize material use and support structures.
- Consolidate test runs to reduce the number of iterations and associated waste.
- Collect and segregate printing waste for recycling or reuse in compliance with available processes.

9.3 Materials and consumables management (procurement, inventory, reuse)

- Maintain accurate inventories of materials and consumables, including chemicals, adhesives, and filaments.

- Purchase materials in quantities appropriate to project needs to avoid overstocking and waste.
- Evaluate options for returning unused materials to suppliers or reallocating them to other projects.

9.4 Safety, substances, and batteries (procedures, disposal)

- Follow established safety procedures for handling chemicals, gases, and hazardous substances, including use of PPE and proper storage.
- Batteries must be selected for longevity and efficiency. Used batteries shall be collected separately and disposed of through authorized recycling channels.
- Safety data sheets and handling instructions shall be readily accessible in laboratories, and members must receive training in safe handling and emergency response.

9.5 Shipping and transport (packaging reduction, planning)

When shipping materials or equipment:

- Choose packaging that balances protection with minimal materials; prioritize reusable or recyclable packaging.
- Plan shipments to consolidate multiple items and reduce the number of deliveries.
- Coordinate with suppliers to reduce packaging when feasible and request returnable containers where available.

10. Measurement, KPIs, and reporting

10.1 Minimum indicators (travel, procurement, 3D printing, digital-energy proxies)

ASTREO shall track indicators to monitor environmental performance, including:

- **Travel:** Number of trips, modes of transport, travel distances or durations, and estimated emissions.
- **Procurement:** Quantity of new equipment, proportion of refurbished or second-hand purchases, and maintenance/repair activities.
- **3D printing and prototyping:** Volume of materials used, waste generated, number of iterations, and reuse of components.
- **Digital-energy proxies:** Estimated energy consumption of data storage, server use, and digital communication activities.

10.2 Estimation methodology (conservative assumptions, data sources)

Estimates shall be calculated using conservative assumptions and transparent methodologies:

- Use recognized emission factors for transport modes and energy consumption where available.
- Base assumptions on publicly available data or institutional guidelines. When precise data is unavailable, err on the side of overestimating environmental impact to encourage greater reductions.
- Document data sources, assumptions, and calculation methods for reproducibility.

10.3 Annual objectives and improvement plans (without numeric targets)

Each year, ASTREO shall set qualitative objectives for improving environmental performance, such as increasing the use of refurbished equipment, reducing unnecessary travel, and enhancing data efficiency. Improvement plans shall outline actions, responsible persons, and timelines, without specifying quantitative targets.

10.4 Internal and external reporting (frequency, format, transparency)

- **Frequency:** Internal reports shall be prepared annually, summarizing performance against KPIs, progress toward objectives, and areas for improvement. Significant incidents or achievements may warrant interim reports.
- **Format:** Reports shall follow a consistent structure, including narrative descriptions, indicator tables, and qualitative analysis. Visual aids may be included to improve clarity.
- **Transparency:** Annual summaries shall be shared with members, advisors, and stakeholders. Sensitive data or proprietary information shall be managed appropriately but overall transparency is expected.

11. Compliance, non-compliance, and corrective actions

11.1 Minimum requirements and behavioral obligations

Compliance with this policy is mandatory. Members are required to:

- Follow all procedures and rules set forth herein.
- Complete required training and stay informed about updates.
- Report any suspected or actual non-compliance.

Non-compliance may include misuse of resources, failure to follow procurement protocols, or unauthorized disposal of e-waste. Instances of non-compliance shall be recorded and addressed promptly.

11.2 Reporting and handling of non-compliance

- Members must report potential non-compliance to the Team Lead via a designated channel.
- Reports shall be kept confidential where necessary, and retaliatory actions against reporters are prohibited.

11.3 Corrective and preventive actions (CAPA)

When non-compliance is confirmed:

- **Corrective actions:** Immediate steps are taken to rectify the situation, such as disposing of waste properly or updating records.
- **Preventive actions:** Measures are implemented to prevent recurrence, including procedural changes, additional training, or updates to the policy.
- CAPA documentation must include details of the issue, actions taken, responsible individuals, and outcomes.

11.4 Controlled exceptions (when allowed and how they are authorized)

Exceptions to the policy may be granted only when justified by operational necessity, safety, or other compelling reasons. The process is as follows:

- The requesting member must submit a written justification to the Team Lead.
- The justification must explain why compliance is impractical and describe the alternative measures considered.
- Approved exceptions shall be monitored and reviewed regularly.

12. Educational role, external responsibility, and partnerships

12.1 Outreach and sustainability education

ASTREO recognizes its educational role in promoting sustainability within the broader community. Outreach activities shall:

- Incorporate sustainability themes into workshops, lectures, and public demonstrations, highlighting the connection between space sustainability and environmental stewardship.
- Engage students and youth with hands-on activities that emphasize resource efficiency and responsible design.
- Collaborate with academic partners to integrate sustainability topics into curricula where relevant.

12.2 Ethical expectations for sponsors/partners

ASTREO seeks partnerships aligned with its values. Sponsors and partners are expected to:

- Demonstrate commitment to environmental responsibility and social ethics.
- Provide transparent information about their sustainability practices.
- Avoid practices inconsistent with ASTREO's mission or that could compromise the team's environmental integrity.

ASTREO reserves the right to evaluate potential partnerships for alignment with these expectations and to disengage from relationships that undermine environmental objectives.

12.3 Contribution to the broader discussion on space sustainability and Earth impact

Through research, publications, and participation in academic and industry forums, ASTREO shall contribute to discourse on space debris mitigation and the environmental impacts of space activities. This includes sharing lessons learned from internal sustainability initiatives and advocating for responsible practices in the aerospace sector.

13. Policy review and continuous improvement

13.1 Review frequency and triggers

The Green Policy shall undergo a formal review every two years or sooner if:

- New projects introduce significant changes to resource use or environmental impact.
- Major events or partnerships require new sustainability considerations.
- Team growth necessitates adjustments to governance structures or operational procedures.
- Feedback from members or stakeholders indicates areas for improvement.

13.2 Update and approval process

- Draft revisions are circulated to the Team Lead, Project Leads, and relevant advisors for comment.
- The Team Lead approves final revisions, and the revised policy is assigned a new version number and date.

13.3 Communication of changes and training

- Upon approval, changes shall be communicated to all members through official channels.

- Updated training materials shall be prepared, and members must complete refresher training within a defined timeframe.
- A summary of changes shall accompany the revised policy to facilitate understanding and compliance.

14. Conclusions and statement of commitment

14.1 Astreo's formal commitment

ASTREO formally commits to integrating environmental sustainability into all facets of its research, development, and operational practices. This Green Policy reflects our recognition of the interconnectedness of Earth and space environments and our responsibility to preserve them for future generations. Through continual improvement, transparency, and adherence to the principles set forth herein, ASTREO strives to be a role model for sustainability in the aerospace research community.

14.2 Entry into force and document validity

This policy enters into force on 29 January 2026 and shall remain valid until replaced or amended by a subsequent version. All members, collaborators, volunteers, and stakeholders are required to abide by the provisions of this document.

President - Francesco Sulli

