Space Center Houston

Mission Innovation Challenge

Competition Guide

Elementary School

Spring 2026 Mission: Carbon Capture System

CHALLENGE OVERVIEW

An issue that is facing both the future of space travel and life on planet Earth is the accumulation of greenhouse gases in closed systems. As human beings, any environment we occupy will eventually show an increase in Carbon Dioxide. If unchecked, this can lead to a myriad of problems from carbon dioxide poisoning in a space-faring vehicle to climate change here at home.

Imagine waking up on the International Space Station and seeing a warning: CO_2 levels are rising. Astronauts need a safe, simple way to pull extra carbon dioxide out of the air—fast—without heavy equipment or lots of power.

NASA has experimented with different solutions for capturing carbon from the air in the past. As they look ahead to longer duration missions, many of these solutions will need to be improved or new, scalable solutions implemented. The STEM Innovation in Schools program will support your students as they attempt to solve this problem in unique ways.

Your mission in The Carbon Capture Challenge is to design and pitch a space-ready concept for a CO_2 recapture device that could be used on the ISS, Lunar Gateway, or Artemis habitats. You'll focus on Design & Conceptualization and telling a clear story of how your idea would work in real life. (Testing/redesign are encouraged for older grades but are not required for scoring.)

ELIGIBILITY

Who Can Enter:

Students in **K–12** (public, charter, private, homeschool, and community-based programs are all welcome).

Entry Type

Individual or **team** entry.
Team size: **2–5 students**.

Grade Divisions

K–5, 6–8, 9–12.

Entry Limits

One submission per student (either solo or on one team). **One slide deck per team.**

Original Work

Entries must be the team's **own original work**. Properly **credit all sources** and images used.

PRIZES

Winners will receive two general admission tickets to Space Center Houston and a virtual chat with an astronaut. Winners will be chosen from Individual and Group Submissions.

OBJECTIVE

Design and share an idea for a CO_2 cleaning system that astronauts could use on the ISS, Gateway, or Moon habitats.
Your project should:

- **Explain the problem and who will use your idea.**
- **Show how your idea will clean the air.**
- **Include a picture or drawing of how it works.**

- Tell why your idea is important and how it helps the astronauts.

DELIVERABLES (ONE SLIDE DECK PER TEAM)

Acceptable presentation formats include:

- Microsoft PowerPoint
- Google Slides
- PDF (Word or Google Document)

Acceptable video formats include (video can be included in your presentation):

- MP4
- MOV
- AVI

Maximum Slide Deck Count: 8 slides

Required Sections (use these as slide titles)

1. TITLE & TEAM
    - What is the name of your idea?
    - Who is on your team?
    - What grade and school are you from?
2. MISSION CONTEXT & USERS
    - What problem are you solving?
    - Where will this be used (ISS, Gateway, Moon, Mars)?
    - Why is it important to solve this problem for astronauts?
3. CRITERIA & CONSTRAINTS
    - What must your idea do to work well?

    - What limits do you have (size, weight, power, safety, crew time)?
    - Which limit is the hardest to solve?
4. CONCEPT OVERVIEW & VISUAL — HOW IT WORKS
    - How does your idea work, step by step?
    - What makes it special or different?
    - What materials would it need?
    - Include a drawing or diagram.
5. IMPACT & WHY THIS DESIGN
    - How will this help astronauts?
    - What trade-offs did you think about (e.g., smaller but slower)?
    - If you had more time, how would you make it even better?
6. REFERENCES & CREDITS
    - What sources helped you?
    - Who created each image or drawing?
    - Who helped you (teachers, parents, friends)?

KEY VOCABULARY

- **CO_2 (Carbon Dioxide):** A gas we breathe out; too much is unsafe.
- **Carbon Capture/Removal:** Taking CO_2 out of the air to keep it safe to breathe.
- **Life Support System:** Tools that keep astronauts alive (air, water, temperature).
- **Habitat:** A place where astronauts live and work in space.
- **Criteria (Must-Haves):** What your idea must do to be a success.
- **Constraints (Limits):** Rules or limits like size, weight, or power.
- **Mass:** How heavy something is.
- **Volume:** How much space something takes up.
- **Power:** Energy needed to run a device.

- **Crew Time:** How much astronaut time it takes to use or fix something.
- **Maintainability:** How easy it is to keep something working.
- **Trade-Off:** Choosing one good thing even if it means another thing isn't as good.
- Artemis / Gateway / ISS: Current NASA programs with habitats/stations where your idea could be used.