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WELCOME TO THE COMMUNITY OF PRACTICE WEBINAR SERIES

- ▶ **Keep your mics muted and cameras off**
 - Helps ensure a clean recording
- ▶ **The recording will be posted online**
 - nasa.gov/flightopportunities
 - Resources menu
 - Community of Practice webinars
- ▶ **Please engage!**
 - Post your questions in the chat

National Aeronautics and Space Administration

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ABOUT THE COMMUNITY OF PRACTICE WEBINAR SERIES



An opportunity to hear from subject matter experts on best practices for preparing for suborbital flight tests



Researchers, program staff, and flight providers



Connecting and sharing information and lessons learned to:

- Increase the impact of suborbital flight tests
- Transfer best practices
- Optimize the experience of current and prospective program participants

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JOIN US FOR COMMUNITY OF PRACTICE WEBINARS

Subscribe to our newsletter for updates on future webinars!

<https://www.nasa.gov/directorates/spacetech/flightopportunities/newsletter>

Future webinars

- Webinars are usually held 1st Wednesday of each month at 10 a.m. PT.
- Topics are announced in the Flight Opportunities newsletter and website.
- Session recordings are posted on the Flight Opportunities website.
- Let us know session topics you would like to see covered.

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TODAY'S SPEAKERS



Dr. Kerrigan Cain
Research Engineer,
Photovoltaic and
Electrochemical
Systems Branch,
NASA's Glenn
Research Center



Gene Arkenberg
Chief Engineer /
Clean Energy
Engineering
Manager,
Teledyne Energy
Systems, Inc.



Chris Cox
Director of Product
Development,
Teledyne Energy
Systems, Inc.



Ben Boxler
Fuel Cell Program
Manager,
Teledyne Energy
Systems, Inc.

National Aeronautics and Space Administration

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Advancing Space Power Capabilities Through Flight Tests

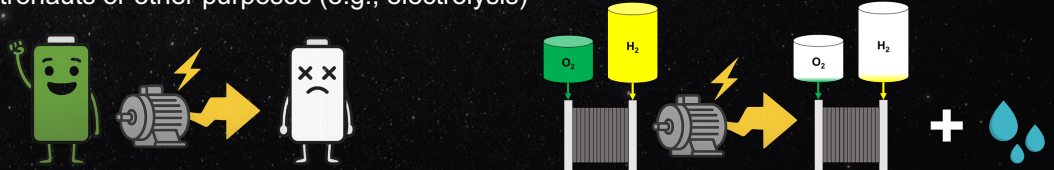
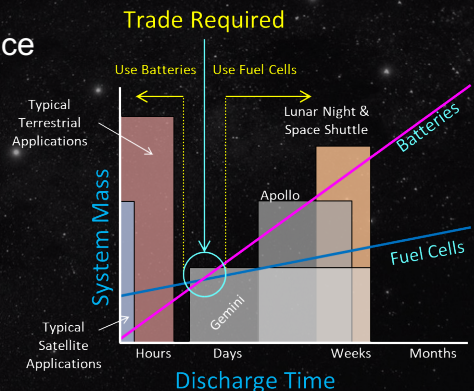
Fuel Cell Technology and Hydrogen Electrical Power System Tipping Point Overview
Dr. Kerrigan Cain | Photovoltaic and Electrochemical Systems Branch | NASA Glenn Research Center

April 1st, 2026

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Fuel Cells: What and Why?

- **Electrochemical Systems:** Energy conversion device to convert chemical energy into usable electrical energy (e.g., batteries and fuel cells)
- **Mission Need:** Fuel cells meet the same energy requirements with less mass than batteries as discharge time increases
 - Fuel cells also produce water that can be used to support astronauts or other purposes (e.g., electrolysis)



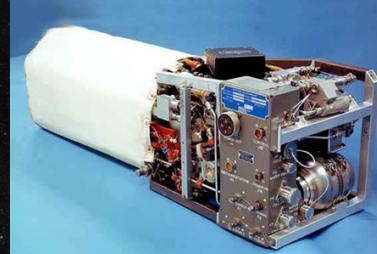
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Tipping Point Award: Why and What?

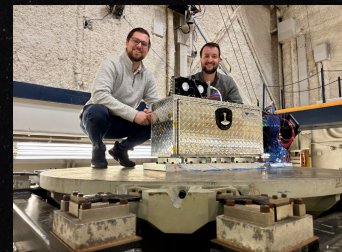


- **Problem:** Availability of flight qualified fuel cells ended with the Space Shuttle Program in 2011
 - Fuel cells were used by Gemini, Apollo, and Space Shuttle missions
- **Challenge:** Terrestrial fuel cells are not directly portable to space applications
- **Hydrogen Electrical Power System (HEPS) Tipping Point:** Partnership between Teledyne Energy Systems Inc. (TESI) and NASA Glenn Research Center (GRC) to significantly mature the fuel cell technology for space applications



(Top Picture) Space Shuttle Orbiter Fuel Cell Power Plant [Burke, K. A., 2003]

(Bottom Picture) HEPS payload at NASA GRC for environmental testing [Photo Credit: TESI]

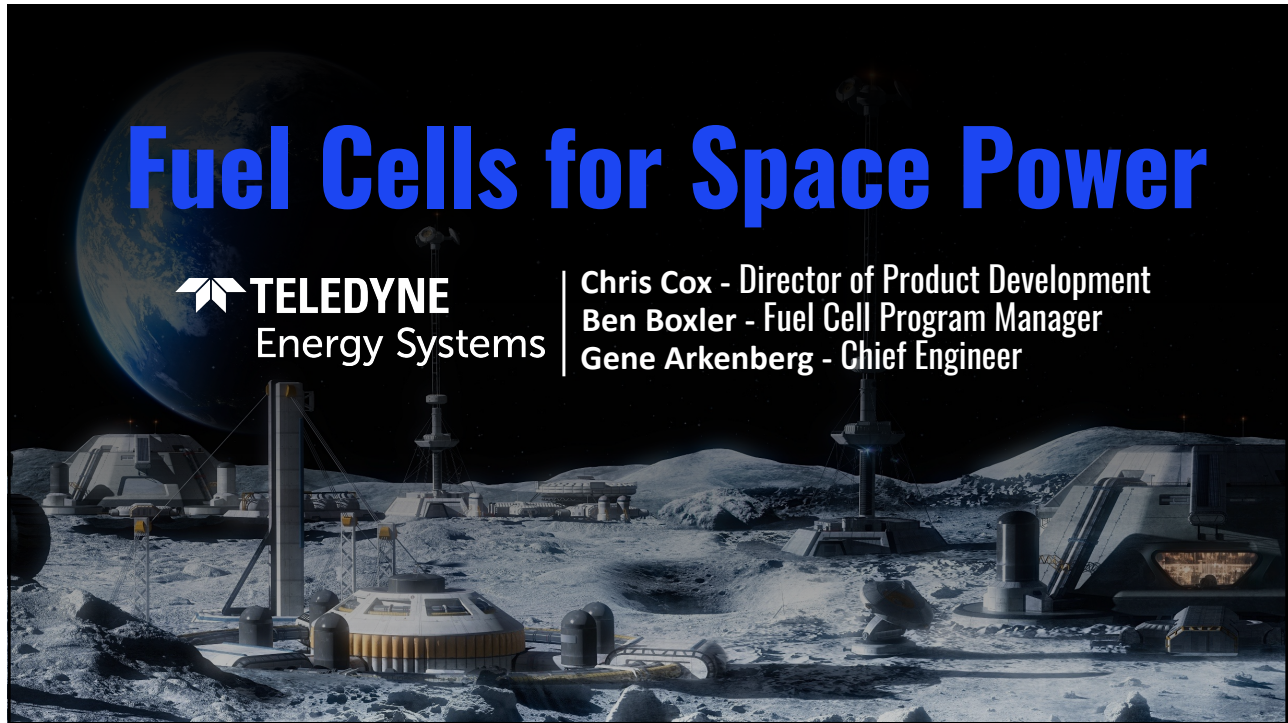


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EXPLORE SPACE TECH

NASA Flight Opportunities Community of Practice
April 2026 | Chris Cox, Ben Boxler, Gene Arkenberg
Teledyne Energy Systems, Inc.

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Teledyne Technologies
Corporate Profile

TDY Stock Symbol	\$5.66B in 2023 revenue, financially strong	~29% of revenue from Aerospace & Defense
15,000+ Employees	65+ Years of experience	58 Successful technology company acquisitions
Develop hardware for deep space missions	Develop X-Rays with higher quality images and lower X-Ray dose	Support oil & gas exploration & production around the globe
Developed first chip-scale atomic clock	Develop avionics systems for large passenger aircraft	Provide monitoring worldwide to protect air & water quality

THOUSAND OAKS, CALIFORNIA

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Teledyne Energy Systems

Location & Facilities

- ▶ Headquartered in Hunt Valley, Maryland.
- ▶ 122,000 ft² in two facilities
- ▶ Manufacturing, Engineering, Design, Testing, Sales & Service / Support
 - Custom systems for remote or challenging applications
- ▶ State-of-the-art Laboratories
 - Thermoelectric
 - Electrochemical
 - Fuel Cell
- ▶ 103 Employees
 - 9 PhD's
 - 14 Masters Degrees
 - 35 Bachelors Science Degrees
 - 45 Production, admin and support

TELEDYNE BROWN ENGINEERING
Everywhere you look[®]

TELEDYNE ENERGY SYSTEMS
Everywhere you look[®]

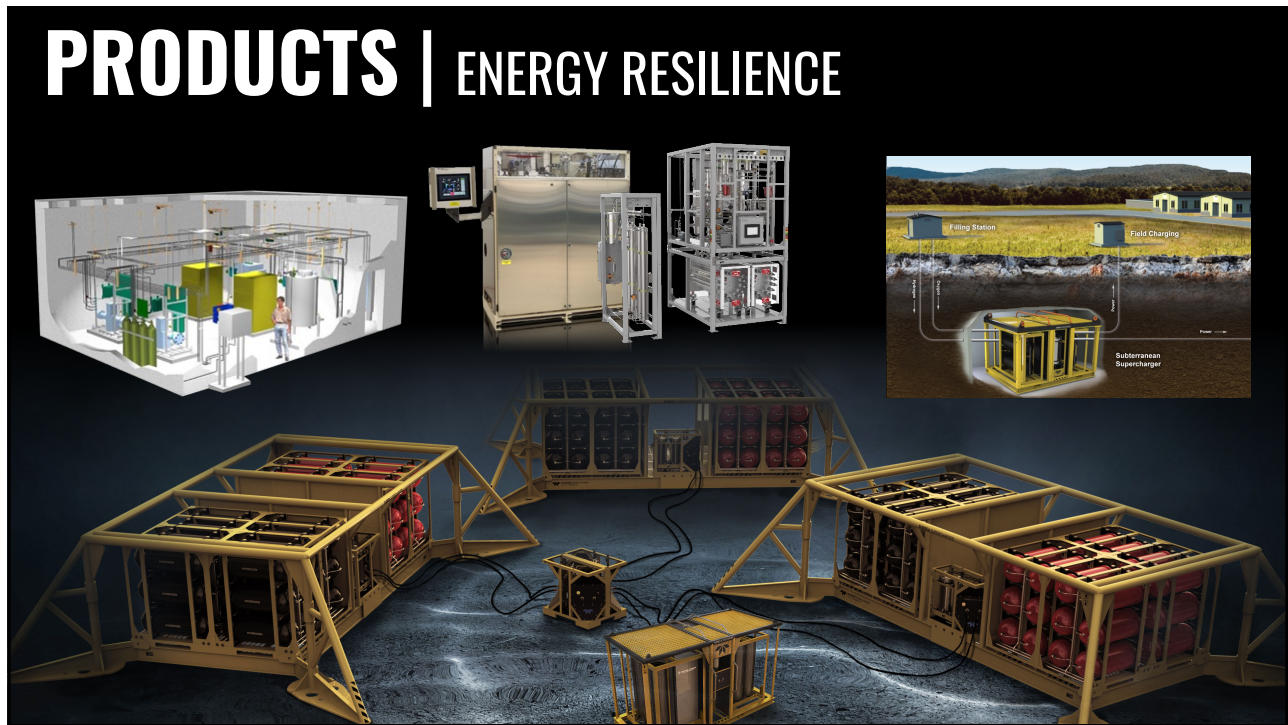
TELEDYNE ADVANCED ELECTRONIC SOLUTIONS
Everywhere you look[®]

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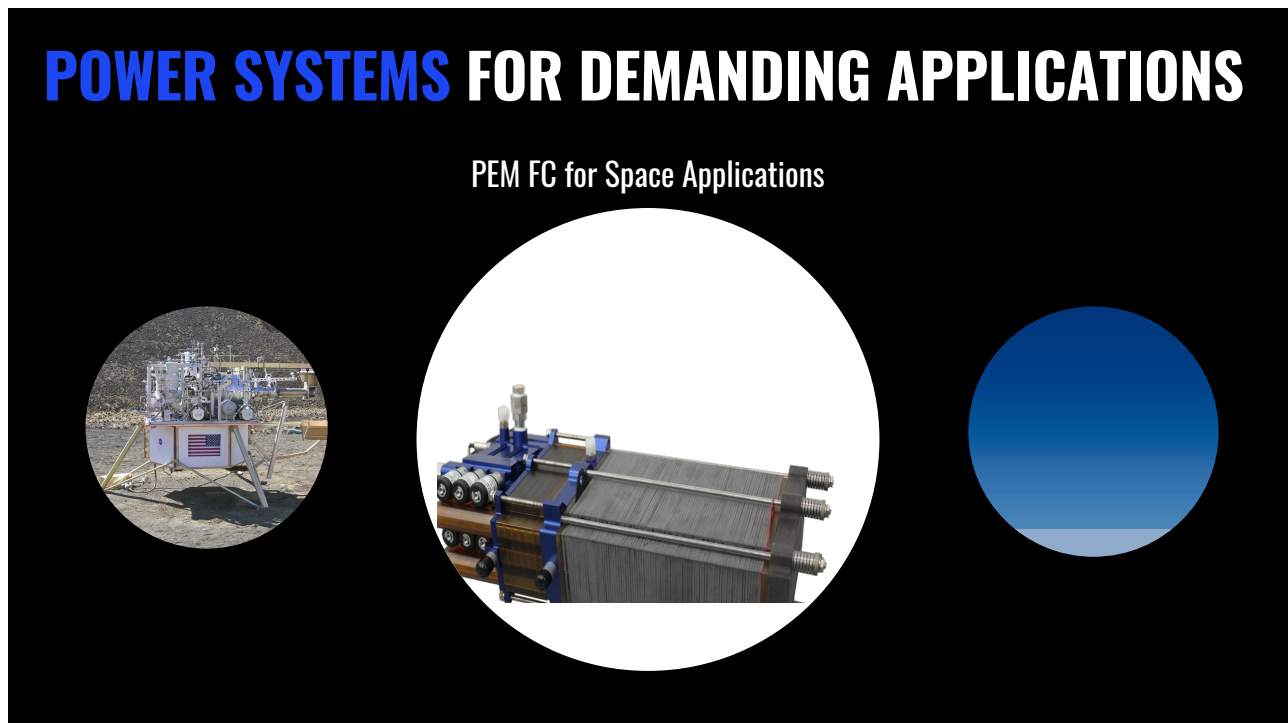
PRODUCTS | ENERGY DOMINANCE

The image displays a variety of energy systems products, including a Mars rover, a fuel cell, a battery pack, and a vertical stack of components, illustrating the company's capabilities in space power.

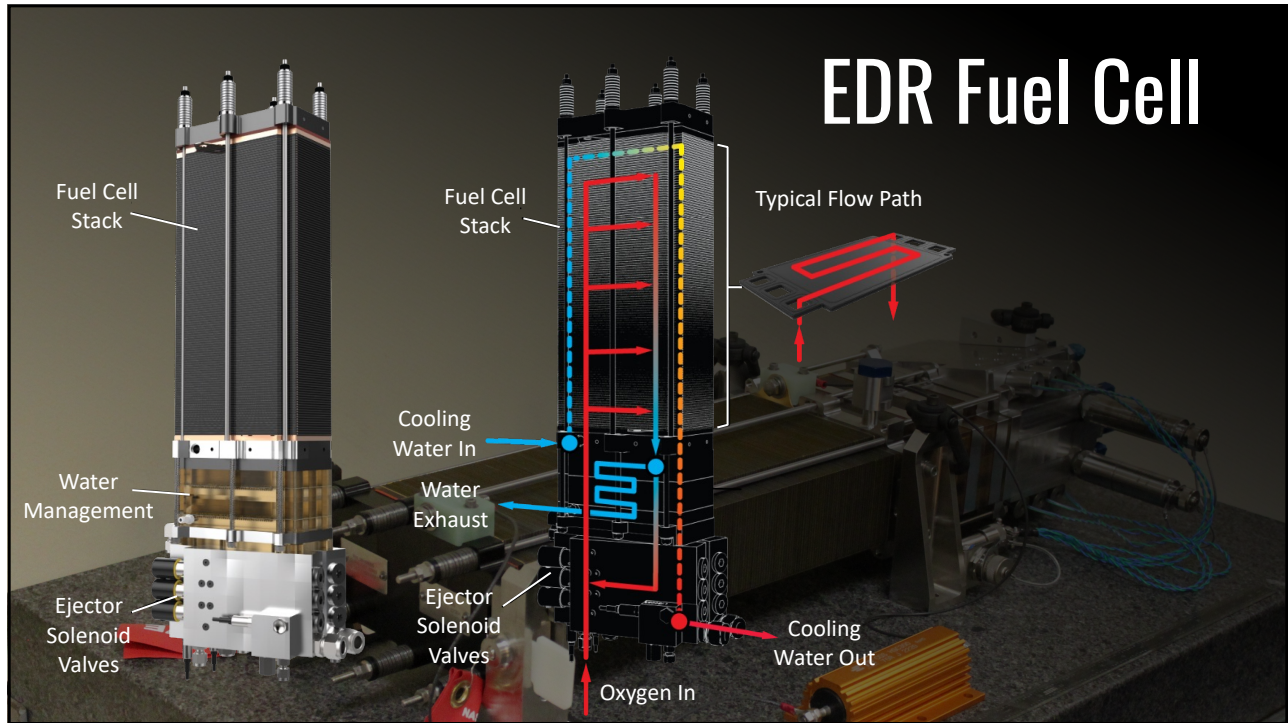
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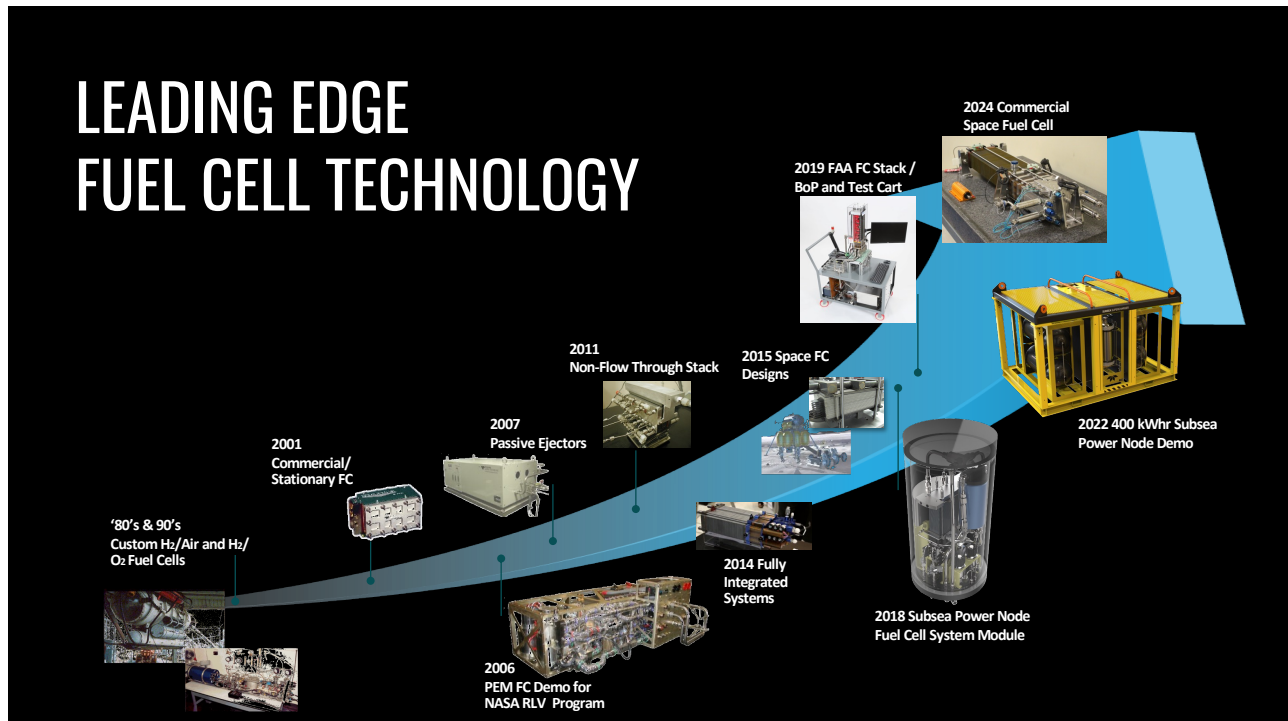
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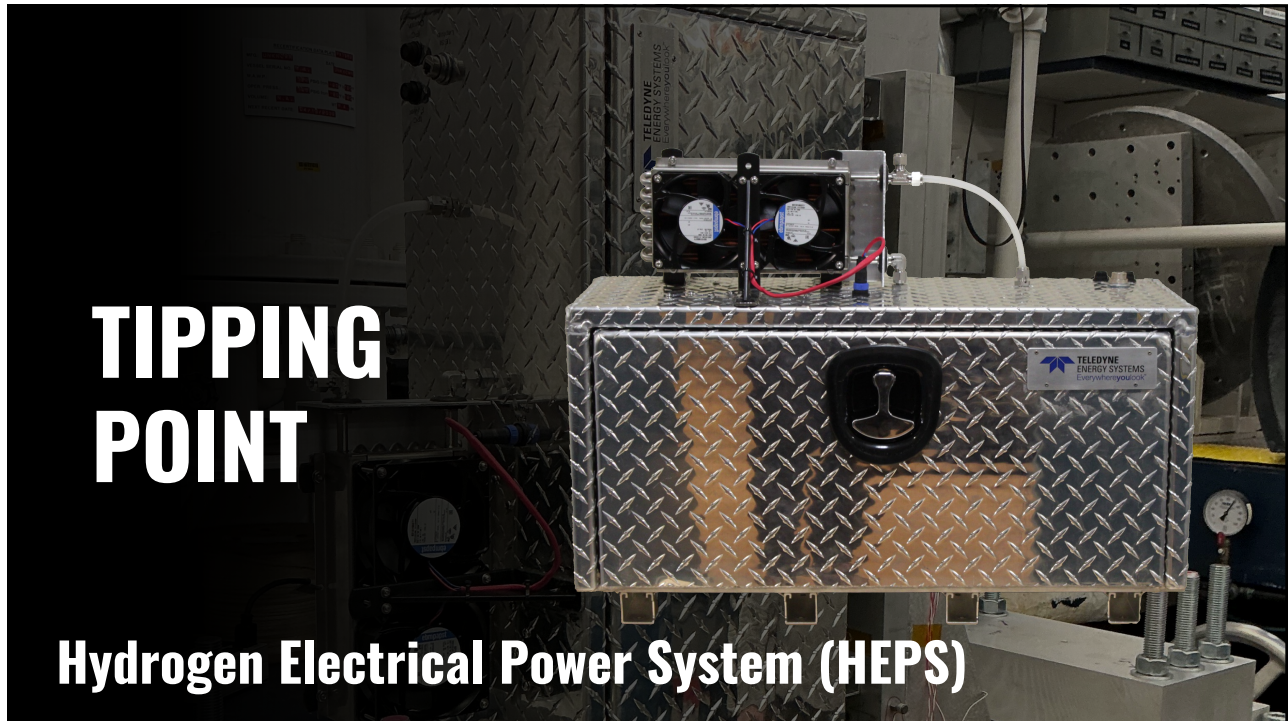
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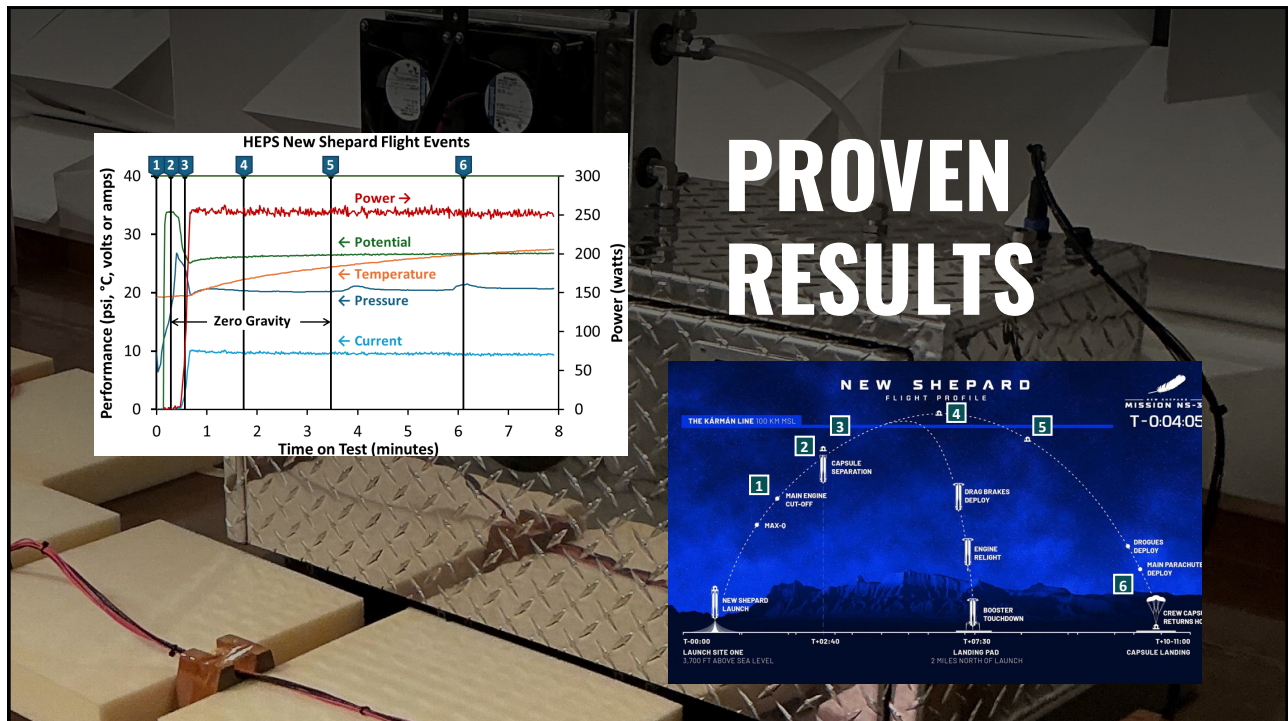
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- NASA-GRC
 - Kerrigan Cain
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 - Anthony Iacovino
- Blue Origin
 - Katie Neuman
 - Paula Adhikari
- Teledyne
 - Michael Brizes
 - Johnny Alston
 - Justin Brown



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QUESTIONS?



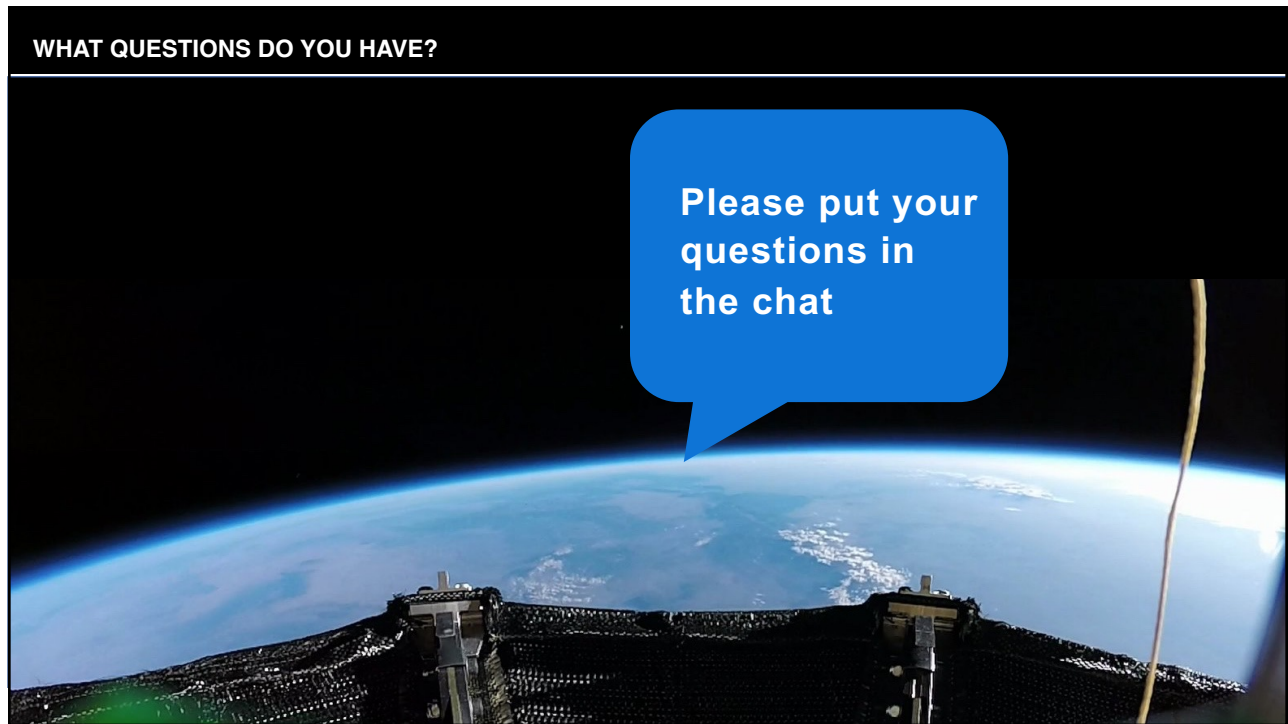
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