



National Aeronautics and Space Administration

# Human Landing System for Lunar Exploration

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# The NASA Charge to the Moon

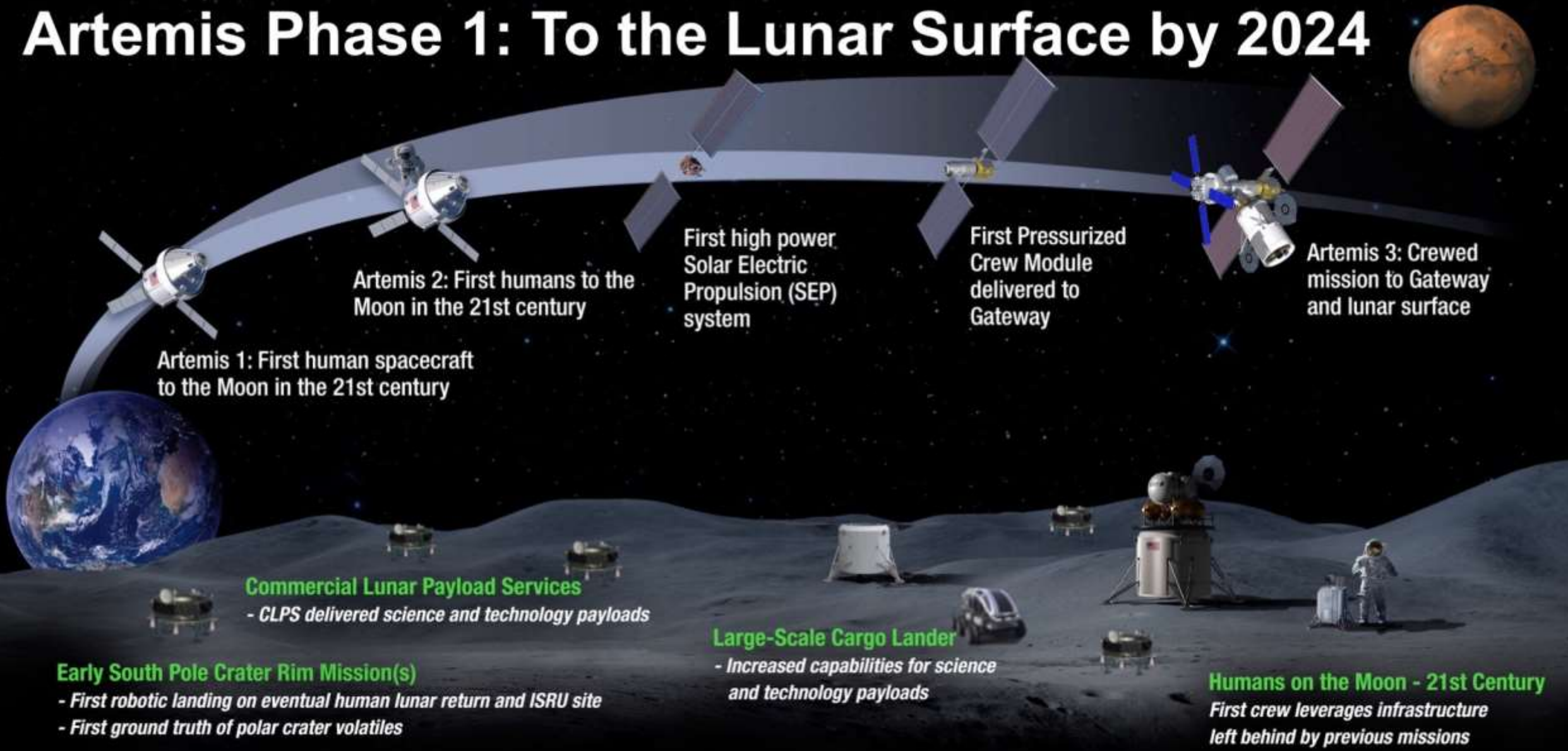
In keeping with SPD-1, NASA is charged with landing the first American woman and next American man at the South Pole of the Moon by 2024, followed by a sustained presence on and around the Moon by 2028.

NASA will “use all means necessary” to ensure mission success in moving us forward to the Moon.



Vice President Mike Pence speaks about NASA's mandate to return American astronauts to the Moon and on to Mars at the U.S. Space & Rocket Center in Huntsville, Alabama.

# Artemis Phase 1: To the Lunar Surface by 2024



## LUNAR SOUTH POLE TARGET SITE

2019

2024

# Achieving 2024 – A Parallel Path to Success

*Artemis will see government and commercial systems moving in parallel to complete the architecture and deliver crew*

## CREW

*NASA Programs SLS and Orion*



### Artemis 1

First flight test of SLS and Orion as an integrated system

### Artemis 2

First flight of crew to the Moon aboard SLS and Orion

### Artemis 3

First crew to the lunar surface; Logistics delivered for 2024 surface mission

*Between now and 2024, U.S. industry delivers the launches and human landing system necessary for a faster return to the Moon and sustainability through Gateway.*

## Human Landing System

### PPE

Power Propulsion Element arrives at NRHO via commercial rocket

### Crew Module

Small pressurized crew module launches to Gateway on a commercial rocket

### Transfer

Transfers lander from Gateway to low lunar orbit

### Descent

Descends from Transfer Vehicle to lunar surface

### Ascent

Ascends from lunar surface to Gateway

*Up to three commercial rocket launches, depending on distribution of the Transfer, Descent, and Ascent functions.*



*Commercially Provided Elements*

## CARGO

# Current Thoughts on Human Landing System

## HLS Notional Transportation Elements



### NextSTEP Appendix E: Human Lander System

- Issued: Feb 7
- Proposals submitted: March 25
- Selections: May
- Awards: July
- Phase A Risk Reduction Studies and prototypes for
  - Descent Element
  - Transfer Element
  - Refueling

Studies expedited via Unfinitized Contract Awards

### NextSTEP Appendix H: Human Lander System 2

- Synopsis Issued: April 8, for [Ascent Element](#)
- Synopsis updated: April 26, now for [development, integration, and crewed demonstration of integrated landing system](#)
- Final solicitation: NET July



# 2024

Develop essential hardware and systems required for a 2024 landing

## CREW



At least 2 on the South Pole

## SUITS



Initial capability suit

## EXPEDITION DURATION

Hours-Days (open trade)

## ROCKETS



## PARTNERS



Significant collaboration with U.S. industry



Potential opportunities for international partners

## ACCESS



## REUSABILITY



# 2028

Establish a sustainable human lunar presence with robust, reusable systems

## CREW



Up to 4 on the Moon

## SUITS



Sustained capability suit

## EXPEDITION DURATION

Days-Weeks (open trade)

## ROCKETS



## PARTNERS



U.S. industry and international collaboration



## ACCESS



## REUSABILITY





\*Concept image