



Laying the trusted foundations of a robust lunar economy with commercial delivery, communications, navigation, and mobility services.

And just getting started.

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Lunar Mobility and Power as Key Enablers

Delivering the foundation of our lunar infrastructure

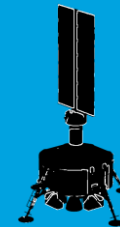
Offering services for a broad and diverse range of partners including NASA, Industry, and International customers

Meeting the challenge to deliver a truly sustained, and sustainable, presence on the Moon



Mobility

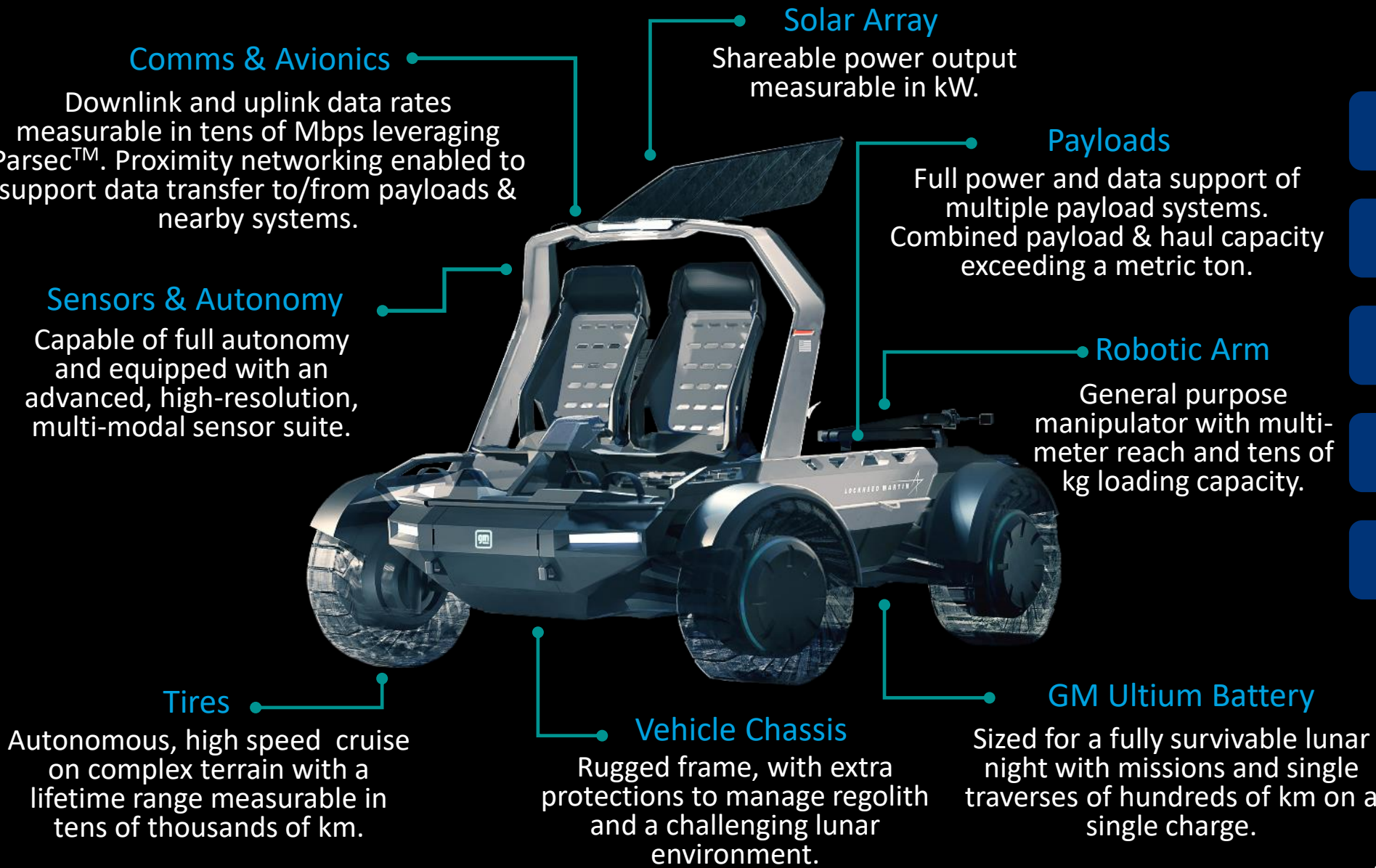
In partnership with GM and MDA, the LMV Rover meets diverse needs for both human and robotic lunar mobility



Power

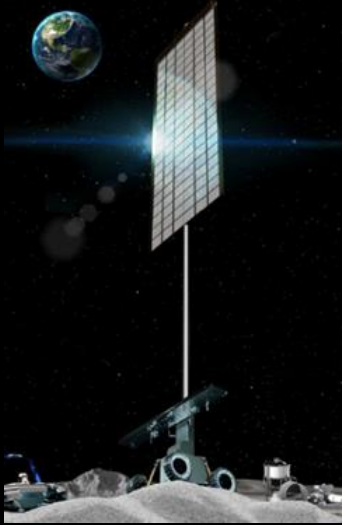
Lockheed Martin is investing in the future of power on the lunar surface, supporting our customers' near and long-term missions

Lunar Mobility Vehicle Rover



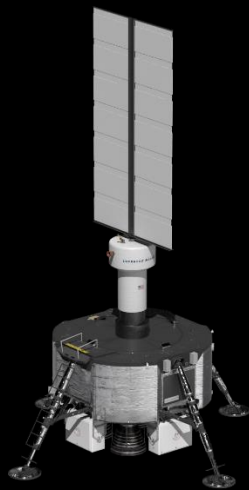
- Full Autonomy & Sensors
- Ruggedized Design
- Long Life
- Paradigm Shifting Mobility
- Evolvable and Scalable

Vertical Solar Array Technology (VSAT)



- The Lockheed Martin VSAT will provide 10kW of mobile power, while being rugged enough to survive the harsh lunar environment for up to ten years.
- It offers transportable solar power generation by means of wheels, a mobility vehicle, and a z-fold flight-qualified array deployment and retraction mechanism.
- The VSAT design leverages the heritage TRL-9 Multi-mission Modular Solar Array (MMSA) and flight proven power conditioning and mechanism hardware.
- The modular VSAT system provides flexible and reliable power solutions for early implementation in the south pole lunar architecture, with a solar array design that is scalable up to 5x the existing design implementation.

Fission Surface Power (FSP)



- The Lockheed Martin FSP will produce >40kWe of continuous power by means of a monolithic core and a direct Brayton power conversion system.
- This technology excels in locations where sunlight is difficult to access for long stretches of time, such as shadowed regions or low latitudes.
- The monolithic core is designed in partnership with BWX Technologies using materials selected for their maturity, simplicity, reliability, and scalability.
- The FSP design leverages innovative, ultra-light deployable radiators with the highest mass efficiency available and utilizes the same z-fold array deployer as VSAT, providing high commonality between technologies.
- The reactor design is highly scalable, capable of increasing reactor power by orders of magnitude.

Power Generation to Support a Robust Lunar Economy

Lunar Surface Power Distribution

- Lockheed Martin recommends implementing Open System Architecture (OSA) principles for lunar surface power distribution.
- OSA describes a set of system design principles which aims to produce systems that are inherently interoperable, modular, scalable, and minimize recourse to retrofit, redesign, and refresh.
- It is critical to implement sufficient design flexibility via OSA into the lunar surface power distribution architecture as it will evolve over time and the needs/use cases will emerge as the architecture develops.

Lockheed Martin Current/Planned Technology Efforts

Power Generation

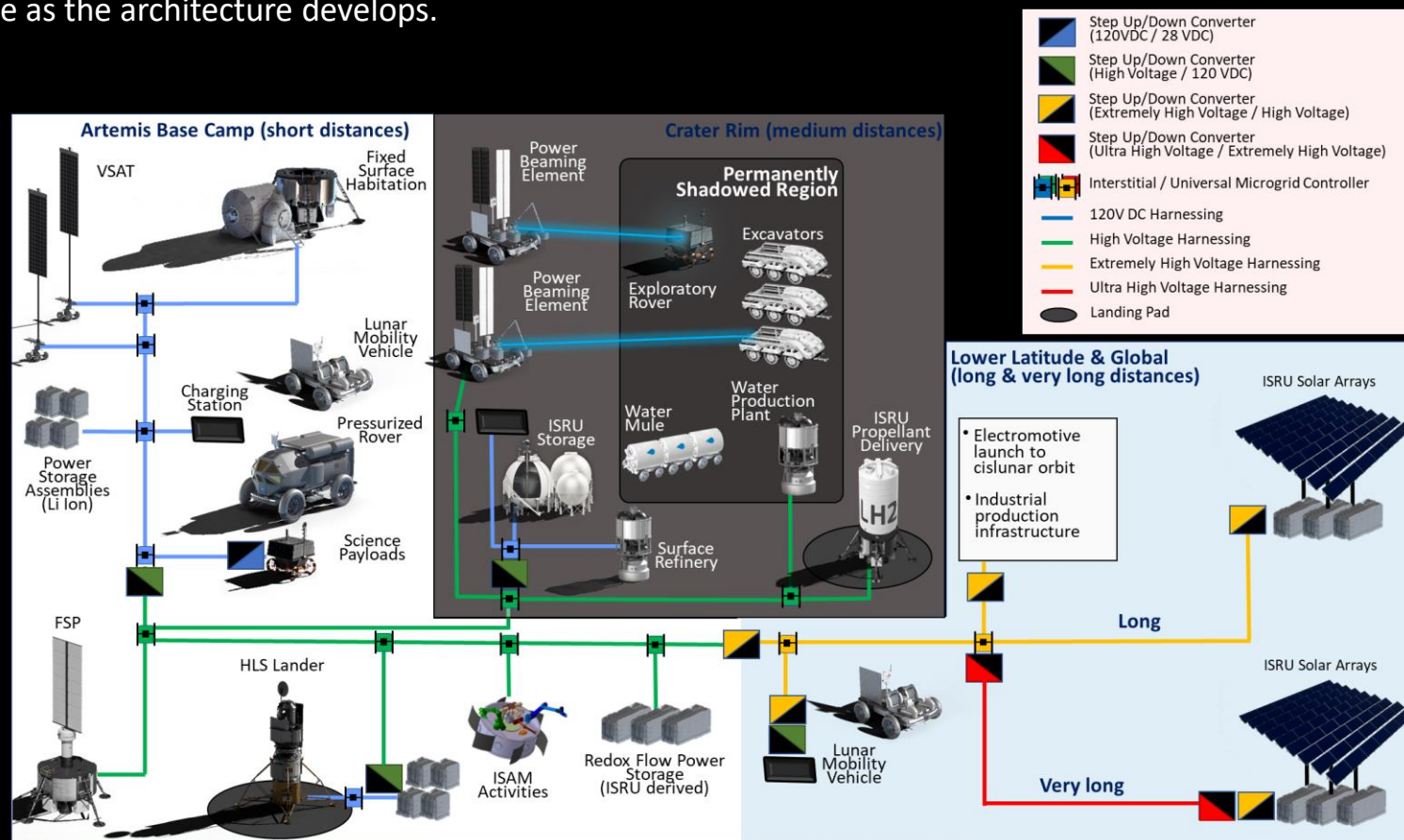
- VSAT
- FSP

PMAD

- High Voltage – Power Conversion Unit (HV-PCU)
- 120VDC/28VDC Power Converter
- Interstitials
- Harnessing

Energy Storage

- GM Ultium Batteries



Questions?



Additional Questions or Comments?

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