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# Capturing the full lunar water ice value chain with OffWorld

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# CAPTURING LUNAR WATER ICE VALUE CHAIN WITH OFFWORLD



**DR GORDON WASILEWSKI  
& OFFWORLD EUROPE TEAM  
27/04/24**

# OFFWORLD MISSION

Enabling permanent human presence on and off our home planet



1. Life insurance policy
2. Sustainable development on Earth
3. Sustainable expansion off planet





VISION

# REVOLUTIONIZING MATERIAL PROCESSING ON EARTH AND IN SPACE



Low Cost

Low Energy

Light Weight

Operates in Extremes

Moving less waste on Earth & Space







OFFWORLD

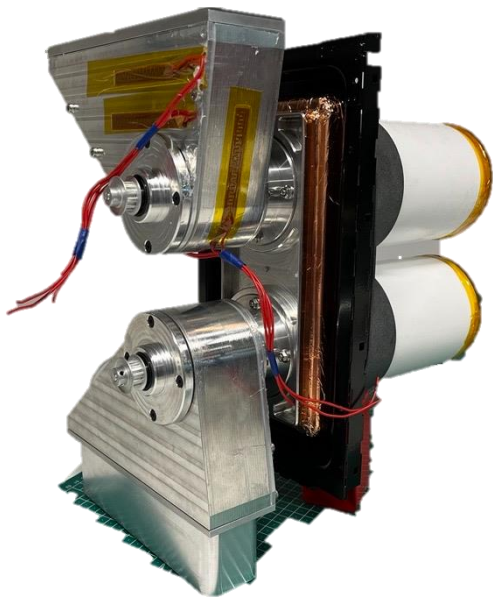
# MICROWAVE

# BUILT TO OPERATE IN LARGE MINES

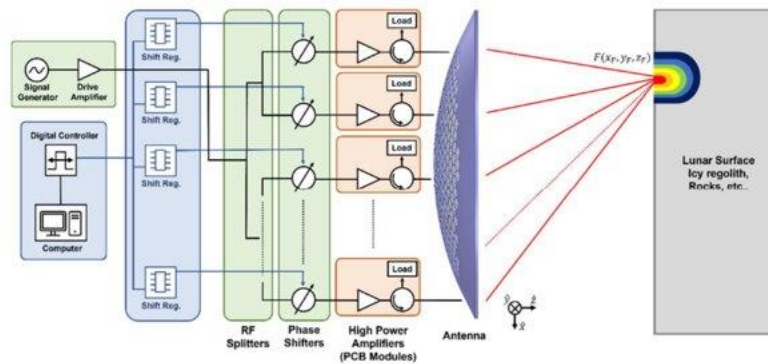




# EXPANDING TO NEW DOMAINS



Volatiles capture in microwave cavity



Volatiles capture using phased array microwave energy projection



# DEMO MISSION 1 – LANDING IN 2027

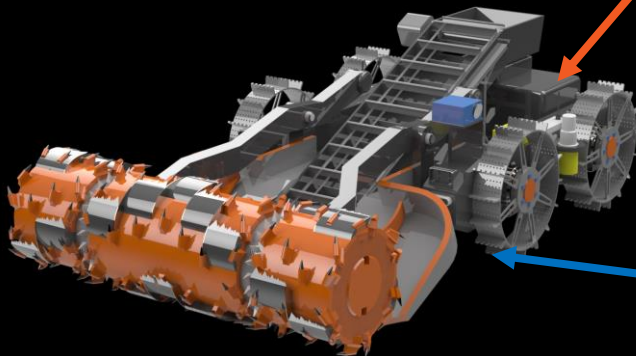
## Goals

Minimum Viable Product (MVP) of the Lunar Processing Module (LPM) and the Lunar Autonomous Mobile Robot (LAMR)

Landing on the Moon in 2027

A single LAMR + LPM capable of traversing to the nearest PSR, excavating **25+** kg of regolith, and producing **4+** liters of crude water

Mission duration: > 12 Earth days



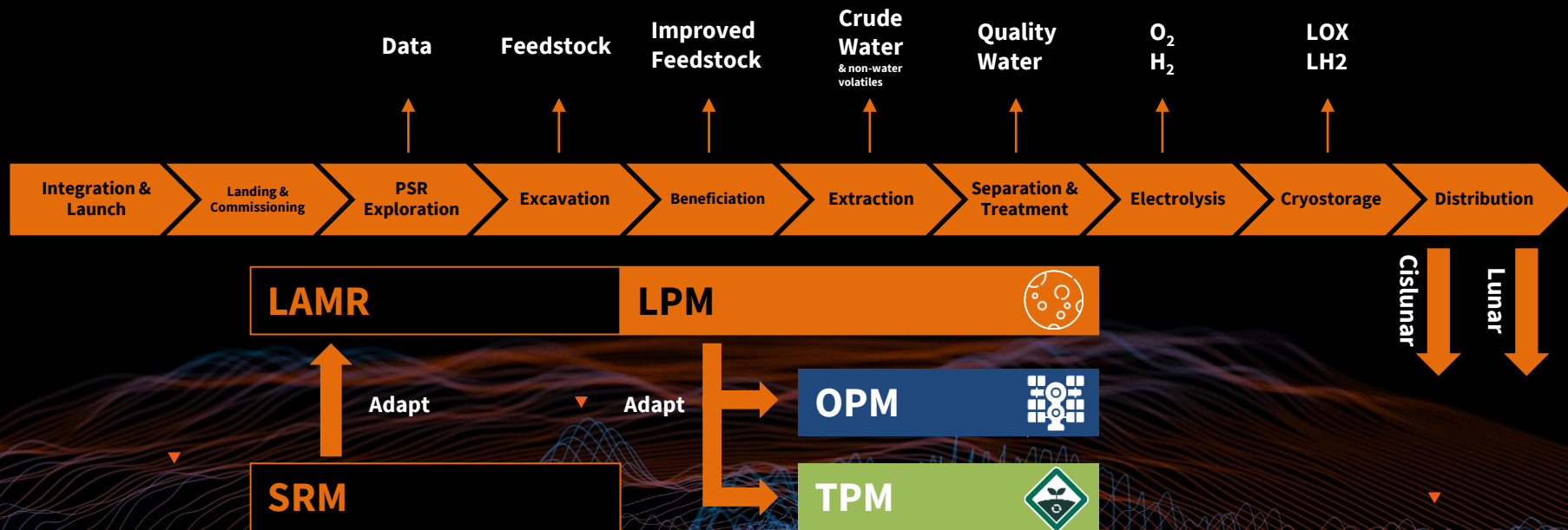
## Lunar Processing Module (OWEU)

The LPM will be able to process the icy regolith and generate large quantities of crude water

## Lunar Autonomous Mobile Robot (OWINC)

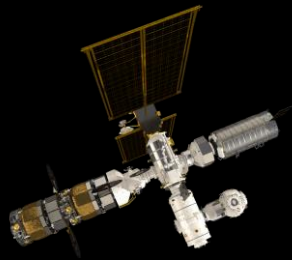
This version of the LAMR will have the capability to traverse into a PSR, excavate and feed the LPM with icy regolith. Other interfaces to the LPM are power, data/comms, thermal control

# LUNAR WATER ISRU VALUE CHAIN





# COMMON CORE VOLATILES EXTRACTION AND PROCESSING TECHNOLOGY



**LIFE SUPPORT**



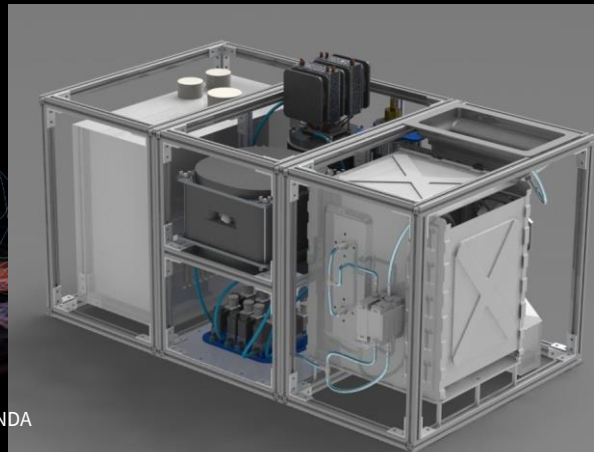
**TREATMENT & DECONTAMINATION**

**LUNAR CONSUMABLES**

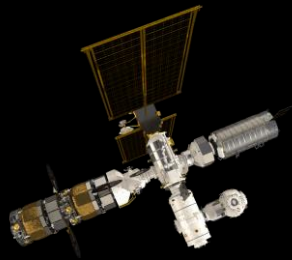


## LPM:

- Regolith handling
- Microwave-based extraction
- Volatiles condensation
- (optional) Water treatment & electrolysis



# COMMON CORE VOLATILES EXTRACTION AND PROCESSING TECHNOLOGY



## LUNAR CONSUMABLES

## LIFE SUPPORT

## TREATMENT & DECONTAMINATION



### LPM:

- Regolith handling
- Microwave-based extraction
- Volatiles condensation
- (optional) Water treatment & electrolysis





A close-up photograph of a large, textured, brownish-grey material, likely a type of soil or sediment, being transported by a screw conveyor system. The material has a rough, crumbly texture.

**Screw conveyance**

A photograph showing a large, dark, irregularly shaped object, possibly a piece of ice or a rock, being processed in a microwave-based ice sublimation system. The object is surrounded by a bright, hazy light, and the background shows industrial equipment with the text "ID: 50078" visible.

**Microwave-based  
ice sublimation**

A photograph showing a bright blue, glowing, and textured surface, likely a low-pressure condensation system. The surface is highly reflective and shows intricate patterns of light and shadow.

**Low pressure  
condensation**

# LPM CAPABILITIES

**80-90%**

of water extracted  
within 3-6 minutes  
compared to hours using  
conventional heating methods

**100 kg/h**

designed processing  
capability,  
giving way to industrial scale  
production

**Derivable to**

ECLS and decontamination  
systems,  
in order to valorize post-ISS commercial space  
station opportunities



OFFWORLD

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