CISLUNAR INDUSTRIES

Enabling a Spacefaring Civilization

The Space Foundry

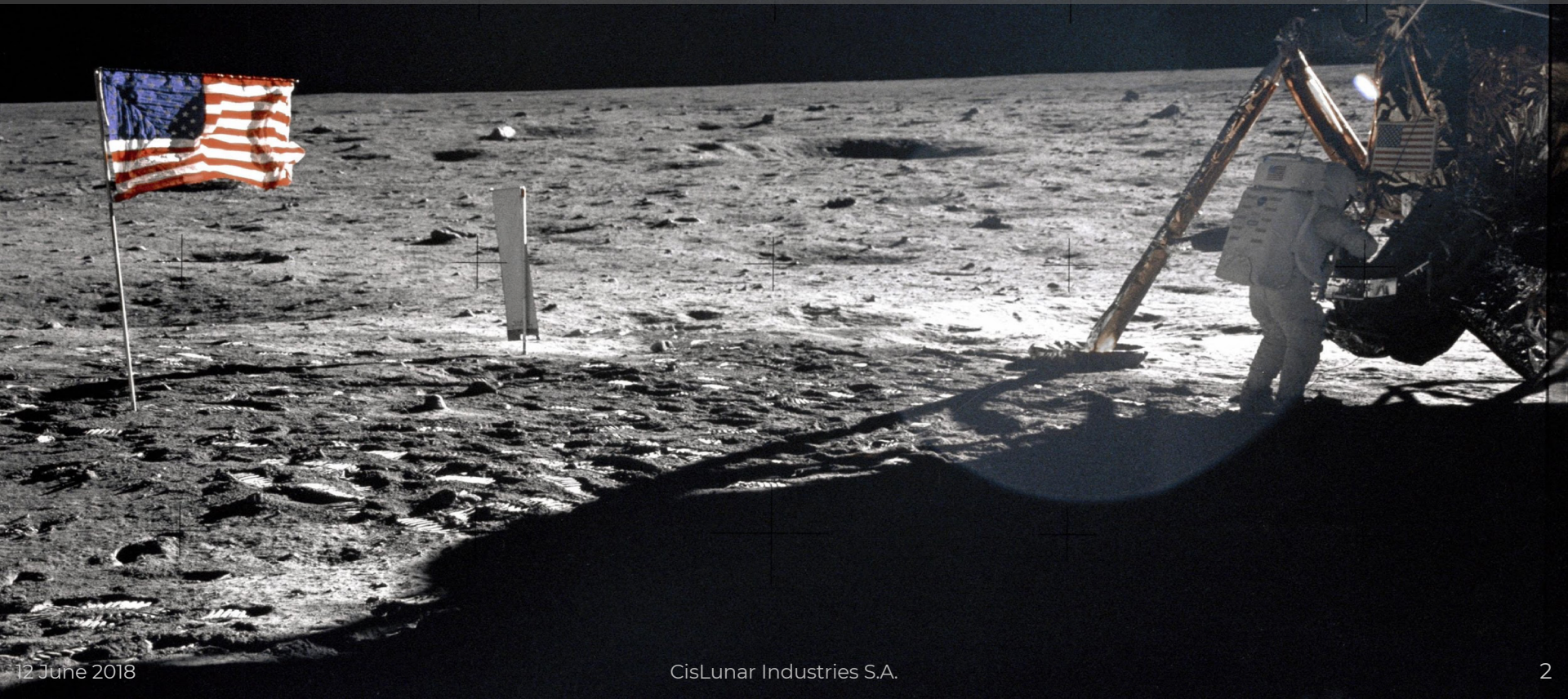
Recycling Space Debris into Refined Materials for In-Space Use

12 June 2018

Gary Calnan, CEO | +1 303 995 0733 | gary@CisLunarIndustries.com | www.CisLunarIndustries.com | 3, Rue de l'Industrie, L1811 Luxembourg

CISLUNAR INDUSTRIES

Last time, we left and never came back
We need to use local resources to stay for good



MATERIALS NEEDED

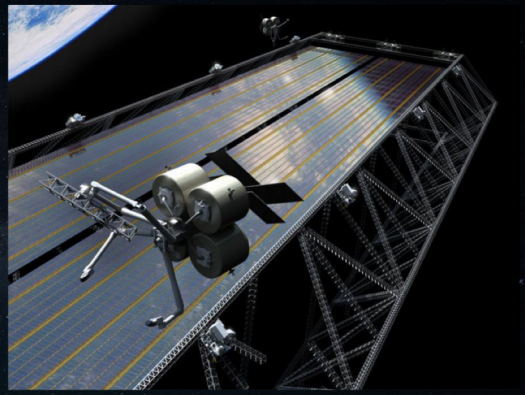
A cost-effective, readily available supply of refined metal **does not exist** for in-space manufacturing and construction

Future Supply Potential

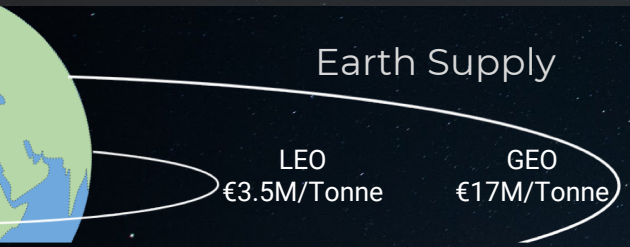
Asteroid Supply

Lunar Supply

- Lower Cost
- Longer Time Horizon



Current Supply Potential



- Higher Cost
- Available Now
- Launch Constrained

CISLUNAR INDUSTRIES

Space Debris is a Resource

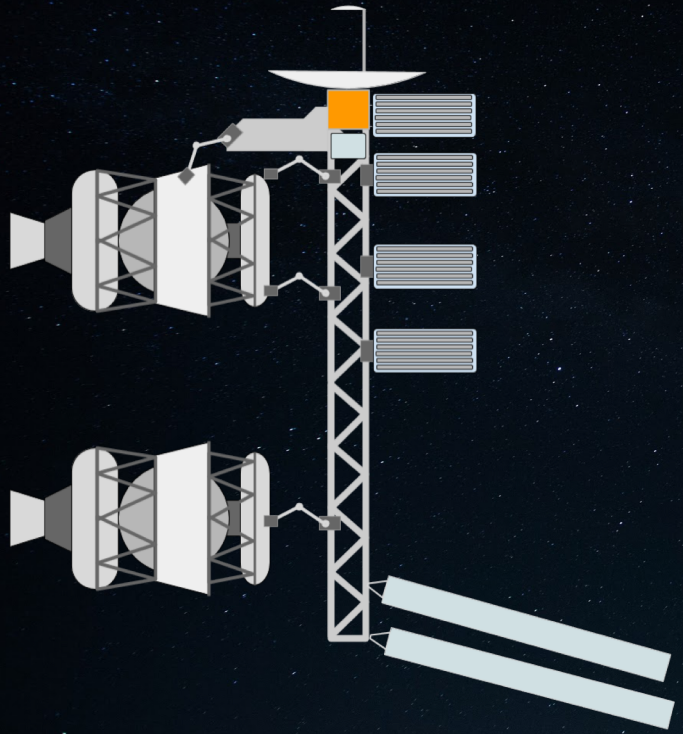
Image credit: Getty Images

VALUE CHAIN

By using space debris to make refined metal, the Space Foundry fills the missing link in the space resources value chain

THE SPACE FOUNDRY

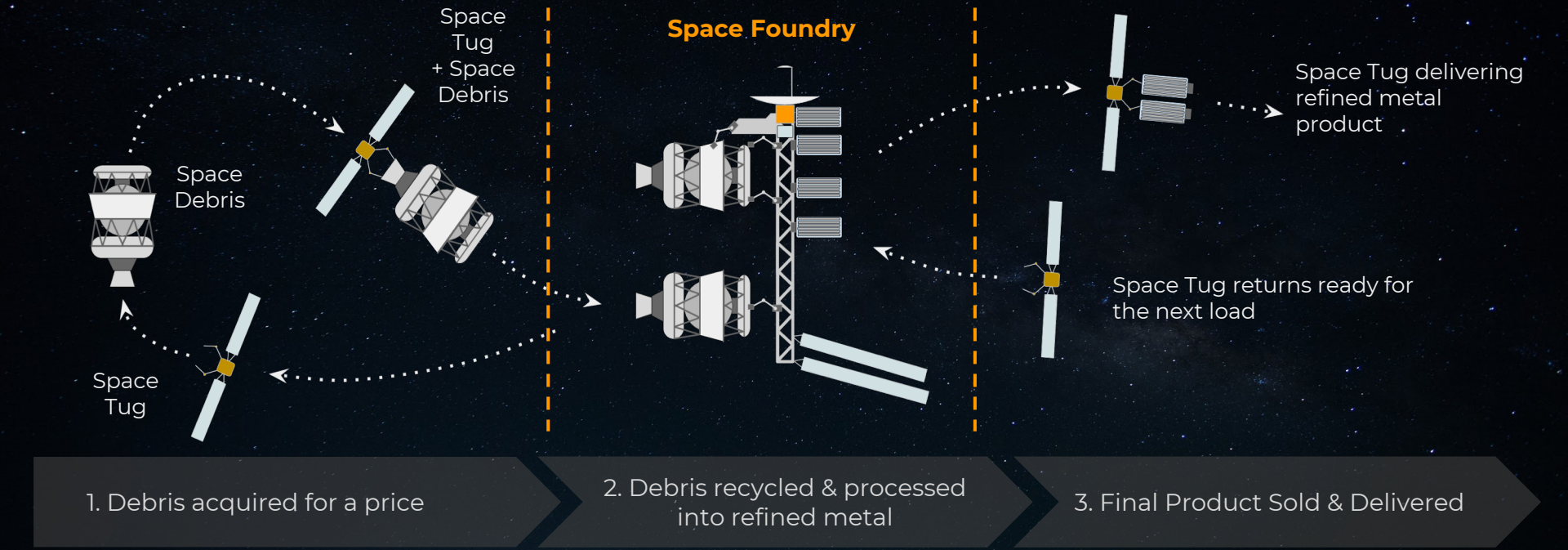
Enables a market for materials in space and the utilisation of space debris



The **first** in-Space capability for recycling metal already in orbit into refined materials for **use in Space**

ARCHITECTURE & BUSINESS MODEL

Enables a standard model for materials production and sales in space
Potential throughput of **1,000 kg per week**

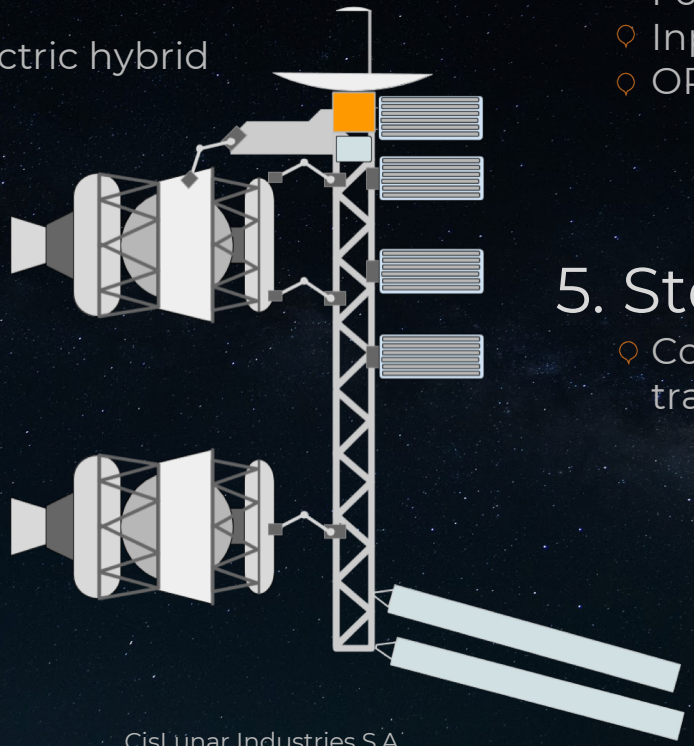


SPACE FOUNDRY DESIGN

3. Furnace
- Zero Maintenance
- Modular
- Solar + Electric hybrid

4. Extrusion
- Form needed by customer
- Inputs for 3D printing
- OR Directly to final form

2. Pre-Processing
- Assess material
- Strip coatings
- Cut into pieces



5. Storage
- Container designed for easy transport to customer

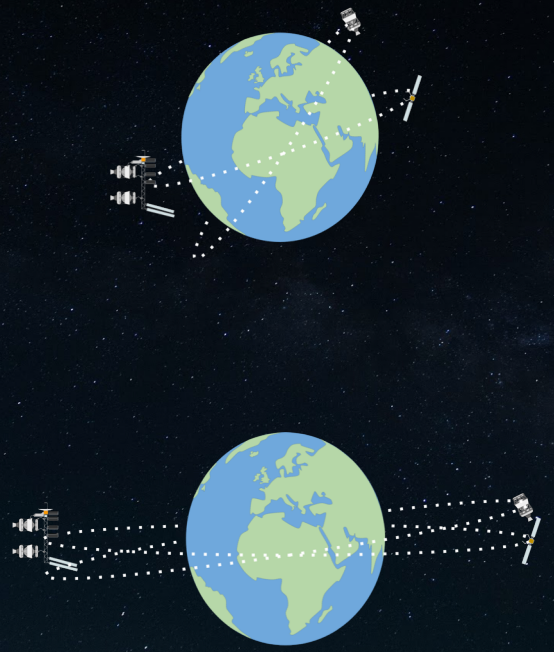
1. Rendezvous
- Robotic arm grapple
- Tug transfers control to Space Foundry

WHY GEO?

Favorable Orbital Mechanics + Product at Highest Value

Key Assumptions

- Tugs equipped with Neumann Drives
- Tugs use metal propellent made from space debris
- ISP ~ 2,000
- Focused on spent stages
- Based on public database



LEO Case

Supply at high inclination

Demand at low inclination

Propellent cost high

Value too low

GEO Case

Supply and Demand within 15 deg inclination

2-20% of debris mass used for logistics

Value of material high

IN-SPACE MANUFACTURING USE CASES

NEAR-TERM

- Large antennas
- 3D Print parts for Sat Service missions
- Supply fuel for metal based solar electric propulsion

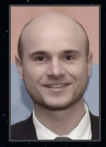
LONG-TERM

- Lunar Space Elevator
- Large GEO Persistent Platform
- Salvage for delivery to lunar colony
- Orbital shipyard

PROGRESS TO DATE

- Co-Founder team in place
- Established HQ in Luxembourg at Paul Wurth InCub
- Advisors are joining the effort
- Forging partnerships - institutional, commercial and financial
- Early prototyping





PAUL WURTH INCUB

Walter Peeters
President
ISU

Josh Izenberg
COO
OffWorld

MOON VILLAGE ASSOCIATION

AUDACY

INTERNATIONAL SPACE UNIVERSITY

OUR NEXT STEPS

Prototype development leading to LEO test demo flight and Earth applications

Q2 - 2018

Prototype I

Basic, low-cost mock-up

Robotic arm

Simple induction melting

H2 - 2018

Customer Discovery

Prototype II

Small Scale demo

Basic end-to-end automation:

- Pre-processing
- Robotic transport
- Melting
- Ingot production

Test various materials

Produce feedstock for 3D printing

H1 - 2019

Prototype II

Evolve into LEO demo satellite configuration

Prototype III

Larger scale demo

End-to-end automation

Higher throughput

Test recycling of durable goods (e.g. bicycles, etc)

COLLABORATION IS A MUST

This will take a whole community of companies, agencies, and individuals

- What would you do with a steady supply of refined metal in orbit?
- Can you help us with logistics?
- Would you like to partner with us in research funding applications?

CisLunar Industries S.A.
www.CisLunarIndustries.com

Primary Point of Contact
Gary Calnan, CEO
+1 303 995 0733
gary@cislunarindustries.com

Luxembourg Headquarters
3, rue de l'Industrie,
L-1811 Luxembourg