

The background of the slide is a composite image. The top half shows a long, thin, blue-tinted structure, likely a space elevator, extending from the top left towards the center. The bottom half shows a sleek, white, aerodynamic re-entry vehicle or spaceplane in the foreground, angled downwards towards the bottom right. In the background, the Earth's horizon is visible, showing a blue sky and white clouds, set against the blackness of space filled with stars.

# Returning Wealth from Space: the Space Elevator's True Value

Re-Entry Vehicles Cannot Cut It

Steven Griggs, PhD, MBA, MA  
[steven.griggs@spacerailway.com](mailto:steven.griggs@spacerailway.com)  
405-338-8511

2025 International Space Elevator Consortium

# Outline

- Space Faring Society Must Pay for Themselves
- Trillions in Transportation Costs & Start Up Cost Requires Repayment from Space Wealth
- Down-Earth Capability to Support Space Settlement Repayment is Far Beyond Reentry Vehicles
- Financial Aspects of a Space Elevator to Pay for Infrastructure
- Technical Challenges for Massive Down-Earth Capability

# Space Faring Society Missions

Major Off-World and Down-Earth Transport Needs - Millions of kg (Mkg)						
	Off-World (Mkg)	Down-Earth (Mkg)	# Rockets Equivalent Falcon Heavy	Rocket Cost \$ Billions	Time to Complete (1 launch/wk)	Time to Complete (5 launch/wk)
Outbound	Moon Village	500	29,762	2,024	572 years	114 years
	SpaceX Colony Mars	1,000	59,524	4,048	1144 years	228 years
	Space Solar Power	5,000	187,000	11,594	3596 years	719 years
	L-5 O'Neill Colony	10,500	392,700	24,304	7551 years	1510 years
	Sun-Earth L-1 Sun Shade	20,000	748,000	46,376	14384 years	2876 years
Combo	Space Tourism	TBD	TBD			
	GEO Manufacturing	TBD	TBD			
Down-Earth	Asteroid 3554 Amun Mining Products		4,677	Unknown Vehicle		
	Other Asteroids and Space Products Returning to Earth		XXX,000,000	Unknown Vehicle		
	Current Total Marketspace Needs	37,000	X30,000,000	1,383,900	\$85,758	26,613 years

*Need something with higher payload capacity, reduced cycle times and low cost*

# Space Settlement/ Economy Must Pay for Itself

Major Off-World Transport Needs - Millions of kg (Mkg)			
	Off-World (Mkg)	# Rockets Equivalent Falcon Heavy	Rocket Cost \$ Billions
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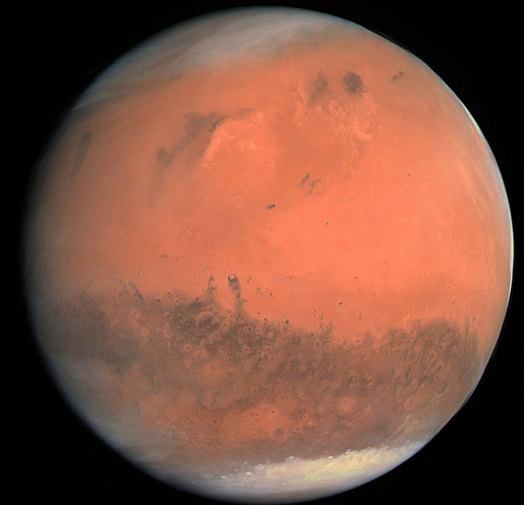
*Transportation Cost Alone is \$Trillions*

# Cost of Venturing Forth: Mars

## Getting to Mars

- Transportation: \$4.2 Trillion Rocket launch cost (1 billion kg)
- Supplies for flight and initial 2 years: \$500-1000 billion
- Cost per person:

Cost	Budget	# of people		
		10,000	100,000	1,000,000
Travel	\$ 4,200,000,000,000	\$ 420,000,000	\$ 42,000,000	\$ 4,200,000
Supplies	\$ 1,000,000,000,000	\$ 100,000,000	\$ 10,000,000	\$ 1,000,000
per person	\$ 5,200,000,000,000	\$ 520,000,000	\$ 52,000,000	\$ 5,200,000
Mass (kg)				
Food (2 years)		18,100,000	181,000,000	1,810,000,000
Humans		1,600,000	16,000,000	160,000,000
Habitats		20,000,000	200,000,000	2,000,000,000
Food production		20,000,000	200,000,000	2,000,000,000
total		59,700,000	597,000,000	5,970,000,000
Available	1,000,000,000	94,030	4,030	(4,970)



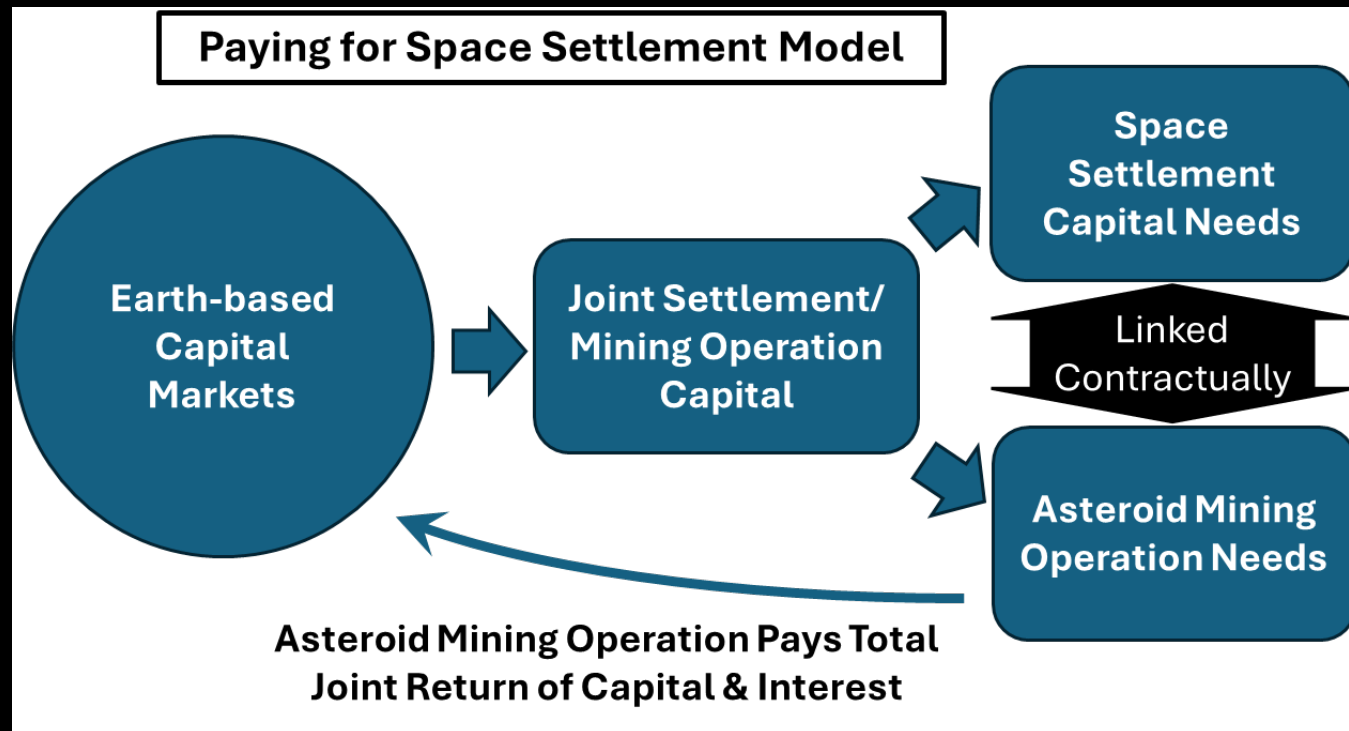
# Space Settlement Sources of Value to Repay Earth-Based Investment

	Zero-g Manufacturing	Orbital Earth	Space Resources
Earth-Focused Value	<ul style="list-style-type: none"> <li>• Crystal growth               <ul style="list-style-type: none"> <li>○ Semi-conductors</li> <li>○ Other electronic devices</li> <li>○ Specialty windows and optics</li> </ul> </li> <li>• Medicine manufacturing               <ul style="list-style-type: none"> <li>○ Protein crystals</li> </ul> </li> <li>• Advanced fiber optics</li> <li>• Human organ growth</li> </ul>	<ul style="list-style-type: none"> <li>• Mega structures</li> <li>• Solar power beamed to Earth</li> <li>• Sunshade to minimize global warming</li> <li>• Large-scale orbital manufacturing targeting Earth-based consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Rare Earth metals</li> <li>• Construction materials for orbital Earth projects</li> <li>• Water, fuel, carbon, nitrogen for space applications</li> </ul>
Potential Value	<ul style="list-style-type: none"> <li>• Billions</li> </ul>	<ul style="list-style-type: none"> <li>• Billions to Trillions in cost avoidance</li> </ul>	<ul style="list-style-type: none"> <li>• Trillions in rare Earth metals</li> </ul>

# Potential Wealth of Asteroid 3554 Anum

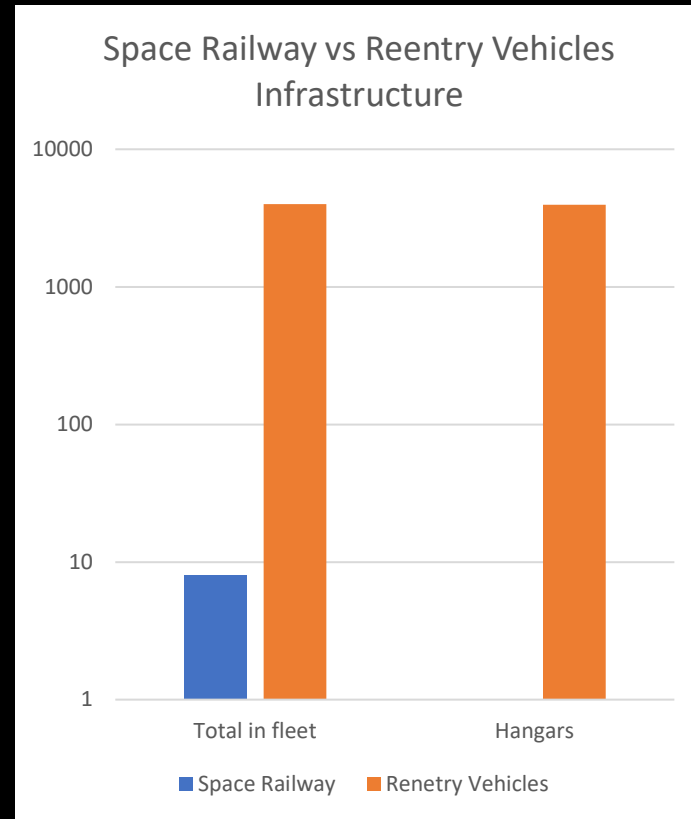
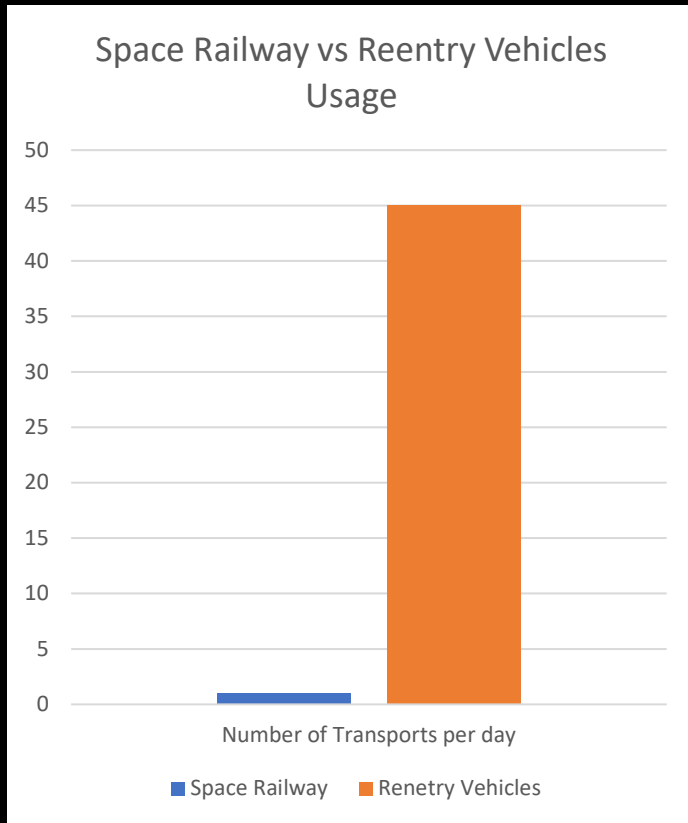
Potential Bring Back Wealth from Asteroid 3554 Anum at Today's Market Price					
Asteroid Composition	Metal Concentrations	Total Mass (Mkg)	\$/kg	Total Wealth (trillions)	% World Annual Production
Iron	90% Fe	27,000,000	\$ 0.092	\$ 2.484	1176%
<b>Precious Metals (PPM)</b>					
Germanium (Ge)	70	2,100	\$ 3,883	\$ 8.154	750000%
Gold (Au)	0.7	21	\$ 84,300	\$ 1.770	500%
<b>Platinum Group (PPM)</b>					
Rhenium (Re)	1.1	33	\$ 2,489	\$ 0.082	1333333%
Ruthenium (Ru)	20.7	621	\$ 12,538	\$ 7.786	4590000%
Rhodium (Rh)	3.9	117	\$ 155,931	\$ 18.244	860000%
Palladium (Pd)	2.6	78	\$ 34,561	\$ 2.696	17143%
Osmium (Os)	14.1	423	\$ 1,653	\$ 0.699	187800000%
Iridium (Ir)	14	420	\$ 4,650	\$ 1.953	11625000%
Platinum (Pt)	28.8	864	\$ 32,000	\$ 27.648	184925%
<b>Total</b>	155.9	27,004,677		<b>\$ 71.517</b>	

# Paying for Space Settlement Requires Asteroid Mining Operations



# Space Railway vs Reentry Vehicles

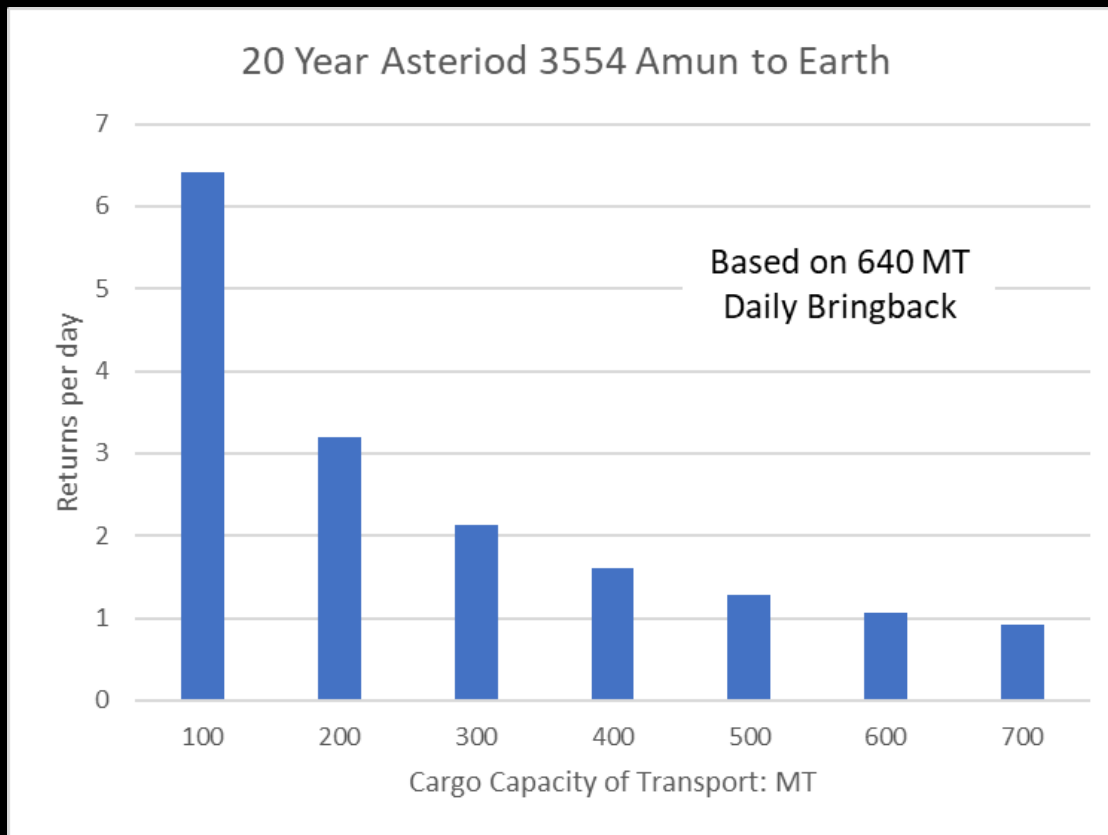
## Asteroid 3554 Anum Only



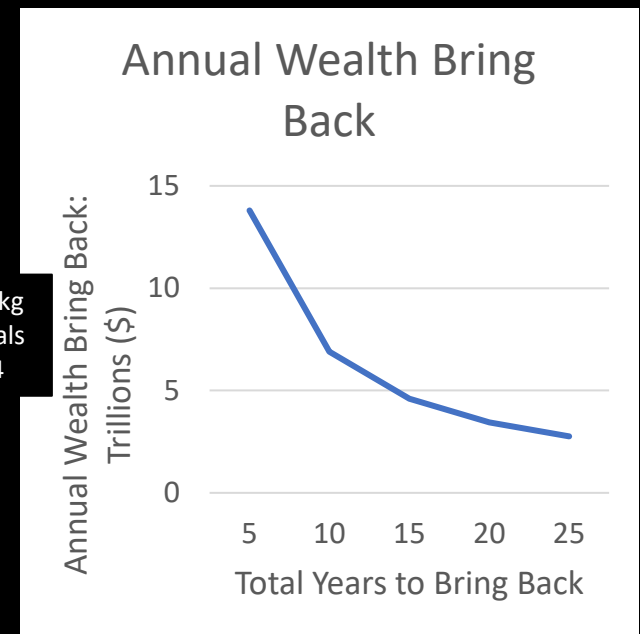
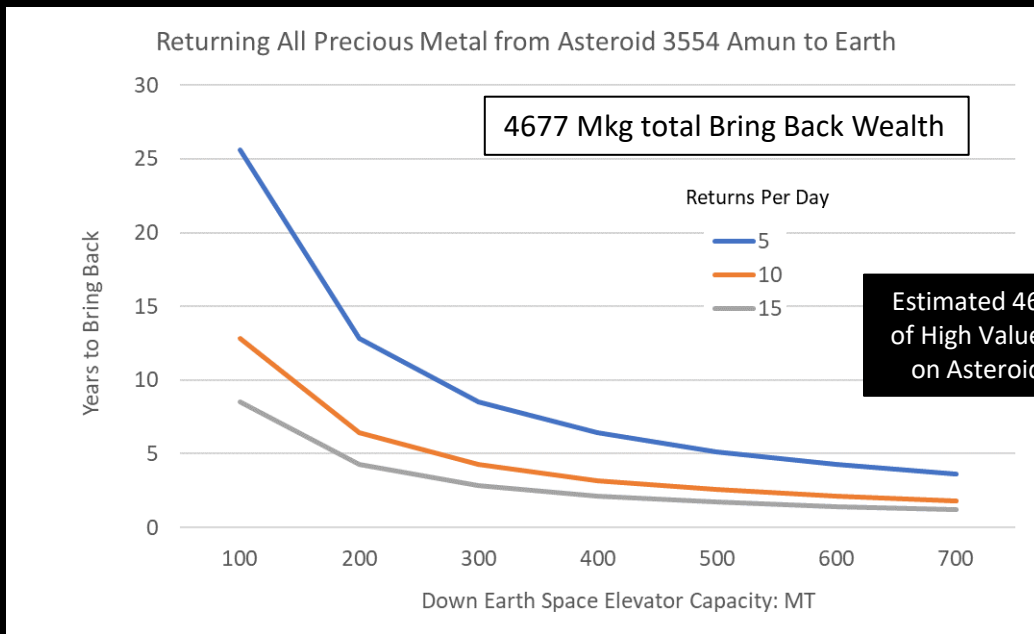
***Reentry Vehicle Infrastructure & Operations  
are Astronomical***

# Trading Railcar Size vs Number of Trips per Day

## Asteroid 3554 Anum Only



# Wealth Bring Back Justifies Larger Space Elevator Investment



*Earth Bound Wealth is Only Limited by Speed of Space Mining Operations*

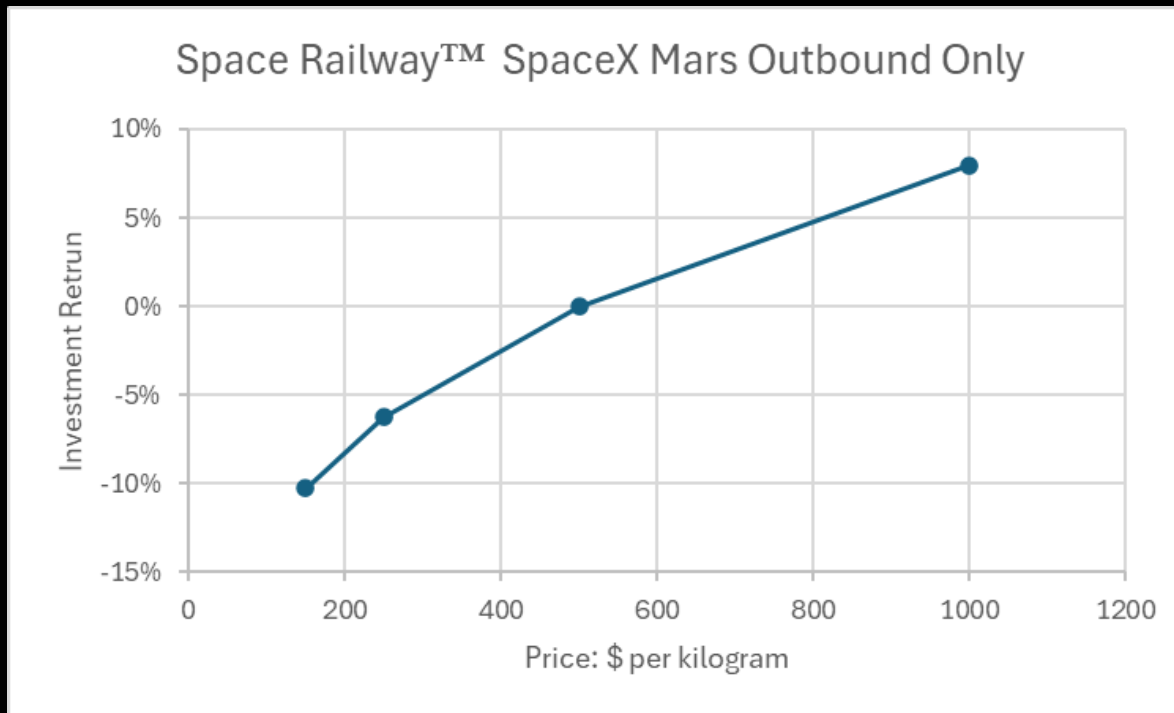
# Viable Space Settlement & Space Economy

- Initial Outbound Target Goal of 1 million KG per day
  - Support Five Basic Missions
    - Moon
    - Mars
    - Solar
    - O'Neill Colonies
    - Sunshade
  - Launch to other places in the solar system
  - Large-scale GEO space manufacturing
- Initial Earth-bound Target Goal of 1 million KG per day
  - Large-scale GEO space manufacturing
  - Bring back wealth from space to pay for settlements
  - Space Tourism

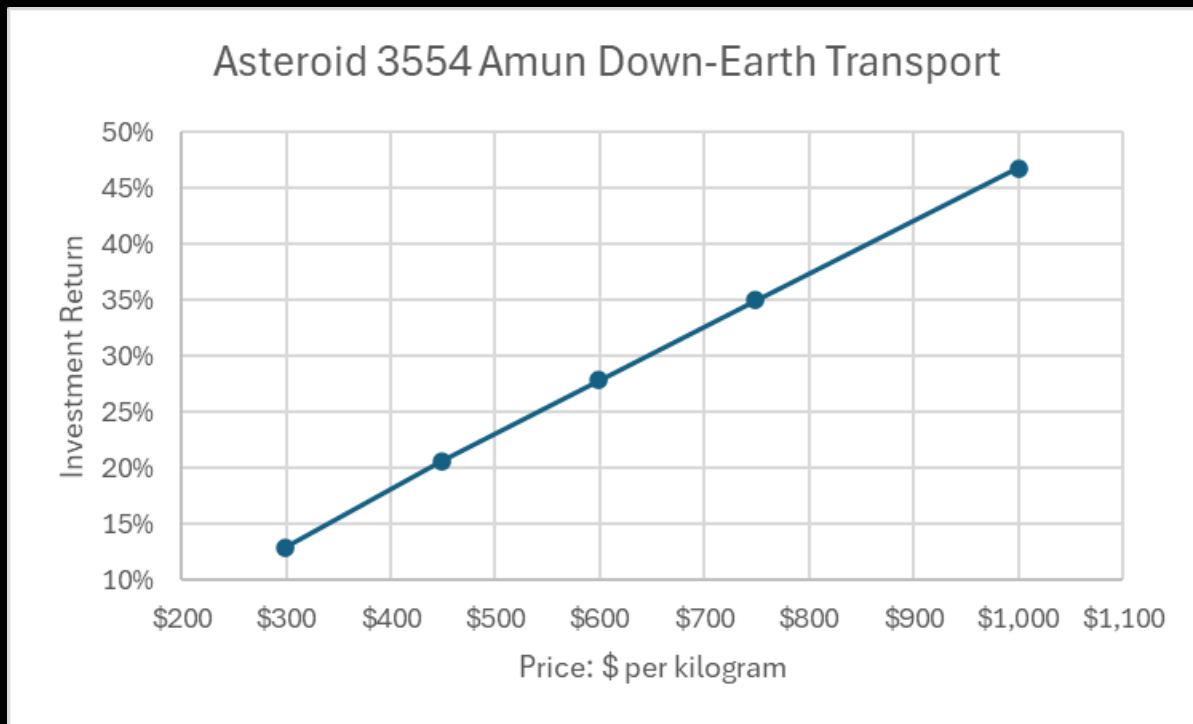
A futuristic, sleek spacecraft is shown in orbit above the Earth. The spacecraft is white with blue accents and a long, thin solar panel extending from its side. The Earth's horizon is visible in the lower right, showing blue oceans and white clouds. The background is a deep black space filled with stars and a blue nebula. The text "A Dual Pricing Model" is overlaid in white on the left side of the image.

# A Dual Pricing Model

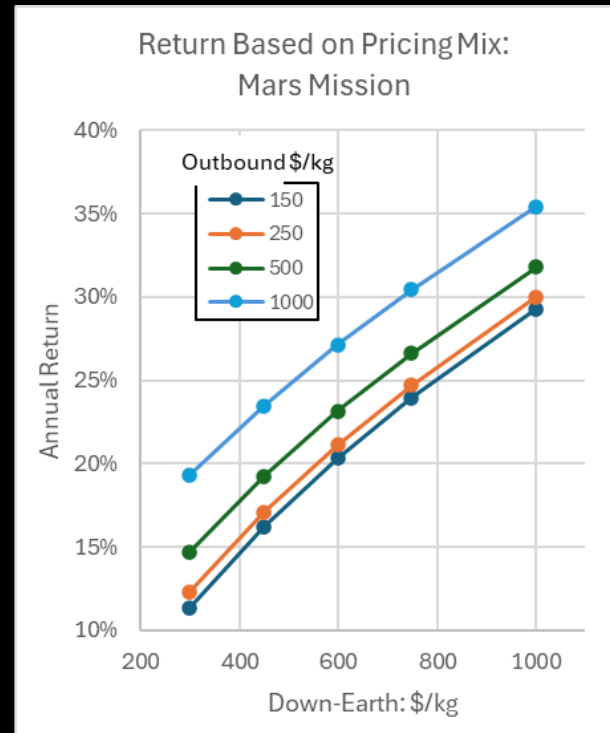
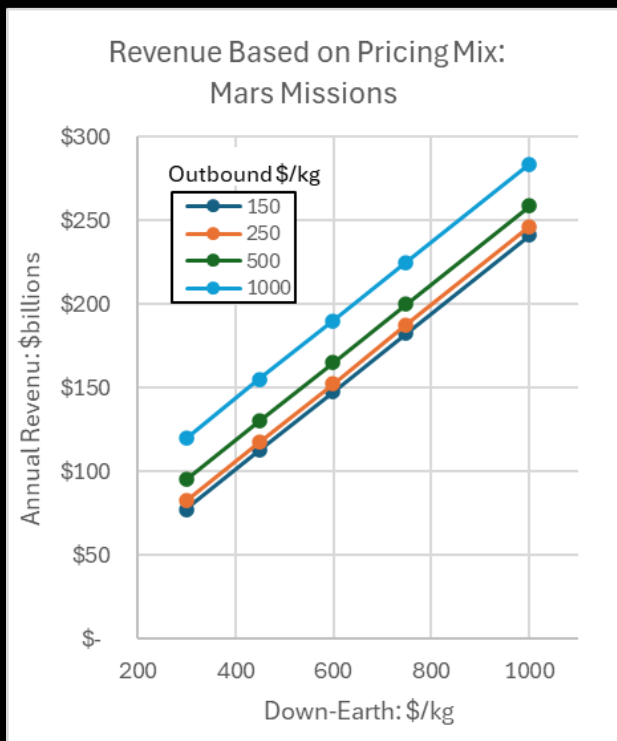
# Return to Investors Based on Outbound 20-Year Mars Mission is Price



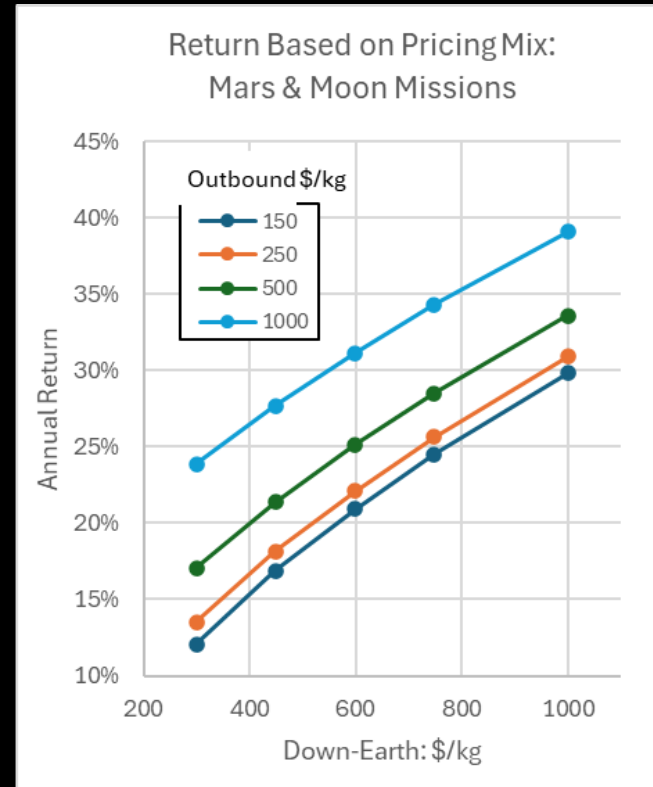
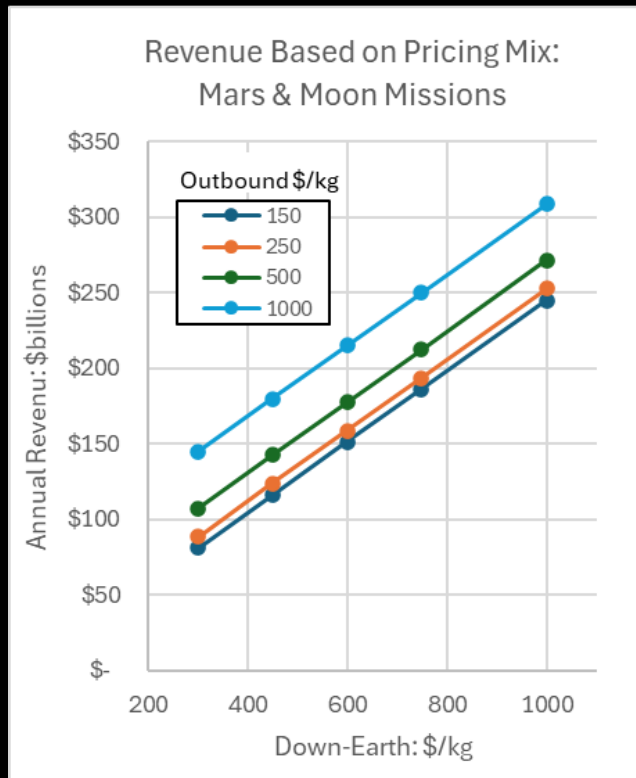
# Return to Investors Based on Asteroid 3554 Amun Down-Earth Transportation



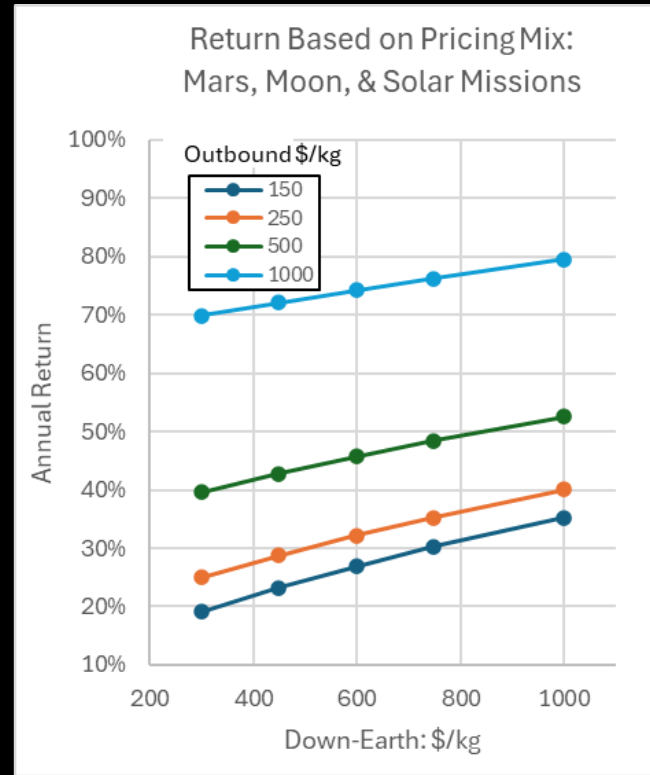
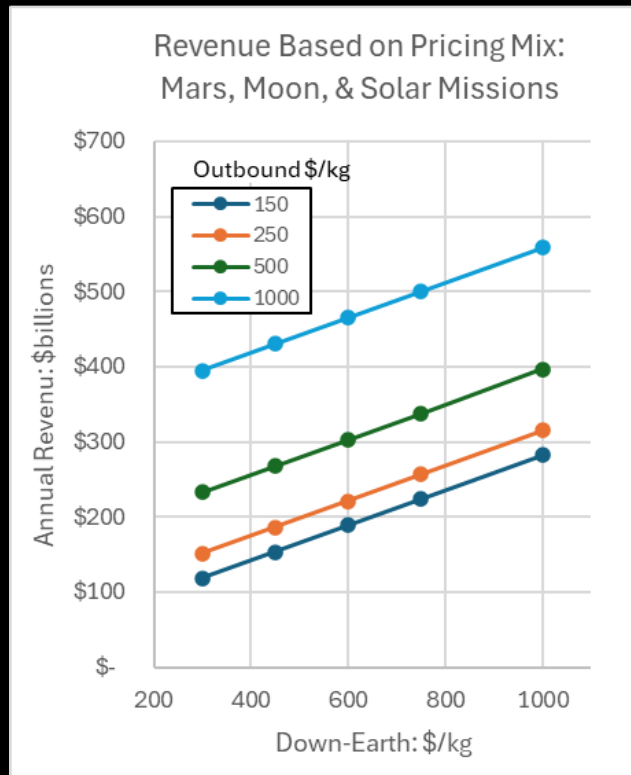
# Dual Pricing Model for Mars Mission Demonstrates the Flexibility in Pricing



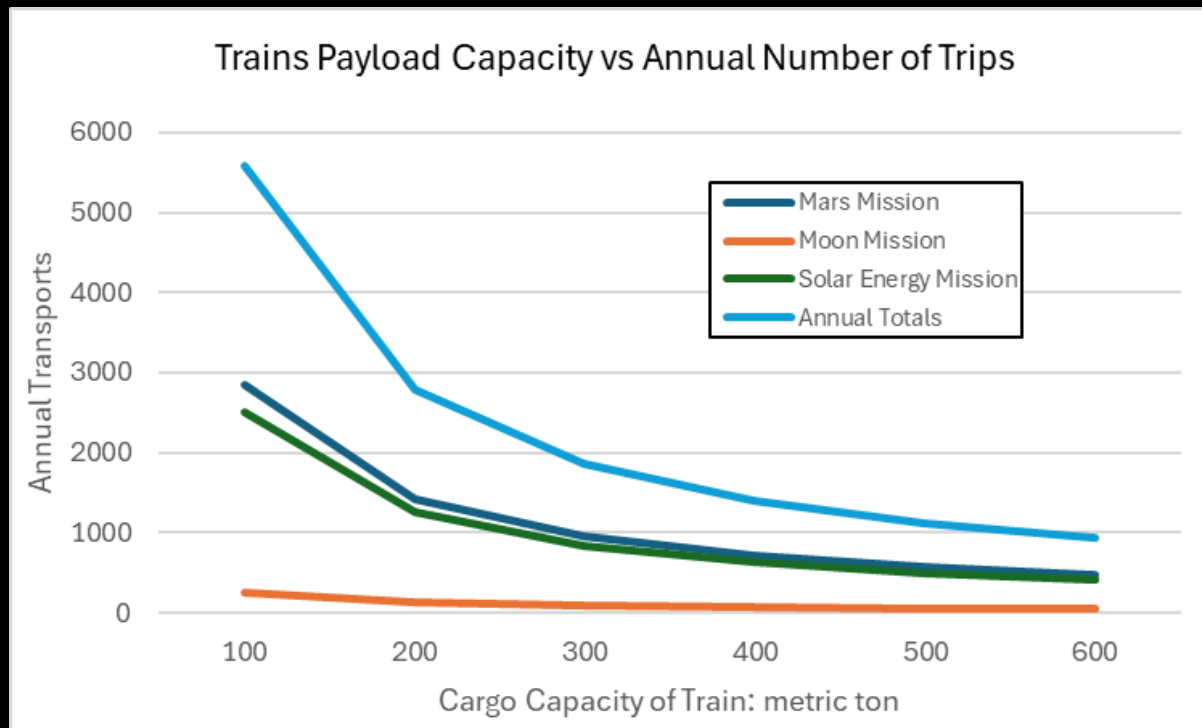
# Dual Pricing Model for Mars & Moon Missions Demonstrates the Flexibility



# Dual Pricing Model for Mars, Moon, & Solar Energy Missions



# Space Railway Train Payload Capability Sets the Number of Annual Tether Transports



# Business model to make it work

- High Fixed Cost, Low Variable Cost Driven Design Solutions
- Dual Pricing Model provides flexibility between stimulating higher demand and profitability
- Payload, Payload, Payload
- Volume, Volume, Volume

# Technical Challenge to Space Elevator Community

- Down-Earth gravitational forces generate considerable regenerative electric power
  - How to manage the electric power generated (use, store, or transmit)
- Inefficiencies in electric power system can create considerable waste heat that must be managed
- Safety issues with down-Earth failure modes
- What is the best vehicle design for transporting tons of precious metals
- What new technologies are needed

# Financially Focused Space Settlement Solutions Drive Technological Investment

Space Railway Corporation's preferred concept and technology development pursuits meet or exceed the new requirements identified in this briefing

# Contact Info

Steven Griggs, PhD, MBA, MA

President Space Railway Corp

[steven.griggs@spacerailway.com](mailto:steven.griggs@spacerailway.com)

405-338-8511

President First Place Business Solutions

[griggs@firstplacebusiness.com](mailto:griggs@firstplacebusiness.com)

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