

THE TAURI GROUP

SUBORBITAL REUSABLE VEHICLES: A 10-Year Forecast of Market Demand

Suborbital reusable vehicles (SRVs) are creating a new spaceflight industry. SRVs are commercially developed reusable space vehicles that may carry humans or cargo. The companies developing these vehicles typically target high flight rates and relatively low costs. SRVs capable of carrying humans are in development for operations in the next few years. SRVs that carry cargo are operational now with more planned.



Understanding the dynamics of emerging SRV markets is important for policy makers and space industry stakeholders as they make governance decisions affecting this new industry. This forecast:

- Characterizes eight potential SRV markets
- Quantifies predictable demand based on what we know today
- Highlights important areas of uncertainty that will affect the forecast

We estimate that baseline SRV demand will support daily flights, with users in six distinct market areas over our 10-year forecast. Our forecast is based on primary research (including 120 interviews and a survey of high net worth individuals) and other data sources informing analysis of market dynamics and trends.

The dominant SRV market is Commercial Human Spaceflight, generating 80% of SRV demand. Our analysis indicates that about 8,000 high net worth individuals (with net worth exceeding \$5 million) from across the globe are sufficiently interested and have spending patterns likely to result in the purchase of a suborbital flight at current prices. Roughly, one-third of these consumers are from the United States. We estimate that about 40% of the interested, high net worth population, or 3,600 individuals, will

fly within the 10-year forecast period. We expect space enthusiasts outside the high net worth population to generate modest additional demand (about 5% more). About 925 individuals currently have reservations on SRVs.

The second largest source of demand is Basic and Applied Research, accounting for about 10% of forecasted demand. Research uses unique SRV capability in four areas: atmospheric research, suborbital astronomy, longitudinal human research, and microgravity. These areas enable investigations of interest to space and science government agencies, non-profits, and universities. Commercial firms will test SRVs as research platforms through typically small exploratory projects.

The remaining 10% of demand is generated by Aerospace Technology Test and Demonstration, Education (which will see hundreds of schools and universities flying low-cost, small payloads to provide students a learning tool), Satellite Deployment, and Media and PR (through what we have predicted to be a small but influential number of flights for advertisements, documentaries, and television programming).

SRVs can support Remote Sensing, but are not competitive in the marketplace. SRVs could evolve into hypersonic airliners to support a market for Point-to-Point Transportation, but not within the 10-year horizon of this forecast.

Suborbital Markets

The Tauri Group analyzed potential SRV activity into distinct markets, grouped by similarities in application and customer behavior.

COMMERCIAL HUMAN SPACEFLIGHT

Human spaceflight experiences for tourism or training

BASIC AND APPLIED RESEARCH

Basic and applied research in a number of disciplines, leveraging the unique properties of and access to the space environment and microgravity

AEROSPACE TECHNOLOGY TEST AND DEMONSTRATION

Aerospace engineering to advance technology maturity or achieve space demonstration, qualification, or certification

MEDIA AND PUBLIC RELATIONS

Using space to promote products, increase brand awareness, or film space-related content

EDUCATION

Providing opportunities to K-12 schools, colleges, universities, and graduate programs to increase access to and awareness of space

SATELLITE DEPLOYMENT

The use of SRVs to launch small payloads into orbit

REMOTE SENSING

Acquisition of imagery of the Earth and Earth systems for commercial, civil government, or military applications

POINT-TO-POINT TRANSPORTATION

Future transportation of cargo or humans between different locations

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In every challenge lies opportunity

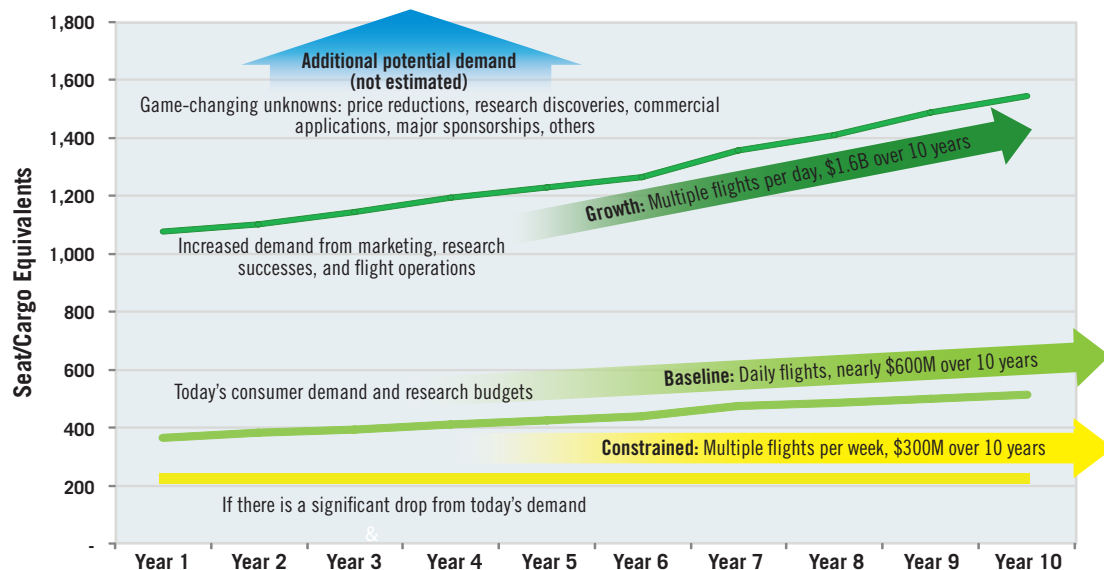
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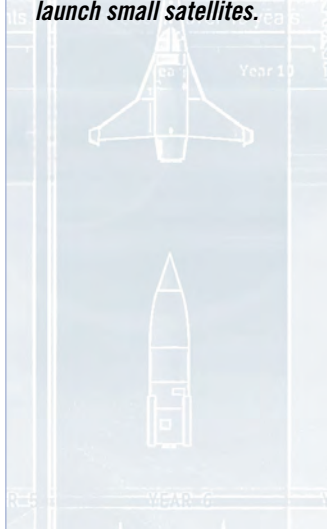
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Summary of Forecast Results Across Three Scenarios



Suborbital Reusable Vehicles (SRVs)

SRVs are rockets designed to cross the threshold of space without achieving orbit. During their time in space, they experience microgravity, exposure to the space environment, and views of the Earth. Some of these vehicles can carry passengers, and some can launch small satellites.



Summary Findings:

- Baseline demand for suborbital flights is sustained and appears sufficient to support multiple providers
- In the growth scenario, demand about triples
- In the constrained scenario, demand is about half baseline levels
- Additional potential demand could result from unpredictable successes

Important Uncertainties:

- Customer behavior when passenger flights begin
- Interest by commercial firms in novel research areas
- Use by government agencies that do not traditionally fund space research
- NASA and DoD use (potential for more transitions from existing systems)
- Perceptions of safety
- Current prices assumed for forecast



For more details, please see the full report, *Suborbital Reusable Vehicles: A 10-Year Market Demand Forecast*. The Tauri Group

conducted this study, which was co-funded by the Federal Aviation Administration's Office of Commercial Space Transportation and Space Florida.

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Effect of Changes in Price

- Demand increases significantly with a drop in price among the high net worth individuals surveyed
- Additional demand (not shown in curve) would result among individuals with lower net worth than those surveyed
- An increase over current prices would reduce demand, but not significantly

