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House Committee on Science, Space & Technology
Subcommittee on Space

Hearing on "The Commercial Space Launch Industry: Small Satellite Opportunities and Challenges"

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Chairman Babin, Ranking Member Edwards, and Members of the Subcommittee, thank you for holding this timely hearing on the commercial space launch industry and for providing me the opportunity to testify as President of the Commercial Spaceflight Federation.

The Commercial Spaceflight Federation (CSF) is the leading national trade association for the commercial spaceflight industry. Founded in 2006, CSF and its more than 70 members are laying the foundation for a sustainable space economy and democratizing access to space for scientists, students, civilians, and businesses. CSF members are responsible for the creation of thousands of high-tech jobs driven by billions of dollars in investment. Through the promotion of technology innovation, CSF is guiding the expansion of Earth's economic sphere, bolstering U.S. leadership in aerospace, and inspiring America's next generation of engineers and explorers.

My testimony will focus on three key areas. First, I will provide an overview of key economic trends and investments in the commercial spaceflight industry, including existing and new markets associated with satellite telecommunication and demand for launch services in this sector; and the burgeoning industry around small satellite technology for telecommunication, remote sensing, scientific research, resource extraction, and space exploration, as well as demand for launch services and launch capacity in this segment. Second, I will focus on new technologies—all financed largely by private investment—that are reducing the cost of access to space, including reusable launch vehicle systems and small launchers. Third, I will outline key policy challenges facing the commercial spaceflight industry, such as reversing sound policy with regard to the use of excess ICBMs for commercial launches that would stunt the growth of emerging commercial sectors, and offer consensus industry recommendations to the Committee.

The Commercial Space Industry Today

The commercial space industry today is a robust and growing technology sector focused on innovation and providing capacity to new markets based on existing and emerging satellite and human spaceflight systems. In our view, the commercial space launch industry can be broken into three core markets:

1. Existing geostationary (GSO) satellite telecommunications market. The market for traditional telecommunications satellite carriage is mature, stable, and predictable.

2. Existing and emerging non-geostationary (NGSO) satellite market, including telecommunications, remote sensing, scientific research, cargo and crew carriage to LEO, and others. Here, the market for traditional NGSO launch is predictable, but new satellite constellations and new dedicated launch systems are emerging as the market expands.

3. Commercial Human Spaceflight. This includes space tourism, including suborbital spaceflights aboard Virgin Galactic's SpaceShipTwo, Blue Origin's New Shepard, XCOR's Lynx, and near-space on World View Enterprise's Voyagers; commercial space habitats, such as those developed by Bigelow Aerospace; and others.

These new and existing markets are driving substantial private capital investment into the U.S. space sector. In 2015, the commercial space industry saw historic levels of private capital investment and market growth. According to a recent report by the Tauri Group, "More than 50 venture capital firms invested in space deals in 2015, the most in any year during the 15-year study period (2000-2015)."[1] These investments totaled $1.8 billion in venture capital, and nearly $2.7 billion in total investment and debt financing, according to this report.[2] This investment is significant and reflects continued confidence in the market, which, according to the Tauri Group, has committed more than $13.3 billion in investment (including debt financing) since 2000.

Moreover, it seems like every day there is news of another significant technological breakthrough in the commercial space industry. Just to highlight a few:

1. In November 2015, Blue Origin demonstrated a successful launch and landing of its New Shepard rocket, and has since launched and landed the same rocket two more times, in January and April.

2. In December 2015, SpaceX successfully launched 11 Orbcomm OG2 satellites (built by Sierra Nevada Corporation) into Low Earth Orbit (LEO), and subsequently landing the first stage of the Falcon 9 rocket on its Landing Zone 1 at Cape Canaveral Air Force Station. Just two weeks ago, SpaceX successfully landing its first stage booster on its autonomous spaceport droneship after successfully deploying its Dragon spacecraft to orbit, and plans to re-fly this stage in the coming months.

3. On Saturday of last week, astronauts aboard the International Space Station (ISS) successfully attached the Bigelow Aerospace Expandable Module (BEAM) to the ISS using the Sierra Nevada Corporation's Berthing Mechanism, following its launch inside of the trunk of SpaceX's Dragon spacecraft.

4. Virgin Galactic unveiled its SpaceShipTwo suborbital vehicle, VSS Unity on February 19, 2016 and plans to launch its orbital small launch vehicle, Launcher One in 2017.

5. Virgin Galactic, Masten Space Systems and Blue Origin are supporting DARPA's XS-1 program.

6. Planetary Resources deployed its first spacecraft, and will be deploying two more this year, AGI won its first space command contract with the U.S. government, and Spaceport America unveiled the "Spaceport America Experience."

7. Moon Express, World View Enterprises, Vulcan Aerospace, XCOR Aerospace, and Sierra Nevada Corporation have all announced plans to begin flight operations in the next couple of years.

[1] Tauri Group. http://space.taurigroup.com/reports/Start_Up_Space.pdf
[2] Tauri Group. http://space.taurigroup.com/reports/Start_Up_Space.pdf

This is an exciting time for the U.S. space industry, with technological advances being demonstrated nearly every day, significant investment by the private sector, unique public-private partnerships with the U.S. Government, and the onset of new space-based technologies, including commercial remote sensing and broadband internet service. Existing U.S. law and policy, including the National Space Transportation Policy, the Commercial Space Launch Act, which facilitates and encourages a robust domestic space launch and space systems industry, are clearly bearing fruit. As I discuss below, now is exactly the wrong time to reverse these policies, which have been decades in the making.

The Commercial GSO Market

The market for traditional commercial geostationary satellites has remained relatively robust and stable for the last several decades. The satellite industry experiences persistent annual growth and represents more than $195B in revenues per year, driven primarily by proven demand for telecommunications provided by satellites in geostationary orbit. Here, the accessible geostationary transfer orbit (GTO) launch market—meaning the market available open to competition from U.S. launch services providers—represents $2.0 billion to $2.5 billion in revenues per year, and roughly 20-25 satellite launches.

According to a 2015 report from the Federal Aviation Administration (FAA), which annually assesses and forecasts the global space launch market, "The GSO market remains stable with a projected demand of 25 satellites per year for the period 2015 – 2017, up from last year's average of 22.3 for the period 2014 – 2016."[3]

The commercial GTO launch market is a good news story for the United States and U.S. competitiveness worldwide. In 1980, for example, the U.S. dominated this market with 100 percent market share. By 2010, however, America's share of the market had collapsed to 0 percent, reflecting the impact of U.S. policies through which the Government competed directly against commercial firms (e.g. commercial payloads on Space Shuttle) and price non-competitiveness from existing U.S. providers relative to foreign competition. As a result, foreign launch service providers such as Arianespace out of Europe and International Launch Services (ILS) out of Russia came to dominate the market entirely.[4]

However, a reversal of the foreign dominance of space launch in this market is underway, primarily due to evolutionary and revolutionary innovations taking place by U.S. space launch services sector. For example, SpaceX, which began offering its Falcon 9 commercial launch service in 2012, has unilaterally recaptured 60 percent of the global commercial satellite market in 2016. SpaceX's entry into the market with reliable, affordable space launch services has prompted a major restructuring of Europe's space launch sector[5], and Russia is also making

[3] FAA AST. "2015 Commercial Space Transportation Forecasts." Pg 2. Source: https://www.faa.gov/about/office_org/headquarters_offices/ast/media/Commercial_Space_Transportation_Forecasts_2015.pdf

[4] *Exploring the Unknown: Selected Document in the History of the U.S. Civil Space Program*; Volume IV: Accessing Space; Edited by John M. Logsdon, with Ray A. Williamson, Roger D. Launius, Russell J. Acker, Stephen J. Garber, and Jonathan L. Friedman. Page 418. Source: http://history.nasa.gov/SP-4407/vol4/cover.pdf

[5] Hepher, Tim. "Airbus, Safran team up on response to SpaceX: sources." Reuters. 15 June 2014. Source: http://www.reuters.com/article/us-airbus-group-safran-idUSKBN0EQ19Z20140616

drastic changes to reduce pricing in order to become more competitive.[6] ULA, and other U.S. launch providers, have also followed suit by partnering with Blue Origin and XCOR to integrate innovative engine technology into their future launch vehicles. The promise of reusability has the potential to fundamentally alter the economics of space launch, if realized.

The NGSO Market

The NGSO market today is comprised largely of cargo resupply flights to the International Space Station (ISS), and, by 2018, the addition of crew flights using U.S. launch vehicle systems and spacecraft to service the ISS through NASA's Commercial Crew Program. These missions utilize existing medium- to intermediate-class rockets, specifically the SpaceX Falcon 9, Orbital ATK's Antares, and the United Launch Alliance (ULA) Atlas V.

In addition to ISS commercial transportation services, the existing NGSO market today is comprised of constellations of satellite systems to provide, for example, machine-to-machine (M2M) data messaging service, i.e. Orbcomm; telecommunications through the deployment of the IridiumNext constellation, GlobalStar, and O3b, among others; commercial remote sensing satellites, including PlanetLabs, Terra Bella (formerly Skybox Imaging), DigitalGlobe, Planetary Resources CERES constellation, and a number of others; and new mega-LEO constellations to support broadband internet such as OneWeb.

According to the FAA, "The demand for commercial NGSO launches is expected to be at a comparably high level as major NGSO telecommunication constellations are replenished and NASA ISS commercial crew and cargo resupply missions become more regular."[7]

In addition to dedicated flights on medium- to intermediate- lift launch vehicles, a new and rapidly-growing market of small satellite deployment has emerged via brokering and bundling of secondary launches, which in turn has ignited a commercial demand for smaller commercial launch vehicles to provide a dedicated launch service. Dedicated small launch capability being developed by multiple U.S. companies are scheduled to come online in the next 2 years, with many companies already manifesting flights. These companies, once fully operational, will launch 12-24 times a year.

The U.S. launch vehicle industry is seeing hundreds of millions of dollars of private sector investments, particularly in the last several years. This investment is driving innovations and technologies to develop launch vehicle systems, start new companies, and create high-paying jobs across the United States.

These developments should be celebrated and encouraged through sound U.S. policy. Until very recently, the space business has been somewhat limited to government agencies and large corporations—and innovation in technology has been static while launch costs have been high—the inverse of Moore's Law. The onset of new firms driving down the cost of space launch and

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[6] Bodner, Matthew. "Russia vs . Elon Musk: U.S. Startup Threatens Moscow's Role in Space." The Moscow Times. 14 April 2016. Source: http://www.themoscowtimes.com/business/article/565756.html

[7] FAA AST. "2015 Commercial Space Transportation Forecasts." Pg 3. Source: https://www.faa.gov/about/office_org/headquarters_offices/ast/media/Commercial_Space_Transportation_Forecasts_2015.pdf

companies developing innovative, small, low-cost satellite systems is, however, resulting in a new world of exploration and experimentation for private industry, universities, research institutions, start-ups, and nonprofits.

Private Industry is Meeting Launch Market Demand

The predicted increase in the number of small satellites (1kg-500kg) over the coming years is directly related to the technology and manufacturing trends that are allowing for low-cost and rapid production of hardware and will be promulgated by the accelerated commercial development for access to space. As the commercial space industry experiences this rapid growth in potential demand, the U.S. launch industry is responding. Presently, the U.S. launch services market is dealing with demand primarily in three ways:

1. As noted, companies are investing substantial capital in the development of a new class of small launch vehicle systems for these payloads, including Virgin Galactic with Launcher One, Firefly with its Alpha vehicle, and Rocket Labs with its Electron launcher, among others.

2. Through bundled satellite deals, on dedicated medium- to intermediate-lift rockets, including the SpaceX Falcon 9, and Blue Origin's future orbital launch vehicle.

3. Through secondary payloads, with help from Nanoracks and Spaceflight Services, companies with very small satellites join launches provided for other satellite customers—here, Planet Labs, with its large constellation of low-cost, small remote sensing satellites has flown to orbit as a secondary customer on a number of flights, including missions to the ISS.

Additionally, there have been several proposals for the deployment of large NGSO constellations of hundreds or thousands of small satellites to LEO to support low-cost, low-latency broadband Internet worldwide. Even here with these mega LEO constellations, the current commercial market is providing sufficient capacity. For example, one of these companies, OneWeb, has selected a mix of Ariane's Europeanize Soyuz and Virgin Galactic's Launcher One to deploy and replenish its constellation.

Outside of small launcher capacity and dedicated bundled flights, many small satellites today fly as secondary or auxiliary payloads on launch vehicles designed for much larger satellites. Although the market is responding with the development of new small-class rockets, there are limited options for dedicated launch vehicles today that allow small satellites to be the primary, or lead, payload. While small satellite customers benefit from being a secondary payload through fractional pricing relative to the price of a dedicated launch service, CSF acknowledges that status as a secondary or auxiliary payload does sometimes result in tradeoffs for the small satellite customer. For example, satellites that fly as secondary or auxiliary payloads must align their launch schedules with the primary customer, and usually have to go to the orbit of the primary payload.

The best solution for access to space for small satellite companies in the U.S. will come when there are dedicated launch providers specifically targeting small satellites as their primary payload, coupled with options for bundled launch services on larger rockets and opportunities to ride to space as a secondary payload. As noted throughout my statement, small launch vehicle capability is less than a year away, financed by private capital. The launch services market is

robustly responding to demand—Government intervention at this time is not necessary and would likely be harmful.

U.S. Launch Capacity

With this growth in demand for domestic space launch, the need in the near term for state-of-the-art launch facilities is necessary. Various spaceports from Virginia to Florida to Alaska are well positioned to support existing as well as new launch vehicles that are coming on line. From horizontal, vertical, and other gateways into space (World View Experience incorporating ballooning technology), as well as testing and research, many different types of facilities and in turn, multiple spaceports, are necessary.

Beyond the Federal Ranges at Cape Canaveral Air Force Station (CCAFS) and Vandenberg Air Force Base (VAFB), as well as the existing Mid-Atlantic Regional Spaceport (MARS), there are currently spaceports in all stages of development. In California, the Mojave Air and Spaceport has for years served as a critical test bed and proving ground for radical new technologies that have developed into new space capabilities for the United States. Spaceport America, in New Mexico, will soon serve as the launch pad for suborbital space tourism. In Georgia, the Camden County Spaceport seeks to join the ranks of the licensed spaceports in the near future. Space Florida is working with companies like Blue Origin to build modern manufacturing and launch facilities. To help support its incredible launch demand, SpaceX is currently developing the world's first fully commercial orbital launch site at Brownsville, Texas. These spaceports will contribute to the Nation's capacity to get to suborbit or orbit, and they will all benefit from a healthy market of launch vehicles—but, they will be inhibited if U.S. policy were ultimately to favor one or two companies over the investments being made in numerous private companies.

Policy Matters Facing Congress and the Industry

CSF, as the leading organization for the commercial space industry, worked hard with Congress on the Commercial Space Launch Competitiveness Act (CSLCA), which was signed into law in November of last year. This bipartisan legislation took important steps to refresh U.S. policy and law with respect to the commercial space launch industry. CSF appreciates the important and well-considered work done by this Committee and the entire Congress on this legislation, as it will facilitate the continued growth in commercial spaceflight.

Commercial Use of Excess ICBM Assets

Even as the ink is still wet on the CSLCA, the Congress is now facing efforts to reverse decades of sound policy with respect to the commercial use of excess intercontinental ballistic missile (ICMB) assets. The vast majority, but not all, of CSF's 70 member companies strongly oppose any effort to reverse the policy.

There are now some in the defense industry that are advocating for releasing old Minuteman and Peacekeeper rocket motors from decommissioned U.S. Government intercontinental ballistic missiles (ICBMs) for use in the commercial marketplace. Those advocating for this change seek to buy the rocket motors at a substantial discount (or simply have it supplied as Government Furnished Equipment (GFE)) and then compete against other U.S. companies that have developed their own launch capabilities, using private capital investment. This proposal is counter to long-

standing U.S. law and policy, including the Commercial Space Act of 1998 and the National Space Transportation Policy, which seek to promote commercial space transportation capabilities.

In the early 1990s, following U.S.-Russian Strategic Arms Reduction Treaty (START) agreements, the issue of whether or not subsidized U.S. government launch assets should be allowed to compete against U.S. commercial launch service providers reemerged in the form of excess ballistic missile assets. Having learned the hard lessons from the failed government-subsidized Space Shuttle launch model[8], and not wanting to repeat them, the U.S. Government correctly reaffirmed the successful U.S. commercial space launch policies established under the Reagan Administration in the 1994 National Space Transportation Policy. The policy set out to "encourage private sector investment in new space transportations systems" by: (1) directing U.S. government agencies to purchase commercially available U.S. space transportation products and services to meet their needs; and (2) directing excess ICBMs to either be retained for government use (only after certain, stringent conditions are met) or destroyed.

Indeed, Congress was especially mindful of the potential negative impact that the conversion and use of excess ballistic missiles would have on the growth of the U.S. commercial space industry in crafting what eventually became Section 205 of the Commercial Space Act of 1998. For example, the Committee on Science commented: "It is the Committee's understanding that the [National Space Transportation Policy] sought to strike a balance between efficient use of government assets and the potential to undermine the health of the U.S. commercial space transportation industry.

Wholesale conversions of ICBMs [Intercontinental Ballistic Missiles] into space transportation vehicles risks placing the government in the position of competing with the private sector and could have long‐term consequences."[9]

By consistently reaffirming 30 years of U.S. commercial launch policy, improving regulatory stability, and promoting pro-growth policies, the United States Government has, thus far, fostered a healthy development of U.S. commercial launch service providers—and we are seeing this policy bear fruit today. Currently U.S. providers operate eight different commercially available orbital launch vehicles, with several more under development. Over the past two years, the U.S. commercial launch industry has made significant progress in terms of competitiveness and innovation. U.S. commercially available launch providers have both recaptured a predominant share of the global commercial launch market, and, established the U.S. as the leading provider of access to space for commercial small-satellite ventures. With a number of new U.S. launch vehicles entering commercial operations in the next year or two, including multiple dedicated small-satellite launch vehicles, this progress is forecasted to continue.

For decades, the Government has correctly recognized that it should not be competing against the U.S. commercial launch sector by utilizing excess ICBMs for its own use (unless certain, stringent conditions are met) because this would have adverse impacts on the U.S. launch industrial base, to the detriment of national security and civil space objectives. This concern would be materially exacerbated by allowing these excess ICBMS to be sold on the open commercial market, because the Government would be directly competing against U.S. industry beyond the Government launch services sector.

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[8] Smith, Marcia. "*Space Launch Vehicles: Government Activities, Commercial Competition, and Satellite Exports."* Congressional Research Service Issue Brief for Congress. 29 April 2005. Pg CRS-2. Source: http://www.hq.nasa.gov/office/hqlibrary/documents/o60694623.pdf

[9] H.R. Rep. 104‐801, pt.1, at 26 (1996).

CSF encourages this Committee to strongly oppose any change to the existing policy with respect to the commercial use of excess ICBM assets for the following reasons:

1. Flooding the market with cheap government motors would tilt the playing field away from the commercial industry and toward the company that received the cheap motors. This kind of market intervention is exactly what the current policy is designed to avoid: picking winners and losers in the marketplace. It also sends a strong signal to investors: don't put your money in launch vehicle companies – the government may decide to cut you off at the knees anytime. The result: a weaker U.S. rocket propulsion industrial base, less innovation from start-up companies, fewer new technologies, and a less robust U.S. national security launch capability.

2. This policy reversal is not necessary. Not only are U.S. firms bringing launch vehicles to market, but Russia is removing both of its Dnepr & Rokot converted ICBM rockets from the market.[10]

3. The impact of this policy reversal has not been studied. Although media reports recently indicated that the Air Force is interested in changing the policy, it is abundantly clear that the Air Force or the Department of Defense has taken no steps to assess or understand the impact of this policy change on the commercial space launch market.[11]

4. This change would materially damage investment by sending a signal to potential developers of future commercial space transportation services that the Government will compete with them at any time, and that the Government will pick winners and losers.

5. This change would undermine longstanding non-proliferation efforts by the U.S. Government to limit the use of these missiles to Government use (in rare circumstances, requiring a waiver/certification), or be destroyed.

6. This change would undermine U.S. Government international leadership opposing the use by other nations of these excess assets on the commercial market, potentially resulting in a flood of these national assets into the market by other nations.

7. There will be no material cost savings to the Government, while this reversal in policy could irreparably harm the U.S. commercial launch industry. Even if a portion of these motors were allowed to be used for commercial launch services, the Air Force would still be required to pay storage and monitoring costs, even if the policy is changed.[12]

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[10] "Moscow Confirms Suspension of Russian-Ukrainian 'Dnepr' Rocket Launches." Sputnik News. 12 December 2015. "An April 15 [2015] decision by the President of the Russian Federation suspended the 'Dnepr' conversion program." Source: http://sputniknews.com/world/20151216/1031854451/russia-ukraine-missile-launches.html
"Russia to close Rokot conversion rocket launches under new space program draft." Tass Russian News Agency. 02 February 2016. Link: http://tass.ru/en/science/854018

[11] Klotz, Irene. Reuters. 14 April 2016. "The last thing we want to do is harm the entrepreneurial space market that we've built in this country. But I don't think it's necessarily a given that selling (ICBMs) will harm it, nor do I think that it won't harm it. We don't have any information one way or another," Loverro said." Source: http://www.reuters.com/article/us-space-missiles-commercial-idUSKCN0XB2YG

[12] Air Force 2017 Budget Request. Storage and Surveillance Cost. Storage and Surveillance Costs: FY17 $11.198M; FY18 $20.914M; FY19 $19.861; FY20 $17.817; FY21 $18.133 Source:

8. There has been no research done or policy discussion conducted as to what would happen if there was a launch failure with an excess ICBM – what would that mean to the integrity of the ICBM arsenal and the broader efficacy of one leg of the nuclear triad?

India Launch Services

Prohibiting access to foreign launch services, like India's, who do not allow their payloads to fly on U.S. vehicles, has opened another set of opportunities for U.S. commercial companies to develop their own systems to serve the global satellite launch market.

Here, CSF opposes any change to the current U.S. policy with respect to launch on Indian launch vehicle systems.

For commercial as well as government launches, Indian launch vehicles are operated by the Indian Space Research Organization (ISRO), a government entity that also funds the development and manufacture of these launch vehicles. Here, CSF has seen that pricing for commercial launch services on Indian rockets historically has not reflected the true costs associated with their initial development and on-going launch operations, putting U.S. commercial launchers at a disadvantage in competitions for these class of payloads. In effect, India is dumping these vehicles on the commercial market to the detriment of U.S. firms. We would encourage the U.S. Congress to support American firms offering legitimate pricing for launch services in this market.

To be sure, the U.S. National Space Policy, the National Security Space Strategy, and the National Space Transportation Policy all note the importance of a robust domestic commercial industry. Specifically, the National Space Transportation Policy notes that "strengthen[ing] U.S. competitiveness in the international commercial launch market is important to ensuring that U.S. space transportation capabilities will be reliable, robust, safe, and affordable in the future" and directs U.S. government entities to consider the health of the U.S. space industrial base in making decisions regarding space transportation.

As my statement has documented, American industry has invested hundreds of millions of dollars to meet government and commercial requirements for space launch services and is recapturing global commercial launch market share. Industry is bringing new launch capability to market to meet new market demand. A new generation of small, flexible, and low cost launch vehicles are being developed with private sector resources and these companies have already added thousands of high-tech American jobs. These new start-ups are particularly vulnerable to the predatory pricing practices of government-owned and -operated launch systems.

Consequently, CSF opposes efforts to facilitate a government-subsidized foreign launch company—in this case, ISRO—to compete with U.S. companies. Such a policy runs counter to many national priories and undermines the work and investment that has been made by government and industry to ensure the health of the U.S. space launch industrial base. At the same time, we have to be cautious not to squeeze out the U.S. satellite manufacturers and operators that have immediate launch needs which cannot yet be served by the aforementioned U.S. launch vehicles that are still in development. If it can be shown that there are no viable U.S.

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http://www.i2insights.com/library/defense_budget-documents/fy2017-defense_budget/3600F/3600F-0605860F-R.pdf

launch opportunities in a given timeframe to a required orbit, launch on PSLV or GSLV should continue to be considered on a case-by-case waiver review for U.S. payloads, as has been the practice for the last several years. This practice should continue while still relevant, but with the knowledge that it is a temporary solution until the U.S. launch industry further matures and becomes available for U.S. payloads.

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Conclusion

Mr. Chairman, on behalf of the more than 70 Members of the Commercial Spaceflight Federation, I appreciate the opportunity to testify before this Committee on this timely and important topic. Given the significant technological breakthroughs and private investment happening across our business, I strongly encourage this Committee to be highly circumspect about ill-conceived changes to policy that could effectively unwind the progress our industry is making.

American industry is responding to market demand and innovating on new technologies, outpacing any other nation in the world. We seek to preserve this national leadership in space, extend Earth's economic sphere, and to create safe and reliable access to space. We look forward to working with the Congress to achieve these goals.