U.S. Senator Maria Cantwell
Speech on the Senate Floor on NASA Reauthorization and the Artemis Program
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Cantwell: Madam President, I wanted to come to the floor and talk about one aspect of the U.S. Innovation and Competition Act that we haven't had time to fully address out here on the floor, although we had some discussion during the amendment process, and that is that the underlying bill and 1260 also reauthorizes NASA and puts support in for the Artemis Program.

On October 5th, 1957, our nation's relationship with space changed forever with the launch of the satellite Soviet Sputnik 1. With rival powers' satellites flying overhead, the geostrategic importance of outer space was undeniable, and within a year, the nation had two new science agencies, the Defense Advanced Research Projects Agency, DARPA, and the National Aeronautics and Space Administration, NASA. That launch ignited the American competitive spirit and inspired the nation to rapidly develop its space capabilities. Only 12 years later from that moment, an American was the first man to set foot on the Moon, and the race to the Moon set the stage for a vibrant commercial space economy we have today. We like the fact that Seattle in the region is now called the Silicon Valley of space. I know there's many aspects to our country where space is a key industry, whether that's in Florida, or Alabama or other southern states, Texas, we know, but the innovation and next phases of innovation, a lot is happening in the nexus between software and space in the Pacific Northwest.

So we're here again for a great competition about the future of space. We must again make the strategic investments needed to win. Space is even more geostrategically important today than it was in 1957. There are more countries in the space race, our competition is more advanced, new NASA Administrator, our former colleague, Senator Bill Nelson, testified before the House Appropriations Committee last week about China's advanced space missions. The United States landed the Perseverance Rover on Mars earlier this year, and shortly after, China landed their own rover on Mars. As Administrator Nelson told the committee, "They're going to be landing humans on the Moon. That should tell us something about our need to get off our duff." Spoken like our colleague, as we knew, I knew him. Blunt and to the point. I personally believe that the power of competition to spur innovation and push our nation to get more serious about making investments in space will also catalyze economic growth. I do believe we should rise to the occasion. That's why we're trying to be very specific in an innovation and competition bill about what it is going to take to fund the Artemis program.

That means recommitting to the ambitious human space exploration goals like returning Americans to the Moon and sending our astronauts to Mars in partnership with commercial and international partners. These are the candidates here for that Artemis mission. They're like our new colleague, Commander Kelly, who are preparing and takes years to prepare for this mission. I want to give them the certainty that we're going to make the right investments. That means taking a hard look at whether we are doing enough to protect the intellectual property essential to our leadership in space. We should make sure that the entrepreneurs for these are concerned that our IP and intellectual property won't be stolen by other countries. And of course, it means providing NASA with the needs that they have to carry out the human exploration, science, and space technology missions.

We can't afford to lose momentum within the Artemis Program. The Chinese, as I mentioned, are making rapid progress on a heavy lift rocket with its ambitious exploration mission. We too, I believe, should be doing all we can to understand and harness the power of this market, and make sure that

Congress does its proper oversight role. I recognize my colleagues and I may have a disagreement about the role of commercial sector in space. It's been a long time since Congress made this decision, but I certainly respect my colleagues' ability and interest and disputing here. Commercial programs can deliver lower prices and allow industry to bring about innovation, and also help catalyze other ideas. That is why it's been NASA policy since 1980 to encourage the fullest commercial use of space. That's when we really took off on this concept.

I do understand that some probably have an idea that NASA should still control all this IP and be in a position of funding all of this ourselves. But I think our policy to move towards the commercialization of space has given us some benefits. A bill focused on competition in research and development cannot leave NASA out of the conversation. That is why Ranking Member Wicker and I did bipartisan legislation to authorize NASA in the Endless Frontier Act as it came out of committee. The exploration and science work NASA carries out is important in and of itself, but their capacity to spin off additional inventions and other benefits to us also return investments. NASA has generated more than 2,000 spin off technologies, since 1976. And on average, these tech transfers from NASA generate generally $1 million per year for each spin off enterprise. The gear that keeps our firefighters safe was originally developed as part of a space program as NASA developed astronaut clothing and gear. Lasik eye surgery, cochlear implants to improve hearing, portable water filtration, cell phone cameras and even memory foam, all came out of NASA programs.

So now let's talk about this next project: that is, the Artemis project that is obviously an indication that we plan to send some women to the surface of the Moon. This time, under NASA's Artemis Program, when we return to the Moon, it will be a woman who will take the first steps. These are two candidates from this mission who I'm proud to say are from the State of Washington, and hopefully will be competing for one of those spots. Going to the Moon will allow us to develop the assets we need to go to Mars, and the assets to reduce the risk of what a crewed Martian mission might look like. This includes developing the most powerful rocket ever built, the Space Launch System, with its enhance upper stage. That rocket will be able to carry 38 tons of crew and cargo which NASA needs to enable a sustainable presence on or around the Moon.

NASA will be developing an orbiting outpost, like the gateway which will be like an international space station for the Moon, that can serve as a waystation for what we need to do to get our astronauts to and from and material to and from the waystation, similar to what we would do with Mars. So nuclear power sources for surface operations, human landing systems, all of these things are part of the critical legislation. So we'll demonstrate the ability to build and live in a habitat on the surface of another planet. That's what the Artemis project is all about. The space launch system and its capabilities will be complemented by commercial rocket launch science, experiments essential to our understanding of how to operate on the Moon, and components of NASA that are building for things in and around the Moon.

Getting to the Moon will also open up new opportunities for more commercial space industry, and once we set up a camp on the Moon, our astronauts will demonstrate the technology needed to extract resources like fuel, water, oxygen, and opening up new economic opportunities. The University of Washington has a lab devoted to technologies for extracting water from the Martian atmosphere and they are ready to do more. And in 2020, NASA challenged the commercial sector to conduct a mission that would set the precedent for mining lunar resources. Our commercial space industry is a critical partner to the Artemis program. The commercial sector brings their best ideas and the best technology

to the table for NASA programs. Commercial capabilities enables the mission at lower cost with greater capabilities than could have been dreamed of during the Apollo era.

However, NASA should be held accountable for how it manages these commercial programs. President Trump and his budget requested $3.4 billion for the Lander System. In fact, I think the Vice President at the time, Mike Pence, was an enthusiastic supporter of the Artemis Program and constantly evangelized our need for investment. The agency made it clear that they need $10 billion for the Human Lander System over the next several years. This program investment, I believe, is critical to the mission, but it's also critical that it follows NASAs best practices. One of the lessons learned from the assembly of the International Space Station is the importance of having multiple space transportation providers. NASA carried out that best practice in programs that developed the commercial space system that carried cargo and crew to the International Space Station.

The American taxpayers invest too much in these space programs not to apply these lessons about the importance of resiliency and redundancy. The same lesson should be applied to the programs developed here as we approach this new project to land people back on the moon. These are complex systems with multiple components that need to work together to the get astronauts down to the lunar surface and back safely. Building in resiliency and redundancy increases NASA's chances of successfully landing humans on the Moon and bringing them home safely. The Commercial Cargo Program is a perfect example where building in resiliency and redundancy through competition paid off. The program was created to transport cargo, like supplies for astronauts and science missions to the International Space Station. During that program, one company's rocket blew up on the way to the International Space Station and had to be removed from service for a whole year. But because the program built in resiliency and redundancy, the nation was able to continue to supply the station with the supplies that it needed. When the second commercial company suffered a launch failure months later, the first company stepped back in. And the importance of maintaining competition within NASA program to protect our investment and maximize our chances for success were clearly there and we were able to keep going.

As a former NASA official put it "Technical redundancy and market competition are central to the principle of commercial space contracting. Any one system would just leave us with the vulnerabilities that had plagued the space shuttle program." And we all know the complexities and challenges and the disaster that could and did happen there. This is our opportunity now to invest as we're making this big decision about America's competition and our innovation. Nothing could be a greater symbol than our return to the Moon and our exploration of Mars and the competition we face than galvanizing Americans in support of this, just as we were in the '60's.

This is our opportunity to invest in American space capabilities for the leadership for decades in the future. We are going to make sure that we get this right. We're going to make sure we protect the taxpayer and their investment, and we're going to make sure that we have redundancy now. I think this underlying bill helps us by clarifying to NASA what we expect out of the Artemis Program and what we need to do to make sure that NASA follows best practices in its management program. Returning Americans to the Moon and landing people on Mars will do wonders, and certainly I'm excited about the iconic nature of a woman returning, being the first to return for us to the Moon, and all the things that it will help us in educating women in the areas of science, technology, engineering, and math.

NASA does great work promoting these missions and getting young people interested in the STEM field, and it can inspire a whole generation of women to take up the sciences and to be involved. We saw this

during the Apollo era. Many scientific and technical professionals went into the fields because they got excited by watching the Apollo mission. So as we stare down the potential for millions and millions of unfilled STEM jobs for the future, I think this is the kind of inspiration that can be quite helpful to us.

Also, from Earth science to solar science to atmospherics, the scientific work of NASA helps us understand our universe. NASA's climate work is particularly impactful. Their data on sea level rises, carbon dioxide levels in the atmosphere, are critical to understanding the ability to fight climate change, and that is why the Earth science opened up so much data for us that we want to make sure we're moving forward with this NASA authorization. It will require NASA to make its Earth science data as interactive, interoperable, and accessible as feasible to academics and industry so they can utilize this information more usefully. I actually think this is a very exciting element of the program and progress that NASA is making. It's a no-brainer that it would allow us to squeeze more value out of the incredible work that NASA already does.

And we also can't forget the first “A” in NASA: aeronautics. The aviation industry is 5.2% of our G.D.P. and supports over 10 million jobs. Keeping that industry competitive, especially as the nation comes out of COVID pandemic and keep us on track with meeting our international mission standards is critical. NASA's experimental work developing X planes in partnership with industry drives major innovations in aeronautics. Their current work is focused on reducing the noise and emissions of aircraft, developing electronic propulsion, demonstrating supersonic aircraft that could one day fly over land among others--each of these are not incremental changes, they are fundamental changes, and I hope that we will move forward on this legislation.

This legislation also requires NASA to continue to collaborate with industry to develop next-generation materials like composites. Composites, lightweight material, are so important. I guarantee you, in the race for aviation, advanced composite manufacturing and whoever conquers this field best will be the leaders in aviation manufacturing. The agency’s advanced composite project was a great success in seeking to reduce the time needed to develop and certify new composites. It would be a loss to the nation if the agency were to lose momentum on this important work.

So, Madam President, as you can see, I believe this NASA provision that is in the underlying legislation is critical. The Senate passed this NASA authorizations last Congress only to have it fail to be taken up in the House. It's time that we get this legislation through the entire Congress, that we make this Artemis mission a true priority with true committed resources to help us be successful and to be proud sometime in the near future to see that woman standing on the face of the Moon. I thank the president, and I yield the floor.