36 – Space Policies We Need

SUMMARY

This chapter succinctly identifies key space policies that will be needed to capitalize on the emerging capability of the reusable heavy lift vehicle fleets. It starts by identifying ship-to-ship propellant transfer as when space policy needs to recognize that the new capabilities are going to become reality. We need to start developing large surface systems to be ready when heavy cargo is being delivered to the Moon. We need to start soon inviting young people around the world to prepare themselves to be part of America's historic Initial Permanent Crew. And we need to go beyond Artemis Accords to coordinate surface exploration and an International Base with other nations.

POLICY TIPPING POINT

When it becomes operational, the Starship fleet will not only be far more cost effective than the SLS but more capable as well. But that point has not yet come and so it is understandable that stage space policy decision makers in DC will want to continue spending money on the SLS for now. But what would it take for that to change? What achievement will start tipping space policy towards a Starship-based architecture thereby freeing up billions each year for a truly vigorous, sustainable lunar development program?

Starship's first stage has already been caught three times by the launch tower's arms (Mechazilla) starting in October 2024, yet this hasn't led to the policy tipping point.

Starship has not yet reached orbit, but its engines have been turned off 8% short of reaching orbit. Achieving orbit is a trivial next step. But when SpaceX chooses to achieve that step there remains an additional step required to give confidence that the alternate approach will likely work.

That additional step is connecting to a depot, transferring propellant, and storing said propellant with minimal loss. Elon has indicated that ship to ship propellant transfer should occur in 2026.

Zero boil off (ZBO) storage using cryocoolers is mostly a thermodynamic question which is provable in the lab. Indeed, this has been done multiple times including by Blue Origin including for liquid hydrogen. Space policy should reasonably assume that long-term storage is largely a solved problem and so the policy tipping point shouldn't wait for that demonstration.

Policy Recommendation: NASA should start messaging that, once a Starship tanker docks and transfers large quantities of propellant between ships, then we should seriously consider whether the Traditional Plan should give way to a Starship-based system.

TAKE FULL ADVANTAGE OF THE STARSHIP FLEET

The capability that SpaceX and Blue Origin are developing will truly revolutionize the course of human history. This is not an overstatement. It will be on these fleets that humanity will begin to spread beyond Earth.

But, to take the lead in this historic venture, the decision makers will need to direct our space policy to explicitly take full advantage of this capability and to not let other space priorities hog the budgetary resources (see Chapter 37).

Policy Recommendation: NASA's budget should prioritize the full utilization of reusable, heavy lift transport systems just as soon as they become available.

DEVELOP SURFACE SYSTEMS

A cost-effective rocket is useless if it has no payload. In anticipation of reusable heavy and super heavy-lift vehicles, NASA should develop a long-term vision for the ILEP and International Lunar Base (ILB). For the latter, there are a set of technologies that companies need to develop given full funding provided by NASA. Those technologies need to be ready to be used when the time comes rather than being an afterthought.

Policy Recommendation: NASA's needs to envision a Plan for the development of a large and growing International Lunar Base including the surface systems needed. After identifying the necessary components needed, budgetary space needs to be opened up with NASA providing fixed-price contracts with purchase commitments. The US should also encourage other nations to fund their own companies to develop competing components of an international base.

SEIZE THE HISTORIC PRIZE

There will be only one opportunity for a country to intentionally write the story of how humanity began settling down off Earth (see Chapter 5). America should choose to seize it.

Policy Recommendation: It should be America space policy to facilitate the first private crew to achieve the historic prize of establishing humanity's first permanent foothold off Earth. This would be achieved at an Initial Permanent Base with as few as eight people who are able to leave Earth and settle down indefinitely.

THE INTERNATIONAL LUNAR EXPLORATION PHASE

The near-term value of a program of lunar exploration and sustainability is American leadership among the nations, writ large! From a space policy standpoint, this is the great value and justification for a sustained lunar program.

The Artemis Accords have been very successful, but they need to be followed up with an "Artemis Accords 2.0" to coordinate exploration and development of a very large-scale program of lunar exploration.

Policy Recommendation: It should be the goal of NASA's space program to provide international leadership by setting up a framework whereby collaborating nations can coordinate a very large International Lunar Exploration Phase for the benefit of all nations.

INTERNAIONAL LUNAR BASE

Related to the policy for the development of surface systems, US space policy should commit to leading the nations to develop an International Lunar Base on the Moon. This would serve as a base for the exploration of the Moon, a base for industrial-level development, and also the base from which private settlement would arise. By establishing leadership in the development of the international base, the United States can ensure that the principles established are consistent with our values.

Perhaps this would be a good time to note that a large base may seem like a far distant project that space policy doesn't need to address now. But given SpaceX's Starship test flights, engine production rate, and their Starship Factory, now is the time to start developing surface systems for the base and the current administration can establish the legacy for having initiated the vision.

For the base, standard (100 tonnes) inflatable habitat structures can be conceived and then NASA can coordinate with the space agencies of other countries for them to pick which specialty hab they would like for their companies to develop as their contribution to the International Base.

Policy Recommendation: It should be the policy of the United States to lead in the establishment of a large and growing International Lunar Base.

AVOIDING POLICY TRAPS

Chapter 37 describes some policy traps that would constrain NASA's budget for many years, committing to programs that don't yield anywhere near the outcomes as the Innovative Plan described in this book. It is essential to acknowledge that decisions need to be made to open up budgetary space. Yes, one could keep all previous programs and expand the budget. But is that sustainable and is it responsible with the taxpayer's money given the level of debt that the federal government has accumulated?

Policy Recommendation: It should be the Administration's and Congress' policy that our space program should give the taxpayers the best outcome for our space bucks and that there should be no sacred cows.

PARTNER WITH SPACEX ON MARS

Although this book is about lunar exploration, development, and settlement, a policy for Mars should be mentioned because the Moon and Mars programs are often set against each other. If we are conscientious about eliminating wasteful programs from our space program, there should be enough budgetary space to do both programs well.

The space policy decision makers need to come to the realization that any NASA crewed mission plans for Mars will be irrelevant because SpaceX is going to beat them.

The decision makers need to decide if they want NASA to remain relevant when it comes to Mars. Certainly, they do want that. So, for them the question really comes down to, what role will NASA play as SpaceX is developing and sending its fleet to deliver cargo and then crew to the red planet?

The answer seems obvious. There needs to be a public-private program in which NASA (and other leading space partners) funding buys seats on the first mission to Mars alongside SpaceX workers. Both will be interested in establishing permanent facilities from the start and NASA will take the lead when it comes to scientific exploration.

Policy Recommendation: It should be the policy of NASA to partner with SpaceX in a joint program for establishing a permanent base on the red planet.