From Lunar Base to Lunar Economy:

Reframing NASA's Moon Strategy for Sustained Commercial Growth

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Abstract

NASA Administrator Jared Isaacman's announcement of a comprehensive lunar base program targeting a robust human surface presence by 2036 represents a pivotal moment in the evolution of U.S. space policy. This paper examines the program's strategic merits and structural limitations, arguing that while the initiative marks a welcome and necessary commitment to permanent human presence beyond Earth, its long-term viability depends on a fundamental reorientation of its underlying logic — from government-led infrastructure program to enabler of a self-sustaining lunar economy. Drawing on lessons from NASA's Commercial LEO Destination (CLD) program and the broader literature on space commercialization, this paper proposes a dual mandate framework: achieving minimum viable operational capability while simultaneously structuring commercial opportunities throughout the infrastructure ramp-up period. It further contends that credible lunar governance, developed in concert with international partners, is a prerequisite for the private investment and resource utilization activity that would give the program its lasting economic rationale.

I. INTRODUCTION

The United States has returned to the Moon before — or nearly so. Since the Apollo program ended in 1972, a succession of policy declarations, architecture studies, and aborted program starts have promised renewed human lunar presence without delivering it. The Vision for Space Exploration under President George W. Bush, the Constellation program, and most recently Artemis have each built and then partially dismantled the institutional momentum required to sustain long-duration lunar activity. Against this backdrop, NASA Administrator Jared Isaacman's 2025 announcement of a comprehensive lunar base program — targeting a robust, permanent human surface presence by 2036 — carries both renewed promise and familiar risk.

What distinguishes the Isaacman architecture from its predecessors is not merely its ambition but its specificity. The program names concrete infrastructure objectives: surface habitats, integrated power systems, in-situ resource utilization (ISRU) capabilities, and a deliberate reallocation of Lunar Gateway funding to surface operations. With a seven-year timeline and an estimated program cost of $20 billion, it represents the most detailed U.S. commitment to permanent lunar presence since Apollo itself.

Yet specificity of infrastructure is not the same as clarity of purpose. This paper argues that the Isaacman lunar base program, as currently framed, contains a critical strategic gap: the near-absence of a coherent commercial development strategy. Without such a strategy, the program risks reproducing the government-dependent contractor culture that has historically limited the emergence of self-sustaining space markets — a dynamic that NASA's own Commercial Low Earth Orbit Destination (CLD) program was expressly designed to disrupt. Drawing on lessons from CLD, the commercial launch revolution, and international models of resource governance, this paper proposes a reorientation of the lunar base program around a dual mandate: infrastructure

development and simultaneous commercial ecosystem creation. The ultimate goal, this paper contends, should not be the lunar base itself. It should be the lunar economy.

II. NASA'S LUNAR ARCHITECTURE: AMBITION AND ASSUMPTIONS

The Isaacman lunar architecture represents a significant departure from the Gateway-centered approach that defined late Artemis planning. Under the prior framework, the Lunar Gateway — a small crewed outpost in near-rectilinear halo orbit — served as the centerpiece of sustainable lunar presence, providing a staging node for periodic surface sorties. Critics argued, with considerable justification, that this approach prioritized orbital infrastructure over surface activity and deferred indefinitely the conditions necessary for genuine lunar habitation.

The revised architecture inverts this logic. By reallocating Gateway funding to surface systems, the Isaacman program signals a commitment to persistent human surface presence rather than periodic visits. The program's infrastructure objectives — surface habitats, modular power systems, and ISRU capabilities — are the right ones. ISRU in particular is indispensable to any vision of a self-sustaining lunar presence. The Moon's polar regions contain water ice deposits that, if extractable at commercial scale, could supply both life support consumables and propellant feedstock for cislunar transportation.[1] The development of ISRU capability would represent a qualitative shift in the economics of lunar activity, reducing dependence on Earth supply chains and creating the conditions for genuinely extended surface operations.

The program's financial assumptions, however, warrant scrutiny. The $20 billion, seven-year timeline reflects a relatively constrained budget envelope for the scope of objectives described. Historical comparisons are instructive: the International Space Station cost approximately $150 billion over its development lifetime, and even the more focused Commercial

Crew program required approximately $8 billion in NASA investment to achieve initial certification of two commercial vehicles.[2] A lunar base program encompassing habitats, power systems, and ISRU infrastructure — while also sustaining ongoing crew rotation — will require sustained and growing budget authority that the seven-year estimate likely underrepresents.

More fundamentally, the architecture's financial sustainability depends on assumptions about cost-sharing and commercial revenue that are not yet specified. If NASA is the sole customer for lunar base services throughout the program's operational phase, the cost structure will mirror traditional government space programs, with all attendant inefficiencies. The question of who else will pay — and for what — is the central strategic question the current framework leaves unanswered.

III. THE COMMERCIAL DEVELOPMENT GAP

The absence of a commercial development strategy in the current lunar base framework is not merely an oversight; it reflects a recurring structural tendency in NASA program design. NASA's procurement culture has historically treated private contractors as vendors — suppliers of components and services to government-defined specifications — rather than as economic actors with independent interests in the development of space markets.[3] This vendor model reliably produces hardware and, in some cases, operational capability. What it does not produce is market creation.

The contrast with NASA's Commercial Orbital Transportation Services (COTS) program and its successors is instructive. COTS, initiated in 2006, represented a deliberate departure from traditional cost-plus contracting by offering Space Act Agreements with milestone-based payments to commercial providers developing cargo resupply services for the ISS.[4] The results —

most visibly SpaceX's development of the Falcon 9 and Dragon systems — demonstrated that NASA investment structured to incentivize commercial capability development, rather than to procure a defined government output, could catalyze genuine market emergence. SpaceX's subsequent development of Starship, funded primarily by private capital, is the downstream consequence of that initial market creation.

The Commercial LEO Destination program extends this logic. CLD is premised on the recognition that the ISS's impending retirement creates both a supply-side gap — the loss of U.S. government laboratory capability in low Earth orbit — and a market-creation opportunity. Rather than simply procuring ISS successor services, CLD aims to develop commercially owned and operated destinations that serve NASA as one customer among several.[5] The program's ambition is to create a self-sustaining low Earth orbit economy in which government demand anchors but does not wholly constitute the market. That ambition has faced significant headwinds — funding uncertainty, schedule pressure, and the structural challenge of demonstrating commercial demand in a market that does not yet exist — but its underlying logic is sound.

The lunar base program should adopt this logic explicitly. As currently framed, it risks treating commercial actors as vendors who will supply habitat modules and power systems on government contract, rather than as potential economic stakeholders with independent reasons to invest in lunar infrastructure. The difference is not merely rhetorical. Vendor relationships produce deliverables. Stakeholder relationships produce ecosystems. The long-term viability of a permanent lunar presence depends on the latter.

IV. A DUAL MANDATE FRAMEWORK

This paper proposes that NASA adopt a dual mandate for the lunar base program: achieving minimum viable operational capability for science, prospecting, and astronaut safety, while simultaneously signaling and structuring commercial opportunities throughout the infrastructure ramp-up period. These objectives are complementary, not competing. Early infrastructure investment can be designed from the outset to create the conditions for commercial activity, rather than treating commercial development as a downstream phase that follows government capability establishment.

Minimum Viable Operational Capability

The first mandate — minimum viable operational capability (MVOC) — recognizes that permanent human presence on the Moon requires a baseline level of infrastructure that is inherently governmental in character: life support systems, medical capability, communications redundancy, and emergency evacuation capacity. These are public goods in the economic sense, in that their provision benefits all lunar operators but cannot be efficiently provided on a purely commercial basis in the program's early phases.[6] NASA's role in developing MVOC is therefore legitimately governmental. The key discipline is scope control: MVOC should be the floor, not the ceiling.

A persistent failure mode in government space programs is the expansion of the government-defined baseline to encompass functions that could be commercially provided, thereby crowding out private investment and perpetuating government dependency. The lunar base program should define MVOC narrowly and explicitly, specifying which infrastructure elements will be government-provided, which will be commercially procured under traditional contracts, and which will be structured to attract independent commercial investment.

Commercial Opportunity Structuring

The second mandate — commercial opportunity structuring — requires that NASA design the lunar base program from inception with explicit attention to the market signals it sends and the contractual mechanisms it deploys. This is a distinct activity from program management, and one that NASA's existing institutional capabilities are not well-suited to perform without deliberate organizational investment.[7] It requires asking, for each infrastructure element and operational function, whether the government procurement approach chosen will encourage or discourage the emergence of an independent commercial market.

Practically, this means several things. First, NASA should publish a long-range demand signal — a multi-year forecast of its requirements for lunar surface services, including habitat capacity, power provision, propellant supply, and surface mobility — sufficient for private investors to underwrite development of commercially owned infrastructure. The ISS experience demonstrates that NASA demand, credibly committed, can serve as the anchor for significant private investment in space infrastructure.

Second, NASA should structure ISRU development as a market-creation activity rather than a program deliverable. Rather than developing ISRU capability in-house and deploying it as government infrastructure, NASA should offer anchor purchase agreements for lunar-derived propellant and water, similar to the structure of its lunar commodity purchase pilots under the Artemis framework.[8] This approach directs private capital toward ISRU development while preserving NASA optionality as a customer rather than a developer.

Third, NASA should develop a transparent framework for the allocation of lunar surface access rights — specifying how surface sites, power infrastructure, and communications bandwidth will be allocated among government and commercial users. The absence of such a

framework creates the uncertainty that most reliably deters private investment in frontier environments.

V. GOVERNANCE AS A PREREQUISITE

The dual mandate framework described above presupposes a governance environment in which private investment in lunar resources is legally credible. That environment does not yet fully exist. The 1967 Outer Space Treaty's prohibition on national appropriation of celestial bodies creates interpretive ambiguity about the legality of commercial resource extraction, even as the United States, Luxembourg, the United Arab Emirates, and others have enacted domestic legislation asserting the legality of commercial resource rights.[9] The Artemis Accords, subscribed by 48 nations as of early 2026, establish a set of norms for lunar activity — including transparency, interoperability, and the protection of heritage sites — but stop short of providing the binding legal framework that commercial investment ultimately requires.

This paper contends that a credible lunar governance framework — one that provides legally enforceable resource rights, dispute resolution mechanisms, and environmental protection standards — is a prerequisite, not a successor, to the private investment and resource utilization activity that would give the lunar base program its lasting economic rationale. This is not merely a legal argument; it is an economic one. Private capital does not flow reliably to environments where property rights are ambiguous, contract enforcement is unavailable, and the rules of competition are undefined.[10]

NASA and the State Department should therefore treat the development of a lunar governance framework as a program-critical activity, not as a parallel diplomatic track. The Artemis Accords provide a foundation; what is now needed is a multilateral negotiation process

— potentially within the framework of the Committee on the Peaceful Uses of Outer Space — that produces binding instruments addressing resource rights and liability standards. This process should be initiated concurrent with, not following, the lunar base program's infrastructure development phase.

The governance challenge is compounded by the geopolitical context. China and Russia are pursuing an independent International Lunar Research Station program that does not subscribe to the Artemis Accords framework, creating the prospect of competing legal regimes on the lunar surface. Managing this complexity will require sustained diplomatic investment and a willingness to negotiate governance frameworks with parties whose operational programs are, for the moment, independent of the U.S.-led architecture. The alternative — allowing legal ambiguity to persist until it becomes a source of active conflict — would be significantly more costly.

VI. CONCLUSION

The Isaacman lunar base program arrives at a moment of genuine opportunity. The convergence of capable commercial launch vehicles, maturing ISRU technology, and renewed political commitment to permanent lunar presence creates conditions that the United States has not previously enjoyed. The program's infrastructure objectives are the right ones. The question is whether the institutional logic governing their pursuit is adequate to the strategic goal.

This paper has argued that the current framework's central limitation is its near-absence of a commercial development strategy. By treating private actors primarily as vendors rather than as economic stakeholders, the program risks building impressive infrastructure that generates limited commercial activity, sustaining government dependency rather than catalyzing the self-sustaining economy that alone can give permanent lunar presence its lasting rationale. The lessons of the

Commercial Crew and CLD programs demonstrate both the transformative potential of market-oriented program design and the institutional difficulty of sustaining it under budget pressure.

The dual mandate framework proposed here — pursuing minimum viable operational capability while simultaneously structuring commercial opportunities — is demanding. It requires NASA to develop institutional capabilities in market design and governance facilitation that sit outside its traditional competencies. It requires the State Department to treat lunar governance as a program-critical activity on par with infrastructure development. And it requires Congress to maintain the budget authority and policy clarity that long-horizon private investment demands.

These are not easy asks. But they are the right ones. The goal of the lunar base should not be the lunar base itself. It should be the creation of a sustainable and growing lunar economy — one in which NASA's role progressively transitions from operator to anchor tenant, and in which the private sector builds the foundation for long-term human expansion beyond Earth. Meeting that goal demands that the program be designed, from its inception, with the lunar economy as its organizing objective.

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