Advanced, Low Cost, Modular, Scalable, Space-Temporal Agnostic, Continuous Power Generation for All Mobility and Derivative Applications [Universal Power Supply - UPS]

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Introduction: NASA seeks solutions for low cost Lunar exploration and maximizing resource utilization including oxygen and water delivery while minimizing energy use and mass of equipment required to be transported to the lunar surface. Same holds true for inner and outer planet exploration and beyond, all of which share common hurdles

The Problem: Arguably, the key technology gap on the moon and elsewhere in all activities lies in the availability of low cost, ubiquitous energy which addresses topics such as:

- ❖ Excavation of vast quantities of regolith;
- ❖ Delivery of large quantities of water and materials;
- ❖ Construction of buildings and infrastructure;
- ❖ Extensive exploration;
- ❖ Lightweight and efficient hardware and equipment ;
- ❖ Hardware and equipment that is reliable and durable in extreme space environments, including prolonged darkness, extreme temperature, dust, and vacuum.

In space, power or energy is the key commodity.

Solution: Unlike institutionalized solution providers, ℕ𝔽𝕋𝔾's unconstrained seminal approach solves the energy challenge uniquely in a simple, scalable, readily deployable, application agnostic, infrastructure independent, ultra-efficient power system that is space environment resistant & agnostic by leveraging current technologies, physics and several of ℕ𝔽𝕋𝔾's simple innovations.

Function, Features, Benefits and Opportunities: Along with ℕ𝔽𝕋𝔾's various maximally efficient, power dense innovations, the **readily available** radioisotope powered UPS system of systems concept gives rise to inherently space environment resistant, high 'specific power/energy' output [3-5X improvement] solution for compact, mobile and stationary power generation, universal mobility and equipment operation. The versatility and scalability of the small footprint components and the system allows unconstrained exploration, resource extraction, manufacturing and operation of any ancillary equipment, structure and infrastructure despite geographic location or solar energy flux [space-time/condition/environment agnostic (2), (3)] anywhere in the Solar system and beyond.

The derivative components and constellation of expedient and synergistic systems. including high performance, long range lunar terrain vehicles (LTV) atmospheric mobility systems (LAV) and robots, are similarly low cost, simple, compact, robust, reliable, modular, multi-purpose, energy and process efficient with high speed and production output capacity [**10-100X**], that can be rapidly implemented anywhere early on in missions without any direct supporting infrastructure, providing long life with minimal downtime in transportation, construction, manufacturing, resource acquisition and processing, solutions, not limited to oxygen, water and fuel resources. Mobility comparisons in Fig.1 & [1].

Efficient, energy/power dense mobility, machines, robots and tools, are in part enabled by a revolutionary ~10X power dense gear technology which does not require lubrication and so can operate in extreme environments.

Technology Readiness Level [TRL]: Most of ℕ𝔽𝕋𝔾's innovations are level 2, 3 & 4 but can rapidly be turned into doctrine w/a modicum of funding. Some tech is TRL/MRL 9.

Hurdles: We are not aware of any significant parameters and constraints on the primary or ancillary architectures required to develop and support our energy and derivative solutions. We seek collaborators / team mates.

FACTOR	LAND	AIR	U.P.S.
Maturity	Low	Low	Good
Wear / dust	Severe	Low	Low
Navigation	Complex	Simple	Simple
Range	Low	Good	Unlimited
Speed	Low	Moderate	High
Payload	Low	Moderate	High
Thermal	Challenging	Simple	Simple
Delivery	Small lander	No lander	No lander
Operating Envelope	Low	Good	Unlimited
Utility	Low	Low	High
Data Size	Low	Low	High
Data Value	Low	Low	High
Mission Cost	Moderate	Moderate	Low
Mission Value	Low	Low	High
Mission Sophistication	Low	Low	High
Mission Duration	Low	Low	High
Science Advancement	Low	Low	High
Technology Advancement	Low	Low	High

Fig.1.Planetary motivity comparison. More at [2] and [3]

Conclusion: The system designs clearly demonstrate superior solutions which will enable sustained exploration presence on Luna and beyond for years to come. Terrestrial applications abound. Sic Parvis Magna.

References: [1] M. Kroupa (2021) Mobility comparison https://www.dropbox.com/s/lbh055478o5z2xc/SP%20advanced%20mobility.jpg?dl=0

[2] M. Kroupa (2022) - 53rd Lunar and Planetary Science Conference 2022 (interactive iPosterSessions) - ADVANCED, ENDURANCE AGNOSTIC, MULTI-MISSION & VTOL CAPABLE, POWERED PLANETARY GLIDER [PPG] -- https://lpsc2022.ipostersessions.com/default.aspx?s=78-00-E5-96-74-BC-02-00-47-CC-EE-0A-53-CA-E7-7A&questview=true

[3] M. Kroupa (2022) - ADV, ENDURANCE AGNOSTIC, MULTI-MISSION, VTOL CAPABILE POWERED GLIDER [PPG] - 53rd LPS, 2771, online.pdf

https://www.dropbox.com/s/47uhsple17u7wm6/ADV%2C%20ENDURANCE%20AGNOSTIC%2C%20MULTI-MISSION%2C%20VTOL%20CAPABILE%20POWERED%20GLIDER%20%5BPPG%5D%20-%2053rd%20LPS%2C%202771%2C%20online.pdf?dl=0