

Notes from Surface Power Monthly Meeting

September 2020

Notes from Discussion

ISRU Workshop Recap ::REFER TO SLIDES::

- Gary Barnhard asked if the workshop was O2 focused
 - Wes Fuhrman answered that it was not, and affirmed that the full phase diagram for water would be considered
 - Karl Hibbitts added that the workshop had focused on industry, specifically companies building rockets and their propellant needs, but that there is room for consideration of and conversations about other volatiles, but O2 was the 'common denominator' for fuel
 - Karl Hibbitts additionally stated that crew consumables would be a smaller fraction of the total but could be addressed as another entry point for consideration
 - Dennis Wingo added that Karl's perspective lends itself well to the decadal approach of increments
- Gary Barnhard pointed out that power was a vital consideration when it comes to processing materials for volatiles, as well as excavation and extraction
 - Wes Fuhrman responded that now that demand was beginning to take shape ISRU and power could coordinate and continue trying to fill technology and knowledge gaps
- Gary Barnhard commented that establishing a minimum increment would be important to enable some level of capacity and scalability
 - Dennis Wingo responded that the consensus number drawn from the ISRU workshop would help shape those increments, and further added that planning a system architecture that could address multiple increments would be ideal
- Paolo Venneri added that on ISRU's Confluence space 50 kilowatts had been identified as the amount needed to produce 10 metric tons of oxygen per year
 - Wes Fuhrman responded that that was the baseline for splitting apart water, which is a good starting point / bounding principle

Open Discussion ::REFER TO SLIDES::

- Gary Barnhard asked whether it was a question of new technology or process engineering
- Wes Fuhrman pointed out that another reasonable question is what is the minimum continuous power demand, and how that can be met
- Dennis Wingo stated that power distribution was a system level question that wasn't currently being addressed
 - Paolo Venneri added that another outstanding issue was how systems would be installed on the lunar surface

- Gary Barnhard pointed out that excess heat from power production would be useful in other lunar surface applications

Year One Goal ::REFER TO SLIDES::

- Gary Barnhard and Marvin advocate for importance of systems and capabilities as well as technologies

::refer to additional comments in chat notes::

Presentation by Dennis Wingo ::REFER TO SLIDES::

- Question from chat (Michael Nord): landed mass
 - Dennis responded it was 4500 kg, within capabilities of Blue Moon lander
- Gary Barnhard asked if the envisioned connector was compatible with robotic shell automation and EVA, and whether it was a hot connect
 - Dennis responded that it was, and that he'd have the hardware in the next seven days, and that it was a cold connect

Notes from Chat

- To request Confluence access, email Andrea Harman at ams573@alumni.psu.edu
- LSIC's LinkedIn presence: <https://www.linkedin.com/groups/13861869/>

ISRU Supply and Demand Recap

- John Verboncoeur observed a need for multi-variable optimization space between power, materials storage and processing capacity
- Karl Hibbitts added to Dennis' point that different system architectures might be appropriate for different levels of production

Fall Meeting

- Fall Meeting event page: <http://lsic.jhuapl.edu/Events/102.php?id=102>

Open Discussion

- Link to Surface Power Confluence space: <https://lsic-wiki.jhuapl.edu/x/a4AZ>
- Dennis Wingo defined the trade space in three parts
- John Verboncoeur stated that H2O phase changes consume tremendous energy, environment should be taken into consideration
- Jeff Slostad pointed out the power system requires a substantial radiator (challenging in dusty environment)
- Technology development ideas from Michael Grizen: Thermochromatic coatings and electrically repelling dust particles

Year One Goals

- Adam Marcinkowski asked whether systems or capabilities should be used
- Ray Beach added that sustainable should be added

Dennis Wingo Presentation

- Peer reviewed paper for background to Dennis' talk: <https://www.liebertpub.com/doi/abs/10.1089/space.2015.0023>
- Moon Trek resource: <https://trek.nasa.gov/moon/>