NASA SBIR 2015 Phase I Solicitation

H10 Ground Processing

Lead Center: KSC

Ground processing technology development prepares the agency to test, process and launch the next generation of rockets and spacecraft in support of NASAâ€™s exploration objectives by developing the necessary ground systems, infrastructure and operational approaches.

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This topic seeks innovative concepts and solutions for both addressing long-term ground processing and test complex operational challenges and driving down the cost of government and commercial access to space. Technology infusion and optimization of existing and future operational programs, while concurrently maintaining continued operations, are paramount for cost effectiveness, safety assurance, and supportability.

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A key aspect of NASAâ€™s approach to long term sustainability and affordability is to make test, processing and launch infrastructure available to commercial and other government entities, thereby distributing the fixed cost burden among multiple users and reducing the cost of access to space for the United States.

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Unlike previous work focusing on a single kind of launch vehicle such as the Saturn V rocket or the Space Shuttle, NASA is preparing common infrastructure to support several different kinds of spacecraft and rockets that are in development. Products and systems devised at a NASA center could be used at other launch sites on earth and eventually on other planets or moons.Â

Subtopics

H10.01 Cryogenic Purge Gas Recovery and Reclamation

Lead Center: SSC

Participating Center(s): GRC, KSC

Helium is becoming a major issue for NASA and the country. Helium is used as a purge gas in cryogenic piping systems to reduce the concentration of hydrogen below the flammable threshold at test and launch complexes. Most of the Nation's helium comes from the National Helium Reserve operated by the Bureau of Land Management (BLM). The statutory authority for BLM to operate is expiring and responsibility is being transferred to the

commercial sector. Helium is a non-renewable gas that is in limited supply. There are already helium shortages and prices are going up.

Fuel cell technology has demonstrated the ability to output high quality helium from a hydrogen/helium gas mixture. The helium/hydrogen gas mixture was collected, helium extracted and recovered. The recovered helium meets the stringent purity requirements for reuse. Proposals are sought that improve upon the demonstrated technology or develop new alternative cryogenic gas separation technology.

This subtopic has the potential to substantially reduce the costs of NASA's test and launch operations. Additional development is needed to increase the efficiency of the recovery process, capture large amounts of mixed gases, and provide real-time solid state sensor technologies for characterizing constituent gases. Helium is the highest value cryogenic gas, but other cryogenic gases could be conserved also.

Specific areas of interest includes the following technologies:Â

- Enhanced membrane technologies including Proton Exchange Membrane (PEM) fuel cells that increase the efficiency, recovery production rate or life span of fuel cell based separation technologies.
- Development of alternative cryogenic gas separation technologies.
- Technologies for the rapid capture and storage of high volumes of mixed cryogenic gases.
- Development of zero trapped gas system technologies to improve purge effectiveness.
- Development of real-time, solid state sensor technologies for monitoring the current state of the system concentration levels and helium/nitrogen purge process effectively (e.g., hydrogen, oxygen, water vapor content, etc.).

Examples of this type of technology:Â

- (http://www.sustainableinnov.com/products/h2renew/)
- (http://www.extrel.com/)