NASA SBIR 2015 Phase I Solicitation

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/)