IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Emerging Space Ventures, including Space Logistics and Space Safety for Sustainability (9-D6.2)

Author: Mr. Pascal NOIR
CNES, France

Mr. BURDASZEWSKI Patrick
Centre National d'Etudes Spatiales (CNES), France

ENVIRONMENTAL AND ECONOMIC INTEREST OF A LOCAL AND AUTONOMOUS ENERGY AND PROPELLANT PRODUCTION FOR FUTURE EUROPEAN LAUNCH SYSTEM IN FRENCH GUIANA

Abstract

During the last three years, CNES has undertaken several studies about the replacement of classical propellants for European future launchers. Although methane is currently considered as the reference propellant, green hydrogen has also been investigated taking into account the wide field of industrial opportunities raised in year 2020 on this topic. At the same time, studies to reach energetic autonomy for launch base and French Guiana in 2030 have been undertaken and are also linked to propellant production. The issues of these investigations have led to the implementation of two projects called BIFROST (BioFuel for Rocket Operation in Space Transportation) and HYGUANE (Hydrogène GUyanais A Neutralité Environnementale). The object of the article is to present the different concepts foreseen for these two projects, their performances, their impacts on environmental criteria and on business plans. The interest of a local and autonomous production in a new geopolitical energy context will also be analyzed. As for BIFROST, the article will compare the three studied concepts using three different technologies: methanization based on bio-waste, exploitation of dump gas issued from household waste and methanization of water hyacinth. Economic interest of BIFROST compared to importation of biomethane and fossil methane will also be highlighted. The article will also detail the social and environmental interest of implementing a circular economy in French Guiana. BIFROST will be able to provide methane for reusable European small launcher and Themis reusable demonstrator but extension of the use of bio GNL for mobility, household energy consumption are also under investigation and would contribute to consolidation business plans HYGUANE is a pilot unit dedicated to green hydrogen production source implementation in French Guiana. The project has the following aims: production of 20% of Ariane 6 propellant need at short term compatible with launcher economic competitiveness, energy production dedicated to launch base by means of fuel cells or hydrogen combustion, and also extension to mobility with liquid hydrogen vehicles. 2030 objectives will be to cover 100% of Ariane 6 propellant need, extension of energy production for launch system and of mobility to Guianese territory