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Contribution of Space Activities to Solving Global Societal Issues (2)

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ECODESIGNING SPACE MISSIONS TO REDUCE THE ENVIRONMENTAL IMPACT

Abstract

The protection of the environment against the onslaught of climate change is arguably the most pressing challenge facing humanity. In the recently published 2017 UN Guidelines on the Peaceful Uses of Outer Space, it states clearly that “intergovernmental organisations should promote the development of technologies that minimize the environmental impact of manufacturing and launching space assets”. Through the Clean Space initiative, ESA is leading the way on ecodesign for space, through the use of life cycle thinking, and more specifically Life Cycle Assessment (LCA). This is an internationally standardized tool widely accepted as the best way to assess one’s environmental footprint. Performing LCA in the space sector is difficult, due to many specificities of the industry (low production rates, specialised manufacturing processes, long development cycles) and therefore the ISO standards do not suffice as a rigorous methodology. At ESA, these difficulties have been tackled and LCAs have been carried out on the European launcher family (Vega, Ariane 5 ECA/ES) as well as four space missions (Earth-observation, telecommunications, meteorological and science). Studies were also undertaken to develop a European database containing LCA datasets of materials and processes and space propellants specific to the space sector. In early 2017, an ESA handbook was published containing the methodology to perform LCA in the space sector. Finally, an ecodesign tool that allows environmental performance to be incorporated as a design criteria in Phase 0 studies has begun regular implementation from 2017. With the knowledge gained from LCA studies and the tools in place - the handbook, database and ecodesign tool - ESA is now ready to reduce its environmental footprint with industry by implementing ecodesign. This will be done on two main levels. Firstly, at project level, an LCA will be asked at early stages in order to flag hotspots and identify mitigation actions. Further iterations of the LCA will be performed as the project matures. This should also involve a risk assessment on environmental regulation, such as REACH. In fact, such a process is already underway within the Ariane 6 launcher development. Secondly, based on hotspots identified from these projects, and previous studies, green technologies will be developed to TRL 7 for adoption within future space missions.