SPACE SYSTEMS SYMPOSIUM (D1)
System Engineering - Methods, Processes and Tools (1) (3)

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INTRODUCING ECO-DESIGN – ENVIRONMENTAL IMPACT ASSESSMENT IN SPACE SYSTEMS AND SYSTEM ENGINEERING

Abstract

In the space sector, environmental issues have only recently started to come under closer consideration. Yet through the risks of supply chain disruptions due to environmental legislation and increasing environmental awareness the sector will face new challenges. ESA's Clean Space initiative is proactively promoting awareness and addressing these challenges. Its branches 1 and 2 take a system level approach to develop a framework to support projects in monitoring their supply chain for compliance with regulation, evaluating environmental impacts, and identifying possible sustainable alternatives while minimising the overall system level impact to the project. This paper gives an overview about the activities within Clean Space branches 1 2, with special focus on the creation of a handbook for space system Life Cycle Assessment (LCA) guidelines and on the implementation of an eco-design software tool in ESA's Concurrent Design Facility (CDF).

Performing LCA in the space sector is difficult, due to many specificities of the industry (low production rates, specialised manufacturing processes, long development cycles). Initial studies established the applicability of the LCA methodology to the space sector and ESA subsequently broadened its knowledge about specific methodologies to assess the environmental impact of space activities. Furthermore, industry has begun work in the area, with Airbus DS, CNES and Arianespace all performing impact studies. In order to be able to exchange, compare and understand results and to avoid 'green washing' – the use of false claims on the environmental benefits of a product for marketing purposes, it is important to establish a standardised LCA methodology for the space sector from an early stage. ESA, with the backing of the European Commission, is performing this role and developing a handbook on *'Space System Life Cycle Assessment (LCA) Guidelines'*.

This standardised methodology provides a necessary step towards the longer term goal of introducing eco-design to space mission, where a product is designed in a way to reduce the environmental impacts. Similarly to cost assessment, the environmental performance of a space system is mainly driven by design elements which are defined at an early stage in the design process. Thus, in order to maximize the potential improvement, an eco-design software tool was developed to be implemented into the CDF to be used at early design phases (pre-phase A). This way the environmental performance of a space project

will be accessible for domain experts and system engineers as a supplementary decision-support element in the design process.