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SPACE ARCHITECTURE FOR SUSTAINABLE LIVING ON EARTH

Abstract

With growing concerns over environmental changes, emphasize on sustainability considerations in everyday life has also increased. Sustainable living is the application of sustainability to lifestyle choice and decisions, to reduce the use of natural resources and reduce the impact of human activities on Earth's environment. Reducing carbon footprint is just one of the principles of sustainability in design. Power and energy consumptions, food and water management, waste management, and transportation are some of the major fields in which sustainable living principles can be used.

Space architecture is dealing with the most extreme environments. To accommodate human in such environment the artificial habitat must be composed of number of autonomous systems. One example could be the Power generation or ECLSS, which are important elements of space habitat that could be also used in terrestrial environment and could help with increasing problem of non-sustainable living in polluted environment. While databases of space spinoffs, published each year by NASA and ESA, cover some of these technologies, they can also be studied for their application to sustainable living, taking in to account the similarities of extreme environments on Earth and in space. This work investigates the applicability of space systems and technologies developed in space architecture to improve sustainable development on Earth. To do so, requirements of sustainable living on Earth, in the 5 categories of sustainable living applications named above, and life in the extreme environment of space are compared. On one hand the space spinoff databases, and on the other hand space architecture components on board major space architectures, including space stations and space shuttle, are studied and a table of useful space systems for sustainable living applications is developed. For each of these technologies suggestions are made on how to use them in terrestrial applications. The results clearly show how and in which applications space architecture components improve sustainable living on Earth.