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Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Systems (2A)

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ON THE PATH TO LUNAR EDEN: ROADMAP AND DEMONSTRATOR DESIGN OF A LUNAR
GREENHOUSE BASED ON AN ANTARCTIC PROTOTPYE.**Abstract**

Long-term human exploration missions to the lunar surface require food supply and reliable life support systems. One element for such an undertaking is a greenhouse system, which is able to produce fresh food for the crew and at the same time provide a bio-regenerative life-support system. DLR has been working on this concept for several years and has developed, built and operated a prototype greenhouse called EDEN ISS MTF (Mobile Test Facility) at the German Neumayer-III station in Antarctica. Based on heritage from EDEN ISS MTF a concept for a space worthy greenhouse has been designed and is to be built as a ground demonstrator. This pathfinder project will be finally developed into a space worthy facility until the end of the decade. This paper explains the current status of EDEN ISS and EDEN NG (Next Generation) and the roadmap intended for the development of the ground demonstrator and flight model with all milestones. It is shown how the Antarctic testbed will be transformed into a ground demonstrator, which is as identical as possible to the actual flight model (differences e.g. due to the environment). The paper provides results of Phase A of the demonstrator design and will elaborate the functional analysis of the demonstrator, the requirements and discuss the delta necessary to achieve full space readiness. Furthermore, the paper explains how the greenhouse will be embedded into a lunar mission scenario using a logistics-to-green approach, i.e. the module will serve as cargo module during transfer to the moon, before being readied for greenhouse operation.