

1 Nitrogen cycling in Regenerative Life Support  
2 Systems: challenges for waste refinery and food  
3 production processes

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## 21 **Abstract**

22 In order to sustain human life in an isolated environment, an efficient conversion of wasted  
23 nutrients to food might become mandatory. This is particularly the case for space missions where  
24 resupply from earth or in-situ resource utilization is not possible or desirable. A combination of  
25 different technologies is needed to allow full recycling of e.g. nitrogenous compounds in space.  
26 In this presentation, an overview is given of the different essential processes and technologies  
27 that enable closure of the nitrogen cycle in Regenerative Life Support Systems (RLSS). Firstly, a  
28 set of biological and physicochemical refinery stages ensures efficient conversion of waste  
29 products into the building blocks, followed by the production of food with a range of biological  
30 methods. For each technology, bottlenecks are identified. Furthermore, challenges and outlooks  
31 are presented at the integrated system level. Space adaptation and integration deserve key  
32 attention to enable the recovery of nitrogen for the production of nutritional food in space, but  
33 also in closed loop systems on earth.