

# CDS 2.0 CASCADE DISTILLATION SYSTEM DEVELOPMENT

**PROJECT MANAGEMENT:** Dr. Michael R. Callahan, PhD ♦ (281) 483-3479 ♦ michael.r.callahan@nasa.gov  
Miriam Sargusingh ♦ (281) 483-1358 ♦ m.sargusingh@nasa.gov  
Sarah Shull ♦ (281) 244-6441 ♦ sarah.a.shull@nasa.gov

## PROJECT OVERVIEW

NASA's Advanced Exploration Systems (AES) Life Support System (LSS) Project is chartered with developing advanced life support systems that will enable NASA human exploration beyond low Earth orbit (LEO). The goal of AES is to increase the affordability of long-duration life support missions, and to reduce the risk associated with integrating and infusing new enabling technologies required to ensure mission success. Because of the robust nature of distillation systems, the AES LSS Project is pursuing development of the Cascade Distillation Subsystem (CDS) as part of its technology portfolio. Currently, the system is being developed into a flight forward Generation 2.0 design.

## PIONEERING SPACE & LIFE ON EARTH

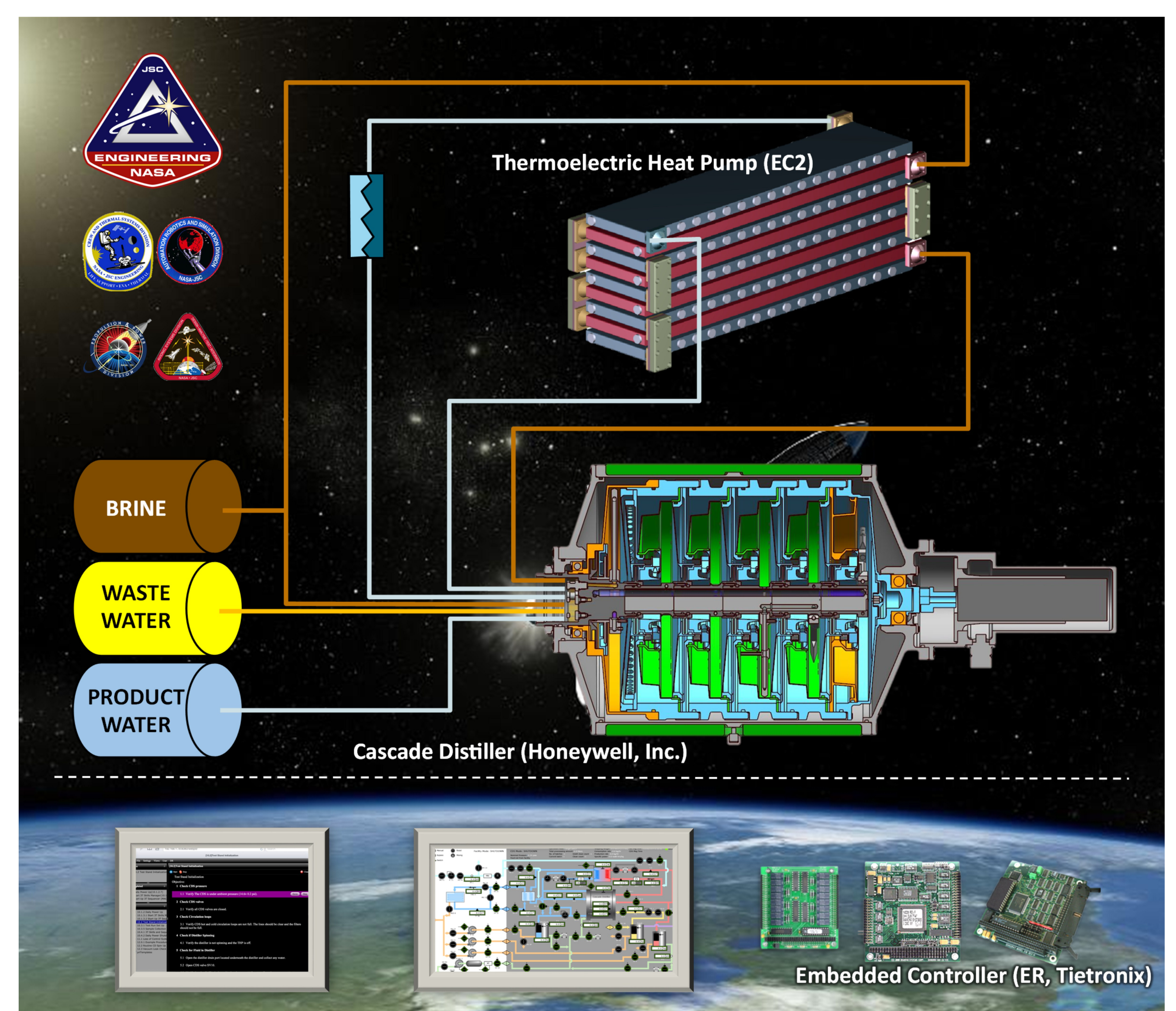
CDS is being considered as an alternative technology for use in an advance closed-loop life support system used to get astronauts to and from Mars. The technology has also been considered for use in water purification for remote ground based systems, e.g., supplying water to forward operating bases.

## OBJECTIVES & OUTCOMES

The goal of this project is to develop a cascade distillation system that can be demonstrated on the International Space Station and ultimately lead to a primary processor design suitable to support water recovery on deep space exploration missions. Specific objectives in the current development cycle include: (1) upgrade and test of the CDS prototype, (2) redesign and optimization of the CDS thermoelectric heat pump (TeHP), (3) upgrade and functional test of the CDS control system.

## INFUSION POTENTIAL

The CDS technology is promising as a alternative primary processor within an exploration water recovery system.



## INNOVATION PERSPECTIVE

- ⇒ Concepts of operation for flight application
- ⇒ High efficiency thermoelectric heat pump
- ⇒ Quick disconnect manifold design
- ⇒ Process optimization for enhanced reliability and autonomy
- ⇒ In-line sensing technology for harsh environments

## PARTNERSHIPS / HIGHLIGHTS

CDS development includes a partnership with Honeywell International.

## NASA TECHNOLOGY AREA ROADMAP

The CDS technology maps to TA06, 6.1.2.2 Wastewater Processing and addresses highly reliable and maintainable systems that can recover water from urine and other spacecraft waste streams.

## TECHNOLOGY READINESS LEVEL = 4