Advancements in Cryogenic Fluid Management are essential to enable NASA’s planned long duration missions.

Utilizing current State of the Art CFM technologies, long duration storage of cryogens is limited to just hours.

Some of NASA’s planned missions require the storage of cryogens for up to three to five years which will require not only optimized “passive” CFM technologies, but “active” systems (cryocoolers) as well.

Some CFM technologies are mature enough to be infused into a vehicle design while others require further technology development.

**Twenty Six CFM Technologies Identified by the Cryogenic Community at NASA**

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**Model Development for Cryogenic Fluid Management**

- Technology / Fluid Model / Thermal / Other
- Advancements in Cryogenic Fluid Management are essential to enable NASA’s planned long duration missions.
- Utilizing current State of the Art CFM technologies, long duration storage of cryogens is limited to just hours.
- Some of NASA’s planned missions require the storage of cryogens for up to three to five years which will require not only optimized “passive” CFM technologies, but “active” systems (cryocoolers) as well.
- Some CFM technologies are mature enough to be infused into a vehicle design while others require further technology development.

**CFM Elements Across Multiple Propulsion Applications**

- In-Space Prop (LOX/LCH4)
- Landers (LOX/LCH4)
- G1, G2, G3, G4, G5, G6, G9, G10, G11, G12, G16, G18, G19, G20, G21, G22, G23, G24, G25, G26

- Red numbers indicate technologies that need to fly to reach TRL 6.
- Does not capture effects of scale.
- Fluid specific technologies may be shown in multiple locations.

**Heat Map of Technology Interest**

- No companies
- Interest Level
- All Companies

**Technology Readiness Levels**

- Can achieve TRL 6 through ground testing.
- Flight Demo required to achieve TRL 6.
- Technology "Long Poles" Development is needed.