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LUNAR GATEWAY ESPRIT REFUELING MODULE (ERM) FEATURES, STATUS AND OUTLOOK

**Abstract**

This paper provides an overview and status of the project ESPRIT Refueling Module (ERM), one of the European Space Agency's contributions to the international partnership for the Lunar Gateway orbital station.

The name of the project "ESPRIT" stands for "European System Providing Refueling Infrastructure and Telecommunication". The refueling infrastructure and the telecommunication functions will be provided by two separate elements, that will reach Gateway at different times : • the HALO Lunar Communication System (HLCS), to be installed externally on the NASA Habitable and Logistics Outpost HALO module, • the European Refueling Module (ERM) - a habitable space for astronauts, with windows, cargo storage and propellant storage and transfer system.

The ERM element provides three main functions to Lunar Gateway: • A 360 wide view on the Moon, Earth, outer space and Gateway station, through its six viewing ports. • Transport of cargo to the station, with stowage space. • Additional fuel to both chemical and electrical Gateway's propulsion systems, part of NASA's Power and Propulsion Element PPE module. It will also provide an additional docking port on Gateway, allowing access from a Visiting Vehicle (VV) with crew and/or logistics.

Two types of propellant will be supplied by ERM : • Xenon gas, for electric propulsion, • Bi-propellant (MMH fuel and MON oxidizer) , for chemical propulsion. ERM will include tanks, embedding a certain quantity of fuel at launch, and active fuel transfer systems (valves, pressurization systems, thermal compressor. . . ) allowing to transfer this fuel to PPE. ERM also enables transfer of fuel from a Visiting Vehicle directly to PPE.

ERM is scheduled for launch at the end of the decennial, as part of Artemis V mission. It will be launched on board SLS block 1b launcher, in a "co-manifested" flight with an Orion vehicle, carrying a crew of four astronauts up to the Gateway station.

This paper explains the key features of the element and depicts current status and future important steps for its development and deployment.