

**MOON DIRECT:  
A COST-EFFECTIVE PLAN TO ENABLE LUNAR EXPLORATION AND  
DEVELOPMENT**

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**Abstract**

This paper presents Moon Direct, a highly cost-effective plan to enable the exploration and development of Earth's Moon. Unlike many other approaches which begin by looking for things to do with existing or planned hardware, the logic of Moon Direct begins by defining the requirements for a highly cost-effective lunar exploration program. These are maximum access to the lunar surface, minimum development and recurring cost, minimum schedule, and minimum risk. It is shown that by far the most effective transportation system architecture is one that makes use of LOx/H<sub>2</sub> propellant produced at a lunar polar base to support the operation of a lightweight Lunary Excursion Vehicle (LEV) flight system with a delta-V capability of 6 km/s or more, enabling sorties to most of the Moon. Such a LEV would also have the capability to fly directly from the lunar surface to low Earth orbit, eliminating the need for any lunar orbit infrastructure, lunar orbit rendezvous, or the delivery of any reentry capsule to any location beyond Earth orbit. Using such an approach recurring lunar missions accessing all parts of the Moon could be done using currently operational launch vehicles with launch costs under \$100 million per mission and no expended hardware.