One Small Step for Entrepreneurship

Once commercial companies and their astronauts for hire have established an orbital infrastructure, they will probably set their sights on the Moon. It’s been nearly 40 years since astronauts last set foot on the lunar surface and momentum is building for a return to establish a permanent manned presence. But the next visit won’t be a “flags and footprints” affair. For a start, unlike the Apollo missions, those touching down on future Moon missions won’t be government astronauts—they will be employees of corporations, intent on mining the lunar surface for fuels and minerals. You see, the lunar surface is a cosmic cash cow that contains a wide range of precious resources: nickel, silicate minerals, and, of course, fusion fuel—helium-3. So, while it was curiosity that drove NASA’s budget for 50 years, the fundamental motivator to return to the Moon will be to create wealth and prosperity, and here’s how commercial enterprise will do it.

MINING THE MOON

With all the talk about manned expeditions to Mars and asteroids, the Moon has been overlooked as a destination by the media, but not by commercial space companies. While some analysts may question why we should return to the lunar surface, remember that we’re at the beginning of the commercial space era, and commercial companies have to earn money, so returning to the Moon makes complete sense; it’s resource-rich with all sorts of minerals and isotopes just waiting to be mined. And besides, with all that wealth hidden in the lunar regolith, mining the Moon could help finance a mission to Mars, and here’s why.

In the last few years, the price of helium-3 has increased dramatically from $150 a liter to $5,000 a liter. Most of Earth’s stockpile of this isotope is located in an underground bunker near Amarillo, Texas, but that stockpile is rapidly being depleted and could be empty within 20 years. This will be bad for US industry because, without helium-3, there is no prospect of helium-3 fusion, a virtually infinite power source that would help scientists develop a Buck Rogers propulsion system that would get us to Mars in no time at all. Fortunately, the Moon has plenty of
helium-3 reserves and, if industry can figure a way to extract the isotope, there’s a chance the lunar surface could be the location of a brisk and lucrative import and export trade (Figure 8.1). How will they extract all that helium-3? We’ll get to that shortly, but, before astronauts for hire can start mining operations, they will have to establish an infrastructure first, just like they did in low-Earth orbit (LEO).

**Infrastructure**

First, a series of lander precursor missions will establish resource distribution and characterize the surface before demonstrating technologies and methods for establishing a lunar settlement. Next, a strategic plan will be implemented to use space resources – a step that will include deploying robotic vehicles, landers for dedicated lunar space resource-utilization missions, and lunar surface test beds. Once that’s been accomplished, an in-situ, self-sustaining infrastructure of solar energy production and storage will be developed, using lunar materials and wireless power distribution (power beaming). While all these autonomous missions are taking place, test beds on board the space logistics depots, inflatable habitats, and the L1 gateway will be developed for the manned lunar base. These test beds will assess technologies such as closed environmental life-support systems (CELSSs) and in-situ resource utilization (ISRU) systems. The robotic phase will be followed by the first manned mission, which will deploy communications networks (comprising a series of relays and mobile repeaters mounted on autonomous robots deployed to optimal communication locations) and navigation satellite system capabilities for cislunar and trans-lunar space to support lunar