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China's quest for a new energy source heads to space

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Seeking a clean energy solution, China visits the moon in search of helium-3

By Brandon Southward, reporter

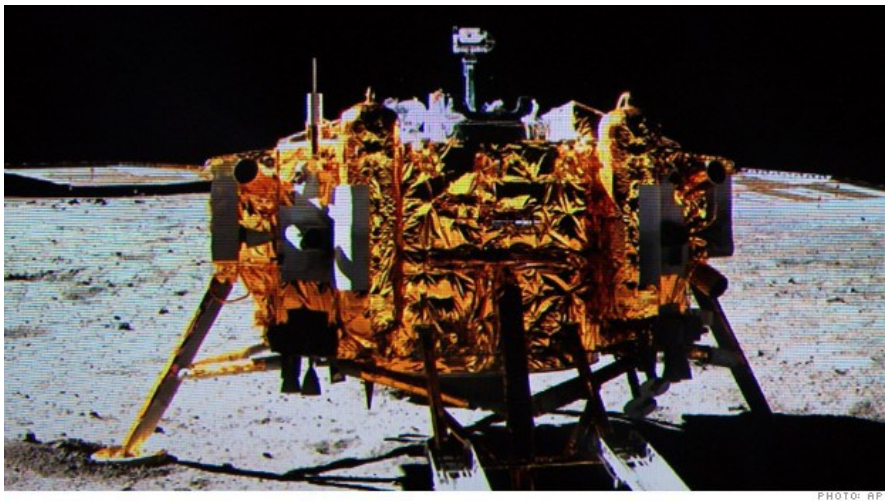
PHOTO: AP

FORTUNE -- No country had successfully completed a soft landing on the moon since the Soviet Union in 1976, which is why eyebrows were raised when China's rover Jade Rabbit landed on the lunar surface this past weekend. While China's motives for space exploration are not clear and the Chinese government is keeping quiet, their interest is expected to be in the substance that lies both above and below the moon's surface: helium-3.

Helium-3 is a light, non-radioactive isotope of helium that is nearly nonexistent on Earth, yet abundant on the moon, and has long been considered the missing piece needed to create fusion power. Scientists deem fusion power to be a potential game-changing source of energy. Helium-3 has a higher efficiency of conversion to electricity than fission, at a rate of 60-70%, and can produce energy with little to no radioactive waste. Another upside of fusion power according to Gerald L. Kulcinski, associate dean of research of college of engineering at University of Wisconsin-Madison, is the amount of energy it can produce. He estimates there is 10 times more energy in helium-3 on the moon than in all the natural gas, oil, and coal on the Earth combined. "Forty tons of helium-3 would provide all the electricity for the U.S. in 2014," Kulcinski explained.

Michael C. Zarnstorff, deputy director of research for Princeton Plasma Physics Lab, says the U.S. and Europe have been trying to make fusion power for years, and now China is making an attempt: "They [China] need a lot more energy due to their increasing population, and they really want to get rid of the pollution problems they have." If China is able to harness helium-3 and produce fusion power they would be able to fix their massive pollution, which has **soured some executives and politicians**. If and when China's pollution problem is rectified, it could potentially become a major energy resource player and offer a clean energy option to countries looking to wean themselves from oil dependency.

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There are still significant roadblocks to harnessing fusion power. One of the first issues is transporting the helium-3 material from the moon, which naturally occurs as a gas. This will cost billions of dollars, and even moving the material back down to Earth would require the process of actually turning that helium-3 into fusion power while still on the moon. According to Kulcinski, there isn't an agreement between federal agencies if the transporting or conversion aspects are achievable. "The Department of Energy doesn't think NASA can go to the moon and bring back the material, while NASA doesn't think the Department of Energy has the resources or ability to be able to turn it into fusion power," he said.

Zarnstorff pointed out that the lack of an agreement between U.S. agencies doesn't mean the effort for finding a way for

fusion power is dead. He pointed to a joint project between the European Union, the U.S., Japan, Korea, India, China, and Russia in southern France called ITER (International Thermonucelar Experimental Reactor) that aims to "produce commercial energy from fusion." The project has been operating for more than 20 years, and in 2007 an agreement was signed to establish a framework for research and development supporting fusion energy over the course of 10 years. This year, ITER was projected to start the Tokamak Complex construction, and the first manufactured components are expected to arrive in 2014.

Based on their voyage, it seems China didn't want to wait.