

# Space Power Pallet Flight Experiment

*Boeing Phantom Works*



## TECHNOLOGY

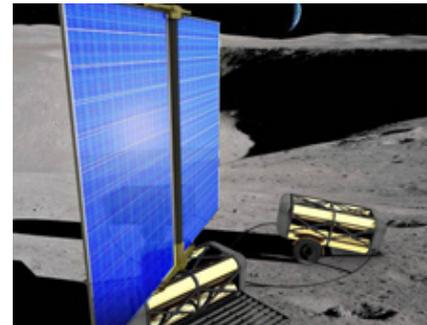
The Space Power Pallet will demonstrate a closed cycle hydrogen oxygen RFC. A regenerative fuel cell uses electricity to divide water into hydrogen and oxygen, which are fed back into the fuel cell to produce more electricity. Instead of using oxygen from the air like other regenerative fuel cells, the closed-loop system re-uses the oxygen from the water. This makes it ideal for use on the moon, where there is no oxygen.

## COMMERCIAL APPLICATION

- ◆ Hydrogen-oxygen RFCs can be used instead of batteries to store solar energy and wind energy
- ◆ A hydrogen-oxygen RFC could be used for energy storage when there are no fossil fuels left.

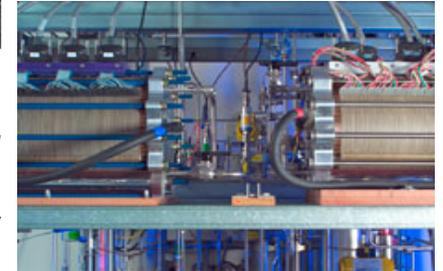
## SOCIAL / ECONOMIC BENEFIT

- ◆ The hydrogen oxygen RFC is safer than a battery by not containing corrosive/toxic materials or releasing harmful emissions.
- ◆ The hydrogen-oxygen RFC would save fossil fuels as its stored solar energy would be completely independent of fossil fuels, carbon, and foreign oil.
- ◆ Hydrogen-oxygen RFCs could be used for storage in developing countries with lots of sunlight but few other resources, a surging economy with power shortages but no existing infrastructure.



*Left: Illustration of a Space Power Pallet on the moon. These could provide energy storage for the lunar outpost called for by 2024.*

*Right: Hydrogen-oxygen Regenerative Fuel Cell at NASA Glenn Research Center*



## NASA APPLICATIONS

- ◆ NASA's Lunar Exploration Initiative plans on using the Space Power Pallet for its energy storage. During the day, the solar arrays will generate electricity to produce hydrogen and oxygen from water. During the lunar nights, the hydrogen-oxygen will be used in the RFC system to produce needed electricity
- ◆ NASA GRC and Boeing Phantom Works are designing a 2 kilowatt power out hydrogen-oxygen RFC for a "human rated space power flight experiment" that would be attached to the International Space Station (ISS). This flight experiment would demonstrate that the RFC can operate reliably for an extended time in the zero gravity space environment.

NASA Contact: David J. Bents, (216) 433-6135  
Company Contact: David Buendia,  
Boeing Phantom Works (714) 372-4769  
Date of Technology: June 2008