

ORION

**The 4-hour flight and fiery re-entry
that could give NASA its
mojo back**
page 24



Proactive on cybersecurity/page 30

Earth-observing Sentinels/page 34

**Aireon's Thoma on
airliner surveillance**
page 22



A modern take on an old idea

The idea of beaming solar power to Earth from space was pioneered during the oil price spikes of the 1970s by American aerospace engineer Peter Glaser, who died in May.

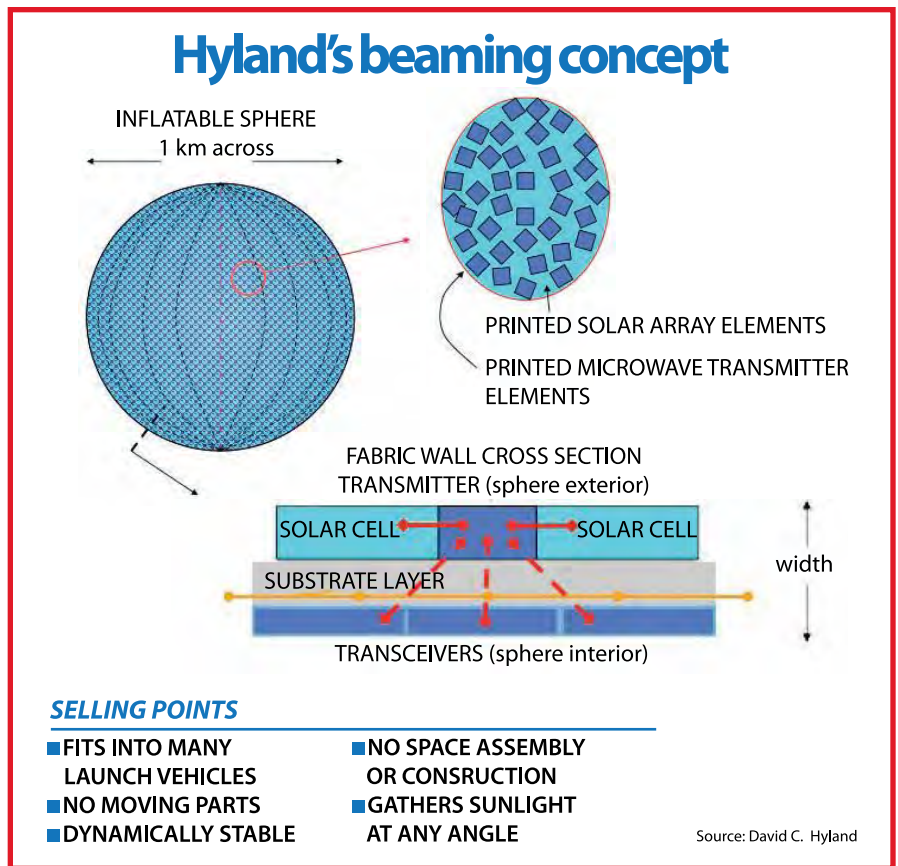
Glaser's patented concept called for deploying large dish-shaped solar collectors from one or more geosynchronous satellites, converting the energy to microwaves and beaming the energy to sites on Earth. It never happened. Once the oil crisis subsided, "Dr. Glaser's long-term alternative came to be seen as technologically and financially daunting," the New York Times wrote earlier this year in an article about Glaser's life.

Enter David Hyland, an aerospace engineering professor at Texas A&M University. Hyland is seeking a patent for an alternative design, called Power Star, that he says is "a revolutionary concept for space solar power" — one that is less technically daunting. Hyland wants to print solar cells and microwave circuits on the surface of an inflatable sphere and transmit the collected energy using beam-forming techniques already employed on communications satellites.

Hyland explained the concept to me at the International Astronautical Congress held in Toronto, Canada, from Sept. 29 to Oct. 3.

The system would combine the old technology of the inflatable sphere (used for NASA's Echo satellites of the early 1960s) and the new technology of printed photovoltaics and patch antennas (arranged in modules called collectennas). Power produced by the cells would be radiated at microwave frequencies within the empty sphere from transceivers on the sun-side to equivalent devices on the Earth-facing side, which would then route the power to exterior transmitters.

According to Hyland, where other concepts call for "gigantic, complex, articulated structures [with] numerous moving parts," Power Star would



combine "very new and very old technologies to obtain the simplest possible structure with no moving parts." All that would move are the "electrons and photons," he said with a smile. No in-orbit construction would be needed, and Hyland said a "starter system" could be deployed by a single launch vehicle. By his calculations, a 1-kilometer-diameter sphere could be expected to produce 3 to 4 megawatts of power, based on an aggregate array and transmitter efficiency of 2 percent. He expects to increase this to about 4 percent, giving 6 to 10 megawatts.

Because printed cell technology is still at an early stage of development, he foresees that the 1 kilometer balloon might be capable of 30 to 50 mega-

watts. The next step in the development process, said Hyland, would be to develop and test prototypes of what he calls "the Solar-Microwave fabric."

The Power Star concept was hosted at the IAC trade exhibition by the Heinlein Prize Trust, which awards prizes to encourage and reward progress in commercial space activities. Heinlein trustee and space entrepreneur Arthur M. Dula said, "Power Star space generating systems could be as important to providing clean energy as communications satellites were to providing cost-effective international communications."

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(Continued on page 13)