

**Powering the World:  
Space Technology and the Energy Industry**

The global energy industry is a vast complex combination of the old and the new, ranging from oil, gas, and coal to solar, wind, and water. Some parts of the industry are cautious about change while others eagerly embrace it. However, all have one characteristic in common: space technology holds out the promise of assisting in their primary mission of providing abundant, reasonably priced power to a world hungry for development.

Three individuals with different leadership roles in the industry find SpaceCom (the Space Commerce Conference and Expo) to be a valuable venue to discuss key issues and learn more about how space assets can make a difference to their future. SpaceCom 2017 will be held in Houston, December 5-7.

**The Director**

Barry Worthington grew up in a small Pennsylvania town with aspirations of teaching high school English. His father worked in the oil business, but Worthington had no interest in following in his dad's footsteps, until he attended college. It was the mid-1970s. Worthington was a freshman, and the nation had just gone through two "oil shocks." This turned out to be a formative moment for the country, and for him.

It didn't take long for Worthington to realize he no longer wanted to teach English. But he hadn't decided at that point what was next either.

"I took a course on the human relationship to the environment," says Worthington, "and I knew energy was a key part of that relationship. I also knew a lot about it from growing up in a family where it was the talk of the dinner table."

Goodbye, teaching English, hello energy planning.

Worthington earned his a BS in Energy from Penn State, moved to Houston, and never looked back.

After spending more than a decade at Houston Lighting & Power, now Centerpoint Energy, and the Edison Foundation, he became the executive director of the US Energy Association (USEA), a post he has held for 29 years.

USEA offers Worthington a unique vantage point from which to observe the energy industry worldwide. It is the US representative on the World Energy Council (WEC) and runs the gamut of energy-producing organizations, from fossil fuels to renewables. The WEC, a UN-accredited energy body headquartered in London, focuses its attention on international collaboration among its member countries.

“We don’t take a position for or against any form of energy and we don’t lobby,” says Worthington. “We create forums for the different organizations to have a dialogue.”

The USEA also keeps its eye on innovations that would advance the industry. When it comes to space technology, Worthington says

one of the most important contributions to the energy sector lies in the ability of satellites to provide sophisticated weather forecasting. “This helps us predict energy consumption day to day and even hour to hour. The ability to plan for tomorrow’s weather helps with load forecasting.”

Worthington notes that this capability simply did not exist 30 years ago and that it is critical to managing a response to storms like Irma and Harvey. “Knowing the direction and intensity of major weather events allows us to plan for post-disaster restoration of power,” says Worthington.

Looking ahead, Worthington predicts that satellites will begin to play a similar role in the maritime industry, as offshore drilling accelerates. Satellites will presumably keep track of people and equipment. On land, Worthington sees satellites as ultimately

substituting for helicopters and drones to inspect pipelines, and electric transmission lines, and provide physical security for infrastructure.

Moving from helicopters to drones and then to satellites represents an enormous savings. “You can imagine what it costs to use helicopters,” says Worthington, “because you have to pay for fuel, pilots, and the equipment.”

The USEA will present at this year’s SpaceCom because the organization wants its constituency to know about the promise space-based assets hold for the industry. “We believe that the opportunities provided by space to energy will grow,” says Worthington. “This is an educational mission for us and SpaceCom is the right venue for achieving it.”

### **The Innovator**

Jose Gutierrez, PhD, is director of technology and innovation, in the Technology and Innovation Group at Transocean, which at first glance seems to be a long way from where he started his working life. Starting out as a biomedical engineer, he never planned to be helping drill for oil miles beneath the ocean’s surface. His passion, however, is innovation and that’s what brought him to the energy industry.

“ I worked at Emerson Electric for some time,” he says, “and I built an innovation department there. I came to Transocean because I knew it would be a challenge to bring innovation to drilling.”

Gutierrez says that there are a number of “verticals” in the industry, and that the level of innovation varies within each of them.

“The seismic engineers are highly innovative and they are tuned into the ‘Internet of Things.’ On the other hand, petrochemical plants are viewed as a commodity, so adding more doesn’t make much of a difference. Increasing production in existing plants does require innovation.”

He points out that the industry also sees underwater drilling as a commodity and they are interested primarily in doing the same thing over and over again, but safely and without interruptions. “When you aren’t drilling, you’re losing money.”

People are reluctant to test new technologies at those depths, so Gutierrez had to find a way to innovate with existing equipment while leveraging technologies from the industrial and aerospace domain.

“The breakthrough,” he says, “is with systems engineering, which I brought over from the space industry. We use the same procedures that NASA uses to launch a spacecraft.”

Systems engineering represents a major contribution by the aerospace industry to other fields, according to Gutierrez, with the International Council of Systems Engineering (INCOSE) having been created by the aerospace industry.

“The innovation,” he says, “is delivering the value of well- controlled drilling. The systems engineer looks at a drill site as a system, not as a bundle of components. We look at the lifetime and reliability of a product, so we can calculate the probability of failure and plan for it. That is exactly how space engineers think about their systems.”

Always on the lookout for even more innovative ideas from the space environment, Gutierrez finds SpaceCom to be “an amazing environment for those of us in the oil and gas industry.”

“We meet people there who have to solve tough problems. When you are in space, you can’t do a lot of tests and you often can’t send people to fix what breaks. That is a lot like the deep ocean environment.”

Gutierrez and his company hosted a meeting at SpaceCom last year and he will participate in a panel at this year’s event.

“You really get a different perspective when you are there,” he says.

## **The Astronaut**

Being an astronaut is a unique profession, with a membership of around 550 people. The skills that these elite professionals learn while on the space shuttle or International Space Station (ISS) often do not transfer easily back to the terrestrial environment. The ability to work in zero gravity, for example, is not a commonly required skill on Earth.

However, Ohio native Carl Walz, a veteran of four shuttle flights and a stint on the ISS, found that just the opposite is the case.

“After leaving the astronaut corps, I went to work in NASA’s headquarters,” Walz says. “After five years there, I worked with Orbital ATK, where my work was very similar to what I did as an astronaut. I managed mission operations for the Cygnus spacecraft, which ferried supplies to the ISS.”

Now working with the Oceaneering Space Systems team at Oceaneering International, Inc., Walz continues to apply the skills he learned in orbit for a company that focuses attention on the Earth’s oceans, in addition to space.

Walz sees numerous ways in which space technology can be applied to the challenges faced by Oceaneering and other companies.

“At Johnson Space Center in Houston, there is a Neutral Buoyancy Lab (NBL) that is used to train astronauts for their work during spacewalks,” Walz says, “and we also use it to simulate underwater operations for the oil and gas industry. Trying out new tools at the NBL is easier and more cost effective than doing that same operation 5,000 feet (1,524 meters) under the ocean surface. It’s safer, faster, and can save a lot of money.”

Robotics represent another technology-transfer opportunity for energy companies. According to Walz, remotely operated vehicles (ROVs) are indispensable at great depths.

“In place of people, robots do repairs, cut bolts, and perform radiography for us,” he says, “and they can also conduct inspections of infrastructure.”

The software driving the robotic arm for the space shuttle has proven to be remarkably adaptable to the ROVs, Walz says. "It has provided additional modes of operation on our ROV robotic arms," he says.

In the future, Walz sees a continuing collaboration between space-based and ocean-based activities, because the environments are so similar. In that sense, he finds his career choices to be gratifying and enjoyable. "I like to see how space capabilities can be applied to help the world."

Walz has been involved with SpaceCom since its inception in 2014. "I began working with SpaceCom when I was at Orbital, and Oceaneering is now a sponsor of the conference. I'll be on a SpaceCom panel again this year."

And so the director, innovator, astronaut, and many others from the energy industry will be attending SpaceCom 2017 in December. Will you?

**For more information on SpaceCom 2017:**

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