Industry Focus: Pratt & Whitney Rocketdyne

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Pratt & Whitney Rocketdyne's upcoming/ongoing projects in Florida.
For nearly 50 years, Pratt & Whitney Rocketdyne (PWR) engines have launched humans to the moon, boosted astronauts into space, and powered satellites into orbit vital to worldwide communication, navigation, research, weather prediction, as well as our nation's security. Realizing our engineering expertise has broad applications in the commercial sector, we have focused our attention on its use in sustainable energy worldwide, including energy-related opportunities in Florida, which has a highly-skilled workforce. PWR is presently exploring energy-related projects ideal for the Sunshine State.

Strategies for sustainable/renewable energy in Florida
One obvious commodity is Florida's abundance of just that – sunshine, which can be harvested directly by converting it to electricity, or indirectly through the growth of sustainable biomass. Considering today's technology, I believe the best near-term renewable energy strategy for Florida is solar-to-electricity, most likely distributed in 10 to 20 megawatt electric installations. This municipal-scale approach is much more cost effective than smaller rooftop solar installations, and could be implemented without expensive upgrades to the electrical grid. Augmenting these installations in the future with affordable electric storage technology is also important. As the cost of solar technology continues to decline, and with responsible incentives, I believe we could see solar as the foundation of Florida's sustainable future.

PWR's compact gasifier located at their pilot plant in Des Plaines, IL.

PWR is a strong supporter of Concentrated Solar Power (CSP) Tower technology, which stores the sun's energy in high temperature molten-salt and provides electricity well into the evening or through the night when the sun is no longer shining. The storage feature also improves grid integration, enabling larger plants to be constructed and deployed. Electricity costs are reduced due to the high efficiency and economies-of-scale for the larger plants. However, CSP Tower plants work best with full, direct sunlight, uninterrupted by clouds or diffused by humidity. The CSP Power plants large field of movable mirrors is also vulnerable to hurricane-wind conditions. Due to Florida's propensity for passing clouds and humidity-diffused sunlight, photovoltaic (PV) solar technology is generally preferred in the state. Also, since PVs are installed lower to the ground, they are more tolerant and easier to design for high-wind conditions.

From the beginning, the PWR compact gasifier has been designed to operate on coal or coal/biomass mixtures. With this coal/biomass combination, and including CO_2 sequestration, the ability to achieve a carbon-neutral or carbon-negative system is possible. We are currently testing this technology in pilot-scale with great success. Based on this approach, we are also investigating a derivative design that would operate on 100

percent biomass. The carbon-neutral output from the biomass gasifier could be used directly to produce electricity or to be further refined for liquid fuel, plastics and other products currently produced from petroleum.

Due to our expertise and current activities in gasification, I believe this is the most reasonable path for the company to pursue in Florida. Distributed 5 to 10 megawatt electric installations would seem to be a reasonable scenario. This would allow biomass plants to be situated within an affordable supply radius of about 75 miles.

In addition, a broad range of technologies being researched within the Florida University system are intriguing, including affordable methods to break down cellulose-based biomass or rapid-growth, oil-producing algae – both of which would be game changers for industry. Also intriguing are approaches being researched to harvest ocean energy in an environmentally-friendly way. For Florida, either capture of kinetic energy from currents, or thermal energy from ocean temperature gradients seem the best bets. Anyone who has been SCUBA driving off Florida's cost and experienced these effects first-hand could testify to their predictable strength and consistency.

How can Florida Energy Systems Consortium best address these issues?
Florida has a fantastic university system that develops great skills and technology to address our sustainable energy needs. When these students graduate, they will need jobs along with the state's existing highly-skilled workforce. The Florida Energy Systems Consortium (FESC) can address this issue by helping to develop a state-supported sustainable energy strategy. If properly structured, I believe this strategy could lead to job growth within the state and enable commercial deployment of technologies that compete cost-wise with fossil fuels. Producing sustainable energy produces sustainable jobs if done right.

Viability of new technologies and commercializing them
One of the responsibilities for FESC Advisory Board members is to help recognize technologies that are viable for commercialization. Upon identifying these technologies, board members provide the State of Florida with recommendations on how it should distribute university research funding. Ultimately, however, the marketplace decides the success or failure of a new technology. FESC Advisory Board can play an important role in screening the viability of new technologies for the state of Florida. I'm a strong believer in environmental responsibility, but also a believer in a strong marketplace.