

## ECCE Plenary Talks Highlight Challenges in Energy Conversion

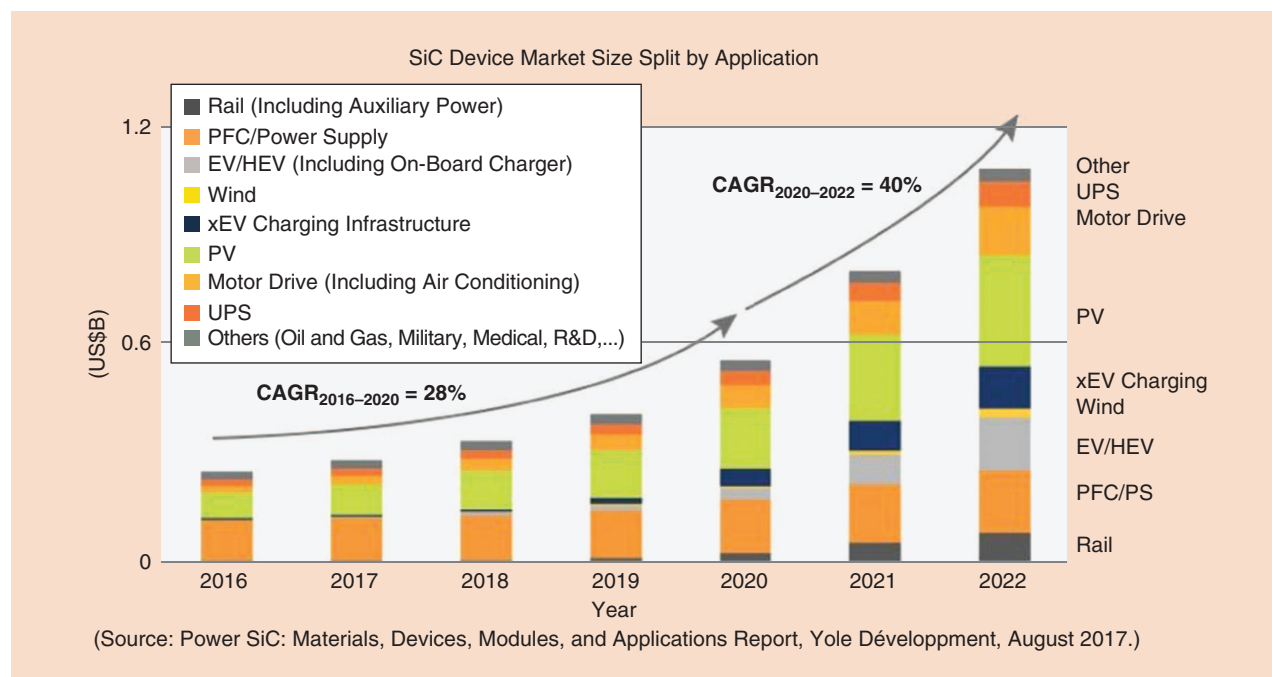
This year marked the tenth anniversary of the annual IEEE Energy Conversion Congress and Exposition (ECCE), which was held 23–27 September at the Oregon Convention Center in Portland. Sponsored by the IEEE Power Electronics Society and the IEEE Industry Applications Society, ECCE boasted a record number of digests from across

the globe. After welcoming the attendees, General Chair Avoki M. Omekanda proudly stated, “This popular conference is already bigger and better than previous years. This year the pivotal international conference was attended by a record 1,789 professionals, practicing engineers, and researchers working on various aspects of energy conversion systems and technologies.” While ECCE is known for presenting the latest in energy conversion research, along

with innovations in traditional components, this year the focus was on the challenges faced in the energy conversion industry.

Five plenary speakers, featuring Victor Veliadis of PowerAmerica, Stephanie Watts Butler of Texas Instruments, Sean James of Microsoft, Jason Busch of Pacific Ocean Energy Trust (POET), and Jiaqi Liang of Hyperloop One, emphatically conveyed this message. PowerAmerica Chief Technology Officer Veliadis kicked off the plenary

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**FIG 1** SiC devices are projected to capture US\$1 billion in device market shares by 2022. EV: electric vehicle; HEV: hybrid EV; PV: photovoltaic; R&D: research and development; CAGR: compound annual growth rate; PFC: power factor correction; xEV: hybrid and electric vehicles; PS: power supplies; UPS: uninterruptible power supply. (Data courtesy of PowerAmerica.)

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session. His talk, "SiC Power Devices: High-Impact Applications and Path to Wide Adoption," indicated that silicon carbide (SiC) power devices are making progress and projected to capture a US\$1 billion device market share by 2022 (Figure 1). As per the talk, SiC devices are expected to displace their incumbent silicon counterparts in high-impact applications, such as variable frequency drives for efficient high-power electric motors at reduced overall system cost; automotive power electronics with reduced losses and relaxed cooling requirements; novel data center topologies with reduced cooling loads and higher efficiencies; more electric aerospace with weight, volume, and cooling system reductions contributing to energy savings; and more efficient, flexible, and reliable grid applications with a reduced system footprint.

Veliadis' talk suggested that two factors impeding WBG adoption include high cost from limited manufacturing volumes in dedicated foundries and the lack of a workforce with experience in wide-bandgap (WBG) technologies. PowerAmerica is addressing these challenges by funding projects in multiple areas of the WBG supply chain that will synergistically culminate in large-scale WBG power electronics adoption. Concurrently, he added, it is also training the workforce in WBG technology while the organization is working on creating jobs in the field. Toward that goal, PowerAmerica is also offering short courses and workshops for power electronics engineers in the industry, noted Veliadis, who is also an IEEE Fellow and a professor in electrical and computer engineering at North Carolina State University, Raleigh.

Texas Instruments' Technology Innovation Architect Stephanie Watts Butler was the second keynote speaker. In her talk, "Power Semiconductors: Enabling a Powerful Decade of Changes," she suggested that advances in power semiconductors in the last decade have driven power electronics to

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new heights, resulting in new levels of power density, efficiency, and form factors. As a result, according to Butler, it has enabled an explosive growth in electrification in industrial, consumer, and automotive markets.

Sean James, Microsoft's director of energy research, presented "Data Centers: Disruptive Facility Architectures with Fuel Cells and Load Side Integration." He discussed the use of fuel cells for feeding power-hungry data centers, which consume 2% of the U.S.'s electricity. According to James' presentation, Microsoft has been researching and testing a new architecture that integrates a simple solid oxide fuel cell (SOFC) system with a server. Besides cost savings and high efficiency, the SOFC system also simplifies design, stated James. Unplugging the power grid from data centers will translate into big cost savings while significantly reducing carbon emissions.

The next keynote was delivered by Jason Busch, executive director of POET. He spoke about creating clean energy from the motion of the ocean. According to Busch, POET has been engaged in various aspects of marine renewable energy for more than a decade. With a mission to promote the responsible development of marine renewable energy, POET has worked to advance marine renewable energy technologies toward commercialization. To that goal and with over US\$14 million of funding from the state of Oregon, the company has funded technology research and development, environmental studies, stakeholder outreach, education, and policy development. As a result, Busch indicated that "worldwide marine renewables are quickly tracking toward commercial viability." By comparison, he added, tidal energy is more advanced than wave energy.

The last speaker of the session was Director of Power Electronics Jiaqi Liang of Hyperloop One. In his talk, "Hyperloop: Creating the Future of Transportation," Liang shared Hyperloop One's vision of making high-speed transportation effortless and affordable. Because advanced electromagnetic and electrical energy conversion systems are some of the key enabling components for Hyperloop, the company has leveraged the latest computational and optimization tools to predict system performance, iterate its designs with less time, and develop prototypes at a much lower cost. Liang said that Hyperloop One's full-scale DevLoop testing facility in Nevada is the only one of its kind in the world, allowing the company to test and validate its prototypes at scale and to integrate various complex components and subsystems—all in the controlled environment of the tube.

by Gerard Hurley

## IEEE Power Electronics Society Celebrates Its 30th Anniversary

The IEEE Power Electronics Society (PELS) celebrated the 30th anniversary of its foundation at a town-hall meeting in Portland, Oregon, where the annual IEEE Energy Conversion Congress and Expo (ECCE) took place 23–27 September 2018 (Figure 1). The town hall meeting was also live streamed to the worldwide membership of PELS. It was opened by PELS President Alan Mantooh, who introduced the Committee Board members and thanked them for their tireless efforts, dedication, and service to the membership.



**FIG 1** Pictured at the town hall meeting are (from left) PELS History Chair Gerard Hurley, PELS President-Elect Frede Blaabjerg, PELS Founding President John Kassakian, and PELS President Alan Mantooh.

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