

Growing ECCE Conference Comes To Heartland Of The Energy Conversion Industry

by David G. Morrison, Editor, How2Power.com

The [Energy Conversion Congress and Expo \(ECCE\)](#) is billed as the foremost IEEE conference in the field of electrical and electromechanical energy conversion. This year's edition, ECCE 2016, strives to build on this legacy with an impressive technical program, plenaries and special sessions on intriguing topics, career-enhancing tutorials and stronger than ever participation on multiple levels. This article will provide an exclusive preview of several of the plenary talks, plus a first glimpse at the lineup of the dozen pre-conference tutorials.

As in past years, the ECCE conference, which is co-sponsored by the IEEE's PELS and IAS societies, will provide researchers, engineers and professionals from industry and academia a convivial and innovative atmosphere for interaction and networking. However, this year's conference and expo, which runs September 18-22, will be held at the Wisconsin Convention Center in downtown Milwaukee. This year's location is in the heartland of the North American energy conversion industry and is home to major OEMs such as Rockwell Automation and Johnson Controls with numerous others such as Eaton, Milwaukee Electric Tool, C-Motive Technologies, Regal Beloit, Harley-Davidson EDCS Power, and Ingeteam calling Wisconsin home. The location is also within driving distance of numerous industrial centers throughout the Midwest.



ECCE 2016 will be held September 18-22 in Milwaukee, Wisconsin.

With this centralized location and the continued growth of this event from year to year, ECCE 2016 is projected to draw more than 1500 engineers, researchers, and students. On top of this, the support for ECCE from industry is stronger than ever with sponsorship for the conference coming from some of the world's leaders in energy conversion. Among the corporate supporters are platinum sponsor Wolong Electric Group; gold sponsors General Motors, Rockwell Automation, Danfoss Drives, Eaton and ABB; plus silver sponsors Keysight Technologies and Delta Group.

ECCE also features a growing exhibition with numerous vendors of components for power converter and machine design plus an array of related design tools and test and measurement instruments. In addition, major OEMs from the automotive, industrial automation, and energy conversion fields are represented. A preview of the 2016 Expo will be featured next month in the July issue of How2Power Today.

A Record Number of Digests Enhances ECCE's Technical Program



This year's conference and expo will be held in the Wisconsin Convention Center, which is located at 400 W. Wisconsin Ave in downtown Milwaukee.

The conference received a record number of digest submissions this year—a total of 1715. This is just over 10% more than ECCE received the previous year.

Power electronics is at the heart of ECCE, but it is part of a larger whole that enable this unique conference to address integrated energy systems. As general chair John Shen explains, "ECCE is unique in our emphasis on integrated systems, presenting the best in contemporary energy conversion research alongside innovations from more traditional component topics."

The theme of integrated energy systems is reflected in the list of topics addressed at ECCE. These topics include:

- renewable energy systems and energy storage
- smart grid and utility applications
- energy efficiency and industrial applications
- computer and telecommunication applications - power supplies, UPS, energy storage, and system architectures
- transportation applications
- electric machines and actuators
- electric motor drives
- power converters, control, and modeling
- power semiconductors and packaging
- magnetic materials and other passive components
- emerging power electronics technologies.

This year’s program also includes invited special sessions on:

- cybersecurity as it pertains to power electronics systems
- future of electric machinery, application-specific future trends
- practical implementation of SiC MOSFETs for industrial applications
- challenges of simulating power electronics systems.

Plenary Speakers Ponder Sustainable Energy Future, Intelligent Motor Control And More

As in previous years, the conference kicks off with an extensive plenary session on Monday (September 19) on timely topics by respected speakers from both industry and academe. ECCE 2016 will feature talks such as “Options to Create a Sustainable Energy Future,” “Intelligent Motor Control in a Connected Enterprise,” and “Research and Application for Advanced HVDC Technology in China.” It will also explore the “Future of the Smartgrid” and “Optimized Power Management Using Data Analytics.” In this conference preview, we’ll take a closer look at the first three talks.

Arun Majumdar, a professor in the department of Mechanical Engineering at Stanford University and a former director of ARPA-E will speak on Options to Create a Sustainable Energy Future. As Majumdar explains, “For almost every action we take in our lives today, we receive the benefit of 250 years of industrial revolution, which has been arguably the most remarkable period of human history. Our global economy and our prosperity grew exponentially, and our population grew tenfold. The industrial revolution has been largely about how we sourced, distributed and used energy. It was and continues to be predominantly based on fossil energy. But science has shown that our current course is unsustainable in the long run.”

Preliminary Schedule at a Glance

TIME	SUNDAY 9/18	MONDAY 9/19	TUESDAY 9/20	WEDNESDAY 9/21	THURSDAY 9/22	FRIDAY 9/23	
7:00							
7:30							
8:00	TUTORIALS	PLENARY SESSIONS	TECHNICAL SESSIONS	TECHNICAL/SPECIAL SESSIONS	TECHNICAL/SPECIAL SESSIONS	WEMPEC OPEN HOUSE SPONSORED BY U. OF WISCONSIN	
8:30							
9:00							
9:30							
10:00			POSTER SESSION II	TECHNICAL/SPECIAL SESSIONS	TECHNICAL/SPECIAL SESSIONS		
10:30			EXPO LUNCH				
11:00			STUDENT DEMO	TECHNICAL/SPECIAL SESSIONS	AWARD LUNCHEON		
11:30			POSTER SESSION III	TECHNICAL/SPECIAL SESSIONS	TECHNICAL/SPECIAL SESSIONS		
12:00							
12:30							
13:00	TUTORIALS	TECHNICAL SESSIONS	POSTER SESSION I	TOWN HALL FORUMS			
13:30							
14:00							
14:30							
15:00		EXPO RECEPTION					
15:30		STUDENT DEMO					
16:00				TECHNICAL/SPECIAL SESSIONS			
16:30							
17:00							
17:30	WELCOME RECEPTION (Art Museum)						
18:00							
18:30							
19:00				BANQUET			
19:30							
20:00							
20:30							
21:00							

Majumdar’s plenary will “discuss a variety of research opportunities and challenges in stationary power and transportation systems that could create such technological options and enable the transition of our energy economy to a sustainable one. Furthermore, this talk will highlight a few grand challenges in science and engineering that must be addressed within the next few decades. Technology is necessary, but not

sufficient. The talk will also briefly discuss options for public policy to create conditions for such technological options to be utilized.”

Bringing an industry perspective to his topic, Blake Moret, CEO of Rockwell Automation will speak on Intelligent Motor Control in a Connected Enterprise.

“Manufacturers who seek to maximize the productivity and sustainability of their industrial processes must look to improvements in both the efficiency of individual power conversion devices, and their operation within an automated system. The integration of power, control, safety and information management holds the promise of unprecedented productivity,” says Moret.

ECCE famously addresses energy conversion and power conversion in many high power applications including the highest power arena of them all—power transmission on the power grid. Guangfu Tang, vice president of the Global Energy Interconnection Research Institute, China, addresses this subject in the ECCE plenary session in his talk on Research and Application for Advanced HVDC Technology in China.

As Tang explains, “Coal and hydro resources are based in northern and southwestern China, and load centers are in central and eastern China. Thus, high voltage dc (HVDC) is one of the key technologies to solve the uneven distribution of energy resources and load centers.”

He adds that “China has made a successful practice in ultra-high voltage dc (UHVDC) technology and engineering, which is a precondition to building cross border interconnections of the power network.” Much more is planned in this area. “By 2030, the State Grid Corporation of China (SGCC) plans to construct 19 UHVDC links, and form a strong and smart power grid characteristic of ac-dc coordinated existence,” says Tang.

Tang also points to working being done on voltage-source converter (VSC) HVDC technology, which is providing more effective support for the regional power grid constructions, and China is accelerating exploration and practice in this field.

Tang’s talk will review the progress made so far in all these areas, and describe the many projects that are currently in development to expand transmission capacity. These includes development of ± 1100 -kV UHVDC technology such as a prototype of ± 1100 -kV UHVDC converter transformer; the first 20-MW/ ± 30 -kV VSC HVDC transmission link, which is the Nanhui wind farm integration project in Shanghai; and two multi-terminal VSC HVDC projects (the Zhouahan five multi-terminal project with ± 200 kV and 1000-MW total capacity and the Nan’ao three multi-terminal project with ± 160 kV links and 200-MW total capacity.) Also to be discussed is the Zhangjiakou dc grid demonstration project with ± 500 -kV links and four converter stations with a total converter capacity of 10 GW.

Those interested in grid-related developments should also appreciate the plenary on the Future of the Smartgrid, which will be presented by Massoud Amin, professor of Electrical and Computer Engineering and director of the Technological Leadership Institute at the University of Minnesota. Finally, there is a plenary session talk on Optimized Power Management Using Data Analytics, which is to be given by Michael Regelski, SVP and chief technology officer of the Electrical Sector at Eaton.

Tutorials Span Microgrids to Drives And Beyond

ECCE offers tutorials relating to many of the topics addressed within the technical program. Among them are microgrids, the smart grid, power converters, power semiconductors, and electric machines. Some have an application or technology focus, while others address modeling and analysis or control methods. The list of tutorials is shown below in the table along with the names of instructors and whether the tutorial is a morning or afternoon session.

Table. ECCE 2016 tutorial lineup.

Title	Instructors (Lead instructor in bold)	Morning or afternoon ? (am or pm)
Circuit Breakers for Protection and Control in DC and AC/DC Hybrid Microgrids	Alex Huang , North Carolina State University, NC, USA; Chang Peng, Iqbal Husain	am
Shipboard DC Microgrids	Josep M. Guerrero , professor, Department of Energy Technology, Aalborg University, Denmark; Robert Cuzner, Giorgio Sulligoi, Shantha Gamini	am
Principles and Applications of Modular Multilevel Converters	Dianguo Xu, Professor , Institute of Power Electronics & Electrical Drives School of Electrical Engineering and Automation Harbin Institute of Technology, Harbin, China; Lie Xu, Hong Rao, Dengshan Zhang	am
Modeling and Control of Grid Inverters	Mark Dehong Xu , Professor/Director, Power Electronics Institute of Zhejiang University in China	pm
Renewables, Energy Storage and Power Electronics as Enabling Technologies for the Smart Grid	Haitham Abu-Rub , Professor, Electrical and Computer Engineering Department, Texas A&M University at Qatar; Dr. Omar Ellabban	pm
The Origin of Converters	Tsai-Fu Wu, Distinguished Professor, National Tsing Hua University, Taiwan	pm
Linearized Modeling and Stability Analysis of AC Power Electronic Based Power Systems	Frede Blaabjerg , Professor, Department of Energy Technology, Aalborg University, Denmark; Xiongfei Wang	am
High Power Si & SiC Module Technology & Application Considerations	John F. Donlon , Senior Engineer , Powerex, Inc., PA, USA; Eric R. Motto	pm
Electric machine design for automotive applications	James Goss , Vice-President, Motor Design Ltd., UK; Mircea Popescu	pm
Power Semiconductors for Vehicle Traction Inverters: From Discretes to Power Modules, from Silicon to Wide Band Gap devices	Andre Christmann , Dr./System Application Engineer, Infineon Technologies Americas; David Levett	am
Advanced High-Power Industrial Drives	Richard Zhang , Dr., GE Power Conversion, China; Jie Shen, Dr. Stefan Schroeder	am
Predictive Control - A simple and Powerful Method of Control Power Converters and Drives	Ralph Kennel , Professor/Dr.-ing, Technische Universitat Munchen, Lehrstuhl fur Elektrische antriebssysteme und leistungselektronik; Jose Rodriguez, M. Kazmierkowski	pm

WEMPEC Open House

On Friday September 23, the day after the ECCE 2016 conference formally closes, the University of Wisconsin at Madison is hosting the WEMPEC Open House event. The Wisconsin Electric Machines and Power Electronics Consortium or WEMPEC, which is celebrating its 35th anniversary, is inviting all ECCE attendees—including first-time visitors as well as alumni and long-time friends—to come spend a day at WEMPEC in Madison.

Activities planned for the day includes a mixture of lab tours, open lab sessions to meet our students, a presentation or two, and plenty of opportunities for socializing, including a buffet lunch. Bus transportation will be offered from Milwaukee to Madison and return. The drive is less than two hours.

For More Information

- For more details on the ECCE 2016 conference program, including details on travel and registration, see the conference [website](#).
- If you're new to the ECCE conference and would like a quick overview and introduction, see How2Power.com's special [ECCE section](#).
- To learn more about things to do and see while you're in Milwaukee, and other help with planning a trip there, see [Visit Milwaukee](#).
- For details on the Wisconsin Convention Center, see the center's [website](#).