

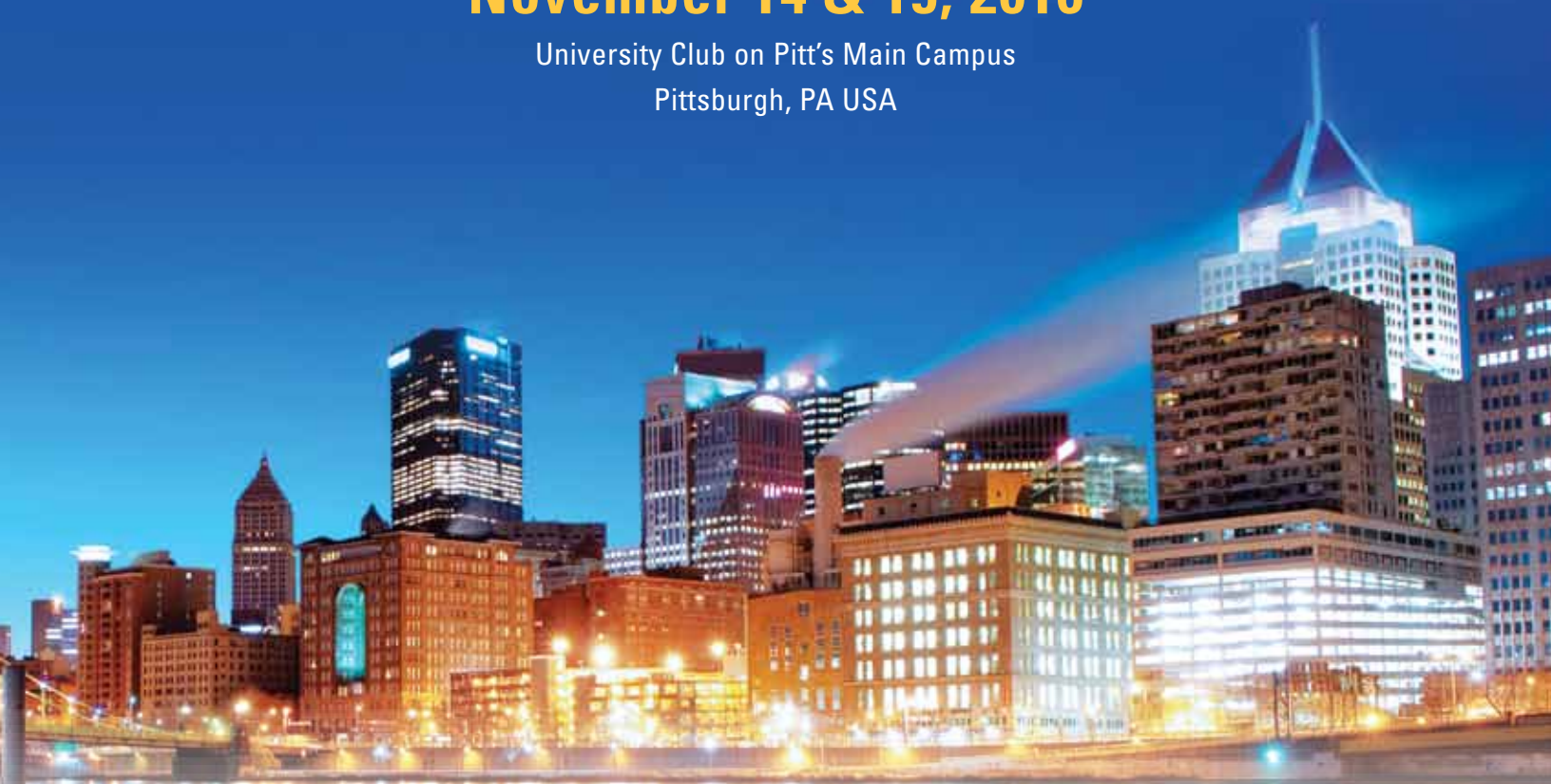
THE 11th ANNUAL  
UNIVERSITY OF PITTSBURGH

# Electric Power Industry Conference


## The Grid in Transformation

**November 14 & 15, 2016**

University Club on Pitt's Main Campus  
Pittsburgh, PA USA



**PITT** | SWANSON  
ENGINEERING

**11TH**  
ANNUAL  
PITT  **ELECTRIC POWER**  
INDUSTRY CONFERENCE  
Presented by the Swanson School of Engineering & the Center for Energy

UNIVERSITY OF PITTSBURGH  
*Center for*  
**ENERGY**



## A special thank you to our sponsors

**PITT** | SWANSON  
ENGINEERING

**DLC**  
—DUQUESNE LIGHT CO.—

 **Dominion**<sup>®</sup>



**ANSYS**<sup>®</sup>

**nrg**<sup>®</sup> 

**PITT OHIO**  
SUPPLY CHAIN • GROUND • LTL • TL

**EEL** Edison Electric  
Institute



**UNIVERSAL**  
ELECTRIC CORPORATION<sup>™</sup>

 **OPAL-RT**  
TECHNOLOGIES

**BURNS**  **MCDONNELL**

**EATON**  
*Powering Business Worldwide*

**Itron** 

 **MITSUBISHI**  
**ELECTRIC**

**DIGIOIA GRAY**  
& ASSOCIATES

**IEEE Foundation**

 **IEEE**  
**PES**  
Power & Energy Society<sup>®</sup>

UNIVERSITY OF PITTSBURGH  
*Center for*  
**ENERGY**



University of Pittsburgh

THE 11th ANNUAL  
UNIVERSITY OF PITTSBURGH  
**Electric Power Industry Conference**

**November 14 & 15, 2016**

University Club, Pittsburgh

**The Grid in Transformation**

**CONFERENCE CHAIR**

**Gregory Reed, PhD**

*Director, Center for Energy and the GRID Institute, Director, Electric Power Systems Laboratory*

*Professor, Electrical and Computer Engineering Department*

*Swanson School of Engineering, University of Pittsburgh*

Dear Friends:

Welcome to the 11th Annual Electric Power Industry Conference (EPIC) at the University of Pittsburgh! On behalf of the conference committee, the Center for Energy, and the Swanson School of Engineering at Pitt, we would like to thank you for attending. We invite you to take part in as many sessions as possible, to learn from and contribute to the various events that we have planned, and to participate in the many networking opportunities throughout both days.

We chose this year's conference theme to not only showcase the accomplishments that we have made thus far in our electric power and energy research, but also as an opportunity to push ourselves further. At the Center for Energy, we aim to make tangible progress on designing and building a resilient, reliable, secure, and truly sustainable energy infrastructure that is needed for powering the nation and our communities. This year's conference theme – "The Grid in Transformation" – builds off of the insights that we have collected from our continued industry collaborations and past conferences, as well as from hosting two key U.S. Department of Energy grid-related workshops earlier this year. It also emphasizes our commitment to innovation and partnership through the announcement of the newly established Pitt Energy GRID (Grid Research and Infrastructure Development) Institute. Our graduate students and faculty members have some great work to share with you, as well as learning from our industry and community partners. Discussing the problems and technological solutions together that are at the forefront of the electric industry will help better position our research in a manner that delivers the necessary support for the broader energy transition.

Our commitment to progress is centered in the City itself. Pittsburgh is well-poised to lead the challenges that are part of the grid in

transformation. We are a city that is well-versed in "rising to the challenge" and using technology to deliver economic security. This year it is my pleasure to welcome Pitt Vice-Chancellor of Economic Development, Rebecca Bagley, who will provide the opening remarks, and in the spirit of the conference theme will discuss how Pitt's energy research is helping to deliver sustainable economic development.

While other cities are struggling to unite stakeholders in the push for change, Pittsburghers are more excited about showing the progress we have already made with our regional and national partners. The Center for Energy is working with industry partners in the City to develop and demonstrate the integration of new flexible technologies. Rich Riazzi, President and CEO of Duquesne Light will provide the keynote address, and discuss how DLC and Pitt are working together to address some of their biggest technological and business challenges.

Innovative designs made in Pittsburgh can be a helpful learning experience for peer cities. Yet, for Pittsburgh to become a leader in energy technologies, it will be important to engage regionally. Lloyd Yates, President Carolinas Region of Duke Energy will therefore provide the student-industry networking keynote remarks on the utility challenges in parts of the southeast, and provide a discussion on how Pittsburgh's processes can be applied to our regional neighbors.

Finally, I would like to take this opportunity to thank our many session speakers, panelists, moderators, corporate sponsors, and exhibitors – your contributions and participation are essential to the continued success of EPIC.

Sincerely,  
Greg

# SCHEDULE

## Monday, November 14

### 9:00 a.m. – REGISTRATION AND NETWORKING

Main Lobby

### 10:00 a.m. – WELCOME

Ballroom B – 2nd Floor

#### Conference Chair

### 10:10 a.m. – OPENING REMARKS

Ballroom B – 2nd Floor

**Rebecca Bagley** – University of Pittsburgh  
Vice Chancellor Economic Partnerships

### 10:20 a.m. – CONFERENCE KEYNOTE ADDRESS

Ballroom B – 2nd Floor

**Rich Riazzi** – Duquesne Light Company  
President and CEO, Duquesne Light Holdings

### 11:00 a.m. – GRADUATE STUDENT RESEARCH SYMPOSIUM

Ballroom B – 2nd Floor

MODERATOR: **Brandon Grainger, PhD** – University of Pittsburgh  
Research Asst. Professor

Presentations from Pitt Electric Power Engineering PhD and M.S. students providing overviews of the group's research activities, and introducing elements of the GSR poster session

### 12:30 p.m. – LUNCH – NETWORKING AND SOCIALIZING

### 1:30 p.m. – TECHNICAL PROGRAM SESSIONS (CONCURRENT TRACKS)

## Session 1

Gold Room – 2nd Floor

### Power Electronic Systems and Devices

MODERATOR: **Ansel Barchowsky** – University of Pittsburgh  
PhD Candidate, Electric Power Systems Laboratory

#### Speakers

**William Stanchina, PhD** – University of Pittsburgh  
Professor, Electrical & Computer Engineering

**Paul Ohodnicki, PhD** – National Energy Technology Lab  
Technical Portfolio Lead / Materials Scientist

**Nicholas Benavides, PhD** – P.C. Krause & Associates  
Senior Lead Engineer

**Martin Belanger** – OPAL-RT  
American Sales Manager

**Ryo Takeda** – Keysight Technologies  
Solution Architect – Energy & Automotive Division

## Session 2

Ballroom B – 2nd Floor

### Microgrid Experiences and Practices

MODERATOR: **Michael Rooney** – University of Pittsburgh,  
Center for Energy  
Manager, District Energy Initiatives

#### Speakers

**Russell Profaizer, PE** – Duquesne Light Company  
Senior Manager of Engineering

**Alexis Kwasinski, PhD** – University of Pittsburgh  
Associate Professor, R.K. Mellon Faculty Fellow in Energy

**John Stampfel** – Eaton  
Vice President and General Manager  
Electrical Engineering Services & Systems

**Maggie Clout, PhD** – Siemens  
Business Development Manager, Energy Management Division

**Paul Roege, PE** – Typhoon HIL  
Senior Advisor  
Former Director of Army Operational Energy Office

## Session 3

Conference Room A – 3rd Floor

### Advances in Grid Equipment

MODERATOR: **Wayne Honath** – University of Pittsburgh,  
Center for Energy  
Special Projects Manager

#### Speakers

**Mircea Lupu, PhD** and **Sheldon Willis** – Emerson Process Mgmt.  
Research & Development Engineers

**William Edwards, PE** – Schweitzer Engineering Laboratories  
Automation Group Manager

**Sameer Kher** – ANSYS, Inc.  
Senior Manager, Research and Development, Systems BU

**Joe Warner** – ABB, Inc.  
FACTS System Design Engineer

**Christopher Lee** – Mitsubishi Electric Power Products Inc.  
Senior Power Control Design Engineer

4:00 p.m.

### GRADUATE STUDENT RESEARCHER POSTER SESSION

Library and throughout Venue

Posters will be available for viewing at distinct locations of the University Club throughout the entire conference. The 4 to 5:30 p.m. time frame is set aside specifically for when the students will be at their posters to present, discuss, and answer questions.

5:30 p.m. – AFTERNOON-TO-EVENING BREAK

6:00 p.m.

### STUDENT/INDUSTRY NETWORKING EVENT AND EVENING KEYNOTE ADDRESS

Ballrooms A and B

All of our students, both undergraduate and graduate who are studying in the electric power and energy fields, join with our industry partners, government sponsors, and other constituents who will have representation in an exhibit area for a networking reception.

### EVENING KEYNOTE ADDRESS

Ballroom B – 2nd Floor

**Lloyd Yates** – Duke Energy  
Executive Vice President, President Carolinas

## Reception and Exhibits

7:00 p.m. – FOLLOWING THE KEYNOTE ADDRESS Ballroom A – 1st Floor

#### List of Exhibitors

ABB	First Energy	PC Krause & Associates
Aclara	HICO America	Power Analytics
ANSYS	i+iconENERGY	University of Pittsburgh, Center for Energy
Burns & McDonnell	Itron	University of Pittsburgh, Distance Learning Programs
CE Power	KEMA	University of Pittsburgh, Office of Technology Management
Duquesne Light	Keysight Technologies	U.S. Department of Energy
Eaton	Mitsubishi Electric	Sargent Electric
Emerson	NovaTech	
EnerNOC	NRG Energy	
	OPAL-RT Technologies	

# SCHEDULE

## Tuesday, November 15

### 8:00 a.m. – REGISTRATION AND NETWORKING

Main Lobby

### 9:00 a.m. – 12:15 p.m.

Ballroom B – 2nd Floor

## Grid Modernization Workshop

Day two will focus on the economics of grid evolution. Focusing on infrastructure challenges and the changing role of the utility, day 2 participants will provide insights on the evolving nature of business in the energy industry.

### 9:15 – 10:30 a.m. – OPENING REMARKS

#### Session Moderator

**Katrina Kelly, PhD** – University of Pittsburgh,  
Center for Energy

*Research Associate & Manager of Business Development*

#### Panelists

**Michael Pesin, PE** – U.S. Department of Energy  
*Deputy Assistant Secretary, Office of Electricity Delivery and Energy Reliability*

**Ralph Masiello, PhD** – Quanta Technology, LLC  
*Industry Advisor*

**David Roop** – Dominion Virginia Power  
*Director, Electric Transmission Operations*

**John Moura** – North American Electric Reliability Corporation  
*Director, Reliability Assessment and System Analysis*

**Patrick O'Connor** – Reliability First  
*Counsel*

### 10:30 – 11:45 a.m. – WORKSHOP BREAKOUT SESSIONS

#### Topic #1 – Utility Business Models

Changing consumer dynamics, technology disruptions, and increased demands for environmental considerations place considerable pressure on the modern utility. This session will focus on the evolution of business models that will be needed to support grid adaptation, as well as the new financial and regulatory obstacles that are needed to support grid evolution.

#### Session Moderator

**Benjamin Morris** – Duquesne Light Company

*Senior Manager, Strategic Planning & Operational Analytics*

#### Topic #2 – Grid Infrastructure Challenges

Increased demands for resilience and sustainability coupled with the traditional demand for reliable power supplies makes infrastructure expansion a formidable challenge in the energy industry. Focusing on emerging and traditional risks to infrastructure build, session participants will discuss how innovative infrastructure designs can help to power the future.

#### Session Moderator

**Steven Bossart** – National Energy Technology Laboratory

*Senior Energy Analyst*

### 11:45 a.m. – 12:15 p.m.

#### BREAKOUT SESSION REPORTING

### 12:15 – 12:30 p.m.

#### CONFERENCE CHAIR CLOSING REMARKS

### 12:30 p.m.

#### CONFERENCE ADJOURNS WITH LUNCH

## SPEAKER BIOGRAPHIES



### GREGORY REED, PhD

*Director, Center for Energy and the GRID Institute, Director, Electric Power Systems Laboratory  
Professor, Electrical and Computer Engineering Department  
Swanson School of Engineering, University of Pittsburgh*

Dr. Gregory Reed is the Director of the University of Pittsburgh's Center for Energy and the Energy GRID Institute; Director of the Electric Power Systems Laboratory in the Swanson School of Engineering at Pitt; and Professor of

Electric Power Engineering in the Swanson School's Electrical and Computer Engineering Department. He is also the Director of the Grid Technologies Collaborative for the U.S. Department of Energy; an inaugural member of the National Academies of Science and Engineering Energy Ambassador Program; and serves as Chief Science Advisor on the Board of Directors of the E-Merge DC Alliance.

His research interests, teaching activities, and related pursuits include advanced electric power grid and energy generation, transmission, and distribution system technologies; power electronics and control technologies (FACTS, HVDC, and MVDC systems); micro-grids and DC infrastructure development, renewable energy systems and integration; smart grid technologies and applications; and energy storage.

Reed has 30 years of combined industry and academic experience in the electric power and energy sector, including positions in engineering, research & development, and executive management throughout his career with the Consolidated Edison Co. of New York, ABB Inc., Mitsubishi Electric Corp., and DNV-KEMA.

He has authored or co-authored more than 80 published papers and technical articles in the areas of electric power system analysis, the applications of advanced power systems and power electronics technologies, and power engineering education. He is an active member of the IEEE Power & Energy Society and the American Society of Engineering Education

Reed earned his PhD in electric power engineering from the University of Pittsburgh (1997); his M.Eng. in electric power from Rensselaer Polytechnic Institute (1986), and his B.S.E.E. with electric power concentration from Gannon University (1985).



*University of Pittsburgh, Electric Power Systems Laboratory, 8th floor, Benedum Engineering Hall*

## REBECCA BAGLEY

University of Pittsburgh

*Vice Chancellor Economic Partnerships*



Rebecca serves as Vice Chancellor for Economic Partnerships and works with senior leadership at Pitt to develop a strategic plan for the University in economic development. She is also developing and overseeing effective public and private partnerships that connect and advance the University and have regional and national impact. She also serves as a liaison with government, community leadership and the business community on matters pertaining to economic development.

Rebecca was formerly the President and Chief Executive Officer of NorTech, a technology-focused organization that worked to strengthen Northeast Ohio's economic vitality by accelerating the pace of innovation in the region. NorTech used its expertise in emerging industries to foster an innovation environment that provided companies of all sizes, higher education and research institutions, and individuals of diverse

backgrounds with new opportunities for collaboration that created jobs and attracted capital having a long-term, economic impact. NorTech also connected with government leaders and other influencers to raise the visibility of Northeast Ohio's assets to position the region as an innovation hub and to attract resources.

Prior to joining NorTech, Rebecca served as Deputy Secretary for the Technology Investment Office of the Pennsylvania Department of Community and Economic Development (DCED). She previously served as Director of the Venture Investment for DCED and managed venture and real estate investment programs. Before joining DCED, Rebecca worked for several investment banks, most notably JPMorgan Chase, where she advised energy and technology companies on mergers and acquisitions and raising capital in the high yield bond group and oil and gas group.

Rebecca holds a Bachelor of Science degree from the University of Colorado at Boulder. Rebecca's husband John is a talented woodworker and they live in Pittsburgh with their two daughters. She frequently participates in triathlons with The Leukemia & Lymphoma Society's Team in Training.

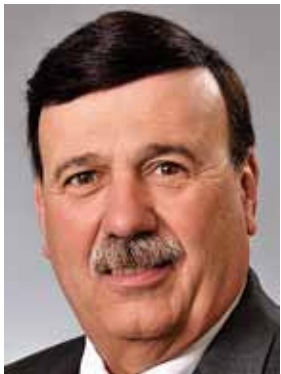
## Conference Keynote Speakers

### RICHARD RIAZZI

Duquesne Light Company

*President and Chief Executive Officer*

A 36-year power and natural gas industry veteran, Richard Riazzi currently serves as President and Chief Executive Officer of Duquesne



Light Holdings and Duquesne Light Company, a leader in the transmission and distribution of electric energy to more than a half a million customers in southwestern Pennsylvania, including downtown Pittsburgh.

Riazzi's six years at Duquesne Light reflect an ongoing focus on customer service and technology improvements. Consistently among the best utilities in the state in reliability and in the top 10

percent in customer satisfaction nationwide, Duquesne Light, under Riazzi's leadership, invested significant resources to ensure that its infrastructure – the wires, transformers, substations, poles and other equipment that make up the company's transmission and distribution

system – meets current and future electrical demands. Most recently, the company replaced separate customer care computer systems with one new, integrated system that will allow customers to better manage their monthly electric use. An extensive upgrade in its metering infrastructure, started in 2014, will put more information in the hands of customers via an online portal, enabling them to make more informed decisions about their energy consumption. Looking to the future, Riazzi also has committed more than \$1 billion to transmission and distribution infrastructure improvements to ensure a safe, reliable source of electricity for Duquesne Light customers.

Prior to joining Duquesne Light, Riazzi spent four years as CEO and General Manager of the Chelan County Public Utility District, a wholesale generator and retail distributor of electric power in the state of Washington. At Chelan County PUD, Riazzi launched a planning process to bring the community and ratepayers together to steer the utility through a financial downturn. Comprehensive financial policies developed during that time will guide the utility through the foreseeable



future by paying down debt, building reserves, and avoiding large rate increases. He is also credited with leading Chelan County to numerous high rankings in transmission system reliability and overseeing the environmental stewardship around the company's three hydroelectric projects.

Previously, Riazzi held various management positions at Idaho Power and its parent company, IDACORP, Inc., an electric utility that serves approximately 500,000 customers in southwest Idaho and nearby portions of adjoining states. He also served as President and Chief Executive Officer for IDACORP Energy, L.P., the energy marketing arm of IDACORP, Inc.

In his early career, Riazzi spent fifteen years with Equitable Resources Inc. (now operating as EQT Corporation) in various management positions, first with Equitable Gas Company and later with its Energy Resource companies.

A native of McKeesport, PA, Riazzi earned his bachelor's and master's degrees at the University of Pittsburgh. Mr. Riazzi is an active member of numerous community and industry organizations, including serving on the boards of the Allegheny Conference on Community Development, the United Way of Allegheny County, Junior Achievement of Western PA, the Pauline Auberle Foundation and the Edison Electric Institute (EEI).

---

## LLOYD M. YATES

Duke Energy

*Executive Vice President, President Carolinas*

Lloyd Yates serves as executive vice president of market solutions and president of Duke Energy's Carolinas Region. He is responsible for aligning customer-focused products and services to deliver a



personalized end-to-end customer experience that positions Duke Energy for long-term growth. In addition, he has responsibility for the profit/loss, strategic direction and performance of the company's regulated utilities in North Carolina and South Carolina.

Yates has more than 30 years of experience in the energy industry, including the areas of nuclear generation, fossil generation and energy delivery.

He previously served as executive vice president of regulated utilities for Duke Energy, where he had responsibility for the company's utility operations in six states. He also had responsibility for federal government affairs, as well as environmental and energy policy at the state and federal levels. As executive vice president of customer operations for Duke Energy, he led the transmission, distribution, customer services, gas operations and grid modernization functions to approximately 7.2 million electric customers and 500,000 gas customers.

Prior to the Duke Energy/Progress Energy merger in July 2012, Yates served as president and chief executive officer for Progress Energy Carolinas. He was promoted to that position in July 2007, after serving for more than two years as senior vice president of energy delivery for Progress Energy Carolinas. Prior to that, he served as vice president of transmission for Progress Energy Carolinas. Yates joined Progress Energy predecessor, Carolina Power & Light, in 1998, and served for five years as vice president of fossil generation. Before joining Progress Energy, he worked for PECO Energy for 16 years in several line operations and management positions.

Yates earned a bachelor's degree in mechanical engineering from the University of Pittsburgh and a master's degree in business administration from St. Joseph's University in Philadelphia. He attended the Advanced Management Program at the University of Pennsylvania Wharton School and the Executive Management Program at the Harvard Business School.

Yates serves on several community, state and industry boards. In 2014, he was elected president and chairman of the Association of Edison Illuminating Companies. He is also a director for Marsh & McLennan Companies Inc., a global professional services firm. Yates and his wife, Monica, have two daughters.

## SESSION MODERATOR

### BRANDON M. GRAINGER, PhD



is currently a research assistant professor in the Electrical and Computer Engineering Department at the University of Pittsburgh

(Pitt) Swanson School of Engineering. He holds a PhD in electrical and computer engineering concentrating in megawatt scale

power electronics and controls, microgrids, and medium voltage DC systems from Pitt. Dr. Grainger has a master's degree in electrical engineering with a concentration in electric power engineering and bachelor's degree in mechanical engineering (Magna Cum Laude honors) from Pitt.

He was also one of the first endowed R.K. Mellon graduate student fellows through the Center for Energy at the University of Pittsburgh. Dr. Grainger's research concentrations and interests are in all classes of power electronic technology including topology design, semiconductor evaluation,

advanced controller design, power electronic applications in microgrids, FACTS, DC system design, and many others. Brandon has worked or interned for ABB Corporate Research, ANSYS Inc, Mitsubishi Electric, Siemens Industry, and volunteers at Eaton's Power Systems Experience Center regularly. He is a member of the IEEE Power and Energy Society, Power Electronics Society (PELS), and Industrial Electronics Society and is an annual reviewer of various power electronic conference and journal articles. He is the chair of the IEEE Pittsburgh PEELS chapter who recently won best chapter of the year for the 2014-2015 year.

## PHD STUDENTS

### HASHIM AL HASSAN



is currently pursuing his PhD degree in electrical engineering at the University of Pittsburgh. He graduated from the University of Pittsburgh with a

bachelor of science in electrical engineering, a concentration in power systems, and a minor in mathematics in 2010. He also graduated from the University of Pittsburgh with a Master's degree in electrical engineering in 2014 with a research focus on HVDC fault location. Hashim was awarded full scholarships for the Bachelor's, Master's, and PhD degrees. His work experience included ANSYS Inc. where he worked as a co-op testing engineer for two rotations and Eaton Corp. where he worked as a research and development intern for a full summer. His research interest includes, power system protection and control, HVDC, renewable energy integration, and microgrids. He is currently working on developing protection solutions and distributed

control techniques for microgrids. Hashim served as the representative for the graduate students body in the Tenure and Academic Freedom Committee of University Senate at Pitt during the year 2014-2015. He actively volunteers at local conferences and science events such as IEEE ECCE, Intel ISEF, and Pittsburgh Regional Science & Engineering fair. He is also a student member of IEEE and IEEE Power and Energy Society, since 2012.

### ANSEL BARCHOWSKY



is a PhD candidate at the University of Pittsburgh. He has developed a deep interest in the development of power electronics and their applications

throughout electric power systems. He aims to apply his background in power grid studies, advanced control, and power electronics design to the development of novel power electronic technologies. In his research, Ansel aims to achieve new

limits for high-power density in both DC/DC and DC/AC converters, through the use of advanced topologies, adaptive control, and wide-bandgap semiconductors. He received his B.S. in Electrical Engineering and M.S. in Electrical Engineering from the University of Pittsburgh in 2012 and 2014, respectively.

### ALVARO CARDOZA



was born in Pittsburgh, Pennsylvania. Currently, he is pursuing his PhD degree in electrical engineering from the University of Pittsburgh with a concentration in

electrical power engineering. He received his B.S. in electrical engineering from the University of Pittsburgh in the spring of 2012. In the summer of 2012, he interned at Bechtel Plant Machinery, Inc. working in the Instrumentation and Controls division. He received his M.S. in electrical engineering in the summer of 2016 with research evaluating the benefits of directly integrating energy

storage into DC-DC converters in order to suppress unstable photovoltaic transients. Alvaro's research interests include renewable energy integration, microgrids, and power electronics. Mr. Cardoza is the President of the Engineering Graduate Student Organization, the Graduate Ambassador and former Regional Graduate Representative for the Society of Hispanic Professional Engineers, a graduate student representative on the ECE Graduate Committee, and a member of the Engineering Diversity Graduate Students Association. He is also a student member of the IEEE Power and Energy Society as well as the IEEE Power Electronics Society.



**RUI HU** is a PhD student at the University of Pittsburgh within the department of electrical and computer engineering. He

received his B.S from Sichuan University, China in 2012 and M.S from Michigan Technological University in 2015 in Electrical Engineering. Right now he is working towards his PhD degree. His research interests include: dc micro grid, power electronics application, renewable energy sources, decentralized control, adaptive control and power system optimization. Rui is a student member of the IEEE Power & Energy Society.

**PATRICK T. LEWIS** was born in Pittsburgh, Pennsylvania, in 1989. He graduated with a Bachelor of Science in 2012, and with a Master of Science in 2014, both degrees in electrical

engineering from the University of Pittsburgh. He is now currently pursuing his doctorate

also at the University of Pittsburgh focusing on electric power and power electronics engineering. Patrick's work experience includes internships with Curtiss Wright and Mitsubishi Electric. From January 2010 through August 2011, he worked three rotations within three different departments at Curtiss Wright. For the summer of 2012, he interned at Mitsubishi Electric Power Products Inc. within their Power System Engineering Studies group (PSES). His master's degree pertained to protection coordination design for MMC-based HVDC transmission. His current research interests include power electronics design and applications, converter protection, and grid resiliency coupled with the power electronic converter reliability in microgrids. Mr. Lewis is a student member of IEEE PES, PELS and IAS, and he is an endowed R.K. Mellon graduate student fellow through the Center for Energy at the University of Pittsburgh.

**ANDREW REIMAN** is a PhD candidate planning degree completion in Spring 2017. Andrew's research interests include power system modeling and simulation, distributed



energy resource integration, and stochastic characterization of distribution systems. He has over four years of full-time industry experience as an Engineer and Senior Engineer at Westinghouse Electric company and spent two summers as a Research Project Participant graduate intern in the Distributed Energy Systems integration group at the National Energy Laboratory in Golden, CO. Andrew received his B.S. in electrical engineering from the University of Michigan, Ann Arbor in 2009 and his M.S. in electrical engineering from the University of Pittsburgh in 2015.

**LAURA M. WIESERMAN** received a B.S.



degree in Electrical Engineering and a minor in Mathematics from the University of Pittsburgh; Johnstown, PA in 2012. She

is currently pursuing a PhD in electrical engineering at the University of Pittsburgh; Pittsburgh, PA. She has been a Graduate Student Researcher with the University of Pittsburgh since 2013 and plans to graduate the fall of 2016. Wieserman also has 4 years of industry experience. Her research interests include integration, testing, modeling, and transient analysis of PV inverters.

## M.S. STUDENTS

**MATTHIEU BERTIN** is a first year M.S



student at the University of Pittsburgh. He's a French exchange student in his final year of engineering at INSA de Lyon (Lyon, France) in

the ECE department. He worked for 5 months between September 2015 and February 2016 for Sysnav, located in Vernon, France as an embedded software developer (sensor integration in embedded environments). His research interests are Power Electronics and Lightning Simulation. He's currently a research assistant under Dr. Brandon Grainger and a teaching assistant under Dr. Gregory Reed in Power Systems Analysis.

## M.S. STUDENTS *(continued)*

**ANDREW BULMAN** was born in



Fredericksburg, Virginia. He is currently pursuing his M.S. degree in electrical power engineering at the University of Pittsburgh. He

graduated from the University of Pittsburgh with a B.S. degree in electrical engineering in 2014. As a graduate student, Mr. Bulman completed an internship with Duquesne Light Company in System Planning and Protection. Additionally, he completed an internship as an undergraduate with Mitsubishi Electric Power Products, Inc. (MEPPI) in the substation division. His research interests include renewable energy integration, power electronics applications and microgrid technologies. Mr. Bulman is the electrical engineering department representative for the Engineering Graduate Student Organization.

**JACOB FRIEDRICH** was born in Syracuse,



New York. He earned his B.S. degree in electrical engineering from Gannon University with Magna Cum Laude honors in 2016. Mr. Friedrich

completed three separate internships at Delphi Automotive. Currently, he is a first year M.S. student at the University of Pittsburgh. He is a graduate student fellow under the guidance of Dr. Grainger. He is a graduate research assistant and teaching assistant for the Department of Electrical Engineering at the University of Pittsburgh. His research interests include power electronics, renewable energy integration, and power transmission and distribution systems.

**SANTINO GRAZIANI** is a first year graduate student advised by Dr. Reed. He graduated from the University of Pittsburgh Summa Cum Laude with a degree in Electrical and Computer Engineering. He also received



a Concentration in Electric Power and a Nuclear Engineering Certificate. As an undergraduate he began research on photovoltaic inverter transient modeling with PhD student Laura Wieserman and Dr. Thomas McDermott. His first graduate project deals with control of GaN based modular multilevel converters. Santino is a 2016 Power and Energy Society (IEEE-PES) Scholarship recipient.

**SAMANTHA MORELLO** was born



in Johnstown, Pennsylvania. She is currently pursuing her M.S. degree in electrical power engineering at the University of Pittsburgh. She graduated from the University of Pittsburgh at Johnstown with a B.S. in Electrical Engineering Technology in 2016. Samantha has completed two internships at Arm Ener-Tech Associates (AETA), where she mainly dealt with automation, design, and generator protection. Ms. Morello also completed two internships at Duquesne Light Company (DLC) where she mainly focused on substation design, relay and control, and reclassified LiDAR (Light Detecting and Ranging) data using PLS-Cadd for various transmission lines. Her research will involve fault protection for MVDC microgrids.

**JOSEPH PETTI** is currently pursuing his



M.S. degree in electrical power engineering at the University of Pittsburgh. He also attended the University of Pittsburgh for his B.S. in electrical engineering, which he completed in the spring of 2016. During his time in undergraduate studies, Mr. Petti interned for the DOE and co-oped with Eaton. In the summer of 2016, Mr. Petti worked for Dominion Virginia Power to develop a microgrid relay protection panel for research purposes at the University of Pittsburgh's new Energy Innovation Center (EIC). He has started working towards a thesis in Adaptive LV/MV Microgrid Control.

**CHRISTOPHER SCIOSCIA** is a third year M.S. student



at the University of Pittsburgh. He completed his undergraduate E.E. degree at the University of Pittsburgh with magna cum laude honors and a concentration in electric power. He has interned as a student researcher at the University of Pittsburgh and as a co-op engineer at GE Energy, focusing on HVDC transmission/distribution and electric drive design/control, respectively. His research interests included resonant converters, energy storage, and power management.



## Monday, November 14, 2016

1:30 – 4:00 p.m.

### SESSION 1

Gold Room – 2nd Floor

#### Power Electronic Systems and Devices

MODERATOR: **Ansel Barchowsky** – University of Pittsburgh  
*PhD Candidate, Electric Power Systems Laboratory*

#### SPEAKERS

**William E. Stanchina, PhD** – University of Pittsburgh  
*Professor, Electrical and Computer Engineering*

#### **What's Here and What's Coming in Wide Bandgap Power Semiconductor Transistors**

##### Abstract

Much has been said about “Wide Bandgap Semiconductors” (WBGs) and their potential impact on emerging power electronic circuits/applications today and in the future. The first part of this talk will briefly present the industry status (i.e. available commercial technology) of both SiC (silicon carbide) and GaN (gallium nitride) as well as the prospects for advancements in these technologies over the coming 5 years. The final brief portion of the talk will introduce farther out (i.e. research stage) semiconductor technology – i.e. Ga<sub>2</sub>O<sub>3</sub> (gallium oxide): what its prospects look like and who today’s “players” are.



##### Biography

**Dr. William E. Stanchina** is a Professor in the Dept. of Electrical and Computer Engineering at the University of Pittsburgh. He’s had a nearly 40-year career in the research, development, and application of compound semiconductor devices. Most recently this has focused on wide bandgap semiconductor transistors (e.g. compounds SiC, GaN, and

Ga<sub>2</sub>O<sub>3</sub>) for applications in higher switching frequency power electronics converters. He also served as ECE Department Chair from 2005-15 after a 21-year career on the technical research staff and as Laboratory Director at HRL Laboratories (Malibu, CA).

**Paul R. Ohodnicki, Jr., PhD** – National Energy Technology Lab  
*Technical Portfolio Lead / Materials Scientist*

#### **Overview of Materials and Device Research for Electrical System Applications within the Research and Innovation Center at the National Energy Technology Laboratory**

##### Abstract

The emergence of commercial and near-commercial wide-bandgap based semiconductor devices is anticipated to have broad impacts on efficiencies, power densities, and maximum temperatures of operation for a range of power electronics based converters. In parallel, a number of societal trends are increasing the demand for advances in power

electronics based converters including the increased penetration of distributed generation resources on the electrical power system and electrification of the transportation system amongst others. But the widespread deployment of advanced wide-bandgap based power converters will be limited by the availability of the balance of enabling technologies that are also required to operate under newly established operational envelopes of wide bandgap based semiconductor devices including the peripheral components and passives such as soft magnetics and dielectrics. The same emerging trends have also resulted in an increasing need for advanced sensing and measurement technologies to increase the visibility across the electrical grid infrastructure spanning the transmission system and penetrating into the distribution system. The ubiquitous deployment of advanced sensing and measurement technologies necessary to have a significant impact will require cost-effective technology platforms that are compatible with the electrically energized and harsh environmental conditions representative of the electrical grid infrastructure which including the constituent electrical components such as power transformers.

In this presentation, an overview will be presented of research efforts within the NETL Research and Innovation Center focused on developing technology solutions for these emerging needs. Recent advances and on-going project work in the area of soft magnetic nanocrystalline / amorphous nanocomposite alloys and their integration into core-level components for applications in a number of emerging wide-bandgap based power converters will be discussed. On-going research in the area of sensor development for electrical grid components and the transmission and distribution system will also be addressed. Opportunities for collaborations and partnerships with the NETL in this area will be highlighted.



### Biography

**Dr. Paul Ohodnicki** is a staff scientist within the Functional Materials Development Division of the National Energy Technology Laboratory (NETL) and the Technical Portfolio Lead for the newly established Transmission & Delivery program. He is the recipient of a number of prestigious fellowships and early career awards including a Presidential

Early Career Award in Science and Engineering in March of 2016. His primary research interests are focused on studies of nanostructured and nanocomposite material systems with a particular emphasis on materials for power electronics, sensors, and energy conversion devices. He is responsible for overseeing several major projects in the areas of functional materials enabled devices for electrical systems, power generation, sub-surface, and natural gas midstream infrastructure

applications including a \$4.5M Solar Energy Technology Office supported DOE SuNLaMP program on the topic of combined solar and energy storage inverter technology development and demonstration. Prior to his current role at the NETL, Paul was a staff scientist in the Chemistry and Surface Science Division from 2011-2013 and he also worked in a program management role for the Solid State Energy Conversion Alliance (SECA) program in 2010. Paul also spent several years as a Research and Development Engineer at PPG Industries where he worked on a development team to successfully commercialize a new optical coating for large-area low emissivity architectural window applications. He has held a position as an adjunct faculty member of the materials science and engineering department at CMU since 2011, is currently the vice-chair of the Magnetic Materials Committee of TMS, and is an associate editor for the Journal of Electronic Materials. He is an author or co-author on approximately 90 technical publications and has submitted more than 15 patent applications with 4 patents successfully issued to date. He graduated with undergraduate degrees in engineering physics and economics from the University of Pittsburgh in 2005 and MS and PhD degrees in materials science and engineering from Carnegie Mellon University in 2006 and 2008, respectively.

**Nicholas Benavides, PhD** – PC Krause & Associates  
*Senior Lead Engineer*

### ***Common-mode Challenges in High-frequency Switching Converters***

#### **Abstract**

The high switching speed capability of wide-bandgap semiconductors such as Gallium-Nitride (GaN) and Silicon-Carbide (SiC) MOSFET devices allow power electronic equipment designers to increase switching frequencies and reduce losses when compared with traditional silicon devices. However, the increased switching speed comes with challenges related to managing common-mode voltages created within the circuit. These common-mode transients lead to challenges in the gate driver, as well as system-level EMI concerns. This presentation will detail some of these challenges and present some best practices for engineers designing equipment with wide-bandgap devices.



### Biography

**Nicholas Benavides** received a BS in Electrical Engineering from the University of Missouri – Rolla (now Missouri University of Science and Technology) in Rolla, MO in 2003 and MS and PhD degrees in Electrical Engineering from the University of Illinois at Urbana-Champaign, in 2004 and 2007, respectively. He is currently a

Senior Lead Engineer with PC Krause and Associates, where his primary responsibilities include power electronic converter design, modeling and analysis for a variety of customers in the mil/aero sector.

Prior to PC Krause and Associates, Dr. Benavides was with GE Power Conversion (formerly Converteam) based in Pittsburgh, PA from 2007-2013. From 2012-2013 he held the position of Executive – Engineering responsible for engineering in the Power Conversion Services division, leading a global team spanning seven countries. From 2010-2012, in the role of Chief Engineer – Technology, he led the research and development team developing commercial and industrial products for the North America unit. Key projects included a medium voltage inverter development for the oil and gas industry and utility scale solar inverters (1-5 MW). From 2007-2009, in the role of Senior Research and Development Engineer he led the next generation Integrated Power System Converter (IPSC) project developing a high-reliability, multi-megawatt inverter system for naval propulsion with funding from NAVSEA.

Additionally, prior to joining Converteam, from 2005-2007, he worked as an Engineer for SmartSpark Energy Systems in Champaign, IL developing man-portable power electronic converters for US Army and SOCOM usage. These converters incorporated fuel-cells, PV sources, ultra capacitors and lithium-ion batteries for long-term field deployment.

**Martin Belanger** – OPAL-RT  
*American Sales Manager*

### **Addressing the Challenges of Onboard Power Electronics Testing**

#### **Abstract**

Over the last decade, onboard power electronics have advanced significantly due to the increased adoption of More Electrical Aircraft (MEA), All Electric Ships (AES) and electric high-speed rail within industry. By replacing certain mechanical, hydraulic and pneumatic functions with power electronic systems, engineers can now reduce costs, increase architectural flexibility and improve acoustics. While onboard power electronics offer significant benefits, stringent regulations concerning reliability and survivability require more comprehensive control and protection testing. As a result, airplane, ship and train manufacturers and suppliers must spend more time designing, testing, validating and certifying this new generation of complex electrical systems.

Moreover, the implementation of newer electrical technologies within onboard power system designs promises to pose still greater challenges requiring, more efficient tools and processes for this emerging area.



#### **Biography**

**Martin Belanger** received his DEC from Collège Édouard-Montpetit. He worked for 1995 to 2000 at CYME International as an analyst programmer on several software for off-line electrical simulation. In 2000 he joined OPAL-RT Technologies as a technical support specialist. For five years he was in charge of training customers. In 2005

he joined the sales team, started with inside sales and quickly become an account manager for major house accounts like GE, Pratt & Whitney, ABB, Rockwell, etc. He was also the channel manager for Germany, Italy, China and South Korea. Now he is focusing on major accounts in aerospace and industrial power electronics customers in the Americas.

**Ryo Takeda** – Keysight Technologies  
*Solution Architect – Energy & Automotive Division*

### **Wide Band Gap Power Device Evaluation Challenges and Technologies**

#### **Abstract**

WBG devices bring about new test challenges due to their superior performance than conventional Si devices.

In this presentation, challenges associated with WBG device testing are discussed at first and then test technologies that can solve these challenges are explained.



#### **Biography**

**Ryo Takeda** is a solution architect at Keysight Technologies. After joining Hewlett-Packard in 1989, he worked as an application development engineer and manager for semiconductor parametric test instruments for more than ten years. Since moving over into product planning, he has guided Agilent's power device analyzer product definition and

performed activities that include market research, business planning and product management. His visits to more than 200 engineers around the world involved with power device characterization and his application engineering support activities have given him a strong knowledge base on power device characterization requirements and practical measurement techniques. He holds a BSEE and MSEE from Keio University (Japan) in the area of semiconductor device physics.

## SESSION 2

Ballroom B – 2nd Floor

### Microgrid Experiences and Practices

MODERATOR: **Michael Rooney** – University of Pittsburgh, Center for Energy Manager, District Energy Initiatives



**Michael Rooney** is Manager of District Energy Initiatives at University of Pittsburgh's Center for Energy. In this role, he works closely with the City of Pittsburgh and surrounding communities to identify opportunities for new energy infrastructure development including microgrid planning and deployment. Michael's career has focused on stakeholder engagement, working in a

diverse set of nonprofits across the country. Previously, he worked for CARE's policy and advocacy team in both Washington, DC and Addis Ababa, Ethiopia. Michael received his Master of Public & International Affairs from the University of Pittsburgh and his Bachelor of Arts from Allegheny College.

### SPEAKERS

**Russell Profaizer, PE** – Duquesne Light Company Senior Manager of Engineering

#### Duquesne Light Company Woods Run Campus Microgrid Update

##### Abstract

Duquesne Light Company (DLC) is a regulated utility that transmits and distributes electric energy to approximately 591,000 residential, commercial, and industrial customers in Allegheny and Beaver Counties including the City of Pittsburgh. DLC's service territory is approximately 817 square miles. Headquartered in Pittsburgh, DLC employs approximately 1400 employees and is wholly-owned by a consortium of private equity investors.

DLC is currently scoping and designing a microgrid for its Woods Run campus in Pittsburgh. DLC has recently completed a Request for Information (RFI) and Request for Proposal (RFP) process to select an engineering firm to design and build the microgrid. A feasibility study was also conducted to evaluate system design and to identify types of generation assets. Many challenges have been identified as a result of the feasibility study related to system and protection design. DLC's microgrid team is currently working on a final design and construction schedule for 2017.



##### Biography

**Russ Profaizer** has worked in the utility industry for the past 9 years. He is currently the Senior Manager of Engineering at Duquesne Light Company, and is responsible for the Company's civil/transmission, distribution, underground network, substation, control, third party attachment, and GIS engineering groups. Prior to joining Duquesne Light, Mr.

Profaizer was the Operations Manager at REA Energy in Ebensburg, PA. Mr. Profaizer received his Bachelors of Science Degree in Electrical Engineering Technology with a Minor in Mathematics from the University of Pittsburgh at Johnstown. He also earned his Master's in Business Administration from Waynesburg University and is a registered Professional Engineer (PE) in Pennsylvania.

**Alexis Kwasinski, PhD** – University of Pittsburgh Associate Professor, R.K. Mellon Faculty Fellow in Energy

#### Resilient Planning and Design of Information and Communications Technology Systems through Microgrids

##### Abstract

In the past decade there has been an increased interest in the study of infrastructure resilience, particularly applied to information and communications technology (ICT) networks and power systems. Such attention is exemplified by the US Presidential Policy Directive 21 which "identifies energy and communications systems as uniquely critical due to the enabling functions they provide across all critical infrastructure sectors." The focus on energy and ICT systems can be explained by the fact that in past disasters, power supply was a main cause of ICT systems operation disruptions. This presentation will discuss resilient planning and design of ICT systems with a focus on their power supply by initially defining basic concepts and metrics associated to resilience studies and describing past performance in notable natural disasters of the last decade using information and physical evidence collected in field damage assessments. Then, the presentation will continue by discussing how microgrids can improve resilience of ICT systems. This presentation concludes by discussing practical application of the previously discussed planning and design strategies.

##### Biography

**Alexis Kwasinski** is currently a tenured Associate Professor and R.K. Mellon Faculty Fellow in Energy at the University of Pittsburgh. Previously he was a tenured Associate Professor at The University of Texas at Austin. After receiving a B.S. degree in electrical engineering from the Buenos Aires Institute of Technology he worked for Telefonica and then Lucent Technologies. Then, in 2005 and 2007, respectively, he received an M.S. and a PhD degrees from the University of Illinois





at Urbana-Champaign. Dr. Kwasinski's research interests include the study of infrastructure performance during extreme events. As part of these studies he has conducted field damage assessment in areas affected by natural disasters including hurricanes Katrina, Gustav, Ike, Isaac and Sandy, and the earthquakes that affected Chile in 2010, New Zealand in 2011 and Japan in 2011. Dr. Kwasinski

received an NSF CAREER award and the IEEE PELS Joseph J. Suozzi INTELEC Fellowship. He is also currently leading technical groups focusing on infrastructure resilience in both the IEEE and the American Society of Civil Engineers (ASCE).

**John Stampfel** – Eaton  
*Vice President and General Manager  
 Electrical Engineering Services & Systems*

***New Power Reliability Trends and the Application of Microgrids***

**Abstract**

Megatrends are impacting the electric grid and our ability to maintain power during and after an outage. This discussion will review market trends, their impact on power resiliency and address the "big question" - how we justify investments in a microgrid.



**Biography**

**John Stampfel** is the vice president of the Electrical Engineering Services & Systems Division at Eaton. Stampfel leads one of the largest and most experienced teams of power systems engineers in the industry. He has worked with customers across commercial, industrial and utility applications to solve complex power management challenges.

Stampfel has over 25 years of experience in electrical power distribution, control and automation. Previously, Stampfel was the managing director of the Electrical Solutions and Services Business in Hengelo, Netherlands. Prior Eaton assignments include plant manager in Fayetteville, North Carolina; operations integration leader in Birmingham, United Kingdom; engineering manager in Coamo, Puerto Rico; product marketing manager in Milwaukee, Wisconsin; sales engineer in the New York metropolitan area.

He holds a degree in Electrical Engineering from Boston University. Stampfel is married and has two daughters. He is also an active member of the regional Pittsburgh community. Currently, he is a Board Member of The Woodlands Foundation and the World Affairs Council of Pittsburgh.

**Maggie Clout, PhD** – Siemens  
*Business Development Manager, Energy Management Division*

***How can Advanced Controls Unleash the Benefits Microgrids Offer?***

**Abstract**

Microgrid is gaining more attention today due to the potential benefits it brings not only to the end users but also to the distribution grid. However, control related challenges remain one of the main concerns for microgrid early adopters. A robust and proven advanced microgrid control technology is warranted to address any control-related technical challenges. It would also potentially provide added benefits for microgrid owners by being able to explore areas such as energy trading, energy arbitrage and more.



**Biography**

Since appointed to the Microgrid Business Development Team for the United States Center of Competence for Distributed Energy Systems (DES) in 2015, **Maggie Clout** has been supporting a team dedicated to helping public and private sector companies make smart, sustainable investments in distributed energy systems. In this role, Maggie

leads and manages microgrid business development as well as crafts and implements microgrid project development plans for multiple vertical markets including commercial and industrial segments, cities, US Federal Government, universities and other campus environments which include developing clean energy technology usage (including energy storage, solar, wind, co-gen, waste heat recovery and more) for distributed energy and microgrid projects.

Prior to rejoining Siemens, Maggie served as Director of Business Development for Calnetix Technologies, leading a worldwide business development effort for Organic Rankin Cycle Waste Heat Recovery Systems; managing numerous sales channels including global distributors, resellers and partners. During her tenure at Converge, Inc., Maggie served as Director of Product Marketing/International Business Development where she identified market segmentation, market potentials, growth rate and profitability, industry cost structures,

distribution channels, market trends, competitor information, and key success factors in all aspect of Energy Management applications. Maggie began her career with Siemens in 2000 as a Proposal Engineer and rose through the ranks over the course of 12 years serving in the roles of Strategic Marketing Management and Marketing Communications Manager.

Maggie received her Bachelor of Science and Master of Science in Textile Engineering from China Textile University, Shanghai; her Master of Business Administration and PhD of Mechanical Engineering from Clemson University and is a Faculty Member at the UoPX School of Business at University of Phoenix teaching courses on Business Research, Quantitative Analysis for Business, Effective Business Communication.

**Paul Roege, PE** – Typhoon HIL

*Senior Advisor*

*Former Director of Army Operational Energy Office*

### ***Avoiding Surprise in Grid Modernization Using Controller Hardware-in-the-Loop (C-HIL).***

#### **Abstract**

Modern society depends increasingly upon electrical power, and power systems are evolving toward more agile and dynamic characteristics. Our methods for stabilizing electrical power services – on large and small grids – is shifting from fundamentally analog electro-mechanical systems with thermal and mechanical inertia to very fast digital switching through power electronic devices. Given the proliferation of functionality, speed and complexity of algorithms used, and the decline in inherent system stability, the problem of understanding and predicting behaviors has reached a critical point. Controller hardware-in-the-loop design and testing represents an important new alternative to conventional “design-build-test.” System integrators inevitably select power system building blocks from a growing suite of available components, often obtained

from different vendors and typically without full access to the underlying device design. Moreover, given the complexity of control and physical interactions, it becomes necessary to perform iterative performance assessment and adjust designs accordingly. Moreover, power electronics and control components may be too complex to model reliably, leading to unpleasant surprises and troubleshooting delays during testing and commissioning phases. Typhoon-HIL offers an integrated design, development and testing suite that simplifies configuration, analysis, modification, and ultimately, ultra fast (sub-microsecond), high-fidelity simulation that creates the possibility to integrate actual controllers operating in real time to virtually eliminate risk of unpredicted behaviors and interactions. This presentation will characterize power network integration challenges and provide an overview of how the integrated design/simulation/C-HIL testing process can reduce project cost and risk.



#### **Biography**

**Paul Roege** is a lifelong energy aficionado who is focusing on the role of energy in growing resilience from the community and regional levels to a national level. He recently spent four years on active military duty to establish the Army’s concepts and strategies, seeking to use energy most effectively toward operational outcomes. He

substantially influenced military strategies, including adoption of a concept for Energy-Informed Operations- weaving appropriate energy considerations into system design, operational and business processes.

Paul has over 34 years of international experience in both civilian and military capacities, including nuclear operations and safety, energy system engineering, and facility construction and operations. He is a registered professional engineer, a West Point graduate and alumnus of Boston University (MBA) and MIT (Nuclear Engineer).

## SESSION 3

Conference Room A – 3rd Floor

### Advances in Grid Equipment

MODERATOR: **Wayne Honath** – University of Pittsburgh,  
Center for Energy  
Special Projects Manager



**Wayne Honath** is Manager of Special Projects, Center for Energy, and has worked with the Center since 2012, supporting the Grid Technology Collaborative through the University Energy partnership. He previously worked in the utility industry, specializing in distribution system reliability and regulatory reporting at Duquesne Light Company, and managed

customer and partner relationships in the smart grid area for Tollgrade Communications.

### SPEAKERS

**Mircea Lupu, PhD** and **Sheldon Willis**  
Emerson Process Management  
Research & Development Engineers

#### **Distributed Control System (DCS) Applications**

##### **Abstract**

Emerson is an industry leader in developing control solutions for industrial processes including power generation and waste water treatment. Emerson's Distributed Control System – Ovation™ – continuously adapts to the changing industry dynamics. The growing complexity of power plant operation and control drive the need for reliable control systems and analytics tools. The presentation describes past and current development efforts to build intelligent systems to enhance decision making and control.

Power plant simulators are an essential Operator training tool. They are very instrumental for a smooth knowledge transfer from the retiring and experienced workforce to the new generation. Operator training is very effective using simulators with complex high-fidelity thermodynamic models which run in real-time.

Ovation's advanced algorithms provide optimization solutions for a large set of applications from balance-of-plant to unit commitment. Moreover, diagnostics and prognostics solutions allow for a safe and cost-effective operation of equipment.



##### **Biography**

**Mircea F. Lupu** received the B.S. degree in automatic control and system engineering from the "Politehnica" University of Timisoara, Timisoara, Romania, in 2007, after completing the final project with the Institute of Automation, University of Bremen, Bremen, Germany, in 2007, and the M.S. and PhD degrees in electrical engineering from the University of Pittsburgh in 2010 and 2013, respectively.

He worked as a Software Developer for the automotive company Hella, Timisoara, before attending the University of Pittsburgh. In 2013, he joined Emerson as a Senior Engineer. Since 2014, he has been an Adjunct Lecturer in the Department of Electrical and Computer Engineering, University of Pittsburgh.



##### **Biography**

**Sheldon Willis** has a Carnegie Mellon University electrical engineering and business degree, a University of Pittsburgh graduate certificate in Nuclear Engineering, and completed 80% towards a Mechanical Engineering Masters.

Sheldon has over 35 years' experience in a variety of industries including precision motion control, gas detection, inertial

navigation, train control, and process control. The majority of Sheldon's career has been as a System Design Engineer. He has performed in a variety of roles such as control system designer, embedded code developer, hardware design engineer, and instrument and control engineer. He joined Emerson at the beginning of the year as a Simulation & Product Development Engineer.

**William Edwards, PE** – Schweitzer Engineering Laboratories  
*Automation Group Manager*

#### **Microgrid Lessons Learned: Essential Keys to Success**

##### **Abstract**

This presentation describes the author's experience in designing, implementing, testing, installing, and commissioning microgrid control systems in several industries. The projects include university, electric utility, off-shore, military, gas liquefaction, oil refining, and mining industry microgrid power systems. These projects are all in service and fully operational. The presentation shares lessons learned from 13 years of providing microgrid control, protection, and communication systems.



### Biography

**William C. Edwards Jr.** received his BSEE from the Georgia Institute of Technology in 2011. He joined Schweitzer Engineering Laboratories, Inc. (SEL) in 2011, where he is presently an automation group manager. Prior to joining SEL, he worked with the Nanotechnology Research Center, where he designed and constructed an

autonomous plasma-enhanced chemical vapor deposition machine used for polymer lithographic printing. William has experience in designing and commissioning automatic reconfiguration distribution automation controller systems. William is a registered professional engineer in Alabama, Arkansas, Georgia, and Tennessee.

**Sameer Kher** – ANSYS, Inc.

*Senior Manager, Research and Development, Systems BU*

### **The Role of Engineering Simulation in Energy Innovation**

#### Abstract

Product companies across a broad range of industries face increasingly tighter efficiency and sustainability goals while still meeting customer expectations and keeping costs down. This is particularly noticeable in the energy industry, with expensive assets that need to operate at ever increasing levels of efficiency and reliability. For product design, these requirements typically mean adding complexity to traditional designs, often through increased use of embedded electronics and software.

Engineering simulation plays a central role in helping designers deal with this additional complexity and in enabling organizations to create and deliver radically better products. For example, ANSYS® Simplorer® could be used to study the benefits and effects of replacing older silicon-based switching devices with more efficient Wide-bandgap devices. Additionally, these requirements highlight another key role for simulation software — that of building a digital twin. The digital twin is the end result of a successful simulation-driven product development cycle — also known as a complete virtual prototype. This digital twin can then be studied and used as a proxy for the real system to train the workforce and to identify and fix operational issues.

In this presentation, we will review the state of the art in engineering simulation software from ANSYS and how it enables both the design and the operational aspects of products.



### Biography

**Sameer Kher** is a Senior R&D Manager at ANSYS Inc. where he heads the ANSYS Simplorer product team and is also responsible for the Systems and Digital Twin initiative. He is passionate about innovations in energy and transportation. He joined ANSYS in 2005 and has a BE in Electronics from the University of Pune, and MS in Computer

Engineering from the University of Cincinnati and an MBA from Carnegie Mellon University.

**Joe Warner** – ABB, Inc.

*FACTS System Design Engineer*

### **Advances in Transmission Shunt Compensation Equipment**

#### Abstract

As a networked power system evolves, the system will inevitably develop areas with unacceptable steady-state or transient voltage performance. Shunt compensation has proven to be an indispensable option where changes to generation and/or line capability is too costly, difficult or unwarranted. An appropriate solution can come from any one or combination of the following technologies: mechanically switched reactor/capacitor (MSR/MSC), synchronous condenser, static var compensator (SVC) or static synchronous compensator (STATCOM). The advancements in shunt compensation are primarily seen in solutions tailored to the specific application using multiple technologies or novel control functions.



### Biography

**Joe Warner** received his BS ('04) and MS ('05) in EE from Wichita State University. Since 2006, he has worked for ABB, initially in the corporate research office ('06-'07) though mainly with the FACTS department ('08-present) where he is currently a Senior System Design Engineer. He has also been involved with standards development in the HV

Power Electronics Stations Subcommittee within IEEE PES Substations Committee since mid-2011, where he has held various officer positions. Most notably, he has held the position of Subcommittee Chair since May of 2015.

**Christopher Lee** – Mitsubishi Electric Power Products Inc.  
*Senior Power Control Design Engineer*

### **Targeted Application of STATCOM Technology in the Distribution Zone**

#### **Abstract**

The application of a Static Synchronous Compensator (STATCOM) is well understood at the substation transmission level and recently introduced at the grid edge via pole mounted solutions for Volt-Var Optimization (VVO). However, by integrating STATCOM technology at the distribution secondary, a new opportunity exists to provide a lower cost, steady state, dynamic solution for power quality issues throughout the length of the feeder via targeted decentralized STATCOM deployment. A new solution will be presented; where a limited number of medium power STATCOMs, optimally located throughout the distribution feeder, demonstrate the ability to significantly affect the feeder performance. This is in contrast to either a centralized solution that requires a high power system to make a significant impact or a high quantity of low power pole mount solutions. A review of the cascaded H-Bridge topology inverter shows unique advantages over the traditional topologies often used in smart inverters for application at the distribution level.



#### **Biography**

**Christopher J. Lee** (M'08) received the B.S. degree from the University of Pittsburgh, Pittsburgh, PA, USA, in 2011. He is currently working toward the M.S. degree in electrical engineering at the Georgia Institute of Technology, Atlanta, GA, USA.

He is currently a Senior Power Controls Design Engineer with Mitsubishi Electric

Power Products (MEPPI), Pittsburgh, PA, USA. Previous positions include Lead Research and Development Engineer at GE Power Conversion, Pittsburgh, PA and Research and Development Engineer at Convertteam, Pittsburgh, PA. His primary technical focus and specialties are in medium-voltage power electronics design, research and development, and validation of medium voltage power converters. He has more than five years of industry experience, while participating in multiple power converter design teams for medium and low voltage inverters for FACTS, industrial, renewable energy and naval applications with a focus in hardware design, analysis, and verification. His main research interests include power electronics design, power systems, and control.



**Tuesday, November 15, 2016**

9:00 a.m. – 12:15 p.m.

## GRID MODERNIZATION WORKSHOP

MODERATOR: **Katrina Kelly, PhD** – University of Pittsburgh, Center for Energy  
*Research Associate & Manager of Business Development*



**Katrina Kelly** is Manager of Strategy and Business Development at the Center for Energy, where she focuses on expanding both national and international research collaborations. She also acts as a research associate, focused on resilience and mitigation as part of economic development strategies. Throughout the duration of her career, Katrina has focused on joint economic

and energy policies, including acting previously as the project manager of Financing Resilient Energy Infrastructure at the UN-accredited NGO, the World Energy Council. Katrina holds degrees from Duquesne University, and Hult International Business School, in addition to recently passing her doctoral viva in Climate Policy and Economics from the University of Nottingham, UK.

## PANELISTS

**Michael Pesin, PE** – U.S. Department of Energy  
*Deputy Assistant Secretary, Office of Electricity Delivery and Energy Reliability*

### Biography

**Michael Pesin** is Deputy Assistant Secretary for the Power Systems Engineering Research and Development Division in the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability. Mr. Pesin has 30 years of experience in the electric utility industry, much of it directing development and execution of advanced technology programs.



His most recent assignment was with Seattle City Light where he developed the technology strategy, managed research and development projects and directed strategic programs to management demonstration projects. His subordinate

strategic programs included substation automation, distribution automation, advanced metering infrastructure (AMI), enterprise OT communication networks, cybersecurity, energy storage, distributed generation, microgrids, electric vehicles, transactive energy, energy management (EMS) and distribution management systems (DMS).

Mr. Pesin has numerous professional affiliations, publications and patents. He holds a Master of Science in Electrical Engineering from St. Petersburg State Polytechnic University, St. Petersburg, Russia, is a Licensed Professional Electrical Engineer (PE), and has a number of other management and technical certifications.

**Ralph Masiello, PhD** – Quanta Technology, LLC  
*Industry Advisor*



**Biography**

**Ralph Masiello, PhD**, Industry Advisor, provides support to our partners in the areas of wholesale market analysis and system performance, energy storage, distributed energy resources, and strategic planning. He received his B.S., M.S., and PhD from the Massachusetts Institute of Technology in Electrical Engineering where he worked on the very

early applications of modern control and estimation theory to electric power systems and the developments of the first state estimators for Transmission operations. Ralph also led the teams that developed the first utility dispatcher training simulators and he led the organization that developed the early commercial ISO systems for market and reliability operations.

**David Roop** – Dominion Virginia Power  
*Director, Electric Transmission Operations*



**Biography**

**David Roop** has a 40-year career in the electric utility industry focused on electric transmission and substation operation and management and culminating in his present position, as he has developed innovative approaches to improving operating procedures, resulting in cost savings to the Company. Chair of Dominion Virginia Power's resiliency

strategy team resulting in industry leading initiatives.

Mr. Roop became the Director of Electric Transmission Operations in 2001. He is responsible for the operation of Dominion's transmission assets, including substations, of Dominion Virginia Power / North Carolina Power. This includes over 6400 miles of transmission lines, 460 substations and 42,900 relays.

Presently manages an organization that provides technical support and engineering resources for electrical equipment, protective relays and operations including research activities to support Transmission System development in the future. In addition, provides technical support for Dominion Generation substations, including protective relaying, for both regulated and merchant plants.

Prior to 2001, Mr. Roop held various engineering and management positions in Energy Efficiency, Distribution, and Electric Transmission.

**John Moura** – North American Electric Reliability Corporation  
*Director, Reliability Assessment and System Analysis*

**Biography**

**John Moura** is the Director of Reliability Assessment and System Analysis for the North American Electric Reliability Corporation (NERC), where he joined in 2008. John leads the electric reliability organization's



efforts to independently assess and report on the overall reliability, adequacy, and associated risks of the interconnected North American bulk power system.

John leads the development of NERC's annual long-term and seasonal reliability assessments, as well as NERC's efforts for evaluating reliability impacts as a result of potential environmental regulations, accommodating high-levels

of variable generation, and an increasing dependence on natural gas. He is the co-author of numerous NERC special reports and technical publications

John coordinates the efforts of NERC's Planning Committee and several other stakeholder groups, which brings together the power industry's leading experts on resource and transmission planning. In addition, John is actively engaged in multiple groups and committees across North America focused on the power system risk and vulnerability analyses, loss of load studies, probabilistic resource adequacy modeling, and interconnection-wide power system modeling. In his capacity as a subject-matter expert on BPS reliability, John provides testimony in numerous state and federal hearings across the country. John earned his bachelor degree from Rutgers University.

**Patrick O'Connor** – Reliability First  
*Counsel*

## MODERATORS

### **Topic #1 – Utility Business Models**

**Benjamin Morris** – Duquesne Light Company  
*Senior Manager, Strategic Planning & Operational Analytics*



**Benjamin Buxton Morris** is Senior Manager, Strategic Planning & Operational Analytics at Duquesne Light Company, a regulated electric transmission and distribution utility serving approximately 587,000 customers in and around Pittsburgh, Pennsylvania. In this capacity, Morris is responsible for optimizing asset utilization and performance, developing and monitoring

asset health, and assisting with strategic planning. Morris also works on Duquesne Light Company's initiatives related to grid modernization and the integration of distributed energy resources, and he is a member of the Association of Edison Illuminating Companies' Distributed Energy Resources Subcommittee.

Prior to joining Duquesne Light Company, Morris was a Vice President in the Regulated Utilities group of Macquarie Infrastructure and Real Assets, Inc., where he helped to identify new private equity investment opportunities and to manage existing private equity investments in the regulated utility industry. Specific private equity investments in the regulated utility industry that Morris helped to manage included Duquesne Light Company; Aquarion Company, a water utility serving approximately 220,000 customers in Connecticut, Massachusetts, and New Hampshire; and Hawai'i Gas, a gas utility serving approximately 68,000 customers in Hawaii.

Previously, Morris was an Associate in the Oil & Gas investment banking group of Macquarie Capital (USA) Inc., where he worked with clients

in the upstream, midstream, downstream, and equipment/services sectors of the oil and gas industry. Specifically, Morris helped to provide strategic advice related to mergers and acquisitions, restructurings, and recapitalizations and to raise capital in the private and public equity and debt capital markets.

Morris holds Bachelor of Arts degrees from Middlebury College and Columbia University. Morris holds a Master of Arts degree from Middlebury College, a Master of Finance degree from INSEAD, and a Master of Business Administration degree from Columbia University.

### **Topic #2 – Grid Infrastructure Challenges**



**Steven Bossart** – National Energy Technology Laboratory  
*Senior Energy Analyst*

**Steve Bossart** has a B.S. degree in chemical engineering from Pennsylvania State University. He is a senior energy analyst at the U.S. Department of Energy's National Energy Technology Laboratory (NETL). His primary area of study is the electric power sector with an emphasis

on modernization of the nation's power system and cost and benefit analysis of 131 Smart Grid Projects funded through the American Recovery and Reinvestment Act. He is a member of Federal Smart Grid Task Force and Smart Grid Policy Center. He has 30 years of project management and analytical experience at the NETL and its predecessor organizations. He is author of over 75 publications covering a wide range of subjects including coal gasification, wastewater treatment, solid waste management, environmental controls, nuclear decommissioning, and Smart Grid.









**Thank you for attending the Electric Power Industry Conference**



# Electric Power Industry Conference

[engineering.pitt.edu/EPIC](http://engineering.pitt.edu/EPIC)

**PITT** | SWANSON  
ENGINEERING

**11<sup>TH</sup>**  
ANNUAL  
PITT **ELECTRIC POWER**  
INDUSTRY CONFERENCE  
Presented by the Swanson School of Engineering & the Center for Energy

UNIVERSITY OF PITTSBURGH  
*Center for*  
**ENERGY**

