**2017 PROGRAM COMMITTEE**

**Kenneth R. Brand,**

Manager

Distribution Operations Services

Public Service Company of Oklahoma

Tulsa, Oklahoma

**Stephen Condren**

Manager, Protection Coordination Engineering

OG&E Electric Services

Oklahoma City, Oklahoma

**David Osburn**

General Manager

Oklahoma Municipal Power Authority

Edmond, Oklahoma

**2017 EXECUTIVE COMMITTEE**

**Kenneth R. Brand,**

Manager

Distribution Operations Services

Public Service Company of Oklahoma

Tulsa, Oklahoma

**Peter Day**

Director, Technical Services

OGE Energy Corporation

Oklahoma City, Oklahoma

**David Osburn**

**G**eneral Manager

Oklahoma Municipal Power Authority

Edmond, Oklahoma

**Rama Ramakumar**

Director

Engineering Energy Laboratory

Regents and PSO/Naeter Professor of Electrical & Computer Engineering

Oklahoma State University

Stillwater, Oklahoma

**2017 SPONSORS**

**Grand River Dam Authority, Luncheon**

**Siemens Energy, Banquet**

**50th Annual**

**Frontiers of Power Conference**

October 30-31, 2017

Conoco/Phillips OSU Alumni Center

*50 Years of Serving the*

*Oklahoma and Regional Power Industry*

Co-Sponsored by

The Engineering Energy Laboratory and

The School of Electrical and Computer Engineering

Oklahoma State University



Conference Arrangements by

The Engineering Energy Laboratory

216 Engineering South

Oklahoma State University

Stillwater, Oklahoma 74078-5034

An Oklahoma State University Outreach Program

**2017**

**50th Annual**

**Frontiers of Power Conference**

ABOUT THE CONFERENCE

The frontiers of power technologies have been expanding dramatically in recent years. This is due to concerns over environmental impacts, entry of renewable energy technologies, security issues, power quality needs to satisfy the evolving digital society and the opportunities that have opened up to embed sensors, computers and two-way communications that utilize the internet to evolve a smart grid. The variety of papers and the Keynote Speakers scheduled in this 50th annual conference reflect these changing times and provide an opportunity for free and open discussion of important issues with serious economic implications.

KEYNOTE SPEAKERS

**Thomas Reddoch**

Senior Technical Executive

Power Delivery and Utilization

Electric Power Research Institute

Knoxville, Tennessee

**S. S. (Mani) Venkata**

Principal Enterprise Architect

GE Grid Solutions/Alstom Grid Inc. (recently retired)

Phoenix, Arizona

Affiliate Professor of Electrical Engineering

University of Washington

Seattle, Washington

**Chanan Singh**

Regents Professor and Irma Runyon Chair Professor

Electrical and Computer Engineering

Texas A&M University

College Station, Texas

**Harold Kirkham**

Staff Scientist

Pacific Northwest National Laboratory

Richland, Washington

**Phil Crissup**

Vice President, Utility Technical Support

OG&E

Oklahoma City, Oklahoma

2

The Frontiers of Power Conference seeks to provide for the frank and open discussion of current problems facing the electric utility industry. Over the years, the scope of this conference has expanded to include several critical problem areas of energy and power technologies. These problems are not only technical but political and economic as well.

Engineers, engineering managers, and supervisors associated with planning, designing, or operating power generating stations, transmission and distribution systems and renewable energy projects will find this program of special relevance to their work.

Participation is invited from all those associated with electric utilities, electric power production facilities, power equipment manufacturers, consultants for municipal and rural electric utilities, universities, and government agencies.

This Fiftieth Annual Conference is a continuation of a program first started in the early 1960’s at Oklahoma State University, Stillwater.

Frontiers of Power Conference Proceedings may be accessed at

<https://stw.sp.okstate.edu/ceat/eel-proceedings/Documents>

username: [ceatg1@okstate.edu](mailto:ceatg1@okstate.edu)

Password (case sensitive)

11

*Impacts of Time Delay and False Data Injection Attacks on*

*Power System Control Loops*

Dattatreya Poosarla

Master of Science Graduate 2017

Yuanxiong Guo

Assistant Professor

Electrical and Computer Engineering

Oklahoma State University

Stillwater, Oklahoma

*Transient Stability Analysis of Two Machine Power System*

Abdulhamid Zaidi

Ph.D. Candidate

Qi Cheng

Associate Professor

Electrical and Computer Engineering

Oklahoma State University

Stillwater, Oklahoma

PRESENTED BY TITLE ONLY

*Design and Development of Solar PV Based DC Nano Grid for*

*Residential Applications*

E. Chandira Sekaran

Professor

S. Vasantharahna

Professor and Head

R. Vaishnavi

PG Student

Electrical and Electronics Engineering

Coimbatore Institute of Technology

Coimbatore, Tamil Nadu, India

*A Novel Single Phase AC-AC Converter Using Four Controlled Switches*

R. L. Josephine

Associate Professor

S. Vimal Raj

Assistant Professor

G. Sivagnanam

Assistant Professor

Chandragupta Mauryan

Professor and Head

Divya Priyadarshini

Assistant Professor

Sri Krishna College of Technology

Coimbatore, India

4:15 p.m. ADJOURN

10

**Monday, October 30, 2017**

8:00 Registration & Continental Breakfast

Conoco/Phillips OSU Alumni Center

Jones Conference Room

9:00 Conference Opening—Jones Conference Room

Introductions and Welcome

**Rama Ramakumar**

Conference Director

Regents Professor and

PSO/Albrecht Naeter Professor

Director, Engineering Energy Laboratory

**Jeffrey L. Young**

Professor and Head

School of Electrical and Computer Engineering

**Paul Tikalsky**

Dean

College of Engineering, Architecture and Technology

**Burns Hargis**

President

Oklahoma State University

Stillwater, Oklahoma

9:30 KEYNOTE PRESENTATION

***Characterizing New Frontiers Facing the Electric Power Industry***

**Thomas Reddoch**

Senior Technical Executive

Power Delivery and Utilization

Electric Power Research Institute

Knoxville, Tennessee

10:30 Break

10:45 KEYNOTE PRESENTATION

***The Vision for Electric Power and Energy Education and***

***Research for the Next 50 years***

**S. S. (Mani) Venkata**

Principal Enterprise Architect

GE Grid Solutions/Alstom Grid Inc.. (recently retired)

Affiliate Professor of Electrical Engineering

University of Washington

Seattle, Washington

11:45 GRDA Luncheon

Click Alumni Hall East

3

1:00 KEYNOTE PRESENTATION

***Resources and Geographic Diversification to Improve***

***Reliability of Renewable Generation***

**Chanan Singh**

Regents Professor and Irma Runyon Chair Professor

Electrical and Computer Engineering

Texas A&M University

College Station, Texas

2:00 Technical Paper Session

Moderator Peter Day

Director, Technical Services

OG&E

Oklahoma City, Oklahoma

*Planning for the Future: The Nation’s First Cyber-Secure Utility*

*Microgrid at Ameren*

Chris Evanich

Manager of Microgrids

Don Dumich

Application Director-Microgrids

S&C Electric

Chicago, Illinois

*Microgrid Experiences in Marine Power and Energy Systems:*

*Stability Issues in Power Electronic Interfaces*

Paul S. Moses

Assistant Professor

John N. Jiang

OG&E Associate Professor

Electrical and Computer Engineering

University of Oklahoma

Norman, Oklahoma

Marounfa Djibo

Ph.D. Candidate

Old Dominion University

Norfolk, Virginia

Huntington Ingalls Industries

Newport News Shipbuilding

4

*Droop Based DC Microgrid Control by State Feedback Linearization*

Anushka M. Dissanayake

Ph.D. Candidate

Nishantha C. Ekneligoda

Assistant Professor

Electrical and Computer Engineering

Oklahoma State University

Stillwater, Oklahoma

*Shunt Active Power Filter for Improved Power Quality and Enhanced Dynamic Performance*

Amali Dehigolle Gedara

Graduate Student

Nishantha C. Ekneligoda

Assistant Professor

Electrical and Computer Engineering

Oklahoma State University

Stillwater, Oklahoma

2:45 BREAK

3:00 Technical Paper Session

Moderator Jeff Beasley

Protection Engineering Group Leader

Relay Engineer

Grand River Dam Authority

Tulsa, Oklahoma

*Impact of PV Integration on the Libyan Power System*

Abdulmunim Guwaeder

Ph.D. Candidate

R. Ramakumar

Regents Professor and PSO/Albrecht Naeter Professor

Electrical and Computer Engineering

Director, Engineering Energy Laboratory

Oklahoma State University

Stillwater, Oklahoma

9

*Bumps on the Grid: The Status of Oklahoma Wind*

Steve Stadler

Professor

Geography

Oklahoma State University

Stillwater, Oklahoma

Scott Greene

Professor and Associate Chair

Geography and Environmental Sustainability

University of Oklahoma

Norman, Oklahoma

12:00 Lunch On Your Own

Hideaway Pizza Buffet Option $10.50 for FOPC Participants

230 S. Knoblock (short walking distance)

**Tuesday afternoon sessions are in Click Alumni Hall West**

1:15 Technical Paper Session

Moderator Stephen Condren

Manager

Protection Coordination Engineering

OG&E Electric Services

Oklahoma City, Oklahoma

*Energy Production in Lean Times*

Marcus O. Durham

Principal

Jason A. Coffin

Senior Analyst

Robert A. Durham

Principal

THEWAY Labs

Tulsa, Oklahoma

*SIRES: Promises and Challenges*

Zeel Maheshwari

Ph.D. Graduate 2017

R. Ramakumar

Regents Professor and PSO/Albrecht Naeter Professor

Electrical and Computer Engineering

Director, Engineering Energy Laboratory

Oklahoma State University

Stillwater, Oklahoma

8

*Decentralized Control of a Hybrid AC and DC Ring Bus Microgrid System*

Majid Alhomim

Ph.D. Candidate

Badur Alharbi

Ph.D. Candidate

Roy A. McCann

Professor

Electrical Engineering

University of Arkansas

Fayetteville, Arkansas

*Microgrid Master Controls-Distributed and Cybersecure*

Don Dumich

Application Director-Microgrids

S&C Electric

Chicago, Illinois

3:30 Break

3:40 Technical Paper Session

Moderator: Dan Johnson

Account Manager-Oklahoma and Texas

Power System Sales, Siemens Energy

Dallas, Texas

*Transmission Access and Pricing*

Bernard A. Cevera

Managing Consultant

Guernsey

Oklahoma City, Oklahoma

*Weakness Analysis for Renewable Energy Integration Based on*

*Electrical Distances*

Di Wu

Assistant Professor

Electrical and Computer Engineering

North Dakota State University

Fargo, North Dakota

Dhruv Sharma

Ph.D. Candidate

John N. Jiang

OG&E Associate Professor

Electrical and Computer Engineering

University of Oklahoma

Norman, Oklahoma

5

*Medium Voltage Solar PV Transient Analysis Using*

*Krylov Subspace Techniques*

Sebastian Garrido

Graduate Student

Roy McCann

Professor

Electrical Engineering

University of Arkansas

Fayetteville, Arkansas

4:50 ADJOURN

7:00 Siemens Energy Banquet

Freddie Paul’s Steakhouse

1707 E. 6th Avenue (Highway 51)

Map online at: [www.freddiepauls.com](http://www.freddiepauls.com)

**Tuesday, October 31, 2017**

**Morning Sessions are in Jones Conference Room**

8:00 Continental Breakfast

8:15 KEYNOTE PRESENTATION

***Measurements and the Smart Grid***

**Harold Kirkham**

Staff Scientist

Pacific Northwest National Laboratory

Richland, Washington

9:15 KEYNOTE PRESENTATION

***Data Analytics: The Next Utility Frontier***

**Phil Crissup**

Vice President, Utility Technical Support

OG&E

Oklahoma City, Oklahoma

10:15 Break

10:30 Technical Paper Session

Moderator Ken Brand

Manager

Distribution Operations

Public Service Company of Oklahoma

Tulsa, Oklahoma

6

*Understanding the Impact of Measurement Errors on Grid Structure*

*Monitoring and Intrusion Detection*

Wanghao Fei

Ph.D. Candidate

Evan Browning

Ph.D. Candidate

Paul S. Moses

Assistant Professor

John N. Jiang

OG&E Associate Professor

Electrical and Computer Engineering

University of Oklahoma

Norman, Oklahoma

*Demand Response and House Design to Mitigate Photovoltaic Ramping*

Milan Dahal

Graduate Student

Kesh Pun

Graduate Student

Ward Jewell

Professor

Electrical Engineering

Wichita Site Director

Power System Engineering Research Center

Wichita State University

Wichita, Kansas

*A Holistic Assessment of Harmonics Induced Technical Losses in*

*Power Distribution Networks*

Onyema S. Nduka

Ph.D. Candidate

Control and Power Research Group

Bikash Pal

Professor

Electrical and Electronic Engineering

Imperial College

London, United Kingdom

7