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NATIONAL RENEWABLE ENERGY LABORATORY
# Table of Contents

## General Information
- Welcome .................................................................................. 2
- Our Thanks............................................................................... 2
- Conference Overview .............................................................. 2
- Conference Location ............................................................... 2
- Conference Schedule at a Glance ............................................ 2
- Registration and Information .................................................. 3
- Included with Registration ..................................................... 3
- In and Around the Registration Area ....................................... 4
- New Attendee’s Orientation Session ........................................ 4
- Welcome Reception .................................................................. 4
- Attendee Breakfasts .................................................................. 4
- Presenters Breakfast .................................................................. 4
- PES Members Meeting ............................................................. 5
- Plenary Session ......................................................................... 5
- Committee Meetings ............................................................... 5
- Technical Sessions and Other Technical Events ......................... 5
- Monday Night Poster Session and Reception .............................. 6
- Candidates’ Meet & Greet Reception .......................................... 6
- New Fellows Reception ............................................................ 6
- Scholarship Plus Reception ..................................................... 6
- Student Poster Contest ............................................................ 7
- Awards Ceremony and Banquet ................................................ 7
- Student Program ...................................................................... 7
- Student / Industry / Faculty Luncheon ........................................ 7
- Student / Industry / Faculty Job Fair .......................................... 7
- Networking Reception – Hosted by PES and IEEE WiP Committee .. 7
- Young Professionals – Seminar and Reception ......................... 7
- Companion Activities .............................................................. 8
- Companion Tours ..................................................................... 8
- Plain Talk about the Electric Power System for Power Industry Professionals 9
- Technical Program Information / Information for Presenters .......... 10
- Audio-Visual Equipment and Presenters Preparation Room ......... 11
- PDHs and CEUs for Attendees .................................................. 11
- Technical Tours ....................................................................... 12
- Tutorials .................................................................................. 14
- Photography / Non Discrimination Policy ................................. 19

## Super Sessions at a Glance ................................................................. 20

## Committee and Other Entity Meetings
- Administrative Committees ....................................................... 22
- Electric Machinery Committee ................................................ 22
- Energy Development and Power Generation Committee .......... 22
- Intelligent Grid Coordinating Committee .................................... 23
- Marine Systems Coordinating Committee ................................. 23
- Power & Energy Education Committee ......................................... 24
- Power System Analysis, Computing, and Economics Committee .... 24
- Power System Communications Committee ............................ 25
- Power System Dynamic Performance Committee ...................... 25
- Power System Instrumentation and Measurements Committee ...... 26
- Power System Operations Committee ......................................... 26
- Power System Planning and Implementation Committee ............. 26
- Substations Committee ............................................................ 26
- Transmission and Distribution Committee ................................. 27
- Wind and Solar Power Coordinating Committee ...................... 27
- Non-Committee ....................................................................... 30

## Meeting at a Glance by Day ................................................................. 31

## Technical and Other Sessions
- Sunday Sessions ...................................................................... 46
- Monday Sessions ...................................................................... 49
- Tuesday Sessions ................................................................. 111
- Wednesday Sessions ............................................................. 158
- Thursday Sessions ............................................................... 197

## Chair and Author Index .................................................................. 214

## Officers and Chairs ...................................................................... 237

## Maps ......................................................................................... 240
WELCOME

The IEEE Power & Energy Society (PES) is proud to be holding its 2015 General Meeting in Denver, Colorado, USA. The technical program theme of "Powering Up the Next Generation" will provide a platform to offer new insights, innovative ideas and answers to some of the most intriguing and important questions facing the power industry today.

The Local Organizing Committee, PES Technical Committees and the General Meeting Coordinating Committee welcome colleagues and friends from all facets of the industry and corners of the world to a valuable technical program, productive committee meetings and exciting networking opportunities.

OUR THANKS

PES gratefully acknowledges the support of the 2015 General Meeting's host utilities, Xcel Energy and TriState Generation & Transmission Association and of all our other generous meeting contributors.

CONFERENCE OVERVIEW

Below is a brief overview of the conference and meeting schedule and a description of each element of the meeting. The descriptions are in approximately the same order as they occur during the meeting.

Note: Attire for the conference is business casual. No denim jeans or shorts in the technical sessions or committee meetings, please.

CONFERENCE LOCATION

The 2015 General Meeting will be held at the Sheraton Denver Downtown Hotel, Denver, Colorado, USA. A sleeping room block has been arranged for conference attendees at this hotel.

CONFERENCE SCHEDULE AT A GLANCE

A quick overview of the meeting in chronological order. Detailed description of the events listed can be found elsewhere in the program.

Note: A limited number of sessions and events (in particular, some committee meeting) may fall outside this schedule.

*Tutorials, Technical and Leisure/Companion Tours and Evening Events, Student, Industry and Faculty Luncheon, and Awards Dinner are optional activities with limited capacities; they require an additional fee and tickets for admittance. Plain Talk courses are co-located with the General Meeting, and require a separate registration rather than General Meeting registration. See the General Meeting Registration page for more information about the Plain Talk courses http://www.pes-gm.org/2015/
### REGISTRATION AND INFORMATION

**Plaza Foyer (Plaza Level)**

<table>
<thead>
<tr>
<th>Sunday, 26 July</th>
<th>7:30 AM – 7:00 PM</th>
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<tr>
<td>Monday, 27 July–Tuesday, 28 July</td>
<td>6:30 AM – 7:00 PM</td>
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<td>Wednesday, 29 July</td>
<td>6:30 AM – 4:00 PM</td>
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<tr>
<td>Thursday, 30 July</td>
<td>6:30 AM – 12:00 PM</td>
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All attendees are required to register for the 2015 General Meeting and pay the appropriate fee in order to participate in any aspect of the meeting.

At the registration counters, you may pick up your advance registration packets, register on-site, purchase tickets for luncheons or companion and evening events (depending on availability), ask questions at both the registration and information counters.

**Conference Proceedings:** All registrants for the technical program will be able to download a copy of the conference proceedings from a secure web site. Information on downloading the proceedings will be sent via the registration when the proceedings are available.

### INCLUDED WITH REGISTRATION

- **Attendee registration fees include:** Continental breakfasts Monday–Thursday, Welcome Reception Sunday evening, full technical session and committee meeting program (including the Poster Session and Reception on Monday evening, and Student Poster Contest on Tuesday morning), access to download a copy of the meeting's proceedings, the opportunity to participate in any of the available optional events open exclusively to registrants at the prevailing registrant rate.

- **Companion and Children registration fees include:** Continental breakfasts Monday–Thursday in the Companion Lounge, welcome reception on Sunday evening, Poster Session and Reception/Fellows Reception on Monday evening, companion lounge Monday–Thursday, the opportunity to participate in companion tours and any of the other available optional events open to registered companions at the prevailing registered companion rate.
rate. Companions are not admitted to technical session nor do they receive a copy of the proceedings. Note: Registered children must be accompanied by a registered companion when in the companion lounge or participating in any conference activities, including tours.

Student registration fees include: Continental breakfasts Monday–Thursday, welcome reception Sunday evening, full technical session and committee meeting program (including the poster session and co-located receptions on Monday evening and the Student Poster Contest on Tuesday morning), access to download a copy of the meeting's proceedings, participation in any program elements designed exclusively for students. If you wish to attend the Student/Industry/Faculty Luncheon on Wednesday, you must purchase a ticket for the luncheon. Plus optional events open to registrants at the prevailing registrant rate.

IN AND AROUND THE REGISTRATION AREA

PES-Related Displays: Tables with literature and with materials about PES and IEEE membership, programs, publications and future meetings.

Information Booth: Staffed by local volunteers, you can obtain information about the meeting, the venue and the Denver area from knowledgeable people.

NEW ATTENDEES ORIENTATION SESSION

Sunday, 26 July 3:00 PM – 4:00 PM Governor’s Square 14
A short orientation session will familiarize first-time attendees with PES and the PES General Meeting. Session will provide an understanding of the various types of technical sessions, committee meetings, tutorials, technical tours, and social events. At the end of the session, the newcomer should be able to navigate confidently through the General Meeting and obtain maximum value from the experience. Session will include a question and answer period.

WELCOME RECEPTION

Sunday, 26 July 6:30 PM – 8:30 PM Denver Art Museum
Take this opportunity to renew old acquaintances and meet more members of the power and energy community. You are invited to enjoy a complimentary hors d’oeuvre buffet and a cash bar. Photo ID will be required to purchase alcoholic beverages.

A few things to keep in mind:
— Remember your GM badge. You will not be allowed to the Welcome Reception without it. Registration will be open until 8:00 PM. (Location: Plaza Foyer – Plaza Level)
— As is true of all elements of the General Meeting, smoking is not permitted at this event.

ATTENDEE BREAKFASTS

Monday, 27 July 6:00 AM – 7:30 AM Plaza Foyer
Tuesday, 28 July 7:00 AM – 9:30 AM Plaza Foyer and Ballroom AD (with Student Poster Contest)
Wednesday, 29 July 6:30 AM – 8:30 AM Plaza Foyer
Thursday, 30 July 6:30 AM – 8:30 AM Plaza Foyer
Complimentary continental breakfasts for all conference registrants will be available Monday through Thursday. Note that a general breakfast is not offered on days other than these.

PRESENTERS BREAKFASTS

Monday, 27 July 6:00 AM – 7:30 AM Grand Ballroom 1
Tuesday, 28 July 6:30 AM – 8:30 AM Grand Ballroom
Wednesday, 29 July 6:30 AM – 8:30 AM Grand Ballroom
Thursday, 30 July 6:30 AM – 8:30 AM Grand Ballroom
Presenters must attend a special breakfast on the day of their sessions where final plans for the session at which they will present will be made. There is a separate Poster Session Presenter Breakfast on Monday morning from 6:00 AM – 7:30 AM. See additional information in the “Information for Presenters” section of this program.
PES MEMBERS MEETING
Monday, 27 July 7:30 AM – 9:00 AM Plaza Ballroom
PES President Miroslav M. Begovic will provide an update about PES progress and activities of the past year. The candidates for the office of the PES candidates for the President-Elect, Secretary and Treasurer will each make a short presentation of their views for the Society and IEEE so you can make an informed decision when you vote during this year’s election. *(Meet the candidates face-to-face at a reception that will be co-located with the Monday Night Poster Session Location to be announced, 5:00 PM– 7:30 PM, Monday, 27 July.)*

PLENARY SESSION
Monday, 27 July 9:00 AM – 11:00 AM Plaza Ballroom
PES President Miroslav M. Begovic will moderate the Plenary Session which begins immediately following the PES Members Meeting. The notable keynote speakers who will address aspects of the conference theme, “Powering Up the Next Generation” are:

- **Dr. Dan Arvizu,** Director, National Renewable Energy Laboratory
- **Mark McGranahan,** Vice President of Power Delivery and Utilization, Electric Power Research Institute
- **Dr. David Sun,** Chief Scientist, Alstom Grid
- **Joel Bladow,** Senior Vice President of Transmission, Tri-State Generation & Transmission Association, Inc.
- **Teresa Mogensen,** Senior Vice President, Transmission, Xcel Energy Services Inc.
- **Dr. Martin Braun,** Fraunhofer Institute for Wind Energy and Energy System Technology (IWES)

COMMITTEE MEETINGS
Most administrative and technical committee meetings are scheduled from Monday 11:00 AM (following the Plenary Session) through Thursday afternoon. Some additional committee meetings are scheduled on Sunday, 26 July. See the Committee Meeting section of the program for details. Last minute updates to the program will be posted on the message board in the Registration area as well as via push notifications for those who will be using mobile app.

TECHNICAL SESSIONS AND OTHER TECHNICAL EVENTS
See the “Technical Session and Other Events” section of the program for a complete listing and description of all technical sessions. Descriptions include an abstract of each event and papers presented during each session. Last minute updates to this program will be posted in the Registration area as well as via push notifications for those who will be using mobile app. Technical meetings are planned for Monday afternoon and evening and all day Tuesday, Wednesday and Thursday. The following types of sessions are scheduled:

- **Super Sessions:** a series of presentations in composite sessions designed to fully explore topics from different perspectives. Experts from several PES technical committees will address subjects that are of significant interest to the profession
  - -DC in a AC World
  - -Changing Generation Assets and Their Impacts
  - -Challenges in Asset Management
  - -Future Economics of the Grid
  - -Late Breaking News

- **Panel Sessions:** Invited papers on a wide variety of noteworthy subjects.

- **Transactions Paper Sessions:** Presentation of high quality IEEE PES Transactions papers on many issues of significance to energy and power professionals.

- **Paper Forums:** Multiple authors present brief overviews of their quality papers followed by time for a discussion with the individual author(s) of your choice.

- **Poster Session:** A Monday evening special event with hundreds of authors representing all aspects of the industry, each presenting a poster version of his/her paper. Enjoy hot and cold hors d’oeuvres and refreshing beverages as you browse the posters and discuss the papers one-on-one with their authors.

- **Student Poster Contest:** The Student Poster Contest will be held in conjunction with the Tuesday morning attendee breakfast (on 28 July) in the Plaza AD.

- **Tutorials:** Twelve tutorials will be presented during the meeting. Classes are taught by eminent professionals in the field. Earn PDHs and CEUs for your attendance (see below for an explanation of PDHs and CEUs).
Full or one-day conference registration plus an additional fee is required in order to attend any of these courses. For complete information about the tutorials including pricing, information about the instructors and schedule, see the Tutorial section of the program in the pages that follow. Tickets may be purchased at the Registration desk if seats remain. Topics covered will include:

- Energy Storage
- Intelligent Systems Support for Transactive Energy Systems
- Fault Current Contributions from Wind Plants
- GHG Emissions Standards for the Power and Energy Sector
- Smart Grid Data and Analytics
- Smart Distribution Systems
- Energy Forecasting
- Renewable Energy Systems
- Distribution Systems Modeling
- Smart Substations
- Understanding Cascading Phenomenon
- Distribution Volt-var Control and Optimization

**Technical Tours:** Four half-day inspection trips are offered. Registration is permitted through 11 July only. **No on-site technical tour registration is available.** Valid photo ID must be presented at the beginning of each tour. See the Technical Tour section of the program for descriptions and details of each tour.

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**MONDAY NIGHT POSTER SESSION AND RECEPTION**

*Monday, 27 July 5:00 PM – 8:00 PM Plaza Foyer & Ballroom (co-located with the Fellows’ Reception, the Meet the Candidates Reception and an opportunity to meet the donors who have contributed to the PES Scholarship Plus program)*

A popular feature of the PES General Meeting technical program is the Poster Session, where papers from each represented committee and all topics will be presented. A complimentary hors d’oeuvre buffet will be served and cash bar will be available. Attendee or Companion badges are required for entrance to the Poster Session. Photo ID will be required to purchase alcoholic beverages at the bar. *(The Student Poster Contest will be held Tuesday morning, 7:30 AM – 9:00 AM in the Plaza AD, during which an Attendee’s Breakfast will be available.)*

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**CANDIDATES MEET & GREET RECEPTION**

*Monday, 27 July 5:00 PM – 8:00 PM Plaza Foyer & Ballroom (co-located with the Poster Session and New Fellows Reception)*

The PES candidates for the President-Elect, Secretary and Treasurer will each make a short presentation of his/her views for the Society and IEEE so you can make an informed decision when you vote during this year’s election.

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**NEW FELLOWS RECEPTION**

*Monday, 27 July 5:00 PM – 8:00 PM Plaza Foyer & Ballroom (co-located with the Poster Session, Candidates Reception)*

As part of PES’s recognition of extraordinary achievements in the technical and professional fields of energy and power, during the reception held in their honor you are cordially invited to stop in and congratulate the IEEE Fellows elected to the class of 2015 who are members of PES.

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**SCHOLARSHIP PLUS RECEPTION**

*Monday, 27 July 5:00 PM – 8:00 PM Plaza Foyer & Ballroom (co-located with the Poster Session, Candidates Reception and New Fellows Reception)*

Meet the individuals who will help shape the future of the Power Industry and congratulate them on being selected as IEEE PES Scholars.
STUDENT POSTER CONTEST
Tuesday, 28 July 7:30 AM – 9:30 AM Plaza Foyer & Ballroom AD (co-located with Attendee Breakfast)

Take this opportunity to see the work done by hundreds of the top students in our field. Plan to spend some time discussing topics of mutual interest with the participants.

AWARDS CEREMONY AND BANQUET
Tuesday, 28 July 7:00 PM – 9:30 PM Grand Ballroom

US$80; After 19 June US$95

Join us for a banquet dinner where IEEE and PES award winners are honored for their outstanding achievements. Vegetarian/vegan meals are available upon request. Seating is limited. You may purchase tickets on-site at the Registration Desk if there are seats remaining. A cash bar serving beer and wine will open at 6:30 PM and be available thru dinner. Photo ID will be required to purchase alcoholic beverages.

STUDENT PROGRAM

An exciting student program for IEEE PES Student Members includes a Poster Contest, and the Student/Industry/Faculty luncheon (ticket required) as well as the Student/Industry/Faculty Job Fair. Student members are invited to participate in all other aspects of the General Meeting as well. After registering for the General Meeting, students may visit http://www.pes-gm.org/2015/ for more information about the program. Students must be prepared to verify their status by providing their ID and IEEE Membership number when picking up their registration packets on-site.

STUDENT / INDUSTRY / FACULTY LUNCHEON
Wednesday, 29 July 11:45 AM – 3:00 PM Grand Ballroom

US$50; After 19 June US$55

Student/Industry/Faculty Luncheon: Attend a luncheon designed to bring together students, industry representatives and faculty advisors. The recipients of the IEEE PES Student Prize Paper Award in Honor of T. Burke Hayes and the recipients of the Student Poster Contest will be recognized. All meeting registrants are invited to purchase tickets and join the luncheon as long as there are seats remaining. Seating is limited.

STUDENT / INDUSTRY / FACULTY JOB FAIR
Wednesday, 29 July 1:00 PM – 3:00 PM Grand Ballroom

International Job Fair for Students: Employers and university graduates and undergraduates can participate in an International Job Fair for Students following the luncheon. This job fair will provide a forum for employers and students who share a common interest in the power and energy industry to meet and discuss career opportunities. It enables one-to-one conversations between company engineers or recruitment professionals and students who will soon be in the job market. Students will sit with a potential employer during lunch. Students may circulate among recruiting tables for further conversations.

NETWORKING RECEPTION – HOSTED BY PES AND IEEE PES WiP (WOMEN IN POWER) COMMITTEE
Wednesday, 29 July 5:00 PM – 6:30 PM Grand Ballroom I

All registered attendees are invited to this complimentary informal reception held to encourage networking between industry, government and university participants. This year, an exciting new format is being introduced. From 5:00 PM – 6:30 PM, interact with one or more of the woman successful in the power industry who has been invited to share experiences and wisdom with those attending the reception. There will be plenty of opportunity to network with other attendees at the reception as well. Light refreshments will be provided.

YOUNG PROFESSIONALS – SEMINAR AND RECEPTION
Wednesday, 29 July 6:00 PM – 7:30 PM Grand Ballroom II

The Young Professionals reception and seminar provides an opportunity for all conference attendees, in particular, current students and engineers that have graduated within the last ten years to network, meet officers of IEEE PES, and to make contacts among their peers in the Power & Energy community. Find out
how you can contribute to PES and how it can help you. All registered attendees are invited. Light refreshments will be provided. A 20 minute seminar will begin at 6:45 PM.

COMPANION ACTIVITIES

Access to the activities described below is limited to registered companions and registered children in the company of a registered companion.

Registered companions and children are invited to mingle and relax in the Companion Hospitality Lounge, located in the South Convention Lobby located in the Tower Building Second level. The lounge will be open:

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
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<tbody>
<tr>
<td>Sunday</td>
<td>12:00 PM – 5:00 PM</td>
</tr>
<tr>
<td>Monday</td>
<td>7:00 AM – 5:00 PM</td>
</tr>
<tr>
<td>Tuesday</td>
<td>7:00 AM – 12:00 PM</td>
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Complimentary breakfast will be served Monday through Thursday, 7:00 AM – 9:30 AM.

Many fun activities are being planned for the lounge. Please check on-site in the lounge for more details and activity sign-up.

COMPANION TOURS

A full program of optional tours has been planned for registered companions. Descriptions of the tours follow in chronological order. Registered children are welcome on the tours but must be accompanied by a registered parent. Tickets for each tour are sold at a single rate regardless of the age of the person participating. A companion or child's badge is required in order to participate. You may purchase ticket onsite if there are seats available. Please visit the registration desk to check availability.

Please arrive at the pick-up point 15 minutes before the scheduled start time of the tour. All tours depart from the Court Street.

Note: The buses used for the tours have storage for a wheelchair or mobility scooter, but do not have a wheelchair lift. Guests must be able to enter and exit the buses without the aid of a lift.

Denver City Swing Tour

Sunday, 26 July 1:00 PM – 4:00 PM

Take a trip into the heart of the “Mile High City” on a Denver City Swing. Guests tour the downtown finance and business areas as well as the revitalized parts of “old” Denver which have been creatively combined with powerful skyscrapers. See the spectacular State Capitol Building, one of the many “ooh and aah” stops. Enjoy riding through our lovely mansion areas and parks. Catch a glimpse of the renovated lower downtown (LoDo) district. The block-long Larimer Square is filled with interesting boutiques as well as some of the city's top restaurants.

A picture stop is made at Coors Field, home of the Colorado Rockies and one of the top tourist stops in the Denver area.

Sample itinerary

Depart Denver: 1:00 PM
Drive by Tour: 1:00 PM – 2:15 PM
U.S. Mint or State Capitol Tour: 2:30 PM – 3:45 PM
Arrive back to Denver Hotel: 4:00 PM

Note: Walking shoes recommended. Photo stops during tour.

Price: US$28.00

Rocky Mountain Rendezvous (Rocky Mountain National Park and Historic Estes Park)

Monday, 27 July 9:00 AM – 6:00 PM

Enter the ancestral Rockies and wind up the spectacular canyon to Estes Park, eastern gateway to Rocky Mountain National Park.

Wildlife viewing is possible most of the year but summer is a particularly good time to see the park’s inhabitants. We’ll tour the park by motorcoach visiting the most scenic spots and most interesting landmarks.

Then, it’s all aboard for the return trip down to the charming and quaint mountain town of Estes Park. You will be given time this afternoon to have lunch, sightsee and browse the myriad shops, quality boutiques and art galleries.

Note: Weather dictates which roads in Rocky Mountain National Park are open throughout the year. Lunch on own.

Price: US$82.00
LODO Walking Tour
Tuesday, 27 July  2:00 PM – 4:00 PM
Don’t miss a chance to see “LoDo,” Denver’s Lower Downtown District, up close. Shops, restaurants, clubs, lofts and galleries are springing up everywhere and pulsing with life!
Discover how Denver was born in this informative entertaining two hour walking tour! Your hosts give historically correct fun facts on how the city thrived on the Pike’s Peak Gold Rush of 1858. Learn about the many historical buildings along the way and which famous citizens have inhabited them.
Note: Walking involved. Casual attire and comfortable shoes suggested.
Price: US$12.00

Best of Boulder
Tuesday, 28 July  10:00 AM – 4:00 PM
Boulder is a dynamic university community, nestled near the base of the scenic Flatiron Mountains – offering breathtaking views. Your tour takes you to the famous Celestial Seasonings facility to see, taste, and smell the world of teas. There is an informative tour and a delightful gift shop with “Tea” shirts, whimsical gifts with the famous “Sleepy – Time Bear” and a variety of tea accouterments.

We then visit the famous Pearl Street Mall – an outdoor mall with very unique character! The Mall is home to a wide variety of fascinating shops and delicious dining. Guests will be given time for lunch on their own on the Mall before we drive through the University of Colorado’s expansive campus to see beautiful historical buildings and gorgeous landscaping on the way back to Denver.
Note: Lunch on Pearl Street varies by restaurant and is not included in the above estimated price.
Price: US$72.00

Foothills Fandango
Tuesday, 28 July  1:00 PM – 5:00 PM
Head for the foothills to experience one of Colorado’s most photographed and scenic sights – Red Rocks Park and Amphitheatre – an experience in itself!
In the nearby town of Golden at the foot of the Colorado Rockies a marvelous tour of the largest single-site brewery in the world awaits. The brewery’s 35-minute self-guided audio tour includes a walk through the malting, brewing and packaging processes. The tour concludes with an opportunity to sample Coors’ fine beers or non-alcoholic products in the hospitality lounge and time to shop in the Coors & Co. gift shop.
Sample itinerary
Depart Denver: 1:00 PM
Red Rocks: 1:30 PM – 2:45 PM
Coors Brewery: 3:00 PM – 4:30 PM
Arrive Back in Denver: 5:00 PM
Note: Walking shoes recommended.
Price: US$52.00

Georgetown: “Silverqueen” of the Rockies
Wednesday, 29 July  8:15 AM – 3:15 PM
Enjoy an excursion into the high Rockies to Georgetown, an old silver mine “Boom Town” of the 1860’s and 1870’s. Once the number one silver producer in the world, today Georgetown, with its beautifully preserved Victorian dwellings and true western main street, has an aura all its own.

Next, experience the thrill of riding the Colorado Historical Society’s Georgetown Loop Railroad. This one hour and ten minute round-trip train ride travels between the towns of Georgetown and Silver Plume and takes you over the reconstructed Devil’s Gate High Bridge and through the same spectacular Colorado mountain scenery that visitors of yesteryear enjoyed.
We’ll then drive back into the historic town of Georgetown for time on your own to enjoy lunch and do some shopping.
Note: Coach seats are not in a fully-enclosed car and will be exposed to the elements. Layers are suggested.
Price: US$99.00
Colorado Sights and Scents
The Denver Botanic Gardens & Denver Art Museum

Wednesday, 29 July 9:00 AM – 12:30 PM

The Denver Botanic Gardens is a unique complex that has attracted international attention through its use of spectacular design, materials and choice of plant specimens.

Following the Denver Botanic Gardens tour, guests will also visit the Denver Art Museum for a Collections Highlight Tour.

The North building completed in 1971 was designed by Gio Ponti and local architect James Sudler. The original building is itself as much a work of art as the objects it contains.

The brilliantly modern new wing of the Denver Art Museum offers a vision of Denver’s future.

Note: Walking shoes recommended.

Price: US$76.00

PLAIN TALK ABOUT THE ELECTRIC POWER SYSTEM FOR POWER INDUSTRY PROFESSIONALS

IEEE PES PLAIN TALK courses for the power industry professional will help you to understand technical aspects of the electric power industry, even if you do not have an engineering background. You will gain insights into the concerns of engineers, the demands of regulators and consumer groups, and the factors and trends that impact the operation of today’s electric power systems. These courses are also appropriate for new engineers to the industry, or for engineers in other fields who are transitioning to the electric power industry. These courses aim to increase your understanding of the electric power system by providing you with practical knowledge that you can use as you work in or with this important industry.

IEEE PES PLAIN TALK courses are co-located events rather than parts of the General Meeting, and thus, conference registration is not required to attend these courses. The fee to register for the courses on-site is US$2,150 for three courses, US$1,510 for two courses and US$795 for a single course. (If you register on or before 1 July, prices are lower. See the Plain Talk web page noted below for specifics.) The course fee includes continental breakfast, lunch and all course materials. Breakfast and registration: 7:30 AM – 8:00 AM. Courses start promptly at 8:00 AM. You may register on-site if seats are available.


Power System Basics – Understanding the Electric Utility Operation Inside and Out

Tuesday 28 July 8:00 AM – 5:00 PM Silver

The focus of this course is to provide a fundamental foundation in electric power systems, from basic formulas to the planning, operations, and equipment involved in generating, transmitting, and distributing electric power. Basic electrical terminology will be explained in simple to understand language with regard to design, construction, operation and maintenance of power plants, substations and transmission and distribution lines. Topics covered in the course include an introduction to the fundamentals and basic formulas of electricity as well as the equipment involved in the electric power system. An overview of generation, substations, transmission, distribution, and utilization is provided. Protection, reliable operation, and safety are among the topics covered.

Instructor: Douglas A. Bowman

Distribution System – Delivering Power to the Customer

Wednesday, 29 July 8:00 AM – 5:00 PM Gold

(Prerequisite for this course is Power System Basics or a familiarity with basic formulas and power system equipment.)

The focus of this course is to provide attendees with an overview of the issues associated with the planning, engineering, design, operation, and automation of electrical distribution systems. Types of distribution systems and network circuits, as well as engineering issues related to distribution systems will be explored. New concepts in the design, challenges, and operation of smart grid will be addressed. This course is intended for those who are not familiar with the delivery of electricity to the end user.

Topics covered in the course include an introduction to the types of distribution systems, issues associated with distribution planning such as outages and reliability, distribution engineering considerations relating to radial and secondary networks, and distribution automation. The course also provides an overview of electrical distribution operations, including the roles of utility personnel, construction and maintenance considerations, and trends in the industry. Smart grid and its impact on the distribution system will be explored.

Instructors: Joseph L. Koepfinger and Maurice Ney
Transmission System – The Interconnected Bulk Electric System

Thursday, 30 July 8:00 AM – 5:00 PM Silver

(Prerequisite for this course is Power System Basics or a familiarity with basic formulas and power system equipment.)

The focus of this course is to provide participants with knowledge of how electric power is transferred from generation sources to distribution systems via the interconnected electric bulk power system known as “the grid.” Basic physical laws governing the grid will be introduced, as well as the regulatory agencies involved in its governance. The great blackouts will be explored. This course is intended to increase participant’s understanding of the electric grid and how it functions in the electric power system. Topics covered in the course include an introduction to the fundamental concepts of power, energy, and power system stability as they relate to the grid. The grid is explored in terms of its interconnections, power flow, North American interconnections, and governing bodies such as NERC/ERO, ISOs, and RTOs. Reliability standards and contingency analysis are addressed. Issues related to the planning and operation of the grid, such as transmission and economic constraints, determining transmission transfer capability, and dealing with congestion are reviewed. The course also discusses the great blackouts, their root causes, and lessons learned.

Instructor: Robert W. Waldele

TECHNICAL PROGRAM INFORMATION

INFORMATION FOR PRESENTERS

Presenter/Chair Breakfasts

All presenters, panelists and session chairs MUST meet at breakfast the day of their session(s) to discuss session arrangements. Attendance is required. All presenters should have received e-mails providing the dates of their sessions and breakfasts.

Presenter Breakfasts

Monday, 27 July 6:00 AM – 7:30 AM Grand Ballroom 1
Tuesday, 28 July 6:30 AM – 8:30 AM Grand Ballroom
Wednesday, 29 July 6:30 AM – 8:30 AM Grand Ballroom
Thursday, 30 July 6:30 AM – 8:30 AM Grand Ballroom

Poster Session Presenter Breakfast

Monday, 27 July 6:00 AM – 7:30 AM Grand Ballroom 2

AUDIO-VISUAL EQUIPMENT AND PRESENTERS PREPARATION ROOM

Technical Session rooms will be equipped with an LCD projector and screen, power and extension cords, podium, microphone if appropriate, and a wireless mouse. Speakers who wish to use a computer during their presentations are required to provide their own laptop computers and are responsible for ensuring compatibility with on-site equipment.

Committee meeting rooms will be equipped with a cart (for any electronic equipment you may provide on your own), screen, and power and extension cords. No projector or computer will be provided. Arrangements, including payment via credit card, for any additional audio-visual equipment you wish to rent from the meeting’s AV provider must be made in advance.

The Presenters Prep Room, located in the Client Office 1, will be equipped with an LCD projector with the same specifications and compatibility as those in the Technical Session rooms. The equipment is provided to allow presenters to become familiar with, and to ensure that, their laptop computers are compatible with on-site equipment provided. Please check at the Information Booth or Paper Sales area for exact location, hours and access.
PDHs AND CEUs FOR ATTENDEES

Continuing Education Units (CEUs) offered by IEEE

A Continuing Education Unit (CEU) is ten contact hours of participation in an organized continuing education experience under responsible, qualified direction and instruction. A unit generally consists of courses of study that refresh, update and enhance knowledge, skills and experience of professional personnel. Any course that offers CEUs which is presented by an IEEE entity has been reviewed and approved according to standards set by IEEE. All registered students who complete an IEEE course offering CEUs will receive a certificate via email from the IEEE attesting to the CEUs earned by the attendee.

It is up to each student to determine if a specific course or program fills the needs of the discipline or certifying body for which the CEUs are intended.

Professional Development Hours (PDHs)

Continuing professional education for licensed engineers is measured in Professional Development Hours (PDH). A PDH is one contact hour of instruction or presentation. Currently, approximately thirty states mandate Professional Development Hours to maintain P.E. licensure, each with varying requirements. CEUs readily translate into PDHs (1CEU=10 PDHs), though PDHs do not convert automatically to CEUs.

The licensee is responsible for maintaining records to be used to support PDH credits claimed. PES does not track this information. Unlike the procedure for CEUs, courses are not pre-approved by the IEEE for PDHs.

At many PES meetings, forms are readily available that can be completed by attendees of any session and signed by the session chair to verify attendance. The completed forms are held by each attendee. They are not submitted to IEEE. It is up to each licensee to provide the forms to the certifying body or employer, and to determine if a specific course or program fills the needs of the discipline or certifying body and/or employer for which the PDHs are intended.

TECHNICAL TOURS

Technical tours are a unique element of the PES General Meeting technical program. This year, the following tours are being offered to registered attendees of the General Meeting. All tours depart from the Court Street. Please arrive 15 minutes earlier than the posted departure time. Advance registration for all technical tours is required. There is no on-site registration for technical tours. Tour conditions require that attendees wear clothing with long sleeves/long pants.

Denver Transit Partners/Regional Transportation District Electric Commuter Rail Maintenance Facility (CRMF)

Monday, 27 July

Tour time: Depart hotel at 1:00 PM, arrive at RTD about 1:30 PM, tour till 3:30 PM
Location: 5151 Fox Street, Globeville (Denver)

The Electric Commuter Rail Maintenance Facility received its first four vehicles in December 2014. It's a 230,000 square foot facility designed to house 220 operators, mechanics, other staff, and up to 80 electric rail cars. The Operations Control Center for Denver's Electric Rail system is also located here. The facility was awarded with a Leadership in Energy and Environmental Design (LEED) Silver Certification. The trip will include a guided tour of the repair and maintenance facilities as well as the Operations Control Center and warehouse.

Note: Limited to 30 people. ADA compliant but quantity of elevators is limited. Recommend comfortable closed toe walking shoes.

Price: US$40.00

These two stops are combined for one round-trip tour.

Solar Technology Acceleration Center (SolarTAC)

Monday, 27 July

Tour time: Depart hotel at 12:30 PM, tour from 1:00 PM – 3:00 PM
Location: 2850 Hudson Mile Rd, Watkins, Colorado

The Solar Technology Acceleration Center is a 74 acre integrated research park. It is used by the solar industry to test, validate, and demonstrate near-market and advanced solar technologies. In operation since
2011, it includes facilities for both photovoltaic and concentrated solar power technologies, as well as access to the electric grid. Located near the Denver International Airport, the site provides excellent solar insolation with more than 300 days of sunshine every year.

**Note:** Will be walking outdoors. Recommend comfortable closed toe walking shoes, hat and sunglasses.

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**SMA**

**Monday, 27 July**

**Tour time:** 3:30 PM – 5:00 PM

**Location:** 3801 Havana St, Denver, Colorado

SMA is the global market leader for inverters, of which more than 30 GW have been delivered. SMA builds inverters for residential, commercial and industrial PV applications of up to 1,500 VDC and 2,475 kVA per unit. They also market a PV / Diesel hybrid system, battery inverters and offer planning software and real-time monitoring systems. This will be an opportunity to discuss emerging product ideas with SMA engineers.

**Price:** US$40.00

These two stops are combined for one round-trip tour.

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**Western Area Power Administration, Electric Power Training Center (EPTC)**

**Tuesday, 28 July**

**Tour time:** Depart hotel at 12:00 PM, tour from 1:00 PM – 2:15 PM

**Location:** 1667 Cole Blvd, Building 19, Lakewood, Colorado

The Western Area Power Administration (WAPA) markets and delivers hydroelectric power and related services within a 15 state region of the central and western US. Its transmission system carries electricity from 55 hydropower plants with a combined capacity of 10.6 gigawatts. The Electric Power Training Center is used to train power system operators at WAPA and many other utilities.

**Note:** Non-US citizen visitor approval required ahead of time. Registration for this tour closes June 26.

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**NREL Energy Systems Interconnection Facility (ESIF)**

**Tuesday, 28 July**

**Tour Time:** Depart EPTC at 2:15 PM, arrive at ESIF at 2:30 PM, tour till 3:45 PM

**Location:** 15013 Denver West Parkway, Golden, Colorado

The National Renewable Energy Laboratory (NREL) is the United States’ primary laboratory for renewable energy and energy efficiency research and development. The Energy Systems Interconnection Facility houses labs conducting research on Power Systems Integration, Energy Storage, Smart Power, Thermal Processes, and Optical Characterization. It is a 183,000 square foot facility that has a new super computer center. It has been awarded with a Leadership in Energy and Environmental Design (LEED) Gold Certification.

**Note:** Non-US citizen visitor approval required ahead of time. Registration for this tour closes June 26.

**Price:** US$40.00

These two stops are combined for one round-trip tour.

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**NREL National Wind Technology Center (NWTC)**

**Wednesday, 29 July**

**Tour Time:** Depart hotel at 12:00 PM, tour 1:00 PM – 3:00 PM

**Location:** 18299 West 120th Ave, (Hwy 93 & 128), Louisville, Colorado

The National Renewable Energy Laboratory (NREL) is the United States’ primary laboratory for renewable energy and energy efficiency research and development. The Wind Technology Center is the nation’s pre-
mier wind energy technology research facility. It advances the development of innovative land-based and offshore wind energy technologies. The 305 acre site is comprised of test sites, test laboratories, industrial work areas, machine shops, electronics and instrumentation laboratories, and office areas. The testing facilities for full size gearboxes and wind turbine blades are especially interesting.

Note: Non-US citizen visitor approval required ahead of time. Registration for this tour closes June 26. Partly outdoors, may be windy. Recommend comfortable closed toe walking shoes, hat, sunglasses and long-pants.

Plains-End Power Plant

Wednesday, 29 July
Tour Time: 3:15 PM – 4:30 PM
Location: 8950 Hwy 93 (near Hwy 72), Arvada, Colorado

The Plains-End Power Plant is the world's largest reciprocating engine peaking power plant. It is comprised of 34 large natural gas units totaling 231 MW. These reciprocating engines have high operational flexibility. Most of the time, they operate in non-spinning reserve mode, capable of ramping to full output in less than ten minutes to help balance changes in wind plant output. With a small diesel generator on site, the plant has black start capabilities.

Note: Part of tour will be outdoors. Recommend comfortable closed toe walking shoes, hat and sunglasses.
Price: US$40.00

TUTORIALS

Meeting registration plus an additional fee is required to attend any of these courses. Earn CEUs and PDHs for your attendance. You may register on-site if seats and materials are available.

HALF DAY TUTORIALS

Energy Storage: An Introduction to Technologies, Applications and Best Practices

Date: Sunday, 26 July
Time: 8:00 AM – 12:00 PM
Price: Regular US$240
Student Regular US$75

Instructors: Hamidreza Zareipour, University of Calgary; Kintner-Meyer, Michael CW, PNNL; Sudipta Lahairi

Energy storage is becoming an attracting solution for today’s smart grid, either being operated independently as asset or interacting with other resources like wind/solar generation or demand response. This tutorial is a half-day course to provide participants a solid understanding on the basics and the state-of-the-art energy storage application, its implications on the grid’s reliability and the system's economics and how-to on evaluating its performance and cost-benefit. Instructors with diverse background on this subject will bring the field deployment experience of energy storage applications and the real-world example to demonstrate the analytic tools in assisting the utility planning and operation decisions. The course is suitable for non-technical, as well as technical audiences, including regulatory, legislative, and utility staff members. Topics include:

• Basics of Energy Storage and Potential Applications for Power System
• Energy Storage Application: Operation and Planning
• Energy Storage Application: Market and Economics
• Tools to Evaluate Energy Storage Performance

Intelligent Systems Support for Transactive Energy Systems: The Fundamentals

Date: Sunday, 26 July
Time: 8:00 AM – 12:00 PM
Price: Regular US$240
Student Regular US$75

Instructors: Dr. Koen Kok, TNO, The Netherlands; Steve Widergren, PNNL; Leigh Tesfatsion, Iowa State University

Recently, Transactive Energy (TE) Systems have gained great interest in the Power and Energy community. TE approaches optimize the operation of distributed energy resources through market-based transactions
between participants. TE systems have shown to improve the match between (local) electricity consumption and the (local) production and, by doing so, (i) improve the integration of renewable energy generation and (ii) solve local overloading in distribution networks. As we move to integrate thousands and millions of distributed energy resources, de-centralized, transactive approaches are becoming increasingly important because of their scalability and robustness. Further, the ability to encourage fair compensation for services rendered is an important aspect. Distributed multi-objective optimization, e.g. using multi-agent systems (MAS) technology, is key to building scalable transactive systems as past experiences have shown. In this tutorial, pioneering transactive energy researchers from both sides of the Atlantic give an overview of the principles and concepts behind transactive energy and give insight in the most important transactive energy implementations available. Topics include:

- Drivers and Fundamentals
- Implementations, Field Experiences and Developmental Guidelines

Fault Current Contributions from Wind Plants

Date: Sunday, 26 July
Time: 1:00 PM – 5:00 PM
Price: Regular US$240
Student Regular US$75
Instructors: Dean Miller, PacifiCorp; Sukumar Brahma, New Mexico State University; Wayne Dilling, Mortenson; Ashok Gopalakrishnan, Quanta Services; Charles Henville, Henville Consulting; Jim Niemira, S&C Electric; Reigh Walling, Walling Energy Systems Consulting

The safe, reliable operation of electrical power systems requires the ability to predict and model the sources of fault current, including contributions from wind powered generating plants, in order to select equipment properly rated, and to design and develop settings for the protection systems. Groups of wind turbine generators are clustered and networked to form wind plants. Several characteristics are unique to wind plants, but the most significant characteristic to the topic of this tutorial is the response of the wind turbine generators to faults on the power system. Wind turbine generators (WTG) must be able to tolerate rapid fluctuations in wind speed (turbulence and gusting). The traditional rigid mechanical and electrical coupling of the prime mover and a synchronous generator will not tolerate these fluctuations. There are WTGs of five basic types that can, in some cases with supplemental equipment, tolerate the fluctuations in the wind speed and deliver electrical power in the form that meets the requirements of the transmission system.

The tutorial and the report that it is based on covers the electrical design of wind plants, the theoretical and experimental performance during faults of the WTGs, the issues in specifying fault interrupting devices and designing protective relay systems for wind plants, the data necessary to model wind plants, and the results from the analysis of faults on wind plant interconnections.

GHG Emissions Standards for the Power & Energy Sector: Design and Application

Date: Sunday, 26 July
Time: 1:00 PM – 5:00 PM
Price: Regular US$240
Student Regular US$75
Instructors: Jim McConnach, Independent Energy Consultant; Richard W Vesel, US-ABB; Dick Doyle

There are a number of ISO and IEC standards for the quantification and recording of Greenhouse Gas (GHG) Emissions. Adapting these for specific uses by the electrical power and energy sector is desirable. The title of the IEEE-SA Standards Project P1595 is: “Standards for Designating and Quantifying Green Energy Projects in the Electricity Sector.” This standard will cover and define the rules for designation and quantification of electrical energy from “Green Technology” projects such as Wind and Solar.

The Tutorial will review existing ISO and IEC Standards to raise awareness of the design principles and application of these standards and how they can form the basis for developing P1595.
Smart Grid 204: Introduction to Smart Grid Data and Analytics

Date: Thursday, 30 July
Time: 8:00 AM – 12:00 PM
Price: Regular US$240
Student Regular US$75
Instructor: Doug Houseman, EnerNex

This is an introductory level course to look at smart grid data and analytics, the focus is on the distribution and customer domains of the NIST model. The course covers the following key topics:

- What data is available from which devices, from the in home controller to meters to relays and substation automation
- What applications can be done with the data, with a heavy focus on AMI and line devices
- What is the value of each of the applications to the various stakeholders that are associated with the grid, using the Illinois Collaborative definitions of stakeholders

The course will look at the process of collecting and verifying data, including all of the pitfalls that may occur and provide a 20 step process to go from no data to running analytics. The course is suitable for non-technical, as well as technical audiences, including regulatory, legislative, and utility staff members. The course will also compare and contrast the two major privacy contenders and the impact each would have on the ability to perform the analytic applications based on the principles of each contender. Included in the course will be a summary of the ARRA analytics that have been highlighted by the EPRI and DOE reports.

FULL DAY TUTORIALS

Smart Distribution Systems

Date: Sunday, 26 July
Time: 8:00 AM – 5:00 PM
Price: Regular US$395
Student Regular $150
Instructors: Larry Clark, Alabama Power Company; Anil Pahwa, Kansas State University; Georges Simard, S.I.M.A.R.D.SG Inc.; Robert Uluski, UISOL; Brian Deaver, EPRI; Ethan Boardman, Alstom GRID; Julio Romero Aguero, Quanta Technology; Grant Gilchrist, Enernex; Terry Saxton, Xtensible Solutions

The concept of Smart Grid involves the complete chain of energy delivery from generation to the customers. Many of the smart grid applications will occur at the distribution level since this is where new communication infrastructure will enable new automation schemes, integration of distributed generation, and integration of customer systems with the operation of the power delivery system. This tutorial covers the most recent evolution of smart distribution applications and technologies involved in the smart distribution system. Important applications include traditional distribution automation functions along with advancements in Volt and Var Control, System Monitoring, Distribution Management Systems and Distributed resource integration. Telecommunication and Standards on Smart Distribution systems will also be part of the tutorial. Topics include:

- Smart Distribution Systems Fundamentals
- Smart Distribution Systems
- Smart Distribution Circuit Automation
- Volt/Var Control
- Smart Distribution Monitoring
- Integrated Distribution Management Systems
- Distributed Energy Resource Integration
- Smart Communications
- Smart Distribution Applications Integration
**Energy Forecasting in the Smart Grid Era**

**Date:** Sunday, 26 July  
**Time:** 8:00 AM – 5:00 PM  
**Price:**  
Regular US$395  
Student Regular $150  

**Instructors:** Tao Hong, University of North Carolina at Charlotte; Shu Fan, Monash University; Hamidreza Zareipour, University of Calgary; Pierre Pinson, Technical University of Denmark

Wide range deployment of smart grid technologies enables utilities to monitor the power systems and gather data on a much more granular level than ever before. While the utilities can potentially better understand the customers, design the demand response programs, forecast and control the loads, integrate renewable energy and plan the systems, etc., they are facing analytic issues with making sense and taking advantage of the “big data.”

This tutorial developed by IEEE Working Group on Energy Forecasting offers a comprehensive overview of energy forecasting to utility forecasters, analysts, planners, operators and their managers. The participants will learn the fundamentals and the state-of-the-art of load, price and wind forecasting through real world examples and case studies.

**Topics include:**
- Fundamentals of Energy Forecasting
- Short-Term and Long-Term Electricity Demand Forecasting
- Price Forecasting in Competitive Electricity Markets
- Wind Power Forecasting in Theory and Practice

**Renewable Energy Systems Modeling and Dynamic Performance**

**Date:** Tuesday, 28 July  
**Time:** 8:00 AM – 5:00 PM  
**Price:**  
Regular US$395  
Student Regular $150  

**Instructors:** Pouyan Pourbeik, EPRI; Nicholas Miller, GE; Eduard Muljadi, NREL; Robert Nelson, Siemens; Yuriy Kazachkov, Siemens PTI; Jason McDowell, GE; Istvan Erlich, University Duisburg Essen; Jens Fortmann, HTW-Berlin

This tutorial is on the dynamic performance and modeling of renewable energy systems, with a focus on wind and PV generation, as it pertains to bulk electric power system analysis.

Topics that will be covered include the latest generic public models developed and now deployed in major commercial software platforms for positive sequence stability analysis of wind and PV generation, the modeling of wind and PV plants in powerflow analyses, calculating the short circuit contributions from inverter based generation and the types of models and methods needed for studying special cases such as subsynchronous torsional interactions between wind turbine and series compensation. Also, there will be discussions on modeling needs for studying wind and PV integration into systems with very low short circuit levels. The tutorial will be of interest to system planner, operators, wind and PV plant developers, research entities and other stakeholders in the power and energy industry.

**Distribution System Modeling, Automation, Management and Advanced Applications**

**Date:** Tuesday, 28 July  
**Time:** 8:00 AM – 5:00 PM  
**Price:**  
Regular US$395  
Student Regular US$150  

**Instructors:** Jiyuan Fan, Southern States LLC; John D McDonald, P.E, Digital Energy, GE

This course introduces the intuitive concepts, fundamental theories, practical technologies on system modeling, automation management, including the core functionalities and real use cases of the integrated Distribution Automation/Distribution Management Systems (DA/DMS) and the advanced applications in Smart Distribution. The potential audience would include power system planning/operation engineers, project/ product managers, business leaders in power utilities, smart grid solution providers, system developers, research institutes, as well as individual researchers, college students and other individuals working on or interested in the Smart Distribution Solutions.

The course will cover the following break-down topics: Overall Framework and Architecture of DA/DMS Systems in Smart Distribution, Distribution System Modeling for automation and management, Static and Dynamic Data for DA/DMS, Advanced Real-time and Analytic Applications for Distribution System Opera-

**Smart Substations: Protection, Control, Communications, Wide Area Measurements, and Enterprise Applications**

**Date:** Tuesday 28 July  
**Time:** 8:00 AM – 5:00 PM  
**Price:** Regular US$395  
Student Regular US$150

**Instructors:** David Boroughs, Quanta Technology; Eric Udren, Quanta Technology

Which substation protection, control, and communications designs lead to integration that serves users across the utility enterprise? Modern protective relays, switchyard data acquisition units, data concentrators, and other intelligent electronic devices (IEDs) are the essential eyes and ears of smart substations. They collect information, protect and control apparatus, monitor equipment condition, and aggregate data for mission-critical and Smart Grid functions via serial or Ethernet communications networks. The data streams include synchrophasors for wide area monitoring, protection, automation, and control (WAMPAC). All of the substation measurements and communications comprise a platform for Smart Grid functions – the utility must plan how to use this platform effectively to realize operational and economic benefits.

The course explains the most recent advances in measurement technology, intelligent relays and IEDs, data communications, and substation integration design. Attendees get an overview of specific functions and implementations, plus practical guidance on how to take advantage of potential benefits. Topics include:

- Transmission versus Distribution Smart Grid Functions
- Trends in System Wide communications
- Wiring to LAN Evolution I – Ethernet & 61850
- Communications Transport Architectures
- Wiring to LAN II – GOOSE & Process Bus
- Communications Technologies & Applications
- Wide Area Protection Evolution
- Planning & optimizing Communications Networks
- Relaying Function Evolution – Line, Bus, Transformer, Circuit Breaker Protection

**Understanding Cascading Phenomenon: Methodologies and Industry Practice for Analysis of Cascading Failures**

**Date:** Wednesday 29 July  
**Time:** 8:00 AM – 5:00 PM  
**Price:** Regular US$395  
Student Regular US$150  
(Note: Free registration to this tutorial for first 20 students courtesy of V&R Energy.)

**Instructors:** Marianna Vaiman, V&R Energy; Bob Cummings, NERC; Ian Dobson, Iowa State University; Michael Forte, Con Edison of New York; Paul Hines, University of Vermont; Mladen Kezunovic, Texas A&M University; Eugene Litvinov, ISO New England; Vahid Madani, Pacific Gas & Electric; Damir Novosel, Quanta Technology; Milorad Papic, Idaho Power Company; Ryan Quint, Dominion Virginia Power; Dede Subakti, California ISO; Vladimir Terzija, University of Manchester; Vijay Vittal, Arizona State University; Brett Wangen, Peak Reliability

Cascading failures present severe threats to power grid reliability and security, and thus reducing their likelihood, and timely detection, mitigation and prevention of cascades are of significant importance, and believed to be one of the greatest challenges in power grids today. This tutorial developed by the IEEE Cascading Failure Working Group provides an overview of the cascading phenomenon and explains methods, technologies, and tools that are currently being used to predict, detect, mitigate and restore from cascading failures. This is the first PES GM tutorial dedicated solely to the subject of cascading outages.

This full day tutorial covers the power system cascading concepts, models, relevant standards and existing industry practices for analysis of cascading failures in planning and operating environments. Close attention is given to the new technologies, such as synchrophasor technology, for better detection and mitigation of cascading outages. The tutorial also explains the root causes and mechanisms of propagation of the past blackouts, and discusses the lessons learned. The tutorial, taught by well recognized experts from industry and academia, is intended for power system engineers, regulators, transmission owners, power engineering students and academics. Topics include:
Overview of Cascading Outages Phenomenon
Framework for Analysis of Cascading Outages
Current Tools and Emerging Technologies for Prediction and Detection of Cascading Outages
Current Tools and Emerging Technologies for Prevention and Mitigation of Cascading Outages
Industry Experience in the Analysis of Cascading Outages
Restoration from Cascading Failures
Analysis of Past Blackouts Caused by Cascading Outages: Lessons Learned

Distribution Volt-var Control and Optimization
Date: Wednesday, 29
Time: 8:00 AM – 5:00 PM
Price:
- Regular US$395
- Student Regular US$150

Instructors:
- Murty V.V.S. Yalla, Beckwith Electric Co Inc
- Bob Uluski, Utility Integration Solutions
- Mike Simms, Duke Energy
- Valentina Dabic, B.C. Hydro
- Larry Conrad, Conrad Technical Services
- Mesut Baran, North Carolina State University
- Barry Stephens, Georgia Power
- Phil Powell, Dominion Voltage Inc
- Borka Milosevic, GE Energy

The concept of Volt-var control is essential to electric power companies' ability to deliver power within appropriate voltage limits (regulated by Public Utility Commissions) so that consumers' equipment operates properly, and to deliver power at an optimal power factor to minimize distribution losses. The relationship between voltage and vars vary depending on the type of load (constant power, constant current, constant impedance), and the type, size, and location of distributed energy resources (photovoltaic, distributed wind, various storage technologies, etc.); among others. The complexity and dynamic nature of these characteristics make the task of managing electrical distribution networks challenging.

The smart grid concept has dramatically changed the design and operation of modern Volt-var control systems. The objectives for Volt-var Control have expanded considerably beyond simply maintaining acceptable voltage and power factor. "Volt-var Control" has become "Volt-var Optimization," which has the expanded objectives to increase overall efficiency, reduce electrical demand using conservation voltage reduction (CVR), promote energy conservation, and improve power quality.

Volt-var Optimization (VVO) systems must accommodate distributed energy resources (DERs), and must respond automatically when the status or output level of DERs changes. In addition, VVO systems must operate effectively following feeder reconfiguration, which will happen more frequently in a smart distribution grid due to optimal network reconfiguration, automatic service restoration, and other applications involving "smart" switching.

This tutorial will cover Volt-var control basic principles, terms and definitions, approaches, issues and challenges, and results observed. This course also presents case studies from GA power, BC Hydro and Duke Energy. This course will benefit engineers in operations, planning, smart grid, SCADA groups. It will be especially useful for utilities who are contemplating implementing Volt-var Optimization. Topics include:

- Introduction and Basics
- Volt-Var Control Technologies and Tradeoffs
- Volt-Var Control Coordination – Potential Issues and Solutions
- Volt-Var Optimization (VVO)/Conservation Voltage Reduction (CVR) Techniques
- Impact of High Penetration of Distributed Generation (DG) on the Volt Var Control
- Verification, Assessment and Monitoring Requirements for CVR
- Cost – Benefit Analysis of VVO
- Implementation of Volt-Var Control – Case Studies from Utilities

PHOTOGRAPHY

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<table>
<thead>
<tr>
<th>DAY / TIME / LOCATION</th>
<th>SESSION NAME AND DESCRIPTION</th>
<th>PG</th>
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</thead>
</table>
| Tuesday, 28 July 8:00 AM–12:00 PM Majestic Ballroom | **Late Breaking News**  
Breaking with tradition, the first half of this super session is unscripted, as we invite 3 industry editors to the table to talk about the very latest issues that face the industry. Rick Bush (T&D World), Marty Rosenberg (Penton Press) and Kathleen Davis (Intelligent Utility) will volley issue back and forth for the first 90 minutes of the session.  
The balance of the session will focus on the future of the grid and look at potential mega scale projects. Ultra High Voltage AC/DC, smart grid technology and clean energy are discussed as part of the future energy mix. Global vision, historical perspective, forward-looking thinking, and systematic methodology, with emphasis on coordinated development of energy and global politics, economy, society, and environment, macro management of energy resource development, allocation and utilization will be considered with examples.  
In this super-session, priorities for development of large energy bases at the North Pole and the Equator; construction of a global UHV backbone network; promotion of worldwide application of smart grid and enhancement of energy and power technology innovation will be demonstrated with examples.  
Co-moderating this portion of the session will be Dr Jun Yu is currently the Deputy Director General of the Department of International Cooperation of State Grid Corporation of China. Speakers will include:  
Ms Liping JIANG, State Grid Energy Research Institute, China  
Dr Ping Liang ZENG, Electric Power Research Institute  
Dr Wei-Jen LEE, University of Texas at Arlington, USA  
Dr Xiao-Ping ZHANG, University of Birmingham, UK  
Both halves of the session should provide eye opening opinions about the future of the industry and challenges we face.  
Moderating the session will be Doug Houseman from EnerNex, a member of the GridVision 2050, and QER teams for PES. |
| | **Changing Generation Assets and Their Impacts**  
In this super session, the following topics regarding the changing generation assets and their impacts will be discussed:  
- True Costs and Limitations of ‘Green’ Generation  
- Utilization of Residential Generation  
- Balancing Intermittent Generation With and Without Storage  
- Power Quality Issues Associated with PVs and Wind Generators  
- Challenges of Changing Fuel Mix  
- Planning, Operation, and Interaction of Gas and Electricity Infrastructures  
- Challenges in Power System Studies  
**Procurement and Integration of Renewables to Achieve California’s RPS Objective – Challenges and Opportunities**  
Ranbir Singh, SCE  
**Impacts of the Distributed Energy Resources onto the Distribution System Power Quality, Operation, and Protection**  
Babak Enayati, National Grid  
**2030 Long-Term Reliability Challenges of Variable Energy Resources (VERs)**  
Mark Lauby, NERC  
**Issues on Renewable (PV or Wind) Generation with Battery Energy Storage System: Modeling, Simulation and Application**  
Xiaokang Xu, S&C  
**Cost of Integrating Variable Generation**  
Sundar Venkataraman, GE  
**Planning for the Changing Grid in ERCOT**  
Warren Lasher, ERCOT | 141 |
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Session Title</th>
</tr>
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| Wednesday, 29 July | 8:00 AM–12:00 PM | Majestic Ballroom | **Future Economics of the Grid**  
- Dr. Joseph H. Eto, Lawrence Berkeley National Laboratory  
- Professor Richard Green, Imperial College London  
- Dr. Eugene Litvinov, ISO New England  
- Dr. Lorenzo Kristov, California ISO  
- Prof. Chongqing Kang, Tsinghua University  
- Prof. Ben Hobbs, Johns Hopkins University  
- Prof. Frank Wolak, Stanford University |
| Wednesday, 29 July | 1:00–5:00 PM   | Majestic Ballroom | **DC in an AC World**  
**IEEE DC@Home Initiative**  
Doug Houseman, VP Innovation, Enernex  
**Emerge Alliance Mission and Work**  
Paul Savage, CEO Nextek Power and Emerge Alliance Board Member  
**HVDC Grids – The European Perspective**  
Mike Basler, Basler Electric, Chair, EDPG  
**Solid State Transformers and How They Will Converge DC and AC Power Systems**  
Dr. Alex Huang, NCSU  
**Coordinating Control of AC and DC Microgrids**  
Rajendra Singh, IEEE Fellow, White House Champion of Change for Solar Deployment, Professor, Clemson University and  
Dr. G. Kumar Venayagamoorthy, Duke Energy Distinguished Professor, Clemson University  
**DC Lessons from the Data Center Power World**  
Luke Dalske, National Data Center Solutions Sales, Schneider Electric (invited – discussing)  
**DC Technology Advancements & Innovation**  
Dr Bartosz Wojszczyk, CEO Decision Point Global |
| Thursday, 30 July  | 8:00 AM–12:00 PM | Majestic Ballroom | **Challenges in Asset Management**  
**Advanced Programs for System Renewal and Modernization**  
Susan Henderson, P.E., Xcel Energy  
**Establishing Metrics for Asset Management**  
Tony McGrail, Doble Engineering Company  
**Implications and Importance of Aging Infrastructure**  
William Williams, Black and Veatch Consulting  
**Asset-Centric Energy Management and Situational Awareness**  
Salman Mohagheghi, Ph.D., Colorado School of Mines  
**Online Noise Analysis for System Health Monitoring and Prognostics**  
Keith Holbert, Nuclear Power Generation Program, School of Electrical, Computer and Energy Engineering  
**Electric Vehicle Grid Integration: Vehicles, Renewables, and Buildings Working Together**  
Tony Markel, Senior Engineer, Electric Vehicle Grid Integration at National Renewable Energy Laboratory |
### Administrative Committees

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Time</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>Regions 1-7 Chapter Chairs Meeting</td>
<td>Su</td>
<td>8:00 A</td>
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<tr>
<td>IEEE PES Scholarship Plus Initiative</td>
<td>Su</td>
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<td>Plaza Court 2</td>
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<tr>
<td>Women in Power Advisory Board Meeting</td>
<td>Su</td>
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<tr>
<td>Regions 1-7 Chapter Chairs Meeting (Lunch)</td>
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<td>IEEE Smart Grid Strategic Planning Meeting</td>
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<td>ISGT Steering Committee</td>
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<td>Power Africa Steering Committee Meeting</td>
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<td>APEEC Conference Meeting</td>
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<td>INTELECT Committee Meeting</td>
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<tr>
<td>Technical Council, Operation &amp; Procedures Committee</td>
<td>Tu</td>
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<tr>
<td>Chapters Leadership Meeting</td>
<td>Tu</td>
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<tr>
<td>Meetings Department Executive Committee</td>
<td>Tu</td>
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<tr>
<td>Chapters Leadership Luncheon and Awards Presentation</td>
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<tr>
<td>Transactions on Power Systems Editorial Board</td>
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<td>Technical Council,Technical Sessions Committee</td>
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<td>Transactions on Sustainable Energy Editorial Board Meeting</td>
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<td>Electrification Magazine Editorial Board Meeting</td>
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<td>Information Session for Authors and Reviewers of IEEE PES Journals</td>
<td>Tu</td>
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<td>PES Major Awards Committee and PES Technical Committee Awards Meeting</td>
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<td>Transactions on Energy Conversion Editorial Board</td>
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<td>Power and Energy Technology Systems Journal Editorial Board Meeting</td>
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<td>Technical Council, Standards Coordination Committee</td>
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<td>Publications Board Meeting</td>
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<td>Web Presence Committee Meeting</td>
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<td>Governing Board Meeting</td>
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### Electric Machinery Committee

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<tr>
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<tr>
<td>EMC WG-10, Revision for IEEE 112 Test Procedures for Polyphase IM&amp;G</td>
<td>Su</td>
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### Committee and Other Entity Meetings, continued

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<thead>
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<tr>
<td>EMC WG 8 Meeting: IEEE Std C50.13</td>
<td>Su</td>
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<td>EMC Grid Long Range Planning</td>
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<td>EMC Generator Subcommittee Meeting</td>
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<td>EMC Renewable Energy Machines &amp; Systems Subcommittee Meeting</td>
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<td>EMC Motor Subcommittee Meeting</td>
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<td>Technology Roadmap for Large Electrical Machines</td>
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<td><strong>Energy Development and Power Generation Committee</strong></td>
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<td>HEP – Governor Task Force</td>
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<td>IPSC Chinese Electricity Infrastructure WG</td>
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<td>IPSC Distributed Generation WG</td>
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<td>IPSC Latin America Infrastructure WG</td>
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<tr>
<td>HEPSC – Guide for Electrical &amp; Control Design of Hydroelectric Water Conveyance Facilities (1827)</td>
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<td>EDPGC Renewable Technologies Subcommittee</td>
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<td>RTSC – Electric Vehicles WG</td>
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<td>RTSC – Photovoltaics WG</td>
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<td>EDPG Felows</td>
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<tr>
<td>IPSC Asian and Australian Infrastructure WG</td>
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<td>EDPG Award Working Group</td>
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<tr>
<td>EDPG Climate Change Technologies SC, P1595 WG, T&amp;D Energy Efficiency WG</td>
<td>Tu</td>
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<tr>
<td>ES&amp;CSC WG: Combo Session on Performance and Modeling</td>
<td>Tu</td>
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<tr>
<td>HEPSC – Guide for Comissioning of Electrical Systems in Hydroelectric Power Plants (1248)</td>
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<td>HEPSC – Guide for Rehabilitation of Hydroelectric Power Plants (1147)</td>
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<td>ESCSC Equipment WG</td>
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<td>HEPSC – 1010</td>
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<td>IPSC Europe Electricity Infrastructure WG</td>
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<td>ES&amp;CSC TF: Field Discharge</td>
<td>Tu</td>
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<td>Tu</td>
<td>5:00 P - 6:00 P</td>
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<td>IPSC Africa Electricity Infrastructure WG</td>
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<td>8:00 A - 9:00 A</td>
<td>Capitol</td>
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<td>EDPG AdCom</td>
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<td>8:00 A - 10:00 A</td>
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<td>HEPSC – Plant Condition Monitoring Task Force</td>
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<tr>
<td>EDPG Station Design &amp; Control Subcommittee</td>
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<td>11:00 A - 12:00 P</td>
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<td>EDPGC HydroElectric Power Subcommittee</td>
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<td>ES&amp;C Subcomittee</td>
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<td><strong>Intelligent Grid Coordinating Committee</strong></td>
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<td>Intelligent Grid Coordinating Committee</td>
<td>M</td>
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<td>Gold</td>
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<tr>
<td><strong>Marine Systems Coordinating Committee</strong></td>
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<td>Marine Systems Coordinating Committee</td>
<td>Tu</td>
<td>1:00 P - 2:00 P</td>
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## Committee and Other Entity Meetings, continued

### Power & Energy Education Committee

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<th>Sub委员会</th>
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<tr>
<td>PEEC Research Subcommittee</td>
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<td>PEEC Career Promotion and Workforce Development Sub委员会</td>
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<td>PEEC Fellows Working Group</td>
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<td>PEEC Student Meetings Subcommittee</td>
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<tr>
<td>Australian Universities Power Engineering Professors</td>
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<td>PEEC Awards Sub委员会</td>
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### Power System Analysis, Computing, and Economics Committee

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<td>PSACE WG on Test Case Coordination</td>
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<tr>
<td>WG on Prize Paper Awards Nomination</td>
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<td>PSACE WG on Awards</td>
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<tr>
<td>Power System Analysis, Computing, and Economics Committee</td>
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### Computer and Analytical Methods Subcommittee

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<td>CAMS TF on Power System Modeling in CIM</td>
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<td>CAMS TF on Cyber Security in Power Systems</td>
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<td>CAMS WG on the Understanding, Prediction, Prevention and Restoration of Cascading Failures</td>
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<td>CAMS WG on Test Systems</td>
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<td>2:00 P - 3:00 P</td>
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<td>CAMS Computer and Analytical Methods Sub委员会</td>
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<td>3:00 P - 4:00 P</td>
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<td>CAMS TF on Open Source Software</td>
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<td>1:00 P - 2:00 P</td>
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<tr>
<td>CAMS TF Big Data Driven Analytics for Smart Grid Operations</td>
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<td>2:00 P - 4:00 P</td>
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<td>CAMS TF on High Performance Computing for Grid Analysis and Operation</td>
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### Distribution System Analysis Sub委员会

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<tr>
<td>DSA WG on Test Feeders</td>
<td>Tu</td>
<td>9:00 A - 10:00 A</td>
<td>Tower Court D</td>
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<tr>
<td>DSA WG on State Estimations for Distribution Systems</td>
<td>Tu</td>
<td>10:00 A - 11:00 A</td>
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### Intelligent Systems Sub委员会

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<tr>
<td>ISS WG on Intelligent Data Mining and Analysis</td>
<td>M</td>
<td>12:00 P - 1:00 P</td>
<td>Vail</td>
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<tr>
<td>ISS WG on Modern Heuristic Optimization</td>
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<td>1:00 P - 2:00 P</td>
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<tr>
<td>ISS TF on Micro-Grid Control Systems</td>
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<td>ISS WG on Intelligent Control Systems</td>
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<td>2:00 P - 3:00 P</td>
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<tr>
<td>ISS TF on Agent-based Modeling</td>
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<td>2:00 P - 3:00 P</td>
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<tr>
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<td>Tu</td>
<td>11:00 A - 1:00 P</td>
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### Committee and Other Entity Meetings, continued

#### Risk, Reliability and Probability Applications Subcommittee

<table>
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<tr>
<td>RRPA TF on Reliability Consideration in Emerging Cyber-Physical Electrical Energy Systems</td>
<td>M</td>
<td>1:00 P</td>
<td>Beverly</td>
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<tr>
<td>RRPA WG on LOLE Best Practices Planning Session</td>
<td>M</td>
<td>3:00 P</td>
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<tr>
<td>RRPA WG on Probability Application for Common Mode Events in Electric Power Systems (PACME)</td>
<td>Tu</td>
<td>9:00 A</td>
<td>Beverly</td>
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<tr>
<td>Reliability, Risk and Probability Applications Subcommittee</td>
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#### System Economic Systems Subcommittee

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<td>SES WG on Prize Paper Award Nomination</td>
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<td>SES WG on Sustainable Electricity Systems for Developing Countries</td>
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<td>SES WG on Network Charging</td>
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#### Power System Communications Committee

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#### Power System Dynamic Performance Committee

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### Committee and Other Entity Meetings, continued

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### Power System Instrumentation and Measurements Committee

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<td>System Operation and Control Center SubCOM</td>
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### Power System Planning and Implementation Committee

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<td>Integrated Intelligent Customer System Planning WG Combo Session</td>
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### Substations Committee

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<td>TF2 of WG I8 Design Tools for PEBB Based Systems</td>
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<td>WG I9 Modern Protection SVC</td>
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<td>Gen Sys – TF on Portable Data &amp; Modeling for Electromagnetic Transient Analysis Programs</td>
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<td>4:00 P</td>
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<td>Gen Sys – TF on Transformer Model for Low Frequency Studies</td>
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<td>Gen Sys – TF on Modeling of Induction Machines</td>
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<td>Gen Sys – WG on Modeling and Analysis of System Transients Using Digital Programs</td>
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<td>Gen Sys – Geomagnetic Induced Currents WG</td>
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### HVDC & FACTS Subcommittee

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### Integration of Renewable Energy into the Transmission & Distribution Grids Subcommittee

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<tr>
<th>C17 – Joint Working Group on Wind Plant Short-Circuit Contributions</th>
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<td>Wind and Solar Plant Collector Design Working Group</td>
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<td>Wind Farm Collector System Grounding for Personal Safety Task Force</td>
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## Overhead Lines Subcommittee

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<td>TF – Line Ratings – Risk &amp; Prediction</td>
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<td>Fiberglass Components TF</td>
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<td>Composite Components – 101</td>
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<td>W.G. on T&amp;D Corrosion Management – 15.11.12</td>
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<td>W.G. on Corona &amp; Field Effects – 15.11.11</td>
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<td>W.G. on Insulator Performance and Applications – 15.11.14</td>
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<td>TC36 TAG TF</td>
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<td>ANSI C29 TF</td>
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## Power Quality Subcommittee

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<td>PQ – TF on Transfer of Power Quality Data (1159.3)</td>
<td>M</td>
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<td>PQ – Power Quality Disturbances Analytics WG</td>
<td>M</td>
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<td>PQ – Power Quality Interest Group</td>
<td>Tu</td>
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<td>PQ – SCC22 Power Quality Standards Coordination Committee</td>
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<td>Tu</td>
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<td>PQ – Issues with Grid Modernization Technologies WG</td>
<td>Tu</td>
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<td>PQ – International Conference on Harmonics and Quality of Power (ICHQP) Executive Committee</td>
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<td>PQ – Harmonics WG (Probabilistic Aspects of Harmonics TF)</td>
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<td>PQ – Voltage Quality WG (1250)</td>
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### Committee and Other Entity Meetings, continued

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<td>PQ – CIGRE C4.24</td>
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### Wind and Solar Power Coordinating Committee

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<td>Task Force on Capacity Value of Solar Power</td>
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### Non-Committee

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<tr>
<td>Advisory and Editorial Board Meeting of CSEE JPES</td>
<td>Tu</td>
<td>5:00 P – 7:00 P</td>
<td>Columbine</td>
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<td>Power Professionals From India</td>
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**MONDAY, JULY 27, 2015**

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<td>ISS WG on Multi-Agent Systems</td>
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<td>PL Other North America Chinese Power Professional Association: Social Event</td>
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**TUESDAY, JULY 28, 2015**

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<th>Time</th>
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<td>COM PSDP PSDP Working Group on Dynamic Security Assessment</td>
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<td>COM T&amp;D Volt/Var Task Force</td>
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<td>PL PSO The Pathway for Sychrophasors into Control Centers</td>
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<td>PL T&amp;D Experiences and System Requirements for Power Quality Data Analytics</td>
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<td>T&amp;D</td>
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<td>Admin</td>
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Meeting at a Glance by Day, continued...
### Meeting at a Glance by Day, continued

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<td>REC</td>
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<td>Dinner</td>
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### WEDNESDAY, JULY 29, 2015

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<td>PSACE Admin Meeting</td>
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<td>Operations Method Subcommittee Meeting</td>
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<td>Capacitor discharge Limitation Application Paper TF</td>
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<td>HVDC &amp; FACTS- Education and HVDC and FACTS Bibliography (WG 15.05.14 &amp; WG 15.05.17)</td>
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<td>Admin Power Systems Reliability and Planning</td>
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<td>EDPG HVDC Grids – The European Perspective</td>
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<td>PSIM PSIM Main Committee Meeting</td>
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<td>PSDP Impact of Renewable Energy Integration on Voltage Control Design</td>
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<td>T&amp;D Gen Sys – General System Subcommittee</td>
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<td>PL PSACE CAM</td>
<td>The Computation of Dynamic Transfer Limits with Contingencies and Remedial Action Schemes in Real Time and Look Ahead Modes</td>
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<td>Need for Policy Level Changes to Encourage Participation in Reactive Power Market, Reactive Power Investment and Reactive Power Control</td>
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<td>Modeling and Computer Simulation of Induction Machines for Transient Analysis</td>
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<td>COM EDPG</td>
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<td>COM T&amp;D</td>
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<td>PSDP Task Force on Contribution to Bulk System Control and Stability by Distributed Energy Resources connected at Distribution Networks</td>
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<td>1:00 PM</td>
<td>PL T&amp;D</td>
<td>Volt/VAR Control in the Era of the Smart Grid</td>
<td>Plaza Court 1</td>
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<tr>
<td>1:00 PM</td>
<td>PL PSACE CAM</td>
<td>Using Big Data to Enhance Transmission System Planning and Operations</td>
<td>Governor's Square 12</td>
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<tr>
<td>1:00 PM</td>
<td>PL PSO</td>
<td>Cloud Computing for Power System Analysis and Operations</td>
<td>Governor's Square 14</td>
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<tr>
<td>1:00 PM</td>
<td>TR-P T&amp;D</td>
<td>Transmission and Distribution Paper Session II – T16</td>
<td>Plaza Court 5</td>
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<tr>
<td>1:00 PM</td>
<td>TR-P PSACE</td>
<td>PSACE Transactions Paper Session – T3</td>
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<td>1:00 PM</td>
<td>TR-P ETC</td>
<td>Emerging Technologies Transactions Session – T24</td>
<td>Governor's Square 11</td>
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<tr>
<td>1:00 PM</td>
<td>PL Admin</td>
<td>Technical Committee Reorganization Town Hall Smart Buildings, Loads and Customer Systems</td>
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<tr>
<td>1:00 PM</td>
<td>COM EM</td>
<td>EMC Motor Subcommittee Meeting</td>
<td>Tower Court A</td>
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<tr>
<td>1:00 PM</td>
<td>PF Admin</td>
<td>Electric Vehicles and Photovoltaics</td>
<td>Plaza Ballroom BE</td>
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<tr>
<td>1:00 PM</td>
<td>PF Admin</td>
<td>Wind Power and Applications</td>
<td>Plaza Ballroom CF</td>
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<tr>
<td>Time</td>
<td>Time</td>
<td>Location</td>
<td>Event Description</td>
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<td>WP</td>
<td>Wind Turbine-Generator Performance on Weak Grids Part 2: Analytical Methods and Solutions for Weak Grid Interactions</td>
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<td>PL</td>
<td>University-Industry Initiative in Resource Creation for Power Engineering Education and Research Training</td>
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<td>1:00 PM</td>
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<td>Integrated Resource Planning Considering Gas and Water Constraints</td>
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<td>Challenges of Renewable Integrations: Flexible Products and Long/Short-Term Market Design</td>
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<td>1:00 PM</td>
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<td>Collaborative Centers on Renewable Energy at Colorado Universities</td>
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<td>Global Energy Forecasting Competition 2014: Finalist Presentations</td>
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<td>PL</td>
<td>Experience on Smart Grid Applications in Asia &amp; Australasia</td>
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<td>1:00 PM</td>
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<td>Smart Village Information Session</td>
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<td>T&amp;D OHL Subcommittee Meeting</td>
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<td>1:30 PM</td>
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<td>COM</td>
<td>T&amp;D ESMOL Subcommittee Meeting</td>
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<tr>
<td>1:30 PM</td>
<td>3:00 PM</td>
<td>PL</td>
<td>Student Job Fair</td>
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<tr>
<td>1:30 PM</td>
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<td>COM</td>
<td>Capacitor Subcommittee Meeting</td>
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<td>1:30 PM</td>
<td>4:00 PM</td>
<td>COM</td>
<td>Distribution Subcommittee Meeting</td>
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<td>1:30 PM</td>
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<td>COM</td>
<td>HVDC &amp; FACTS Subcommittee Meeting</td>
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<tr>
<td>2:00 PM</td>
<td>4:00 PM</td>
<td>COM</td>
<td>PSDP ES&amp;C Subcommittee Meeting</td>
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<tr>
<td>2:00 PM</td>
<td>4:00 PM</td>
<td>COM</td>
<td>Review of IEEE Std. 1122_ Digital Recorders for Measurements in High-Voltage Impulse Tests, and its comparison with IEC 61083-1</td>
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<td>2:00 PM</td>
<td>6:00 PM</td>
<td>COM</td>
<td>T&amp;D OHL / ESMOL Joint Meeting</td>
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<tr>
<td>3:00 PM</td>
<td>5:00 PM</td>
<td>PL</td>
<td>Review of IEEE Std. 1122_ Digital Recorders for Measurements in High-Voltage Impulse Tests, and its comparison with IEC 61083-1</td>
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<td>3:00 PM</td>
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<td>OHL / ESMOL Joint Meeting</td>
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<td>3:00 PM</td>
<td>5:00 PM</td>
<td>COM</td>
<td>Publications Board Meeting</td>
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<td>3:00 PM</td>
<td>5:00 PM</td>
<td>COM</td>
<td>Web Presence Committee Meeting</td>
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<tr>
<td>3:00 PM</td>
<td>5:00 PM</td>
<td>PL</td>
<td>Applications of IEEE Std 1564-2014 for Voltage Sag Indices</td>
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<tr>
<td>3:00 PM</td>
<td>5:00 PM</td>
<td>PL</td>
<td>Stochastic Scheduling vs. Smart Reserve Requirements: Which Will Win the Race?</td>
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<tr>
<td>3:00 PM</td>
<td>5:00 PM</td>
<td>PL</td>
<td>Distributed Control and Intelligence for Future Power System Networks</td>
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<tr>
<td>3:00 PM</td>
<td>5:00 PM</td>
<td>TR-P</td>
<td>Transmission and Distribution Paper Session III – T17</td>
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<tr>
<td>3:00 PM</td>
<td>5:00 PM</td>
<td>TR-P</td>
<td>Electric Machinery Transactions Session 01</td>
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<td>3:00 PM</td>
<td>5:00 PM</td>
<td>TR-P</td>
<td>PSACE Transactions Paper Session – T4</td>
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<tr>
<td>5:00 PM</td>
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<td>COM</td>
<td>HVTT Subcommittee Meeting</td>
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<tr>
<td>5:00 PM</td>
<td>6:00 PM</td>
<td>COM</td>
<td>PSACE RRA Review of IEEE Std. 1122_ Digital Recorders for Measurements in High-Voltage Impulse Tests, and its comparison with IEC 61083-1</td>
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<td>5:00 PM</td>
<td>7:00 PM</td>
<td>COM</td>
<td>PSDP ADComm Meeting</td>
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<td>5:00 PM</td>
<td>7:00 PM</td>
<td>COM</td>
<td>North American Chinese Power Professionals Association Panel Session for SGEPRI</td>
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<tr>
<td>5:30 PM</td>
<td>7:30 PM</td>
<td>COM</td>
<td>IPSC Subcommittee Meeting</td>
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</tr>
<tr>
<td>6:00 PM</td>
<td>7:00 PM</td>
<td>COM</td>
<td>Other Power Professionals From India</td>
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### Meeting at a Glance by Day, continued

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
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<tbody>
<tr>
<td>6:00 PM - 7:30 PM</td>
<td>REC Admin</td>
<td>PES Young Professionals Seminar and Networking Reception</td>
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### THURSDAY, JULY 30, 2015

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:00 AM - 10:00 AM</td>
<td>COM T&amp;D</td>
<td>W.G. on Design &amp; Construction of Overhead Lines – 15.11.03/04/05</td>
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<tr>
<td>8:00 AM - 10:00 AM</td>
<td>PL PSO</td>
<td>Flexible Operation Scheduling and Its Economic Impacts on Markets</td>
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<tr>
<td>8:00 AM - 10:00 AM</td>
<td>PL PSACE IS</td>
<td>Benchmarking Challenges and Test Systems for Intelligent Control and Management</td>
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<tr>
<td>8:00 AM - 11:00 AM</td>
<td>COM T&amp;D</td>
<td>Transmission and Distribution Administrative Subcommittee</td>
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<tr>
<td>8:00 AM - 11:00 AM</td>
<td>COM EDPG</td>
<td>EDPG – All (Committee)</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>COM EM</td>
<td>EMC Main Committee Meeting</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>COM PSPI</td>
<td>Integrated Intelligent Customer System Planning WG Combo Session</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>PF Admin</td>
<td>Renewable Energy Storage</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>PF Admin</td>
<td>HVDC Systems and AC Transmission Lines</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>PL T&amp;D</td>
<td>Lessons Learned from the Smart Grid Demonstration Projects</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>PL EDPG</td>
<td>Transmission System Security and Blackout Prevention</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>PL LOC</td>
<td>Workforce Development for Renewable Energy and Power Systems</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>PL PSPI</td>
<td>Advanced Applications of Dispatchable DER in a Smart Grid Environment</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>PL PSACE RRA</td>
<td>Industrial Resource Adequacy Studies: Current Practices and Research Needs</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>SS SS</td>
<td>Challenges in Asset Management</td>
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<tr>
<td>8:00 AM - 12:00 PM</td>
<td>Tutorial Other</td>
<td>Smart Grid 204: Introduction to Smart Grid Data and Analytics</td>
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<tr>
<td>8:00 AM - 5:00 PM</td>
<td>Tutorial Other</td>
<td>Transmission System</td>
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<tr>
<td>9:00 AM - 12:00 PM</td>
<td>COM PSDP</td>
<td>PSDP Committee Meeting</td>
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<tr>
<td>10:00 AM - 12:00 PM</td>
<td>COM T&amp;D</td>
<td>W.G. on T&amp;D Overhead Line Structural Materials &amp; Hardware – 15.11.08/10</td>
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<td>10:00 AM - 12:00 PM</td>
<td>PL PSO</td>
<td>Effects of Contract Design on Electricity Market Performance with Increased Penetration of Distributed Energy Resources and Variable Generation</td>
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<td>10:00 AM - 12:00 PM</td>
<td>PL EDPG</td>
<td>Ice-Breaking Projects in Power Systems</td>
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<tr>
<td>12:00 PM - 1:00 PM</td>
<td>COM PSO</td>
<td>Task Force Meeting on Bulk Power System Operations with Variable Generation</td>
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<td>1:00 PM - 2:00 PM</td>
<td>COM PSDP</td>
<td>PSDP Task Force on Adjustable Speed Pump Pumped Storage Modeling</td>
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<tr>
<td>1:00 PM - 2:00 PM</td>
<td>COM T&amp;D</td>
<td>Integration of Renewable Energy Into the Transmission &amp; Distribution Grids Subcommittee</td>
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<td>1:00 PM - 2:30 PM</td>
<td>COM T&amp;D</td>
<td>W.G. on Corona &amp; Field Effects D.15.11.11</td>
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<td>1:00 PM - 3:00 PM</td>
<td>COM PSDP</td>
<td>PSDP Working Group on Voltage Stability</td>
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<tr>
<td>1:00 PM - 3:00 PM</td>
<td>PL EDPG</td>
<td>Stochastic Operation and Planning Considering Renewable Integration</td>
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<td>1:00 PM - 5:00 PM</td>
<td>COM PSPI</td>
<td>Asset Management WG Combo Session</td>
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<td>1:00 PM - 5:00 PM</td>
<td>COM EM</td>
<td>Technology Roadmap for Large Electrical Machines</td>
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<tr>
<td>1:00 PM - 5:00 PM</td>
<td>COM Admin</td>
<td>Governing Board Meeting</td>
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<tr>
<td>1:00 PM - 5:00 PM</td>
<td>PF Admin</td>
<td>Distributed Energy Resources and Demand Response</td>
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<tr>
<td>1:00 PM - 5:00 PM</td>
<td>PF Admin</td>
<td>Smart Grid, Microgrids and DC Systems</td>
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<tr>
<td>1:00 PM - 5:00 PM</td>
<td>PL PSACE RRA</td>
<td>Demand Response for Reliable Integration of Variable Renewable Energy</td>
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<tr>
<td>Time</td>
<td>Session Type</td>
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<td>1:00 PM</td>
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<td>2:30 PM</td>
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<td>3:00 PM</td>
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<td>EDPG</td>
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**FRIDAY, JULY 31, 2015**

<table>
<thead>
<tr>
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<th>Topic</th>
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<td>7:00 AM</td>
<td>COM</td>
<td>Admin</td>
<td>Governing Board Meeting</td>
<td>Director's Row H</td>
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<tr>
<td>8:00 AM</td>
<td>COM</td>
<td>T&amp;D</td>
<td>TC36 TAG TF</td>
<td>Governor's Square 17</td>
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<tr>
<td>9:00 AM</td>
<td>COM</td>
<td>T&amp;D</td>
<td>ANSI C29 TF</td>
<td>Governor's Square 17</td>
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</table>

TR-P = Transactions Paper Session; PL = Panel Session; PF = Paper Forum; T= Tutorial; COM = Committee Meeting; COMBO = Combination meeting; PO = Poster Session; SS = Super Session
Sunday Morning

Energy Storage: An Introduction to Technologies, Applications and Best Practices (tutorial)

Sunday, 26 July, 8:00 AM–12:00 PM

Sponsored by: IEEE Power & Energy Society

INSTRUCTORS:
H. ZAREIPOUR, University of Calgary
M. CW KINTNER-MEYER, PNNL
S. LAHAIRI, DNV GL Energy

Energy storage is becoming an attracting solution for today’s smart grid, either being operated independently as asset or interacting with other resources like wind/solar generation or demand response. This tutorial is a half-day course to provide participants a solid understanding on the basics and the state-of-the-art energy storage application, its implications on the grid’s reliability and the system’s economics and how-to on evaluating its performance and cost-benefit. Instructors with diverse background on this subject will bring the field deployment experience of energy storage applications and the real-world example to demonstrate the analytic tools in assisting the utility planning and operation decisions. The course is suitable for non-technical, as well as technical audiences, including regulatory, legislative, and utility staff members. Topics include:

- Basics of Energy Storage and Potential Applications for Power System
- Energy Storage Application: Operation and Planning
- Energy Storage Application: Market and Economics
- Tools to Evaluate Energy Storage Performance

Intelligent Systems Support for Transactive Energy Systems: The Fundamentals (tutorial)

Sunday, 26 July, 8:00 AM–12:00 PM

Sponsored by: IEEE Power & Energy Society

INSTRUCTORS:
K. KOK, TNO, The Netherlands
S. WIDERGREN, PNNL
L. TESFATSION, Iowa State University

Recently, Transactive Energy (TE) Systems have gained great interest in the Power and Energy community. TE approaches optimize the operation of distributed energy resources through market-based transactions between participants. TE systems have shown to improve the match between (local) electricity consumption and the (local) production and, by doing so, (i) improve the integration of renewable energy generation and (ii) solve local overloading in distribution networks. As we move to integrate thousands and millions of distributed energy resources, de-centralized, transactive approaches are becoming increasingly important because of their scalability and robustness. Further, the ability to encourage fair compensation for services rendered is an important aspect. Distributed multi-objective optimization, e.g. using multi-agent systems (MAS) technology, is key to building scalable transactive systems as past experiences have shown. In this tutorial, pioneering transactive energy researchers from both sides of the Atlantic give an overview of the principles and concepts behind transactive energy and give insight in the most important transactive energy implementations available. Topics include:

- Drivers and Fundamentals
- Implementations, Field Experiences and Developmental Guidelines
IEEE Smart Village Workshop Focused on Its Mission to Build Toward Sustainability in Off Grid Communities (panel)

Sunday, 26 July, 8:00 AM–4:00 PM                         Posner Center (off site location) – IEEE Global Classroom

Sponsored by:             IEEE PES

SCHEDULE OVERVIEW:

IEEE Smart Village Ambassador and Entrepreneur Development
8:00 AM – 8:45 AM
IEEE Smart Village Mission, Vision and Business Model
Speaker:  R. LARSEN, SLAC National Accelerator Laboratory

8:45 AM – 10:45 AM
Integrative Approaches to Development Practices via the IEEE Global Classroom
Speaker:  D. WESSNER, Posner Center for International Development & Regis University

11:00 AM – 12:00 PM
Collaboration of University and Nonprofit through IEEE Smart Villages
Speaker:  H. LOUIE, Seattle University

1:00 PM – 1:30 PM
Benefits of Being a Smart Village Ambassador
Speaker:  N. P. KUMAR, NextEra Energy Resources – DG

1:30 PM – 2:45 PM
Opportunities for Smart Village Ambassador
Speaker:  R. PODMORE, Incremental Systems

3:00 PM – 4:00 PM
Post Graduate Research and IEEE Smart Village
Speaker:  P. DAUENHAUER, Strathclyde University

Smart Distribution Systems (tutorial)

Sunday, 26 July, 8:00 AM–5:00 PM                         Gold
Sponsored by:             IEEE Power & Energy Society

INSTRUCTORS:
L. CLARK, Alabama Power Company
A. PAHWA, Kansas State University
R. ULUSKI, UISOL
B. DEAVER, EPRI
ET. BOARDMAN, Alstom GRID
J. ROMERO AGUERO, Quanta Technology
G. GILCHRIST, Enernex
T. SAXTON, Xtensible Solutions

The concept of Smart Grid involves the complete chain of energy delivery from generation to the customers. Many of the smart grid applications will occur at the distribution level since this is where new communication infrastructure will enable new automation schemes, integration of distributed generation, and integration of customer systems with the operation of the power delivery system. This tutorial covers the most recent evolution of smart distribution applications and technologies involved in the smart distribution system. Important applications include traditional distribution automation functions along with advancements in Volt and Var Control, System Monitoring, Distribution Management Systems and Distributed resource integration. Telecommunication and Standards on Smart Distribution systems will also be part of the tutorial. Topics Include:

- Smart Distribution Systems Fundamentals
- Smart Distribution Systems
- Smart Distribution Circuit Automation
- Volt/VAR Control
- Smart Distribution Monitoring
- Integrated Distribution Management Systems
- Distributed Energy Resource Integration
- Smart Communications
- Smart Distribution Applications Integration
Energy Forecasting in the Smart Grid Era *(tutorial)*

**Sunday, 26 July, 8:00 AM–5:00 PM**

**Spruce**

**Sponsored by:** IEEE Power & Energy Society

**INSTRUCTORS:**
- T. HONG, University of North Carolina at Charlotte
- S. FAN, Monash University
- H. ZAREIPOUR, University of Calgary
- P. PINSON, Technical University of Denmark

Wide range deployment of smart grid technologies enables utilities to monitor the power systems and gather data on a much more granular level than ever before. While the utilities can potentially better understand the customers, design the demand response programs, forecast and control the loads, integrate renewable energy and plan the systems, etc., they are facing analytic issues with making sense and taking advantage of the “big data.”

This tutorial developed by IEEE Working Group on Energy Forecasting offers a comprehensive overview of energy forecasting to utility forecasters, analysts, planners, operators and their managers. The participants will learn the fundamentals and the state-of-the-art of load, price and wind forecasting through real world examples and case studies. Topics include:

- Fundamentals of Energy Forecasting
- Short-Term and Long-Term Electricity Demand Forecasting
- Price Forecasting in Competitive Electricity Markets
- Wind Power Forecasting in Theory and Practice

Smart Village Introduction Session *(information)*

**Sunday, 26 July, 10:00 AM–12:00 PM**

**Plaza Court 6**

**Sponsored by:** IEEE Smart Village

Stop by to learn more about the IEEE Smart Village Program

Sunday Afternoon

Fault Current Contributions from Wind Plants *(tutorial)*

**Sunday, 26 July, 1:00 PM–5:00 PM**

**Denver**

**Sponsored by:** IEEE Power & Energy Society

**INSTRUCTORS:**
- D. MILLER, PacifiCorp
- S. BRAHMA, New Mexico State University
- W. DILLING, Mortenson
- A. GOPALAKRISHNAN, Quanta Services
- C. HENVILLE, Henville Consulting
- J. NIEMIRA, S&C Electric
- R. WALLING, Walling Energy Systems Consulting

The safe, reliable operation of electrical power systems requires the ability to predict and model the sources of fault current, including contributions from wind powered generating plants, in order to select equipment properly rated, and to design and develop settings for the protection systems. Groups of wind turbine generators are clustered and networked to form wind plants. Several characteristics are unique to wind plants, but the most significant characteristic to the topic of this tutorial is the response of the wind turbine generators to faults on the power system. Wind turbine generators (WTG) must be able to tolerate rapid fluctuations in wind speed (turbulence and gusting). The traditional rigid mechanical and electrical coupling of the prime mover and a synchronous generator will not tolerate these fluctuations. There are WTGs of five basic types that can, in some cases with supplemental equipment, tolerate the fluctuations in the wind speed and deliver electrical power in the form that meets the requirements of the transmission system.

The tutorial and the report that it is based on covers the electrical design of wind plant, the theoretical and experimental performance during faults of the WTGs, the issues in specifying fault interrupting devices and designing protective relay systems for wind plants, the data necessary to model wind plants, and the results from the analysis of faults on wind plant interconnections.
GHG Emissions Standards for the Power & Energy Sector – Design and Application (tutorial)

Sunday, 26 July, 1:00 PM–5:00 PM              Century
Sponsored by:     IEEE Power & Energy Society

INSTRUCTORS:
J. McConnach, Independent Energy Consultant
R. W. Vesel, US-ABB
D. Doyle

There are a number of ISO and IEC standards for the quantification and recording of Greenhouse Gas (GHG) Emissions. Adapting these for specific uses by the electrical power and energy sector is desirable. The title of the IEEE-SA Standards Project P1595 is: “Standards for Designating and Quantifying Green Energy Projects in the Electricity Sector.” This standard will cover and define the rules for designation and quantification of electrical energy from “Green Technology” projects such as Wind and Solar.

The Tutorial will review existing ISO and IEC Standards to raise awareness of the design principles and application of these standards and how they can form the basis for developing P1595.

Smart Village Introduction Session II (information)

Sunday, 26 July, 2:00 PM–4:00 PM              Plaza Court 6
Sponsored by:     IEEE Smart Village

Stop by to learn about the IEEE Smart Village Program.

New Attendees Orientation (panel)

Sunday, 26 July, 3:00 PM–4:00 PM              Governor’s Square 14
Sponsored by:     IEEE Power & Energy Society

A short orientation session will familiarize first-time attendees with PES and the PES General Meeting. The session will provide an understanding of the various types of technical sessions, committee meetings, tutorials, technical tours and social events. At the end of the session, the newcomer should be able to navigate confidently through the General Meeting and obtain maximum value from the experience. The session will have a question and answer period.

Scholarship Plus Reception (reception)

Sunday, 26 July, 4:00 PM–6:00 PM              Pints Pub
Sponsored by:     IEEE PES

Sunday Evening

Welcome Reception (reception)

Sunday, 26 July, 6:30 PM–9:30 PM              Denver Art Museum
Sponsored by:     IEEE PES

Monday Morning

Attendee Breakfast (breakfast)

Monday, 27 July, 6:00 AM–7:30 AM              Plaza Exhibit

Presenter Breakfast (breakfast)

Monday, 27 July, 6:00 AM–7:30 AM              Grand Ballroom I
Poster Presenters Breakfast  *(breakfast)*

*Monday, 27 July, 6:00 AM–7:30 AM*  
Grand Ballroom II

PES Members Meeting  *(panel)*

*Monday, 27 July, 7:30 AM–9:00 AM*  
Plaza Ballroom BCEF  
Sponsored by:  
IEEE PES

PES President, Miroslav Begovic, will update the membership on various PES activities. Candidates for the offices of PES President Elect, PES Secretary and PES Treasurer will speak.

Plenary Session:  Powering Up the Next Generation  *(panel)*

*Monday, 27 July, 9:00 AM–11:30 AM*  
Plaza Ballroom BCEF  
Sponsored by:  
IEEE Power & Energy Society

Dr. Miroslav Begovic, President, IEEE Power & Energy Society

1ST PANEL – Next Generation Technology and Drivers

**Emerging Technologies**  
D. ARVIZU, Director, National Renewable Energy Laboratory

**International Game Changers**  
M. MCGRANAHAN, Vice President of Power Delivery and Utilization, Electric Power Research Institute

**Managing an Intelligent Grid**  
D. SUN, Chief Scientist, Alstom Grid

**Audience Q&A**  
Moderated by M. BEGOVIC, President, IEEE Power & Energy Society

2ND PANEL – Planning for and Operating the Next Generation Grid

**The Evolution of Rural Transmission**  
J. BLADO, Senior Vice President of Transmission, Tri-State Generation & Transmission Association, Inc.

**Obstacles and Opportunities in Transmission and Distribution**  
T. MOGENSEN, Senior Vice President, Transmission, Xcel Energy Services Inc.

**European Experiences – Issues and Solutions in Germany**  
M. BRAUN, Fraunhofer Institute for Wind Energy and Energy System Technology (IWES)

**Audience Q&A**  
Moderated by M. BEGOVIC, President, IEEE Power & Energy Society

CLOSING REMARKS FROM PES PRESIDENT

M. BEGOVIC, President, IEEE Power & Energy Society

CIGRE U.S. National Committee Luncheon  *(luncheon)*

*Monday, 27 July, 11:30 AM–2:00 PM*  
Grand Ballroom I  
Sponsored by:  
CIGRE

How to Write an Effective IEEE Fellow Nomination  *(panel)*

*Monday, 27 July, 11:30 AM–1:00 PM*  
Governor’s Square 17  
Sponsored by:  
IEEE Power & Energy Society  
Chair:  
M. CROW, Missouri Institute of Science and Technology

This presentation will give an overview of the IEEE Fellow nomination process. This webinar will discuss how to effectively organize the nomination packet to highlight the candidate’s contributions. Recommendations will be made regarding presentation of supporting evidence and how to best assess impact. Guidelines will be provided for letters of support and reference. The 30-minute presentation will be followed by a Q&A session with members of the IEEE and PES Fellows committees.
Monday Afternoon

**Marine Hydrokinetic (panel)**

*Monday, 27 July, 1:00 PM–5:00 PM*  
*Governor’s Square 16*

**Sponsored by:** Electric Machinery  
**Chair:** E. MULJADI, NREL

This panel covers diverse topics in Marine and Hydrokinetic (MHK) Generation (wave, tidal, and stream-based technologies) including the prime mover design, electrical energy conversion, control strategies, power plant planning (resource assessment) and operation, testing, and grid integration. Panelists will include representatives from research centers, universities, device manufacturers, project developers, and utilities from the international community. Panelists will present different perspectives of MHK generation during this panel session, with ample time allocated for discussion with the audience.

**PRESENTATIONS AND PANELISTS:**

- **15PESGM1014**, Overview of Global Ocean Energy Development  
  A. BAHAJ, University of Southampton, UK
- **15PESGM1015**, Permanent Magnet Direct-Drive Generator for Wave Energy Conversion  
  W. OUYANG, ABB
- **15PESGM1016**, Impact on Power Quality of Marine Energy Conversion Systems  
  A. BLAVETTE, SATIE, France
- **15PESGM1017**, Progress on Structured Innovation in Wave Energy Converter Technology Development  
  J. WEBER, NREL, US
- **15PESGM1018**, Operation of Doubly Fed Induction Generator in Ocean Wave Energy Conversion System by Stator Phase Sequence Switching  
  S. BHATTACHARYA, North Carolina State University
- **15PESGM1019**, A Hybrid Hydrokinetic-Diesel Energy Conversion System for Remote Applications  
  P. PILLAY, Concordia University, Canada
  M. LAWSON, NREL
- **15PESGM1020**, Multi-Step Forecasting of Wave Power Using  
  A. LAMADRID, Lehigh University
- **15PESGM1013**, Scaled Development of a Novel Wave Energy Converter Through Wave Tank to Utility-Scale Laboratory Testing  
  K. RHINEFRANK, Columbia Power Technologies  
  A. SCHACHER, Columbia Power Technologies  
  J. PRUDELL, Columbia Power Technologies  
  E. HAMMAGREN, Columbia Power Technologies  
  A. VON JOUANNE, Oregon State University  
  T. BREKKEN, Oregon State University

**Electrical Machines for Harsh Environments (panel)**

*Monday, 27 July, 1:00 PM–5:00 PM*  
*Plaza Court 8*

**Sponsored by:** Electric Machinery  
**Chairs:** K. HARAN, University of Illinois  
Y. DUAN, Aker Solutions

Advances in electrical machines and drives for harsh environments will be presented by experts in this area. Subsea motors and drives used in oil and gas industries are also presented. The latest technologies in these motors and drives will be presented by the panelists.

**PRESENTATIONS AND PANELISTS:**

- **15PESGM2815**, Motors for Subsea Pumps to Increase Oil Recovery  
  Y. DUAN, FMC Technologies
- **15PESGM2817**, Motors in Harsh Environments: Solid Rotor Canned Pump Motors  
  S. SALON, Rensselaer Polytechnic Institute
- **15PESGM2816**, Geothermal ESP for High-Temperature-High Volume Lifting  
  M. SHAH, GE Global Research
- **15PESGM2818**, Status Review of IPM Motor Drives for Electric Submersible Pump in Harsh Cold Oceans  
  M. RAHMAN, Memorial University of Newfoundland
Emerging G3 PLC: A Promising Technology (panel)

Monday, 27 July, 1:00 PM–3:00 PM
Plaza Court 4

Sponsored by: Emerging Technologies Coordinating Chair
N. HADJSAID, Grenoble-INP

PLC G3 is currently an emerging technology for not only being a carrier for exchanged information between new generation of smartmeters and DSO data concentrators but also for observability purposes with regards to distribution grids. When coupled to a T-pass Technology allowing transmission of information between primary and secondary sides of a distribution transformer, than it will be also used at the MV grid contributing thus to the collection of measurements at that level.

The Panel will discuss this emerging technology for DSO and vendors.

PRESENTATIONS AND PANELISTS:

- 15PESGM2960, Why is G3 PLC the Best Solution for DSOs
  M. BOILLOT, EDF
- 15PESGM2961, G3 PLC: Can It Be a Universal Standard?
  R. SCHOMBERG, EDF
- 15PESGM2962, Certification of G3 PLC Worldwide
  L. DRIESSEN, Enexis
- 15PESGM2963, New Technologies with G3 PLC
  A. ROBIC, Nexans

The Role of Virtual Storage in the Integrated Energy System of the Future (panel)

Monday, 27 July, 1:00 PM–3:00 PM
Plaza Court 6

Sponsored by: Energy Development and Power Generation Committee Chairs:
M. O’MALLEY, University College Dublin
B. KROPOSKI, NREL

The energy system is becoming more integrated with increasing interactions between energy vectors and across scales. For example the growth in combined heat and power (CHP) and the deployment of distributed resources (e.g. Photovoltaic and demand response) that impact on the bulk power system. With this integrated energy system come the opportunities and challenges of planning and operating the energy system in a more coordinated manner. Proper coordinating can lead to virtual storage e.g. dumping excess electricity into hot water storage in an integrated electricity/heat system. This virtual storage has significant advantages over dedicated storage technologies such as batteries etc. but also has its limitations. This panel will explore the benefits and limitations of virtual storage in the integrated energy system of the future.

PRESENTATIONS AND PANELISTS:

- 15PESGM1197, The Coordination of Combined Heat and Power in China to Increase Wind Energy Penetration
  C. KANG, Tsinghua
- 15PESGM1198, Co Optimization of Heat and Electricity in the Danish Energy System
  H. MADSEN, Technical University of Denmark
- 15PESGM1196, Using the Demand Side as a Virtual Storage Device in Future Energy Systems
  A. BREIDENBAUGH, EnerNOC
- 15PESGM2339, Techno-Economic Modelling of Domestic Smart Electric Thermal Storage in Ireland
  D. BURKE, UCD

Impact of Water/Energy Regulations on Smart Grid (panel)

Monday, 27 July, 1:00 PM–3:00 PM
Plaza Court 3

Sponsored by: Energy Development and Power Generation Committee Chair:
K. V. RUPCHAND, Tamil Nadu Electricity Board

Powering up the next generation will be a big challenge. Energy development has been conceived as the most important amongst all technologies affecting the mankind. There is continual surge in the demand of electrical power. The induction of electric vehicles in a big way and increased use of electrical gadgets necessitates a totally different approach in power development and grid operation. Huge additions of electrical power will be needed, that too of reliable quality, which is possible only by achieving Smart Grid everywhere. It has been established that large-scale development of reversible hydros
will play a key role for this objective. However, such a recourse is beset with many problems, essentially due to regulations stipulated for water and energy. These regulations will significantly impact the grid operations ‘per se’. This panel will delve into details of such impact and highlight on a coordinated approach with compatible regulations.

PRESENTATIONS AND PANELISTS:
- 15PESGM3007, Impact of Water/Energy Regulations on Smart Grid
  K. RUPCHAND, Tamil Nadu Electricity Board
- 15PESGM3008, Impact of Water-Energy Nexus on Power Development
  M. LUIKEN, Lambton College
  T. TBD, FERC
- 15PESGM3010, Water Regulations Affecting Power Development
  T. TBD, IWWA

Cyber-Physical Educational Modules (panel)

Monday, 27 July, 1:00 PM–5:00 PM                  Plaza Court 5
Sponsored by:             Power & Energy Education
Chairs:                         A. SRIVASTAVA, Washington State University
                               S. KHUSHALANI-SOLANKI, West Virginia University

The technological breakthroughs made by the advancement in computation, availability of low cost metering, high speed communications, new communication technology and greater internet bandwidths has led to enhance usage of cyber system to support power grid operation. These advancements and ongoing changes towards development of the smarter grid requires integrating these topics into power systems education and training the next generation workforce. This panel will focus on highlighting existing educational material and modules for cyber physical systems education for engineering students and for pre-engineering students.

PRESENTATIONS AND PANELISTS:
- 15PESGM2938, CPS Security for the Smart Grid: A Curriculum Development Experience
  M. GOVINDARASU, Iowa State University
- 15PESGM2939, The Smart City Testbed, Classroom Training, and Outreach Activities for Cyber-Physical Power Grid Education
  A. HAHN, Washington State University
- 15PESGM2940, NSF Programs in Cyber-Physical Systems Research and Education
  R. BAHETI, NSF
- 15PESGM2941, Smart Grid Cyber Security: Training for the Future
  T. YARDLEY, University of Illinois
- 15PESGM2942, Using Testbeds for Managing the Multidimensional Learning Curve in Cyber-Physical Power Systems Education
  R. GOODFELLOW, Information Sciences Institute
- 15PESGM2943, Cyber-Physical Educational Simulator for Cyber-Power Infrastructure Security
  S. ZONOUZ, Rutgers University

Insights and Outcomes from Significant System Flexibility Studies (panel)

Monday, 27 July, 1:00 PM–5:00 PM                  Plaza Court 7
Sponsored by:             Power System Planning and Implementation
Chair:                           E. LANNOYE, EPRI

This panel session will focus on discussing and reviewing the latest results from major studies on power system flexibility. The panel will cover insights from studies from a range of systems where renewable integration and new resources are giving rise to questions about the ability of future systems to meet ramping needs.

PRESENTATIONS AND PANELISTS:
- 15PESGM2780, Improvement in Grid Reliability with Renewables: Learnings from Recent Studies
  H. JOHAL, GE
- 15PESGM2781, The Eastern Renewable Generation Integration Study: Flexibility and High Penetrations of Wind and Solar
  A. BLOOM, NREL
- 15PESGM2782, The Impact of Transmission and Market Modeling on Flexibility in California
  A. PAPALEXOPoulos, ECCO International
Placement of Automated Distribution Protective and Switching Devices for Reliability (panel)

Monday, 27 July, 1:00 PM–3:00 PM  Governor’s Square 9
Sponsored by:  Transmission and Distribution Committee
Chair:  F. FRIEND, AEP

Placement of automated protective devices can have a huge impact on distribution feeder reliability, either positively or negatively. This proposed panel for the IEEE PES General Meeting in 2015 will explore these opportunities and challenges, including case studies from electric utilities.

PRESENTATIONS AND PANELISTS:

• 15PESGM1539, How Many Reclosers / Smart Switches are Too Many? – Sectionalizing to 300 Customer Zones Using Only Local Intelligence
  A. KASZNAY, Northeast Utilities
• 15PESGM3039, Identification, Prioritization, and Placement of Automatic Sectionalizing Devices at PECO
  J. REID, PECO Energy
• 15PESGM1542, Reliability-Centered Auto-Isolation Device Placement at PacifiCorp
  H. CASWELL, Pacificor
• 15PESGM3057, Self-Healing Network (Centralized Restoration Gateway)
  C. THOMPSON, Georgia Power Company

Everything Old Is New Again! (panel)

Monday, 27 July, 1:00 PM–5:00 PM  Governor’s Square 14
Sponsored by:  Transmission and Distribution Committee
Chair:  M. HENDERSON, ISO-New England

Many FACTS and HVDC facilities physically reach the end of their useful life, but are still fulfilling critical system needs. This panel session summarizes the justification for refurbishing the facilities and the challenges that must be overcome for replacing and upgrading existing FACTS and HVDC equipment and control systems.

PRESENTATIONS AND PANELISTS:

• 15PESGM1798, TBD
  B. FURUMASU, Power Engineers
• 15PESGM1795, TBD
  A. ISAACS, Electranix
• 15PESGM1799, TBD
  K. MITSCH, BPA
• 15PESGM1800, TBD
  D. LARSSON, ABB
• 15PESGM1801, Eddy County Power Electronics Projects
  G. WOLF, Lone Wolf Engineering
• 15PESGM1802, TBD
  P. ZANCHETTE, Hydro Quebec
• 15PESGM1803, TBD
  J. BURROUGHTS, VELCo
• 15PESGM1804, TBD
  N. KIRBY, Alstom
• 15PESGM1805, TBD
  B. GEMMELL, Siemens
• 15PESGM1806, TBD
  K. SEN, Sen Transformer
• 15PESGM1794, TBD
  M. HENDERSON, ISO-New England
Smart Village Information Session (information)

Monday, 27 July, 1:00 PM–5:00 PM  Director’s Row J
Sponsored by: IEEE Smart Village
Chair: M. WILSON, IEEE PES

IEEE Smart Village Development – An Investment in Innovation and Social Responsibility

1:00 PM–2:00 PM
Information Session: Smart Village as a Signature Program of IEEE Foundation

SPEAKER:
M. DEERING, IEEE Foundation IEEE Smart Village

Each year IEEE Smart Village receives many more requests to its Grants Program than it is able to support. NGO’s from around the globe seek assistance, however due to financial constraints; too many well-deserved requests are turned away.

Specifics about current efforts to raise US$10M will be shared. Learn how you can get involved through outreach efforts to industry, private and corporate foundations, and other interested parties. Regardless to the amount of time you have to volunteer, you can help make an impactful difference. As with all of IEEE’s member-initiated programs, IEEE Smart Village success requires passionate volunteers working together to achieve unbelievable goals. Don’t miss your opportunity to help! IEEE Smart Village has a dedicated fund held and managed by IEEE Foundation, a US based tax exempt 501c3 charitable organization.

2:00 PM–3:00 PM
Panel: How Can a Smart Village Entrepreneur Raise Their Own Funding?

What Does IEEE Smart Village Look for in a Proposal?
How Do You Qualify for USAID Funding?
How Do You Obtain Venture Financing?
How Do You Write a Successful Proposal?
How Do You Survive a Government Audit?

PANELISTS:
P. DAUENHAUER, Research Fellow Electronic & Electrical Engineering – Strathclyde University
D. VILSACK, Executive Director – Posner Center for International Development
R. PODMORE, President – Incremental Systems, Co-Founder IEEE Smart Village
H. LOUIE, Seattle University
L. BLANCHARD, 100X Foundation

3:00 PM–4:00 PM
IEEE Smart Village – Fundraising & Executive Advisory Joint Committee Meeting

4:00 PM–5:00 PM
IEEE Smart Village – Finance Committee Meeting

Best Conference Papers on Cyber Security, Stability, and Protection (paper)

Monday, 27 July, 1:00 PM–5:00 PM  Governor’s Square 11
Sponsored by: IEEE Power & Energy Society
Chair: TBD

PAPERS AND AUTHORS:

- 15PESGM1790, Smart Grid Data Integrity Attacks: Observable Islands
  M. GARCIA, Los Alamos National Laboratory
  A. GIANI, Los Alamos National Laboratory
  R. BALDICK, University of Texas, Austin

- 15PESGM2497, One Breaker is Enough: Hidden Topology Attacks on Power Grids
  D. DEKA, University of Texas at Austin
  R. BALDICK, University of Texas at Austin
  S. VISHWANATH, University of Texas at Austin

- 15PESGM1948, Cybersecurity Test-Bed for IEC 61850 based Smart Substations
  Y. YANG, Jiangsu Electric Power Company Research Institute
  H. JIANG, Jiangsu Electric Power Company Research Institute
  K. MCLAUGHLIN, Queen’s University Belfast
L. GAO, Jiangsu Electric Power Company Research Institute  
Y. YUAN, Jiangsu Electric Power Company Research Institute  
W. HUANG, Jiangsu Electric Power Company Research Institute  
S. SEZER, Queen's University Belfast

- **15PESGM0496**, Design and Development of Wide Area Protection and Emergency Control for Application in Distribution Networks of Embedded Generation  
  A. WEN, China Southern Power Grid Co., Ltd.  
  M. ZHAO, China Southern Power Grid Co., Ltd.  
  W. HUANG, China Southern Power Grid Co., Ltd.  
  C. WEI, China Southern Power Grid Co., Ltd.  
  L. LI, NR Electric Co., Ltd.

- **15PESGM1100**, New Directional Protection for Distribution Networks  
  Y. SHARON, S&C Electric Company  
  A. MONTENEGRO, S&C Electric Company  
  A. GARDNER, S&C Electric Company  
  M. ENNIS, S&C Electric Company

- **15PESGM2271**, Dynamic State Estimation-Based Protection of Power Transformers  
  R. FAN, Georgia Institute of Technology  
  S. MELIOPoulos, Georgia Institute of Technology  
  G. COCKINIDES, Georgia Institute of Technology  
  L. SUN, Georgia Institute of Technology  
  Y. LIU, Georgia Institute of Technology

- **15PESGM2564**, Out-of-Step Detection Using Zubov’s Approximation Stability Boundaries  
  Y. WEI, Clemson University  
  S. PAUDYAL, Michigan Technological University  
  B. MORK, Michigan Technological University

- **15PESGM0982**, An Expansion of the NEMA 5VS Survey on the Use of Surge Protective Devices for the Protection of Safety Equipment  
  R. HOTCHKISS, Surge Suppression Incorporated

- **15PESGM2255**, Response of an AC – DC Hybrid Transmission System to Faults in the AC Network  
  T. NEUMANN, University Duisburg-Essen  
  I. ERLICH, University Duisburg-Essen  
  T. WIJNHOVEN, KU Leuven and Energyville  
  G. DECONINCK, KU Leuven and Energyville

- **15PESGM1331**, Time-Localization of Forced Oscillations in Power Systems  
  J. FOLLUM, Pacific Northwest National Laboratory  
  J. PIERRE, University of Wyoming

- **15PESGM1480**, Investigation of Frequency Stability during High Penetration of CCGTs and Variable-Speed Wind Generators in Electricity Networks  
  L. MEEGAHAPOLA, RMIT University  
  D. FLYNN, University College Dublin

- **15PESGM1596**, Monitoring Voltage Collapse Margin with Synchrophasors Across Transmission Corridors with Multiple Lines and Multiple Contingencies  
  L. RAMIREZ, Iowa State  
  I. DOBSON, Iowa State

- **15PESGM2045**, Stability Analysis of the Hybrid Dynamics Coupling Power Systems with Power Markets  
  Y. LIANG, Tsinghua University  
  F. LIU, Tsinghua University  
  S. MEI, Tsinghua University

- **15PESGM2202**, An Approach to Refine Linear Models Used in Small Signal Stability Assessment  
  T. FERNANDES, University of Sao Paulo  
  E. GERALDI JUNIOR, University of Sao Paulo  
  R. RAMOS, Escola de Engenharia de Sao Carlos/USP

- **15PESGM2254**, Robust Small-Signal Stability Region of Power Systems Considering the Output Fluctuations of Wind Farms  
  Y. PAN, Tsinghua University  
  F. LIU, Tsinghua University  
  C. SHEN, Tsinghua University  
  L. CHEN, Tsinghua University  
  S. MEI, Tsinghua University

- **15PESGM0482**, Reactive Power Planning with Transient Process Stability Constraint  
  Y. WANG, Southeast University  
  F. LI, University of Tennessee  
  H. CHEN, Southeast University
• 15PESGM2666, Control Instability Index (CII) Based Approach for Evaluating Weak Grid Integration of Wind Generation Clusters
  M. SAHNI, PWR Solutions – A DNV GL Company
  V. KHOI, KEMA Inc – A DNV GL Company
  M. TABRIZI, PWR Solutions – A DNV GL Company
  N. PRAKASH, PWR Solutions – A DNV GL Company
  N. KARNIK, PWR Solutions – A DNV GL Company
  W. BOJORQUEZ, Sharyland Utilities
  M. CASKEY, Sharyland Utilities

• 15PESGM1252, Role of Western HVDC Link in Stability of Future Great Britain (GB) Transmission System
  Y. PIPELZADEH, Imperial College London
  B. CHAUDHURI, Imperial College London
  T. GREEN, Imperial College London
  R. ADAPA, Electric Power Research Institute

Best Conference Papers on Power System Modeling and Simulation  (paper)
Monday, 27 July, 1:00 PM–5:00 PM  Governor’s Square 10
Sponsored by:  IEEE Power & Energy Society
Chair :  TBD

PAPERS AND AUTHORS:
• 15PESGM1605, Long-Term Expansion Planning of Integrated Electricity and Natural Gas Transportation Infrastructures
  X. ZHANG, Illinois Institute of Technology
  L. CHE, Illinois Institute of Technology
  M. SHAHIDEPOUR, Illinois Institute of Technology

• 15PESGM0435, Polar Vortex Analysis with Generator Availability Data System (GADS) Data
  M. VARGHESE, NERC
  H. GUGEL, NERC
  J. MERLO, NERC
  B. MCMILLAN, NERC
  E. RUCK, NERC

• 15PESGM1592, Demand Side Response Performance Assessment: An Impact Analysis of Load Profile Accuracy on DSR Performances
  C. ZHAO, University of Bath
  H. SHI, University of Bath
  R. LI, University of Bath
  F. LI, University of Bath

• 15PESGM2123, Risk Evaluation for Power Systems Based on Self-Organized Criticality
  C. PENG, University of Hong Kong
  Y. HOU, University of Hong Kong

• 15PESGM2439, Application of Adomian Decomposition for Multi-Machine Power System Simulation
  G. GURRALA, Oak Ridge National Laboratory
  D. ALEKSANDAR D, Oak Ridge National Laboratory
  S. PANNALA, Oak Ridge National Laboratory
  S. SRDJAN, Oak Ridge National Laboratory
  S. KAI, University of Tennessee

• 15PESGM2452, An Assessment of the Impact of Stochastic Day-Ahead SCUC on Economic and Reliability Metrics at Multiple Timescales
  H. WU, National Renewable Energy Laboratory
  E. ELA, National Renewable Energy Laboratory
  I. KRAD, National Renewable Energy Laboratory
  A. FLORITA, National Renewable Energy Laboratory
  J. ZHANG, National Renewable Energy Laboratory
  B. HODGE, National Renewable Energy Laboratory
  W. GAO, University of Denver

• 15PESGM2649, Aggregate Equivalent Models of Flexible Distribution Systems for Transmission-Level Studies
  E. POLYMENEAS, Georgia Institute of Technology
  S. MELIPOULOS, Georgia Institute of Technology
• 15PESGM0212, Measurement Accuracy Limitation Analysis on Synchrophasors
  J. ZHAO, University of Tennessee, Knoxville
  L. ZHAN, University of Tennessee, Knoxville
  Y. LIU, University of Tennessee, Knoxville
  H. QI, University of Tennessee, Knoxville
  J. GARCIA, Oak Ridge National Laboratory
  P. EWING, Oak Ridge National Laboratory

• 15PESGM0320, Net Interchange Schedule Forecasting Using Bayesian Model Aggregation
  M. VLACHOPOULOU, PNNL
  L. GOSINK, PNNL
  T. PULSIPHER, PNNL
  R. HAFEN, PNNL
  J. ROUND, Purdue University
  N. ZHOU, Binghamton University
  J. TONG, PJM

• 15PESGM1379, Hybrid Time Series-Bayesian Neural Network Short-Term Load Forecasting with a New Input Selection Method
  M. GHOFRANI, University of Washington, Bothell
  K. WEST, University of Washington, Bothell
  M. GHAYEKHLOO, Qazvin Islamic Azad University

• 15PESGM1097, Analytical Goal Programming Model for Optimal Restoration of Distribution Systems
  D. GAZZANA, UFRGS
  G. PERREIRA, UFRGS
  R. SILVA, UFRGS
  A. BRETAS, UFRGS
  A. BETTIOL, NEO DOMINO
  A. CARNIATO, NEO DOMINO
  L. PASSOS, NEO DOMINO
  R. HOMMA, CELESC
  F. MOLINA, CELESC

• 15PESGM1006, Bus.py: A GridLAB-D Communication Interface for Smart Distribution Grid Simulations
  T. HANSEN, Colorado State University
  B. PALMINTIER, National Renewable Energy Laboratory
  S. SURYANARAYANAN, Colorado State University
  A. MACIEJWSKI, Colorado State University
  H. SIEGEL, Colorado State University

• 15PESGM1740, Distributed Moving Horizon Estimation for Power Systems
  T. CHEN, Nanyang Technological University
  D. ZHOU, Nanyang Technological University
  T. TRAN, Nanyang Technological University
  C. KASTNER, Nanyang Technological University
  K. LING, Nanyang Technological University
  K. TSENG, Nanyang Technological University
  J. MACIEJOWSKI, University of Cambridge

• 15PESGM0126, Generic Wind Turbine Generator Models for WECC – A Second Status Report
  A. ELLIS, Sandia National Laboratories
  P. POURBEIK, Electric Power Research Institute
  J. SANCHEZ-GASCA, GE
  J. SENTHIL, Siemens
  J. WEBER, PowerWorld Corporation

• 15PESGM0939, Initialization of an Unbalanced Radial Distribution System
  J. KHAZAEI, University of South Florida
  Z. MIAO, University of South Florida
  L. PIYASINGHE, University of South Florida
  L. FAN, University of South Florida

• 15PESGM2391, Universal Grid Analyzer Design and Development
  L. ZHAN, University of Tennessee, Knoxville
  J. ZHAO, University of Tennessee, Knoxville
  S. GAO, Tsinghua University
  J. CULLISS, University of Tennessee, Knoxville
  Y. LIU, University of Tennessee, Knoxville
  Y. LIU, University of Tennessee, Knoxville

• 15PESGM1317, DC Grid System Behavior: A Real-Time Case Study
  P. MITRA, ABB Sweden
  J. HANNING, ABB Sweden
  J. KÖHLSTRÖM, ABB Sweden
  T. LARSSON, ABB Sweden
  J. DANIELSSON, ABB Inc.
• 15PESGM2284, Utility Customer Model for Fifth Harmonic State Estimation in Combination with Fundamental State Estimation in Distribution Network
  N. OKADA, CRIEPI

• 15PESGM1534, The Optimal Reactive Dispatch Problem with Discrete Control Variables and Limited Control Adjustments
  A. MAZZINI, Sao Carlos School of Engineering – University of Sao Paulo
  E. ASADA, Sao Carlos School of Engineering – University of Sao Paulo
  G. LAGE, Federal University of Sao Carlos

Best Conference Papers on Grid Operation and Management (paper)

Monday, 27 July, 1:00 PM–5:00 PM                      Director’s Row E
Sponsored by: IEEE Power & Energy Society
Chair: TBD

PAPERS AND AUTHORS:

• 15PESGM1143, Cooperative Operation Based Master-Slave in Islanded Microgrid with CPT Current Decomposition
  A. MORTEZAEI, Colorado School of Mines
  M. GODOY SIMÕES, Colorado School of Mines
  F. P. MARAFÃO, UNESP – Univ Estadual Paulista Sorocaba, SP, Brazil

• 15PESGM1508, Managing Vanadium Redox Batteries Towards the Optimal Scheduling of Insular Power Systems
  G. OSÓRIO, University of Beira Interior
  J. LIJANO-ROJAS, University of Beira Interior
  J. MATIAS, University of Beira Interior
  J. CATALAO, University of Beira Interior

• 15PESGM2631, Blackstart of an Induction Motor in an Autonomous Microgrid
  A. TAZAY, University of South Florida
  Z. MIAO, University of South Florida
  L. FAN, University of South Florida

• 15PESGM2121, Induction Causing Smart Grid Communication Failure, A Case Study from Hydro-Quebec
  M. LACROIX, Vizimax
  D. CHAN-FOY, Hydro-Quebec

• 15PESGM0104, Resilience Enhancement with DC Microgrids
  L. CHE, Illinois Institute of Technology
  X. ZHANG, Illinois Institute of Technology
  M. SHAHIDEPOUR, Illinois Institute of Technology

• 15PESGM2217, Optimal Operation of Microgrids Under Conditions of Uncertainty
  K. BALASUBRAMANIAM, Clemson University
  R. HADDI, Clemson University Restoration Institute
  E. MAKRAM, Clemson University

• 15PESGM0869, Impact of Human Error on Electrical Equipment Preventive Maintenance Policy
  Y. BAO, Zhejiang University
  Y. WANG, Zhejiang University
  G. HUANG, Zhejiang University
  J. XIA, State Grid Hunan Electric Power Corporation
  J. CHEN, State Grid Hunan Electric Power Corporation
  C. GUO, Zhejiang University

• 15PESGM1827, A GPS-Free Power Grid Monitoring System over Mobile Platforms
  H. LU, University of Tennessee, Knoxville
  L. ZHAN, University of Tennessee, Knoxville
  Y. LIU, University of Tennessee, Knoxville
  W. GAO, University of Tennessee, Knoxville

• 15PESGM1456, Optimal Spatio-Temporal Emergency Crew Planning for a Distribution System
  A. KOC, IBM
  A. SINGHEE, IBM
  H. WANG, IBM
  A. SABHARWAL, Allen Institute for Artificial Intelligence
  R. MUELLER, DTE Energy
  G. LABUT, DTE Energy

• 15PESGM0384, Dynamic Programming for Optimal Load-Shedding of Office Scale Battery Storage and Plug-Loads
  M. SANKUR, University of California, Berkeley
  D. ARNOLD, University of California, Berkeley
  D. AUSLANDER, University of California, Berkeley
• 15PESGM2313, Exhaustive Search and Multi-Objective Evolutionary Algorithm for Single Fault Service Restoration in a Real Large-Scale Distribution System
  M. CAMILLO, COPEL Distribuição S/A
  M. ROMERO, COPEL Distribuição S/A
  R. FANUCCHI, COPEL Distribuição S/A
  T. LIMA, University of São Paulo – USP
  A. DELBEM, University of São Paulo – USP
  J. LONDON JUNIOR, University of São Paulo – USP

• 15PESGM0541, An Energy Storage Assessment: Using Optimal Control Strategies to Capture Multiple Services
  D. WU, PNNL
  C. JIN, ERCOT
  P. BALDUCCI, PNNL
  M. KINTNER-MEYER, PNNL

• 15PESGM1273, Step-Voltage Regulator Model Test System
  M. RASHID-MOJUMDAR, University of Oviedo
  P. ARBOLEYA, University of Oviedo
  C. GONZÁLEZ-MORÁN, University of Oviedo

• 15PESGM0137, Online Convergence Factor Tuning for Robust Cooperative Distributed Economic Dispatch
  Y. ZHANG, North Carolina State University
  N. RAHBARI ASR, North Carolina State University
  M. CHOW, North Carolina State University

• 15PESGM0036, A Stochastic Unit Commitment with Derand Technique for ISO’s Reserve Adequacy Assessment
  Y. LIU, Sears Holdings Corporation
  M. FERRIS, University of Wisconsin-Madison
  F. ZHAO, ISO New England, Inc.
  T. ZHENG, ISO New England, Inc.
  E. LITVINOV, ISO New England, Inc.

• 15PESGM0874, Security-Constrained Unit Commitment with Dynamic Gas Constraints
  C. CORREA-POSADA, XM, Compañía de Expertos en Mercados
  P. SÁNCHEZ-MARTÍN, Comillas Pontifical University

• 15PESGM0878, Cycling and Flexibility Concerns Revealed in High Variability Systems Employing Sub-Hourly UC
  A. MELHORN, University College Dublin
  D. FLYNN, University College Dublin

• 15PESGM2326, Coupled ISO-NE Real-Time Energy and Regulation Markets for Reliability with Natural Gas
  M. CVETKOVIC, Massachusetts Institute of Technology
  A. ANNASWAMY, Massachusetts Institute of Technology

• 15PESGM0461, Evaluation of Multiple Inverter Volt-VAR Control Interactions with Realistic Grid Impedances
  S. CHAKRABORTY, National Renewable Energy Laboratory
  A. HOKE, National Renewable Energy Laboratory
  B. LUNDSTROM, National Renewable Energy Laboratory

• 15PESGM2053, Analysis of Power Redispatch Schemes for HVDC Grid Secondary Voltage Control
  J. BEERTEN, University of Leuven
  D. VAN HERTEM, University of Leuven

Best Conference Papers on Integration of Renewable & Intermittent Resources (paper)

Monday, 27 July, 1:00 PM–5:00 PM
Director’s Row H
Sponsored by: IEEE Power & Energy Society
Chair: TBD

PAPERS AND AUTHORS:
• 15PESGM1580, Offshore Substation Locating in Wind Farms Based on Prim Algorithm
  P. HOU, Aalborg university
  W. HU, Aalborg university
  Z. CHEN, Aalborg university

• 15PESGM2654, Renewable in Distribution Networks: Centralized vs. Decentralized Integration
  L. JIA, Cornell University
  L. TONG, Cornell University
• 15PESGM2345, Operating Beyond Today’s PV Curves: Challenges and Potential Benefits
  M. ILIC, Carnegie Mellon University
  S. CVIJIC, NETSS Inc.
  J. LANG, MIT
  J. TONG, PJM
  D. OBADINA, ERCOT

• 15PESGM0262, Impact of Operational Constraints on Generation Portfolio Planning with Renewables
  P. VITHAYASRICHAREON, University of New South Wales
  T. LOZANOV, University of New South Wales
  J. RIESZ, University of New South Wales
  I. MACGILL, University of New South Wales

• 15PESGM0954, Special Condition Wind Power Forecasting Based on Gaussian Process and Similar Historical Data
  J. YAN, Queen’s University Belfast
  K. LI, Queen’s University Belfast
  E. BAI, University of Iowa
  A. FOLEY, Queen’s University Belfast

• 15PESGM0917, Glaciothermal Power Generation in Cold Climate Regions
  M. NEGNEVITSKY, University of Tasmania
  Z. SMITH, University of Tasmania
  X. WANG, University of Tasmania
  K. KELVIN, University of Tasmania

• 15PESGM0488, Transmission Contingency-Constrained Unit Commitment with Uncertain Wind Generation via Interval Optimization
  Y. YU, University of Connecticut
  P. LUH, University of Connecticut
  E. LITVINOV, ISO New England
  T. ZHENG, ISO New England
  J. ZHAO, ISO New England
  F. ZHAO, ISO New England

• 15PESGM0247, GEFCom2014 Probabilistic Solar Power Forecasting based on k-Nearest Neighbor and Kernel Density Estimator
  Y. ZHANG, Xi’an Jiaotong University
  J. WANG, Xi’an Jiaotong University

• 15PESGM2483, WAMS-Based Frequency Regulation Strategy for Photovoltaic System in Isolated Power Systems
  S. LIAO, Wuhan University
  J. XU, Wuhan University
  Y. SUN, Wuhan University
  W. GAO, University of Denver
  L. XU, Wuhan University
  L. HUANG, Wuhan University
  X. LI, China Power Investment Corporation
  J. GU, CFI Energy Group Meng-Dong Group
  J. DONG, CFI Energy Group Meng-Dong Group

• 15PESGM2204, The Collaborative Control Strategy for the Grid’s Maximization of Renewable Energy Consumption
  H. LIU, China Electric Power Research Institute
  M. DING, Ningxia Electric Power Corp.
  L. HONG, Southeast University
  X. XU, China Electric Power Research Institute

• 15PESGM1577, Comparative Study of Solar Panel Decentralized Controls in Low Voltage Network with Real Time Simulation
  A. MERCIER, g2elab

• 15PESGM2316, Accuracy and Validation of Measured and Modeled Data for Distributed PV Interconnection and Control
  E. STEWART, Lawrence Berkeley National Laboratory
  S. KILICCOTE, Lawrence Berkeley National Laboratory
  D. ARNOLD, University of California, Berkeley
  A. VON MEIER, California Institute for Energy and Environment
  R. ARGHANDEH, California Institute for Energy and Environment

• 15PESGM1250, Cooperation and Storage Tradeoffs in Power-Grids under DC Power Flow Constraints and Inefficient Storage
  S. LAKSHMINARAYANA, SUTD
  W. WEI, SUTD
  V. POOR, Princeton University
  T. QUEK, SUTD
Monday Afternoon, continued

- **15PESGM0103, Impact of Natural Gas System on Short-Term Scheduling with Volatile Renewable Energy**
  X. ZHANG, Illinois Institute of Technology
  L. CHE, Illinois Institute of Technology
  M. SHAHIDEHPOUR, Illinois Institute of Technology

- **15PESGM0794, On Wind Farm Operation with Third-Party Storage**
  T. HARING, ETH Zurich
  M. BUCHER, ETH Zurich
  A. RATHA, ETH Zurich
  G. ANDERSSON, ETH Zurich

- **15PESGM1673, Distribution System Reconfiguration in Economic Dispatch with High Wind Penetration**
  A. BIZUAYEHU, Univ. Beira Interior
  A. DE LA NIETA, Univ. Beira Interior
  J. CATALAO, Univ. Beira Interior
  P. DE QUEVEDO, University of Castilla–La Mancha
  J. CONTRERAS, University of Castilla–La Mancha

- **15PESGM2033, Transformer Operation Conditions Under Introduction of Photovoltaic and Electric Vehicles in an Eco-District**
  X. DANG, Ecole Supérieure d’Electricité
  P. CODANI, Ecole Supérieure d’Electricité
  M. PETIT, Ecole Supérieure d’Electricité

- **15PESGM1309, Overfrequency Limiting Control by VSC-HVDC Connected Offshore WFs**
  M. SUWAN, Electrical Engineering and Information Technology
  I. ERLICH, Electrical Engineering and Information Technology

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PES Young Professional Panel Session *(panel)*

**Monday, 27 July, 2:00 PM–4:00 PM**
**Plaza Court 1**

*Sponsored by:* IEEE Power & Energy Society

*Chair:* A. ST LEGER, United States Military Academy

**PRESENTATIONS AND PANELISTS:**

- **Transactive Power System Challenges**
  S. CHANDLER, Navigant Consulting

- **Designing the DC Side of Solar Plants**
  B. PATEL, Biren Patel Engineering

- **The WIND and SIND Toolkits: Wind and Solar Data for the Next Generation of Renewable Integration Studies**
  B.-M. HODGE, National Renewable Energy Laboratory

- **Quantification of Power Distribution System Resiliency against Weather-Based Outages or Targeted Attacks**
  C. SAYONSOM, Quanta Technologies

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Overview and Discussion of the United States Quadrennial Energy Review

**Monday, 27 July, 2:00 PM–4:00 PM**
**Majestic Ballroom**

*Chair:* J. NELSON, Tennessee Valley Authority

A representative from the United States Department of Energy (DOE) will provide an overview of the final published 2015 U.S. Quadrennial Energy Review (QER) requested by President Barack Obama. The overview will focus on the key findings and recommendations related to the electric grid. In addition, IEEE, EEI and NEMA will provide an overview of their input and response to the DOE QER key findings and recommendations.

**PRESENTERS:**

G. SINGLETON, United States Department of Energy
D. NOVOSEL, IEEE Power & Energy Society
V. RABL, IEEE USA Energy Policy Committee
M. HATCH, Edison Electric Institute
P. HUGHES, National Electrical Manufacturers Association
Testing Emerging Technology G3 PLC: DSOs Projects in Europe and Asia (panel)

Monday, 27 July, 3:00 PM–5:30 PM  
Plaza Court 3

Sponsored by:  
Emerging Technologies Coordinating Chair:  
M. BOILLOT, EDF

PLC G3 is currently an emerging technology and need to be tested worldwide in order to assess its performances from reliability of exchanged information to its contribution to advanced DSO functions including grid observability.

The Panel will deal with testing experiences conducted by DSOs from Europe and Asia and exchange feedback experience on this emerging technology.

PRESENTATIONS AND PANELISTS:

- **15PESGM2964, 500 000 G3 PLC Meters in France in 2016**  
  M. DELANDRE, ERDF

- **15PESGM2965, G3 PLC Meters in Belgium**  
  J. HUGE, ORES

- **15PESGM2966, G3 PLC Meters in Luxemburg**  
  P. HOFFMANN, Luxmetering

- **15PESGM2967, G3 PLC Meters in Austria**  
  H. GRASSMAN, EVN

- **15PESGM2968, G3 PLC: An Advanced Technology for Route B in Japan**  
  S. SAN, Texas Instruments

International Practices for Smart Grid Deployment and Operation (panel)

Monday, 27 July, 3:00 PM–5:00 PM  
Plaza Court 4

Sponsored by:  
Energy Development and Power Generation Committee Chairs:  
L. L. LAI, State Grid Energy Research Institute, China  
K. P. WONG, University of Western Australia

Smart networks includes the development of new concepts, system architectures and a regulatory framework for control, supervision and operation of electricity networks to transform the grid into an interactive service network between customers and operators, while maximizing reliability, power quality, efficiency, security and reducing carbon emission. These systems should be based on applications of distributed intelligence. The smart grids include smart metering and the ability to integrate power generated locally or remotely under big data environment. New methods of controlling bulk public power flows across national boundaries will enable the cleanest sources to be tapped to supply electricity at national and international level. The grid is able to learn to coordinate all equipment for optimal expected performance despite random disturbances. The bottom line includes value added, quality of service, reliability, security and affordability etc.

PRESENTATIONS AND PANELISTS:

- **15PESGM0761, An Efficient and Robust Case Sorting Algorithm for Transient Stability Assessment**  
  Y. XUE, State Grid EPRI  
  T. HUANG, Southeast University  
  K. LI, Queens University Belfast  
  Z. DONG, University of Sydney  
  D. YUE, Nanjing University of Posts and Telecommunications  
  F. XUE, State Grid EPRI  
  J. HUANG, State Grid EPRI

- **15PESGM1461, Renewable Energy and Smart Grid Operation**  
  Y. XIN, National Electric Power Dispatching and Control Centre

- **15PESGM3054, Strategy and Practice of Smart Grid in SGCC**  
  H. LIN, State Grid Corporation of China

- **15PESGM1471, A Two-Stage Power Dispatching Algorithm for System Support by Droop-Controlled DC Grids**  
  Z. XU, Hong Kong Polytechnic University  
  Y. LI, Hong Kong Polytechnic University

- **15PESGM1472, Efficient Real-Time Residential Energy Management through MILP Based Rolling Horizon Optimization**  
  H. WANG, University of Newcastle  
  K. MENG, University of Newcastle  
  Z. DONG, University of Sydney  
  F. LUO, University of Newcastle  
  Z. XU, Hong Kong Polytechnic University  
  K. WONG, University of Western Australia
• 15PESGM1473, Web-Based Real-Time Monitoring System to Enhance the Market Participation of an Industrial Power System
  W. LEE, University of Texas at Arlington
• 15PESGM1474, Implementing Smart Grid Optimal Operation Using Model-Based Analytics
  H. HAGHI, University of Central Florida
  Z. QU, University of Central Florida
• 15PESGM1475, Network Constrained Transactive Control for Electric Vehicles Integration
  G. YANG, Technical University of Denmark
  J. HU, Technical University of Denmark
  H. BINDNER, Technical University of Denmark

From Smart Metering and PMU Data to Intelligent Power and Energy Management (panel)
Monday, 27 July, 3:00 PM–5:00 PM Governor’s Square 17
Sponsored by: PSACE Intelligent Systems
Chairs: G. LAMBERT-TORRES, PS Solutions
        Z. VALE, Polytechnic of Porto

This panel presents the evolution and applications of data mining techniques in Intelligent Meters and PMU Data. This panel reports real applications existing in these areas and possible future applications, including data treatment, data management, and data analysis. The main idea of this panel is presented how transform data from intelligent meters and PMU meters into knowledge to be used for power system operation and planning.

PRESENTATIONS AND PANELISTS:
• 15PESGM2047, Remuneration of Distributed Generation and Demand Response Resources Considering Scheduling and Aggregation
  J. SPINOLA, Polytechnic of Porto
  P. FARIA, Polytechnic of Porto
  Z. VALE, Polytechnic of Porto
• 15PESGM2187, SEAS – An IT Platform to Enable Intelligent Energy Management
  P. BOURGUIGNON, GDF Suez
• 15PESGM2191, How Internet of Things (IoT) Shape the Next Generation of Smart Grids
  M. MANI, Itron
• 15PESGM0504, Some Discussions about Data in the New Environment of Power Systems
  G. LAMBERT-TORRES, Gnarus Institute
  R. ROSSI, Gnarus Institute
  M. COUTINHO, Itajuba Federal University
  C. DE MORAES, Itajuba Federal University
  L. BORGES DA SILVA, Itajuba Federal University
• 15PESGM2896, Green Button Alliance: Making Consumption Data Available
  D. COFFIN, Green Button Alliance

Power Quality Issues with Grid Modernization Technologies (panel)
Monday, 27 July, 3:00 PM–5:00 PM Governor’s Square 12
Sponsored by: Transmission and Distribution Committee
Chair: D. MUELLER, EnerNex

The panel session is to provide information on the power quality issues central to grid modernization activities. Smart grid activities are thought to mainly improve power quality, but in reality they re-introduce some old problems in new wrappers. For example, microgrids will present new challenges for the control of harmonics, frequency variations, and system stability. Smart meters are purported to measure power quality, but progress needs to be made in implementing existing standards for the measurement of PQ. Rooftop solar is challenging distribution feeder power quality levels. Finally, the panel will include a presentation on the activities of the CIGRE Working Group on these topics.

PRESENTATIONS AND PANELISTS:
• 15PESGM0946, PQ Issues with Microgrids
  E. GUNTHER, EnerNex Corporation
• 15PESGM0948, Issues for Smart Meters and PQ Data
  T. COOKE, EPRI
• 15PESGM0949, PQ Impacts from Rooftop PV on Distribution Systems
  J. SMITH, EPRI
Monday Evening

Electric Machinery Poster Session *(poster)*

Monday, 27 July, 5:00 PM–8:00 PM  Plaza Ballroom

Sponsored by: Electric Machinery

**PAPERS AND AUTHORS:**

- **15PESGM0336**, Field Winding Inter-Turn Fault Detection in Round Rotor Synchronous Machines
  M. ANDERE, UNIFEI  
  J. ROCHA, ALSTOM  
  E. BORTONI, UNIFEI

- **15PESGM0379**, Analytical Determination of Slot Harmonics Content of Air-Gap Magnetic Field for an Induction Machine
  S. A. PRASHANTH, Indian Institute of Technology Guwahati  
  S. NEKKALAPU, Indian Institute of Technology Guwahati  
  A. DALAL, Indian Institute of Technology Guwahati  
  P. KUMAR, Indian Institute of Technology Guwahati

- **15PESGM0499**, State-Space Voltage-Behind-Reactance Modeling of Induction Machines Based on Shifted-Frequency Analysis
  Y. HUANG, University of British Columbia  
  F. THERRIEN, University of British Columbia  
  J. JATSKEVICH, University of British Columbia  
  L. DONG, Northwestern Polytechnical University

- **15PESGM1008**, Hybrid Excitation Topologies for Three-Phase Mutually Coupled Reluctance Machine with Standard Inverters
  M. KABIR, North Carolina State University  
  I. HUSAIN, North Carolina State University

- **15PESGM1235**, Soft and Fast Starting Induction Motors Using Controllable Resistive Type Fault Current Limiter
  M. NEGNEVITSKY, University of Tasmania  
  N. SEYEDBEHZAD, University of Tasmania

- **15PESGM2200**, Constant Parameter VBR Model of Permanent Magnet Synchronous Machine Wind Generation System
  N. AMIRI, University of British Columbia  
  M. CHAPARIHA, University of British Columbia  
  S. EBRAHIMI, University of British Columbia  
  J. JATSKEVICH, University of British Columbia  
  L. WANG, University of British Columbia

- **15PESGM2208**, Permanent Magnet Synchronous Condenser with Solid State Excitation
  P. HSU, San Jose State University  
  E. MULJADI, National Renewable Energy Laboratory  
  D. GAO, University of Denver  
  Z. WU, University of Denver

- **15PESGM2308**, Field Programmable Gate Array Based Speed Control of BLDC Motor
  R. PINDORIYA, Marwadi Education Foundation Group of Institution (MEFGI), Rajkot

- **15PESGM2344**, A Novel Transverse Flux Machine for Vehicle Traction Applications
  Z. WAN, North Carolina State University  
  A. AHMED, North Carolina State University  
  I. HUSAIN, North Carolina State University  
  E. MULJADI, National Renewable Energy Laboratory

- **15PESGM2562**, A Serial-Connected Compensator for Eliminating the Unbalanced Three-Phase Voltage Impact on the Wind Turbine Generations
  Z. WU, University of Denver  
  P. HSU, San Jose State University  
  E. MULJADI, National Renewable Energy Laboratory  
  W. GAO, University of Denver
Emerging Technologies Poster Session  (poster)
Monday, 27 July, 5:00 PM–8:00 PM  Plaza Ballroom
Sponsored by:  Emerging Technologies Coordinating

PAPERS AND AUTHORS:

- **15PESGM0012**, Optimal Investment Strategy in Photovoltaics and Energy Storage for Commercial Buildings
  M. SARKER, University of Washington
  M. ORTEGA-VAZQUEZ, University of Washington

- **15PESGM1121**, ARIMA-Based Demand Forecasting Method Considering Probabilistic Model of Electric Vehicles’ Parking Lots
  M. AMINI, Carnegie Mellon University
  O. KARABASOGLU, Sun Yat-sen University-Carnegie Mellon University
  M. ILIC, Carnegie Mellon University
  K. G. BOROOJENI, Florida International University
  S. IYENGAR, Florida International University

- **15PESGM1221**, PV Power Output Uncertainty in Australia
  S. VEYSI RAYGANI, University of Queensland
  R. SHARMA, University of Queensland
  T. SAHA, University of Queensland

- **15PESGM1229**, Management Model of a Stormwater Detention Tank as Storage System in an Urban Area
  D. MENNITI, University of Calabria
  N. SORRENTINO, University of Calabria
  G. BELLI, University of Calabria
  A. PINNARELLI, University of Calabria
  G. BARONE, University of Calabria

- **15PESGM1886**, Design of Pole Placement Controllers for Doubly-Fed Induction Generators in the Complex Domain
  H. BAESMAT, University of Utah
  M. BODSON, University of Utah

- **15PESGM2139**, Optimal Solution of Grid-Able Electric Vehicles to Minimize Cost and Emission in a Smart Grid – A Developing Country View
  M. AHMAD, Indian Institute of Technology, Patna
  S. SIVASUBRAMANI, Indian Institute of Technology, Patna

- **15PESGM2251**, Description of the Low Frequency Phenomena Involved When Connecting a 3 kW EV Charger to the Distribution Network and Their Validation by On Site Tests
  M. RIOUAL, EDF R&D
  C. ZAKHOUR, Ecole Supérieure d’Electricité
  M. LOPEZ-AMOROS, Ecole Supérieure d’Electricité
  J. BARGUES, EDF R&D
  S. NASR, Ecole Supérieure d’Electricité

- **15PESGM2324**, Bounds on the Smoothing of Renewable Sources
  A. PURI, DNV GL

- **15PESGM2380**, Scheduling for Wireless Energy Sharing Among Electric Vehicles
  Z. HUANG, University of Maryland, Baltimore County
  T. ZHU, University of Maryland, Baltimore County
  H. LUO, State University of New York, Binghamton

- **15PESGM2488**, Energy Efficient Air Quality Control in Residential Buildings
  Z. HUANG, University of Maryland, Baltimore County
  T. ZHU, University of Maryland, Baltimore County
  H. LUO, State University of New York, Binghamton

Energy Development and Power Generation Poster Session  (poster)
Monday, 27 July, 5:00 PM–8:00 PM  Plaza Ballroom
Sponsored by:  Energy Development and Power Generation Committee
Chairs:  B. WOJSZCZYK, DP Global
         J. ROMERO AGUERO, Quanta Technology

PAPERS AND AUTHORS:

- **15PESGM0030**, Estimation of the Failure Rate of Wind Turbine Electrical Systems Exposed to Lightning Strikes
  N. MALCOLM, University of Bath
• 15PESGM0033, Value Priority Based Optimal Power System Stabilization of Generating Resources Using Local and Global Controllers
  R. YOUSEFIAN, University of North Carolina at Charlotte
  S. KAMALASADAN, University of North Carolina at Charlotte

• 15PESGM0129, Wind Farms Coordination Control Based on Contribution Index
  Y. Qi, Shandong University
  Y. LIU, Shandong University

• 15PESGM0196, A Robust Coordinated Control Method for BESS to Smooth Wind Power Generation
  Z. LI, Shanghai Jiao Tong University
  H. JAIN, Shanghai Jiao Tong University
  P. ZHANG, Shanghai Jiao Tong University
  X. LUO, Southern California Edison

• 15PESGM0219, Combined Approach for Short-Term Wind Power Prediction: A Case Study of the East Coast of China
  Y. JIANG, Hohai University
  X. CHEN, Hohai University
  K. YU, Hohai University
  Y. LIAO, Hohai University

• 15PESGM0246, Application of High Temperature Superconductor to Improve the Dynamic Performance of WECS
  M. KHAMAIRA, Curtin University

• 15PESGM0349, Multiple Solutions of PMSG with Different Orientations and Reference Powers
  S. LI, Hefei University of Technology

• 15PESGM0375, Effects of Inertia Emulation in Modern Wind Parks on Isolated Power Systems
  C. RAHMANN, University of Chile
  J. JARA, University of Chile
  M. M. B. C. SALLES, University of São Paulo

• 15PESGM0383, Efficient Real-Time Residential Energy Management through MILP Based Rolling Horizon Optimization
  H. WANG, University of Newcastle
  K. MENG, University of Newcastle
  Z. DONG, University of Sydney
  F. LUO, University of Newcastle
  Z. XU, Hong Kong Polytechnic University
  K. WONG, University of Western Australia

• 15PESGM0411, Matching a Desirable Generation Pattern for Large-Scale Wind Farm with Autonomous Energy Storage Control Strategy
  J. DONG, Xi’an Jiaotong University
  F. GAO, Xi’an Jiaotong University
  X. GUAN, Xi’an Jiaotong University
  Q. ZHAI, Xi’an Jiaotong University
  J. WU, Xi’an Jiaotong University

• 15PESGM0452, Operating Fixed-Speed and Wide-Slip Wind Turbines in Isolated Microgrids
  R. CHIRAPONGSANANURAK, University of Texas at Austin
  S. SANTOSO, University of Texas at Austin
  A. MAITRA, Electric Power Research Institute

• 15PESGM0459, Energy-Based Distributed Generation Incentive for Distribution Network Operators
  M. HIDAYAT, University of Bath
  F. LI, University of Bath

• 15PESGM0535, DFIG Based Wind Farm with Autonomous Frequency Control on Island Operation
  Y. ZHANG, AESO
  B. OOI, McGill University

• 15PESGM0536, A Scenario Generation Method for Wind Power Ramp Events Forecasting
  M. CINTUGLU, Florida International University
  T. MA, Florida International University
  O. MOHAMMED, Florida International University

• 15PESGM0554, Aggregated Active Distribution Networks for Secondary Control of Islanded Power Systems
  M. BITARAF, Virginia Tech, Advanced Research Institute
  H. ZHONG, Tsinghua University
  S. RAHMAN, Virginia Tech, Advanced Research Institute

• 15PESGM0558, Managing Large Scale Energy Storage Units to Mitigate High Wind Penetration Challenges
  H. BITARAF, Virginia Tech, Advanced Research Institute
  S. RAHMAN, Virginia Tech, Advanced Research Institute
• 15PESGM0747, Interval Arithmetic Based Optimal Curtailment for Infeasible SCED Considering Wind Power Uncertainties
  T. DING, Tsinghua University
  R. BO, Midcontinent Independent Transmission System Operator (MISO)
  C. HUANG, University of Tennessee, Knoxville
  R. LI, State Grid Jibei Electric Power Company Ltd.
  Z. YANG, State Grid Jibei Electric Power Company Ltd.
  F. LI, University of Tennessee, Knoxville
  H. SUN, Tsinghua University

• 15PESGM0770, Evaluation of Low Voltage Ride-Through Capability of Synchronous Generator Connected to a Grid
  S. YANG, Nanyang Technological University
  G. SHAGAR, Nanyang Technological University
  A. UKIL, Nanyang Technological University
  S. JAYASINGHE, Nanyang Technological University
  A. GUPTA, Nanyang Technological University

• 15PESGM0801, Sizing of a Generic Hybrid Energy Storage System for Power Smoothing of a Wind Generator
  G. NAIR S, IIT Delhi
  D. JAIN, IIT Delhi
  R. JAIN, IIT Delhi
  N. SENROY, IIT Delhi
  A. ABHYANKAR, IIT Delhi

• 15PESGM0931, Optimal and Fair Real Power Capping Method for Voltage Regulation in Distribution Networks with High PV Penetration
  J. ZHAO, University of New Haven
  C. WANG, Wayne State University
  Y. WANG, Wayne State University
  L. XU, Farmingdale State College
  A. GOLBAZI, University of New Haven
  J. LU, Chongqing University

• 15PESGM0932, A Sparsified Vector Autoregressive Model for Short-Term Wind Farm Power Forecasting
  M. HE, Texas Tech University
  V. VITTAL, Arizona State University
  J. ZHANG, Arizona State University

• 15PESGM0951, Clean and Efficient Power Dispatch at Hybrid Power Plant with Energy Storage
  F. PAZHERI, King Saud University
  M. OTHMAN, Universiti Teknologi Malaysia
  E. AL-AMMAR, King Saud University
  S. OTTUKULOOTH, Government College of Engineering, Kannur

• 15PESGM0963, Real-Time Simulation and Hardware-in-the-Loop Tests of a Battery System
  J. KHAZAEI, University of South Florida
  L. PIYASINGHE, University of South Florida
  V. DISFANI, University of South Florida
  Z. MIAO, University of South Florida
  L. FAN, University of South Florida

• 15PESGM0986, Dictionary Learning for Short-Term Prediction of Solar PV Production
  P. SHAMS, Missouri University of Science and Technology
  M. MARSOUSI, University of Toronto
  H. XIE, Missouri University of Science and Technology
  W. FRIES, Missouri University of Science and Technology
  C. SHAFFER, Missouri University of Science and Technology

• 15PESGM0998, Optimal Wind Farm Placement Considering System Constraints and Investment and Uncertainty Costs
  E. MITCHELL-COLGAN, Virginia Tech
  C. MISHRA, Virginia Tech
  V. CENTENO, Virginia Tech

• 15PESGM1056, Evaluation of NERC’s BRD Frequency Control Standard in Hydroelectric Generation
  M. FEKRI MOGHADAM, University of British Columbia
  E. VAAHEDI, BC Hydro
  W. DUNFORD, University of British Columbia
- 15PESGM1093, Stochastic Modeling of Small Hydropower and Its Allowed Penetration Level
  Research
  X. WANG, Guangdong University of Technology, China
  Z. PENG, Guangdong University of Technology, China
  X. PENG, Guangdong University of Technology, China
  X. WU, Guangdong University of Technology, China

- 15PESGM1115, Development of Distributed Solar Photovoltaic Energy Market in India
  K. SINGH, GNDEC, Ludhiana
  V. YADAV, Galgotias University
  N. PADHY, IIT Roorkee
  A. SINGLA, Chitkara University

- 15PESGM1141, Multi-Objective Dynamic Optimal Power Flow Using Fuzzy Sets Theory
  Incorporating a Carbon Capture Power Plant
  Y. XIANG, Hohai University
  Z. WEI, Hohai University
  G. SUN, Hohai University
  Y. SUN, Hohai University
  H. ZANG, Hohai University
  K. CHEUNG, ALSTOM Grid Inc.

- 15PESGM1209, Basic Situation of Wind Power Development in China
  H. CHEN, China Southern Power Grid Co., Ltd.
  H. BAI, China Electric Power Research Institute

- 15PESGM1230, Optimal Onshore Wind Power Integration Supported by Local Energy Storages
  C. KLABUNDE, Otto-von-Guericke University of Magdeburg
  N. MOSKALENKO, Otto-von-Guericke University of Magdeburg
  F. LOMBARDI, Fraunhofer-Institute-IFF Magdeburg
  P. KOMARNICKI, Fraunhofer-Institute-IFF Magdeburg
  Z. STYCZYNSKI, Otto-von-Guericke University of Magdeburg

- 15PESGM1240, Temperature Dependency of Partial Shading Effect and Corresponding Electrical
  Characterization of PV panel
  M. HASAN, IIT PATNA
  S. PARIDA, IIT PATNA

- 15PESGM1301, Wind Power Curtailment Analysis under Generation Flexibility Requirements:
  The Spanish Case Study
  S. MARTIN-MARTINEZ, Universidad de Castilla-La Mancha
  E. GOMEZ-LAZARO, Universidad de Castilla-La Mancha
  A. HONRUBIA-ESCRIBANO, Universidad de Castilla-La Mancha
  M. CANAS-CARRETON, Universidad de Castilla-La Mancha
  A. MOLINA-GARCIA, Universidad Politècnica de Cartagena

- 15PESGM1305, Distributed Storage Capacity Reservations for Residential PV Generation
  Utilization and LV Network Operation
  Z. WANG, China State Grid
  C. GU, Bath University
  F. LI, Bath University
  L. QIN, China State Grid

- 15PESGM1330, Capacity Specification for Hybrid Energy Storage System to Accommodate Fast
  PV Fluctuations
  X. WANG, Brookhaven National Laboratory
  M. YUE, Brookhaven National Laboratory

- 15PESGM1388, An Online Autonomous I-V Tracer for PV Monitoring Applications
  C. RILEY, University of Tennessee
  L. TOLBERT, University of Tennessee

- 15PESGM1506, Short-Term Frequency Support of Power System from Wind Farms Using Energy
  Storage System
  J. LIU, Huazhong University of Science and Technology
  W. YAO, Huazhong University of Science and Technology
  J. WEN, Huazhong University of Science and Technology
  Y. LONG, Huazhong University of Science and Technology

- 15PESGM1595, Dynamic Modeling of Adjustable Speed Pumped Storage Hydropower Plant
  E. MULJADI, National Renewable Energy Laboratory
  M. SINGHI, National Renewable Energy Laboratory
  V. GEVORGIAN, National Renewable Energy Laboratory
  M. MOHANPURKAR, Idaho National Laboratory
  R. HOVSAPIAN, Idaho National Laboratory
  V. KORITAROV, Argonne National Laboratory
• 15PESGM1624, Impacts of Voltage Surge and Resonance on a Grid Connected Variable Speed Wind Turbine and Their Remedial Measures  
Z. RAFIQUE, University of Tasmania  
M. HAQUE, University of Tasmania  
M. MAHMUD, Swinburne University of Technology

• 15PESGM1680, Renewable Generation Effect on Net Regional Energy Interchange  
V. DIAKOV, NREL  
G. BRINKMAN, NREL  
P. DENHOLM, NREL  
T. JENKIN, NREL  
R. MARGOLIS, NREL

• 15PESGM1726, Modeling Wind Speed Using Probability Distribution Function, Markov and ARMA Models  
A. BIZRAH, King Fahd University of Petroleum and Minerals  
M. ALMUHAINI, King Fahd University of Petroleum and Minerals

• 15PESGM1767, Reduction of CO₂ Emissions due to Wind Energy – Methods and Issues in Estimating Operational Emission Reductions  
H. HOLTTINEN, VTT  
J. KIVILUOMA, VTT  
J. MCCANN, SEAI  
M. CLANCY, SEAI  
M. MILLIGAN, NREL  
I. PINEDA, EWEA  
P. BÖRRE ERIKSEN, Energinet.dk  
A. ORTHS, Energinet.dk  
O. WOLFGANG, Sintef

• 15PESGM1785, Dealing with a Complex Smart Grid: An Integrated Perspective  
S. DJOKIC, University of Edinburgh  
D. HIRST, Hirst Solutions Limited  
B. BONATTO, UNIFEI – Federal University of Itajuba  
H. ARANGO, UNIFEI – Federal University of Itajuba  
J. LIU, PJM Interconnection  
S. PULLINS, Green Energy Corp.  
R. FEIOCK, Florida State University  
P. RIBEIRO, UNIFEI – Federal University of Itajuba

• 15PESGM1829, Environmental Economic Dispatch towards Multiple Emissions Control Coordination Considering a Variety of Clean Generation Technologies  
Z. GENG, Tsinghua University  
Q. CHEN, Tsinghua University  
X. CHEN, Tsinghua University  
Q. XIA, Tsinghua University  
J. LI, Electric Power Dispatching Center of Guangdong Province  
Y. WANG, Electric Power Dispatching Center of Guangdong Province  
Y. CHEN, Electric Power Dispatching Center of Guangdong Province

• 15PESGM1941, Sliding-Mode Observer-Based Sensorless Direct Power Control of DFIGs for Wind Power Applications  
C. WEI, University of Nebraska-Lincoln  
W. QIAO, University of Nebraska-Lincoln  
Y. ZHAO, Virginia Commonwealth University

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N. ULLAH, Solvina AB

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Z. LUBOSNY, Gdansk University of Technology  
K. DOBRZYNSKI, Gdansk University of Technology  
J. KLUCZNIK, Gdansk University of Technology

• 15PESGM2008, Simple Certificate of Solvability of Power Flow Equations for Distribution Systems  
S. YU, MIT  
H. NGUYEN, MIT  
K. TURITSYN, MIT

• 15PESGM2086, A Multi Task Microgrid Inverter Based Instantaneous Power Theory in Islanded and Grid-Connected Modes  
A. MORTEZAEI, Colorado School of Mines  
M. GODOY SIMÕES, Colorado School of Mines  
T. DAVI CURI BUSARELLO, University of Campinas

• 15PESGM2157, Smart Energy Storage System for Integration of PMSG-Based Wind Power Plant  
R. ABEDI, Baylor University  
K. LEE, Baylor University
• 15PESGM2168, Activation Schemes of Synthetic Inertia Controller on Full Converter Wind Turbine (Type 4)
  F. GONZALEZ-LONGATT, Loughborough University

• 15PESGM2269, Methodology for Grid Current Unbalance Compensation Applying DFIG as a Parallel Active Filter
  V. PRADO SUPPIONI, Universidade Federal do ABC
  A. PIONKOSKI GRILLO PAVANI, Universidade Federal do ABC
  J. TEIXEIRA, Universidade Federal do ABC

• 15PESGM2290, Coordinated Wind Power Plant Control for Frequency Support under Wake Effects
  C. KIM, Hanyang University
  Y. GUI, Hanyang University
  C. CHUNG, Hanyang University

• 15PESGM2312, Open Phase Faults in the External Power Supply Systems of a Nuclear Power Generating Station: Symmetrical Components Analysis and EMTP Validation
  L. ROUCO, Universidad Pontificia Comillas
  A. PONTES, Universidad Pontificia Comillas
  J. ARCHILLA, Iberdrola

• 15PESGM2408, Small-Signal Impedance Modelling of Type-III Wind Turbine
  I. VIETO, Rensselaer Polytechnic Institute
  J. SUN, Rensselaer Polytechnic Institute

• 15PESGM2458, Control and Charge Management of a Grid-Connected Photovoltaic System with Plug-In Hybrid Vehicle as Energy Storage
  Y. ZHANG, University of Tasmania
  M. HAQUE, University of Tasmania
  M. MAHMUD, Swinburne University of Technology

• 15PESGM2509, Optimized Selection and Operation of Electrical Energy Storage Systems
  B. NUNES, UNIFEI
  Y. SILVA, UNIFEI
  E. BORTONI, UNIFEI

• 15PESGM2543, Characterization of GP30EVLF 30 Ah Lithium Iron Phosphate Battery Cells
  Z. SALAMEH, University of Massachusetts Lowell
  D. PATEL, University of Massachusetts Lowell

• 15PESGM2553, A Survey of Techniques for Designing and Managing Microgrids
  R. VENKATRAMAN, Iowa State University
  S. KHAITAN, Iowa State University

• 15PESGM2570, Short-Term Wind Forecasting Using Spatial and Temporal Wind Measurements
  E. OTTENS, Carnegie Mellon University
  A. DANESH, Carnegie Mellon University
  O. ADEKANYE, Carnegie Mellon University
  J. ILIC, Carnegie Mellon University

• 15PESGM2621, Dynamic Voltage Stability of Distribution System with a High Penetration of Rooftop PV Units
  J. YAGHOOB, University of Queensland (UQ)
  N. MITHULANANTHAN, University of Queensland
  T. SAHA, University of Queensland

• 15PESGM2634, A Simplified Configuration and Implementation of a Standalone Microgrid
  J. PHILIP, Indian Institute of Technology, Delhi
  K. KANT, Indian Institute of Technology, Delhi
  C. JAIN, Indian Institute of Technology, Delhi
  B. SINGH, Indian Institute of Technology, Delhi
  S. MISHRA, Indian Institute of Technology, Delhi

• 15PESGM2664, Power Sharing in Microgrids with Minimum Communication Control
  S. NANDANOORI, Iowa State University
  H. POTA, University of New South Wales
  U. VAIYYA, Iowa State University

• 15PESGM2675, Decentralized PI Control with Improved Disturbance Observer for Power Plant Fluidized Bed Combustor
  L. SUN, Tsinghua university
  D. LI, Tsinghua university
  K. LEE, Baylor University

• 15PESGM2685, Emulation for De-Rating and Degradation/Turbidity Factors Effects on PV Module
  S. ALTURAIKI, University of Massachusetts Lowell
  Z. SALAMEH, University of Massachusetts Lowell

• 15PESGM2686, Optimal Allocation of Robotic Wind Turbine inspectors in a Wind Farm
  J. CHEN, New York University
  Q. ZHU, New York University
• 15PESGM2708, The Necessity of Time-Series Simulation for Investigation of Large-Scale Solar Energy Penetration
  A. KHOSHKBAR-SADIGH, University of California Irvine

• 15PESGM2717, A Mixed Integer Modeling of Micro Energy-Hub System
  P. TEIMOURZADEH BABOLI, Mazandaran University
  M. YAZDANI DAMAVANDI, Tarbiat Modares University
  M. PARSA MOGHADDAM, Tarbiat Modares University
  M. HAGHIFAM, Tarbiat Modares University

• 15PESGM2718, Decentralized Power System Emergency Control in the Presence of High Wind Power Penetration
  B. HOSEINZADEH, Aalborg University
  F. FARIA DA SILVA, Aalborg University
  C. LETH BAK, Aalborg University

Insulated Conductors Poster Session (poster)
Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
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PAPERS AND AUTHORS:
• 15PESGM0239, Experimental Evidence Rejecting a Common Method for Finding Soil Thermal Stability
  K. MALMEDAL, NEI Electric Power Engineering
  C. BATES, NEI Electric Power Engineering
  D. CAIN, NEI Electric Power Engineering

• 15PESGM2672, Hybrid High Frequency Pulse and Pattern Recognition Method for Water Tree Detection for Long Distance Underground Cables
  Q. CHEN, Clemson University
  E. MAKRAM, Clemson University
  X. XU, Clemson University

Intelligent Grid Poster Session (poster)
Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: Intelligent Grid Coordinating

PAPERS AND AUTHORS:
• 15PESGM0021, Game-Theory-Based Electricity Market Clearing Mechanisms for an Open and Transactive Distribution Grid
  N. ZHANG, University of Michigan-Dearborn
  Y. YAN, University of Michigan-Dearborn
  S. XU, University of Michigan-Dearborn
  W. SU, University of Michigan-Dearborn

• 15PESGM0024, An Intelligent Power Utilization Strategy in Smart Building Based on AIWPSO
  L. WANG, Nanjing University of Posts and Telecommunications
  J. XIE, Nanjing University of Posts and Telecommunications
  J. LEI, Research Institute of China Southern Power Grid, Guangzhou
  D. YUE, Nanjing University of Posts and Telecommunications

• 15PESGM0087, Optimal Use of Demand Response for Lifesaving and Efficient Capacity Utilization of Power Transformers during Contingencies
  M. HUMAYUN, Aalto University
  M. ALI, Aalto University
  A. SAFDARIAN, Aalto University
  M. DEGEFA, Aalto University
  M. LEHTONEN, Aalto University

• 15PESGM0099, A Hybrid Approach Based on Cuckoo Search for Bi-Level Distributed Wind Generation Allocation in Active Distribution Network
  J. WEN, North China Electric Power University
  J. TONG, North China Electric Power University
  B. ZENG, North China Electric Power University
  J. ZHANG, North China Electric Power University

• 15PESGM0191, Cyber-Physical Risk Assessment for Smart Grid System Protection Scheme
  P. WANG, Iowa State University
  A. ASHOK, Iowa State University
  M. GOVINDARASU, Iowa State University
• 15PESGM0204, Kalman-Filter Based Recursive Regression for Three-Phase Line Parameter Estimation Using Phasor Measurements
  C. MISHRA, Virginia Polytechnic Institute and State University
  A. PAL, Virginia Polytechnic Institute and State University
  V. CENTENO, Virginia Polytechnic Institute and State University
• 15PESGM0252, Highly Distributed State Estimation for a DC Spacecraft Power System
  R. MAY, Vantage Partners, LLC
  C. BEIERLE, NASA Glenn Research Center
  M. HONG, Case Western Reserve University
  K. LOPARO, Case Western Reserve University
• 15PESGM0549, Dynamic Consensus Algorithm based Distributed Unbalance Compensation in Islanded Microgrids
  L. MENG, Aalborg University
  X. ZHAO, Aalborg University
  M. SAVAGHEBI, Aalborg University
  F. TANG, Beijing Jiaotong University
  T. DRAGICEVIC, Aalborg University
  J. VASQUEZ, Aalborg University
  J. GUERRERO, Aalborg University
• 15PESGM0708, Agent-Based Redispatch for Real-Time Overload Relief in Electrical Transmission Systems
  L. ROBITZKY, TU Dortmund University
  S. MUELLER, TU Dortmund University
  S. DALHUES, TU Dortmund University
  U. HAEGER, TU Dortmund University
  C. REHTANZ, TU Dortmund University
• 15PESGM0811, Research on Fault Ride-Through Capacity Enhancement of FSWT Using Fault Current Limiters of Different Types and Impedance
  J. YUAN, Wuhan University
  Y. LEI, Wuhan University
  B. CHEN, Wuhan University
• 15PESGM0894, Advanced Operational Functionalities for Low Voltage Microgrid Test Site
  F. ADINOLFI, University of Genova
  F. D’AGOSTINO, University of Genova
  S. MASSUCCO, University of Genova
  M. SAVIOZZI, University of Genova
  F. SILVESTRO, University of Genova
• 15PESGM0895, Robustness Analysis of Feedback Linearization Distributed Control Schemes in Smart Grid Systems
  A. FARRAJ, University of Toronto
  E. HAMMAD, University of Toronto
  D. KUNDUR, University of Toronto
• 15PESGM0898, Study of Effect of Local PSS and WADC Placement Based on Dominant Inter-Area Paths
  A. PAUL, Indian Institute of Technology Delhi
  M. BHADU, Indian Institute of Technology Delhi
  N. SENROY, Indian Institute of Technology Delhi
  A. ABHYANKAR, Indian Institute of Technology Delhi
• 15PESGM0899, Towards a Real-Time Energy Management System for a Microgrid using a Multi-Objective Genetic Algorithm
  P. VERGARA, University of Campinas
  R. TORQUATO, University of Campinas
  L. P. DA SILVA, University of Campinas
• 15PESGM0978, An Actively Calibrated Capacitively Coupled Electrostatic Device for High Voltage Measurement
  R. SEVLIAN, Stanford University
  J. LIZARAZO, Verivolt LLC
  R. RAJAGOPAL, Stanford University
• 15PESGM1009, Influence of Enhanced Interconnecting Links on Cascading Failures in Smart Grid
  L. LIU, University of Sydney
  J. MA, University of Sydney
  Z. DONG, University of Sydney
  G. CHEN, University of Sydney
  K. WONG, University of Western Australia
• 15PESGM1041, A Novel Evolutionary Game Theoretic Approach to Real-Time Distributed Demand Response
  P. SRIKANTHA, University of Toronto
  D. KUNDUR, University of Toronto

• 15PESGM1108, A New Protection Scheme for DC Microgrid Using Line Current Derivative
  A. MEGHWANI, Indian Institute of Technology, Kanpur
  S. SRIVASTAVA, Indian Institute of Technology, Kanpur
  S. CHAKRABARTI, Indian Institute of Technology, Kanpur

• 15PESGM1125, Operational Improvement of Modular Multilevel Converter with Redundancy Sub-Modules by New NLC Scheme
  B. HAN, Myongji University
  D. KIM, Myongji University
  J. KIM, Myongji University
  Y. YOON, Myongji University

• 15PESGM1142, Optimal Sizing and Placement of Battery Energy Storage in Distribution System Based on Solar Size for Voltage Regulation
  H. NAZARIPOUYA, UCLA
  Y. WANG, UCLA
  P. CHU, UCLA
  H. POTA, UNSW
  R. GADH, UCLA

• 15PESGM1254, Voltage and Current Balancing in Low and Medium Voltage Grid by Means of Smart Transformer
  G. DE CARNE, Kiel University
  G. BUTICCHI, Kiel University
  M. LISERRE, Kiel University
  C. YOON, Aalborg University
  F. BLAABJERG, Aalborg University

• 15PESGM1268, Optimal Energy Management for Grid Connected Microgrid by Using Dynamic Programming Method
  L. NGOC AN, Da Nang University of Technology
  T. QUOC TUAN, CEA Ines

• 15PESGM1269, Generic Modularized Analytical Modelling of Multiport LCL DC Hub and Multiport DC-DC
  W. LIN, University of Aberdeen
  D. JOVCIC, University of Aberdeen
  L. MIAO, Huazhong University of Science and Technology
  J. WEN, Huazhong University of Science and Technology

• 15PESGM1308, A Distributed Strategy for Flexible Load as Spinning Reserves in Power System
  Y. LI, Hohai University
  P. JU, Hohai University
  T. YONG, China Electric Power Research Institute
  J. YAO, China Electric Power Research Institute
  S. YANG, China Electric Power Research Institute
  W. MAO, China Electric Power Research Institute

• 15PESGM1340, Governing Millions Meters Data
  Z. LI, LY Grid Innovation
  F. YANG, University of Wisconsin Platteville

• 15PESGM1386, Recent Developments on Signal Processing for Smart Grids
  L. SILVA, Federal University of Juiz de Fora
  C. DUQUE, Federal University of Juiz de Fora
  P. RIBEIRO, Federal University of Itajubá

• 15PESGM1478, Maximizing Energy Injections of Distributed Generation in Rural Areas
  F. MUZI, University of L’Aquila
  M. POMPLI, University of Rome “Sapienza”

• 15PESGM1520, Provision of Flexible Load Control by Multi-Flywheel-Energy-Storage System in Electrical Vehicle Charging Stations
  B. SUN, Aalborg University
  T. DRAGICEVIC, Aalborg University
  F. ANDRADE, Aalborg University
  J. C. VASQUEZ, Aalborg University
  J. M. GUERRERO, Aalborg University

• 15PESGM1558, Power Sharing Correction in Angle Droop Controlled Inverter Interfaced Microgrids
  R. KOLLURI, University of Melbourne
  I. MARREELS, University of Melbourne
  T. ALPCAN, University of Melbourne
M. BRAZIL, University of Melbourne
J. DE HOOG, University of Melbourne
D. THOMAS, University of Melbourne

• 15PESGM1648, Real-Time Co-Simulation Platform Using OPAL-RT and OPNET for Analyzing Smart Grid Performance
D. BIAN, Virginia Polytechnic Institute and State University
M. KUZLU, Virginia Polytechnic Institute and State University
M. PIPATTANASOMPORN, Virginia Polytechnic Institute and State University
S. RAHMAN, Virginia Polytechnic Institute and State University
Y. WU, KTH Royal Institute of Technology

• 15PESGM1658, A Distributed Solution to Real-Time Economic Dispatch Problem Under Power Flow Congestion
Y. LIU, Zhejiang University
H. XIN, Zhejiang University
Z. QU, University of Central Florida
D. GAN, Zhejiang University

• 15PESGM1771, Primary Frequency Control with Refrigerators Under Startup Dynamics and Lockout Constraints
C. ZIRAS, Power Systems Laboratory, ETH Zurich
E. VRETTOS, Power Systems Laboratory, ETH Zurich
G. ANDERSSON, Power Systems Laboratory, ETH Zurich

• 15PESGM1843, Research of Control Strategy on DC Microgrids Using Smart Power Router
Z. YAO, Xiangtan University
B. DUAN, Xiangtan University

• 15PESGM1923, Research on Short-Term Module Temperature Prediction Model Based on BP Neural Network for Photovoltaic Power Forecasting
Y. SUN, State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources (North China Electric Power University)
F. WANG, State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources (North China Electric Power University)
Z. ZHEN, State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources (North China Electric Power University)
Z. MI, State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources (North China Electric Power University)
C. LIU, China Electric Power Research Institute
B. WANG, China Electric Power Research Institute
J. LIU, China Electric Power Research Institute

• 15PESGM1939, A Secondary Voltage Control Method for an AC/DC Coupled Transmission System Based on Model Predictive Control
F. XU, Tsinghua University
Q. GUO, Tsinghua University
H. SUN, Tsinghua University
B. WANG, Tsinghua University
Q. WU, Technical University of Denmark

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M. CHEN, Xiangtan University
B. DUAN, Xiangtan University

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F. ANTUNES, Cemig GT
P. RIBEIRO, UNIFEI
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• 15PESGM2029, Extremum Seeking Control of Smart Inverters for VAR Compensation
D. ARNOLD, University of California Berkeley
M. NEGRETE-PINCETIC, Pontificia Universidad Catolica de Chile
E. STEWART, Lawrence Berkeley National Laboratory
D. AUSLANDER, University of California Berkeley
D. CALLAWAY, University of California Berkeley

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S. YOU, University of Tennessee, Knoxville
L. ZHU, University of Tennessee, Knoxville
Y. LIU, University of Tennessee, Knoxville
H. LIU, University of Tennessee, Knoxville
Y. LIU, University of Tennessee, Knoxville
M. SHANKAR, Oak Ridge National Laboratory
R. ROBERTSON, Grid Protection Alliance
T. KING, Oak Ridge National Laboratory
- 15PESGM2091, Reliability-Based Updating Strategies of Cyber Infrastructures
  C. WANG, University of Hong Kong
  Y. HOU, University of Hong Kong

- 15PESGM2118, Paradigms and Performance of Distributed Cyber-Enabled Control Schemes for the Smart Grid
  E. HAMMAD, University of Toronto
  A. FARRAJ, University of Toronto
  D. KUNDUR, University of Toronto

- 15PESGM2219, A Fully Distributed Active Power Control Method with Minimum Generation Cost in Grid-Connected Microgrids
  Z. WANG, Tsinghua University
  W. WU, Tsinghua University
  B. ZHANG, Tsinghua University

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  K. TUTTELBERG, Tallinn University of Technology
  J. KILTER, Tallinn University of Technology

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  L. MACKAY, Delft University of Technology
  T. HAILU, Delft University of Technology
  G. CHANDRA MOULI, Delft University of Technology
  L. RAMIREZ-ELIZONDO, Delft University of Technology
  J. FERREIRA, Delft University of Technology
  P. BAUER, Delft University of Technology

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  R. GUPTA, Galgotias University
  D. JHA, GD Goenka University
  V. YADAV, Galgotias University
  S. KUMAR, Galgotias University

- 15PESGM2505, Frequency-Stabilizing Control Scheme for Islanded Microgrids
  F. KAZEMPOUR, University of Toronto
  E. HAMMAD, University of Toronto
  A. FARRAJ, University of Toronto
  D. KUNDUR, University of Toronto

  L. ARUNAGIRI, Indian Institute of Technology Mandi
  A. JAIN, Central Power Research Institute
  B. RAJPURHIT, Indian Institute of Technology Mandi

- 15PESGM2636, The Sliding Mode Load Frequency Controller Design for Renewable Multi-Area Interconnected Power System
  Y. MI, Shanghai University of Electric Power
  Y. YANG, Shanghai University of Electric Power

- 15PESGM0425, Hardware in the Loop Implementation of a Disturbance Based Control in Switched MVDC Grids
  M. CUPPELLI, E.ON Energy Research Center – RWTH Aachen University
  M. DE PAZ CARRO, E.ON Energy Research Center – RWTH Aachen University
  A. MONTI, E.ON Energy Research Center – RWTH Aachen University

Marine Focus Poster Session (poster)
Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: Marine Systems Coordinating Committee
Chair: D. ALEXANDER, Northrop Grumman

PAPERS AND AUTHORS:
- 15PESGM0341, PTO-Sim: Development of a Power Take Off Modeling Tool for Ocean Wave Energy Conversion
  R. SO, Oregon State University
  S. CASEY, Energy Storage Systems, Inc
  S. KANNER, University of California Berkeley
  A. SIMMONS, Oregon State University
  T. BREKKEN, Oregon State University
• 15PESGM0707, IEEE Standards for Oscillating Machines to Advance Direct-Drive Wave Energy Generators
  K. RHINEFRANK, Columbia Power Technologies
  A. SCHACHER, Columbia Power Technologies
  J. PRUDELL, Columbia Power Technologies
  E. HAMMAGREN, Columbia Power Technologies
  T. BREKKEN, Oregon State University
  A. VON JOUANNE, Oregon State University
  J. ZHANG, Oregon State University

• 15PESGM0985, Development of a State Space Model for Wave Energy Conversion Systems
  M. STARRETT, Oregon State University
  R. SO, Oregon State University
  T. BREKKEN, Oregon State University
  A. MCCALL, Dehlsen Associates

• 15PESGM1417, AVR Design and Stability Analysis of Six-Phase Generator-Rectifier Unit for MVDC Applications
  H. LIU, Rensselaer Polytechnic Institute
  J. LIANG, ABB Inc.
  L. QI, ABB Inc.

• 15PESGM1622, Frequency Dependent DC Voltage Droop Control for Hybrid Energy Storage in DC Microgrids
  J. LIANG, ABB
  L. QI, ABB
  J. LINDTJØRNN, ABB
  F. WENDT, ABB

• 15PESGM1769, Wave-Induced Flicker Level Emitted by a Tidal Farm
  A. BLAVETTE, CNRS
  B. MULTON, CNRS
  H. BEN HAMED, CNRS
  L. MORVAN, French Navy
  A. VERSCHAE, French Navy
  M. MACHMOUM, University of Nantes
  D. O'SULLIVAN, Analog Devices

• 15PESGM2407, DC Fault Dynamics in a VSC Based MVDC Shipboard Distribution System (Resubmit)
  E. WILLIAM, Commonwealth Edison
  J. LEMAN, POWER Engineers
  B. JOHNSON, University of Idaho

• 15PESGM2460, A Fault Location Algorithm for Shipboard Power Systems
  P. JAHANMARD, Louisiana State University
  S. MEHRAEEN, Louisiana State University

PEEC Poster Session (poster)

Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: Power & Energy Education
Chairs: B. JOHNSON, University of Idaho
S. BRAHMA, New Mexico State University

PAPERS AND AUTHORS:
• 15PESGM0346, Guidance-Based Hybrid Lab Training Method for Enhancing Core Skills of EE Students
  H. LE, Cal Poly Pomona

• 15PESGM1382, Introduction of Emerging Technologies to Distribution System Laboratory Modules via Simulation
  A. DEESE, College of New Jersey (TCNJ)
  V. CECCHI, University of North Carolina – Charlotte
  B. POUDEL, University of North Carolina – Charlotte
Monday Evening, continued

Power System Communications Poster Session  (poster)
Monday, 27 July, 5:00 PM–8:00 PM  Plaza Ballroom
Sponsored by:  Power System Communications

PAPERS AND AUTHORS:

- 15PESGM0258, A Case Study of Power Line Carrier Using Dynamic Simulation
  R. SUN, Dominion Virginia Power
  B. BOWMAN, Dominion Virginia Power

- 15PESGM1204, Simulation and Testing of Novel Ferro-Transient Suppression Circuit for Capacitor Voltage Transformer
  J. SAKAMURI, Technical University of Denmark
  D. J. YESURAJ, Crompton Greaves Ltd.
  S. JOSHI, Crompton Greaves Ltd.

- 15PESGM1294, Impact Assessment of Communication Service Disruptions in Power System Applications
  Q. WANG, Southeast University
  M. PIPATTANASOMPORN, Virginia Tech
  M. KUZLU, Virginia Tech
  Y. TANG, Southeast University
  Y. LI, Southeast University
  S. RAHMAN, Virginia Tech

- 15PESGM2663, Modeling and Performance Analysis of a PLC System in Presence of Impulsive Noise
  A. DUBEY, National Institute of Technology – Goa
  D. SHARMA, Indian Institute of Technology – Delhi
  R. MALLIK, Indian Institute of Technology – Delhi
  S. MISHRA, Indian Institute of Technology – Delhi

PSDP Poster Session  (poster)
Monday, 27 July, 5:00 PM–8:00 PM  Plaza Ballroom
Sponsored by:  Power System Dynamic Performance
Chairs:  N. ZHOU, Binghamton University
         R. KUIAVA, Federal University of Parana

PAPERS AND AUTHORS:

- 15PESGM0069, Ambient Signal Based Load Model Parameter Identification Using Optimization Method
  X. ZHANG, Tsinghua University
  C. LU, Tsinghua University
  Y. HAN, Tsinghua University
  S. YU, Tsinghua University
  J. WANG, China Southern Power Grid
  H. HUANG, China Southern Power Grid
  Y. SU, China Southern Power Grid

- 15PESGM0220, Study on a Fast Controlled Partition Scheme Based on Improved Dinic Max-Flow Strategy
  F. TANG, Wuhan University
  J. JIA, Wuhan University
  B. WANG, Wuhan University
  Q. LIAO, Wuhan University
  J. WANG, Wuhan University
  Z. ZHU, Wuhan University
  Y. LIU, South-Central University for Nationalities

- 15PESGM0302, Simultaneous Tuning of Fuzzy Power System Stabilizers Using Bat Optimization Algorithm
  M. RAMÍREZ-GONZÁLEZ, Instituto de Investigaciones Eléctricas
  O. MALIK, University of Calgary

- 15PESGM0362, Model Predictive Excitation Control for Constrained Frequency and Voltage Stabilization
  X. MIAO, Carnegie Mellon University
  M. ILIC, Carnegie Mellon University

- 15PESGM0490, Computing Saddle-Node and Limit-Induced Bifurcation Manifolds for Subtransmission and Transmission Wind Generation
  S. BAGHSORKHI, University of Michigan
• 15PESGM0547, Equilibria Analysis of Power Systems Using a Numerical Homotopy Method
  S. CHANDRA, North Carolina State University
  D. MEHTA, University of Notre Dame
  A. CHAKRABORTTY, North Carolina State University

• 15PESGM0610, Optimal Allocation of AC-DC Capacity Considering Cascading Failure Risk of AC-DC Parallel Power System
  J. TU, China Electric Power Research Institute
  Z. LU, Zhejiang University
  X. SONG, State Grid Jilin Electric Power Supply Company
  Y. LIU, Zhejiang University

• 15PESGM0656, Minimum-Cost Generation-Shedding for Dynamic Remedial Action Scheme
  A. SHRESTHA, University of North Carolina Charlotte
  V. CECCHI, University of North Carolina Charlotte
  R. COX, University of North Carolina Charlotte

• 15PESGM0769, Correlation between Frequency Response and Short-Circuit Performance due to High Wind Penetration
  N. MASOOD, University of Queensland
  R. YAN, University of Queensland
  T. SAHA, University of Queensland
  M. PIEKUTOWSKI, Hydro Tasmania

• 15PESGM0796, Classification and Modelling of Loads in Power Systems Using SVM and Optimization Approach
  V. VIGNESH, Indian Institute of Technology, Kanpur
  S. CHAKRABARTI, Indian Institute of Technology, Kanpur
  S. SRIVASTAVA, Indian Institute of Technology, Kanpur

• 15PESGM0804, Distributed Economic Automatic Generation Control: A Game Theoretic Perspective
  Z. WANG, Tsinghua University
  F. LIU, Tsinghua University
  L. CHEN, Tsinghua University
  S. MEI, Tsinghua University

• 15PESGM0845, Studies of Fault Protection Strategies Aiming to DC System with DC Converter
  Y. ZHAO, Tsinghua University
  L. SHI, Tsinghua University
  L. YAO, China Electric Power Research Institute
  Z. WANG, China Electric Power Research Institute
  B. YANG, China Electric Power Research Institute

• 15PESGM0846, Nonlinear Adaptive Excitation Controller Design for Multimachine Power Systems
  T. ROY, Swinburne University of Technology
  M. MAHMUD, Swinburne University of Technology
  W. SHEN, Swinburne University of Technology
  A. OO, Deakin University

• 15PESGM0864, Critical Machine Cluster Identification Using the Equal Area Criterion
  T. WECKESSER, Technical University of Denmark
  H. JÖHANNSSON, Technical University of Denmark
  J. ØSTERGAARD, Technical University of Denmark

• 15PESGM0926, Evaluation of Synthetic Inertia Provision from Wind Plants
  F. TENG, Imperial College London
  G. STRBAC, Imperial College London

• 15PESGM0940, Generic VSC-Based DC Grid EMT Modeling, Simulation, and Validation on a Scaled Hardware Platform
  L. VANFRETTI, KTH Royal Institute of Technology
  W. LI, KTH Royal Institute of Technology
  A. EGEA-ALVAREZ, UPC – Universitat Politecnica de Catalunya
  O. GOMIS-BELLMUNT, UPC – Universitat Politecnica de Catalunya

• 15PESGM0955, Towards Consistent Model Exchange and Simulation of VSC-HVdc Controls for EMT Studies
  R. ROGERSTEN, KTH Royal Institute of Technology
  L. VANFRETTI, KTH Royal Institute of Technology
  W. LI, KTH Royal Institute of Technology

• 15PESGM0956, Transient Stability of the US Western Interconnection with High Wind and Solar Generation
  K. CLARK, National Renewable Energy Laboratory
  N. MILLER, GE
  M. SHAO, GE
  S. PAJIC, GE
  R. D’AQUILA, GE
• 15PESGM0958, Linear Quadratic Control of SSSC to Increase Power Oscillations Damping of HVDC-AC Power System
  R. FAN, Georgia Institute of Technology
  L. SUN, Georgia Institute of Technology
  Z. TAN, Georgia Institute of Technology
• 15PESGM0960, Dynamic State Estimation and Parameter Calibration of a DFIG Using the Ensemble Kalman Filter
  R. FAN, Georgia Institute of Technology
  Z. HUANG, Pacific Northwest National Laboratory
  S. WANG, Pacific Northwest National Laboratory
  R. DIAO, Pacific Northwest National Laboratory
  D. MENG, Pacific Northwest National Laboratory
• 15PESGM1004, Study of Flatness-Based Automatic Generation Control Approach on an NPCC System Model
  M. HASSANI VARIANI, University of Tennessee, Knoxville
  S. WANG, University of Tennessee, Knoxville
  K. TOMSOVIC, University of Tennessee, Knoxville
• 15PESGM1090, Distributed Self-Sensing Secondary Loads for Frequency Regulation in Wind-Powered Islanded Microgrids
  R. WIES, University of Alaska Fairbanks
  N. JANSSEN, University of Alaska Fairbanks
  R. PETERSON, University of Alaska Fairbanks
• 15PESGM1095, Design of Defined Controller for Modular Multilevel Converter Based on CPS-SPWM in PSCAD
  H. LI, North China Electric Power University
  C. LIU, North China Electric Power University
  G. LI, North China Electric Power University
  Q. GUO, China Southern Power Grid
  X. LIN, China Southern Power Grid
• 15PESGM1152, Fast Parameter Identification and Modeling of Electric Load Based on Simplified Composite Load Model
  S. YU, Tsinghua University
  S. ZHANG, Tsinghua University
  Y. HAN, Tsinghua University
  C. LU, Tsinghua University
  Z. ZHANG, Tsinghua University
• 15PESGM1228, Reactive Power Management of a AC/DC Microgrid System Using a Smart PV Inverter
  F. RAFI, Griffith University
  M. HOSSAIN, Griffith University
  D. LESKARAC, Griffith University
  J. LU, Griffith University
• 15PESGM1314, Thevenin Equivalent Method for Dynamic Contingency Assessment
  J. MØLLER, Technical University of Denmark
  H. JØHANNSSON, Technical University of Denmark
  J. ØSTERGAARD, Technical University of Denmark
• 15PESGM1381, Monitoring Power System Transient Stability Using Synchrophasor Data
  Y. WU, University of Maine
  L. BADESA, University of Maine
  M. MUSAVI, University of Maine
  P. LERLEY, RLC Engineering
• 15PESGM1392, Using an On-Line BSE Technique for Wide-Area Oscillations Monitoring
  J. AYON, Cinvestav IPN
  S. NARASIMHAN, University of Waterloo
• 15PESGM1557, Bootstrap-Based Hypothesis Test for Detecting Sustained Oscillations
  M. GHORBANIPARVAR, State University of New York at Binghamton
  N. ZHOU, State University of New York at Binghamton
• 15PESGM1582, A Coordination Scheme of FACTS-Based WADC to Improve Small Signal Stability with Transient Stability Constraints in Multi-Machine System
  M. PAN, Wuhan University
  T. LIN, Wuhan University
  G. DING, Wuhan University
  S. DING, Wuhan University
  R. CHEN, Wuhan University
  X. XU, Central China Electric Power
• 15PESGM1659, Control of an Islanded Wind-Diesel Microgrid with High Penetration Level of Wind Generation
  T. LUKASIEVICZ, Federal Technological University of Parana
  R. OLIVEIRA, Federal Technological University of Parana
  G. DRANKA, Federal Technological University of Parana

• 15PESGM1663, Robust Power Systems Stability Assessment with Sum of Squares Optimization
  H. CHOI, University of Minnesota
  P. SEILER, University of Minnesota
  S. DHOPLE, University of Minnesota

• 15PESGM1734, Modeling and Stability Analysis of Modular Multilevel HVDC Converters
  N. CHAUDHURI, North Dakota State University
  R. OLIVEIRA, Ryerson University
  A. YAZDANI, Ryerson University

• 15PESGM1761, A Small-Signal Impedance Method for Analyzing the SSR of Series-Compensated DFIG-Based Wind Farms
  H. LIU, Tsinghua University
  X. XIE, Tsinghua University
  Y. LI, North China Electric Power Research Institute
  H. LIU, North China Electric Power Research Institute
  Y. HU, North China Electric Power Research Institute

• 15PESGM1779, A Decoupling Based Direct Method for Power System Transient Stability Analysis
  B. WANG, University of Tennessee
  K. SUN, University of Tennessee
  X. SU, University of Tennessee

• 15PESGM1844, Distributed Multi-Agent Scheme to Improve Dynamic Voltage Stability of Distribution Networks
  M. RAHMAN, UNSW Canberra
  M. MAHMUD, Swinburne University of Technology
  H. POTA, UNSW Canberra
  M. HOSSAIN, Griffith University
  A. MAUNG THAN OO, Deakin University

• 15PESGM1852, Subband Transmission Line Modelling for Robust Power System Transient Simulation
  P. ARGYROPOULOS, Northeastern University
  H. LEV-ARI, Northeastern University
  A. ABUR, Northeastern University

• 15PESGM1869, Stored Energy Balance for Distributed PV-Based Active Generators in an AC Microgrid
  N. DIAZ, Aalborg University
  D. WU, Aalborg University
  T. DRAGICEVIC, Aalborg University
  J. VÁSQUEZ, Aalborg University
  J. GUERRERO, Aalborg University

• 15PESGM1892, Fast Power System Stabilizer Tuning in Large Power Systems
  S. GHOSH, University of North Carolina at Charlotte
  N. SENROY, Indian Institute of Technology Delhi
  S. MISHRA, Indian Institute of Technology Delhi
  S. KAMALASADAN, University of North Carolina at Charlotte

• 15PESGM1912, IAO Mode Coherence Estimation Utilizing Enhanced-EMD Technique and Correlation Analysis
  N. RONG, Guizhou University
  T. LI, Guizhou University
  S. HAN, Guizhou University
  K. XU, Guizhou Electric Power Testing and Research Institute

• 15PESGM1934, Frequency Responsive Demand in U.S. Western Power System Model
  M. ELIZONDO, Pacific Northwest National Laboratory
  K. KALSI, Pacific Northwest National Laboratory
  C. MOYA CALDERON, Ohio State University
  W. ZHANG, Ohio State University

• 15PESGM2090, Coordinated Attacks Against Power Grids: Load Redistribution Attack Coordinating with Generator and Line Attacks
  Y. XIAO, University of Wisconsin-Milwaukee
  L. WANG, University of Wisconsin-Milwaukee
  D. YU, University of Wisconsin-Milwaukee
  N. LIU, North China Electric Power University
• 15PESGM2196, An Approach for Statistical Quantitative Analysis of Voltage Fluctuations Using Extended Participation Factors
  E. GERALDI JR., University of Sao Paulo
  T. FERNANDES, University of Sao Paulo
  G. ALVES, University of Sao Paulo
  R. RAMOS, University of Sao Paulo

• 15PESGM2203, Voltage-Sag-Severity-Index Based Size Planning of Shunt Capacitor Banks to Improve Short-Term Voltage Stability
  Y. DONG, Tsinghua University
  X. XIE, Tsinghua University
  B. ZHOU, China Southern Power Grid
  W. YAO, China Southern Power Grid

• 15PESGM2230, DFIG-Based Wind Turbines with Virtual Synchronous Control: Inertia Support in Weak Grid
  S. WANG, Huazhong University of Science and Technology
  J. HU, Huazhong University of Science and Technology
  X. YUAN, Huazhong University of Science and Technology

• 15PESGM2296, A New Hybrid Approach to Thevenin Equivalent Estimation for Voltage Stability Monitoring
  M. NAKMALI, University of Oklahoma
  D. OSIPOV, University of Tennessee
  K. SUN, University of Tennessee

• 15PESGM2306, Analysis of Power System Oscillatory Frequency Using Differential Groebner Basis and the Harmonic Balance Method
  N. DUAN, University of Tennessee
  B. WANG, University of Tennessee
  K. SUN, University of Tennessee
  J. NING, Dominion Virginia Power

• 15PESGM2317, An Analytical Approach for Evaluating the Risk of SSR for Reciprocating Engine Based Generation in Series Compensated Networks
  H. YIN, DNV GL
  N. KARNIK, DNV GL
  M. SAHNI, DNV GL
  D. EVANS, South Texas Electric Cooperative
  J. PACKARD, South Texas Electric Cooperative
  J. MOORE, South Texas Electric Cooperative

• 15PESGM2367, Assessment of Discrepancies in Load Models across Transient Stability Software Packages
  K. SHETYE, University of Illinois at Urbana-Champaign
  T. OVERBYE, University of Illinois at Urbana-Champaign
  T. DOERN, Bonneville Power Administration

• 15PESGM2368, A Static Voltage Stability Detector Using Only Local Measurements of Droop-Controlled Generators for Stressed Power Distribution Networks
  Z. WANG, University of Notre Dame
  M. LEMMON, University of Notre Dame

• 15PESGM2387, Simulation of a Power Grid Blackout Event in Vietnam
  H. NGUYEN-DUC, Hanoi university of Science and Technology
  H. CAO DUC, Institute of Energy
  C. NGUYEN-DINH, National Load Dispatch Center
  V. NGUYEN-XUAN-HOANG, HuTech University of Technology

• 15PESGM2435, Robust Ectropy-Based Cooperative Control of a Wind DFIG for Transient Stabilization and MPPT
  S. BAROS, Carnegie Mellon University
  M. ILIC, Carnegie Mellon University

• 15PESGM2441, Utilizing Generator Pair-Wise Potential Energy Functions for Critical Generator Estimation
  C. SAUNDERS, Brunel University
  M. ALAMUTI, Brunel University
  G. TAYLOR, Brunel University
  Y. LIU, Sichuan University
  J. GOU, Sichuan University
  J. LIU, Sichuan University

• 15PESGM2484, Least Squares Estimation-Based Synchronous Generator Parameter Estimation Using PMU Data
  B. MOGHARBEL, University of South Florida
  L. FAN, University of South Florida
  Z. MIAO, University of South Florida
• 15PESGM2517, Inertial Control Methods of Variable-Speed Wind Turbine: Comparative Studies
  L. SUN, Huazhong University of Science and Technology
  X. YUAN, Huazhong University of Science and Technology
  J. HU, Huazhong University of Science and Technology
  W. HE, Huazhong University of Science and Technology

• 15PESGM2524, A Hybrid Framework for Online Dynamic Security Assessment Combining High Performance Computing and Synchrophasor Measurements
  E. FARANTATOS, Electric Power Research Institute
  A. DEL ROSSO, Electric Power Research Institute
  N. BHATT, Electric Power Research Institute
  K. SUN, University of Tennessee Knoxville
  Y. LIU, University of Tennessee Knoxville
  L. MIN, Lawrence Livermore National Lab
  C. JING, E-MIT
  J. NING, Alstom Grid
  M. PARASHAR, Alstom Grid

• 15PESGM2571, Real-Time Monitoring of Long-Term Voltage Stability via Local Linear Regression
  S. LI, Iowa State University
  V. AJJARAPU, Iowa State University

• 15PESGM2623, Legacy SE to Distributed Dynamic State Estimators: Evolution and Experience
  S. MELIOPOULOS, Georgia Tech

• 15PESGM2690, Experimental Transient Stability Analysis of MicroGrid Systems: Lessons Learned
  R. BELKACEMI, TNTECH
  S. ZARRABIAN, TNTECH
  A. BABALOLA, TNTECH
  R. CRAVEN, TNTECH

**Power System Instrumentation and Measurements Poster Session** *(poster)*

Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom

Sponsored by: Power System Instrumentation and Measurements

**PAPERS AND AUTHORS:**

• 15PESGM0057, Radial Thermal Circuit Model for Overhead Conductors Based on Parameter Identification Under Natural Convection Condition
  F. KAI, Nanjing University of Science & Technology
  Y. ZHANFENG, Nanjing University of Science & Technology
  T. XUAN, Nanjing University of Science & Technology

• 15PESGM0635, Variable Window Length Applied to a Modified Hanning Filter for Optimal Amplitude Estimation of Power Systems Signals
  T. MENDONÇA, Federal University of Juiz de Fora
  C. MARTINS, Federal University of Juiz de Fora
  M. PINTO, Federal University of Juiz de Fora
  C. DUCUE, Federal University of Juiz de Fora

• 15PESGM0779, Estimation of Power System Frequency Using a Modified Non-Linear Least Square Technique
  P. RAY, NIT Rourkela
  G. PANDA, NIT Meghalaya
  S. BENGANI, NIT Rourkela

• 15PESGM0887, On the Estimation of an Optimum Size of Energy Storage System for Local Load Shifting
  C. PARK, Zurich University of Applied Sciences
  F. SEGUNDO SEVILLA, Zurich University of Applied Sciences
  V. KNAZKINS, Zurich University of Applied Sciences
  P. KORBA, Zurich University of Applied Sciences
  J. POLAND, ABB Corporate Research

• 15PESGM0927, Dynamic PMU Compliance Test Under C37.118.1a-2014
  R. GHIGA, Technical University of Denmark

• 15PESGM0959, Synchronized Rotor Angle Measurement Using Microprocessors
  J. DELPORT, Virginia Tech
  J. DEL LA REE, Virginia Tech

• 15PESGM1134, Topology Detection in Microgrids with Micro-Synchrophasors
  R. ARGHANDEH, University of California, Berkeley
  M. GAHR, ETH Zurich
  A. VON MEIER, University of California, Berkeley
  G. CAVRARO, University of Padova
  M. RUH, ETH Zurich
  G. ANDERSSON, ETH Zurich
• 15PESGM1163, Phase Identification in Distribution Networks with Micro-Synchrophasors
  M. WEN, University of Hong Kong
  R. ARGHANDEH, University of California, Berkeley
  A. VON MEIER, University of California, Berkeley
  K. POOLLA, University of California, Berkeley
  V. LI, University of Hong Kong

• 15PESGM1727, PMU-Aided Voltage Security Assessment for a Wind Power Plant
  H. JIANG, University of Denver
  Y. ZHANG, NREL
  J. ZHANG, University of Denver
  E. MULJADI, NREL

• 15PESGM1863, Estimation of Phasor Under Dynamic Conditions Using Convolution
  A. SHAIK, National Institute of Technology Meghalaya
  P. TRIPATHY, Indian Institute of Technology Guwahati

• 15PESGM2336, Data-Driven Approach for Distribution Network Topology Detection
  G. CAVRARO, University of Padova
  R. ARGHANDEH, University of California, Berkeley
  A. VON MEIER, University of California, Berkeley
  K. POOLLA, University of California, Berkeley

• 15PESGM2406, Phasor Measurement Based Voltage Sensitivities for Contingency Analysis
  H. RETTY, Virginia Tech

• 15PESGM2478, Adaptive Transversal Digital Filter for Reference Current Detection in Shunt Active
  Power Filter
  A. MOHAMED, FIU University
  A. BERZOY, FIU University
  O. MOHAMMED, FIU University

• 15PESGM2522, Amplitude-Phase-Locked Loop: Estimator of Three-Phase Grid Voltage Vector
  L. SHANG, Huazhong University of Science and Technology
  J. HU, Huazhong University of Science and Technology
  X. YUAN, Huazhong University of Science and Technology
  W. TANG, Huazhong University of Science and Technology
  X. HOU, Huazhong University of Science and Technology

PSO Poster Session (poster)

Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom

Sponsored by: Power System Operations
Chair: L. BARROSO, PSR

PAPERS AND AUTHORS:

• 15PESGM0017, Modelling the Benefits of Smart Energy Scheduling in Micro-Grids
  H. CAI, State Grid Jiangsu Economic Research Institute
  J. HUANG, State Grid Jiangsu Economic Research Institute
  Z. XIE, State Grid Jiangsu Economic Research Institute
  T. LITTLER, Queen’s University Belfast, U.K.

• 15PESGM0043, A Modified Levenberg-Marquardt Approach to Explore the Limit Operation State
  of AC/DC Hybrid System
  J. CAO, Shanghai Jiao Tong University
  Z. YAN, Shanghai Jiao Tong University
  X. XU, Shanghai Jiao Tong University

• 15PESGM0118, A Practical Clustering Method of DFIG Wind Farms based on Dynamic Current
  Error
  T. SUN, Harbin Institute of Technology
  X. MOU, Harbin Institute of Technology
  Z. LI, Harbin Institute of Technology

• 15PESGM0122, Decentralized Synergetic Dispatch of Prosumer-Based Interconnected Microgrids
  J. SHEN, Zhejiang University
  Y. WEN, Zhejiang University
  C. GUO, Zhejiang University
  S. MA, China Electric Power Research Institute
  J. ZHANG, China Electric Power Research Institute

• 15PESGM0228, Toward Online Line Switching Method for Relieving Overloads in Power Systems
  W. LIU, TianJin University
  H. CHIANG, Cornell University
• 15PESGM0273, ERCOT Experience in Using Online Stability Analysis in Real-Time Operations
  J. CHEN, Electric Reliability Council of Texas
  T. MORTENSEN, Electric Reliability Council of Texas
  C. THOMPSON, Electric Reliability Council of Texas
  B. BLEVINS, Electric Reliability Council of Texas
  P. DU, Electric Reliability Council of Texas

• 15PESGM0275, PMU Based Robust Dynamic State Estimation Method for Power Systems
  J. ZHAO, Southwest Jiaotong University
  G. ZHANG, Southwest Jiaotong University
  L. MASSIMO, Politecnico di Bari

• 15PESGM0323, Probabilistic Load Flow Evaluation with Hybrid Latin Hypercube Sampling and Multiple Linear Regression
  X. XU, Shanghai Jiao Tong University
  Z. YAN, Shanghai Jiao Tong University

• 15PESGM0332, Sensitivity Analysis of Dynamic Tariff Method for Congestion Management in Distribution Networks
  S. HUANG, Technical University of Denmark
  Q. WU, Technical University of Denmark
  Z. LIU, Technical University of Denmark
  H. ZHAO, Technical University of Denmark

• 15PESGM0378, Optimal Scheduling of Energy Storage System in Wind Power Integrated System Based on Bi-Level Programming
  S. ZHAO, State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources
  Y. WANG, State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources
  Y. XU, State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources
  J. YIN, State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources

• 15PESGM0405, An Optimization Method of Unit Restoration Based on NNIA for Power System Restoration
  S. LI, North China Electric Power University
  X. GU, North China Electric Power University
  K. LI, North China Electric Power University
  J. DONG, North China Electric Power University

• 15PESGM0407, Initialization to Grid-Integrated BDFM under MPPT and Dispatch Modes
  S. LI, Hefei University of Technology

• 15PESGM0498, A Coordinated Approach to Energy Exchange between Electric Vehicle Load Aggregators and Wind Generation Companies under Uncertainty
  M. NEGNEVITSKY, University of Tasmania
  A. TAVAKOLI, University of Tasmania
  K. MUTTAQI, University of Wollongong

• 15PESGM0520, Application of the Forecast Error on Unit Commitment with Renewable Power Integration
  X. JIANG, Wuhan University
  H. CHEN, Wuhan University
  X. LIU, Wuhan University
  T. XIAO, Wuhan University

• 15PESGM0525, A New Type of MW and MVar Dispatch Index for Meeting Voltage Stability Margin Criteria based on Normal Vector of Limit Surface
  S. FANG, Shanghai Jiaotong University
  H. CHENG, Shanghai Jiaotong University
  Y. SONG, Shanghai Jiaotong University
  Q. ZHOU, China Electric Power Research Institute
  H. HE, China Electric Power Research Institute
  P. ZENG, China Electric Power Research Institute

• 15PESGM0546, VSCADA: A Reconfigurable Virtual SCADA Test-Bed for Simulating Power Utility Control Center Operations
  A. DAYAL, Virginia Tech
  Y. DENG, Virginia Tech
  A. TBAILEH, Virginia Tech
  S. SHUKLA, Virginia Tech

• 15PESGM0560, A Conic Programming Approach to Optimal Transmission Switching Considering Reactive Power and Voltage Security
  Y. BAI, Tsinghua University
  H. ZHONG, Tsinghua University
  Q. XIA, Tsinghua University
  Y. WANG, State Grid Corporation of China
Monday Evening, continued

- **15PESGM0561, EMS Experience of Reactive Power Control for LCC Based HVDC System**
  R. DAI, Alstom
  D. HWANG, Alstom
  X. LIU, AESO
  Y. XIA, AESO
  W. QIU, Alstom
  W. WANG, Alstom

- **15PESGM0566, DC Power Flow Using Fuzzy Linear Equations**
  H. LIVANI, University of Nevada Reno
  S. JAFARZADEH, California State University Bakersfield
  M. FADALI, University of Nevada Reno

- **15PESGM0615, Hedging Against Uncertainties for Wind Power Producer with Block Futures Contracts**
  Y. XIAO, Xi’an Jiaotong University
  X. WANG, Xi’an Jiaotong University
  C. DU, Xi’an Jiaotong University
  S. LIU, Xi’an Jiaotong University

- **15PESGM0646, A High-Speed, Real-Time Visualization and State Estimation Platform for Monitoring and Control of Electric Distribution Systems: Implementation and Field Results**
  B. LUNDSTROM, National Renewable Energy Laboratory
  P. GOTSEFF, National Renewable Energy Laboratory
  J. GIRALDEZ, National Renewable Energy Laboratory
  M. CODDINGTON, National Renewable Energy Laboratory

- **15PESGM0681, Equivalent Ramp Rate Function for Thermal Power Systems**
  H. ZHONG, Tsinghua University
  S. RAHMAN, Virginia Tech
  Q. XIA, Tsinghua University
  C. KANG, Tsinghua University

- **15PESGM0692, Real-Time Wide-Area Loading Margin Sensitivity (WALMS) in Power Systems**
  H. YUAN, University of Tennessee
  T. JIANG, Tianjin University
  H. JIA, Tianjin University
  F. LI, University of Tennessee
  Y. MISHRA, Queensland University of Technology
  H. CHEN, Northeast Dianli University
  G. LI, Northeast Dianli University

- **15PESGM0791, Development and Test of Conservation Voltage Reduction Application for Korean Smart Distribution Management System**
  S. GO, Chonnam National University
  S. AHN, Chonnam National University
  J. CHOI, Chonnam National University
  W. JUNG, KEPCO Research Institute
  C. CHU, KEPCO Research Institute

- **15PESGM0872, Identification of Critical Network Elements and Recommendations to Sustain Electricity Market in Southeast Europe**
  G. MAJSTROVIC, Energy Institute Hrvoje Pozar
  D. BAJIS, Energy Institute Hrvoje Pozar
  W. POLEN, United States Energy Association

- **15PESGM0877, Supervisory Control for VSC-HVDC Grid Interconnecting AC Systems**
  M. FIDAI, KTH, Royal Institute of Technology
  D. BABAZADEH, KTH, Royal Institute of Technology
  A. MUTHUKRISHNAN, KTH, Royal Institute of Technology
  L. NORDSTRÖM, KTH, Royal Institute of Technology

- **15PESGM0892, Calculating the Long Term Voltage Stability Margin Using a Linear Index**
  A. RAMAPURAM MATAVALAM, Iowa State University
  V. AJJARAPU, Iowa State University

- **15PESGM0916, Charging Schedule for Electric Vehicles in Danish Residential Distribution Grids**
  J. PILLAI, Aalborg University
  S. HUANG, Aalborg University
  P. THØGERSEN, kk-electronic
  B. BAK-JENSEN, Aalborg University

- **15PESGM0938, Analysis of Bad Data Detection in Power System State Estimators Considering PMUs**
  M. YUCRA CCAHUANA, University of Campinas
  F. SCHMIDT, University of Campinas
  M. CORTES DE ALMEIDA, University of Campinas
• 15PESGM1011, Hierarchical Control Approach for Microgrid Load Sharing with Renewable Energy Sources
  M. BARIK, University of New South Wales
  H. POTA, University of New South Wales
  J. RAVISHANKAR, University of New South Wales

• 15PESGM1012, Case Studies of Application of Process Immunity Time in Assessment of Financial Losses due to System Faults Induced Industrial Process Interruptions
  J. CEBRIAN, University of Sao Paulo
  J. MILANOVIC, University of Manchester
  N. KAGAN, University of Sao Paulo

• 15PESGM1052, A New DMS with Real-Time Security Analysis and Control Based on Security Region
  J. XIAO, Tianjin University
  G. ZU, Tianjin University
  Q. HE, Tianjin University
  F. LI, University of Tennessee

• 15PESGM1116, DC Power Flow Estimation Utilizing Bayesian-Based LMMSE Estimator
  M. AMINI, Carnegie Mellon University
  M. ILIC, Carnegie Mellon University
  O. KARABASOGLU, Sun Yat-sen University-Carnegie Mellon University

• 15PESGM1158, Control of Storage Batteries Using a Disturbance Observer in Load Frequency Control for Large Wind Power Penetration
  Y. KURITA, Waseda University
  Y. MORIYA, Waseda University
  S. IWAMOTO, Waseda University

• 15PESGM1211, Game Theory Method for Multi-Objective Optimal Operation of Microgrid
  P. LI, North China Electric Power University
  J. MA, North China Electric Power University
  B. ZHAO, State Grid Zhejiang Electric Power Company

• 15PESGM1225, Data Mining & Pattern Recognition of Voltage Sag Based on K-Means Clustering Algorithm
  R. DUAN, Shanghai Jiaotong University
  F. WANG, Shanghai Jiaotong University
  R. HUANG, Shenzhen Power Grid Co. Ltd.
  J. ZHANG, Shanghai Jiaotong University
  X. ZHANG, Shenzhen Power Grid Co. Ltd.

• 15PESGM1255, Measurement-Based Real-Time Economic Dispatch
  K. VAN HORN, University of Illinois at Urbana-Champaign
  A. DOMINGUEZ-GARCIA, University of Illinois at Urbana-Champaign
  P. SAUER, University of Illinois at Urbana-Champaign

• 15PESGM1397, An IGDT-Based Intraday Scheduling Strategy Method Considering Wind Power Ramp Event
  H. MA, Shandong University
  Y. LIU, Shandong University

• 15PESGM1412, Efficient Data Acquisition in Advanced Metering Infrastructure
  Z. HU, University of Tennessee at Chattanooga
  S. MOHAGHEGHI, Colorado School of Mines
  M. SARTIPI, University of Tennessee at Chattanooga

• 15PESGM1482, A Study on Optimal Operation of Microgrids Considering the Uncertainty of Renewable Generation and Load by Use of Duration Curves
  B. LEE, Incheon National University
  J. YANG, Incheon National University

• 15PESGM1496, A Taguchi-Based Approach for Optimal Placement of Distributed Generations for Power Loss Minimization in Distribution System
  N. MEENA, Malaviya National Institute of Technology
  A. SWARNKAR, Malaviya National Institute of Technology
  N. GUPTA, Malaviya National Institute of Technology
  K. NIAZI, Taibah University

• 15PESGM1554, An Alternative Method for Multiarea State Estimation Based on OCD
  X. GONZALEZ, CINVESTAV del IPN
  J. RAMIREZ, CINVESTAV del IPN
  G. CAICEDO, Universidad del Valle

• 15PESGM1561, A Method of Power Quality Evaluation based on Vague Sets
  L. WANG, Wuhan University
  H. CHEN, Wuhan University
  K. XU, Wuhan University

Monday Evening, continued
• 15PESGM1609, Energy Loss Estimation in Distribution Networks Using Stochastic Simulation-V2
  Z. MAHMOODZADEH, Washington State University
  N. GHANBARI, Sharif University of Technology
  A. MEHRIZI-SANI, Washington state university
  M. EHSAN, Sharif University of Technology

• 15PESGM1612, Achieving Real-Time Economic Dispatch in Power Networks via a Saddle Point Design Approach
  X. ZHANG, University of Oxford
  N. LI, Harvard University
  A. PAPACHRISTODOULO, University of Oxford

• 15PESGM1628, Convex Envelopes of Optimal Power Flow with Branch Flow Model in Rectangular Form
  Z. QIN, University of Hong Kong
  Y. HOU, University of Hong Kong
  Y. CHEN, China Southern Power Grid (CSG) Co., Ltd

• 15PESGM1650, Baseline and Target Values for PV Forecasts: Toward Improved Solar Power Forecasting
  J. ZHANG, National Renewable Energy Laboratory
  B. HODGE, National Renewable Energy Laboratory
  S. LU, IBM TJ Watson Research Center
  H. HAMANN, IBM TJ Watson Research Center
  B. LEHMAN, Northeastern University
  J. SIMMONS, University of Arizona
  E. CAMPOS, Argonne National Laboratory
  V. BANUNARAYANAN, U.S. Department of Energy

• 15PESGM1698, A Data Mining Approach for Real-Time Corrective Switching
  J. SHI, University of California at Berkeley
  S. OREN, University of California at Berkeley

• 15PESGM1716, Multistage Phasor-Aided Bad Data Detection and Identification
  J. ZHAO, Southwest Jiaotong University
  G. ZHANG, Southwest Jiaotong University
  L. MASSIMO, Politecnico di Bari
  J. ZHANG, Virginia Tech-Advanced Research Institute

• 15PESGM1732, Mitigation of Wind Output Curtailment by Coordinating with Pumped Storage and Increasing Transmission Capacity
  J. ZOU, Wuhan University
  S. RAHMAN, Virginia Tech
  X. LAI, Wuhan University

• 15PESGM1733, Analysis of Load Shedding Parameters Through a New Scoring Metric System
  A. SANTOS, University of São Paulo
  R. MONARO, University of São Paulo
  D. COURY, University of São Paulo
  M. OLESKOVICZ, University of São Paulo

• 15PESGM1768, Short Term Self Scheduling of Hydro Power Plants with Intra-Day Regulation Capacity. Case Study of Los Molles and Sauzal in Chile
  J. VILLAVICENCIO, Endesa Chile
  R. RAMIREZ, Endesa Chile
  E. PEREIRA-BONVALLET, Endesa Chile

• 15PESGM1807, Power System Reliability Enhancement Considering Smart Monitoring
  B. FALAHATI, Operation Technology Inc.
  A. KARGARIAN, Carnegie Mellon University

• 15PESGM1809, A Synchronphasor System Emulator – Software Approach and Real-Time Simulations
  G. ZENG, Powertech Labs Inc.
  F. HOWELL, Powertech Labs Inc.
  L. WANG, Powertech Labs Inc.

• 15PESGM1823, Economic and Reliable Operation of Renewable-Powered Microgrids Considering Uncertainties and Hourly Reliability Worth
  W. ALHARBI, University of Waterloo
  K. RAAHEMIFAR, Ryerson University
  K. BHATTACHARYA, University of Waterloo

• 15PESGM1835, Combined and Optimized Redispatch Management of Multiple Congestions and Voltage Deviations with Active and Reactive Power based on AC-PTDFs with Distributed Slack
  T. LEVERINGHAUS, Leibniz Universität Hannover, Germany
  L. HOFMANN, Leibniz Universität Hannover, Germany
• 15PESGM1841, Robust Voltage Control Model for Active Distribution Network Considering PVs and Loads Uncertainties
  Y. WANG, Tsinghua University
  W. WU, Tsinghua University
  B. ZHANG, Tsinghua University
  Z. LI, Tsinghua University
  W. ZHENG, Tsinghua University

• 15PESGM1861, A Novel Load Frequency Control Strategy Based on Model Predictive Control
  X. SHI, Southeast University
  J. HU, Southeast University
  J. YU, Southeast University
  T. YONG, China Electric Power Research Institute

• 15PESGM1917, A Novel SMEM and Sensitivity based Model and Algorithm of Transient Stability Constrained Optimal Power Flow
  J. ZHAO, Hohai University
  L. QIAN, Hohai University
  G. CHEN, Hohai University

• 15PESGM1918, Impacts of Plug-In Electric Vehicles on Local Distribution Feeders
  H. LE, Cal Poly Pomona

• 15PESGM1920, Two-Stage Optimization Method for Network Reconfiguration and Load Recovery During Power System Restoration
  S. LIAO, Huazhong University of Science and Technology
  W. YAO, Huazhong University of Science and Technology
  X. HAN, Huazhong University of Science and Technology
  J. WEN, Huazhong University of Science and Technology
  Y. HOU, University of Hong Kong

• 15PESGM1924, Distributed Control of Multiple Electric Springs in Microgrids
  X. CHEN, University of Hong Kong
  Y. HOU, University of Hong Kong

• 15PESGM1969, Dynamic Optimal Control of Sustained Overvoltage during Power System Restoration Process
  B. CHEN, Shandong University
  H. WANG, Shandong University
  X. CAO, Shandong University

• 15PESGM1970, Optimal HSVC Droop Planning for the Voltage Profile Improvements in Bulk Power Systems
  J. AN, North East Dianli University
  G. HUANG, Texas A&M University
  G. MU, North East Dianli University
  T. ZHENG, State Grid Jilin Electric Power Supply Company
  Y. ZHOU, North East Dianli University

• 15PESGM2001, A Design Scheme of the Smart Appliances to Minimize Energy Cost without Reducing Customer's Utility
  H. SONG, Seoul National University
  S. PARK, Seoul National University
  Y. YOON, Seoul National University

• 15PESGM2042, Control and Dynamic Performance Evaluation of Multi-Terminal DC Grid
  N. YOUSEFPOR, Quanta Technology
  S. BHATTACHARYA, North Carolina State University

• 15PESGM2048, Neural Network Approach for Improving AGC Control Performance
  D. CHEN, Siemens

• 15PESGM2064, Graph Theory Based Splitting Strategies for Power System Islanding Operation
  T. DING, Tsinghua University
  K. SUN, University of Tennessee, Knoxville
  F. LI, University of Tennessee, Knoxville
  H. SUN, Tsinghua University
  X. ZHANG, State Grid Gansu Electric Power Research Institute

• 15PESGM2087, Locational Allocation and Pricing of Responsive Contingency Reserves
  J. PRADA, Carnegie Mellon University
  M. ILIC, Carnegie Mellon University

• 15PESGM2285, Study of the Impact of Communication Failures on Power System
  Y. XUE, NARI Technology Inc.
  M. NI, NARI Technology Inc.
  J. YU, Southeast University
  J. HU, Southeast University
  W. YU, NARI Technology Inc.
• 15PESGM2319, Co-Located Storage Systems with Renewable Energy Sources for Voltage Support in Distribution Networks
  V. CALDERARO, University of Salerno
  V. GALDI, University of Salerno
  F. LAMBERTI, University of Salerno
  A. PICCOLO, University of Salerno

• 15PESGM2333, Robust Mean-Variance Optimization Model for Grid-Connected Microgrids
  L. BAI, University of Tennessee, Knoxville
  T. DING, University of Tennessee, Knoxville
  Q. HU, University of Tennessee, Knoxville
  F. LI, University of Tennessee, Knoxville
  H. SUN, Tsinghua University

• 15PESGM2348, Stochastic Coordinated Transaction Scheduling via Probabilistic Forecast
  Y. JI, Cornell University
  L. TONG, Cornell University

• 15PESGM2381, Heuristic Optimization for Wind Energy Integrated Optimal Power Flow
  W. BAI, Baylor University
  I. EKE, Kirikkale University
  K. LEE, Baylor University

• 15PESGM2420, Information Theoretic Index for Regime Shifts in Power Systems
  L. REN, University of Connecticut
  P. ZHANG, University of Connecticut
  H. YE, Shandong University

• 15PESGM2506, A Method to Improve Reactive Reserve Management with Respect to Voltage Stability
  Q. SUN, Shanghai Jiao Tong University
  H. CHENG, Shanghai Jiao Tong University
  J. ZHANG, China Electric Power Research Institute
  B. LI, China Electric Power Research Institute
  Y. SONG, University of Hong Kong
  D. YANG, Shanghai Jiao Tong University
  S. FANG, Shanghai Jiao Tong University

• 15PESGM2578, Detection of Event Sequences Leading to Cascading Failures in Power Systems
  J. HAZRA, IBM Research
  A. SINHA, IIT Kharagpur

• 15PESGM2632, Experimental Evaluation of Cyber Attacks on Automatic Generation Control Using a CPS Security Testbed
  A. ASHOK, Iowa State University
  P. WANG, Iowa State University
  M. BROWN, Iowa State University
  M. GOVINDARASU, Iowa State University

PSPI Poster Session (poster)

Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: Power System Planning and Implementation
Chair: F. F. LI, University of Tennessee

PAPERS AND AUTHORS:
• 15PESGM0039, An Aggregated Multi-Cut Decomposition Algorithm for Two-Stage Transmission Expansion Planning Problems
  H. ZHANG, California ISO
  V. VITTAL, Arizona State University
  G. HEYDT, Arizona State University

• 15PESGM0156, Integrated Electricity Generation, CHPs, and Boilers Expansion Planning: Alberta Case Study
  Y. MOZAFARI, University of Calgary
  W. ROSEHART, University of Calgary
  H. ZAREIPOUR, University of Calgary

• 15PESGM0227, Enhanced NERC TPL-003 Steady State Compliance Studies at American Transmission Company
  C. GUO, American Transmission Company
  C. LAWRENCE, American Transmission Company
  M. VAIMAN, V&R Energy Systems Research, Inc.
• 15PESGM0327, A Hierarchical Charging Strategy for Electric Vehicles Considering the Users’ Habits and Intentions
  J. NING, Southeast University
  Y. TANG, Southeast University
  W. GAO, University of Denver

• 15PESGM0348, Batch and Sequential Forecast Models for Photovoltaic Generation
  F. GOLESTANEH, Nanyang Technological University
  H. GOOI, Nanyang Technological University

• 15PESGM0382, A Preliminary Study of Building a Transmission Overlay for Regional US Power Grid
  Y. LEI, University of Tennessee
  Y. LU, University of Tennessee
  Y. LI, University of Tennessee
  Y. LIU, University of Tennessee
  F. WANG, University of Tennessee
  K. TOMSOVIC, University of Tennessee

• 15PESGM0392, Kernel-Based Electric Vehicle Charging Load Modeling with Improved Latin Hypercube Sampling
  W. LI, Chongqing University
  M. LIANG, Chongqing University
  J. YU, Chongqing University
  L. SHI, State Grid Chongqing Electric Power Research Institute

• 15PESGM0555, Electric Vehicle Capacity Forecasting Model with Application to Load Levelling
  B. ZHOU, Queen's University Belfast
  T. LITTLER, Queen's University Belfast
  A. FOLEY, Queen's University Belfast

• 15PESGM0584, Potential Impacts and Economic Value of US Offshore Wind
  S. LIU, ABB, Inc.
  J. DANIEL, ABB, Inc.
  J. PAN, ABB, Inc.

• 15PESGM0616, An Aggregated Fridge-Freezer Peak Shaving and Valley Filling Control Strategy for eEnhanced Grid Operations
  M. MARTIN ALMENTA, Queen's University Belfast
  J. MORROW, Queen's University Belfast
  R. BEST, Queen's University Belfast
  B. FOX, Queen's University Belfast
  A. FOLEY, Queen's University Belfast

• 15PESGM0880, Critical Load Profile Estimation for Sizing of Battery Storage System
  D. SHARMA, Indian Institute of Technology Kanpur
  S. SINGH, Indian Institute of Technology Kanpur
  B. RAJPUROHIT, Indian Institute of Technology Mandi
  F. LONGATT, Loughborough University UK

• 15PESGM1113, Examining the Potential Impact of Plug-In Electric Vehicles on Residential Sector Power Demand
  B. JOHNSON, Electric Power Research Institute
  M. STARKE, Oak Ridge National Laboratory
  A. DIMITROVSKI, Oak Ridge National Laboratory

• 15PESGM1136, Multi-Step Network Segmentation Using Optimization and Sequential Participant Migration
  D. KIRAN, Indian Institute of Technology Delhi
  A. ABHYANKAR, Indian Institute of Technology Delhi
  B. PANIGRAHI, Indian Institute of Technology Delhi
  N. SENROY, Indian Institute of Technology Delhi

• 15PESGM1172, Optimal Placement of the Distribution Transformers to Improve Reliability Under Load Growth
  M. ESMAEELI, Iran University of Science and Technology
  A. KAZEMI, Iran University of Science and Technology
  H. SHAYANFAR, Iran University of Science and Technology
  M. HAGHIFAM, Tarbiat Modares University

• 15PESGM1189, Active Distribution Network Expansion Planning Integrated with Centralized and Distributed Energy Storage System
  X. SHEN, Tsinghua University
  S. ZHU, Tsinghua University
  J. ZHENG, Tsinghua University
  Y. HAN, Tsinghua University
  Q. LI, China Southern Power Grid Co.
  J. NONG, China Southern Power Grid Co.
  M. SHAHIDEPOUR, Illinois institute of Technology
• 15PESGM1203, Reactive Power Planning with Large-Scale PV Generation Systems Considering Power Fluctuation
  Y. LIU, Southeast University
  S. GAO, Southeast University

• 15PESGM1380, Effective Load Carrying Capability for High Penetration Renewable Energy Integration
  Z. CHEN, Arkansas Tech University
  L. WU, Clarkson University

• 15PESGM1393, Assessing Impacts of Very High Penetration of Distributed Photovoltaic on Real MV Network Feeders
  R. KUSUMA, University of Auckland
  N. NAIR, University of Auckland

• 15PESGM1413, Challenges to Supplying Large Induction Motor Loads in a Long Radial Transmission System
  W. WANG, BC Hydro
  M. ZOU, BC Hydro
  W. SHUM, BC Hydro

• 15PESGM1425, A Study of Reactive Power Margins in Power System Following Severe Generation Imbalance
  M. JAVAD, University of Oklahoma
  B. ZHAO, Tsinghua University
  D. HU, Tsinghua University
  J. JIANG, University of Oklahoma

• 15PESGM1450, Development of Stochastic Models for Assessing the Impact of Electric Vehicles in Distribution Grids
  S. BARGHI-NIA, Polytechnique Montreal
  F. SIROIS, Polytechnique Montreal

• 15PESGM1576, Second-Order Cone Model for Active Distribution Network Expansion Planning
  H. XING, Shanghai Jiao Tong University
  S. ZHANG, Shanghai Jiao Tong University
  Y. ZHANG, Fujian Electric Power Research Institute

• 15PESGM1610, Optimal Location, Sizing and Allocation of Subtransmission Substations Using k-Means Algorithm
  S. VAHEDI, University of Shahrood

• 15PESGM1611, Time Step Simulation Tool for Studying the Impact of Solar Photovoltaic Penetration
  R. QUINT, Dominion Virginia Power

• 15PESGM1627, A New Strategy to Quantify Uncertainties of Wavelet-GRNN-PSO Based Solar PV Power Forecasts Using Bootstrap Confidence Intervals
  D. ALHAKEEM, University of Texas at El Paso
  P. MANDAL, University of Texas at El Paso
  A. UL HAQUE, Teleshant Consultants LP
  A. YONA, University of the Ryukyus
  T. SENJYU, University of the Ryukyus
  B. TSENG, University of Texas at El Paso

• 15PESGM1662, Model Considerations of Simulating the Transients of Power System Restoration
  X. LIU, NSTAR Electric
  T. TESSIN, NSTAR Electric

• 15PESGM1693, Profit Maximization for Plug-In Electric Taxi with Uncertain Future Electricity Prices
  [Transaction Number: TPWRS-01396-2013]
  Z. YANG, Zhejiang University
  L. SUN, Zhejiang University
  J. CHEN, Zhejiang University
  Q. YANG, Zhejiang University
  X. CHEN, State Grid Corporation of China
  K. XING, University of Science and Technology of China

• 15PESGM1720, Enhanced Pan-European Transmission Planning Methodology
  C. PACHE, RTE
  J. MAEGHT, RTE
  B. SEGUINOT, RTE
  A. ZANI, RSE
  S. LUMBRESSAS, IIT
  A. RAMOS, IIT
  S. AGAPOFF, RTE
  L. WARLAND, SINTEF
  L. ROUCO, IIT
  P. PANCIATI, RTE
• 15PESGM1838, Research and Application of Climatic Sensitive Short-Term Load Forecasting
K. LI, Shanghai Jiao Tong University
N. TAI, Shanghai Jiao Tong University
S. ZHANG, Shanghai Jiao Tong University

• 15PESGM1973, Considering Geographical Distribution of Pollutants Emission in Production Costing
S. LEI, University of Hong Kong
Y. HOU, University of Hong Kong
Z. QIN, University of Hong Kong
C. PENG, University of Hong Kong

• 15PESGM2065, Study on the Physical Mechanism and the Fast Algorithm of ATC Constrained by Transient Stability for the Point-to-Grid Transmission System
X. QIN, China EPRI
N. LIU, SGCC
B. LI, China EPRI
Q. GUO, China EPRI
S. MA, China EPRI
L. ZHAO, SGCC
Y. SUN, China EPRI
J. DING, China EPRI
Q. ZHOU, China EPRI
P. ZENG, China EPRI

• 15PESGM2105, Consideration of Ancillary Services in Screening Curve Method
T. ZHANG, University of Texas at Austin
R. BALDICK, University of Texas at Austin

• 15PESGM2133, Data Center Energy Systems: Current Technology and Future Direction
S. CHALISE, South Dakota State University
A. GOLSHANI, South Dakota State University
S. AWASTHI, South Dakota State University
S. MA, South Dakota State University
B. SHRESTHA, South Dakota State University
L. BAJRACHARYA, South Dakota State University
W. SUN, South Dakota State University
R. TONKOSKI, South Dakota State University

• 15PESGM2152, Benefits of Load Shedding for Distribution Grids Investments Planning
V. GOUIN, Université Grenoble Alpes
M. ALVAREZ-HÉRAULT, Université Grenoble Alpes
B. RAISON, Université Grenoble Alpes

• 15PESGM2273, Investigating the Declining Reactive Power Demand of UK Distribution Networks
C. KALOUDAS, University of Manchester
L. OCHOA, University of Manchester
I. FLETCHER, Northern Powergrid
B. MARSHALL, National Grid
S. MAJITHIA, Energy and Climate Advisory Services

• 15PESGM2346, Evolution and Future Prospects of Electricity Demand for Residential Customers
J. DICKERT, TU Dresden
F. SCHEDSER, TU Dresden

• 15PESGM2372, Stability Analysis of Weak Rural Electrification Microgrids with Droop-Controlled Rotational and Electronic Distributed Generators
Z. WANG, University of Notre Dame
M. LEMMON, University of Notre Dame

• 15PESGM2479, Design of a Large-Scale Virtual Power Grid for Research Community
Y. LIU, University of Tennessee, Knoxville
G. KOU, University of Tennessee, Knoxville
Y. LIU, University of Tennessee, Knoxville
J. GRACIA, Oak Ridge National Laboratory
T. KING, Oak Ridge National Laboratory

• 15PESGM2503, A Computer Package for Multi-Contingency Constrained Reactive Power Planning
A. TIWARI, EDP

• 15PESGM2510, A Method for Minimum Loss Reconfiguration of Radial Distribution Systems
S. ELSAIAH, Michigan State University

• 15PESGM2521, Considering Renewables in Capacity Expansion Models: Capturing Flexibility with Hourly Dispatch
C. BARROWS, National Renewable Energy Lab
T. MAI, National Renewable Energy Lab
E. HALE, National Renewable Energy Lab
A. LOPEZ, National Renewable Energy Lab
K. EUREK, National Renewable Energy Lab
Power System Relaying Poster Session (poster)

Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: Power System Relaying

PAPERS AND AUTHORS:

- **15PESGM0098**, Research on Reclosing Scheme for Parallel Lines on the Same Tower
  Y. KONG, Xi’an Jiaotong University
  B. ZHANG, Xi’an Jiaotong University
  T. ZHENG, Xi’an Jiaotong University
  J. ZHANG, Xi’an Jiaotong University
  H. WANG, Xi’an Jiaotong University

- **15PESGM0112**, Accurate Phase Comparison Scheme with Synchronised Measurements
  T. HINGE, College of Engineering, Pune

- **15PESGM0253**, Protection Analysis for Plant Rating and Power Quality Issues in LVDC Distribution Power Systems
  A. EMHEMED, University of Strathclyde
  G. BURT, University of Strathclyde

- **15PESGM0281**, Performance of Line Protection and Supervisory Elements for Doubly Fed Wind Turbines
  R. JAIN, University of Idaho
  B. JOHNSON, University of Idaho
  H. HESS, University of Idaho

- **15PESGM0316**, Determination of Optimal Setting Parameters of Distance Relay in Transmission Systems
  W. ZHANG, Tongji University
  Y. ZHANG, Milim Syscon

- **15PESGM0324**, A Novel Method to Identify the Travelling Wave Reflected from the Fault Point or the Remote-End Bus
  L. AOYU, Tsinghua University
  D. XINZHOU, Tsinghua University
  S. SHENXING, Tsinghua University

- **15PESGM0401**, Prediction of Arc Extinction Time for Single-Phase Reclosing of Transmission Lines
  F. ZHALEFAR, Western University
  M. DADASH ZADEH, Western University
  T. S. SIDHU, UOIT

- **15PESGM0581**, A Protection Algorithm Based on Spectrum Characteristic of Transient Component
  W. XINGGUO, China Electric Power Research Institute
  Z. ZEXIN, China Electric Power Research Institute
  D. DINGXIANG, China Electric Power Research Institute
• 15PESGM0748, A Novel Directional Protection Based on Transient Energy for HVDC Line  
  G. ZOU, Shandong University  
  B. TONG, Shandong University  
  Z. LI, Shandong University  
  H. GAO, Shandong University  
  Y. LIU, Shandong University  

• 15PESGM0784, Novel Traveling Wave Protection Method for High Voltage DC Transmission Line  
  Z. LI, Shandong University  
  G. ZOU, Shandong University  
  B. TONG, Shandong University  
  H. GAO, Shandong University  
  Q. FENG, Shandong University  

• 15PESGM1446, Design of A Novel Bridge-Type FCL and Its Application in UPFC  
  F. CHEN, Zhejiang University  
  D. JIANG, Zhejiang University  
  Y. FAN, Zhejiang University  
  K. CHEN, Zhejiang University  
  Y. GUO, Zhejiang University  
  W. LV, Zhejiang Electric Power Corporation Research Institute  

• 15PESGM1667, A Travelling Wave-Based Fault Location Method for Hybrid Three-Terminal Circuits  
  H. LIVANI, University of Nevada Reno  
  R. JALILZADEH HAMIDI, University of Nevada Reno  

• 15PESGM1672, An Effective Method for Impedance Estimation in Distance Relay Based on DC Offset Removal  
  E. VAZQUEZ, Universidad Autónoma de Nuevo Leon  
  J. RAMIREZ, CINVESTAV del IPN  
  A. ZAMORA, CINVESTAV del IPN  
  M. ARRIETA-PATERININA, CINVESTAV del IPN  

• 15PESGM1780, Comparison of Estimation Methods for Compensating the Saturation Effects in Secondary Current of Current Transformers  
  B. SCHETTINO, Universidade Federal de Juiz de Fora  
  C. DUQUE, Universidade Federal de Juiz de Fora  
  P. DA SILVEIRA, Universidade Federal de Itajubá  

• 15PESGM1915, Fault Line Identification of Single Line to Ground Fault for Non-Effectively Grounded Distribution Networks with Double-Circuit Lines  
  B. JIANG, Tsinghua University  
  X. DONG, Tsinghua University  
  S. SHI, Tsinghua University  
  B. WANG, Tsinghua University  

• 15PESGM1937, Research on the Applications of Differential Protection in TCT Controllable Shunt Reactor  
  F. ZHANG, North China Electric Power University  
  T. ZHENG, North China Electric Power University  
  Y. JIN, North China Electric Power University  
  Y. ZHAO, Jiangsu Electric Power Company  
  L. LIU, North China Electric Power University  

• 15PESGM2014, Travelling Wave Based Directional Comparison Protection Scheme and Its Application in 750 kV Transmission Lines  
  X. DONG, Tsinghua University  
  S. LUO, Tsinghua University  
  S. SHI, Tsinghua University  
  B. WANG, Tsinghua University  
  S. WANG, Tsinghua University  
  L. REN, Tsinghua University  

• 15PESGM2100, Higher I–2t Stress on Equipment Due to Increased Penetration of Distributed Generation  
  L. NIE, California State University, Sacramento  
  W. FU, California State University, Sacramento  
  M. VAZIRI, California State University, Sacramento  
  M. ZARGHAMI, California State University, Sacramento  

• 15PESGM2261, Continuously Variable Series Reactor: Impacts on Distance Protection Using CCVTs  
  M. YOUNG, Oak Ridge National Laboratory  
  A. DIMITROVSKI, Oak Ridge National Laboratory  
  Z. LI, Oak Ridge National Laboratory  
  Y. LIU, Oak Ridge National Laboratory  
  R. PATTERSON, Patterson Power Engineers, LLC
• 15PESGM2398, Dynamic State Estimation Based Protection of Microgrid Circuits
  Y. LIU, Georgia Institute of Technology
  A. MELIOPOULOS, Georgia Institute of Technology
  R. FAN, Georgia Institute of Technology
  L. SUN, Georgia Institute of Technology

• 15PESGM2476, Analysis of the Fault Type for Adaptive Single-Phase Autoreclosure
  J. ZHU, ALSTOM Grid Inc.
  N. ZHOU, Chongqing University

• 15PESGM1737, Optimal Protection Coordination for Meshed Distribution Systems with DG Using Dual Setting Directional Over-Current Relays [Transaction Number: TSG.2014.2357813]
  H. ZEINELDIN, Masdar Institute
  H. SHARAF, Cairo University
  D. IBRAHIM, Cairo University
  E. ABOU EL-ZAHAB, Cairo University

PSACE CAMS Poster Session (poster)

Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: (PSACE) Computer Analytical Methods

PAPERS AND AUTHORS:

• 15PESGM0084, Study of the Short Circuit Current Contributed by a DC System with a Three-Phase Fault on the AC Side of an Inverter
  T. WANG, China Electric Power Research Institute
  L. WAN, China Electric Power Research Institute
  Y. ZHANG, China Electric Power Research Institute
  G. BU, China Electric Power Research Institute

• 15PESGM0142, The Investigation of Dielectric Barrier Impact on the Breakdown Voltage in High Voltage Systems by Modeling and Simulation
  E. FORUZAN, University of Nebraska Lincoln
  H. VAKILZADIAN, University of Nebraska Lincoln

• 15PESGM0211, Measurement Based Static Load Model Identification
  C. BAONE, GE Global Research
  Y. PAN, GE Global Research
  W. PREMERLANI, GE Global Research
  J. DAI, GE Global Research
  A. JOHNSON, Southern California Edison

• 15PESGM0450, Spatio-Temporal Forecasting of Weather-Driven Damage in a Distribution System
  Z. LI, IBM T J Watson Research Center
  A. SINGHEE, IBM T J Watson Research Center
  H. WANG, IBM T J Watson Research Center
  A. RAMAN, IBM T J Watson Research Center
  S. SIEGEL, IBM T J Watson Research Center
  R. MUELLER, DTE Energy
  G. LABUT, DTE Energy

• 15PESGM0483, Component GARCH-M Type Models for Wind Power Forecasting
  H. CHEN, Jiangsu Electric Power Company
  F. LI, University of Tennessee
  Y. WANG, Southeastern University

• 15PESGM0512, Matrix Exponential based Algorithm for Electromagnetic Transient Modeling and Simulation of Large-Scale Induction Generator Wind Farms
  P. LI, Tianjin University
  X. FU, Tianjin University
  C. WANG, Tianjin University
  H. YU, Tianjin University
  D. LIN, Hainan Power Grid Corporation
  F. XING, Hainan Power Grid Corporation

• 15PESGM0676, An NLP Penalty-Based Strategy for Handling Discrete Controls for Volt/Var Optimization in Distribution Systems
  F. M. DE VASCONCELOS, Sao Carlos School of Engineering / USP
  G. LAGE, Federal University of Sao Carlos
  G. R. M. DA COSTA, Sao Carlos School of Engineering / USP
• 15PESGM0786, Short-Term Load Forecasting Using Support Vector Regression-Based Local Predictor
  M. LI, South China University of Technology
  T. JI, South China University of Technology
  Q. WU, South China University of Technology
  L. ZHU, University of Liverpool

• 15PESGM0802, Power Quality Disturbance Identification Using Morphological Pattern Spectrum and Probabilistic Neural Network
  Z. CHEN, South China University of Technology
  M. LI, South China University of Technology
  T. JI, South China University of Technology
  Q. WU, South China University of Technology

• 15PESGM0814, Paired Bacteria Optimizer for Power System Fault Signal Identification
  T. JI, South China University of Technology
  L. ZHANG, South China University of Technology
  M. LI, South China University of Technology
  Q. WU, South China University of Technology

• 15PESGM0919, Kernel Methods for Short-Term Spatio-Temporal Wind Prediction
  J. DOWELL, University of Strathclyde
  S. WEISS, University of Strathclyde
  D. INFIELD, University of Strathclyde

• 15PESGM0961, High Resolution Simulations of Increased Renewable Penetration on Central European Transmission Grid
  P. ESER, ETH Zurich
  A. SINGH, ETH Zurich
  N. CHOKANI, ETH Zurich
  R. ABHARI, ETH Zurich

• 15PESGM0979, Sub-Second State Estimation Implementation and Its Evaluation with Real Data
  Y. CHEN, Pacific Northwest National Laboratory
  R. MARK, Pacific Northwest National Laboratory
  K. GLAESEMANN, Pacific Northwest National Laboratory
  Z. HUANG, Pacific Northwest National Laboratory

• 15PESGM1153, Comprehensive Decoupled Risk-Limiting Dispatch
  G. HUANG, Zhejiang University
  Y. WEN, Zhejiang University
  Y. BAO, Zhejiang University
  C. GUO, Zhejiang University
  S. MA, China Electric Power Research Institute
  Q. HE, China Electric Power Research Institute

• 15PESGM1296, Robust and Efficient Voltage Stability Margin Computation Using Synchrophasors
  J. Giraldo, University of Campinas (UNICAMP)
  J. Castillón, University of Campinas (UNICAMP)
  C. Castro, University of Campinas (UNICAMP)

• 15PESGM1311, A Statistical Method for Analyzing Lifetime of a Battery Pack
  D. SASAKI, Chuo University
  S. TSUKIYAMA, Chuo University
  M. MATSUMAGA, Chuo University
  O. ISHIBASHI, NEC Corporation
  S. TAKAHASHI, NEC Asia Pacific Pte. Ltd.

• 15PESGM1855, Unbalanced Three-Phase Continuation Power Flow for Distribution Networks with Distributed Generation
  J. ZHAO, Hohai University
  X. FAN, Hohai University
  Z. GAO, State Grid Electric Power Research Institute
  Z. DAI, State Grid Electric Power Research Institute
  G. CHEN, Hohai University

• 15PESGM2436, Phasor Domain Modeling of Type-IV Wind Turbine Generator for Protection Studies
  U. KARAAGAC, École Polytechnique de Montréal
  T. KAUFFMANN, École Polytechnique de Montréal
  I. KOCAR, École Polytechnique de Montréal
  H. GRAS, École Polytechnique de Montréal
  J. MAHNEREDJIAN, École Polytechnique de Montréal
  B. CETINDAG, École Polytechnique de Montréal
  E. FARANTATOS, Electric Power Research Institute (EPRI)

• 15PESGM2487, Signature-Based Detection for Activities of Appliances
  Z. HUANG, University of Maryland, Baltimore County
  T. ZHU, University of Maryland, Baltimore County
  H. LUO, State University of New York, Binghampton
• 15PESGM2535, Multi-Resolution Modeling of Induction Furnace Systems with Line-Commutated Rectifier and Resonant Converter  
S. EBRAHIMI, University of British Columbia  
H. ATIGHECHI, University of British Columbia  
N. AMIRI, University of British Columbia  
J. JATSKEVICH, University of British Columbia  
J. M. CANO, University of Oviedo

• 15PESGM2612, Phasor Domain Modeling of Type III Wind Turbine Generator for Protection Studies  
T. KAUFFMANN, École Polytechnique de Montréal  
U. KARAAGAC, École Polytechnique de Montréal  
I. KOCAR, École Polytechnique de Montréal  
H. GRAS, École Polytechnique de Montréal  
J. MAHSEREDJIAN, École Polytechnique de Montréal  
B. CETINDAG, École Polytechnique de Montréal  
E. FARANTATOS, Electric Power Research Institute (EPRI)

PSACE DSAS Poster Session *(poster)*

**Monday, 27 July, 5:00 PM–8:00 PM**  
Plaza Ballroom  
Sponsored by: *(PSACE) Distribution System Analysis*

**PAPERS AND AUTHORS:**

• 15PESGM0134, Distribution Network Reconfiguration with Aggregated Electric Vehicle Charging Strategy  
H. CUI, University of Tennessee, Knoxville  
R. LONG, University of Oklahoma  
F. LI, University of Tennessee, Knoxville  
X. FANG, University of Tennessee, Knoxville

• 15PESGM0152, A Comparison of MV Distribution System State Estimation Methods Using Field Data  
B. HAYES, IMDEA Energy  
M. PRODANOVIC, IMDEA Energy

• 15PESGM0194, Day-Ahead Dispatch of Battery Energy Storage System for Peak Load Shaving and Load Leveling in Low Voltage Unbalance Distribution Networks  
K. JOSHI, IIT Gandhinagar  
N. PINDORIYA, IIT Gandhinagar

• 15PESGM0280, Application of Distance Relay for Distribution System Monitoring  
H. MORTAZAVI, Quebec University (ETS)  
H. MEHRJERDI, Quebec University (ETS)  
M. SAAD, Quebec University (ETS)  
S. LEBEBYRE, IREQ  
A. DALAL, IREQ

• 15PESGM0462, Sensitivity Factors for Distribution Systems  
H. AHMADI, University of British Columbia  
J. MARTI, University of British Columbia  
A. ALSUBAIE, University of British Columbia

• 15PESGM0589, Three-Phase Optimal Power Flow Based Distribution Locational Marginal Pricing and Associated Price Stability  
J. WEI, Washington State University  
L. CORSON, Washington State University  
A. SRIVASTAVA, Washington State University

• 15PESGM0701, An Improved Harmonic Contribution Estimation Using Nonlinear Optimization Techniques  
M. SHEIKHOLESLAMZADEH, Kinetics Inc.  
N. WRATHALL, Kinetics Inc.  
S. CRESS, Kinetics Inc.  
A. HAMLYN, Hydro One Networks Inc.

• 15PESGM0803, N-1 Loadability for Distribution Systems  
J. XIAO, Tianjin University  
B. SU, Tianjin University  
S. LIU, Tianjin University  
F. LI, University of Tennessee

• 15PESGM0903, MatLVDC: A New Open Source Matlab Toolbox to Simulate DC Networks including Power Electronic Converters and Distributed Energy Resources  
G. VAN DEN BROECK, KU Leuven/EnergyVille  
T. MAI, KU Leuven/EnergyVille  
J. DRIESEN, KU Leuven/EnergyVille
• 15PESGM1316, Contingency Analysis of Operational Planning Models with Distribution Network Reconfiguration
  A. MUTTALIB, Brunel University London
  G. TAYLOR, Brunel University London
  M. BRADLEY, National Grid, UK

• 15PESGM1426, Fault Location Estimation Based on Voltage Sag Information of PQMS
  S. TAO, North China Electric Power University
  C. ZHAO, North China Electric Power University
  C. LUO, North China Electric Power University
  X. XIAO, North China Electric Power University

• 15PESGM1457, Experimental Test on Temperature Rise of Conductors in Roof-Mounted Conduits
  Y. BAGHZOUZ, UNLV
  Z. MOHAMMAD, UNLV
  R. HURT, UNLV

• 15PESGM1553, Stochastic Volt-Var Optimization Function for Planning of MV Distribution Networks
  S. RAHIMI, Ventyx, an ABB company
  K. ZHU, Ventyx, an ABB company
  S. MASSUCCO, University of Genova
  F. SILVESTRO, University of Genova

• 15PESGM1575, Modeling of PEV Charging Load Using Queuing Analysis and Its Impact on Distribution System Operation
  O. HAFEZ, University of Waterloo
  K. BHATTACHARYYA, University of Waterloo

• 15PESGM1895, Analysis and Reduction of Total Harmonic Distortions in Distribution System with Electric Vehicles and Wind Generators
  R. MISRA, Midcontinent Independent System Operator (MISO)
  S. PAUDYAL, Michigan Technological University

• 15PESGM2082, State Estimator for Electrical Distribution Systems Based on a Particle Filter
  S. ALHALALI, University of Waterloo
  R. ELSHATSHAT, University of Waterloo

• 15PESGM2117, Capacity Constrained Energy Management for Unbalanced Distribution Systems
  S. UDDIN, University of Queensland
  O. KRAUSE, University of Queensland

• 15PESGM2119, Recloser Allocation and Placement for Rural Distribution Systems
  Q. QIN, Binghamton University
  N. WU, Binghamton University

• 15PESGM2120, A Modified Forward Backward Sweep Load Flow Algorithm for Unbalanced Radial Distribution Systems
  P. SAMAL, National Institute of Technology, Rourkela, India
  S. GANGULY, National Institute of Technology, Rourkela, India

• 15PESGM2205, Estimating EV Integration Patterns Considering Spatial Dispersion in Distribution Systems
  L. CHENG, Tsinghua University
  Y. CHANG, Tsinghua University
  M. LIU, Tsinghua University
  Q. WU, State Grid Corporation of China

• 15PESGM2276, Particle Swarm Optimization Based Demand Response for Residential Consumers
  N. KINHEKAR, Indian Institute of Technology Roorkee, India
  N. PADHY, Indian Institute of Technology Roorkee, India
  H. GUPTA, Jaypee Institute of Information Technology, Noida

• 15PESGM2383, Understanding Photovoltaic Hosting Capacity of Distribution Circuits
  A. DUBEY, University of Texas at Austin
  S. SANTOSO, University of Texas at Austin
  A. MAITRA, Electric Power Research Institute

• 15PESGM2448, Bad Data Analysis in Distribution State Estimation Considering Load Models
  S. BRAUNSTEIN, Sul-Rio-Grandense Federal Institute
  A. ROSSONI, Federal University of Rio Grande do Sul
  A. BRETAG, University of Florida
  N. BRETAG, University of São Paulo

• 15PESGM2467, Toward a Resilient Distribution System
  Y. XU, Washington State University
  C. LIU, Washington State University
  K. SCHNEIDER, Pacific Northwest National Laboratory
  D. TON, U.S. Department of Energy
Monday Evening, continued

- **15PESGM2485**, Smart Inverter Settings for Improving Distribution Feeder Performance  
  S. ABATE, University of Pittsburgh  
  T. MCDERMOTT, University of Pittsburgh  
  M. RYLANDER, Electric Power Research Institute  
  J. SMITH, Electric Power Research Institute

- **15PESGM2581**, Ultra-Short-Term Load Forecasting Using Robust Exponentially Weighted Method in Distribution Networks  
  N. VIETCUONG, Tsinghua University  
  W. WU, Tsinghua University  
  B. ZHANG, Tsinghua University  
  Z. LI, Tsinghua University  
  Y. WANG, Tsinghua University

- **15PESGM2630**, Digital Grid in Low-Voltage Distribution System  
  K. MATSUURA, University of Fukui  
  H. TAOKA, University of Fukui  
  R. KATO, University of Fukui  
  R. ABE, University of Tokyo

**PSACE SES Poster Session (poster)**

*Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom*

*Sponsored by: (PSACE) Economic Systems*

**PAPERS AND AUTHORS:**

- **15PESGM0028**, Incorporating Optimal Transmission Switching in Day-Ahead Unit Commitment and Scheduling  
  J. WU, Alstom Grid  
  K. CHEUNG, Alstom Grid

- **15PESGM0038**, Computation of Loss Factors for Locational Marginal Prices in Distribution Systems  
  G. HEYDT, ASU  
  N. STEFFAN, ERCOT

- **15PESGM0166**, On Transfer Function Modeling of Price Responsive Demand: An Empirical Study  
  J. AN, Texas A&M University  
  P. KUMAR, Texas A&M University  
  L. XIE, Texas A&M University

- **15PESGM0263**, Large-Scale Preventive Security Constrained Optimal Power Flow based on Compensation Method  
  Y. YANG, Guangxi University  
  Y. FENG, Guangxi University

- **15PESGM0296**, Mixed Integer Programming for HVACs Operation  
  M. ALHAIDER, University of South Florida  
  L. FAN, University of South Florida

- **15PESGM0330**, A Reserve Forecast-Based Approach to Determining Credit Collateral Requirements in Electricity Markets  
  S. CHANG, Texas A&M University  
  L. XIE, Texas A&M University  
  J. DUMAS, Electric Reliability Council of Texas (ERCOT)

  Y. TANG, University of Rhode Island  
  H. HE, University of Rhode Island  
  Z. NI, University of Rhode Island  
  J. WEN, Huazhong University of Science and Technology

  F. LUO, Tianjin University  
  T. ZHANG, Tianjin University  
  Z. MI, Tianjin University  
  F. LI, University of Tennessee, Knoxville  
  L. BAI, University of Tennessee, Knoxville  
  G. LIU, China Electric Power Research Institute  
  Q. SUN, State Grid Energy Research Institute  
  X. WANG, State Grid Energy Research Institute
• 15PESGM0583, Modeling and Algorithm to Find the Economic Equilibrium for Electricity Market with the Changing Generation Mix
  P. ZOU, Tsinghua University
  Q. CHEN, Tsinghua University
  Q. XIA, Tsinghua University
  C. KANG, Tsinghua University
  X. CHEN, Tsinghua University

• 15PESGM0714, MISO AGC Enhancement Proposal to Better Utilize Fast Ramping Resources
  W. LI, Iowa State University
  Y. CHEN, MISO

• 15PESGM0889, The Impact of Financial Transmission Rights on Load Serving Entities’ Strategic Bidding Considering Coupon-Based Demand Response
  X. FANG, University of Tennessee, Knoxville
  F. LI, University of Tennessee, Knoxville
  N. GAO, Qingpu Power Supply Company
  Q. HU, University of Tennessee, Knoxville
  Y. WEI, Southern California Edison

• 15PESGM1378, Utilizing Flywheels to Provide Regulation Services for Systems with Renewable Resources
  N. LI, Arizona State University
  M. HEDAYATI, Arizona State University
  K. HEDMAN, Arizona State University

• 15PESGM1625, Robust Security-Constrained Unit Commitment with Recourse Cost Requirement
  H. YE, IIT
  Z. LI, IIT

• 15PESGM1646, ARIMA Based Statistical Approach to Predict Wind Power Ramps
  A. NAYAK, Malaviya National Institute of Technology Jaipur
  K. SHARMA, Malaviya National Institute of Technology Jaipur
  R. BHAKAR, University of Bath
  J. MATHUR, Malaviya National Institute of Technology Jaipur

• 15PESGM1217, Coordination of Renewable Energy and Flexible Loads in Electricity Markets via Financial Tools
  Y. TAO, ABB Inc.
  Z. XU, Tsinghua University

• 15PESGM2228, Application of Carbon Intensity in Generation Expansion Planning: A Comparative Study
  O. ZHOU, Shanghai Jiao Tong University
  T. SUN, Shanghai Jiao Tong University
  D. FENG, Shanghai Jiao Tong University
  T. DING, Shanghai Jiao Tong University

• 15PESGM2343, Optimal Firm Transmission Access Using Chance-Constrained Optimisation for Renewable Integration
  E. UZUNCAN, KTH Royal Institute of Technology
  M. HESAMZADEH, KTH Royal Institute of Technology

• 15PESGM2352, Data-Driven Dynamic Energy Pricing
  Y. HE, Iowa State University
  B. CHEN, Iowa State University
  L. ZHANG, Iowa State University

• 15PESGM2424, Distributed DC Optimal Power Flow for Radial Networks Through Partial Primal Dual Algorithm
  V. DISFANI, University of South Florida
  L. FAN, University of South Florida
  Z. MIAO, University of South Florida

• 15PESGM2432, PEV Parking Lot Behavior Equilibria in Energy and Reserve Markets
  N. NEYESTANI, University of Beira Interior
  M. DAMAVANDI, University of Beira Interior
  M. SHAHIE-KHAH, University of Beira Interior
  J. CATALAO, University of Beira Interior
  J. CONTRERAS, University of Castilla-La Mancha

• 15PESGM2453, Adaptive Market Based Load Shedding Scheme
  K. MOLLAH, University of Auckland
  N. NAIR, University of Auckland

• 15PESGM2486, A Modified Priority List-Based MILP Method for Solving Large-Scale Unit Commitment Problems
  X. KE, North Carolina State University
  D. WU, Pacific Northwest National Laboratory
  N. LU, North Carolina State University
  M. KINTNER-MEYER, Pacific Northwest National Laboratory
Monday Evening, continued

- 15PESGM2580, Study on DSM Operation Strategy for ADN based on Differential Electricity Costs
  X. PENG, Wuhan University
- 15PESGM2627, Evaluation of Interface Pricing in Electricity Markets
  X. ZHANG, MISO
  D. CHATTERJEE, MISO
  C. LUO, MISO
  L. FAN, University of Florida
- 15PESGM2660, An Approach to Assess the Responsive Residential Demand to Financial Incentives
  Q. HU, University of Tennessee Knoxville
  X. FANG, University of Tennessee Knoxville
  F. LI, University of Tennessee Knoxville
  X. XU, University of Tennessee Knoxville
  C. CHEN, University of Tennessee Knoxville
  H. HU, State Grid Cooperation of China

PSACE ISS Poster Session (poster)

Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: (PSACE) Intelligent Systems

PAPERS AND AUTHORS:
- 15PESGM0181, New Multivariate Linear Regression Real and Reactive Branch Flow Models for Volatile Scenarios
  S. APPALASAMY, University of Melbourne
  O. JONES, University of Melbourne
  N. MOIN, University Malaya
  C. TAN, University Tenaga National (UNITEN)
- 15PESGM0388, Probabilistic Baseline Estimation via Gaussian Process
  Y. WENG, Stanford University
  R. RAJAGOPAL, Stanford University
  S. MOON, Hanyang University
  W. KIM, Hanyang University
  J. SIN, Hanyang University
  M. NA, Hanyang University
  J. KIM, Hanyang University
- 15PESGM0637, A New Distributed Algorithm for Integrated Volt-VAR Control in Smart Grids
  C. NGUYEN, New York Independent System Operator
  A. FLUECK, Illinois Institute of Technology
- 15PESGM0941, Training Recurrent Neural Network Vector Controller for Inner Current-Loop Control of Doubly Fed Induction Generator
  X. FU, University of Alabama
  S. LI, University of Alabama
- 15PESGM1042, Online Bad Data Detection Using Kernel Density Estimation
  M. UDDIN, University of Hawaii at Manoa
  A. KUH, University of Hawaii at Manoa
  Y. WENG, Stanford University
  M. ILIC, Carnegie Mellon University
- 15PESGM1304, Scalable and Practical Multi-Objective Distribution Network Expansion Planning
  N. LUONG, Centrum Wiskunde & Informatica (CWI)
  M. GROND, Eindhoven University of Technology (TU/e)
  H. LA POUTRE, Centrum Wiskunde & Informatica (CWI)
  F. BOSMAN, Centrum Wiskunde & Informatica (CWI)
- 15PESGM1521, Probabilistic Estimation of the State of Electric Vehicles for Smart Grid Applications in Big Data Context
  J. SOARES, Polytechnic of Porto
  N. BORGES, Polytechnic of Porto
  B. CANIZES, Polytechnic of Porto
  Z. VALE, Polytechnic of Porto
- 15PESGM1739, Error Estimation of Statistical Baseline Load Methods
  F. MIAO, Shandong University
  L. ZHANG, Shandong University
  M. ZHANG, Shandong University
  S. HAN, Shandong University
•  15PESGM1824, Real-Time Charging Navigation of Electric Vehicles: A Non-Cooperative Game Approach  
  J. TAN, University of Wisconsin-Milwaukee  
  L. WANG, University of Wisconsin-Milwaukee

•  15PESGM1871, Coordinated Optimization of PHEVs for Frequency Regulation Capacity Bids Using Hierarchical Game  
  J. TAN, University of Wisconsin-Milwaukee  
  L. WANG, University of Wisconsin-Milwaukee

•  15PESGM1940, A Multiagent System for Residential DC Microgrids  
  T. KIM, University of Nebraska-Lincoln  
  J. YUN, University of Nebraska-Lincoln  
  W. QIAO, University of Nebraska-Lincoln

•  15PESGM2063, Relaxation of Non-Convex Problem as an Initial Solution of Meta-Heuristics for Energy Resource Management  
  J. SOARES, Polytechnic of Porto  
  C. LOBO, Polytechnic of Porto  
  M. SILVA, Polytechnic of Porto  
  H. MORAI'S, DTU  
  Z. VALE, Polytechnic of Porto

•  15PESGM2078, Topological Processing of Mutually Coupled Circuits for Directional Overcurrent Protection  
  W. BERNARDES, Sao Carlos School of Engineering – University of Sao Paulo  
  E. ASADA, Sao Carlos School of Engineering – University of Sao Paulo  
  J. DE MELIO VIEIRA, Sao Carlos School of Engineering – University of Sao Paulo

•  15PESGM2364, Threshold-Based Power Grid Fault Diagnosis  
  W. CHEN, University of Connecticut  
  A. ULATOWSKI, University of Connecticut  
  A. BAZZI, University of Connecticut

PSACE Poster Session  (poster)

Monday, 27 July, 5:00 PM–8:00 PM  
Plaza Ballroom  
Sponsored by:  PSACE

PAPERS AND AUTHORS:

•  15PESGM0352, Game Design for Price based Demand Response  
  M. YE, Nanyang Technological University  
  G. HU, Nanyang Technological University

•  15PESGM0675, A Wide-Area, Wide-Spectrum Big Data System  
  G. ZWEIGLE, Schweitzer Engineering Laboratories, Inc.

•  15PESGM1190, Data Analysis and Robust Modelling of the Impact of Renewable Generation on Long Term Security of Supply and Demand  
  M. TROFFAES, Durham University  
  E. WILLIAMS, Durham University  
  C. DENT, Durham University

•  15PESGM1848, Approximate Method for AC Transmission Switching based on a Simple Relaxation for AC OPF Problems  
  D. BIENSTOCK, Columbia University  
  G. MUNOZ, Columbia University

•  15PESGM2019, Cooperative Distributed Scheduling for Storage Devices in Microgrids Using Dynamic KKT Multipliers and Consensus Networks  
  N. RAHBARI-ASR, North Carolina State University  
  Y. ZHANG, North Carolina State University  
  M. CHOW, North Carolina State University

•  15PESGM2258, Bad Data Processing for Real-Time Equivalent Networks  
  E. ÂNGELOS, São Carlos Engineering School, University of Sào Paulo.  
  E. ASADA, São Carlos Engineering School, University of São Paulo

•  15PESGM2715, Multi-Time Interval Power System State Estimation Incorporating Phasor Measurements  
  Y. GUO, Tsinghua University  
  W. WU, Tsinghua University  
  B. ZHANG, Tsinghua University  
  H. SUN, Tsinghua University
PSACE RRPAS Poster Session (poster)
Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: (PSACE) Reliability and Risk Analysis

PAPERS AND AUTHORS:

- **15PESGM0011, Probabilistic Modeling of Tidal Power Generation**
  M. LIU, Chongqing University
  W. LI, Chongqing University
  R. BILLINTON, University of Saskatchewan
  C. WANG, Wayne State University
  J. YU, Chongqing University

- **15PESGM0106, Incorporating Protection Systems into Composite Power System Reliability Assessment**
  H. LEI, Texas A&M University
  C. SINGH, Texas A&M University

- **15PESGM0533, Visualising Risk in Generating Capacity Adequacy Studies Using Clustering and Prototypes**
  S. TINDEMANS, Imperial College London
  G. STRBAC, Imperial College London

- **15PESGM0696, Microgrid Self Adequacy Optimization Using Back Tracking Search Algorithm**
  R. OSAMA, Ain Shams University
  A. ABDELAZIZ, Ain Shams University
  R. SWIEF, Ain Shams University
  M. EZZAT, Ain Shams University
  E. EL-SAADANY, University of Waterloo

- **15PESGM1107, Practical Experience in Evaluating Adequacy of Generating Capacity in the Western Interconnection**
  M. PAPIC, Idaho Power
  E. PRESTON, dba Transmission Adequacy Consulting
  N. DAI, BC Hydro
  M. ELKINS, WECC
  M. PEACOCK, WECC
  B. HEATH, MISO

- **15PESGM1109, Outage Data Collection and Parameter Estimation for an Improved Probabilistic Contingency Analysis**
  M. YUE, Brookhaven National Laboratory
  X. WANG, Brookhaven National Laboratory

- **15PESGM1247, Operational Resilience Assessment of Power Systems Under Extreme Weather and Loading Conditions**
  M. PANTELI, University of Manchester
  P. MANCARELLA, University of Manchester

- **15PESGM1292, A Risk Assessment Approach for Dispatching Operations Based on Critical Equipment Search**
  D. LU, Tianjin University
  K. HOU, Tianjin University
  Y. ZENG, Tianjin University
  W. WEI, Tianjin University
  L. GUO, Tianjin Power Grid

- **15PESGM1389, Power System Fault Classification Method based on Sparse Representation and Random Dimensionality Reduction Projection**
  L. CHENG, Rensselaer Polytechnic Institute
  L. WANG, IBM
  F. GAO, IBM
  M. WANG, Rensselaer Polytechnic Institute

- **15PESGM1665, DER Volt-VAR and Voltage Ride-Through Needs to Contain the Spread of FIDVR Events**
  R. BRAVO, Southern California Edison

- **15PESGM1668, Prioritization of MTTC-Based Combinatorial Evaluation for Hypothesized Substations Outages**
  R. BULBUL, Michigan Technological University
  C. TEN, Michigan Technological University
  L. WANG, University of Wisconsin–Milwaukee
• 15PESGM2419, Multi-Objective Distribution System Reconfiguration for Reliability Enhancement and Loss Reduction
  N. PATERAKIS, University of Beira Interior
  S. SANTOS, University of Beira Interior
  J. CATALAO, University of Beira Interior
  A. MAZZA, POLITO
  G. CHICCO, POLITO
  O. ERDINC, Arel University
  A. BAKIRTZIS, AUTH

• 15PESGM2422, Assessing the Bulk Power System's Resource Resilience to Future Extreme Winter Weather Events
  T. LY, NERC
  J. MOURA, NERC
  G. VELUMMYLUM, NERC

Battery Storage (poster)
  Monday, 27 July, 5:00 PM–8:00 PM  Plaza Ballroom
  Sponsored by:  Stationary Battery
  Chairs:  C. ASHTON, Centurylink
           R. TRESSLER, Alber Corp.

PAPERS AND AUTHORS:
• 15PESGM0233, An On-line Tracking Algorithm for Li-Ion Batteries' Optimal Charging Frequency
  A. HUSSEIN, UAEU
  A. FARDOUN, UAEU
  S. STEPHEN, UAEU

• 15PESGM0334, Staircase Modulation Based Battery Storage System with Asymmetric Cascaded H-Bridge Multilevel Inverter
  T. BUSARELLO, University of Campinas – UNICAMP
  A. BUBSHAIT, Colorado School of Mines
  J. POMILIO, University of Campinas – UNICAMP
  M. SIMÕES, Colorado School of Mines

• 15PESGM1120, Cost-Benefit Analysis Tool and Control Strategy Selection for Lithium-Ion Battery Energy Storage System
  F. MATTHEY, Hitachi Research Laboratory
  T. KAMIJOH, Hitachi Research Laboratory
  K. TAKEDA, Hitachi Research Laboratory
  S. ANDO, Hitachi Research Laboratory
  T. NOMURA, Hitachi Ltd.
  T. SHIBATA, Hitachi Ltd.
  A. HONZAWA, Hitachi Ltd.

Substations Poster Session (poster)
  Monday, 27 July, 5:00 PM–8:00 PM  Plaza Ballroom
  Sponsored by:  Substations

PAPERS AND AUTHORS:
• 15PESGM0201, A New Substation Linear State Estimation Method
  M. ZHAI, NARI Technology Development Co. Ltd.
  T. ZHANG, NARI Technology Development Co. Ltd.
  H. ZHANG, NARI Technology Development Co. Ltd.
  M. QI, NARI Technology Development Co. Ltd.
  C. GONG, NARI Technology Development Co. Ltd.
  L. LI, NARI Technology Development Co. Ltd.

• 15PESGM0256, Development of the Insulating Foam Model for the Study of Electric Field Distribution for the Application of Gas Insulated Transmission Line
  H. PENDSE, Arizona State University
  G. KARADY, Arizona State University

• 15PESGM0358, Distribution Substation Bus Design for Optimal Reliability and Economics
  Z. CRAMER, California State University, Sacramento
  M. VAZIRI YAZDI, California State University, Sacramento
  M. ZARGHAMI, California State University, Sacramento
• 15PESGM0442, Software Merging Unit based IED Functional Test Platform
  Y. WU, KTH – Royal Institute of Technology
  Z. SHI, ABB AB
  N. HONETH, KTH – Royal Institute of Technology
  L. NORDSTRÖM, KTH – Royal Institute of Technology

• 15PESGM0556, Computationally Efficient Method for Simulating Multi-Terminal MMC-HVDC
  H. JIANG, McGill University
  C. WANG, McGill University
  G. JOOS, McGill University
  B. OOI, McGill University

• 15PESGM0618, Development of a Life Cycle Cost Estimating Tool to Compare GIS and AIS Substation Projects
  T. WONG, University of Queensland
  J. LOPEZ-ROLDAN, Powerlink
  T. SAHA, University of Queensland

• 15PESGM1131, Analysis of Technology and Economy of New Generation Smart Substation
  Y. CHEN, North China Electric Power University

• 15PESGM1272, SF₆ Alternative Development for High Voltage Switchgears
  Y. KIEFFEL, ALSTOM Grid
  F. BIQUEZ, ALSTOM Grid
  P. PONCHON, ALSTOM Grid
  T. IRWIN, ALSTOM Grid

• 15PESGM1275, Research on the Security Risk Assessment of Substation Automation System Considering Cyber Attack
  B. WEN, South China University of Technology
  M. LIU, South China University of Technology
  C. GUO, Zhejiang University

• 15PESGM1459, Fault Diagnosis of the Substation
  Z. GAO, Shandong University
  J. WANG, Shandong University
  N. GAO, Shandong Jianzhu University

• 15PESGM2165, Synchronization of Communication Service Configuration Parameter in Power Utility Automation Based on IEC 61850 Service Tacking
  J. CHEN, Xiangtan University
  B. DUAN, Xiangtan University
  Y. LIU, Xiangtan University

• 15PESGM2425, A Game-Theoretic Approach to Optimal Defense Strategy against Load Redistribution Attack
  Y. XIAO, University of Wisconsin-Milwaukee
  L. WANG, University of Wisconsin-Milwaukee

Switchgear Poster Session (poster)
Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: Switchgear

PAPERS AND AUTHORS:
• 15PESGM0783, Performance Analysis of Resistive and Flux-Lock Type SFCL in Electricity Networks with DGs
  Y. ZHAO, University of Queensland
  T. SAHA, University of Queensland
  O. KRAUSE, University of Queensland
  Y. LI, Hunan University

Transformers Committee Poster Session (poster)
Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: Transformers

PAPERS AND AUTHORS:
• 15PESGM0420, A Novel UV-Vis Spectroscopy Application to Measure Interfacial Tension of Transformer Oil
  N. ABU BAKAR, Curtin University
Transmission and Distribution Poster Session (poster)
Monday, 27 July, 5:00 PM–8:00 PM Plaza Ballroom
Sponsored by: Transmission and Distribution
Chair: G. Chang, National Chung Cheng University

PAPERS AND AUTHORS:
- 15PESGM0091, Reactive Compensation of Overhead AC Transmission Lines Using Underground Power Cables
  U. KARKI, Michigan State University
  D. GUNASEKARAN, Michigan State University
  F. ZHENG PENG, Michigan State University

- 15PESGM0120, Risk Constrained Placement of Surge Arresters in Smart Power Systems
  K. WHEELER, University of Saskatchewan
  D. JAYAWEERA, University of Birmingham
• 15PESGM0123, Applying Adaptive Notch Filter in Alpha-Beta-Coordinate to Improve 3-Phase 4-Wire Shunt APF Performance under Non-Ideal PCC Voltage
  T. NGUYEN DUC, Shibaura Institute of Technology
  T. FUNABASHI, Nagoya University
  D. NGUYEN DUY, Shibaura Institute of Technology
  G. FUJITA, Shibaura Institute of Technology

• 15PESGM0345, PV Stabilizer
  J. XIONG, Carleton University
  S. LIU, Carleton University
  X. WANG, Carleton University
  S. ZHU, Tsinghua University
  J. ZHENG, Tsinghua University
  K. MENG, China Southern Power Grid Corp.

• 15PESGM0356, Distributed Generation Effects on Voltage Profile of Distribution Grid with SVC and Smart Inverter
  M. TAYYAB, California State University, Sacramento
  M. VAZIRI YAZDI, California State University, Sacramento
  A. YAZDANI, Zglobal
  M. ZARGHAMI, California State University, Sacramento

• 15PESGM0398, A Two-Stage Power Dispatching Algorithm for System Support by Droop-Controlled DC Grids
  Y. LI, Hong Kong Polytechnic University
  Z. XU, Hong Kong Polytechnic University
  K. WANG, University of Western Australia
  L. LAI, State Grid Energy Research Institute, Beijing, P. R. China

• 15PESGM0410, Application of Loop Power Flow Controllers for Power Demand Optimization at Industrial Customer Sites
  J. CANO, University of Oviedo
  J. JATSKEVICH, University of British Columbia
  J. G. NORNIELLA, University of Oviedo
  C. ROJAS, University of Oviedo
  G. A. ORCAJO, University of Oviedo

• 15PESGM0426, Harmonics in a Wind Power Plant
  V. PRECIADO, Instituto Tecnologico de Morelia
  M. MADRIGAL, Instituto Tecnologico de Morelia
  E. MULJADI, National Renewable Energy Laboratory
  V. GEVORGIAN, National Renewable Energy Laboratory

• 15PESGM0454, On the Effects of Monitoring and Control Settings on Voltage Control in PV-Rich LV Networks
  A. PROCIOPOU, University of Manchester
  C. LONG, University of Manchester
  L. OCHOA, University of Manchester

• 15PESGM0480, Direct Circulating Current Suppressing Control for MMC-HVDC
  F. YU, Shanghai Jiaotong University
  X. WANG, Shanghai Jiaotong University
  W. LIN, School of Engineering

• 15PESGM0481, An Integrated Nine-Switch Power Conditioner Parallel with Transformer for Power Quality Enhancement
  Y. SHI, Southeast University
  Z. WU, Southeast University
  X. DOU, Southeast University
  M. HU, Southeast University

• 15PESGM0537, Utilization of Advanced Metering Infrastructure in Back-Fed Ground Fault Detection
  G. ABUSDAL, Arizona State University
  A. RIPEGUTU, Agder Energi Nett
  G. HEYDT, Arizona State University

• 15PESGM0628, A Methodology for Designing Low Power Factor Penalties in Distribution Networks
  A. ALABDULJABBAR, KACST
  M. SMIAI, KACST

• 15PESGM0661, EMTP Model of a Bidirectional Multilevel Solid State Transformer for Distribution System Studies
  J. MARTINEZ, Universitat Politecnica de Catalunya
  F. GONZALEZ, Universitat Rovira i Virgili
  J. MARTIN-ARNEDO, Estabanell Energia
  S. ALEPUZ, Escuela Universitaria Politecnica de Mataro
• 15PESGM0703, Integrated Control and Switching Strategy for a Grid-Connected Modular Multilevel Converter  
  Y. MA, University of South Florida  
  L. FAN, University of South Florida  
  Z. MIAO, University of South Florida

• 15PESGM0726, Comparison of Conventional and a Novel Direct-Current Vector Control Approaches for a LCL-Filter based STATCOM  
  Y. SUN, University of Alabama  
  S. LI, University of Alabama

• 15PESGM0744, Galloping Amplitude Analysis and Observation on Full-Scale Overhead Transmission Lines  
  Y. LIU, Shanghai Jiaotong University  
  Z. FU, Shanghai Jiaotong University  
  X. YANG, HAPEC Electrical Power Research Institute

• 15PESGM0879, An Effective Procedure for Voltage Control in HV Systems Receiving Remarkable Energy from DG  
  F. MUZI, University of L’Aquila  
  A. CARRANO, Terna SPA, Italy  
  L. PASSACANTANDO, Terna SPA, Italy

• 15PESGM0884, New Passive Methodology for Online Power Cable Diagnosis by Frequency Analysis  
  Y. KIM, Arizona State University  
  K. HOLBERT, Arizona State University

• 15PESGM1088, A Novel Traveling Wave Based Fault Location Scheme for Power Distribution Grids with Distributed Generations  
  X. CHEN, Huazhong University of Science and Technology  
  X. YIN, Huazhong University of Science and Technology  
  X. YIN, University of Manchester  
  J. TANG, Huazhong University of Science and Technology  
  M. WEN, Huazhong University of Science and Technology

• 15PESGM1242, Frequency Support from Modular Multilevel Converter Based Multi-Terminal HVDC Schemes  
  O. ADEUYI, Cardiff University  
  M. CHEAH-MANE, Cardiff University  
  Y. WU, State Grid Corporation of China  
  C. LIN, State Grid Corporation of China  
  J. LIANG, Cardiff University  
  X. WU, State Grid Corporation of China  
  N. JENKINS, Cardiff University

• 15PESGM1291, Decentralized Voltage Optimization and Coordinated Method in Smart Distribution Grid  
  K. LIU, China Electric Power Research Institute

  R. Schaerer, POWER Engineers, Inc.  
  D. Lewis, POWER Engineers, Inc.

• 15PESGM1684, A Digital Implementation of IEC 61000-4-15 Flickermeter  
  Y. CHEN, National Chung Cheng University  
  G. CHANG, National Chung Cheng University  
  S. LIN, National Chung Cheng University

• 15PESGM1763, Impact of Load Variation on the Synchronous DG Frequency-Based Anti-Islanding Protection  
  D. Motter, University of Sao Paulo  
  F. Mourinho, University of Sao Paulo  
  J. Vieira, University of Sao Paulo

• 15PESGM1793, Grid-Interactive Inverter Modeling for Power System Studies  
  N. Ninad, CanmetENERGY  
  D. Turcotte, CanmetENERGY  
  T. El-Fouly, CanmetENERGY

• 15PESGM1797, On the Accuracy of the Phase-Domain Model for EMT Analysis of Transmission Lines and Cables  
  J. Aguilar, CINVESTAV  
  A. Rosas, CINVESTAV  
  M. Vega, CINVESTAV  
  J. Naredo, CINVESTAV
• 15PESGM1854, A Study of Passive Harmonic Filter Planning for an AC Microgrid
  G. CHANG, National Chung Cheng University
  H. SU, National Chung Cheng University
  L. HSU, National Chung Cheng University

• 15PESGM1866, Fault Current Limiting by Phase Shifting Angle Control of TCPST
  J. LIU, Xi’an Jiaotong University
  W. FANG, Xi’an Jiaotong University
  C. DUAN, Xi’an Jiaotong University
  Z. WEI, Xi’an Jiaotong University
  Z. YANG, State Grid Shanghai Electric Power Company
  Y. CUI, State Grid Shanghai Electric Power Company

• 15PESGM2011, Assessment of Post-Outage Congestion Risk of Wind Power with Dynamic Line Ratings
  B. BANERJEE, Curtin University
  D. JAYAWEERA, University of Birmingham
  S. ISLAM, Curtin University

• 15PESGM2083, A Novel Approach Towards Passive Filter Placement
  F. BELCHIOR, Federal University of Itajubá – UNIFEI
  J. CASTRO, Pontifical Catholic University of Rio de Janeiro (PUC-Rio)
  L. LIMA, Federal University of Itajubá – UNIFEI
  P. RIBEIRO, Federal University of Itajubá – UNIFEI

• 15PESGM2238, Wind Power Transmission through LCC-HVDC with Wind Turbine Inertial and Primary Frequency Supports
  M. ZHANG, Huazhong University of Science and Technology
  X. YUAN, Huazhong University of Science and Technology
  J. HU, Huazhong University of Science and Technology
  S. WANG, Huazhong University of Science and Technology
  S. MA, China Electric Power Research Institute
  Q. HE, China Electric Power Research Institute
  J. YI, China Electric Power Research Institute

• 15PESGM2262, Secondary Control in Multi-Terminal VSC-HVDC Transmission System
  T. HAILESELASSIE, Siemens – Oil & Gas Solutions
  A. ENDEGNANEW, Norwegian University of Science and Technology
  K. UHLEN, Norwegian University of Science and Technology

• 15PESGM2356, Guidelines for High Penetration of Single-Phase PV on Power Distribution Systems
  A. REIMAN, University of Pittsburgh
  T. MCDERMOTT, University of Pittsburgh
  G. REED, University of Pittsburgh
  B. ENAYATI, National Grid

• 15PESGM2366, Financial Assessment of Battery Energy Storage Systems for Frequency Regulation Service
  M. AVENDANO-MORA, S&C Electric Company
  E. CAMM, S&C Electric Company

• 15PESGM2410, Methodology to Calculate Economic Benefits of Shield Wire Segmentation
  R. RAMOS, Southern Company Services
  R. HORTON, Southern Company Services

• 15PESGM2554, Large Scale Photovoltaic System and Its Impact on Distribution Network in Transient Cloud Conditions
  J. KRATA, University of Queensland
  T. SAHA, University of Queensland
  R. YAN, University of Queensland

• 15PESGM2557, Modernizing an Aging Infrastructure through Real-Time Transmission Monitoring
  J. GENTLE, Idaho National Laboratories
  W. PARSONS, Idaho National Laboratories
  M. WEST, Idaho National Laboratory
  S. JAISON, Idaho National Laboratories

• 15PESGM2619, Islanding Detection and Transient Over Voltage Mitigation Using Wireless Sensor Networks
  A. ESHRAGHI, University of Hawaii at Manoa
  R. GHORBANI, University of Hawaii at Manoa

  S. MOHAN, University of Western Ontario
  H. MALEKI, University of Western Ontario
  R. VARMA, University of Western Ontario
  W. LITZENBERGER, Power Engineers
  S. RAHMAN, University of Western Ontario
  H. MALEKI, University of Western Ontario
  S. MOHAN, University of Western Ontario
  R. VARMA, University of Western Ontario
  W. LITZENBERGER, Power Engineers

North America Chinese Power Professional Association: Social Event
  Monday, 27 July, 8:00 PM–10:00 PM                      Grand Ballroom I
  Sponsored by:             North American Chinese Power Professional Association

Tuesday Morning

Presenter Breakfast (breakfast)
  Tuesday, 28 July, 6:30 AM–8:30 AM                       Grand Ballroom

Student Poster Session and Attendee Breakfast (breakfast)
  Tuesday, 28 July, 7:00 AM–9:30 AM                       Plaza Exhibit

Student Poster Session (poster)
  Tuesday, 28 July, 7:00 AM–9:30 AM                       Plaza Exhibit
  Sponsored by:             Power & Energy Education Student Activities

PAPERS AND AUTHORS:
• 15STUGM001, Robust Oscillation Monitoring via Dimensionality Reduction of Synchrophasor Data
  Y. CHEN, Texas A&M University
• 15STUGM002, Online Bad Data Detection Using Kernel Density Estimation
  M. S. UDDIN, Carnegie Mellon University
• 15STUGM003, A Partially Observable Markov Decision Process Approach to Customer Energy
  Management Systems
  T. HANSEN, Colorado State University
• 15STUGM004, Design and Implementation of a Power Quality Analysis System Based on IEEE
  Standard 1159.3
  L. Y. HSU, National Chung Cheng University
• 15STUGM005, Participation of Customers in Active Demand Side Participation Programs Under
  Different Pricing Schemes
  H. XU, University of Strathclyde
• 15STUGM006, Analyzing a Multi-Microgrid Power System with Stochastic Uncertainties Including
  Optimal PV Allocation
  H. KESHTKAR, West Virginia University
• 15STUGM007, Charging Algorithm for an Electric Vehicle Charging Aggregator in Distribution
  Systems
  S. G. PARK, Myongji University
• 15STUGM008, Characterizing the Storage Properties of a Smart Building
  J. E. C. OCANA, University of Washington
• 15STUGM009, Measurement Accuracy Limitation Analysis on Synchrophasor
  J. ZHAO, University of Tennessee
• 15STUGM010, Optimal Allocation of Robotic Wind Turbine Inspectors in a Wind Farm
  J. CHEN, New York University
• 15STUGM011, Control and Scheduling Big Data Computing Tasks in the Smart Grid
  L. ZHANG, Imperial College
• 15STUGM012, A Framework for Home Energy Management Systems Using the Analytical
  Network Process
  D. DANESHKA, Colorado State University
• 15STUGM013, Reliability Considerations in Cyber Enabled Power Systems
  M. H. KAPOURCHALI, Wichita State University
• 15STUGM014, Development of Microgrid Test-Bed for Energy Management System
  S. NEPAL, South Dakota State University
• 15STUGM015, Advanced Remote Hardware-in-the-Loop Testing
  L. HALING, Colorado State University
• 15STUGM016, Impact Assessment of Communication Service Disruptions in Power System Applications
  Q. WANG, Southeast University
• 15STUGM017, Electricity Demand Forecasting Considering Large-Scale Penetration of Electric Vehicles’ Parking Lots Utilizing ARIMA Model
  M. AMINI, Carnegie Mellon University
• 15STUGM018, Smart Loads for Voltage Control in Distribution Networks
  Z. AKHTAR, Imperial College
• 15STUGM019, Development and Integration of Modified Voltage Stability Index for Distribution System
  L. CORSON, Washington State University
• 15STUGM020, Vehicle-to-Grid Automatic Load Sharing with Driver Preference in Micro-Grids
  H. NAZARIPOUYA, University of California
• 15STUGM021, A Matlab-Based Residential Load Modeling Toolbox for HEM Algorithms Development
  X. ZHU, Student Member, IEEE
• 15STUGM022, Phasor Measurement Data Compression and Power System Identification
  MD. A. KHAN, Student Member, IEEE
• 15STUGM023, Capacity Constrained Energy Management for Unbalanced Distribution Systems
  S. UDDIN, University of Queensland
• 15STUGM024, A Fully Distributed Active Power Control Method with Minimum Generation Cost in Grid-Connected Microgrids
  Z. WANG, Tsinghua University
• 15STUGM025, MPC-Based Approach for Voltage Control with OLTC in Active Distribution System
  Y. CAI, Tsinghua University
• 15STUGM026, Provision of Flexible Load Control by Multi-Flywheel-Energy-Storage System in Electrical Vehicle Charging Stations
  B. SUN, Aalborg University
• 15STUGM027, Distributed Computing Approach to Solve Three-Phase Distribution OPFs
  A. MOSADDEGH, University of Waterloo
• 15STUGM028, Investigation into Incentive based Demand Response Program (DRP) for Operating Reserve Scheduling Considering Stochastic Load
  Q. DUAN, University of Hong Kong
• 15STUGM029, Phase-Wise Day-Ahead Dispatch of Battery Energy Storage System in Unbalance Distribution Networks
  K. JOSHI, IIT Gandhinagar
• 15STUGM030, Grid-Adaptive Limitation of Short Circuit Current Contribution from Wind Power Plant with Superconducting Fault Current Controller
  S. KIM, Yonsei University
• 15STUGM031, Primary Reserve Estimation from Industrial/Commercial Loads in Great Britain System
  D. CHAKRAVORTY, Student Member, IEEE
• 15STUGM032, Real-Time Simulation and Hardware-in-the-Loop Tests of a Battery System
  L. PIYASINGHE, Student Member, IEEE
• 15STUGM033, Frequency Regulation under Contingency by Controlling Thermostatically Controlled Loads
  Y. ZHANG, Student Member, IEEE
• 15STUGM034, Synchronphasor based Platform for Testing Transient Stability Prediction in Power System
  B. SHRESTHA, University of Saskatchewan
• 15STUGM035, An Experimental Phasor Measurement Unit Setup at the University of Wyoming
  S. PASCO, University of Wyoming
• 15STUGM036, Harmonious Integration of Faster Acting Energy Storage Systems as Regulation and Reserve Resource into the Grid Ancillary Service
  J. W. SHIM, Student Member, IEEE
• 15STUGM037, Multi-Microgrid Operation Management Strategy Based on Multi-Agent System
  S. MA, South Dakota State University
• 15STUGM038, Multi-Time Scale Frequency Prediction Using Cellular Computational Network
  Y. WEI, Clemson University
• 15STUGM039, Galloping Amplitude Analysis and Observation on Full-Scale Test Overhead Transmission Lines
  L. YAKUN, Shanghai Jiao Tong University
• 15STUGM040, Coordinated Cyber-Physical Attack Targeting Undetectable Severe Line Outages
  Z. LI, Illinois Institute of Technology
• 15STUGM041, Bad Data Detection in Modern Power Networks
  A. MAJUMDAR, Imperial College
• 15STUGM042, GPS-Spoofed Synchrophasor Data Correction for State Estimation
  X. FAN, University of Wyoming
• 15STUGM043, Implementing Attacks for Modbus/TCP Protocol in a Real-Time Cyber Physical
  System Test Bed
  B. CHEN, Texas A&M University
• 15STUGM044, A Distributed Optimization Algorithm for Attack-Resilient Wide-Area Monitoring of
  Power Systems: Theoretical and Experimental Methods
  J. ZHANG, North Carolina State University
• 15STUGM045, Comprehensive Comparison of Power Models for Cascading Failure Analysis
  Y. TANG, University of Rhode Island
• 15STUGM046, TCD based Fault Propagation Analysis and Prevention in Cyber-Physical Systems
  H. CHAMORRO, Qatar University
• 15STUGM047, A Study of Power System Coherency including Renewables
  R. JAIN, North Carolina State University
• 15STUGM048, GPU-Based Two-Step Preconditioning for Conjugate Gradient Method in Power Flow
  X. LI, University of Tennessee
• 15STUGM049, Risk-Based Constraint Relaxation for Security Constrained Economic Dispatch
  X. GUO, Iowa State University
• 15STUGM050, Comprehensive Decoupled Risk-Limiting Dispatch
  G. HUANG, Student Member, IEEE
• 15STUGM051, Fast SVD Computations for Synchrophasor Algorithms
  T. WU, Washington State University
• 15STUGM052, Impact Analysis of Network Topology Change on Transmission Distance Relay Settings
  M. TASDIGHI, Texas A&M University
• 15STUGM053, A Power Flow Adjustment Method Using PSTs Considering Large-Scale PV Penetration
  S. YAMANOUCHI, Waseda University
• 15STUGM054, Application of Anomaly Detection to Transient Stability Multi-Swing Step-Out Prediction
  H. KAKISAKA, Waseda University
• 15STUGM055, A Highly-Reliable Power Flow Calculation Method Requiring No Jacobian Matrix
  M. ICHIHARA, Waseda University
• 15STUGM056, A Novel Critical Fault Screening Method Using Time Domain Equal-Area Criterion
  T. SADAKAWA, Waseda University
• 15STUGM057, Self-Correction Strategies for Frequency Domain Ringdown Analysis in Power Systems
  E. REZAEI, Washington State University
• 15STUGM058, Preventive Voltage Control Considering Generator PQ Curves under Large-Scale PV Penetration
  A. ISHIKAWA, Waseda University
• 15STUGM059, System Voltage Control Using Game Theory with PV Output Prediction
  T. GOMI, Waseda University
• 15STUGM060, Strategic Energy Storage System Investment
  E. NASROLAHPOUR, University of Calgary
• 15STUGM061, Transformer Tap Estimation and Estimation of Losses Using Hybrid Particle Swarm Optimization
  S. NANCHIAN, Imperial College
• 15STUGM062, Enhanced Utilization of Pumped Hydro Storage in Power System Operation Using Policy Function Approximation
  N. LI, Arizona State University
• 15STUGM063, Economic Assessment of Compressed Air Energy Storage Technology
  S. SHAFIEE, University of Calgary
• 15STUGM064, A New EMT-TS Hybrid Simulation Platform and Its Application to Detailed FIDVR Studies
  Q. HUANG, Arizona State University
• 15STUGM065, Modeling the Impact of Energy Storage System (ESS) on Electricity Price
  P. Z. DEHKORDI, University of Calgary
• 15STUGM066, Harnessing Flexibility of the Transmission Grid to Enhance System Reliability: PJM Test Case
  P. BALASUBRAMANIAN, Arizona State University
• 15STUGM067, Aggregated Optimal Charging Control of Electric Vehicles for Large EV Population
Y. TANG, University of Hong Kong

• 15STUGM068, Probabilistic Forecast of Real-Time LMP and Network Congestion
Y. Ji, Cornell University

• 15STUGM069, Multiobjective Stability Constrained Optimal Power Flow Using Convex Semi-Definite Programming
S. MOGHADASI, University of North Carolina at Charlotte

• 15STUGM070, High Speed Distance Relaying Scheme Using FPGAs & IEC 61850
X. JIN, University of Saskatchewan

• 15STUGM071, The Application of Continuously Variable Series Reactor to Enhance Power System Loadability
X. ZHANG, University of Tennessee

• 15STUGM072, Effect of Electricity Market Operation Structure on Potential Benefit of Energy Storage
D. KHASTIEVA, KTH Royal Institute of Technology

• 15STUGM073, Multi-Machine Power System Control based on Goal Representation Adaptive Dynamic Programming
Z. NI, University of Rhode Island

• 15STUGM074, Distributed Online Modified Greedy Algorithm for Networked Storage Operation under Uncertainty
J. QIN, Stanford University

• 15STUGM075, Integrated Electricity Generation, CHPs, and Boilers Expansion Planning: Alberta Case Study
Y. MOZAFARI, University of Calgary

• 15STUGM076, Stochastic Security Constrained Unit Commitment with Parallel Algorithm
C. WANG, Mississippi State University

• 15STUGM077, An Optimization Model for the Operation of Energy Storage in Stochastic Unit Commitment
J. M. MONSON, University of Washington

• 15STUGM078, Estimating the Propagation and Extent of Cascading Line Outages from Colombia ISO Data with a Branching Process
L. RAMIREZ, Iowa State University

• 15STUGM079, Real-Time Wide-Area Loading Margin Sensitivity (WALMS) in Power Systems
H. YUAN, University of Tennessee

• 15STUGM080, Calculating the Long Term Voltage Stability Margin Using a Linear Index
R. MATAVALAM, Iowa State University

• 15STUGM081, Demonstration of Real-Time Measurement-Based Voltage Stability Monitoring and Control Using CURENT Hardware Test Bed System
F. HU, University of Tennessee

• 15STUGM082, Design of Resilient Distribution Network against Natural Disasters: A Robust Optimization Approach
W. YUAN, University of Tennessee

• 15STUGM083, Aggregated Active Distribution Networks for Secondary Control of Islanded Power Systems
M. H. CINTUGLU, Florida International University

• 15STUGM084, Investigation of Moisture Influence on Dielectric Response of Ester Oil Impregnated Pressboard
K. BANDARA, University of Queensland

• 15STUGM085, Microgrid Security Assessment and Islanding Control by Support Vector Machine
Y. ZHU, University of Tennessee

• 15STUGM086, AIS-MAS Algorithm for Cascading Failures Prevention in Power Systems
A. A. BABALOLA, Tennessee Tech University

• 15STUGM087, Adaptive and Intelligent PMU for Smart Applications
H. LEE, Washington State University

• 15STUGM088, Robust Mean-Variance Optimization Model for Grid-Connected Microgrids
L. BAI, Student Member, IEEE

• 15STUGM089, Adaptive Robust Tie-Line Scheduling for Multi-Area Power Systems with Wind Power Variability
Z. LI, Tsinghua University

• 15STUGM090, Short-Term Wind Power Forecasting Using State-Space Approach and Uncertain Basis Functions
C. HUANG, University of Tennessee

• 15STUGM091, A Hybrid Islanding Detection Method for Inverter Based Distributed Generations
R. AZIM, University of Tennessee

• 15STUGM092, Supervisory Control for VSC-HVDC Grid Interconnecting AC Systems
M. H. FIDAI, KTH-Royal Institute of Technology
Tuesday Morning, continued

- 15STUGM093, Frequency Control in Isolated Microgrids Through Voltage Regulation
  M. FARROKHABADI, University of Waterloo

- 15STUGM094, Statistical Wind Power Forecasting Using Kernel Density Estimation and Autoregressive Model
  K. DEHGHPANPOUR, Montana State University

- 15STUGM095, Transformer Operating Conditions Under Introduction of PV and EVs in an Eco-district
  P. CODANI, CentraleSupelec, CNRS

- 15STUGM096, Efficient Responsive Reserve Study for High Penetration of Wind Resources in ERCOT
  W. LI, North Carolina State University

  Y. ZHANG, Xi'an Jiaotong University

- 15STUGM098, Smart Energy Storage System for Integration of PMSG-Based Wind Power Plant
  M. R. ABEDI, Baylor University

- 15STUGM099, Impact Assessment and Sensitivity Analysis of Distributed Generation on Steady State Performance of Distribution system
  A. SINGH, Iowa State University

- 15STUGM100, Shift Frequency/Dynamic Phasor Modeling of Wind Generators in RTDS
  B. K. THAKUR, University of Saskatchewan

- 15STUGM101, Fault Identification in Ungrounded Solar PV Systems
  M. HARTWIG, University of Strathclyde

- 15STUGM102, Swarm Based Parameter Estimation of Wave Characteristics for Control in Ocean Energy Farms
  K. HATALIS, Lehigh University

- 15STUGM103, Prediction-Based Policy Generation for Scheduling Wind Energy and Dispatch Margin
  M. HEDAYATI, Arizona State University

- 15STUGM104, Comparison of Energy Storage System Dispatch Strategies for Congestion Management in Meshed Power Systems
  K. HARTWIG, University of Strathclyde

- 15STUGM105, Performance Metrics-based Design and Dispatch for Electric Microgrids
  M. PANWAR, Colorado State University

- 15STUGM106, A Dynamic Operational Scheme for Residential PV Inverters
  A. MALEKPOUR, Kansas State University

- 15STUGM107, A Distribution Level Stacked Energy Storage Services Control Algorithm Considering Renewables Integration & Peak Load Shaving
  S. ABELRAZEK, University of North Carolina at Charlotte

- 15STUGM108, Medium Frequency Transformer Enabled Wave Energy Integration Architecture
  S. HAZRA, Carolina State University

- 15STUGM109, Volt/Var Control Implementation Strategies in High PV Penetration Distribution Power System
  M. G. KASHANI, North Carolina State University

- 15STUGM110, PV and Energy Storage Integration into Medium Voltage Grid Using Cascaded Converter with 3L-NPC Units
  R. CHATTOPADHYAY, Carolina State University

  W. BAI, Baylor University

- 15STUGM112, Harmonic Characterization of Grid Connected PV Systems & Validation with Field Measurements
  A. CHIDURALA, University of Queensland

- 15STUGM113, Modeling Reserves Sharing via Interregional Transmission within Co-Optimization Planning Software
  A. FIGUEROA, Iowa State University

- 15STUGM114, A Fundamental Study of Applying Wind Turbines for Power System Frequency Control
  F. W. BERNAL, Rensselaer Polytechnic Institute Troy

- 15STUGM115, Distribution Network Reconfiguration with Aggregated Electric Vehicle Charging Strategy
  H. CUI, University of Tennessee

- 15STUGM116, A Filtering Scheme to Reduce the Penetration of Harmonics into Transmission Systems
  T. DING, University of Alberta

- 15STUGM117, High-Speed Distance Relaying Implementation Using Altera FPGAs
  S. LIU, University of Saskatchewan
• 15STUGM118, Matlab/Simulink Dynamic Model for PSS Design Based on PMUs Signals for Improving the Damping of Inter-Area Oscillations
  M. NOORIZADEH, Qatar University

• 15STUGM119, Controller Hardware-in-Loop Testing for Optimal Control of Inverter in a Microgrid Setup
  K. PRABAKAR, Student Member, IEEE

• 15STUGM120, A Decoupling Based Direct Method for Power System Transient Stability Analysis
  B. WANG, University of Tennessee

• 15STUGM121, Identification of a Multi-Area Dynamic Equivalent Model of the WECC Using Synchrophasors
  G. CHAVAN, North Carolina State University

• 15STUGM122, Model Predictive Excitation Control for Constrained Frequency and Voltage Stabilization
  X. MIAO, Carnegie Mellon University

• 15STUGM123, Identification and Reduction of Impact of Islanding Using Hybrid Method with Distributed Generation
  K. NARAYANAN, Malaviya National Institute of Technology

• 15STUGM124, Radial Thermal Circuit Model for Overhead Conductors Based on Parameter Identification under Natural Convection Condition
  K. FENG, Nanjing University of Science & Technology

• 15STUGM125, Bootstrap-Based Hypothesis Test for Detecting Sustained Oscillations
  M. GHORBANIPARVAR, Binghamton University

• 15STUGM126, Investigation of Reactive Power Limit Induced Voltage Instability in Isolated Microgrid by Using DAE and Small Signal Analysis
  H. M. CHOU, Student Member, IEEE

• 15STUGM127, Large Scale Photovoltaic System and Its Impact on Distribution Network in Transient Cloud Conditions
  J. KRATA, University of Queensland

• 15STUGM128, Hierarchical Voltage Control for Systems with High Wind Penetration
  Y. LU, University of Tennessee

• 15STUGM129, Design of Real-Time Fuzzy Logic PSS Based on PMUs for Damping Low Frequency Oscillations
  J. KARIM, Qatar University

• 15STUGM130, Control of Smart Grids to Prevent Blackout Using Neural Networks: Experimental Approach
  S. ZARRABIAN, Tennessee Technological University

• 15STUGM131, Virtual Actuators for Wide-Area Damping Controller of Power Systems
  M. E. RAOUFAT, University of Tennessee

• 15STUGM132, Analysis of Power System Dynamics Using Trajectory Sensitivity for Transient Stability
  J. K. KIM, Yonsei University

• 15STUGM133, Detection of Electrical Center in Out-Of-Step Conditions
  M. A. KHORSAND, Arizona State University

• 15STUGM134, A Dynamic Model to Characterize Power System Cascading Failure
  H. ZHENG, Student Member, IEEE

• 15STUGM135, Development of Algorithm for Islanding Detection Using Circuit Breaker Reignition
  J. H. RYU, Myongji University

• 15STUGM136, Analyzing Fuzzy Dynamic Line Rating Using Confidence Interval
  S. KARIMI, University of Calgary

• 15STUGM137, Robust Entropy-Based Cooperative Control of a Wind DFIG for Transient Stabilization and MPPT
  S. BAROS, Carnegie Mellon University

• 15STUGM138, Network Control Methods to Reduce the Frequency and Impact of Severe Disturbances
  Q. ZHANG, Iowa State University

• 15STUGM139, The Impact of Financial Transmission Rights on Load Serving Entities’ Strategic Bidding Considering Coupon-Based Demand Response
  X. FANG, University of Tennessee

• 15STUGM140, An Approach to Assess the Responsive Residential Demand to Financial Incentives
  Q. HU, University of Tennessee

• 15STUGM141, Kernel-Based Electric Vehicle Charging Load Modeling with Improved Latin Hypercube Sampling
  M. LIANG, Chongqing University

• 15STUGM142, A Coordinated Approach to Energy Exchange between Electric Vehicle Load Aggregators and Wind Generation Companies under Uncertainty
  A. TAVAKOLI, University of Tasmania Hobart
• 15STUGM143, Hedging Against Uncertainties for Wind Power Producer with Block Futures Contracts  
  Y. XIAO, Xi’an Jiaotong University

• 15STUGM144, Analyzing the Impacts of Constraint Relaxation Practices in Electric Energy Markets  
  Y. AL-ABDULLAH, Arizona State University

• 15STUGM145, Unit Commitment and Energy Pricing Using a Two-Stage MIP based Algorithm  
  Y. XIA, Rensselaer Polytechnic Institute

• 15STUGM146, Design of Performance-Based Frequency Regulation Market and Implementation in Real-Time Operation  
  Z. WANG, University of Hong Kong

• 15STUGM147, Incentive Based Demand Response to Reduce Costs and Minimize Price Volatility  
  A. ASADINEJAD, University of Tennessee

• 15STUGM148, Base-Case and Post Contingency Line Relaxations Impact on System Reliability  
  A. SALLOUM, Arizona State University

• 15STUGM149, Market-to-Market Day-Ahead Scheduling  
  M. KHANABAD, Mississippi State University

• 15STUGM150, Co-optimization of Transmission and Other Resources: Case Study for the EI  
  E. SPYROU, Student Member, IEEE

• 15STUGM151, Flexibility in Dutch Electricity Markets  
  R. B. HYTOWITZ, Johns Hopkins University

• 15STUGM152, Natural Gas-Electricity Market Design Utilizing Contract Theory  
  N. NEHA, MIT

• 15STUGM153, Market-Based Microgrid Optimal Scheduling  
  S. PARHIIZI, University of Denver

• 15STUGM154, Study Abroad: Supplement to Engineering Education  
  A. BARTLETT, University of Kentucky

• 15STUGM155, A Two-Stage Power Dispatching Algorithm for System Support by Droop-Controlled DC Grids  
  Y. LI, Student Member, IEEE

• 15STUGM156, Adaptive Transversal Digital Filter for Reference Current Detection in Shunt Active Power Filter  
  A. MOHAMED, Florida International University

• 15STUGM157, Optimizing a Virtual Impedance Droop Controller for Parallel Inverters  
  M. KABALAN, Villanova University

• 15STUGM158, Effects of High Frequency Harmonics on Lighting Equipment  
  G. SINGH, Clemson University

• 15STUGM159, Multi-Terminal DC System Performance Evaluation Using Interconnected RTDS and OPAL RT System  
  S. ACHARYA, Carolina State University

• 15STUGM160, Integrated Control and Switching Strategy for a Grid-Connected Modular Multilevel Converter  
  Y. MA, University of South Florida

• 15STUGM161, Dynamic Consensus Algorithm based Distributed Unbalance Compensation in Islanded Microgrids  
  L. MENG, Aalborg University

• 15STUGM162, Analysis of Modular Multilevel Converter Based on Asymmetrical Uni-Directional Full-Bridge Submodules for the DC Fault Blocking Capability  
  J. KANG, Yonsei University

• 15STUGM163, Psuedo Saturation of DC Coupling Transformer and Mitigation Techniques  
  R. BEDDINGFIELD, Carolina State University

• 15STUGM164, Background Harmonic Mitigation and Reactive Power Control Using an Advanced Distributed PV Power Plant  
  H. JAFARIAN, Student Member, IEEE

• 15STUGM165, Application of Synchronous Closing in Generator Synchronization by Reducing Transients  
  Y. ZHOU, University of Alberta

• 15STUGM166, A Novel Transverse Flux Machine for Vehicle Traction Applications  
  Z. WAN, North Carolina State University

• 15STUGM167, Field Programmable Gate Array Based Speed Control of BLDC Motor  
  R. PINDORIYA, Indian Institute of Technology Gandhinagar

• 15STUGM168, Transient Stabilization of Power Grids Using Passivity-Based Control with Flywheel Energy Storage Systems  
  K. BACHOVCHIN, Carnegie Mellon University

• 15STUGM169, Co-Optimization of Electric and Natural Gas Infrastructures  
  S. L. CANO, Iowa State University

Tuesday Morning, continued
Tuesday Morning, continued

- 15STUGM170, A Monte Carlo Simulation Platform for Studying Low Voltage Residential Networks
  R. TORQUATO, University of Campinas
- 15STUGM171, A Practical Guideline to Design Harmonic Filters in Residential Power Distribution Systems
  P. BAGHERI, University of Alberta
- 15STUGM172, A Novel Hybrid Islanding Detection Method Combination of SMS and Q-inf for Inverter-Based DG
  S. AKHLAGHI, Binghamton University
- 15STUGM173, An Event-oriented Method for Online Load Modeling Based on Synchronphasor Data
  Y. GE, Illinois Institute of Technology
  Y. BAI, Tsinghua University
- 15STUGM175, Investigation of Sub-Synchronous Resonance in DFIG and Full-Converter Turbines
  O. NDUKA, Imperial College
- 15STUGM176, Probabilistic Modeling of Tidal Power Generation
  M. LIU, Chongqing University
- 15STUGM177, Frequency Response and Its Enhancement Using Synchronous Condensers in Presence of High Wind Penetration
  N. AL-MASOOD, University of Queensland
- 15STUGM178, Multistage Adaptive Robust Optimization for the Unit Commitment Problem
  A. LORCA, Georgia Institute of Technology
- 15STUGM179, Bayesian Framework for Power Network Planning Under Uncertainty
  A. LAWSON, Durham University
- 15STUGM180, Direct Initialization of Doubly-Fed Induction Generator Based Wind Turbines for Power System Transient Simulation
  M. WU, Texas A&M University
- 15STUGM181, An Advanced Simulation Platform with Application to Frequency Control
  S. WANG, University of Tennessee
- 15STUGM182, Optimal Generation Expansion Plan Under CO₂ Emission Reduction Mechanisms
  Y. SONG, University of Hong Kong
- 15STUGM183, Distinct Approaches to Model Electricity Consumers for the Participation in Demand Response Programs
  P. FARIA, Polytechnic Institute of Porto
- 15STUGM184, Probabilistic Estimation of the State of Electric Vehicles for Smart Grid Applications in Big Data Context
  J. SOARES, Polytechnic Institute of Porto
- 15STUGM185, Initialization of an Unbalanced Radial Distribution System
  J. KHAZAEI, University of South Florida
- 15STUGM186, Transient Simulation of Detailed Large-Scale Power Systems
  D. A. MALDONADO, Illinois Institute of Technology
- 15STUGM187, Asymptotic Cramer-Rao Bound for AR(2) Process
  D. ROBERSON, University of Wyoming
- 15STUGM188, Distributed Control Design for Damping Inter area Oscillations in Large Power Networks
  M. MAHMOUDI, University of Tennessee
- 15STUGM189, Sub-Synchronous Oscillations in Wind Power Plants
  M. T. ALI, KTH Royal Institute of Technology
- 15STUGM190, New Multivariate Linear Regression Real and Reactive Branch Flow Models for Volatile Scenarios
  S. APPALASAMY, University of Melbourne
- 15STUGM191, Development of a Cyber-Physical Testbed for Relay Protection Scheme
  J. HONG, South Dakota State University
- 15STUGM192, Optimal Planning of Switches and DGs in Distribution Network Based on Reliability Insurance
  A. MOHSENZADEH, Wichita State University
- 15STUGM193, Reliability-Network-Equivalent Based Algorithm for Reliability Assessment of Radial Distribution Feeder
  M. SEPEHRY, Wichita State University
- 15STUGM194, Voltage Stability Analysis for Wind Power Hubs Using the AQ-Bus Method
  M. LIEHR, Rensselaer Polytechnic Institute
- 15STUGM195, Combined Economic and Emission Dispatch Considering Integrated Responsive Demand Side Resources
  M. R. ANDEBILI, Clemson University
Tuesday Morning, continued

- 15STUGM196, Levelized Avoided Cost of Electricity: A Complementary Index of LCOE
  C. MARIN, Universidad de Antioquia

- 15STUGM197, Interconnection of Real Time Simulators: Typhoon HIL and RTDS
  I. MAZHARI, University of North Carolina at Charlotte

- 15STUGM198, Spatio-temporal Co-optimization of Wind Energy and Electric Vehicles Resources
  F. ELDALI, Colorado State University

- 15STUGM199, Calibration, Probabilistic Assessment and Sensitivity Analysis of Long-Term Generation Investment Models Using Bayesian Emulation
  M. XU, Durham University

- 15STUGM200, Online Inertia Estimation Technique Using Data from Past Disturbances and Linear Regression
  D. ZOGRAFOS, Royal Institute of Technology

Late Breaking News (super session – panel)

Tuesday, 28 July, 8:00 AM–12:00 PM  Majestic Ballroom

Sponsored by: PES Super Session
Chairs: D. HOUSEMAN, EnerNex
        J. YU, State Grid Corporation of China

Breaking with tradition, the first half of this super session is unscripted, as we invite 3 industry editors to the table to talk about the very latest issues that face the industry. Rick Bush (T&D World), Marty Rosenberg (Penton Press) and Kathleen Davis (Intelligent Utility) will volley issue back and forth for the first 90 minutes of the session.

The balance of the session will focus on the future of the grid and look at potential mega scale projects. Ultra High Voltage AC/DC, smart grid technology and clean energy are discussed as part of the future energy mix. Global vision, historical perspective, forward-looking thinking, and systematic methodology, with emphasis on coordinated development of energy and global politics, economy, society, and environment, macro management of energy resource development, allocation and utilization will be considered with examples.

In this super-session, priorities for development of large energy bases at the North Pole and the Equator; construction of a global UHV backbone network; promotion of worldwide application of smart grid and enhancement of energy and power technology innovation will be demonstrated with examples. Co-moderating this portion of the session will be Dr Jun Yu is currently the Deputy Director General of the Department of International Cooperation of State Grid Corporation of China. Speakers will include:

  L. JIANG, State Grid Energy Research Institute, China
  P. L. ZENG, Electric Power Research Institute
  W.-J. LEE, University of Texas at Arlington, USA
  X.-P. ZHANG, University of Birmingham, UK

Both halves of the session should provide eye opening opinions about the future of the industry and challenges we face.

Moderating the session will be Doug Houseman from EnerNex, a member of the GridVision 2050, and QER teams for PES.

Advanced Motors and Drives for Transportation (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM  Plaza Court 4

Sponsored by: Electric Machinery
Chairs: T. WU, University of Central Florida
        I. HUSAIN, North Carolina State University

There is active research and development in electric motors for HEV and EV applications. Panelists will present the latest research and developments of some unique machine structures, switched reluctance motors, DC biased machines, and some status reviews. The session also includes aircraft motor applications.

PRESENTATIONS AND PANELISTS:

- 15PESGM2972, Asymmetric Pole Shapes for Switched Reluctance Machines for Hybrid Electric Vehicle Applications
  D. ALIPRANTIS, Purdue University

- 15PESGM2973, A Grid-Connected Multi-Input Boost Converter for HEVs
  O. MOHAMMED, Florida International University

- 15PESGM2974, 3-DOF Spherical Momentum Exchange Actuator for Spacecraft Attitude Maneuver
  B. LI, Tianjin University
Interconnection Requirements for Renewable Generation (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM
Plaza Court 3
Sponsored by: Electric Machinery
Chair: R. NELSON, SIEMENS

This panel will present requirements for interconnection of renewable generation in different parts of the world, including Europe, North America, the Pacific Basin, and Latin America. Consideration will be given to both steady state operating requirements, like voltage regulation, frequency response, and active power control, as well as transient performance, including low voltage ride through, high voltage withstand, reactive current production during faulted conditions, and dynamic stability.

PRESENTATIONS AND PANELISTS:
• 15PESGM3001, Grid Requirements for Variable Generation Technologies Latin America
  C. RAHMANN, University of Chile
• 15PESGM3002, European Interconnection Requirements for Renewable Power Plants
  I. ERLICH, University of Duisburg-Essen
• 15PESGM3003, US Interconnection Requirements for Renewable Generation
  C. SMITH, UVIG
• 15PESGM3004, Overview of Interconnection Requirements for Wind Power Plants
  F. MARTIN, Siemens
• 15PESGM3005, Interconnection Requirements for Renewable Power Plants in the Pacific Basin
  J. MACDOWELL, General Electric
• 15PESGM3006, Canadian Interconnection Requirements for Renewable Power Generation
  T. LEVY, CANWEA

Demand Response in Fast Growing Countries: Challenges and Opportunities (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM
Governor’s Square 9
Sponsored by: Energy Development and Power Generation Committee
Chairs B. BEZERRA, PSR
R. MORENO, Universidad de Chile & Imperial College London

Demand response is arising as an effective measure to provide flexibility to a power system and increase its capability to deal with intermittent and uncertain generation outputs from renewables. Demand response also makes the entire system operation activity more efficient since it may displace flexibility services that are normally provided by out-of-merit generators. This panel will show fundamental developments and experiences in promoting and implementing demand response programs, especially in fast-growing countries where there is an important share of flexible generation (hydro) and where economic incentives should ensure enough generation capacity in order to deal with a significantly high demand growth.

PRESENTATIONS AND PANELISTS:
• 15PESGM1978, The Rapid Growth of Demand Response Services Around the World: Case Studies from Introduction to Implementation
  K. SHISLER, ENERNOC
• 15PESGM2773, Operational and Economic Aspects of Demand Response Aggregators
  M. NEGRETIN-PINCETIC, Pontificia Universidad Catolica de Chile
• 15PESGM1977, Challenges for Demand Response in Brazil: How to Change the Mindset after Decades of Relying on Hydro to Provide All the Flexibility the System Needs
  R. FERREIRA, PSR
• 15PESGM1980, Benefits of Industrial Demand Response in the Chilean Electricity Market
  O. MORALES, Systep
• 15PESGM1981, A Vision for an Effective Implementation of Demand Response in Latin America
  R. LEON, XM S.A.
Impact of Green Generation on Power Systems – Experiences, Investigation Methods and Future Evolutions towards successful Integration (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM                     Plaza Court 7
Sponsored by: Energy Development and Power Generation Committee
Chairs: A. ORTHS, Energinet.dk
        K. RUDNION, University of Stuttgart

The integration of variable renewable energy resources (RES) – or “green generation” impacts the electricity system in various ways and its success depends on a number of different aspects. Many European and US power systems are currently subject to a transition process. Both, real life experience and simulation studies from several European countries will be presented, highlighting operational and planning aspects in the light of overall economic efficiency.

Results from international collaborations are given as well:
- a big European research project finalized investigations on the provision of ancillary services from RES and
- a global IEA collaboration evaluates investigation methods to estimate changed power systems’ changed CO₂ emission profiles.

The challenge of how to efficiently provide system flexibility, system reliability related suitable market designs is compared and contrasted between the US and Europe.

PRESENTATIONS AND PANELISTS:
- 15PESGM2807, Impact of Green Generation on Power Systems
  A. ORTHS, Energinet.dk
- 15PESGM2808, Optimal Onshore Wind Power Integration Supported by Local Energy Storages
  C. KLABUNDE, Otto-von-Guericke University of Magdeburg
- 15PESGM2809, Ancillary Services from Wind and Solar PV: Capabilities, Costs and Benefits
  N. CUTULULIS, Technical University of Denmark
- 15PESGM2810, Generation Flexibility and Wind Power Curtailment Correlation: The Spanish Case
  E. GOMEZ-LAZARO, Universidad de Castilla-La Mancha
  H. HOLTTINEN, VTT
- 15PESGM2812, Planning High Wind Penetrated Systems Considering System Dynamic Aspects – The Irish Case
  D. FLYNN, University College Dublin
  V. SILVA, EDF – R&D
- 15PESGM2814, Integration of Variable Renewable Generation – Update on Evolutions of US and EU Market Designs
  C. SMITH,UVIG

The Pathway for Synchrophasors into Control Centers (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM                     Plaza Court 5
Sponsored by: Power System Dynamic Performance Committee and Power System Operations Committee
Chairs: S. NUTHALAPATI, ERCOT
        M. GARDNER, Virginia Power

Synchrophasor technology has many advantages and provides better wide area visualization of the grid. Since this technology has matured, there are efforts underway to take this technology into Control Centers Operations in operating the grid more effectively. The focus of this panel is the detailing of efforts by various system operators, utilities, and vendors in taking Synchrophasor Technology into Control Center Operations.

PRESENTATIONS AND PANELISTS:
- 15PESGM2590, Pathway for PMUs into Control Centers
  J. GIRI, Alstom
PSDP Transactions Session – T7  (transactions paper)

Tuesday, 28 July, 8:00 AM–10:00 AM  Vail

Sponsored by:  Power System Dynamic Performance
Chairs:  N. ZHOU, Binghamton University
A. KUMAR SINGH, Imperial College London

PAPERS AND AUTHORS:

• 15PESGM0172, Coherency-Independent Structured Model Reduction of Power Systems  [Transaction Number: TPWRS.2014.2302871]
  C. STURK, KTH Royal Institute of Technology
  L. VANFRETTI, KTH Royal Institute of Technology
  Y. CHOMPOOBUTROO, KTH Royal Institute of Technology
  H. SANDBERG, KTH Royal Institute of Technology

• 15PESGM0173, A Quantitative Method to Determine ICT Delay Requirements for Wide-Area Power System Damping Controllers  [Transaction Number: TPWRS.2014.2356480]
  N. ANH, KU Leuven
  L. VANFRETTI, KTH Royal Institute of Technology
  J. DRIESEN, KU Leuven
  D. VAN HERTEM, KU Leuven

• 15PESGM0337, Selection of Feedback Signals for Controlling Dynamics in Future Power Transmission Networks  [Transaction Number: TSG-00265-2014]
  B. PAL, Imperial College London
  L. KUNJUMUHAMMED, Imperial College London

  A. MAM, Imperial College London
  B. PAL, Imperial College London
  A. SINGH, Imperial College London

• 15PESGM0739, Initial Results in Using a Self-Coherence Method for Detecting Sustained Oscillations  [Transaction Number: TPWRS-00014-2014]
  N. ZHOU, Binghamton University
  J. DAGLE, Pacific Northwest National Lab

• 15PESGM0773, A Novel Adaptive Wide Area PSS Based on Output-Only Modal Analysis  [Transaction Number: TPWRS-00551-2014.R2]
  J. ZHANG, Tsinghua University
  C. CHUNG, University of Saskatchewan
  C. LU, Tsinghua University
  K. MEN, Electric Power Research Institute of China Southern Power Grid
  L. TU, Electric Power Research Institute of China Southern Power Grid

• 15PESGM0921, Dynamic State Estimation of a Synchronous Machine using PMU Data: A Comparative Study  [Transaction Number: TSG-00923-2013]
  N. ZHOU, Binghamton University
  D. MENG, Pacific Northwest National Lab
  Z. HUANG, Pacific Northwest National Lab
  G. WELCH, University of Central Florida

• 15PESGM1958, Measurement and Modeling of Delays in Wide-Area Closed-Loop Control Systems  [Transaction Number: TPWRS-001302014]
  F. ZHANG, Tsinghua University
  Y. SUN, Tsinghua University
  L. CHENG, Tsinghua University
  X. LI, Wuhan University
  J. CHOW, Rensselaer Polytechnic Institute
  W. ZHAO, State Grid
The Pathway for Synchrophasors into Control Centers (panel)

Tuesday, 28 July, 8:00 AM–10:00 AM
Governor’s Square 16

Sponsored by: Power System Operations
Chairs: S. NUTHALAPATI, ERCOT
        M. GARDNER, Virginia Power

Synchrophasor technology has many advantages and provides better wide area visualization of the grid. Since this technology has matured, there are efforts underway to take this technology into Control Centers Operations in operating the grid more effectively. The focus of this panel is the detailing of efforts by various system operators, utilities, and vendors in taking Synchrophasor Technology into Control Center Operations.

PRESENTATIONS AND PANELISTS:
- 15PESGM1360, Integration of PMU Data into SCADA: Challenges and Limitations
  L. VANFRETTI, KTH Royal Institute of Technology
- 15PESGM1358, Pathway for PMUs into Southern California Edison Control Center
  J. ANTHONY, Southern California Edison
- 15PESGM1359, Pathway for PMUs into Dominion Virginia Power Control Center
  K. JONES, Dominion Virginia Power
- 15PESGM1361, Pathway for PMUs into ERCOT Control Center
  B. BLEVINS, Electric Reliability Council of Texas
- 15PESGM1639, Pathways of PMUs into MISO Control Center
  K. FRANKENY, MISO
- 15PESGM1640, Pathway for PMUs into PG&E Control Center
  V. MADANI, PG&E

Natural Gas and Electricity Coordination – Experiences and Challenges (panel)

Tuesday, 28 July, 8:00 AM–10:00 AM
Governor’s Square 14

Sponsored by: Power System Operations
Chairs: X. WANG, Alstom
        T. ZHENG, ISO New England

With accelerated retirement of coal generators and recent significant increase of natural gas production, National Gas is playing a very important role in the fuel shift of the power industry. This has raised concerns from Independent System Operators (ISOs), Regional Transmission Organizations (RTOs), market participants, industrial electricity and gas consumers, regulatory bodies, etc., regarding the reliability of electric power system when the natural gas delivery system is constrained or the gas supply interruption occurs. In the US, FERC calls for a closer coordination between gas and electric market operations, and NERC has published a reliability assessment report to accommodate increased dependency on natural gas for electricity. Such dependency and coordination will require improvements in system planning, system operation, markets operation, etc. This panel will share experiences in dealing with the challenges of gas dependency as well as gas and electricity coordination.

PRESENTATIONS AND PANELISTS:
- 15PESGM2034, Electricity and Gas Integration in the Hydro-Dominated Countries of Latin America: Opportunities and Challenges
  L. BARROSO, PSR
- 15PESGM2035, Experiences with Gas and Electric Market Coordination in the PJM Market
  A. OTT, PJM
- 15PESGM2036, FERC’s Gas-Electric Coordination Effort
  J. QUINN, Federal Energy Regulatory Commission
- 15PESGM2037, The Transformation of the New England Power System and the Implications for Resource Adequacy and Gas/Electricity Coordination
  G. VAN WELIE, ISO New England, Inc.

Planning Transmission for Co-optimization with Resource Expansion – Part II (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM
Plaza Court 1

Sponsored by: Power System Planning and Implementation Committee and PSACE Committee
Chair: M. HENDERSON, ISO-New England

The need for transmission expansion and development of proper plans is driven by resource development, which is often determined by policy makers and independent market participants. This panel will discuss the reasons behind transmission expansion and how optimal plans are developed. The session
will provide an update on Order 1000 as a backdrop and then discuss planning techniques that measure the true value of transmission. New applications of HVDC and FACTS are next discussed as a means of providing flexible expansion of the network. Finally, the role of storage and demand resources as ways of providing ancillary services and securing the network for N-1-1 contingencies will be discussed.

PRESENTATIONS AND PANELISTS:

- **15PESGM1815, TBD**  
  J. ZHU, ABB
- **15PESGM1816, Transmission Build-Out Methodology for High Renewable Penetration in the Electric Grid**  
  N. KUMAR, GE
- **15PESGM1817, Coordinating Centralized Planning and Decentralized Implementation of Transmission Expansion in Brazil: Lessons Learned from Auctioning Transmission for the Integration of Renewables**  
  R. FERREIRA, PSR-INC
- **15PESGM1811, Enhancing Grid Resiliency: HVDC for Wind Integration in System Restoration**  
  W. SUN, South Dakota State University
- **15PESGM1813, TBD**  
  M. ILIC, Carnegie Mellon University
- **15PESGM1818, TBD**  
  D. MANJURE, MISO
- **15PESGM1819, Some Ways to Value Transmission Expansion**  
  R. BOYER, Consultant
- **15PESGM1812, Prepare to Meet the Challenges in Regional Transmission Planning and Development**  
  Y. ZHU, Siemens PTI
- **15PESGM1814, The Zero-Marginal Cost Power Grid**  
  S. MEYN, University of Florida
- **15PESGM1820, HVDC and New Generation Development**  
  C. ZHOU, Manitoba Hydro
- **15PESGM1821, Utility's Experience under FERC Order 1000**  
  L. ZHANG, Dominion
- **15PESGM1822, Probabilistic Consideration of Transmission Constraints in Generation Adequacy Analysis**  
  A. GAiKWAD, EPRI

PSPI Transactions Paper Session 19 *(transactions paper)*

**Tuesday, 28 July, 8:00 AM–10:00 AM**  
Director's Row H

**Sponsored by:** Power System Planning and Implementation  
**Chairs:** R. BO, MISO  
Q. GUO, Tsinghua University

**PAPERS AND AUTHORS:**

- **15PESGM0289, Wind Power Curtailment and Energy Storage in Transmission Congestion Management Considering Power Plants Ramp Rates**  
  [Transaction Number: TPWRS-00227-2014]  
  L. VARGAS, Universidad de Chile  
  G. BUSTOS-TURU, Imperial College London  
  F. LARRAIN, Georgia Institute of Technology
- **15PESGM0367, An Adjustable Robust Optimization Approach for Contingency-Constrained Transmission Expansion Planning**  
  [Transaction Number: TPWRS-00366-2014]  
  A. MOREIRA, Pontificial Catholic University of Rio de Janeiro  
  A. STREET, Pontificial Catholic University of Rio de Janeiro  
  J. ARROYO, Universidad de Castilla-La Mancha
- **15PESGM0579, Generation Capacity Expansion Planning under Hydro Uncertainty Using Stochastic Mixed Integer Programming and Scenario Reduction**  
  [Transaction Number: TPWRS-01631-2013]  
  E. GIL, Universidad Técnica Federico Santa María  
  I. ARAVENA, Universidad Técnica Federica Santa María  
  R. CÁRDENAS, Universidad Técnica Federico Santa María
- **15PESGM1703, Joint Scheduling of Large-Scale Appliances and Batteries Via Distributed Mixed Optimization**  
  [Transaction Number: TPWRS-00393-2014]  
  Z. YANG, Zhejiang University  
  K. LONG, Zhejiang University  
  P. YOU, Zhejiang University  
  M. CHOW, North Carolina State University
Power System Relaying Transactions Session – T21  (transactions paper)

Tuesday, 28 July, 8:00 AM–10:00 AM  
Columbine

Sponsored by:  
Power System Relaying

Chairs:  
S. BRAHMA, New Mexico State University  
C. PAN, Wichita State University

PAPERS AND AUTHORS:

- **15PESGM0061, Synchrophasor-Assisted Zone 3 Operation**  
  [Transaction Number: TPWRD-00104-2013]  
  P. KUNDU, Indian Institute of Technology Kharagpur  
  A. PRADHAN, Indian Institute of Technology Kharagpur

- **15PESGM0322, Harmonic Current Protection Scheme for Voltage Source Converter-Based High-Voltage Direct Current Transmission System**  
  [Transaction Number: 10.1049/iet-gtd.2013.0377]  
  X. ZHENG, Shanghai Jiaotong University  
  N. TAI, Shanghai Jiaotong University  
  Z. WU, Midwest ISO  
  J. THORP, Virginia Tech

- **15PESGM0377, A Data-Mining Model for Protection of FACTS-Based Transmission Line**  
  [Transaction Number: 7]  
  S. SAMANTARAY, IIT Bhubaneswar

- **15PESGM0855, Secured Zone 3 Protection During Stressed Condition**  
  [Transaction Number: TPWRD-01260-2013]  
  P. NAYAK, Indian School of Mines Dhanbad  
  A. PRADHAN, Indian Institute of Technology Kharagpur  
  B. BAJPAI, IIT Kharagpur

- **15PESGM1137, Directional Relaying during Single-Pole Tripping Using Phase-Change in Negative Sequence Current**  
  [Transaction Number: TPWRD-00687–2012]  
  P. JENA, Indian Institute of Technology, Roorkee  
  A. PRADHAN, Indian Institute of Technology, Kharagpur

- **15PESGM1337, High Impedance Fault Detection in Distribution Network Using Time-Frequency Based Algorithm**  
  [Transaction Number: 06915897]  
  A. GHADERI, University of South Carolina  
  H. MOHAMMADPOUR, University of South Carolina  
  H. GINN, University of South Carolina  
  Y. SHIN, Yonsei University

- **15PESGM1543, A Novel Method Based on Fuzzy Logic and Data Mining for Synchronous Generator Digital Protection**  
  [Transaction Number: TPWRD.2014.2372007]  
  R. MONARO, University of Sao Paulo  
  J. VIEIRA, University of Sao Paulo  
  D. COURY, University of Sao Paulo  
  O. MALIK, University of Calgary

- **15PESGM1604, Dynamic Phasor Modeling of Type 3 DFIG Wind Generators (including SSCI Phenomenon) for Short Circuit Calculations**  
  [Transaction Number: TPWRD-01291-2013]  
  S. CHANDRASEKAR, University of Saskatchewan  
  R. GOKARAJU, University of Saskatchewan
Bridging the Knowledge Gap between Power Engineering and Cyber Security (panel)

Tuesday, 28 July, 8:00 AM–10:00 AM  Governor’s Square 10

Sponsored by: (PSACE) Computer Analytical Methods
Chair: M. GOVINDARASU, Iowa State University

Electric power grid is a complex cyber physical system (CPS) that forms the lifeline of modern society, and its reliable and secure operation is of paramount importance to national security and economic well-being. Therefore, cyber security of the power grid — encompassing attack prevention, detection, mitigation, and resilience — is among the most important R&D and educational priorities in smart grid. The focus of this panel session will be to bridge the gaps in knowledge, education and learning practices between power engineering engineers and cyber security professionals. In particular, the panel will address the issues and potential solutions pertaining to imparting the necessary cyber security knowledge to power engineers and imparting the relevant power engineering knowledge to cyber security professionals. Case studies of learning modules, capstone design projects, industry short courses, tutorials, cyber-defense competitions, and other relevant artifacts will be discussed.

PRESENTATIONS AND PANELISTS:
• 15PESGM2413, Cyber Security Education and Training for Power Industry
  T. MORRIS, Mississippi State University
• 15PESGM2414, PNNL Research Combining Cyber Security with Power Systems
  P. SKARE, PNNL
• 15PESGM2415, Methods for Introducing Power Generation, Transmission and Distribution Systems to Cyber Security Professionals
  T. OVERMAN, EPRI
• 15PESGM2416, Imparting the Interdisciplinary Knowledge in Cyber Security for Power Systems
  P. SAUER, University of Illinois, Urbana Champaign
• 15PESGM2417, Building Bridges: Reflections on Teaching a First Graduate Course on Smart Grid Cyber-Physical Security
  D. KUNDUR, University of Toronto
• 15PESGM2418, Professional Education in Cyber Security Technology and Policy
  M. AMIN, University of Minnesota

Stochastic Optimization for Smart Grid Operation (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM  Governor’s Square 15

Sponsored by: (PSACE) Intelligent Systems
Chairs: I. ERLICH, University of Duisburg-Essen
J. RUEDA, Delft University of Technology

The transition toward sustainable and environmental friendly energy supply with massive integration of renewable energy sources and higher demand side participation requires smart grid oriented strategies to optimally address operational concerns within a context of increasing uncertainties and significant structural changes. This panel focuses on

i) An overview and discussion on the formulation complexities, scalability, and solution challenges of different stochastic optimization problems related to technical and economic aspects of power system operation.

ii) Case studies, performance comparison, and experience with the application of classical, heuristic, and hybrid optimization algorithms.

PRESENTATIONS AND PANELISTS:
• 15PESGM2908, Stochastic Optimization of Distributed Energy Resources in Smart Grids
  Z. VALE, Polytechnic of Porto
• 15PESGM2913, Accelerating the Convergence of Stochastic Unit-Commitment Problems by Using Tight and Compact MIP Formulations
  G. MORALES-ESPANA, Delft University of Technology
  A. RAMOS, Universidad Pontificia Comillas
• 15PESGM2912, Development of Tabu Search with the Stochastically Reduced Neighborhood
  H. MORI, Meiji University
• 15PESGM2911, Smart Grids and Smart Consumers: Joining Forces Towards a Sustainable and Reliable Operation
  L. PINTO, Engenho
• 15PESGM2914, Stochastic Security-Constrained AC Optimal Power Flow Solver for Large Power Networks with Renewable
  H. CHIANG, Cornell University
PSACE Transactions Paper Session – T5  (transactions paper)

Tuesday, 28 July, 8:00 AM–10:00 AM  Windows
Sponsored by:  PSACE
Chair:  X. ZHANG, MISO

PAPERS AND AUTHORS:

  M. YUE, BNL
  X. WANG, BNL

- 15PESGM0200, Assessment of Spare Breaker Requirements for High Voltage Transmission Stations  [Transaction Number: TPWRS-00267-2013.R2]
  G. HAMOUD, Hydro One Inc.

- 15PESGM0265, The Influence of Modelling Transformer Age Related Failures on System Reliability  [Transaction Number: TPWRS-00263-2014]
  S. AWADALLAH, University of Manchester
  J. MILANOVIC, University of Manchester
  P. JARMAN, National Grid plc, UK

- 15PESGM0819, Extracting Rare Failure Events in Composite System Reliability Evaluation via Subset Simulation  [Transaction Number: TPWRS-01471-2013]
  B. HUA, Xi’an Jiaotong University
  Z. BIE, Xi’an Jiaotong University
  S. AU, University of Liverpool
  W. LI, Chongqing University
  X. WANG, Xi’an Jiaotong University

- 15PESGM2226, Reliability Comparison of Wind Turbines with DFIG and PMG Drive Trains  [Transaction Number: TEC-00463-2014]
  J. CARROLL, University of Strathclyde

- 15PESGM2302, Revisiting the Merit-Order Effect of Renewable Energy Sources  [Transaction Number: TPWRS-00201-2014]
  M. HILDMANN, ETH Zurich
  A. ULBIG, ETH Zurich
  G. ANDERSSON, ETH Zurich

  X. KE, North Carolina State University
  N. LU, North Carolina State University
  C. JIN, ERCOT

  H. MOHSENIAN-RAD, University of California at Riverside

Online Condition Monitoring – Experience and Evolution  (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM  Plaza Court 8
Sponsored by:  Substations
Chair:  N. FANTANA, ABB

There is an increased interest in on-line condition monitoring devices and systems. The use of such systems are making the networks more reliable and available and allow for better equipment lifetime management, operation and planning. Presentations from world-wide experts will address this and be followed by a discussion with ALL present. Join us!

Let us know your opinion respond to our 5 minutes SURVEY:  https://www.surveymonkey.com/s/GW2PY5H

The preferential subjects are:

1. Experience and value of On-line Condition Monitoring, what have we learned from OLCM installations technically and on the obtained value from condition monitoring?
2. Evolution and trends. Quo vadis on-line condition monitoring, in the view of new sensing and information and communication technologies, requirements from the future/smart grids and activities in research and academia teams?

Chair, contact: Dr.Ing. N. L. Fantana, nicolaie.fantana@de.abb.com, fantana@ieee.org

PRESENTATIONS AND PANELISTS:
- 15PESGM3029, Evolution and Challenges of Online Condition Monitoring
  N. FANTANA, ABB
- 15PESGM3034, CIGRE Activities and a View on Substation Condition Monitoring
  T. KRIEG, CIGRE
- 15PESGM3025, IEEE Activities and Monitoring Aspects
  C. PREUSS, Black & Veatch
- 15PESGM3030, The Role of Standards in OLCM
  P. MYRDA, EPRI
- 15PESGM3031, Dynamic State Estimation-Based Diagnostic Systems: Evolution and Experience
  S. MELIPOULOS, Georgia Tech
- 15PESGM3035, Turning Data from Monitoring and Condition Assessment into Transformer Reliability Information
  C. STIEGEMEIER, ABB
- 15PESGM3036, Recent Technology Development and Experience on On-Line Condition Monitoring for Substations in Japan
  M. HIKITA, Kyushu Institute of Technology
- 15PESGM3028, Protection and Control Systems – Monitoring Themselves and Primary Apparatus
  E. UDREN, Quanta Technology, LLC
- 15PESGM3033, Evolution of On-Line Condition Monitoring in Future Power Systems Based on Case Studies with HV Components
  J. SMIT, Technical University Delft
- 15PESGM3026, On-Line Condition Monitoring and Its Data Model
  T. XIA, Dominion Virginia Power
- 15PESGM3032, Communications and Data Security in Substations and OLCM
  B. SPARLING, Dynamic Ratings

Experiences and System Requirements for Power Quality Data Analytics (panel)

Tuesday, 28 July, 8:00 AM–10:00 AM
Governor’s Square 12
Sponsored by: Transmission and Distribution Committee
Chair: Thomas Cooke, EPRI

There are several factors that contribute to successful power quality data analytics:
- How the data is obtained and formatted.
- The processing capability and efficiency of algorithms.
- The ease and effectiveness of the analytics in translating large sums of data to produce quick and meaningful power quality information.

This panel will share experiences and discuss information related to these factors, as well as proposed methods to enhance power quality analytics for the future smart grid.

PRESENTATIONS AND PANELISTS:
- 15PESGM1600, Data Validation and Lessons Learned from a North American Power Quality Study
  W. SUNDERMAN, EPRI
- 15PESGM1599, Sensor Accuracy and Data Management Issues
  J. MEYER, Technical University of Dresden
- 15PESGM1601, Monitoring System Requirements
  J. WISCHKAEMPER, Texas A&M University
- 15PESGM1602, Open Source Tools for Automated Analytics and Data Validation
  F. ELMENDORF, Grid Protection Alliance
- 15PESGM1598, Condensing PQ Data and Visualization Analytics
  T. COOKE, EPRI
The rapid growth of renewable energy sources present urgent challenges and unique opportunities to meet those challenges. The original plan of IEEE 1547 to quickly shut off these resources during disturbances is being replaced with techniques for these resources to support the grid. Modern distributed resources can do more to enhance voltage and reactive control. In some cases, renewable inverters may even provide reactive support when not delivering renewable energy. These possibilities improve power system performance and increase the value of the renewable resource. This panel explores the voltage and reactive power needs and explores some of the opportunities offered by renewable resources.

**PRESENTATIONS AND PANELISTS:**
- 15PESGM1772, CAISO Experience with Impact of High Penetration of Renewable Resources on Short-Term Voltage Stability
  I. GREEN, California ISO
- 15PESGM1773, PJM Road Map for Voltage and VAR Control and Renewable Integration
  J. LIU, PJM Interconnection LLC
- 15PESGM1774, Impacts of Distributed Energy Resources on the Bulk Energy Distribution and Transmission System Reactive Power Management and Voltage Control
  D. BROOKS, EPRI
- 15PESGM1775, How to Make Good Use of Voltage and Reactive Power Control Capabilities of Wind Farms
  M. FISCHER, ENERCON Canada Inc.
  S. MILLER, P.E., Commonwealth Associates

**Power System Economics (paper forum)**

**PAPERS AND AUTHORS:**
- 15PESGM0357, Coordinated Multiarea Economic Dispatch via Multi-Parametric Programming
  Y. GUO, Tsinghua University
  L. TONG, Cornell University
  W. WU, Tsinghua University
  B. ZHANG, Tsinghua University
  H. SUN, Tsinghua University
- 15PESGM0553, A Data-Driven Approach to Identifying System Pattern Regions in Market Operations
  X. GENG, Texas A&M University
  L. XIE, Texas A&M University
- 15PESGM0672, Modeling and Economic Evaluation of Power2Gas Technology Using Energy Hub Concept
  M. BUCHER, ETH Zurich
  T. HARING, ETH Zurich
  F. BOSSHARD, ETH Zurich
  G. ANDERSSON, ETH Zurich
- 15PESGM0690, Combined Optimal Retail Rate Restructuring and Value of Solar Tariff
  A. NEGASH, University of Washington
  D. KIRSCHEN, University of Washington
- 15PESGM0853, Real-Time Market-to-Market Coordination in Interregional Congestion Management
  C. LUO, Midcontinent Independent System Operator, Inc. (MISO)
  L. JIANG, University of Liverpool
  J. WEN, Huazhong University of Science and Technology (HUST)
  X. ZHANG, Midcontinent Independent System Operator, Inc. (MISO)
  Q. WANG, Midcontinent Independent System Operator, Inc. (MISO)
15PESGM0914, Probabilistic Day-Ahead CHP Operation Scheduling
I. DIMOULKAS, KTH Royal Institute of Technology
M. AMELIN, KTH Royal Institute of Technology

15PESGM0922, Voltage Regulation for Active Distribution Network: A Generalized Nash Game Approach Based on Locational Marginal Price
T. ZHAO, North China Electric Power University
W. LIU, North China Electric Power University
J. ZHANG, North China Electric Power University

15PESGM0934, Chance-Constrained Real-Time Volt/Var Optimization Using Simulated Annealing
D. CHAUDHARY, South Dakota State University
W. SUN, South Dakota State University
Q. ZHOU, South Dakota State University
A. GOLSHANI, South Dakota State University

15PESGM1319, Short-Term Trading for a Photovoltaic Power Producer in Electricity Markets
A. DE LA NIETA, University of Beira Interior
T. TAVARES, University of Beira Interior
J. CATALAO, University of Beira Interior
J. CONTRERAS, University of Castilla-La Mancha

15PESGM1356, Balancing Authority Area Coordination with Limited Exchange of Information
D. APOSTOLOPOULOU, University of Illinois at Urbana-Champaign
P. SAUER, University of Illinois at Urbana-Champaign
A. DOMINGUEZ-GARCIA, University of Illinois at Urbana-Champaign

15PESGM1431, Load Interval Forecasting Methods Based on An Ensemble of Extreme Learning Machines
Z. LI, Illinois Institute of Technology
X. LIU, Illinois Institute of Technology
L. CHEN, Zhejiang Electric Power Research Institute

15PESGM1458, Extended-Time Demand Bids: A New Bidding Framework to Accommodate Time-Shiftable Loads
M. KOHANSAL, University of California at Riverside
H. MOHSENIAN-RAD, University of California at Riverside

15PESGM1718, Security-Constrained Economic Dispatch Using Semidefinite Programming
Y. LIU, Sears Holdings Corporation
M. FERRIS, University of Wisconsin-Madison

15PESGM2052, Monte Carlo Based Method for Managing Risk of Scheduling Decisions with Dynamic Line Ratings
B. BANERJEE, Curtin University
D. JAYAWEERA, University of Birmingham
S. ISLAM, Curtin University

A. ABEYUNAWARDANA, Queensland University of Technology
A. AREFI, Queensland University of Technology
G. LEDWICH, Queensland University of Technology

15PESGM2404, Five Indicators for Assessing Bidding Area Configurations in Zonally-Priced Power Markets
M. SARFATI, KTH Royal Institute of Technology
M. HESAMZADEH, KTH Royal Institute of Technology
A. CANON, KTH Royal Institute of Technology

15PESGM2463, Distribution Network Spatiotemporal Marginal Cost of Reactive Power
E. NTAKOU, Boston University
M. CARAMANIS, Boston University

15PESGM2482, Electricity Markets Design and Regional Integration
O. OURIACHI, University College London
C. SPATARU, University College London

15PESGM2547, Stochastic Optimization of Power Market Forecast Using Non-Parametric Regression Models
S. SHENOY, Stanford University
D. GORINEVSKY, Stanford University

15PESGM1603, Impacts of Time Delays on Distributed Algorithms for Economic Dispatch
T. YANG, PNNL
D. WU, PNNL
Y. SUN, PNNL
J. LIAN, PNNL
Synchrophasors, Protection, and Fault Locating (paper forum)

Tuesday, 28 July, 8:00 AM–12:00 PM Plaza Ballroom BE

Sponsored by: IEEE Power & Energy Society
Chair: TBD

PAPERS AND AUTHORS:

• 15PESGM0050, Communication-Assisted Hierarchical Protection Strategy for High-Reliability Microgrids
  L. CHE, Illinois Institute of Technology
  X. ZHANG, Illinois Institute of Technology
  M. SHAHIDEHPOUR, Illinois Institute of Technology

• 15PESGM0127, Protection Strategies for Rotor Side Converter of DFIG-Based Wind Turbine during Voltage Dips
  M. BARBOSA DE CAMARGO SALLES, University of Sao Paulo
  R. AVILA NARANJO, University of Sao Paulo
  A. PIONKOSKI GRILLO PAVANI, Universidade Federal do ABC (UFABC)
  A. SQUAREZI FILHO, Universidade Federal do ABC (UFABC)
  C. RAHMANN, Universidad de Chile

• 15PESGM0136, Relay-Based Undervoltage Load Shedding Scheme for Entergy’s Western Region
  S. KOLLURI, Entergy Services Inc.
  J. RAMAMURTHY, Entergy Services Inc.
  S. WONG, Entergy Services Inc.
  M. PETERSON, Entergy Services Inc.
  P. YU, Entergy Services Inc.
  M. CHANDER, Entergy Services Inc.

• 15PESGM0206, A PMU-Based State Estimator for Networks Containing VSC-HVDC Links
  W. LI, KTH Royal Institute of Technology
  L. VANFRETTI, KTH Royal Institute of Technology

• 15PESGM0414, A Transmission Line Current Differential Protection Based on Virtual Restraint Current
  W. XINGGUO, China Electric Power Research Institute
  Z. ZEXIN, China Electric Power Research Institute

• 15PESGM0608, Estimation of Transmission Line Parameters Using PMU Measurements
  M. ASPROU, University of Cyprus
  E. KYRIAKIDES, University of Cyprus

• 15PESGM0774, A Novel Single-Ended Fault Location Scheme and Applications Considering Secondary Circuit Transfer Characteristics
  F. XU, Tsinghua University
  X. DONG, Tsinghua University
  B. WANG, Tsinghua University
  S. SHI, Tsinghua University

• 15PESGM0847, Integrated Wide Area Protection Based on Advanced Communication Network
  S. GE, Xuji Group Company
  Z. BO, Xuji Group Company
  L. WANG, Xuji Group Company
  F. ZHOU, Xuji Group Company
  Z. FAN, Xuji Group Company

• 15PESGM1036, Online Data Loss in Substation Automation Systems
  B. FALAHATI, Operation Technology Inc.
  M. VAKILIAN, Sharif University of Technology
  Y. FU, Mississippi State University

• 15PESGM1059, An Improved Earthed Faults Nature Detection Scheme for Three-Phase Reclosure on Transmission Lines Based on Mode Parameter Identification
  W. SHAO, Xi’an Polytechnic University
  W. ZHANG, Xi’an Polytechnic University

• 15PESGM1145, Instantaneous-Energy-Ratio Based Faulted Phase Selection Scheme for Transmission Lines Considering High Fault Resistances
  Y. CHEN, South China University of Technology
  T. JI, South China University of Technology
  M. LI, South China University of Technology
  Q. WU, South China University of Technology

• 15PESGM1281, Fault Detection in a Series Compensated Line during Power Swing Using Superimposed Apparent Power
  J. KUMAR, Indian Institute of Technology, Roorkee
  P. JENA, Indian Institute of Technology, Roorkee
Tuesday Morning, continued

- 15PESGM1307, Simultaneous Transmission Line Parameter and PMU Measurement Calibration  
  L. ZORA, Virginia Tech  
  Z. WU, Virginia Tech  
  A. PHADKE, Virginia Tech

- 15PESGM1401, Impact Analysis of Network Topology Change on Transmission Distance Relay Settings  
  M. TASDIGHI, Texas A&M University  
  M. KEZUNOVIC, Texas A&M University

- 15PESGM1791, An Approach to Fault Location in HVDC Lines Using Mathematical Morphology  
  J. TRIVENO RAMOS, State University of Campinas  
  V. P. DARDENGO, State University of Campinas  
  M. CORTES DE ALMEIDA, State University of Campinas

- 15PESGM1991, Protection Scheme for Active Distribution Networks Using Positive-Sequence Components  
  W. HUANG, Shanghai Jiao Tong University  
  N. TAI, Shanghai Jiao Tong University  
  K. LI, Shanghai Jiao Tong University  
  X. ZHENG, Shanghai Jiao Tong University  
  S. CHEN, Shanghai Jiao Tong University

- 15PESGM2401, Method for Adaptive Overcurrent Protection of Distribution Systems with Distributed Synchronous Generators  
  R. FERREIRA, UFABC  
  A. PAVANI, UFABC  
  J. TEIXEIRA, UFABC  
  R. SANTOS, UFABC

- 15PESGM2471, Performance Testing of IEC 61850 Based Architecture for UK National Grid Standardised Substation Automation Solutions  
  X. CHEN, University of Manchester

- 15PESGM2533, Wavelet Entropy based Fault Detection Approach for MMC-HVDC Lines  
  S. WANG, North China Electric Power University  
  T. BI, North China Electric Power University  
  K. JIA, North China Electric Power University

- 15PESGM0942, Calculating Sequence Impedances of Transmission Using PMU Measurements  
  H. ZHOU, Grid Control Center  
  X. ZHAO, Grid Control Center  
  D. SHI, Energy Management via Information Technology  
  H. ZHAO, Grid Control Center  
  C. JING, Energy Management via Information Technology

Power System Basics (tutorial)  
Tuesday, 28 July, 8:00 AM–5:00 PM  
Sponsored by: IEEE Power & Energy Society

The focus of this course is to provide a fundamental foundation in electric power systems, from basic formulas to the planning, operations, and equipment involved in generating, transmitting, and distributing electric power. Basic electrical terminology will be explained in simple to understand language with regard to design, construction, operation and maintenance of power plants, substations, and transmission and distribution lines. Anyone who is involved in some way with the electric utility industry can benefit from attendance at this course.

Topics covered in the course include an introduction to the fundamentals and basic formulas of electricity as well as the equipment involved in the electric power system. An overview of generation, substations, transmission, distribution, and utilization is provided. Protection, reliable operation, and safety are among the topics covered.

Renewable Energy Systems Modeling and Dynamic Performance (tutorial)  
Tuesday, 28 July, 8:00 AM–5:00 PM  
Sponsored by: IEEE Power & Energy Society

INSTRUCTORS:
- P. POURBEIK, EPRI  
- N. MILLER, GE  
- E. MULJADI, NREL  
- R. NELSON, Siemens  
- Y. KAZACHKOV, Siemens PTI
This tutorial is on the dynamic performance and modeling of renewable energy systems, with a focus on wind and PV generation, as it pertains to bulk electric power system analysis. Topics that will be covered include the latest generic public models developed and now deployed in major commercial software platforms for positive sequence stability analysis of wind and PV generation, the modeling of wind and PV plants in powerflow analyses, calculating the short circuit contributions from inverter based generation and the types of models and methods needed for studying special cases such as subsynchronous torsional interactions between wind turbine and series compensation. Also, there will be discussions on modeling needs for studying wind and PV integration into systems with very low short circuit levels. The tutorial will be of interest to system planner, operators, wind and PV plant developers, research entities and other stakeholders in the power and energy industry.

Distribution System Modeling, Automation, Management and Advanced Applications (tutorial)

Tuesday, 28 July, 8:00 AM–5:00 PM Spruce
Sponsored by: IEEE Power & Energy Society

INSTRUCTORS: J. FAN, Southern States LLC
J. D. MCDONALD, P.E, Digital Energy, GE

This course introduces the intuitive concepts, fundamental theories, practical technologies on system modeling, automation management, including the core functionalities and real use cases of the integrated Distribution Automation/Distribution Management Systems (DA/DMS) and the advanced applications in Smart Distribution. The potential audience would include power system planning/operation engineers, project/product managers, business leaders in power utilities, smart grid solution providers, system developers, research institutes, as well as individual researchers, college students and other individuals working on or interested in the Smart Distribution Solutions.


Smart Substations – Protection, Control, Communications, Wide Area Measurements, and Enterprise Applications (tutorial)

Tuesday, 28 July, 8:00 AM–5:00 PM Century
Sponsored by: IEEE Power & Energy Society

INSTRUCTORS: D. BOROUGHHS, Quanta Technology
E. UDREN, Quanta Technology

Which substation protection, control, and communications designs lead to integration that serves users across the utility enterprise? Modern protective relays, switchyard data acquisition units, data concentrators, and other intelligent electronic devices (IEDs) are the essential eyes and ears of smart substations. They collect information, protect and control apparatus, monitor equipment condition, and aggregate data for mission critical and Smart Grid functions via serial or Ethernet communications networks. The data streams include synchrophasors for wide area monitoring, protection, automation, and control (WAMPAC). All of the substation measurements and communications comprise a platform for Smart Grid functions – the utility must plan how to use this platform effectively to realize operational and economic benefits.

The course explains the most recent advances in measurement technology, intelligent relays and IEDs, data communications, and substation integration design. Attendees get an overview of specific functions and implementations, plus practical guidance on how to take advantage of potential benefits. Topics include:

- Transmission versus Distribution Smart Grid Functions
- Trends in System Wide communications
- Wiring to LAN Evolution I – Ethernet & 61850
Technical Committee Reorganization Town Hall – General Information Session (Town Hall)

Tuesday, 28 July, 8:00 AM–10:00 AM Terrace
Sponsored by: IEEE Power & Energy Society
Chairs: K. EDWARDS, BPA
        M. P. SANDERS, Schweitzer Engineering Labs

Overview of the proposed re-organization of the PES Technical Committee Structure: Come listen as Miroslav Begovic, IEEE PES President and Damir Novosel, IEEE PES President-elect discuss the on-going reorganization – including new committee(s) and changing existing committees as we adapt to provide better coverage of current technologies and practices.

Smart Village Information Session 2 (information session)

Tuesday, 28 July, 8:00 AM–12:00 PM Director's Row J
Sponsored by: IEEE Smart Village
Chair: P. DAUENHAUER, Strathclyde University

IEEE Smart Village Technology & Business Operations – A look at the off-grid hardware deployed, telemetric reporting and village enterprise operation.

Co-Chairs: P. DAUENHAUER, Strathclyde University
          R. LARSEN, SLAC National Accelerator Laboratory

8:00 AM–9:00 AM
Presentation: Sustainable Electricity Products
SPEAKER:
R. LARSEN, SLAC National Accelerator Laboratory
Basic Electricity Products for Energy-Impoverished Areas
Basic Franchise Business Plan

9:00 AM–10:00 AM
Presentation: Product Development Program 2015
SPEAKERS:
A. RIAUD, CONCEPT'R Consulting – France
W. GUTSCHOW, Nextek Power Systems
R. LARSEN, SLAC National Accelerator Laboratory
Basic Plan for Sustainable Evolving Products
Original SunBlazer I Plus Home Lighting Kit (PBK plus LEDs)
SunBlazer II Design, Cost Improvements
SunBlazer III (Lite) New Product Positioning
Universal PBK New Product Features, Positioning

10:00 AM–10:30 AM
Presentation: An Open Source Charge Controller
SPEAKER:
S. SAHA, Arizona State University

10:30 AM–11:00 AM
Presentation: Fast Charging of Portable Battery Kits
SPEAKERS:
E. MORRIS, Seattle University
N. SWOPE, Seattle University

11:00 AM–12:00 PM
IEEE Smart Village – Technology, Interconnectivity & Telemetry Committee Meeting
Energy Systems Integration (panel)

Tuesday, 28 July, 8:00 AM–12:00 PM  Governor’s Square 11
Sponsored by:  Local Organizing Committee, Committee and Energy Development and Power Generation Committee and Emerging Technologies Coordinating Committee
Chair:  B. KROPOSKI, NREL

Energy Systems Integration (ESI) seeks to optimize the energy system and other large scale infrastructures, in particular water and transport, by leveraging the synergies across all scales and pathways (i.e. electricity, fuels, heat). ESI is a multidisciplinary area ranging from science, engineering and technology to policy, economics, regulation and human behavior. The research scope is potentially vast, however, ESI research is most valuable at the interfaces where the coupling and interactions are strong and represent a challenge and an opportunity. This panel will explore the benefits and limitation of connecting electric power systems with other energy infrastructures to create a modern grid that provides flexibility for the integration of clean energy systems and optimizes the overall energy system efficiency.

PRESENTATIONS AND PANELISTS:

- 15PESGM2863, Energy Systems Integration Overview – Optimization of Electric Power Systems with Other Energy Networks
  M. O’MALLEY, University College Dublin

- 15PESGM2867, Modeling and Analysis Tools for Energy System Integration
  G. ANDERSON, ETH

- 15PESGM2869, Regulatory and Market Framework Best Supports an Integrated Energy System
  A. OTT, PJM

- 15PESGM3056, Role and Impact of the Consumer in an Integrated Energy System
  J. KUMAR, Alstom

- 15PESGM2865, Coupling Energy Control Systems at the Distribution and Home Level
  Y. ZHANG, NREL

- 15PESGM2866, Industrial Scale Energy Systems Integration
  M. RUTH, National Renewable Energy Laboratory

- 15PESGM2870, Energy Systems Integration in Denmark: A Solution with More than 40 pct Wind Power
  H. MADSEN, Danish Technical University

- 15PESGM2864, National Scale Energy Systems Integration
  J. MCCALLEY, Iowa State University

Estimating Dynamic States for Real-Time Power Grid Operation (panel)

Tuesday, 28 July, 9:00 AM–1:00 PM  Plaza Court 2
Sponsored by:  Power System Dynamic Performance Committee
Chairs:  Z. HUANG, PNNL
         G. BINDEWALD, Department of Energy

The power grid is evolving at pace faster than ever before, with significant penetration of renewable energy generation, smart loads, electric vehicles, and other emerging technologies. Such a new mix of generation and consumption results in emerging stochastic behaviors and dynamics that the grid has never seen nor been designed for. This would invalidate the steady-state assumption used in today’s state estimation function. State estimation is a central component in power system operation. It generates critical inputs for other operational tools. Today’s state estimation largely ignores dynamics in the power grid. Electro-mechanical interaction of generators and dynamic characteristics of loads and control devices are not included in operational models. The steady-state based operational tools do not capture such dynamics in the system and make it difficult to make effective decisions. To operate the new power grid, we need to explore ways to estimate dynamic states (e.g. rotor angles and rotor speeds) instead of only the static states (bus voltages and phase angles). Removing the steady-state assumption and estimating dynamic states in real time are an emerging topic that has been recognized in the technology development roadmaps of research organizations and power companies. Advanced measurements and computing technologies provide opportunities for doing so. This panel invites experts across the world to discuss the need, the supporting technologies, and the solutions for estimating dynamic states for real-time operation.

PRESENTATIONS AND PANELISTS:

- 15PESGM1877, Hybrid Processing of SCADA and Synchronized Phasor Measurements for Tracking Network State
  B. ALCAIDE-MORENO, Universidad Michoacana de San Nicolás de Hidalgo
  C. FUERTE-ESQUIVEL, Universidad Michoacana de San Nicolás de Hidalgo
  M. GLAVIC, University of Liege
  T. VAN CUTSEM, University of Liege
Tuesday Morning, continued

- 15PESGM1882, Capturing Real-Time Power System Dynamics: Opportunities and Challenges
  Z. HUANG, PNNL
  N. ZHOU, Binghamton University
  R. DIAO, PNNL
  S. WANG, PNNL
  S. ELBERT, PNNL
  D. MENG, PNNL
  S. LU, PNNL

- 15PESGM1881, Observability and Dynamic State Estimation
  A. ABUR, Northeastern University

- 15PESGM1883, Synchronized Phasor Measurements Based Dynamic State Estimation
  T. BI, North China Electric Power University
  D. YUAN, North China Electric Power University
  L. CHEN, North China Electric Power University
  Q. YANG, North China Electric Power University

- 15PESGM1880, Correction Factors for Dynamic State Estimation of Aggregated Generators
  A. VAHIDNIA, Queensland University of Technology
  G. LEDWICH, Queensland University of Technology
  Y. MISHRA, Queensland University of Technology

- 15PESGM1879, Legacy SE to Distributed Dynamic State Estimators: Evolution and Experience
  S. MELIOPoulos, Georgia Tech

- 15PESGM1878, PMU Analytics for Decentralized Dynamic State Estimation of Power Systems
  Using the Extended Kalman Filter with Unknown Inputs
  E. GHAHREMANI, Hydro-Québec Research Institute (IREQ)
  I. KAMWA, Hydro-Québec Research Institute (IREQ)

- 15PESGM1876, Least Squares Estimation (LSE) and Kalman Filter Based Dynamic Parameter Estimation
  L. FAN, University of South Florida

Renewable Generation Development, Integration and Management – T23
(transactions paper)

Tuesday, 28 July, 10:00 AM–12:00 PM  Director’s Row I
Sponsored by:  Energy Development and Power Generation Committee
Chairs:  B. WOJSZCZYK, DP Global
         J. ENSLIN, UNCC

PAPERS AND AUTHORS:
- 15PESGM0046, Analysis of Hydro-Coupled Power Plants and Design of Robust Control to Dam Oscillatory Modes
  [Transaction Number: 10.1109/TPWRS.2014.2333002]
  H. VILLEGAS PICO, Purdue University
  D. ALIPRANTIS, Purdue University
  J. MCCALLEY, Iowa State University
  N. ELIA, Iowa State University
  N. CASTRILLON, XM, Colombia

- 15PESGM0105, Stability Analysis of Converter-Connected Battery Energy Storage Systems in the Grid
  [Transaction Number: IEEE-TSTE-00027-2014]
  D. BAZARGAN, University of Manitoba
  S. FILIZADEH, University of Manitoba
  A. GOLE, University of Manitoba

- 15PESGM0368, An Ultracapacitor Integrated Power Conditioner for Intermittency Smoothing and Improving Power Quality of Distribution Grid
  [Transaction Number: TSTE.2014.2334622]
  D. SOMAYAJULA, Missouri University of Science and Technology
  M. CROW, Missouri University of Science and Technology

- 15PESGM0391, Spatiotemporal Modeling of Wind Generation for Optimal Energy Storage Sizing
  [Transaction Number: 2360702]
  H. VALIZADEH HAGHI, University of Central Florida
  S. LOTIFARD, Washington State University

- 15PESGM0623, Comparative Study of Advanced Signal Processing Techniques for Islanding Detection in a Hybrid Distributed Generation System
  [Transaction Number: TSTE-00069-2014.R2]
  S. MOHANTY, Motilal Nehru National Institute of Technology
  N. KISHOR, Motilal Nehru National Institute of Technology
  P. RAY, International Institute of Information Technology
  J. CATALAO, University of Beira Interior
PSDP Transactions Session – T8 (transactions paper)

Tuesday, 28 July, 10:00 AM–12:00 PM                      Vail
Sponsored by:                      Power System Dynamic Performance
Chairs:                      R. PREECE, University of Manchester
                            R. KUIAVA, Federal University of Parana

PAPERS AND AUTHORS:

• 15PESGM0234, Improved Recursive Electromechanical Oscillations Monitoring Scheme: A Novel Distributed Approach [Transaction Number: TPWRS.2014.2336859]
  H. KHALID, Masdar Institute of Science and Technology
  J. PENG, Masdar Institute of Science and Technology

• 15PESGM0317, Application of Energy-Based Power System Features for Dynamic Security Assessment [Transaction Number: TPWRS-00282-2014]
  J. GEEGANAGE, University of Manitoba
  U. ANNAKKAGE, University of Manitoba
  M. WEEKES, Manitoba Hydro
  B. ARCHER, Manitoba Hydro

  R. PREECE, University of Manchester
  J. MILANOVIC, University of Manchester

• 15PESGM0429, Coordination of Reactive Power in Grid-Connected Wind Farms for Voltage Stability Enhancement [Transaction Number: TPWRS-01021-2013]
  V. SESHADRI SRAVAN KUMAR, Indian Institute of Science
  K. KRISHNA REDDY, Indian Institute of Science
  D. THUKARAM, Indian Institute of Science

• 15PESGM1744, Mathematical Expectation Modeling of Wide-Area Controlled Power Systems with Stochastic Time Delay [Transaction Number: TSG-00683-2014.R1]
  C. LU, Tsinghua University
  X. ZHANG, Tsinghua University
  X. WANG, Carleton University
  Y. HAN, Tsinghua University

• 15PESGM2057, Design of Anti-Windup Compensation for Energy Storage based Damping Controller to Enhance Power System Stability [Transaction Number: TPWRS-00410-2013]
  J. FANG, Aalborg University
  W. YAO, Huazhong University of Science and Technology
  Z. CHEN, Aalborg University
  J. WEN, Huazhong University of Science and Technology
  S. CHENG, Huazhong University of Science and Technology

• 15PESGM2220, Control Signal Selection for Damping Oscillations with Wind Power Plants based on Fundamental Limitations [Transaction Number: 10.1109/TPWRS.2013.2264842]
  J. DOMÍNGUEZ-GARCÍA, Catalonia Institute for Energy Research (IREC)
  F. BIANCHI, Catalonia Institute for Energy Research (IREC)
  O. GOMIS-BELLMUNT, Catalonia Institute for Energy Research (IREC)

• 15PESGM2492, Ectropy-Based Nonlinear Control of FACTS for Transient Stabilization [Transaction Number: TPWRS-01337-2013.R1]
  M. CVETKOVIC, Massachusetts Institute of Technology
  M. ILIC, Carnegie Mellon University
Decision Support Tools for Energy Storage Operations  (panel)

Tuesday, 28 July, 10:00 AM–12:00 PM  Governor’s Square 12
Sponsored by:  Power System Operations
Chairs:  R. SIOSHANSI, Ohio State University 
U. HELMAN, Helman Analytics

This panel covers the current state of decision support tools for energy storage operations and the need for future model development. After an overview talk that provides an outline of the topics to be covered in the panel, a survey of existing storage models will be given. This survey will cover the capabilities of existing models and provide a gap analysis of their capabilities. The panel will include two talks from industry—one from a storage user and one from a model developer—that will discuss industry needs for storage modeling capabilities. Finally, the panel will include talks by researchers developing cutting-edge storage operation models. Overall, the panel will discuss where the community is in terms of our current capabilities to model storage operations, what gaps in our modeling capabilities need to be addressed, and what cutting-edge work is currently being done to fill these gaps.

PRESENTATIONS AND PANELISTS:

- 15PESGM1025, Policy, Regulatory, and Market Drivers for Storage Development: Implications for Modeling Needs
  U. HELMAN, Helman Analytics
- 15PESGM1023, Survey of Existing Models and Methods to Value Energy Storage in Power Systems
  A. TUOHY, EPRI
- 15PESGM1026, Quantifying the Impact of Energy Storage to Renewable Generation Integration
  T. GUO, Energy Exemplar
- 15PESGM1027, Modeling Energy Storage for Ancillary Service Use Using Production Cost and Subhourly Methods
  W. KATZENSTEIN, California Independent System Operator
- 15PESGM1028, Market Challenges to Deployment of Energy Storage for Support of Renewable Energy Integration
  P. DENHOLM, National Renewable Energy Laboratory
- 15PESGM1024, Needs for Improved Modeling of Storage and Greater Consistency in Methods and Metrics
  R. SIOSHANSI, Ohio State University

Experiences in Identifying Model and Parameter Errors using State Estimation in Control Centers  (panel)

Tuesday, 28 July, 10:00 AM–12:00 PM  Governor’s Square 14
Sponsored by:  Power System Operations
Chairs:  K. CLEMENTS, Worcester Polytechnic Institute 
S. NUTHALAPATI, ERCOT

State Estimator (SE) is an important tool in control centers to monitor the real-time state of a power system. Generally, SE problem is formulated and solved based on the assumption that the network parameters and model are perfectly known. Any errors in parameters and model would affect the SE results, which further may have impact on other downstream applications, such as contingency analysis, Voltage Security Assessment, etc. Therefore it is important to identify such parameter and model errors. This panel discusses various experiences of using SE to identify parameter and model errors in control centers.

PRESENTATIONS AND PANELISTS:

- 15PESGM1345, An Overview of the Problem of Topology Error Estimation
  K. CLEMENTS, Worcester Polytechnic Institute
- 15PESGM1344, Hydro One’s Experience of Using State Estimation for Model Validation
  Y. GUO, Hydro One
- 15PESGM1346, Peak Reliability’s Experience of Using State Estimation to Identify West System Model Errors under Reliability Coordinator Control Centers
  H. ZHANG, Peak Reliability
- 15PESGM1347, Experiences of Using State Estimation to Identify Model and Parameter Errors at ISO New England
  S. RAMESH, ISO New England
- 15PESGM1394, Experiences of Using State Estimation to Identify Model and Parameter Errors at PJM Control Center
  D. MOSCOVITZ, PJM Interconnection
Power System Planning and Implementation Transactions Session – 20 (transactions paper)

Tuesday, 28 July, 10:00 AM–12:00 PM          Director’s Row H
Sponsored by:  Power System Planning and Implementation
Chairs:  A. PAHWA, Kansas State University
J. ZHAO, University of New Haven

PAPERS AND AUTHORS:

• 15PESGM0029, Joint Expansion Planning of Distributed Generation and Distribution Networks  
  [Transaction Number: TPWRS-00413-2014.R2]
  G. MUÑOZ-DELGADO, University of Castilla – La Mancha
  J. CONTRERAS, University of Castilla – La Mancha
  J. ARROYO, University of Castilla – La Mancha

• 15PESGM0585, Multi-Objective Planning for Reactive Power Compensation of Radial Distribution Networks with Unified Power Quality Conditioner Allocation Using Particle Swarm Optimization  
  [Transaction Number: TPWRS-00878-2013]
  S. GANGULY, National Institute of Technology

• 15PESGM1429, Techno-Economic Assessment of Voltage Control Strategies in Low Voltage Grids  
  T. STETZ, Fraunhofer IWES
  K. DIWOLD, Fraunhofer IWES
  M. KRAICZY, Fraunhofer IWES
  D. GEIPEL, Fraunhofer IWES
  M. BRAUN, Fraunhofer IWES
  S. SCHMIDT, Bayernwerk AG

• 15PESGM1699, Load Scheduling with Price Uncertainty and Temporally-Coupled Constraints in Smart Grids  
  [Transaction Number: TPWRS-01049-2013]
  R. DENG, Zhejiang University
  Z. YANG, Zhejiang University
  J. CHEN, Zhejiang University
  M. CHOW, North Carolina State University

• 15PESGM1704, Distributed Real-Time Demand Response in Multiseller Multibuyer Smart Distribution Grid  
  Z. REN, Chongqing University
  W. YAN, Chongqing University
  X. ZHAO, Chongqing University
  W. LI, Chongqing University
  J. YU, Chongqing University

• 15PESGM1914, Modeling and Validation of Electrical Load Profiling in Residential Buildings in Singapore  
  [Transaction Number: TPWRS-01076-2014]
  L. CHUAN, Nanyang Technological University
  A. UKIL, Nanyang Technological University

PSACE Transactions Paper Session – T6 (transactions paper)

Tuesday, 28 July, 10:00 AM–12:00 PM          Windows
Sponsored by:  PSACE
Chair:  J. FOLLUM, PNNL

PAPERS AND AUTHORS:

• 15PESGM0042, Chronological Probability Model of Photovoltaic Generation  
  Z. REN, Chongqing University
  W. YAN, Chongqing University
  X. ZHAO, Chongqing University
  W. LI, Chongqing University
  J. YU, Chongqing University

• 15PESGM0223, Contracting Strategies for Renewable Generators: A Hybrid Stochastic and Robust Optimization Approach  
  [Transaction Number: TPWRS-01630-2013]
  B. FANZERES DOS SANTOS, Pontifical Catholic University of Rio de Janeiro
  A. STREET, Pontifical Catholic University of Rio de Janeiro
  L. AUGUSTO BARROSO, Power System Research
• 15PESGM0445, An Interaction Model for Simulation and Mitigation of Cascading Failures  
[Transaction Number: 10.1109/TPWRS.2014.2337284]  
J. QI, University of Tennessee  
K. SUN, University of Tennessee  
S. MEI, Tsinghua University

• 15PESGM0727, Self-Commitment of Combined Cycle Units under Electricity Price Uncertainty  
[Transaction Number: TPWRS2354832]  
A. PAPAVASILIOU, Université Catholique de Louvain  
Y. HE, Pacific Gas and Electric  
A. SVOBODA, Pacific Gas and Electric

• 15PESGM1671, State Estimation in Two Time Scales for Smart Distribution Systems  
[Transaction Number: TSG-00932-2013]  
A. GÓMEZ-EXPÓSITO, University of Seville  
C. GÓMEZ-QUILES, University of Seville  
I. DŽAFIC, SIEMENS AG

• 15PESGM2092, Smart Charging of PEVs Penetrating into Residential Distribution Systems  
[Transaction Number: TSG-00207-2013]  
I. SHARMA, University of Waterloo  
C. CANIZARES, University of Waterloo  
K. BHATTACHARYA, University of Waterloo

• 15PESGM2096, Smart Distribution System Operations with Price-Responsive and Controllable Loads  
[Transaction Number: TSG-00372-2013]  
I. SHARMA, University of Waterloo  
K. BHATTACHARYA, University of Waterloo  
C. CANIZARES, University of Waterloo

• 15PESGM2409, Temporal Versus Stochastic Granularity in Thermal Generation Capacity Planning with Wind Power  
[Transaction Number: TPWRS-00280-2013]  
S. JIN, Liberty Mutual Insurance Group  
A. BOTTERUD, Argonne National Laboratory  
S. RYAN, Iowa State University

Distribution Resiliency: Performance of Distribution Systems during Major Events  (panel)  
Tuesday, 28 July, 10:00 AM–12:00 PM  
Plaza Court 6

Sponsored by: Transmission and Distribution Committee  
Chair: T. SHORT, EPRI

Distribution systems, particularly overhead systems can suffer heavy damage during major storms. This panel will cover several hardening and resiliency approaches. The panelists will cover various approaches for improving the performance of overhead distribution lines during major events like ice/snow storms, tropical storms, and derechos. Topics will include vegetation management impacts on performance, performance of components under impacts, field testing of tree impacts to distribution lines, and lessons learned from outage data. Hardening approaches such as larger poles and NESC extreme-wind criteria will be covered along with approaches to coordinate damage to minimize repair times.

PRESENTATIONS AND PANELISTS:

• 15PESGM0826, Tappan Lake: Distribution Line Full Scale Destructive Testing  
  M. SHELLENBERGER, American Electric Power (AEP)

• 15PESGM0827, Resiliency Data Analytics at Duke Energy  
  L. TAYLOR, Duke Energy

• 15PESGM0828, Resiliency Options at Xcel Energy  
  B. COPPOCK, Xcel Energy

• 15PESGM0829, Resiliency Tests of Overhead Structures and Components  
  J. POTVIN, Electric Power Research Institute (EPRI)
Technical Committee Reorganization Town Hall – PSO, PSPI, Sub-Committees of PSACE (Town Hall)

Tuesday, 28 July, 10:00 AM–12:00 PM Terrace
Sponsored by: IEEE Power & Energy Society
Chairs: K. EDWARDS, BPA
M. P. SANDERS, Schweitzer Engineering Labs

Power System Operations, Power System Planning and Implementation, and the Economics subcommittee of the Power System Analysis, Computer and Economics Committee will review their current proposal and scope for a combined technical committee.

LEADERS:
H. CHEN, ML Chan

Tuesday Afternoon

Changing Generation Assets and Their Impacts (super session – panel)

Tuesday, 28 July, 1:00 PM–5:00 PM Majestic Ballroom
Sponsored by: PES Super Session
Chair: F. F. LI, University of Tennessee

In this super session, the following topics regarding the changing generation assets and their impacts will be discussed:

- True Costs and Limitations of ‘Green’ Generation
- Utilization of Residential Generation
- Balancing Intermittent Generation With and Without Storage
- Power Quality Issues associated with PVs and Wind Generators
- Challenges of changing fuel mix
- Planning, operation, and interaction of gas and electricity infrastructures.
- Challenges in power system studies

PRESENTATIONS AND PANELISTS:

Procurement and Integration of Renewables to Achieve California’s RPS Objective – Challenges and Opportunities
R. SINGH, SCE

Impacts of the Distributed Energy Resources onto the Distribution System Power Quality, Operation, and Protection
B. ENAYATI, National Grid

2030 Long-term Reliability Challenges of Variable Energy Resources (VERs)
M. LAUBY, NERC

Issues on Renewable (PV or Wind) Generation with Battery Energy Storage System: Modeling, Simulation and Application
X. XU, S&C

Cost of Integrating Variable Generation
S. VENKATARAMAN, GE

Planning for the Changing Grid in ERCOT
W. LASHER, ERCOT

Advanced Topics in Electrical Machines (panel)

Tuesday, 28 July, 1:00 PM–5:00 PM Governor’s Square 14
Sponsored by: Electric Machinery
Chairs: M. OOSHIMA, Tokyo University of Science
A. CHIBA, Tokyo Institute of Technology

Electric machines have been advanced in several aspects. Bearingless motors are magnetically suspended motor. Optimization provides latest motor structures. Decrease of iron loss for efficiency improvements is necessary. Rotor leakage inductance evaluation in synchronous machine is also presented.

PRESENTATIONS AND PANELISTS:

- 15PESGM2978, High Speed, High Frequency Air-Core Machine and Drive
  K. HARAN, Illinois
Tuesday Afternoon, continued

- 15PESGM2979, Compensation Method of Suspension Force and Rotor Levitation Tests in a Time-Divided Torque and Suspension Force Control Type Bearingless Motor
  M. OOSHIMA, Tokyo University of Science

- 15PESGM2980, Study of Field Current Characteristic at Transient Condition
  D. HIRAMATSU, Toshiba

- 15PESGM2981, An Asymmetric Permanent Magnet Synchronous Machine for Wide Constant Power Speed Range Applications
  J. ALSAWALHI, Purdue

- 15PESGM2982, Force and Torque Improvements of One-Axis Actively Positioned Single-Drive Bearingless Motor with Short Axial Length
  H. SUGIMOTO, Tokyo Institute of Technology

International Practices for Clean Energy Generation and Management Worldwide (panel)

Tuesday, 28 July, 1:00 PM–3:00 PM                Plaza Court 6
Sponsored by:              Energy Development and Power Generation Committee
Chairs:                          L. L. LAI, State Grid Energy Research Institute
                                 K. P. WONG, University of Western Australia

Electricity transmission and distribution systems are among the most important technologies serving the world today, bringing clean and useful energy to meet the demand of end users in many parts of the world. However, in the light of concerns on energy security and access, environmental impacts of energy use and depletion and rising costs of non-renewable energy resources, the existing energy distributed generations have begun to show signs of inflexibility, vulnerability, high costs and inefficiencies. At the same time, distributed energy resources are becoming increasingly widespread and important, and entail the development and use of new and innovative approaches and technologies in energy supply and distribution & renewables and storage embedded microgrids. Development in power conversion techniques, methods, policy and practices which enable safe, quick-response, high-quality and efficient generation power from distributed energy sources will also be considered.

PRESENTATIONS AND PANELISTS:

- 15PESGM0402, A Hybrid Interactive Simulation Method for Studying Emission Trading Behaviors
  Y. XUE, State Grid EPRI
  C. JIANG, Nanjing University of Science & Technology
  J. HUANG, State Grid EPRI
  F. WEN, Zhejiang University
  Y. DING, Zhejiang University
  Z. XU, Hong Kong Polytechnic University
  K. WONG, University of Western Australia

- 15PESGM3051, UHV AC/DC Technologies for Renewable Generation Transmission
  L. YAO, China Electric Power Research Institute

- 15PESGM3052, Research on Friendly Grid-Connection of Distributed Photovoltaic Generation

- 15PESGM1465, Enhancement of DFIG Wind Turbine Fault Ride through Capability with Advanced Control Strategy and Battery Energy Storage System
  Z. DONG, University of Sydney

- 15PESGM1464, A MILP Approach to Accommodate More Building Integrated Photovoltaic System in Distribution Network
  K. WONG, University of Western Australia

- 15PESGM3053, Economic Analysis on the Comparison of Electric Vehicle Charging and Battery Swap Stations
  G. WANG, Hong Kong Polytechnic University

- 15PESGM1467, Infrastructure Development for Transportation Electrification
  W. LEE, University of Texas at Arlington

- 15PESGM1468, Comparison of Wind Power Data-Driven Models
  H. HAGHI, University of Central Florida
  Z. QU, University of Central Florida
Emerging Optimization Models and Concepts to Design Transmission Networks in Modern Power Systems  (panel)

Transmission network investments are driven by opportunities to exchange power that increase the economic and/or reliability performance of the entire system. The transmission network is also seen as a key enabler of renewable energy integration, since the best renewable resources are often far from load centers and the existing grid. In this context, this panel will present the latest developments and applications of optimization models and concepts to build economic, reliable and sustainable power networks. The invited panelists will especially focus on the treatment of uncertainties in both operation and planning timescales that are critical for designing 21st-century transmission networks.

PRESENTATIONS AND PANELISTS:

- **15PESGM1995, Application of Minimax Regret Approach to North Seas Grid Infrastructure Planning Under Uncertainty**
  G. STRBAC, Imperial College London
  B. HOBBS, Johns Hopkins University
- **15PESGM1997, Optimization Models for Long-Term Transmission Planning: Managing Oversizing to Face Uncertainties**
  H. RUDNICK, Pontificia Universidad Catolica de Chile
  D. WATTS, Pontificia Universidad Catolica de Chile
- **15PESGM1998, Adjustable Robust Optimization for Contingency-Constrained Transmission Expansion Planning**
  J. ARROYO, Universidad de Castilla – La Mancha

Energy Efficiency and Smart Cities  (panel)

The increasing population in cities is an additional challenge and it requires an enormous effort for reducing the greenhouse gases. Especially, cities have a high and still increasing demand on electricity, gas, heating and cooling simultaneously. Therefore, an optimal use of multi energy systems in the urban environment using smart control and communication technologies and the implementation of e-mobility is the key towards highly efficient and carbon-reduced cities. Therefore, in the framework of Smart Grids, Smart Cities take a particular role. The panel will provide the newest research results and information about running pilot and demonstration projects in Europe concerning energy efficiency and smart cities. The main issues of urban multi-energy systems, DSM, cogeneration and urban smart grid technologies will be pointed out under different technical point of views.

PRESENTATIONS AND PANELISTS:

- **15PESGM2839, ENERNET – Demonstrating Smart Electric Thermal Storage (SETS) on the Power System of Ireland**
  D. BURKE, UCD
- **15PESGM2840, Machine Learning to Estimate Energy Demands and User Behavior Related to Buildings in the Smart Grid Context**
  E. MOCANU, Eindhoven University of Technology
- **15PESGM2855, Taking Energy into Consideration from the First Steps of Urban Planning**
  R. BELHOMME, EDF
Intelligent Grid CC Transactions Session – T2  (transactions paper)

Tuesday, 28 July, 1:00 PM–3:00 PM
Director’s Row H
Sponsored by: Intelligent Grid Coordinating
Chair: S. WIDERGREN, PNNL

PAPERS AND AUTHORS:

- **15PESGM0157, Testing and Enhancement of the Dynamic Performance of a Phasor Measurement Unit** [Transaction Number: 10.1109/TPWRD.2014.2322516]
  D. GURUSINGHE, University of Manitoba
  A. RAJAPAKSE, University of Manitoba
  K. NARENDRA, ERLPhase Power Technologies Ltd

- **15PESGM0159, Multi Agent System for Distributed Management of Microgrids** [Transaction Number: 10.1109/TPWRS.2014.2322622]
  Y. FOO, Nanyang Technological University
  H. GOOI, Nanyang Technological University
  S. CHEN, DNV GL Energy

- **15PESGM0293, Stability Analysis of Networked Control in Smart Grids** [Transaction Number: TSG-00854-2013]
  A. SINGH, Imperial College London
  R. SINGH, ABB Group
  B. PAL, Imperial College London

- **15PESGM0532, Investigation of Maximum Possible OPF Problem Decomposition Degree for Decentralized Energy Markets** [Transaction Number: TPWRS2365959]
  E. LOUKARAKIS, Durham University
  J. BIALEK, Skoltech
  C. DENT, Durham University

- **15PESGM0713, Thermal Profiling of Residential Energy Use** [Transaction Number: TPWRS2329485]
  A. ALBERT, C3 Energy
  R. RAJAGOPAL, Stanford University

- **15PESGM0830, Why Ideal Constant Power Loads Are not the Worst Case Condition from a Control Standpoint** [Transaction Number: TSG-00625-2013.R1]
  M. CUPPELLI, E.ON Energy Research Center – RWTH Aachen University
  A. MONTI, E.ON Energy Research Center – RWTH Aachen University

- **15PESGM1057, Distribution Automation Strategies: Evolution of Technologies and the Business Case** [Transaction Number: 10.1109/TSG.2014.2368393]
  R. DAS, ABB Inc.
  V. MADANI, Pacific Gas & Electric
  F. AMINIFAR, University of Tehran
  J. MCDONALD, GE Energy Management
  S. VENKATA, Alstom Grid
  D. NOVOSEL, Quanta Technology
  J. BIALEK, Skoltech
  M. SHAHIDEHPOUR, Illinois Institute of Technology

- **15PESGM1702, Optimal Charging Strategy for Plug-In Electric Taxi with Time-Varying Profits** [Transaction Number: TSG-00760-2013]
  Z. YANG, Zhejiang University
  L. SUN, Zhejiang University
  M. KE, Zhejiang University
  Z. SHI, Zhejiang University
  J. CHEN, Zhejiang University

New Technologies Impacting the Power Industry (panel)

Tuesday, 28 July, 1:00 PM–3:00 PM
Vail
Sponsored by: Intelligent Grid Coordinating
Chair: S. PULLINS, Green Energy Corp

Presentations on new technologies that will make an impact on the power and energy industry in the future.

PRESENTATIONS AND PANELISTS:

- **15PESGM3060, Update on the TC Re-Organization**
  D. HOUSEMAN, EnerNex

- **15PESGM3061, Discussion on the Proposal to Merge IGCC and ETCC**
  S. PULLINS, Green Energy Corp
Transmission Planning with the Perspective of Renewable Resource Integration: Education and Research Initiatives (panel)

Tuesday, 28 July, 1:00 PM–5:00 PM     Plaza Court 8

Sponsored by: Power & Energy Education
Chairs: S. SURYANARAYANAN, Colorado State University
        G. HEYDT, ASU

The objectives of this panel are to bring together experts from industry and academia who are on the forefront of education and research programs in transmission expansion. The special focus is the integration of renewable resources in the grid. The panel will seek to update the audience on the needs of the industry; the capabilities of education programs; planning philosophies; the latest engineering and mathematical tools for transmission expansion; and case histories and experiences relating to the expansion planning for the integration of large scale renewable resources. The panel consisting of 5–6 speakers will be recruited from industry, academia, government, and the national laboratories. An objective is to bring an international perspective to this topic.

PRESENTATIONS AND PANELISTS:
• 15PESGM1674, University Contribution to International Projects on Expansion of Electric Power Transmission
  K. STRUNZ, TU Berlin
• 15PESGM1675, Tailoring Engineering Degree (Undergraduate and Graduate) Programs to Handle Technical Challenges Posed by Integrating Renewable Sources
  R. GORUR, Arizona State University
• 15PESGM1676, Transmission Expansion Planning and the Operating Experience: Bridging the Divide
  D. HAUGHTON, Arizona Public Service Co.
• 15PESGM1677, Stochastic Transmission Planning and Generation Cooptimization
  B. HOBBS, Johns Hopkins University
• 15PESGM1678, Metrics and Screening for the Integration of Renewables into Power Systems: 40% Wind in Minnesota
  E. VITTAL, General Electric Co.

New Techniques for Power Quality Measurement and Field Experiences (panel)

Tuesday, 28 July, 1:00 PM–4:00 PM     Plaza Court 5

Sponsored by: Power System Instrumentation and Measurements Committee
Chairs: A. EMANUEL, Worcester Polytechnic Institute
        E. SO, National Research Council of Canada

PRESENTATIONS AND PANELISTS:
• 15PESGM3040, Experiences on Using Synchronized Harmonic Phasors and Gapless Waveform Data for Power Quality Analysis
  W. XU, University of Alberta
• 15PESGM3041, Measuring Flicker: IEEE 1453
  K. SEDZIOL, Duke Energy
• 15PESGM3042, The Future for Power Quality Monitoring
  G. HOOPS, Candura Instruments
• 15PESGM3043, Incipient Cable Fault Detection and Location Using Power Quality Data
  S. SANTOSO, University of Texas
• 15PESGM3044, Non-contact PQ Measurement and Other Advanced Techniques
  B. HOWE, Electric Power Research Institute
• 15PESGM3045, Case Studies in Detection and Location of Permanent and Incipient Faults Using PQ Monitors
  D. SABIN, Electrotek Concepts

Performance Metrics for Application of DSA Technology in Real-Time Operations (panel)

Tuesday, 28 July, 1:00 PM–3:00 PM     Governor’s Square 15

Sponsored by: Power System Operations
Chair: Z. YAO, BC Hydro

Online (or real-time) DSA application is considered as one of the key real-time tools for control centers to monitor/maintain grid security in real-time operations (RTO). Since a decade, more and more control centers have installed DSA applications and integrated them with EMS; and more to come. It becomes
an urgent need to establish agreed upon performance metrics for existing users to enhance their existing installations and for new users to set up reasonable expectations for their upcoming projects. This panel session will provide a platform for users to share experiences in measuring the performance of the technology RTO environment.

PRESENTATIONS AND PANELISTS:

- 15PESGM2735, Performance Metrics for PJM On-Line TSA Application
  J. TONG, PJM Interconnection
- 15PESGM2736, Development of Integrated Stability Control System Using Online DSA Functions
  Y. KOKAI, Hitachi America, Ltd.
- 15PESGM2737, Performance Metrics for BC Hydro’s Online DSA for Real-Time Operations
  D. ATANACKOVIC, BC Hydro

Advanced Real-time Transmission and Distribution Security Solutions (panel)

Tuesday, 28 July, 1:00 PM–5:00 PM  Governor’s Square 16

Sponsored by: Power System Operations
Chairs: E. VAAHEDI, UBC
        L. WANG, Powertech Labs Inc.

Utilities are adopting real-time security solutions to enhance system reliability and efficiency of the transmission and distribution systems. Examples of real-time transmission security solutions include:

- Online Transient and Voltage Stability
- Total Transfer Capability
- Transient Stability and Voltage Stability Monitors Using PMUs
- Distribution Security Assessment

This panel session reviews the implementation details of these solutions as well as exploring new solution methods enhancing transmission and distribution security solutions.

PRESENTATIONS AND PANELISTS:

  X. LIN, Powertechlabs
- 15PESGM2756, Distribution Security Part 2: Augmentation Under a New DSO Construct
  F. RAHIMI, OATI
- 15PESGM2757, Integrating SCADA and PMU Measurements to Detect Islanding Following Large Hurricanes
  V. VITTAL, Arizona State University
- 15PESGM2758, Transmission Security over Multiple Time Horizons – Alstom’s Solutions and Practice
  W. QIU, Alstom Grid
- 15PESGM2759, Online DSA Experience and New Developments
  J. JARDIM, HPPA
  F. ALBUYEH, OATI
- 15PESGM2761, Architecture Challenge for Real-Time Security Solutions
  D. ATANACKOVIC, BC Hydro
- 15PESGM2762, Fast Transient Stability Solutions
  P. ZADKHAST, UBC
- 15PESGM2763, Solutions for Managing Real-Time Distribution Grid Resiliency with High DER Penetration
  A. JAYANTILAL, Alstom

PSO Transactions Paper Session – T11 (transactions paper)

Tuesday, 28 July, 1:00 PM–3:00 PM  Windows

Sponsored by: Power System Operations
Chair: J. BIAN, Nerc

PAPERS AND AUTHORS:

  F. DING, Case Western Reserve University
  K. LOPARO, Case Western Reserve University
Deterministic system planning criteria have well served the power industry for many years. However, the weaknesses of deterministic planning criteria have also been unveiled. Many uncertain factors in power systems cannot be handled by traditional methods and deterministic criteria. Necessity of probabilistic system planning has been gradually recognized and become a hot topic in recent years. This panel session will invite seven experts from both industry and academia to address different aspects in probabilistic system planning. The visions and experiences from NERC, WECC, utilities and universities will be deeply discussed. The presentations will include the basic concepts, criteria, procedure and tasks in probabilistic system planning, applications and case studies of probabilistic methods in generation resource, transmission system, distribution network and equipment spare planning, and data issues for probabilistic planning.

PRESENTATIONS AND PANELISTS:

- 15PESGM0730, Overview of Probabilistic System Planning
  W. LI, Chongqing University

- 15PESGM0731, Increased Need for Probabilistic System Planning in the 21st Century
  M. LAUBY, NERC

- 15PESGM0733, Probabilistic Inputs to Transmission Planning: C A New England Case Study
  M. HENDERSON, ISO-New England

- 15PESGM0734, Probabilistic Methods in Resource Adequacy Planning at PJM
  P. ROCHA-GARRIDO, PJM Interconnection LLC

- 15PESGM0735, Probabilistic Expansion Planning of a Distribution System Considering Reliability and Cost Analysis
  K. XIE, State Key Laboratory of Power Transmission Equipment & System Security

- 15PESGM0736, Probabilistic Method for Optimizing the Number and Timing of Substation Spare Transformers
  A. LEITE DA SILVA, Pontifical Catholic University of Rio de Janeiro

- 15PESGM0732, Outage Data and Application of Probabilistic Indicators in System Planning
  M. PAPIC, Idaho Power
Cascading Failures: Advanced Methodologies, Restoration and Industry Perspectives (panel)

Tuesday, 28 July, 1:00 PM–5:00 PM Plaza Court 3
Sponsored by: (PSACE) Computer Analytical Methods
Chairs: M. PAPIC, Idaho Power
        W. SUN, South Dakota State University

The goal of this panel is to share some latest methods in the areas of analysis, mitigation and prevention of cascading outage events. The session will highlight the importance of addressing the industry perspectives and standards that deal with evaluation, mitigation and preventive actions for cascading failure events. Panel will also address the problem of power system restoration following an extreme cascading outage event.

Another purpose of this panel session is to bring some main contributors from different countries together to share their accomplishments in this area. The panel will also address the future industry needs in the evaluation and mitigation of cascading failure events. Potential speakers at this panel will be well recognized researchers from universities, research organizations and utility industry.

We anticipate the following topics to be covered in this panel session:

- New methodologies
- Restoration
- Industry Perspectives

PRESENTATIONS AND PANELISTS:

- 15PESGM1075, Dynamic Probabilistic Risk Assessment of Cascading Outages
  P. HENNEAUX, Tractebel Engineering, GDF-Suez
  J. SONG, Oregon State University
  E. COTILLA-SANCHEZ, Oregon State University

- 15PESGM1074, Estimating Cascading Failure Risk with Random Chemistry
  P. HINES, University of Vermont

- 15PESGM1070, Extracting Information from Observed Cascading Data
  I. DOBSON, Iowa State University

- 15PESGM1091, An Innovative Tool for Probabilistic Risk Assessment of Power and ICT System Subjected to Wide Area Disturbances Due to Weather/Environment Events
  E. CIAPESSONI, RSE

- 15PESGM1073, Current Industry Practice with Cascading Outage Events
  M. PAPIC, Idaho Power

- 15PESGM1080, NERC Event Analysis of Cascading Outages
  B. CUMMINGS, NERC

- 15PESGM1081, Applications and Analysis Tools for Monitoring Dynamics on the Grid
  P. OVERHOLT, DOE

- 15PESGM1079, Impacts of Blackouts
  M. ADIBI, IRD Corporation

- 15PESGM1076, Addressing Restoration Issues in New England and Future Challenges
  M. HENDERSON, ISO-New England

- 15PESGM1078, Microgrid in Restoration
  C. LIU, WSU

- 15PESGM1071, Review of Restoration Methodologies, Blackstart Capabilities, Using Renewable in Restoration
  W. SUN, South Dakota State University

- 15PESGM1072, Restoration Methods and Applications in China and Development of EPRI’s Restoration Tool
  Y. HOU, University of Hong Kong

Impacts of Variability, Uncertainty and Forecasting Errors on Power System Operational Planning (panel)

Tuesday, 28 July, 1:00 PM–5:00 PM Governor’s Square 11
Sponsored by: (PSACE) Economic Systems
Chairs: M. ORTEGA-VAZQUEZ, University of Washington
        A. LAMADRID, Lehigh University

This panel will explore not only the current practices to manage such uncertainty, from the point of view of vendors and providers of software and industry, but also the assessment of impacts of this uncertainty on the overall operating efficiency. Additionally, we will include the current methodological proposals from academia to tackle this same problem, and how do they maximize operating efficiency while ensuring the
desired level of security. The core idea of the panel is to identify the gap between these two strands and identify the bridges to: i) successfully bring to reality and implement the academic advancements, and include a proper set of practical considerations when doing so and/or ii) identify the barriers to implement sophisticated scheduling algorithms in practice, and the impact of poor information on the resulting schedules and the real-time operation of the system.

**PRESENTATIONS AND PANELISTS:**

- **15PESGM2819, Toward Cost-Efficient and Tractable Unit Commitment with Uncertainty**  
  Y. DVORKIN, University of Washington
- **15PESGM2820, How Practical are the Stochastic Unit Commitment Solvers in the Market Environment?**  
  N. NAVID, Pacific Gas and Electric
- **15PESGM2822, Advanced Power System Operation with High Penetration of Wind Power**  
  J. WANG, Argonne National Laboratory
- **15PESGM2821, Non-Traditional Approaches to Providing Grid Operational Flexibility, Uncertainty Quantification and Reduction**  
  Y. MAKAROV, Pacific Northwest National Laboratory
- **15PESGM2823, Joint Energy and Flexi-Ramp Dispatch with Opportunity Cost Pricing**  
  S. OREN, University of California at Berkeley
- **15PESGM2824, Practical Considerations for Meeting Transmission Reliability Reflective of Operational Uncertainties**  
  W. YEOMANS, NYISO

**Market-Based Approaches for Demand Response (panel)**

**Tuesday, 28 July, 1:00 PM–5:00 PM**  
**Governor’s Square 17**

**Sponsored by:**  
(PSACE) Economic Systems

**Chairs:**  
J. LIAN, Pacific Northwest National Laboratory  
W. ZHANG, Ohio State University

As demand response is becoming increasingly important, various control schemes have been developed to engage responsive loads in demand response programs in order to provide ancillary services to the power grid. Among these control frameworks, market-based coordination and control has attracted considerable research attentions. It borrows ideas from microeconomics, and therefore is amenable to problems where self-interested users are coordinated to achieve social efficiency. With transactive control at the distribution level, it will be promising to integrate demand response into the wholesale transactive operations to realize the transactive operation framework for the power system. This panel will present the latest theoretical results and examine the future challenges of market-based coordination and control applied for demand response.

**PRESENTATIONS AND PANELISTS:**

- **15PESGM2952, Market-Based Approaches for Demand Response**  
  W. ZHANG, Ohio State University
- **15PESGM2957, A Dynamic Market Mechanism for Integration of Renewables and Demand Response**  
  A. ANNASWAMY, MIT
- **15PESGM2958, Enhancing Demand Bids in Wholesale Electricity Markets**  
  H. MOHSENIAN-RAD, UC Riverside
- **15PESGM2955, From the Sunshine State to the Solar State**  
  S. MEYN, University of Florida
- **15PESGM2954, Energy Internet Power Agreement Protocols and Demand Response**  
  S. GRIJALVA, Georgia Tech
- **15PESGM2956, Demand Response Using Supply Function Bidding**  
  N. LI, Harvard University
- **15PESGM2953, Dynamic Contracts for Demand Response**  
  D. CALLAWAY, UC Berkeley

**Coordinated Control of AC and DC Microgrids (panel)**

**Tuesday, 28 July, 1:00 PM–3:00 PM**  
**Governor’s Square 12**

**Sponsored by:**  
(PSACE) Intelligent Systems

**Chair:**  
G. KUMAR VENAYAGAMOORTHY, Clemson University

**PRESENTATIONS AND PANELISTS:**

- **15PESGM2931, Day-Ahead Optimal Resource Scheduling Under Uncertainty in a Microgrid with Intensive Penetration of Renewable Sources and Electric Vehicle**  
  Z. VALE, ISEP
Harmonics from 2 kHz to 150 kHz: Immunity, Emission, Assessment and Compatibility (panel)

Tuesday, 28 July, 1:00 PM–3:00 PM
Plaza Court 2
Sponsored by: Transmission and Distribution Committee
Chair: R. LANGELLA, Second University of Naples

In the new scenario of Smart Grids, the distribution systems and Microgrids will use more and more Power Electronics devices to interface loads, dispersed generation, storage systems and other single components or sub-systems. The switching frequencies adopted by modern power electronic apparatus, including small production units, are increasing, thanks to the availability of faster high power switches, to increase efficiency and controllability. This trend is changing the scenario of the harmonic pollution analyses and the traditional interval of frequencies of interest (0–2 kHz), recently extended (2 V 9 kHz), should be substituted by a wider interval (0–150 kHz). The panel session is intended to discuss characterization and modeling aspects related to harmonics in the frequency range from 2 kHz to 150 kHz. The panelists will present theoretical aspects, measurement results, and practical applications.

PRESENTATIONS AND PANELISTS:
- 15PESGM0909, MV Component Modeling and Propagation Issues
  A. TESTA, Second University of Naples
  R. LANGELLA, Second University of Naples
- 15PESGM0907, Propagation and Cancellation Characteristics in LV Networks
  W. XU, University of Alberta
- 15PESGM0908, Modeling and Simulation Issues Resulting from Extended Measurements
  M. BOLLEN, Luleå University of Technology
  S. RÖNNBERG, Luleå University of Technology
- 15PESGM0910, Use of Modern Power Electronic Devices with Higher Switching Frequencies in Industrial Areas
  I. PAPIC, University of Ljubljana
- 15PESGM0911, Immunity Issues Related to Revenue Meters
  J. DRAPELA, Brno University of Technology
- 15PESGM0912, Modelling of Emission of PV Inverters and Electric Vehicles based on Measurements
  J. MEYER, Technical University of Dresden

Power System Operations (paper forum)

Tuesday, 28 July, 1:00 PM–5:00 PM
Plaza Ballroom CF
Sponsored by: IEEE Power & Energy Society
Chair: H. ZAREIPOUR, University of Calgary

PRESENTATIONS AND PANELISTS:
- 15PESGM0018, Congestion Management with Dynamic Line Ratings Considering Network Imbalance
  B. BANERJEE, Curtin University
  D. JAYAWEERA, University of Birmingham
  S. ISLAM, Curtin University
- 15PESGM0066, Multi-Period Optimization for Voltage Control System in Transmission Grids
  N. QIN, Energinet.dk
  S. CHEN, Energinet.dk
  C. LIU, Energinet.dk
  H. ABILDGAARD, Energinet.dk
  C. BAK, Aalborg University
  Z. CHEN, Aalborg University
- 15PESGM0254, Mutual Inductance Computation Method for Coils of Different Geometries and Misalignments
  A. DALAL, Indian Institute of Technology Guwahati
  T. REENA, Indian Institute of Technology Guwahati
  P. KUMAR, Indian Institute of Technology Guwahati
Tuesday Afternoon, continued

- **15PESGM0311, Approximating the ACOPF Problem with a Hierarchy of SOCP Problems**
  X. KUANG, Lehigh University  
  L. ZULUAGA, Lehigh University  
  B. GHADDAR, IBM Research – Ireland  
  J. NAQUM-SAWAYA, IBM Research – Ireland

- **15PESGM0313, Model Reduction of Power Systems with Preservation of Slow and Poorly Damped Modes**
  G. SCARCIOTTI, Imperial College London

- **15PESGM0544, MaximizingTransmission Efficiency Using the National Grid Electricity Balancing System**
  S. CHANG, ABB  
  C. TEOH, ABB  
  Y. TAO, ABB  
  P. PENG, ABB  
  H. LI, National Grid  
  J. DYER, National Grid  
  S. BARNETT, NA

- **15PESGM0789, A Distributed Asynchronous Algorithm for the Two-Stage Stochastic Unit Commitment Problem**
  I. ARAVENA SOLÍS, Université Catholique de Louvain  
  A. PAPAVASILIOU, Université Catholique de Louvain

- **15PESGM0867, Toward On-Line System Splitting Method for Emergency Control with Priority Service Areas**
  S. WU, Tianjin University  
  H. CHIANG, Cornell University

- **15PESGM1050, Application of Distributed SeriesReactors in Voltage Balancing**
  K. RAHIMI, Virginia Tech  
  H. JAIN, Virginia Tech  
  J. HAMBRICK, Electrical Distribution Design  
  R. BROADWATER, Virginia Tech

- **15PESGM1312, The Need for a New Generation of Var Meters**
  T. ZHANG, Worcester Polytechnic Institute (WPI)  
  J. ORR, Worcester Polytechnic Institute (WPI)  
  A. EMANUEL, Worcester Polytechnic Institute (WPI)

- **15PESGM1645, Cloud Computing: An Innovative IT Paradigm to Facilitate Power System Operations**
  F. MA, ISO New England  
  X. LUO, ISO New England  
  Q. ZHANG, ISO New England  
  E. LITVINOV, ISO New England

- **15PESGM1719, Stochastic Look-Ahead Economic Dispatch with Flexible Ramping Product**
  G. ZHANG, Iowa State University  
  J. MCCALLEY, Iowa State University

- **15PESGM1721, Estimation of Synchronous Generator Model Parameters Operating under Unbalanced Three-Phase Conditions**
  E. GERALDI JR, University of Sao Paulo  
  T. FERNANDES, University of Sao Paulo  
  R. RAMOS, University of Sao Paulo

- **15PESGM1832, Voltage VAR Optimization Real Time Closed Loop Deployment – BC Hydro Challenges and Opportunities**
  V. DABIC, BC Hydro  
  D. ATANACKOVIC, BC Hydro

- **15PESGM2114, Novel Exploitation of Convex Hull Invariance for Solving Unit Commitment by Using Surrogate Lagrangian Relaxation and Branch-and-Cut**
  M. BRAGIN, University of Connecticut  
  P. LUH, University of Connecticut  
  J. YAN, Southern California Edison  
  G. STERN, Southern California Edison

- **15PESGM2427, Detecting Positive-Sequence Component in Active Power Filter under Distorted Grid Voltage**
  S. SANTOSO, University of Texas at Austin  
  T. NGO, University of Texas at Austin  
  Q. NGUYEN, University of Texas at Austin

- **15PESGM2455, GPU-based Two-Step Preconditioning for Conjugate Gradient Method in Power Flow**
  X. LI, University of Tennessee, Knoxville  
  F. LI, University of Tennessee, Knoxville
• 15PESGM2469, Exploring the Concept of Hosting Capacity for Harmonic Distortions Assessment
  I. SANTOS, Federal University of Uberlandia
  M. BOLLEN, Luleå University of Technology
  P. RIBEIRO, Federal University of Itajubá

• 15PESGM2502, Chebyshev Based Continuous Time Power System Operation Approach
  M. MATUS, Universidad de Chile
  N. CACERES, Universidad de Chile
  S. PUSCHEL, Universidad de Chile
  R. MORENO, Universidad de Chile & Imperial College London

• 15PESGM2465, Fast Computing Method for Two-Stage Robust Network Constrained Unit Commitment Problem
  W. YUAN, University of South Florida
  B. ZENG, University of South Florida
  E. LITVINOV, ISO New England
  T. ZHENG, ISO New England
  J. ZHAO, ISO New England

• 15PESGM2337, A Strategy of Minimising Wind Power Curtailment by Considering Operation Capacity Credit
  Z. LIU, Aalborg University
  C. SU, Aalborg University
  J. FANG, Aalborg University
  W. HU, Aalborg University
  Z. CHEN, Aalborg University
  Y. HU, Glyndwr University
  T. ZHENG, China State Grid Jilin Electric Power Co. Ltd.
  Y. SUN, China State Grid Jilin Electric Power Co. Ltd.

Power System Modeling and State Estimations (paper forum)
Tuesday, 28 July, 1:00 PM–5:00 PM Plaza Ballroom BE
Sponsored by: IEEE Power & Energy Society
Chairs: X. WANG, Carleton University
        A. RAMIREZ, Cinvestav-Guadalajara

PRESENTATIONS AND PANELISTS:
• 15PESGM0487, Constrained State Estimation with Partial Measurements in Unobservable Distribution Network
  M. KUMAGAI, Hitachi, Ltd.
  S. OMI, Hitachi, Ltd.
  K. YAMANE, Hitachi, Ltd.
  M. WATANABE, Hitachi, Ltd.

• 15PESGM0662, Exploring Adaptive Interpolation to Mitigate Non-Linear Impact on Estimating Dynamic States
  S. AKHLAGHI, State University of New York at Binghamton
  N. ZHOU, State University of New York at Binghamton
  Z. HUANG, Pacific Northwest National Laboratory

• 15PESGM0673, Single-Phase Transformer Model Validation for Ferroresonance Analysis Including Hysteresis
  J. MARTINEZ, Universitat Politècnica de Catalunya
  J. COREA-ARAUJO, Universitat Rovira i Virgili
  F. GONZALEZ, Universitat Rovira i Virgili
  F. CASTRO-ARANDA, Universidad del Valle
  J. BARRADO-RODRIGO, Universitat Rovira i Virgili
  L. GUASCH-PESQUER, Universitat Rovira i Virgili

• 15PESGM0962, Generic Photovoltaic System Models for WECC
  R. ELLIOTT, Sandia National Laboratories
  A. ELLIS, Sandia National Laboratories
  P. POURBEIK, Electric Power Research Institute
  J. SANCHEZ-GASCÓ, GE Energy
  J. SENTHIL, Siemens PTI
  J. WEBER, PowerWorld Corporation

• 15PESGM1061, Periodic Steady State Solution of Power Systems by Selective Transition Matrix Identification, LU Decomposition and Graphic Processing Units
  E. MAGAÑA-LEMUS, Universidad Michoacana de San Nicolás de Hidalgo
  A. MEDINA-RIOS, Universidad Michoacana de San Nicolás de Hidalgo
  A. RAMOS-PAZ, Universidad Michoacana de San Nicolás de Hidalgo
• 15PESGM1101, Convergence Analysis of ADMM-Based Power System Mode Estimation Under Asynchronous Wide-Area Communication Delays
  J. ZHANG, North Carolina State University
  S. NABAVI, North Carolina State University
  A. CHAKRABORTTY, North Carolina State University
  Y. XIN, North Carolina State University

• 15PESGM1114, Robust Estimation for Enhancing the Cyber Security of Power State Estimation
  Y. CHAKHCHOUKH, Tokyo Institute of Technology
  H. ISHII, Tokyo Institute of Technology

• 15PESGM1363, Design of a Simulation Model to Analyze the Consequences of Using Electric Vehicles to Provide Control Reserve
  T. JIANG, Technical University Ilmenau Germany
  R. SCHWERDFEGER, Technical University Ilmenau Germany
  S. SCHLEGEL, Technical University Ilmenau Germany
  D. WESTERMANN, Technical University Ilmenau Germany

• 15PESGM1403, Validation of a MMC Model in a Real-Time Simulation Platform for Industrial HIL Tests
  S. DENNETIERE, RTE
  E. GHAHREMANI, OPAL-RT
  B. CLERC, RTE
  W. LI, OPAL-RT
  H. SAAD, RTE
  J. BELANGER, OPAL-RT

• 15PESGM1522, Secondary Arc Modelling for Single Pole Reclosing Analyses
  J. KLUCZNIK, Gdansk University of Technology
  Z. LUBOSNY, Gdansk University of Technology
  K. DOBRZYNSKI, Gdansk University of Technology
  S. CZAPP, Gdansk University of Technology

• 15PESGM1626, A Composite k-Nearest Neighbor Model for Day-Ahead Load Forecasting with Limited Temperature Forecasts
  R. ZHANG, University of Newcastle
  Y. XU, University of Sydney
  Z. DONG, University of Sydney
  W. KONG, University of Sydney
  K. WONG, University of Western Australia

• 15PESGM1729, Factory Acceptance Test of a Five-Terminal MMC Control and Protection System using Hardware-in-the-Loop Method
  G. LI, NR Electric
  Y. DONG, NR Electric
  J. TIAN, NR Electric
  W. WANG, OPAL-RT Technologies
  W. LI, OPAL-RT Technologies
  J. BELANGER, OPAL-RT Technologies

• 15PESGM2173, A Design of Grid-Connected PV System for Real-Time Transient Simulation Based on FPGA
  P. LI, Tianjin University
  Z. WANG, Tianjin University
  C. DING, Tianjin University
  H. YU, Tianjin University
  C. WANG, Tianjin University

• 15PESGM2610, A Wide-Area SVC Controller Design Using a Dynamic Equivalent Model of WECC
  M. WEISS, NC State University
  A. CHAKRABORTTY, NC State University
  F. ASHRAFI, Southern California Edison
  A. JAMEHBOZORG, California State University Los Angeles
  B. ABU-JARADEH, Southern California Edison

• 15PESGM2716, Online Power System State Estimation Using Alternating Direction Method of Multipliers
  S. KIM, University of Maryland, Baltimore County
Technical Committee Reorganization: Power Systems Communications and Cybersecurity Town Hall Meeting (Town Hall)

Tuesday, 28 July, 1:00 PM–4:00 PM Terrace
Sponsored by: IEEE Power & Energy Society
Chairs: K. EDWARDS, BPA
M. P. SANDERS, Schweitzer Engineering Labs

PANEL SUMMARY:
LEADER: C. PREUSS

Power System Communications, Power System Relaying and Substations are combining several of the subcommittees and working group to create a technical committee to cover communications and protocols used in the power system as well as including cybersecurity.

Smart Village Information Session 3 (Information session)

Tuesday, 28 July, 1:00 PM–5:00 PM Director’s Row J
Sponsored by: IEEE Smart Village
Chair: D. WESSNER, Posner Center for International Development & Regis University

1:00 PM–1:30 PM
IEEE Smart Village – Education and Training – Successful power schemes in remote off-grid communities requires an integrated approach
Co-Chairs: D. WESSNER, Posner Center for International Development & Regis University
N. JOHNSON, Arizona State University

1:30 PM–2:00 PM
Presentation: An IEEE Smart Village Development Practice Program
SPEAKER: D. WESSNER, Posner Center for International Development & Regis University

This session introduces a holistic, multi-disciplinary approach to IEEE – Smart Village deployment of new technologies and access to global community-based development education. While IEEE collaborates with off-grid communities to incubate, design, and show the sustained usefulness of appropriate tools, it also engages these partners as “learning communities” in development education that links at-risk and in-excess contexts, both needing new and applied learning for sustainable and better livelihoods. This global coursework launches in this fall and welcomes participation from IEEE members and communities, alike.

2:00 PM–2:30 PM
Presentation: Creating a Successful Smart Village Electrification Program at a University
SPEAKER: H. LOUIE, Seattle University

This presentation discusses how to establish and maintain a successful off-grid electrification program in the context of IEEE Smart Village. The focus, in particular, is how universities can become actively engaged in this space outside of the typical student-led clubs found at most institutions. Faculty and staff members must carefully balance disciplinary research, education and teaching, fundraising, volunteers and project management aspects of the program. The presentation describes how the program at Seattle University has balanced these aspects, resulting in award-winning design experiences from students, research publications, financial support from major industrial corporations, and collaborations with NGOs locally and abroad while providing electricity service to the energy-impoverished.

2:30 PM–3:00 PM
Panel: Developing a Vocational Program Training for Smart Village Entrepreneurs
PANELISTS:
M. SICKLES, Purros Namibia Project
N. JOHNSON, Arizona State University
P. DAUENHAUER, University of Strathclyde
R. PODMORE, Incremental Systems
M. WILSON, IEEE Smart Village

The long-term efficacy and sustainability of appropriate technology projects is improved with on-point training in installation, maintenance and franchisee management. IEEE – Smart Village will provide
Microgrid as a Resource for Resiliency  (panel)

Tuesday, 28 July, 3:00 PM–5:00 PM  
Governor's Square 9

Sponsored by:  
Energy Development and Power Generation Committee

Chairs:  
A. SRIVASTAVA, WSU  
M. JOHNSON, USACE

Microgrids improve the reliability of the critical loads in natural disasters and grid disturbances. With additional planning and design, microgrid can also help to restore critical loads outside microgrid and hence increase the system resiliency. There are several examples, when microgrids provided critical loads during contingencies when power from grid was not available specially during extreme weather events. This panel will focus on defining resiliency and experience with several microgrid projects for enhancing the system resiliency and providing case for additional values to the microgrids development.

PRESENTATIONS AND PANELISTS:
- 15PESGM2944, Defining and Measuring Resilience  
  R. GUTTROMSON, Sandia National Lab
- 15PESGM2947, Experience with DOE Microgrid Resiliency Project  
  D. TON, US Department of Energy
- 15PESGM2946, European Perspective on Microgrid Resilience  
  N. HATZIARGYRIOU, National Technical University of Athens
- 15PESGM2945, Control Needs for Microgrid Resiliency  
  A. ANNASWAMY, MIT
  M. BURR, Microgrid Institute

Integrated Grid Panel Session  (panel)

Tuesday, 28 July, 3:00 PM–5:00 PM  
Vail

Sponsored by:  
Intelligent Grid Coordinating

Chair:  
E. GUNTHER, EnerNex Corporation

From Intelligent Grid to smart grid to integrated grid. Presentations on the evolution of what the next generation of distribution and transmission systems.

PRESENTATIONS AND PANELISTS:
- 15PESGM3059, Integrated Grid Discussion  
  M. MCGRANAGHAN, EPRI

Next-Generation EMS for Advanced Future Bulk Power Systems: Challenges, Architecture and Concept  (panel)

Tuesday, 28 July, 3:00 PM–5:00 PM  
Governor’s Square 12

Sponsored by:  
Power System Operations

Chairs:  
H. SUN, Tsinghua University  
J. TONG, PJM Interconnection

The energy industry is undergoing rapid and dramatic changes as the massive distributed energy resources are adopted and more information infrastructure is integrated as an overlay on the physical grid operations. On the other hand, the energy management systems (EMS) were designed in 70s and
80s to better suit for the centralized, fossil generation fleet. The objective of this panel is to provide a platform to discuss the emerging trends in grid operations and the breakthrough technologies of the next-generation EMS which could help to transform the future power grid into a fully integrated, highly resilient paradigm.

PRESENTATIONS AND PANELISTS:

- **15PESGM1454, Next-Generation EMS: Challenges and Principles**  
  J. TONG, PJM Interconnection

- **15PESGM1455, The Architecture of Next-Generation EMS**  
  A. BOSE, Washington State University

- **15PESGM1453, EMS Family for Smart Grids: Concept and Validation**  
  H. SUN, Tsinghua University

- **15PESGM1452, EMS Vision and Roadmap for Future Grid Management**  
  X. WANG, Alstom

- **15PESGM2754, Operational Experiences and Challenges of Ultra-High Voltage Power Grid in East China**  
  J. ZHOU, Aast China Dispatching Center

**Power System Operations Transactions Session – T12 (transactions paper)**

**Tuesday, 28 July, 3:00 PM–5:00 PM**  
Windows

**Sponsored by:**  
Power System Operations

**Chair:**  
J. BIAN, Nerc

**PAPERS AND AUTHORS:**

- **15PESGM0310, Using Semidefinite Relaxation to Solve the Day-Ahead Hydro Unit Commitment Problem**  
  [Transaction Number: 10.1109/TPWRS.2014.2359803]  
  M. PAREDES, University of Campinas – UNICAMP  
  L. MARTINS, IBM  
  S. SOARES, University of Campinas – UNICAMP

- **15PESGM0578, Market Implications and Pricing of Dynamic Reserve Policies for Systems with Renewables**  
  [Transaction Number: TPWRS-00202-2014]  
  J. LYON, Arizona State University  
  F. WANG, Arizona State University  
  K. HEDMAN, Arizona State University  
  M. ZHANG, Arizona State University

- **15PESGM1089, Managing Uncertainty of Wind Energy with Wind Generators Cooperative**  
  [Transaction Number: 10.1109/TPWRS.2012.2233502]  
  C. OPATHELLA, Ryerson University  
  B. VENKATESH, Ryerson University

- **15PESGM1544, Optimal Topology Control with Physical Power Flow Constraints and N-1 Contingency Criterion**  
  [Transaction Number: TPWRS-00339-2014.R2]  
  G. POYRAZOGLU, State University of New York at Buffalo  
  H. OH, State University of New York at Buffalo

- **15PESGM2043, ISO's Optimal Strategies for Scheduling the Hourly Demand Response in Day-Ahead Markets**  
  [Transaction Number: TPWRS-00481-2013]  
  M. PARVANIA, University of California, Davis  
  M. FOTUHI-FIRUZABAD, Sharif University of Technology  
  M. SHAHIDEHPOUR, Illinois Institute of Technology

**Protection Design for Smart Distribution (panel)**

**Tuesday, 28 July, 3:00 PM–5:00 PM**  
Plaza Court 2

**Sponsored by:**  
Transmission and Distribution Committee

**Chair:**  

The fast changes occurring on the distribution grids, especially with Distributed Generation (DG), have significant impact on fault management. Indeed, the power flows are fast changing and no longer unidirectional. The short-circuit currents are modified and grid topologies are evolving. Clearly,
Protection mechanisms need to evolve to accommodate these changes both at the grid side and at the generation side. On the other hand the distribution protection systems can benefit from new technologies from IEDs and smart protection relay designs including advanced communication technologies. The diverse structures of distribution systems in different parts of the world may also influence the protection design. All these factors should not deteriorate the reliability nor the power quality expected by customers. This session is about sharing the emerging new protection design experiences for Smart Distribution systems from speakers from each side of the Atlantic.

Presentations and Panelists:
- **15PESGM1633**, Monitoring, Back-Up Protection and Fault Location in Distribution Networks Using System-Wide Measurements
  J. MAUN, Universite Libre de Bruxelles
- **15PESGM2838**, Smart Protection for Smart Distribution
  P. STACHEL, Schneider Electric
- **15PESGM1635**, Leveraging Communication and Sensing for New Protection Methods
  C. MC CARTHY, S&C Electric
- **15PESGM1632**, Protection Practices for an Integrated Grid
  R. ARRITT, EPRI

Transmission and Distribution Paper Session I – T15 (transactions paper)

Tuesday, 28 July, 3:00 PM–5:00 PM          Governor’s Square 10
Sponsored by: Transmission and Distribution Committee
Chair: R. VARMA, University of Western Ontario

Papers and Authors:
- **15PESGM0163**, Valve Losses Evaluation Based on Piecewise Analytical Method for MMC-HVDC Links [Transaction Number: 10.1109/TPWRD.2014.2304724]
  Z. ZHANG, Zhejiang University
  Z. XU, Zhejiang University
  Y. XUE, Zhejiang University
- **15PESGM0164**, Impacts of Three MMC-HVDC Configurations on AC System Stability under DC Line Faults [Transaction Number: DOI: 10.1109/TPWRS.2014.2315666]
  G. TANG, Zhejiang University
  Z. XU, Zhejiang University
  Y. ZHOU, Zhejiang University
  J. BROCHU, Hydro-Quebec – IREQ
  P. COUTURE, Hydro-Québec – IREQ
- **15PESGM0691**, Fault Detection and Interruption in an Earthed HVDC Grid Using ROCOV and Hybrid DC Breakers [Transaction Number: 10.1109/TPWRS.2014.2364547]
  J. SNEATH, Electronix Corporation
  A. RAJAPAKSE, University of Manitoba
  D. JOVCIC, University of Aberdeen
  M. TAHERBANEH, University of Aberdeen
  J. TAINSE, RTE
  S. NGUEFEU, RTE
- **15PESGM1293**, DC Transmission Grid with Low Speed Protection Using Mechanical DC Circuit Breakers [Transaction Number: TPWRD-00491-2014]
  M. HAJIAN, University of Aberdeen
  L. ZHANG, University of Aberdeen
  D. JOVCIC, University of Aberdeen
  E. KÖNTOS, Delft University of Technology
  R. TEIXEIRA PINTO, Delft University of Technology
  S. RODRIGUES, Delft University of Technology
  P. BAUER, Delft University of Technology
- **15PESGM2126**, Droop Control of Distributed Electric Springs for Stabilizing Future Power Grid [Transaction Number: TSG.2013.2258949]
  C. LEE, University of Hong Kong
  N. CHAUDHURI, North Dakota State University
  B. CHAUDHURI, Imperial College London
  R. HUI, Imperial College London
Tuesday Evening – Wednesday Morning

**Tuesday Evening**

North America Chinese Power Professionals Association – Panel Session  
*(panel)*

Tuesday, 28 July, 5:00 PM–7:00 PM  
Governor’s Square 14  
Sponsored by:  
North America Chinese Power Professionals Association

Pre Awards Dinner General Reception

Tuesday, 28 July, 6:00 PM–7:00 PM  
Grand Ballroom Foyer

PES Awards Dinner

Tuesday, 28 July, 7:00 PM–9:30 PM  
Grand Ballroom  
Sponsored by:  
IEEE Power & Energy Society

**Wednesday Morning**

**Attendee Breakfast**

Wednesday, 29 July, 6:30 AM–8:30 AM  
Plaza Exhibit

**Presenter Breakfast**

Wednesday, 29 July, 6:30 AM–8:30 AM  
Grand Ballroom

**Future Economics of the Grid  (super session – panel)**

Wednesday, 29 July, 8:00 AM–12:00 PM  
Majestic Ballroom  
Sponsored by:  
IEEE Power & Energy Society  
Chair:  
D. KIRSCHEN, University of Washington

**PANELISTS:**

J. H. ETO, Lawrence Berkeley National Laboratory  
R. GREEN, Imperial College London  
E. LITVINOV, ISO New England  
L. KRISTOV, California ISO  
C. KANG, Tsinghua University  
B. HOBBES, Johns Hopkins University  
F. WOLAK, Stanford University

**WTG Performance on Weak Grids; Part 1: Technical Concepts Under Weak System Conditions  (panel)**

Wednesday, 29 July, 8:00 AM–12:00 PM  
Plaza Ballroom A  
Sponsored by:  
Electric Machinery  
Chairs:  
R. PIWKO, GE Energy Consulting  
I. ERLICH, University of Duisburg-Essen

It is increasingly common for wind plants to be connected to the power grid in locations where the driving point impedance of the transmission system is relatively high. That is, the ac system is “weak” relative to the MW rating of the wind plant. which introduces challenges for standard WTG control designs and tuning practices. The panel will include, an overview, grid-operator’s perspective, analytical methods for assessment, technical solutions for wind control, cases studies and operators experience in low short circuit strength systems.
PRESENTATIONS AND PANELISTS:

- **15PESGM0966**, Experience with WTG Weak System Interactions on the ERCOT System
  F. HUANG, ERCOT
- **15PESGM0967**, Frequency-Domain Characterization and Mitigation of Weak-Grid Effects on
  Turbine Control Stability and System Resonance
  J. SUN, RPI
- **15PESGM0968**, Successes and Failures: Experiences with Inverter Based Generation in Weak
  Systems
  A. ISAACS, Electranix
- **15PESGM0969**, Experience with WTG Weak System Interactions in Tasmania
  A. HALLEY, TasNetworks
- **15PESGM0970**, Stable Operation of Doubly-Fed Induction Generator in Weak Grids
  L. CAI, Senvion SE
  I. ERLICH, University of Duisburg-Essen
  U. KARAAGAC, École Polytechnique de Montréal
  J. MAHSEREDJIAN, École Polytechnique de Montréal
- **15PESGM0971**, Flicker Reduction by Wind Turbines Using Advanced Turbine Control
  J. FORTMANN, Senvion GmbH

Condition Monitoring of Electrical Machines (panel)

**Wednesday, 29 July, 8:00 AM–12:00 PM**

Plaza Court 5

Sponsored by: Electric Machinery

Chairs: D. IONEL, Regal Beloit Corp.
       P. NETI, General Electric

Some latest methods of conditioning monitoring of electric machines will be presented by experts in this
area. The latest technologies in these motors and drives will be presented by the panelists.

PRESENTATIONS AND PANELISTS:

- **15PESGM2833**, Acoustic Noise and Vibration Reduction by Novel Current Profile in Switched
  Reluctance Motor
  A. CHIBA, Tokyo Institute of Technology
- **15PESGM2834**, Condition Monitoring of Electrical Machines for Extreme Environments Using the
  Electromagnetic Stray Fields
  O. MOHAMMED, Florida International University
- **15PESGM2835**, Electromagnetic and Thermal Coupled Model for Electric Machines Using Finite
  Elements and Equivalent Thermal Networks
  D. IONEL, University of Wisconsin
- **15PESGM2836**, Wireless Condition Monitoring of Rotating Induction Machines Using Self-
  Powered Portable Device
  S. PANDA, National University of Singapore
- **15PESGM2837**, Electric Motor Thermal Management R&D
  K. BENNION, National Renewable Energy Laboratory

HVDC Grids – The European Perspective (panel)

**Wednesday, 29 July, 8:00 AM–12:00 PM**

Governor’s Square 14

Sponsored by: Energy Development and Power Generation Committee

Chairs: D. WESTERMANN, Ilmenau University of Technology
       A. ORTHS, Energinet.dk

The energy revolution in Europe places new requirements on the transmission grid. If it comes to large
scale wind power integration in the north of Europe, as well as bulk solar power production in south, long
distance bulk power transmission becomes integral part of an entirely new power system where new con-
trollable devices will operate to make transmission smarter. In the last consequence a new network layer
based on HVDC technology will be built which is referred to as an overlay grid in Europe. This session is
about activities carried out in Europe and focusing on the meshed HVDC grids.

PRESENTATIONS AND PANELISTS:

- **15PESGM2786**, Continuous DC Node Voltage Control Characteristic for Multi-Terminal and
  Meshed HVDC Grids
  A. MARTEN, Technische Universität Ilmenau
- **15PESGM2787**, Power System Reliability Considerations of HVDC Grids
  D. VAN HERTEM, KU Leuven
Microgrids projects can increase reliability, enhance renewable energy usage, and reduce emissions. However, project planners face unique and novel challenges when designing effective projects to realize these multifold benefits. Microgrid designers tailor projects to meet specific requirements of the site, but the experience gained from design, construction, and operation provides instructive experience to other projects. This panel will focus on lessons learned from several microgrid projects. Panelists with first-hand microgrid design and implementation experience will discuss what challenges they encountered through the project's design, construction, and operation and how their teams addressed those challenges to make the microgrids successful.

**PRESENTATIONS AND PANELISTS:**

- **15PESGM2948, Lessons Learned from SPIDERS Microgrid Program Assessments**
  K. SCHNEIDER, Pacific Northwest National Laboratory
- **15PESGM2949, Challenges and Opportunities for the Development of Isolated Micro Grids in Latin America**
  G. JIMÉNEZ-ESTÉVEZ, Universidad de Chile
- **15PESGM2950, Lessons Learned from a Microgrid Implementation**
  I. STAMENKOVIC, Eaton
- **15PESGM2951, Microgrid Stability and Cyber Resilience Advancements at Ft. Bragg, NC**
  G. BRAINARD, Honeywell

**DC@Home Panel Session (panel)**

Wednesday, 29 July, 8:00 AM–12:00 PM
Governor’s Square 9

**PRESENTATIONS AND PANELISTS:**

- **15PESGM3058, Update on the Status of the ICAID Work**
  D. HOUSEMAN, EnerNex

**Existing and Proposed Power Systems Laboratories for the Undergraduate Curriculum (panel)**

Wednesday, 29 July, 8:00 AM–12:00 PM
Plaza Court 6

**PRESENTATIONS AND PANELISTS:**

- **Power & Energy Education**
  B. CHOWDHURY, University of North Carolina at Charlotte
PRESENTATIONS AND PANELISTS:

• 15PESGM2856, A Review of the Computer-Based Simulations and Practical Experiments Carried Out by Power System Protection Students at Curtin University
  S. ISLAM, Curtin University
• 15PESGM2857, Laboratory Experience in Undergraduate Teaching at the University of Queensland, Australia
  T. SAHA, University of Queensland
• 15PESGM2858, Photovoltaic Modeling and Integration Laboratory
  A. ST. LEGER, United States Military Academy
• 15PESGM2859, UNC-Charlotte's Power Engineering Teaching Labs
  B. CHOWDHURY, University of North Carolina at Charlotte
• 15PESGM2860, A Measurement Course and Laboratory for the Power Engineering Undergraduate Students at UPB
  M. ALBU, Politehnica University of Bucharest
• 15PESGM2861, Electric Power Systems Laboratory at the University of Pittsburgh Swanson School of Engineering
  G. REED, University of Pittsburgh
• 15PESGM2862, The SmartEST Way: Open-Source based Smart Grid Test and Research Infrastructure Automation
  G. LAUSS, AIT Austrian Institute of Technology

System Model Validation per NERC Reliability Standards and Similar International Standards (panel)

Wednesday, 29 July, 8:00 AM–12:00 PM  Plaza Court 2
Sponsored by:  Power System Dynamic Performance Committee
Chairs:  P. POURBEIK, EPRI
        B. CUMMINGS, NERC

The panel session is intended to discuss newly approved NERC Reliability Standards related to model validation. The primary focus of this panel is to discuss MOD-033-1 (Steady-state and Dynamic System Model Validation), which relates to system-wide model validation. The August 14, 2003 Blackout Report Recommendation 14 states: The after-the-fact models developed to simulate August 14th conditions and events indicate that dynamic modeling assumptions, including generator and load power factors, used in planning and operating models were inaccurate. Power flow and transient stability simulations should be periodically compared (benchmarked) with actual system events to validate model data.

With the approval of MOD-033-1, there is a great interest in learning how to perform such a system-wide model validation. This panel will invite companies performed such validation to share their experience in this area.

The panel will also discuss two related standards newly approved, MOD-026-1 (Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions) and MOD-027-1 (Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions). R&D entities and various utilities have done extensive work in this area.

In addition, the panel will include at least one presentation from international participants that have similar efforts on the way outside of North America.

PRESENTATIONS AND PANELISTS:

• 15PESGM2241, Introduction and Overview of NERC Standards on Modeling and Model Validation
  E. ALLEN, NERC
• 15PESGM2239, ERCOT Experience with Model Validation
  P. DU, ERCOT
• 15PESGM2242, Experience with Validation
  S. HSU, Southern Company
• 15PESGM2243, Vectren Experience with MOD 33
  L. ROGERS, Vectren
• 15PESGM2244, APS Experience with Model Validation
  B. AGRAWAL, APS
• 15PESGM2245, BPA Experience with MOD 33
  K. FRAUGHTON, BPA
• 15PESGM2246, BPA Experience with MOD 26/27
  S. YANG, BPA
• 15PESGM2240, R&D Work on Model Validation Tools and Techniques (Synchronous Generators, Wind and PV, SVC and STATCOM)
  P. POURBEIK, EPRI
PSDP Transactions Session – T9 (transactions paper)

Wednesday, 29 July, 8:00 AM–10:00 AM               Director’s Row H
Sponsored by:             Power System Dynamic Performance
Chairs:                         Z. MIAO, University of South Florida
                              R. OLIVEIRA, Federal Technological University of Parana

PAPERS AND AUTHORS:

  S. POURMOUSAVI, NEC-Labs America
  H. NEHRIR, Montana State University

•  15PESGM0509, Characterization of Gas Turbine Lean Blowout during Frequency Excursions in Power Networks  [Transaction Number: TPWRS.2014.2356336]
  L. MEEGAHAPOLA, RMIT University
  D. FLYNN, University College Dublin

•  15PESGM0551, MMC Capacitor Voltage Decoupling and Balancing Controls  [Transaction Number: TPWRD-01417-2013.R1]
  H. SAAD, Polytechnique Montreal
  X. GUILLAUD, Ecole Centrale de Lille
  J. MAHEREDJIAN, Polytechnique Montreal
  S. DENNETIERE, RTE
  S. NGUEFEU, RTE

•  15PESGM0559, Internal Model-Based Current Control of the RL Filter-Based Voltage-Sourced Converter  [Transaction Number: TEC-00149-2014]
  M. YAZDANIAN, Washington State University
  A. MEHRIZI-SANI, Washington State University

•  15PESGM0684, Impedance and Damping Characteristics of Grid-Connected VSCs with Power Synchronization Control Strategy  [Transaction Number: TPWRS-00240-2014/TPWRS.2014.2332179]
  K. ALAWASA, Mutah University
  Y. MOHAMED, University of Alberta

•  15PESGM2428, Impedance Model-Based SSR Analysis for TCSC Compensated Type-3 Wind Energy Delivery Systems  [Transaction Number: TSTE-00015-2014.R2]
  L. PIYASINGHE, University of South Florida
  Z. MIAO, University of South Florida
  J. KHAZAEI, University of South Florida
  L. FAN, University of South Florida

Experiences in Incorporating PMUs in Power System State Estimation (panel)

Wednesday, 29 July, 8:00 AM–10:00 AM               Governor’s Square 12
Sponsored by:             Power System Operations
Chairs:                         L. Mili, Virginia Tech
                              A. ABUR, Northeastern University

It has been more than two decades since PMUs were first introduced to power grids. However, their utilization for various network applications has been gradual. This panel considers one of the network applications, namely the state estimation and discusses the issues related to the incorporation of PMU measurements into state estimation. Presentations address a broad spectrum of topics ranging from PMU implementation issues and solutions to three-phase state estimation and international experiences in the US, Brazil and China. It is intended to initiate further discussion and work towards resolution of outstanding problems as well as to disseminate recent results for the PES community.

PRESENTATIONS AND PANELISTS:

•  15PESGM1498, Incorporating PMUs in Power System State Estimation for Smart Grid EMS
  B. ZHANG, Tsinghua University

•  15PESGM1499, Use of PMUs in WLS and LAV based State Estimation
  A. ABUR, Northeastern University

•  15PESGM1500, Enhancing Power State Estimation by Integrating PMU Measurement Buffer Length and Correlation
  Y. CHAKHCHOUKH, Tokyo Institute of Technology
Wednesday Morning, continued

- **15PESGM1501**, Experiences with PMU-based Three-Phase State Estimator at Dominion Virginia Power  
  K. JONES, Dominion Virginia Power
- **15PESGM1502**, PMU Implementation Issues  
  V. CENTENO, Virginia Tech
- **15PESGM1503**, Installation of PMU for Improving the Supervision of Interconnected Brazilian Transmission System  
  R. PIRES, Federal University of Itajuba

**Power System Operations Transactions Session – T13 (transactions paper)**

**Wednesday, 29 July, 8:00 AM–10:00 AM**

**Sponsored by:** Power System Operations

**Chair:** P. DU, ERCOT

**PAPERS AND AUTHORS:**

- **15PESGM0058**, Dynamic Reserve Zones for Day-Ahead Unit Commitment with Renewable Resources  
  [Transaction Number: 10.1109/TPWRS.2014.2328605]
  F. WANG, Arizona State University  
  K. HEDMAN, Arizona State University
- **15PESGM0114**, Tight and Compact MILP Formulation for the Thermal Unit Commitment Problem  
  [Transaction Number: TPWRS-00779-2012]
  G. MORALES-ESPAÑA, Delft University of Technology  
  J. LATORRE, Universidad Pontificia Comillas  
  A. RAMOS, Universidad Pontificia Comillas
- **15PESGM0215**, A Hybrid Stochastic/Interval Approach to Transmission-Constrained Unit Commitment  
  [Transaction Number: TPWRS-01212-2013]
  Y. DVORKIN, University of Washington  
  H. PANDZIC, University of Washington  
  M. ORTEGA-VAZQUEZ, University of Washington  
  D. KIRSCHEN, University of Washington
- **15PESGM2080**, Fault Current Management Using Inverter-Based Distributed Generators in Smart Grids  
  N. RAJAEI, University of Waterloo  
  M. AHMED, University of Waterloo  
  M. SALAMA, University of Waterloo  
  R. VARMA, University of Western Ontario
- **15PESGM2446**, Distributed Security-Constrained Unit Commitment for Large-Scale Power Systems  
  [Transaction Number: TPWRS-00251-2014]
  A. KARGARIAN, Mississippi State University  
  Y. FU, Mississippi State University  
  Z. LI, Illinois Institute of Technology
- **15PESGM2667**, Introducing a Novel DC Power Flow Method with Reactive Power Considerations  
  [Transaction Number: TPWRS-00255-2014]
  S. FATEMI, Texas Tech University  
  S. ABEDI, Texas Tech University  
  G. GHAREHPEITIAN, Amirkabir University of Technology  
  S. HOSSEINIAN, Amirkabir University of Technology  
  M. ABEDI, Amirkabir University of Technology
- **15PESGM2103**, An Isolated Industrial Power System Driven by Wind-Coal Power for Aluminum Productions: A Case Study of Frequency Control  
  [Transaction Number: TPWRS.2014.2322080]
  J. XI, Wuhan University  
  S. LIAO, Wuhan University  
  Y. SUN, Wuhan University  
  X. MA, Wuhan University  
  W. GAO, University of Denver  
  X. LI, China Power Investment Corporation  
  J. GU, CPI Mengdong Energy Group  
  J. DONG, CPI Mengdong Energy Group  
  M. ZHOU, Wuhan University
NewPSP 2015 Session on New Power System Planning Issues & Advancement in this Smart Grid Era (panel)

Wednesday, 29 July, 8:00 AM–12:00 PM               Plaza Court 4
Sponsored by:            Power System Planning and Implementation
Chair:                           ML CHAN, ML Consulting Group

Highlighted by a presentation on what China is planning and implementing in her Strong Smart Grid policy, we will launch into a panel session on the latest development and challenges in power system planning in this Smart Grid era, a continuation of the NewPSP series of panel sessions. This session addresses the newest power system planning issues that relate to regulations and policies (e.g., FERC Order 1000); technologies (e.g., Active Circuit Planning, FACTS, HVDC); system integration (e.g., EMS/SCADA, DMS/SCADA, AMI and business enterprise systems); integration of demand-side resources; problem modeling and solution techniques, and incorporation of flexibility into power system planning, especially when integrating renewable resources, DR, BEMS and DER. The presentations will cover the areas of energy supply, transmission system, distribution system, customer sectors, asset management, and energy/price forecasting, leading to ideas for formulating appropriate technical sessions for IEEE PES Conferences.

PRESENTATIONS AND PANELISTS:

- 15PESGM2518, New Power System Planning Issues & Advancement in this Smart Grid Era
  M. CHAN, ML Consulting Group
- 15PESGM2738, Strong Smart Grid in China
  Y. WANG, State Grid Corporation of China
  J. YAN, Southern California Edison
- 15PESGM2744, Transmission System Planning
  M. HENDERSON, ISO-New England
- 15PESGM2745, Modern & Future Distribution System Planning
  L. OCHOA, Manchester University
- 15PESGM2746, Integrated Intelligent Customer System Planning
  H. WELLER, Leidos
- 15PESGM2747, Energy Forecasting
  T. HONG, University of North Carolina at Charlotte
- 15PESGM2748, Assessment of Power System Flexibility
  E. LANNOYE, EPRI
- 15PESGM2749, Asset Management
  A. MCGRAIL, National Grid USA

Global Energy Forecasting Competition 2014: An Overview (panel)

Wednesday, 29 July, 8:00 AM–12:00 PM               Plaza Court 3
Sponsored by:            Power System Planning and Implementation
Chair:                           T. HONG, University of North Carolina at Charlotte

In today’s competitive and dynamic environment, more and more decision making processes in the power and energy industry are relying on probabilistic forecasts. The applications of probabilistic energy forecasts spread across planning and operations of the entire energy value chain. The Global Energy Forecasting Competition 2014 (GEFCom2014) brings together state-of-the-art techniques and methodologies for probabilistic energy forecasting. GEFCom2014 features four tracks: Probabilistic Electric Load Forecasting, Probabilistic Electricity Price Forecasting, Probabilistic Wind Power Forecasting and Probabilistic Solar Power Forecasting. This session includes the presentations from the organizers of GEFCom2014 to discuss the findings and insights.

PRESENTATIONS AND PANELISTS:

- 15PESGM2983, Probabilistic Electric Load Forecasting
  S. FAN, Monash University
- 15PESGM2984, Probabilistic Electricity Price Forecasting
  H. ZAREIPOUR, University of Calgary
- 15PESGM2987, Probabilistic Wind Power Forecasting
  P. PINSON, DTU, Denmark
- 15PESGM2989, Probabilistic Solar Power Forecasting
  A. TROCCOLI, CSIRO
- 15PESGM2985, GEFCom2014 Institute Prize – University of North Carolina at Charlotte
  T. HONG, University of North Carolina at Charlotte
- 15PESGM2986, GEFCom2014 Institute Prize – Tsinghua University
  C. KANG, Tsinghua
• 15PESGM2988, Probabilistic Load and Price Forecasting – Tololo
  R. NEDELLEC, EDF R&D
• 15PESGM2990, Probabilistic Price, Wind and Solar Forecasting – C3 Green Team
  Z. KOLTER, C3 Energy
• 15PESGM2991, Probabilistic Wind and Solar Forecasting – dmlab
  G. NAGY, Budapest University of Technology and Economics

Power System Relaying Transactions Session – T18 *(transactions paper)*

Wednesday, 29 July, 8:00 AM–10:00 AM               Vail
Sponsored by:             Power System Relaying
Chairs:                         S. BRAHMA, New Mexico State University
                               C. PAN, Wichita State University

PAPERS AND AUTHORS:

• 15PESGM0340, Optimal PMU Placement for Power System Dynamic State Estimation by Using Empirical Observability Gramian  *[Transaction Number: TPWRS-00384-2014]*
  J. QI, University of Tennessee, Knoxville
  K. SUN, University of Tennessee, Knoxville
  W. KANG, Naval Postgraduate School
• 15PESGM1988, Application of a Real-Time Data Compression and Adapted Protocol Technique for WAMS  *[Transaction Number: TPWRS-01368-2013]*
  F. ZHANG, Tsinghua University
  L. CHENG, Tsinghua University
  X. LI, Wuhan University
  Y. SUN, Tsinghua University
  W. GAO, University of Denver
  W. ZHAO, State Grid
• 15PESGM2169, Automated Verification of Power System Protection Schemes – Part I: Modelling and Specifications  *[Transaction Number: TPWRD-00992-2013.R2]*
  A. SENGUPTA, NIT Rourkela
  S. MUKHOPADHYAY, IIT Kharagpur
  A. SINHA, IIT Kharagpur
• 15PESGM2175, Automated Verification of Power System Protection Schemes – Part II: Test Case Generation Using Swarm Intelligence  *[Transaction Number: TPWRD-00993-2013.R2]*
  A. SENGUPTA, NIT Rourkela
  S. MUKHOPADHYAY, IIT Kharagpur
  A. SINHA, IIT Kharagpur
• 15PESGM2295, Con-Resistant Trust for Improved Reliability in a Smart Grid Special Protection System  *[Transaction Number: TPWRD-00377-2014]*
  C. SHIPMAN, Air Force Institute of Technology
  K. HOPKINSON, Air Force Institute of Technology
  J. LOPEZ, Air Force Institute of Technology
• 15PESGM0133, Multiattribute SCADA-Specific Intrusion Detection System for Power Networks  *[Transaction Number: TPWRD-01263-2012]*
  Y. YANG, Jiangsu Electric Power Company Research Institute
  K. MCLAUGHLIN, Queen’s University Belfast
  T. LITTLE, Queen’s University Belfast
  E. GYU IM, Hanyang University
  B. PRANGGONO, Glasgow Caledonian University
  H. WANG, North China Electric Power University
• 15PESGM1581, Break Point Diagnosis of Grounding Grids Using Transient Electromagnetic Apparent Resistivity Imaging  *[Transaction Number: TPWRD-01007-2014.R1]*
  C. YU, Chongqing University
  Z. FU, Chongqing University
  X. HOU, Electric Power Research Institute of Chongqing
  H. TAI, University of Tulsa
  X. SU, Chongqing University
High-Performance Computing in Power Systems Planning  
Wednesday, 29 July, 8:00 AM–12:00 PM  
Governor’s Square 11  
Sponsored by:  (PSACE) Computer Analytical Methods  
Chairs:  B. PALMINTIER, NREL  
L. MIN, Lawrence Livermore National Lab

Power systems’ increasing reliance on variable generation and highly distributed technologies drives a need to capture richer, more computationally demanding simulation models during the planning process. High Performance Computing (HPC) and advanced computational science are used widely within the government and selected industry applications to solve important problems of high complexity, often providing orders of magnitude solution time improvements over desktop computer solutions. In power engineering, however, the application of HPC and advanced computational methods are in their infancy. This dedicated panel on “High Performance Computing in Power System Planning” will serve as a platform for the industry, academia and vendors to share their experience and practical implementation of HPC in transmission planning, distribution planning, and integrated T&D modeling and simulation, and to explore future trends of deploying HPC within power system planning.

PRESENTATIONS AND PANELISTS:

• 15PESGM2791, Application of HPC for Power Networks of the Future  
  I. KOCKAR, University of Strathclyde  
• 15PESGM2792, Integrated Transmission and Distribution Planning  
  J. FULLER, Pacific Northwest National Laboratory  
• 15PESGM2793, Next Generation of Transmission & Resource Planning Models at NYISO  
  H. CHAO, NYISO  
• 15PESGM2794, Scalable Coupled ICT and Power Grid Simulation  
  L. MIN, Lawrence Livermore National Lab  
• 15PESGM2795, The Integrated Grid Modeling System (IGMS) for Combined Transmission and Distribution Simulation  
  B. PALMINTIER, NREL  
• 15PESGM2796, The Evolution of Planning Software  
  D. VAN ZANDT, GE Energy  
• 15PESGM2797, TBD  
  R. PALENSKY, TU Delft  
• 15PESGM2798, TBD  
  T. GOMEZ, Universidad Pontificia Comillas

International Coordination of Distribution Planning  
Wednesday, 29 July, 8:00 AM–10:00 AM  
Governor’s Square 15  
Sponsored by:  (PSACE) Distribution System Analysis  
Chairs:  W. LUAN, China EPRI  
M. MCGRANAGHAN, EPRI

This panel session will focus on advancements in methods and tools to support distribution planning with participation of experts from around the world. Important issues include how to address better forecasting of future loads, new types of loads like electric vehicle charging, the impact of distributed generation and demand response, integrating new technologies like microgrids, and tools that support both distribution planning and real time operations. Topics will include:

• Objectives and Approaches for Distribution Planning  
• Forecasting including New Loads, Distributed Generation, Energy Storage, Demand Response  
• Role of Automation and Advanced Metering in Achieving Reliability and Efficiency Goals  
• New Approaches for Modeling and Simulation to Support both Planning and Operations

PRESENTATIONS AND PANELISTS:

• 15PESGM2847, Toward a Smarter Distribution Network  
  W. LUAN, China EPRI  
• 15PESGM2846, Open Source Modeling Platform to Facilitate Worldwide Coordination on Distribution Planning Model Development  
  R. DUGAN, EPRI  
• 15PESGM2848, Distribution Automation – C BC Hydro Approach for Reliability Improvement  
  A. HUSSAIN, BC Hydro  
• 15PESGM2849, Distribution Planning Challenges and Priorities in Brazil  
  N. KAGAN, University of Sao Paulo  
• 15PESGM2850, Advanced Approaches for Distribution Planning and Operations to Integrate Distributed Resources  
  A. KEANE, University College Dublin
Role of DERMS/DMS in Managing Distributed Energy Resources (DERs) (panel)

Wednesday, 29 July, 8:00 AM–10:00 AM               Plaza Court 1
Sponsored by:             Transmission and Distribution Committee
Chair:                           B. ULUSKI, Utility Integration Solutions

Distributed energy resources (distributed generation, energy storage, and controllable loads) will have significant impacts, both positive and negative, on distribution system operation. Negative impacts include voltage regulation difficulties, protection challenges, and potential for significant impact on electric utility revenues. Positive opportunities include demand reduction, reduction of greenhouse gas emissions from central generating facilities, participation in ancillary services markets, and reliability improvement during major outages through microgrid "island" operations. This proposed panel for the IEEE PES General Meeting in 2015 will explore these opportunities and challenges, with an emphasis on the role of Distribution Management System (DMS) in DER Management. Presentations include case studies from electric utilities, vendor views of the system requirements (DERMS) and system integration, and status of key standards that are being developed to support this need (e.g. IEEE PES 2030.7 - Distribution Resources Integration WG/Microgrid Controllers).

PRESENTATIONS AND PANELISTS:
• 15PESGM2023, IEEE SGIP 2.0 Update – Standards for Interfacing DMS with DERMS
  B. SEAL, Electric Power Research Institute
• 15PESGM2025, DMS Requirements for Interacting with Microgrid EMS
  J. REILLY, Verizon
• 15PESGM2024, Practical Experience in Using a DERMS for Management of Distributed Energy Resources
  S. CHERIAN, Spirae
• 15PESGM2022, Integrating Distributed Energy Resources (DER) into the Distribution Management System (DMS) – Duke Energy’s Direction and Approach
  M. MILLER, Duke Energy
• 15PESGM2021, Coordinated and Optimized Control of Distributed Generation Integration
  W. LUAN, China EPRI

Analysis of Subsynchronous Interactions in Systems with Renewable Generation Resources (panel)

Wednesday, 29 July, 8:00 AM–12:00 PM                Governor’s Square 10
Sponsored by:             Transmission and Distribution Committee
Chair:                           H. MA, Siemens

This panel will review means of assessing and analyzing possible subsynchronous interactions, caused either by series compensation or by control interactions with dynamic voltage control devices. Presentations will include system operators from systems that use series compensation, from consultants that analyze systems, and from equipment vendors of renewable generation equipment. It is planned to have 2 sub-sessions, one for system analysis and design and one for equipment analysis and design, as well as mitigation. The panel includes many foremost experts in analysis and design of equipment to operate in systems susceptible to SSI.

PRESENTATIONS AND PANELISTS:
• 15PESGM2726, Application of Full Converter Wind Turbines for SSI Concerns
  R. NELSON, SIEMENS
• 15PESGM2727, Assessment of SSI for Renewable Interconnections in CAISO
  S. ZHU, CAISO
  I. GREEN, CAISO
• 15PESGM2728, Analysis and Mitigation of Unstable Subsynchronous Oscillations for Renewable Generation Interconnections
  W. REN, GE
  R. PIWKO, GE
  B. ENGLISH, GE
• 15PESGM2729, Study Methods for SSCI: State-of-the-Art and the Way Forward
  A. ISAACS, Electranix
• 15PESGM2730, SSI Screening & Verification Analysis for PV and Wind Generation Interconnections
  R. NATH, Siemens-PTI
• 15PESGM2731, Experience in ERCOT with SSR/SSI – Guidelines for Analysis and Countermeasures
  J. ROSE, ERCOT
Power Systems Reliability and Planning  
**Wednesday, 29 July, 8:00 AM–12:00 PM  
Plaza Ballroom CF**

**Presentations and Panelists:**

- **15PESGM0082, A Reliability Assessment Approach for the Urban Energy System and Its Application in Energy Hub Planning**
  - X. Xu, Tianjin University
  - K. Hou, Tianjin University
  - H. Jia, Tianjin University
  - X. Yu, Tianjin University

- **15PESGM0571, Practical Experience in Assessing the Effects of Extreme Contingencies with Respect to Standards TPL-001-4 and CIP-014-1**
  - M. Papic, Idaho Power
  - O. Ciniglio, Idaho Power
  - M. Vaiman, VR Energy

- **15PESGM0885, Overview of Power System Reliability Assessment Considering Age Related Failure of Equipment**
  - S. Awadallah, University of Manchester
  - J. Milanovic, University of Manchester
  - Z. Wang, University of Manchester
  - P. Jarmen, National Grid Plc, UK

- **15PESGM0901, Unified Generating and Storing Capacity Reliability Evaluation in Nearly-Zero Energy Buildings**
  - P. Arboleya, University of Oviedo
  - E. Dominguez, National Polytechnic School (Ecuador)
  - F. Lorenzo, University of Oviedo (Spain)

- **15PESGM0906, Geographical Impacts of Natural Disaster on Power System Reliability**
  - J. Liu, Tsinghua University
  - N. Zhang, Tsinghua University
  - C. Kang, Tsinghua University
  - J. Bai, State Grid Energy Research Institute
  - L. Cheng, State Grid Energy Research Institute
  - J. Tan, State Grid Jiangsu Power Economic Research Institute
  - Z. Xie, State Grid Jiangsu Power Economic Research Institute
  - J. Huang, State Grid Jiangsu Power Economic Research Institute

- **15PESGM2283, Reliability Assessment of a Power System with High Penetration of Wind and Cascade Hydropower Plant Considering Wind Correlation**
  - Q. Dai, China Electric Power Research Institute
  - P. Zeng, China Electric Power Research Institute
  - Q. Zhou, China Electric Power Research Institute
  - F. Zhao, State Grid Jibei Electric Power Research Institute
  - B. Li, China Electric Power Research Institute

- **15PESGM2304, Simulation and Analysis of Cascading Failures on an NPCC Power System Test Bed**
  - W. Ju, University of Tennessee
  - J. QI, University of Tennessee
  - K. Sun, University of Tennessee

- **15PESGM0013, Contingency Analysis Using Node/Breaker Model for Operation Studies**
  - R. Ramathavan, Maxisys Inc.
  - B. Tuck, BPA

- **15PESGM0436, North American Transformer Outage Rates and Durations in Assessment of Transmission System Reliability and Availability**
  - S. Ekisheva, NERC
  - H. Gugel, NERC
• 15PESGM0439, North American AC Circuit Outage Rates and Durations in Assessment of Transmission System Reliability and Availability
  S. EKISHEVA, NERC
  H. GUGEL, NERC

• 15PESGM0598, A Contingency Selection Approach Considering Uncertainty Based on Interval Theory
  C. XU, Southeast University
  W. GU, Southeast University
  Z. LUO, Southeast University
  J. YAO, China Electric Power Research Institute
  S. YANG, China Electric Power Research Institute
  K. WANG, China Electric Power Research Institute

• 15PESGM0678, Wide-Area Monitoring of the North American Power Grid: An Integrated Portfolio of Real-Time Reliability Tools
  C. MARTINEZ, Advanced Systems Researchers, iNC.
  J. ETO, Lawrence Berkeley National Laboratory

• 15PESGM0799, A Framework of Advanced Outage Pre-Warning & Contingency Planning
  Q. ZHOU, Accenture
  J. ZHANG, Accenture
  M. LI, Accenture
  Z. YANG, Accenture
  J. AN, Accenture

• 15PESGM1370, Comprehensive Regional Transmission Planning – ERCOT Experience
  S. KANG, ERCOT
  J. BOYD, ERCOT
  X. YU, ERCOT
  G. GNANAM, ERCOT
  J. BILLO, ERCOT

• 15PESGM1377, Detrending Daily Natural Gas Consumption Series to Improve Short-Term Forecasts
  R. BROWN, Marquette University
  S. VITULLO, Marquette University
  G. CORLISS, Marquette University
  M. ADYA, Marquette University
  P. KAEPER, Marquette University
  R. POVINELLI, Marquette University

• 15PESGM1419, Node-Breaker Topology Representation of Con Edison's Stations for Planning Studies
  M. KOENIG, Con Edison
  S. SAGARELI, Con Edison
  M. VAIMAN, V&R Energy
  M. VAIMAN, V&R Energy

• 15PESGM1705, Power Schedule Planning and Operation Algorithm of the Local Virtual Power Plant based on μCHP-Devices
  T. HESS, TU Dresden
  P. SCHEGNER, TU Dresden

• 15PESGM2399, Impacts of the Changing Resource Mix on Essential Reliability Services in North America
  N. ABDEL-KARIM, North American Electric Reliability Corporation
  P. SHAH, North American Electric Reliability Corporation
  E. NETHERCUTT, North American Electric Reliability Corporation
  G. VELUMITYLM, North American Electric Reliability Corporation
  J. MOURA, North American Electric Reliability Corporation
  T. BURGESS, North American Electric Reliability Corporation

• 15PESGM2433, An Integrated Generation, Transmission and Natural Gas Grid Expansion Planning Approach for Large Scale Systems
  F. BARATI, IUST
  H. SEIFI, TMU
  A. NATEGH, TMU
  M. SEPAHIAN, PWUT
  M. SHAHIE-KHAH, Univ. Beira Interior
  J. CATALAO, Univ. Beira Interior

• 15PESGM2689, LODF-Based Transmission Solution Screening Method In Economic Transmission Planning
  R. BO, MISO
  C. WU, MISO
  J. YAN, MISO
  L. HECKER, MISO
  Z. ZHOU, MISO
Power System Dynamics (paper forum)

Wednesday, 29 July, 8:00 AM–12:00 PM  Plaza Ballroom BE

Sponsored by: IEEE Power & Energy Society
Chairs: K. SUN, University of Tennessee
  N. RAY CHAUDHURI, North Dakota State University

PAPERS AND AUTHORS:

- **15PESGM0248, Application of PSS4B Stabilizers in Suppressing Low Frequency Oscillations: A Case Study**
  L. JIA, North China Branch of State Grid Corporation of China
  X. GAO, North China Branch of State Grid Corporation of China
  Y. XU, North China Branch of State Grid Corporation of China
  H. XIE, North China Electric Power Research Institute Co., Ltd.
  T. WU, North China Electric Power Research Institute Co., Ltd.
  W. SU, North China Electric Power Research Institute Co., Ltd.
  J. ZHOU, Zhejiang University
  G. GAN, Zhejiang University
  H. XIN, Zhejiang University

- **15PESGM0438, Distinguishing Features of Natural and Forced Oscillations**
  R. XIE, Montana Tech
  D. TRUDNOWSKI, Montana Tech

- **15PESGM0516, PMU-based Real-Time Damping Control System Software and Hardware Architecture Synthesis and Evaluation**
  E. REBELLO, KTH Royal Institute of Technology
  L. VANFRETTI, KTH Royal Institute of Technology
  M. ALMAS, KTH Royal Institute of Technology

- **15PESGM0658, Design of Power Systems Stabilizers for Distributed Synchronous Generators Using Linear Matrix Inequality Solvers**
  M. CASTEROBA BENTO, University of Sao Paulo
  R. RAMOS, University of Sao Paulo
  M. FAVORETTO CASTOLDI, Technological Federal University of the Para

- **15PESGM0746, Researches on DC Modulation to Damp Low Frequency Oscillation in China Southern Power Grid**
  H. CHEN, China Southern Power Grid Co.,Ltd.
  H. HUANG, China Southern Power Grid Co.,Ltd.
  Y. ZHANG, China Southern Power Grid Co.,Ltd.
  Y. SU, China Southern Power Grid Co.,Ltd.

- **15PESGM0933, Subsynchronous Oscillation Detection using Phasor Measurements and Synchrosqueezing Transform**
  M. HE, Texas Tech University
  S. NIMMAGADDA, Texas Tech University
  S. BAYNE, Texas Tech University
  M. GIESSELMANN, Texas Tech University

- **15PESGM0952, Transient Stability Assessment of Power Systems through Wide-Area Monitoring System**
  M. RAHMATIAN, University of British Columbia
  W. DUNFORD, University of British Columbia
  A. PALIZBAN, Powerex
  A. MOSHREF, BBA Inc.

- **15PESGM1279, RT-HIL Testing of an Excitation Control System for Oscillation Damping using External Stabilizing Signals**
  M. ALMAS, KTH Royal Institute of Technology
  L. VANFRETTI, KTH Royal Institute of Technology

- **15PESGM1547, RMS-Energy Filter Design for Real-Time Oscillation Detection**
  M. DONNELLY, Montana Tech
  D. TRUDNOWSKI, Montana Tech
  J. COLWELL, Montana Tech
  J. PIERRE, University of Wyoming
  L. DOSIEK, Union College

- **15PESGM1708, Voronoi Diagram Based Optimization of Dynamic Reactive Power Sources**
  W. HUANG, University of Tennessee
  K. SUN, University of Tennessee
  J. QI, University of Tennessee
  Y. XU, Oak Ridge National Laboratory
Wednesday Morning, continued

- 15PESGM1711, Optimal Operation of Distribution Networks with Synchronous Generators Via Transient Stability Constrained Optimal Power Flow
  K. FUCHS, Federal University of Parana (UFPR)
  R. KUIAVA, Federal University of Parana (UFPR)
  T. FERNANDES, Federal University of Parana (UFPR)

- 15PESGM2009, RT-SIL Performance Analysis of Synchrophasor-and-Active Load-Based Power System Damping Controllers
  G. JONSDOTTIR, KTH Royal Institute of Technology
  M. ALMAS, KTH Royal Institute of Technology
  M. BAUDETTE, KTH Royal Institute of Technology
  M. PALSSON, Landsnet
  L. VANFRETTI, KTH Royal Institute of Technology

  J. HE, Beijing Jiaotong University
  Z. LI, Beijing Jiaotong University
  X. WANG, Beijing Jiaotong University
  T. YIP, Beijing Jiaotong University

- 15PESGM2176, Binding CIM and Modelica for Consistent Power System Dynamic Model Exchange and Simulation
  F. GOMEZ, KTH Royal Institute of Technology
  L. VANFRETTI, KTH Royal Institute of Technology
  S. OLSEN, Statnett SF

- 15PESGM2421, Transient Stabilization of Power Grids Using Passivity-Based Control with Flywheel Energy Storage Systems
  K. BACHOVCHIN, Carnegie Mellon University
  M. ILIC, Carnegie Mellon University

- 15PESGM2182, Analysis of Sustainable Public Transportation System and Its Interaction with the Grid
  M. NAIK, IIT
  P. KUMAR, I.I.T-Guwahati
  S. MAJHI, I.I.T-Guwahati

**Distribution System (tutorial)**

**Wednesday, 29 July, 8:00 AM–5:00 PM**  
**Gold**

**Sponsored by:** IEEE Power & Energy Society

**Prerequisite for this course is Power System Basics or a familiarity with basic formulas and power system equipment.**

The focus of this course is to provide attendees with an overview of the issues associated with the planning, engineering, design, operation, and automation of electrical distribution systems. Types of distribution systems and network circuits, as well as engineering issues related to distribution systems will be explored. New concepts in the design, challenges, and operation of smart grid will be addressed. This course is intended for those who are not familiar with the delivery of electricity to the end user. Topics covered in the course include an introduction to the types of distribution systems, issues associated with distribution planning such as outages and reliability, distribution engineering considerations relating to radial and secondary networks, and distribution automation. The course also provides an overview of electrical distribution operations, including the roles of utility personnel, construction and maintenance considerations, and trends in the industry. Smart grid and its impact on the distribution system will be explored.

**Understanding Cascading Phenomenon: Methodologies and Industry Practice for Analysis of Cascading Failures (tutorial)**

**Wednesday, 29 July, 8:00 AM–5:00 PM**  
**Silver**

**Sponsored by:** IEEE Power & Energy Society

**INSTRUCTORS:**

M. VAIMAN, V&R Energy
B. CUMMINGS, NERC
I. DOBSON, Iowa State University
M. FORTE, Con Edison of New York
P. HINES, University of Vermont
M. KEZUNOVIC, Texas A&M University
Cascading failures present severe threats to power grid reliability and security, and thus reducing their likelihood, and timely detection, mitigation and prevention of cascades are of significant importance, and believed to be one of the greatest challenges in power grids today. This tutorial developed by the IEEE Cascading Failure Working Group provides an overview of the cascading phenomenon and explains methods, technologies, and tools that are currently being used to predict, detect, mitigate and restore from cascading failures. This is the first PES GM tutorial dedicated solely to the subject of cascading outages.

This full day tutorial covers the power system cascading concepts, models, relevant standards and existing industry practices for analysis of cascading failures in planning and operating environments. Close attention is given to the new technologies, such as synchrophasor technology, for better detection and mitigation of cascading outages. The tutorial also explains the root causes and mechanisms of propagation of the past blackouts, and discusses the lessons learned. The tutorial, taught by well recognized experts from industry and academia, is intended for power system engineers, regulators, transmission owners, power engineering students and academics. Topics include:

- Overview of Cascading Outages Phenomenon
- Framework for Analysis of Cascading Outages
- Current Tools and Emerging Technologies for Prediction and Detection of Cascading Outages
- Current Tools and Emerging Technologies for Prevention and Mitigation of Cascading Outages
- Industry Experience in the Analysis of Cascading Outages
- Restoration from Cascading Failures
- Analysis of Past Blackouts Caused by Cascading Outages: Lessons Learned

Distribution Volt-var Control and Optimization (tutorial)

Wednesday, 29 July, 8:00 AM–5:00 PM  
Spruce
Sponsored by: IEEE Power & Energy Society

INSTRUCTORS:
- M. V.V.S. YALLA, Beckwith Electric Co Inc.
- B. ULLUSKI, Utility Integration Solutions
- M. SIMMS, Duke Energy
- V. DABIC, B.C. Hydro
- L. CONRAD, Conrad Technical Services
- M. BARAN, North Carolina State University
- B. STEPHENS, Georgia Power
- P. POWELL, Dominion Voltage Inc.
- B. MILOSEVIC, GE Energy

The concept of Volt-var control is essential to electric power companies’ ability to deliver power within appropriate voltage limits (regulated by Public Utility Commissions) so that consumers’ equipment operates properly, and to deliver power at an optimal power factor to minimize distribution losses. The relationship between voltage and vars vary depending on the type of load (constant power, constant current, constant impedance), and the type, size, and location of distributed energy resources (photovoltaic, distributed wind, various storage technologies, etc.) among others. The complexity and dynamic nature of these characteristics make the task of managing electrical distribution networks challenging.

The smart grid concept has dramatically changed the design and operation of modern Volt-var control systems. The objectives for Volt-var Control have expanded considerably beyond simply maintaining acceptable voltage and power factor. “Volt-var Control” has become “Volt-var Optimization,” which has the expanded objectives to increase overall efficiency, reduce electrical demand using conservation voltage reduction (CVR), promote energy conservation, and improve power quality.

Volt-var Optimization (VVO) systems must accommodate distributed energy resources (DERs), and must respond automatically when the status or output level of DERs changes. In addition, VVO systems must operate effectively following feeder reconfiguration, which will happen more frequently in a smart distribution grid due to optimal network reconfiguration, automatic service restoration, and other applications involving “smart” switching.

This tutorial will cover Volt-var control basic principles, terms and definitions, approaches, issues and challenges, and results observed. This course also presents case studies from GA power, BC Hydro and
Duke Energy. This course will benefit engineers in operations, planning, smart grid, SCADA groups. It will be especially useful for utilities who are contemplating implementing Volt-var Optimization. Topics include:

- Introduction and Basics
- Volt-var Control Technologies and Tradeoffs
- Volt-var Control Coordination – Potential Issues and Solutions
- Volt-var Optimization (VVO)/Conservation Voltage Reduction (CVR) Techniques
- Impact of High Penetration of Distributed Generation (DG) on the Volt Var Control
- Verification, Assessment and Monitoring Requirements for CVR
- Cost – Benefit Analysis of VVO
- Implementation of Volt-var Control – Case Studies from Utilities

**Smart Village Information Session 4 (information session)**

**Wednesday, 29 July, 8:00 AM–12:00 PM**

**Director's Row J**

**Sponsored by:** IEEE Smart Village

**Chair:** R. LARSEN, SLAC National Accelerator Laboratory

**8:00 AM–8:30 AM**

**IEEE Smart Village – Partnership Development**

**Co-Chairs:** P. DAUENHAUER, Strathclyde University

8:30 AM–9:00 AM

**Presentation:** Requirements for Forging Partner Relationships

**SPEAKER:** R. LARSEN, SLAC National Accelerator Laboratory

- In the near future, IEEE SV aims to enable a number of strong partners to provide sustainable energy access for a significant portion of today's underserved.
- The development of successful partner relationships will pace Smart Village progress in future.
- Basic ideals and principles are discussed along with major practical issues to be solved.

9:00 AM–9:45 AM

**Presentation:** Reporting Requirements for Smart Village Entrepreneurs

**SPEAKERS:**

P. DAUENHAUER, University of Strathclyde
M. WILSON, IEEE Smart Village

9:45 AM–11:00 AM

**Panel:** Operating Issues for Smart Village Entrepreneurs

**PANELISTS:**

M. WILSON, IEEE Smart Village
M. SICKLES, Purros Namibia Project
R. MOULTON, Village Help for South Sudan
D. VILSACK, Posner Center for International Development
R. KELLER, Malawi Solar Light Project

Panelists will address:

- Surveys Prior to Launch
- Recruiting Local Smart Village Workforce
- Achieving Impact and Scaling
- Use of Tools for Inventory Control
- Financial Controls
- Reporting Requirements
- Options for Financing Growth
- Importance of Storytelling
- Technical Support Issues

11:00 AM–12:00 PM

IEEE Smart Village – New Initiatives Committee Meeting Wednesday
New Advanced Distribution System Architectures and Control for Distributed Generation and Storage Management (panel)

Wednesday, 29 July, 8:00 AM–12:00 PM                Plaza Court 7
Sponsored by:             Local Organizing Committee Committee and Energy Development and Power Generation Committee and Emerging Technologies Coordinating Committee
Chair:                           M. BAGGU, NREL

New advanced distribution system architectures and controls are of primary focus to the research communities in the era of high penetration of Distributed Energy Resources (DER). To address this need the panel intends to present the latest technical developments in the broad spectrum of distributed generation and storage management. The panel includes all aspects of distributed generation, storage, and interconnection technologies as well as electric power system simulation studies as applied to real-world electric distribution system. Panelists in this panel focus specifically on one of the following topics:

• Value Addition through Management Systems like Distribution Management System (DMS), Distributed Energy Resource Management System (DERMS), Microgrid Management System (MGMS), etc.
• Software Simulation Models and Methods to Evaluate the Distribution Grid with High Penetration of DER
• Role of Storage in Control and Management of Distribution Systems
• Market Models and Disruptive Market Shifts Leading to New Services at the Distribution Level

PRESENTATIONS AND PANELISTS:
• 15PESGM2906, Smart Grid Demonstration Considering High Penetration of Renewable Energy
  S. MAROZUMI, New Energy and Industrial Development Organization (NEDO)
• 15PESGM2905, Dynamic Distribution System, A New Architecture for the Integrated Grid
  B. BEIHOFF, Midwest Energy Research Consortium
• 15PESGM2900, Prosumer-Based Decentralized Cyber-Control for Sustainable Electricity Systems
  S. GRIJALVA, Georgia Tech
• 15PESGM2904, Analysis of Hydropower Flexibility during Wind Energy Curtailments: The Spanish Case
  E. GOMEZ-LAZARO, Universidad de Castilla-La Mancha
• 15PESGM2902, Optimizing Distributed Energy Resource Value through Economies of Scope Opportunities
  H. ROSENTRATER, Avista Utilities
• 15PESGM3064, Integrating DER in DMS – Part 1: Duke Energy’s Business Drivers
  L. PONDER, Duke Energy
• 15PESGM2899, Integrating DER in DMS – Part 2: Alstom Grid’s Technical Approach
  J. GANTZ, Alstom Grid
• 15PESGM2903, Active Microgrid Management: Fossil Fuel Reduction and Reliability Enhancement
  H. KLEY, Spirae LLC

Impact of Renewable Energy Integration on Voltage Control Design (panel)

Wednesday, 29 July, 9:00 AM–1:30 PM                  Governor’s Square 16
Sponsored by:             Power System Dynamic Performance Committee
Chairs:                         Q. GUO, Tsinghua University
                                  V. AJJARAPU, Iowa State University

Renewable generators were something integrated into a power grid without sufficient voltage support or control. This problem is accentuated by the fact that wind farms are mostly connected into the subtransmission network (115 kV or 230 kV), and by many wind farms operating nearby without proper coordination. Thus at times when the wind is highly variable, system voltage will experience significant fluctuation to the point of wind curtailment. On the other hand, with more and more distributed energy resources integrated into the distribution grid, conventional load models and voltage stability analysis methods will also be challenged, which is an emerging problem for the future grid. This panel will discuss voltage control schemes and voltage stability analysis methods for power system operation with renewable integration on both transmission side and distribution side.

PRESENTATIONS AND PANELISTS:
• 15PESGM0665, Mechanism of Grid Voltage Dynamics and Multiple Time-Scale Voltage Stability Problem in Wind Integration
  X. YUAN, Huazhong University of Science and Technology
• 15PESGM0663, Coordinated Voltage Control for Distribution Networks with Distributed Energy Resources
  Q. WU, Technical University of Denmark
• 15PESGM0671, ERCOT Operation Analysis
  S. SHARMA, ERCOT
• 15PESGM0666, An Isolated Industrial Power System Driven by Wind-Coal Power for Aluminum Production: A Case Study of Frequency Control by Regulating Voltage
  J. XU, Wuhan University
• 15PESGM0667, A Multi-Objective Automatic Voltage Optimization Dispatch of Wind and Other Energy Sources with Grid Security Constraints
  H. LI, Jiangsu Electric Power Company
• 15PESGM0664, Hierarchical Automatic Voltage Control for Integration of Large-Scale Wind Power: Design and Implementation
  Q. GUO, Tsinghua University
• 15PESGM0669, A Systematic Approach for Calculating/Validating Wind Plant Droop Settings for Voltage Control Coordination
  R. KONOPINSKI, GE Energy Management
• 15PESGM1594, Sub-Synchronous Oscillations in Wind Power Integration System: Simulation and Case Study
  Y. LI, North China Electric Power Research Institute Co., Ltd
  H. LIU, North China Electric Power Research Institute Co., Ltd
  X. XIE, Tsinghua University
  S. LIU, Zhangjiakou Wind, Photovoltaic and Energy Storage Demonstration Station Co., Ltd
• 15PESGM0670, Advanced Voltage Control: A Case Study
  R. ENTRIKEN, EPRI

Hydroelectric Power Plant Unit Control Modernization Schemes (panel)

Wednesday, 29 July, 10:00 AM–12:00 PM  Plaza Court 1
Sponsored by: Energy Development and Power Generation Committee
Chair: E. VAUGHN, Bureau of Reclamation Technical Service Center

Presentation by utilities, consultants, and manufacturers on the unit control modernization schemes they have utilized in recent years. These schemes range from hardwired logic (relay controls) to PLC/computer controls. The advantages and disadvantages of the different schemes will be explored. The panel members will also discuss interface issues when upgrading to digital excitation and speed governor systems with legacy controls. Balance of plant control schemes, such as distributed I/O or centralized I/O will also be explored from the standpoint of flexibility, reduced construction interface costs, trending, and digital communication. Digital options requirements such as training, complexity, and cyber security will also be addressed.

PRESENTATIONS AND PANELISTS:
• 15PESGM2841, Utility Asset Management Concerns and Regulatory Issues
  D. BROWN, Pacific Gas and Electric
• 15PESGM2842, Standardized Approach to Controls Modernization to Minimize Spares, Learning Curves, and Support Requirements
  J. YALE, Chelan County PUD
• 15PESGM2843, Going Digital: A Managed Approach to Equipment Lifecycles, Cyber Security, and Interfacing with Legacy Equipment
  J. VOLK, Seguity Consulting
• 15PESGM2844, Control System Configurations: Migration from Hardwired RTU to Networked Communication, How Much data Do You Need?
  B. BENSON, Black and Veatch
• 15PESGM2845, BC Hydro’s Experience with Unit Control Upgrades
  D. APPS, BC Hydro (Utility)

PEEC/Transformer/IGC Transaction Paper Session – T22 (transactions paper)

Wednesday, 29 July, 10:00 AM–12:00 PM  Plaza Court 8
Sponsored by: Power & Energy Education Committee and Intelligent Grid Coordinating Committee and Transformers Committee
Chairs: S. BRAHMA, New Mexico State University
        B. WOJSZCZYK, Decision Point Global

PAPERS AND AUTHORS:
• 15PESGM0309, Hands-On Laboratory Course for Future Power System Experts [Transaction Number: 06704850]
  I. KUZLE, University of Zagreb
  J. HAVELKA, University of Zagreb
  H. PANDZIC, University of Zagreb
  T. CAPUDER, University of Zagreb
PSDP Transactions Paper Session – T10  (transactions paper)

Wednesday, 29 July, 10:00 AM–12:00 PM      Director's Row H
Sponsored by:                                  Power System Dynamic Performance
Columns:                                 B. CHAUDHURI, Imperial College London
                                        D. DOTTA, IFSC

PAPERS AND AUTHORS:

- **15PESGM0180**, Consensus-Based Droop Control Synthesis for Multiple DICs in Isolated
  Micro-Grids  [Transaction Number: TPWRS-01186-2013]
  L. LU, National Tsing Hua University
  C. CHU, National Tsing Hua University

- **15PESGM0619**, A Teaching Tool for Phasor Measurement Estimation  [Transaction Number:
  10.1109/TPWRS.2014.2311102]
  D. DOTTA, IFSC

- **15PESGM0788**, An Aggregate Model of Plug-In Electric Vehicles for Primary Frequency Control
  [Transaction Number: TPWRS-00250-2014]
  S. IZADKHAST, Smart and Green Networks Research Group
  P. GARCIA-GONZALEZ, Institute for Research in Technology
  P. FRÍAS, Institute for Research in Technology

- **15PESGM0807**, Novel Coordinated Voltage Control for Hybrid Micro-Grid with Islanding Capability
  [Transaction Number: TSG-00512-2014]
  K. ALOBEIDLI, Masdar Institute of Science and Technology
  M. SYED, University of Strathclyde
  M. EL MOURSI, Masdar Institute of Science and Technology
  H. ZEINELDIN, Masdar Institute of Science and Technology
  H. ZEINELDIN, Masdar Institute of Science and Technology
Need for Policy Level Changes to Encourage Participation in Reactive Power Market, Reactive Power Investment and Reactive Power Control (panel)

Wednesday, 29 July, 10:00 AM–12:00 PM  Governor’s Square 12

Sponsored by:  Power System Operations
Chair:  V. R. VINNAKOTA, California ISO

Reactive power reserves are needed for healthy voltage levels and to guard against certain grid catastrophes. Reactive power can’t be transferred over long distances and is primarily a local problem. Investment in reactive power resources does not attract large scale participation in today’s free markets. This panel is intended to articulate upon impact of renewable energy resources on reactive power control and grid reliability, need for better market strategies and control strategies of reactive power and factors which influence investment in reactive resources for plausible policy or strategic direction changes towards a reliable grid while improving delivery of quality power.

PRESENTATIONS AND PANELISTS:

- 15PESGM2585, Reactive Power Control, Integration of Wind Generation to Grid, Plausible Solutions for Supporting Quality Power and Reliable Grid in Free Markets  
  D. OBADINA, ERCOT
- 15PESGM2584, Nature and Significance of Reactive Power, Reserves, Potential Problems of Inadequate Reserves, Plausible Solution Directions  
  V. AJJARAPU, Iowa State University
- 15PESGM2586, Reactive Power for Grid Operation in the Transforming Utility Business  
  D. SUN, Alstom
- 15PESGM2583, Voltage and Reactive Power Control – Need for Greater Attention for a Reliable Grid in Free Markets  
  M. ILIC, Carnegie Mellon University
- 15PESGM2587, Reactive Power Grid Control and Coordination with Electricity Markets  
  S. RAJAGOPAL, Siemens
- 15PESGM2588, Optimized Reactive Power Controls to Support the Requirements for Free Markets  
  H. PINTO, NEXANT
- 15PESGM2589, Reactive Power Control Strategies and Policies in Free Markets  
  D. SUBAKTI, California ISO
- 15PESGM2582, Coordinated Automatic Voltage Control to Support Large Scale Wind Power Integration: Field Site Experience in China  
  H. SUN, Tsinghua University

Power System Operations Transactions Session – T14 (transactions paper)

Wednesday, 29 July, 10:00 AM–12:00 PM  Windows

Sponsored by:  Power System Operations
Chair:  P. DU, ERCOT

PAPERS AND AUTHORS:

  A. MOAWWAD, Masdar Institute, iEnergy Center
  M. EL MOURSI, Masdar Institute, iEnergy Center
  W. XIAO, Masdar Institute, iEnergy Center
The next generation electrical utilities will face increased challenges for reliable operation of electrical grid due to the high penetration of renewable generation resources. The variability and uncertainty associated with the high penetration of renewable resources in the grid will create challenges in computing the online accurate dynamic transfer limits for interfaces for increased power exchange. It is desirable to use the online computed dynamic transfer limits instead of offline calculated dynamic transfer limits for increased and reliable power transfer. The speakers of this panel will share their experiences of real time and look ahead dynamic transfer limits computation with contingencies and remedial protection schemes.
Modeling and Computer Simulation of Induction Machines for Transient Analysis (panel)

Wednesday, 29 July, 10:00 AM–12:00 PM Governor’s Square 15
Sponsored by: Transmission and Distribution Committee
Chair: S. FILIZADEH, University of Manitoba

Induction machines (both multi-phase and single-phase) represent major portions of the load in a power system. Analysis of the transient behavior of a power system will require suitable induction machine models. Various induction machine models may be deployed depending upon the scope of the study and the level of detail to be included. Apart from the varying model complexity, they are also interfaced differently with the models of the rest of the system. This panel session will present induction machines modeling and computer simulation techniques that are suitable for studies of transients from electromechanical to electromagnetic frequency ranges. Interfacing techniques for connection of models will also be presented.

PRESENTATIONS AND PANELISTS:
• 15PESGM2641, Interfacing Induction Machine Models in Transient Simulation Programs
  J. JATSKEVICH, University of British Columbia
• 15PESGM2639, Induction Motor Models for Transient Stability Simulations and Motor Starting Analysis
  J. FELTES, Siemens
• 15PESGM2642, Dynamic Induction Machine Modeling, Parameter Characterization and Applications from Low Frequency to High Frequency
  L. WANG, UBC – Okanagan
• 15PESGM2643, State of Induction Machine Models in RTDS Real-Time Digital Simulator
  A. DEHKORDI, RTDS Technologies
• 15PESGM2640, Induction Machine Modeling Using Extended-Frequency Dynamic Phasors
  S. FILIZADEH, University of Manitoba

Energy Storage and Stationary Battery Committee (ESSB) Town Hall (Town Hall)

Wednesday, 29 July, 10:00 AM–12:00 PM Terrace
Sponsored by: IEEE Power & Energy Society
Chairs: K. EDWARDS, BPA
M. P. SANDERS, Schweitzer Engineering Labs

The Stationary Battery Committee and the Distributed Generation and Energy Storage subcommittee will discuss the current proposal and a proposed scope for the combined ESSB technical committee.

LEADERS:
C. SEARLES
R. TRESSLER
K. STRUNZ

Attendees involved with energy storage equipment and solutions interested in helping to form appropriate standards are invited to attend.

Student Faculty Industry Luncheon (luncheon)

Wednesday, 29 July, 11:45 AM–1:30 PM Grand Ballroom

Wednesday Afternoon

DC in an AC World (super session – panel)

Wednesday, 29 July, 1:00 PM-5:00 PM Majestic Ballroom
Sponsored by: IEEE Power & Energy Society
Chair: S. PULLINS, Green Energy Corp

PRESENTATIONS AND PANELISTS:
IEEE DC@Home Initiative
D. HOUSEMAN, VP Innovation, Enernex
Emerge Alliance Mission and Work
P. SAVAGE, CEO Nextek Power and Emerge Alliance Board Member
Wednesday Afternoon, continued

HVDC Grids – The European Perspective
M. BASLER, Basler Electric, Chair, EDPG

Solid State Transformers and How They Will Converge DC and AC Power Systems
A. HUANG, NCSU

Coordinating Control of AC and DC Microgrids
R. SINGH, IEEE Fellow, White House Champion of Change for Solar Deployment, Professor, Clemson University
G. K. VENAYAGAMOORTHY, Duke Energy Distinguished Professor, Clemson University

DC Lessons from the Data Center Power World
L. DALSKE, National Data Center Solutions Sales, Schneider Electric (invited – discussing)

DC Technology Advancements & Innovation
B. WOJSZCZYK, CEO Decision Point Global

Emerging Technologies Transactions Session – T24  (transactions paper)

Wednesday, 29 July, 1:00 PM–3:00 PM                  Governor’s Square 11
Sponsored by:             Emerging Technologies Coordinating
Chairs:                         N. HADJSAID, Grenoble-INP
                                           N. ROSTAMKOLAI, Rose-Hulman Institute of Technology

PAPERS AND AUTHORS:

• 15PESGM0626, Qualification and Quantification of Reserves in Power Systems under High Wind Generation Penetration Considering Demand Response  [Transaction Number: TSTE-00070-2014.R2]
  N. PATERAKIS, University of Beira Interior
  O. ERDINC, Arel University, Istanbul
  A. BAKIRTZIS, Aristotle University of Thessaloniki
  J. CATALAO, University of Beira Interior

• 15PESGM0742, Adaptive Real Power Capping Method for Fair Overvoltage Regulation of Distribution Networks With High Penetration of PV Systems  [Transaction Number: TSG-00805-2013]
  S. ALYAMI, Wayne State University
  Y. WANG, Wayne State University
  C. WANG, Wayne State University
  J. ZHAO, University of New Haven
  B. ZHAO, State Grid Zhejiang Electric Power Corporation Research Institute

• 15PESGM1106, Maximum Power Point Tracking Strategy for Large-scale Wind Generation Systems Considering Wind Turbine Dynamics  [Transaction Number: 14-TIE-0532]
  C. HUANG, University of Tennessee
  F. LI, University of Tennessee
  Z. JIN, Western Digital

• 15PESGM1144, Real-Time Price Based Home Energy Management Scheduler  [Transaction Number: TPWRS-00656-2014]
  C. VIVEKANANTHAN, Queensland University of Technology
  Y. MISHRA, Queensland University of Technology
  F. LI, University of Tennessee

  D. SOMAYAJULA, Missouri University of Science and Technology
  M. CROW, Missouri University of Science and Technology

• 15PESGM1613, The Impact of Increased Penetration of Converter Control-Based Generators on Power System Modes of Oscillation  [Transaction Number: 10.1109/TPWRS.2014.2303293]
  J. QUINTERO, Universidad Autonoma de Occidente
  V. VITTAL, Arizona State University
  G. HEYDT, Arizona State University
  H. ZHANG, California ISO

• 15PESGM2431, Hourly Average Wind Speed Simulation Based on ARMA Model in Jeju Island, Korea  [Transaction Number: TSG-01185-2014]
  D. DO, Gyeongsang National University
  Y. LEE, Gyeongsang National University
  J. CHOI, Gyeongsang National University
Integrated Resource Planning Considering Gas and Water Constraints  (panel)

Wednesday, 29 July, 1:00 PM–5:00 PM  
Plaza Court 6

**Sponsored by:** Energy Development and Power Generation Committee

**Chairs:** S. LU, Pacific Northwest National Lab  
M. LUIKEN, Lambton College of Applied Arts and Technology

This panel will invite power grid planning experts from utilities, Independent System Operators and solution providers to discuss the challenges faced by the power industry to manage and plan the generation fleet with consideration of water availability, sufficiency of gas infrastructure, and gas supply curtailment because of cold snap. The green-house gas proposal released by EPA in June 2014 will likely result in power systems relying more on natural gas supply. Given that many generators have non-firm contracts with gas companies, gas curtailment could pose a very high risk on power system reliability. Southwestern and western US are facing droughts, which pose uncertainty of cooling water supply on thermal generators. Power grid planners need to think out of the silos and develop grid management and planning methodologies that consider interdependencies among sectors. This panel will present the industry’s vision on power grid management and planning.

**PRESENTATIONS AND PANELISTS:**

- **15PESGM2764**, Co-Optimization of Energy-Gas in Power System Planning and Operations  
  T. GUO, Energy Exemplar

- **15PESGM2765**, ERCOT Practice on Consideration of Fuel and Water Impacts on Resource Adequacy  
  P. WARNKEN, ERCOT

- **15PESGM2766**, Impact of Gas and Hydro Limitations on the California ISO Market  
  G. BAUTISTA ALDERE, CAISO

  G. SNIDER, Duke Energy

- **15PESGM2768**, Incorporating Gas System Constraints into Electric Resource Planning in the West  
  N. SCHLAG, Energy & Environmental Economics (E3)

- **15PESGM2769**, Modeling Framework for Coordinating Short-Term Operational and Long-Term Generation Planning Decisions  
  B. FENG, Power Costs, Inc. (PCI)

- **15PESGM2770**, Impact of Water Shortages on Electric System Capacity Expansion and Operations  
  J. RICE, Pacific Northwest National Laboratory

- **15PESGM2771**, Opportunities and Challenges at the Gas-Electricity Nexus: What Can We Learn from ISO-NE?  
  M. BABULA, ISO-NE

Experience on Smart Grid Applications in Asia & Australasia  (panel)

Wednesday, 29 July, 1:00 PM–5:00 PM  
Governor’s Square 15

**Sponsored by:** Energy Development and Power Generation Committee

**Chairs:** M. NEGNEVITSKY, University of Tasmania  
S. MUKHOPADHYAY, GTBIT, GGSIP University

It is now well established and accepted that smart grid is a modernized grid that uses analog or digital Information and Communications Technology to gather and act on information, such as information about behaviors of suppliers and consumers, in an automated fashion to improve efficiency, reliability, economics, and sustainability of the production of electricity. With the advancement in ICT, Power and Energy system consisting of segments of generation, transmission, distribution, operation, market, service provider, and customer has created vast opportunity for making the system highly efficient and smarter as a whole day by day. While a lot of works are being carried out elsewhere in this context, Electricity Industry in the Asian and Australasian countries too is not lagging behind. The present panel session, therefore, is aimed at providing a platform to Practicing Engineers and Researchers to present their experience of SG Applications in these countries based on equipment implemented.

**PRESENTATIONS AND PANELISTS:**

- **15PESGM3017**, Detecting Low Frequency Oscillations Through PMU-Based Measurements for Indian National Grid  
  S. MUKHOPADHYAY, GTBIT, GGSIP University

- **15PESGM3019**, Smart Grid Pilot Projects in India – Applications and Experiences  
  A. JAIN, Central Power Research Institute
Conflicting resource allocation and prioritization of funding often kills many important and innovative ideas of platform for research and learning facilities. This force EE faculty to seek beyond the comfort level in securing external support. Fortunately, many faculty members have great interactions with industry. When academia delivers beneficial program of activities for industry, mutual trust is built and industry sees good return of investment as a business value proposition. Industry also sees an early exposure of their products at performing academia for potential lobbying for tools at their employment sites they have been trained with. It is a medium term investment for industry but something they see as potentially creating champions at stakeholder locations.

There are some great examples of such university and industry collaboration (such as API, I/U CRC) that can be exemplars. Others can learn from their experience in diversification of sources of resources. Experience also points out that levels of these collaborations have direct correlation with success of sustainable power engineering programs.

PRESENTATIONS AND PANELISTS:

- 15PESGM1747, Centre for Smart Grid and Sustainable Power Systems: An Industry Inspired University Education and Research Activities in Australia
  S. ISLAM, Curtin University
- 15PESGM1748, Power Engineering Industry-Academia Engagements in New Zealand
  N. NAIR, University of Auckland
- 15PESGM1749, Large Scale Industry – University Centers in Electric Power Engineering
  G. HEYDT, ASU
- 15PESGM1750, Collaborative Research and Education in Southeastern US in Emerging Areas of Power Engineering
  B. CHOWDHURY, University of North Carolina at Charlotte
- 15PESGM1751, Education and Research Activities of Electrical Engineering in China’s University and Industry
  H. GENG, Tsinghua University
  Z. ZHENG, Tsinghua University
  G. YANG, Tsinghua University
- 15PESGM1752, Experience in University-Industry Education and Research Activities at the University of Illinois Urbana Champaign
  P. SAUER, University of Illinois, Urbana Champaign
- 15PESGM1753, Utility-Sponsored Center for Electric Energy at the University of Minnesota
  N. NED MOHAN, University of Minnesota
Cloud Computing for Power System Analysis and Operations (panel)

Wednesday, 29 July, 1:00 PM–3:00 PM
Governor's Square 14
Sponsored by: Power System Operations
L. MIN, Lawrence Livermore National Lab.

Cloud computing provides a new paradigm for easy access to larger scale computing resources over the Internet, thus offering an alternative solution to big data processing and heavy computational work. The technology is evolving fast with companies adapting to it. Industry experts believe that this trend will only continue to grow and develop even further in the coming few years. However the electricity industry is relatively conservative and has become one of the few industries where cloud computing has not yet been adopted, even though power system planning, operation and analysis have significant data volumes and are highly computationally intensive. This panel will serve as a platform for the industry, academia and vendors to share their experience and practical implementation of cloud computing in power system analysis and operations, to explore all the concerns including data security and privacy, real-time assurance, consistency and compliance audit.

PRESENTATIONS AND PANELISTS:
• 15PESGM1897, Cloud Based Open Source Power Applications
  R. PODMORE, Incremental Systems
• 15PESGM1898, Cloud Computing Potential for DMS: Security, SCADA, Software, Solutions
  J. KATZ, IBM
• 15PESGM1896, Cloud-Based and Parallel Multi-Stage Stochastic Optimization Applied to Hydrothermal Scheduling of Large Scale Power Systems
  L. BARROSO, PSR
• 15PESGM1899, Application of Cloud Computing at ISO New England – Experience and Challenges
  E. LITVINOV, ISO New England Inc.
• 15PESGM1900, Using Cloud Computing Services for Testing and Scaling GPU-Based Contingency Analysis
  A. WIGINGTON, Electric Power Research Institute
• 15PESGM1902, FRCC Experience in Cloud Based System Restoration and Emergency Drills
  R. CROES, Florida Reliability Coordinating Council
• 15PESGM1901, Security and Regulatory Challenges for Leveraging Cloud Computing in Power Systems
  E. LUZCANDO, New York ISO
• 15PESGM1903, A Secure and Cost Effective Platform to Host the Smart Bulk Transmission Network
  K. BIRMAN, Cornell University

Challenges of Renewable Integrations: Flexible Products and Long/Short-Term Market Design (panel)

Wednesday, 29 July, 1:00 PM–5:00 PM
Plaza Court 3
Sponsored by: Power System Planning and Implementation
Chair: J. YAN, Southern California Edison

This year's panel session will build upon the conclusions reached in the previous year's session. The following questions will be discussed to address the questions and challenges identified in the previous year's panel session.

A. How do we define, quantify and estimate the need for flexibility in the short and long term?
B. How the long-term capacity market (or equivalent non-market process) should be set up to incentivize appropriate grid-scale and distributed generation, energy storage, energy efficiency and demand response program investment that will lead to a flexible, sustainable, efficient and reliable power system?
C. How should the ISO day-ahead and real-time markets be redesigned and coordinated with long-term capacity market to send appropriate price signal to resources that provide additional flexibility to accommodate increased penetration of intermittent resources, minimize market power, and provide incentives for the flexible capacities that are needed to balance the grid and ensure the system reliability?
D. What role renewable resources could play in reducing the volatility in net load and needs for additional products that provide “flexibility” to the system operator?
Global Energy Forecasting Competition 2014: Finalist Presentations (panel)

Wednesday, 29 July, 1:00 PM–5:00 PM  Governor’s Square 17
Sponsored by:  Power System Planning and Implementation
Chair:  T. HONG, University of North Carolina at Charlotte

In today’s competitive and dynamic environment, more and more decision making processes in the power and energy industry are relying on probabilistic forecasts. The applications of probabilistic energy forecasts spread across planning and operations of the entire energy value chain. The Global Energy Forecasting Competition 2014 (GEFCom2014) brings together state-of-the-art techniques and methodologies for probabilistic energy forecasting. GEFCom2014 features four tracks: Probabilistic Electric Load Forecasting, Probabilistic Electricity Price Forecasting, Probabilistic Wind Power Forecasting and Probabilistic Solar Power Forecasting. This session includes the presentations from the winners of GEFCom2014.

Presentations and Panelists:
- 15PESGM2992, Probabilistic Electric Load Forecasting – Adada
  A. PIERROT, EDF R&D
- 15PESGM2993, Probabilistic Electric Load Forecasting – Jingrui (Rain) Xie
  J. XIE, University of North Carolina at Charlotte
- 15PESGM2994, Probabilistic Electric Load Forecasting – OxMath
  S. HABEN, University of Oxford
- 15PESGM2995, Probabilistic Electricity Price Forecasting – Team Poland
  J. NOWOTARSKI, Wroclaw University of Technology
- 15PESGM2996, Probabilistic Electricity Price Forecasting – Pat1
  F. LEMKE, Knowledge Miner
- 15PESGM2997, Probabilistic Wind Power Forecasting – kPower
  M. LANDRY, Eigen Analytics
- 15PESGM2998, Probabilistic Wind Power Forecasting – Yao Zhang
  Y. ZHANG, Xi’an Jiaotong University
- 15PESGM2999, Probabilistic Solar Power Forecasting – Gang-gang
  J. HUANG, CSIRO
- 15PESGM3000, Probabilistic Solar Power Forecasting – UT_Argonne
  D. LEE, University of Texas at Austin

Using Big Data to Enhance Transmission System Planning and Operations (panel)

Wednesday, 29 July, 1:00 PM–3:00 PM  Governor’s Square 12
Sponsored by:  (PSACE) Computer Analytical Methods
Chair:  J. WEN, Southern California Edison

The ever increasing renewable generation driven by the green initiatives, with their variable and intermittent nature, is posing ever greater challenges to the system planning and operations. It is imperative that utilities are able to establish a better system modeling and develop more effective analytical algorithms to mitigate these challenges. On the other hand, advanced telecommunications technology and
newly deployed intelligent electronic devices in the fields (e.g. transmission grid as well as substations) enable better visibility of the grid and collect significant amount of data regarding the system conditions. It is the best interest of the power industry and research institutions to develop solution tools that leverage the available data. This panel will bring utility experts, real world application developers, and academic researchers to discuss what and how power system data are available.

**PRESENTATIONS AND PANELISTS:**

- **15PESGM1629, Stop the Data Flood**  
  J. ANTHONY, SCE
- **15PESGM1571, Synchrophasor-Based Big Data Analytics for Grid Operations and Planning**  
  M. PARASHAR, Alstom
- **15PESGM1572, Predictive Analytics Derived from HVAC and PMU Data, Case Histories at UCSD**  
  C. WELLS, OSIsoft
- **15PESGM1569, Application of Synchrophasor Data to Power System Operations**  
  J. CHOW, Rensselaer Polytechnic Institute

**PSACE Transactions Paper Session – T3 (transactions paper)**

**Wednesday, 29 July, 1:00 PM-3:00 PM  
Director’s Row H**

**Sponsored by:** PSACE  
**Chairs:** D. WU, PNNL  
W. SUN, San Diego State University

**PAPERS AND AUTHORS:**

- **15PESGM0093, Acceleration of Umbrella Constraint Discovery in Generation Scheduling Problems**  
  [Transaction Number: TPWRS.2014.2352318]  
  A. JAHANBANI ARDAKANI, McGill University  
  F. BOUFFARD, McGill University
- **15PESGM0213, Modeling of LCC-HVDC Systems Using Dynamic Phasors**  
  [Transaction Number: 10.1109/TPWRD.2014.2308431]  
  M. DARYABAK, University of Manitoba  
  S. FILIZADEH, University of Manitoba  
  J. JATSKEVICH, University of British Columbia  
  A. DAVOUDI, University of Texas Arlington  
  M. SAEEDIFARD, Georgia Tech  
  V. SOOD, University of Ontario Institute of Technology  
  J. MARTINEZ, Universitat Politècnica de Catalunya  
  D. ALPRANTIS, Purdue University  
  J. CANO, Universidad de Oviedo  
  A. MEHRIZI-SANI, Washington State University
- **15PESGM0412, A Hybrid Dynamic Optimization Approach for Stability Constrained Optimal Power Flow**  
  [Transaction Number: 10.1109/TPWRS.2014.2306431]  
  G. GENG, Zhejiang University  
  V. AJJARAPU, Iowa State University  
  Q. JIANG, Zhejiang University
- **15PESGM1138, Exploring the Modeling Capacity of Two-Stage Robust Optimization: Variants of Robust Unit Commitment Model**  
  [Transaction Number: 10.1109/TPWRS.2014.2320880]  
  B. ZENG, University of South Florida  
  Y. AN, University of South Florida
- **15PESGM1315, Parallel Detrended Fluctuation Analysis for Fast Event Detection on Massive PMU Data**  
  [Transaction Number: 10.1109/TSG.2014.2340446]  
  M. KHAN, Brunel University London  
  P. ASHTON, Brunel University London  
  M. LI, Brunel University London  
  G. TAYLOR, Brunel University London  
  I. PISICA, Brunel University London  
  J. LIU, Sichuan University
- **15PESGM1681, Fast Sensitivity Analysis Approach to Assessing Congestion Induced Wind Curtailment**  
  [Transaction Number: TPWRS.2013.2282286]  
  Y. GU, GE Energy Management  
  L. XIE, Texas A&M University
- **15PESGM1787, Decentralized Optimal Dispatch of Photovoltaic Inverters in Residential Distribution Systems**  
  [Transaction Number: TEC2357997]  
  E. DALL’ANSE, National Renewable Energy Laboratory  
  S. DHOPLE, University of Minnesota  
  B. JOHNSON, National Renewable Energy Laboratory  
  G. GIANNAKIS, University of Minnesota
Volt/VAR Control in the Era of the Smart Grid (panel)

Wednesday, 29 July, 1:00 PM–3:00 PM Plaza Court 1
Sponsored by: Transmission and Distribution Committee
Chair: L. XU, Nexant

Traditional Volt/VAR control technologies have been used in the industry for over 30 years to maintain acceptable voltage of distribution feeders. With the smart grid initiatives and developments, Volt/VAR control technologies have gained renewed interest to improve energy efficiency, to achieve energy conservation, and to enable the wide adoption of distributed energy resources. The trend presents both challenges and opportunities to the industry. This panel draws together insights and experiences from government and utilities to present the current state of Volt/VAR control technology test, demonstration, and deployment.

PRESENTATIONS AND PANELISTS:
- **15PESGM0688, Major Findings from a DOE-Sponsored National Assessment of Conservation Voltage Reduction (CVR)**
  R. WILLOUGHBY, Applied Energy Group
- **15PESGM0687, Modeling Effectiveness of Advanced Voltage Control Technologies Model-Driven Assessment of Distributed Energy Resources**
  A. MAITRA, EPRI
- **15PESGM0686, Sharing SCE’s Experience with Distribution Volt/VAR Control – Irvine Smart Grid Demonstration Project**
  B. PHAM, Southern California Edison
- **15PESGM0685, Evaluation of Volt/VAR Control Schemes Using Hardware in the Loop Test-Bed**
  F. KATIRAEI, Quanta Technology

Transmission and Distribution Paper Session II – T16 (transactions paper)

Wednesday, 29 July, 1:00 PM–3:00 PM Plaza Court 5
Sponsored by: Transmission and Distribution Committee
Chairs: V. DINAVAHI, University of Alberta
        G. CHANG, National Chung Cheng University

PAPERS AND AUTHORS:
- **15PESGM0434, Aggregation and Amplification of Wind-Turbine Harmonic Emission in a Wind Park** [Transaction Number: TPWRD-00761-2013.R3]
  K. YANG, Lulea University of Technology
  M. BOLLEN, Lulea University of Technology
  A. LARSSON, Lulea University of Technology
- **15PESGM1367, A Method to Estimate the Impact of Harmonic and Unbalanced Currents on the Ampacity of Concentric Neutral Cables** [Transaction Number: TPWRD-01443-2013.R1]
  J. YONG, Chongqing University
  W. XU, University of Alberta
  M. HONG, Case Western Reserve University
  X. YU, Xi’an University of Technology
  N. YU, University of California Riverside
  K. LOPARO, Case Western Reserve University
- **15PESGM0003, Parallel Massive-Thread Electromagnetic Transient Simulation on GPU** [Transaction Number: TPWRD-00863-2012]
  Z. ZHOU, University of Alberta
  V. DINAVAHI, University of Alberta
Wind Turbine-Generator Performance on Weak Grids Part 2: Analytical Methods and Solutions for Weak Grid Interactions (panel)

Wednesday, 29 July, 1:00 PM-5:00 PM
Plaza Ballroom A

Sponsored by: Wind Power Coordinating Committee and Electric Machinery Committee
Chairs: R. PIWKO, GE Energy Consulting
I. ERLICH, University of Duisburg-Essen

As the penetration of wind power continues to grow worldwide, more and more wind plants are being connected to the power grid in locations where the ac system is “weak” relative to the MW rating of the wind plant.

This second part of a two-part panel will focus on:

- Analytical methods for assessing wind plant control stability and multi-plant interactions by consultants who have analyzed and developed solutions for weak system applications
- Technical solutions for improving wind turbine and wind plant control robustness in low SCR locations by manufacturers of WTGs and WTG controls
- Case studies and experience with wind plants in weak system locations by wind plant suppliers and/or wind plant owners and/or grid operators

PRESENTATIONS AND PANELISTS:

- 15PESGM0973, Stable Operation of Low Short-Circuit Grids with Advanced Control of Double-Fed Wind Turbine-Generators
  N. MILLER, GE Energy Consulting

- 15PESGM0974, Challenges to Control Stability of Frequency Converters for Wind Turbines in Weak Grids
  S. ENGELHARDT, Woodward GmbH

- 15PESGM0972, Design of Wind Turbine Controls to Optimize Performance in High Impedance Grids
  R. NELSON, SIEMENS

- 15PESGM0975, Comparison of Experiences with Wind Power Plants with Low SCR
  P. KJÆR, Vestas Technology R&D
  S. SAYLORS, Vestas

- 15PESGM0976, Experiences with Wind Power Plant Projects Connected to Weak Grids
  S. NIKOLAI, Enercon, GmbH, Research & Development

- 15PESGM0977, WTG Power Converter Performance on Weak AC Grids
  M. JANSSEN, GE Power Conversion
Electric Vehicles and Photovoltaics  (paper forum)
Wednesday, 29 July, 1:00 PM–5:00 PM   Plaza Ballroom BE
Sponsored by: IEEE Power & Energy Society
Chair: S. KHUSHALANI-SOLANKI, West Virginia University

PRESENTATIONS AND PANELISTS:
• 15PESGM0067, Performance of OLTC-Based Control Strategies for LV Networks with Photovoltaics
  C. LONG, University of Manchester
  A. PROCOPIOU, University of Manchester
  L. OCHOA, University of Manchester
  G. BRYSON, Electricity North West Ltd.
  D. RANDBLES, Electricity North West Ltd.
• 15PESGM0361, Online Clustering Modeling of Large-Scale Photovoltaic Power Plants
  Z. MA, Tsinghua University
  J. ZHENG, Tsinghua University
  X. WANG, Carleton University
  S. ZHU, Tsinghua University
  X. SHEN, Tsinghua University
  K. MEN, China Southern Power Grid Corp.
  L. WEI, Tsinghua University
• 15PESGM0460, Statistical Characterization of Electric Vehicle Charging in Different Locations of the Grid
  K. SUN, University of Washington
  M. SARKER, University of Washington
  M. ORTEGA-VAZQUEZ, University of Washington
• 15PESGM0925, Autonomous Grid Services through Electric Vehicles
  D. ASWANI, Sacramento Municipal Utility District
  B. BOYCE, Sacramento Municipal Utility District
• 15PESGM0943, Energy and Cost Minimization of Bidirectional Frequency Regulation Service by EV Following FERC Order 755
  M. NIKKHÄH MOJDEHI, Syracuse University
  P. GHOSH, Syracuse University
  M. FARDAD, Syracuse University
• 15PESGM1111, Communication Network Topology Analysis on Distributed Optimization Performance in PV-ES Combined System
  Z. WANG, University of Sydney
  L. ZHANG, University of Sydney
  G. CHEN, University of Sydney
  D. HILL, University of Hong Kong
• 15PESGM1208, AC Bus Distributed Bidirectional Contactless Charging Station
  E. JOY, Indian Institute of Technology Guwahati
  K. THIRUGNANAM, National Institute of Technology Sikkim
  P. KUMAR, Indian Institute of Technology Guwahati
• 15PESGM1260, Real-Time Scheduling of Electric Vehicles for Ancillary Services
  F. JUUL, Aalborg University
  M. NEGRETÉ-PINCETIC, Pontificia Universidad Catolica de Chile
  J. MACDONALD, Lawrence Berkeley National Lab
  D. CALLAWAY, University of California, Berkeley
• 15PESGM1560, Harmonic Characterization of Grid Connected PV Systems & Validation with Field Measurements
  A. CHIDURALA, University of Queensland
  T. SAHA, University of Queensland
  N. MITHULANANTHAN, University of Queensland
• 15PESGM1616, A Model for Residential Adoption of Photovoltaic Systems
  A. AGARWAL, Caltech
  D. CAI, Caltech
  S. SHAH, Southern California Edison
  M. CHANDY, Caltech
  R. SHERICK, Southern California Edison
• 15PESGM1762, System-Level Charging Control Strategy for Plug-In Electric Vehicles
  Y. TANG, University of Hong Kong
  J. ZHONG, University of Hong Kong
• 15PESGM1784, A Method to Identify Exposed Nodes in Low Voltage Distribution Grids with High PV Penetration
  M. ARMENDARIZ, KTH – Royal Institute of Technology
  D. BRODEN, KTH – Royal Institute of Technology
  N. HONETH, KTH – Royal Institute of Technology
  L. NORDSTRÖM, KTH – Royal Institute of Technology
• 15PESGM2003, A Trip-Purpose Based Model of Plug-In Electric Vehicle Charging Demand
  A. HILSHEY, Penn State University, Altoona
• 15PESGM2079, An Advanced Data Driven Model for Residential Electric Vehicle Charging Demand
  X. ZHANG, Georgia Institute of Technology
  S. GRIJALVA, Georgia Institute of Technology
• 15PESGM2275, Real-Time Energy Management Algorithm for PV-Assisted Charging Station Considering Demand Response
  Q. CHEN, North China Electric Power University
  N. LIU, North China Electric Power University
  Y. CUI, North China Electric Power University
  X. LIN, North China Electric Power University
  J. ZHANG, North China Electric Power University
• 15PESGM2412, Improving Distribution Network PV Hosting Capacity via Smart Inverter Reactive Power Support
  J. SEUSS, Georgia Institute of Technology
  M. RENO, Georgia Institute of Technology
  R. BRODERICK, Sandia National Laboratories
  S. GRIJALVA, Georgia Institute of Technology
• 15PESGM2545, Maximum PV Generation Estimation Tool for Residential Low Voltage Feeders: First-Stage
  S. HESLOP, University of NSW
• 15PESGM2546, Integration of PV Generation and Storage on Power Distribution Systems Using MPC
  V. ZAMANI, UC San Diego
  A. CORTES, UC San Diego
  J. KLEISSL, UC San Diego
  S. MARTINEZ, UC San Diego
• 15PESGM2653, Power Quality Enhancement of Grid Integrated Solar PV System Based on Adaptive Noise Reduction Control
  B. SINGH, Indian Institute of Technology, Delhi
  A. SINGHAL, Iowa State University
  C. JAIN, Indian Institute of Technology, Delhi
  S. GOEL, Indian Institute of Technology, Delhi
  A. GARG, Indian Institute of Technology, Delhi

Wind Power and Applications (paper forum)

Wednesday, 29 July, 1:00 PM–5:00 PM                  Plaza Ballroom CF
Sponsored by:             IEEE Power & Energy Society
Chair:                           F. MILANO, University College Dublin

PAPERS AND AUTHORS:

• 15PESGM0189, An Optimization Model for Combined Heat and Power Dispatch with Short-Term Forecasted Wind Power
  X. LIU, University of Arkansas at Little Rock
• 15PESGM0430, Setting the Loading Level of a Wind Power Plant in Power System Planning Stability Studies
  M. BORODULIN, New York Independent System Operator (NYISO)
• 15PESGM0485, Frequency Response and Its Enhancement Using Synchronous Condensers in Presence of High Wind Penetration
  N. MASOOD, University of Queensland
  R. YAN, University of Queensland
  T. SAHA, University of Queensland
  N. MODI, AEMO
• 15PESGM0775, A Robust Model Predictive Control Approach to Coordinating Wind and Storage for Joint Energy Balancing and Frequency Regulation Services
  A. THATTE, Texas A&M University
  L. XIE, Texas A&M University
• 15PESGM0871, What Do High Penetrations of Wind Power Mean for Gas Generation?
  J. DEVLIN, Queen's University Belfast
  K. LI, Queen’s University Belfast
  P. HIGGINS, Queen's University Belfast
  A. FOLEY, Queen’s University Belfast
Wednesday Afternoon, continued

- 15PESGM1084, Coordinated Design of Active and Reactive Power Modulation Auxiliary Loops of Wind Turbine Generators for Oscillation Damping in Power Systems
  D. RIMOROV, McGill University
  I. KAMWA, Hydro-Quebec Research Institute
  G. JOOS, McGill University

- 15PESGM1302, Review on Potential Strategies for Transmission Grid Operations Based on Power Electronics Interfaced Voltage Sources
  G. DENIS, L2EP
  T. PREVOST, RTE
  X. KESTELYN, L2EP
  P. PANCIATICI, RTE
  F. COLAS, L2EP
  X. GUILLAUD, L2EP

- 15PESGM1614, Voltage Stability of Large-Scale Wind Plants Integrated in Weak Networks: An ERCOT Case Study
  J. SCHMALL, ERCOT
  S. HUANG, ERCOT
  Y. LI, ERCOT
  J. BILLO, ERCOT
  J. CONTO, ERCOT

- 15PESGM1723, An Optimized Swinging Door Algorithm for Wind Power Ramp Event Detection
  M. CUI, National Renewable Energy Laboratory
  J. ZHANG, National Renewable Energy Laboratory
  A. FLORITA, National Renewable Energy Laboratory
  B. HODGE, National Renewable Energy Laboratory
  D. KE, Wuhan University
  Y. SUN, Wuhan University

- 15PESGM1990, Wind Power Forecasting at Transmission System Operator's Control Room
  J. MIETTINEN, VTT – Technical Research Centre of Finland
  H. HOLTINEN, VTT – Technical Research Centre of Finland
  J. ÄMMÄLÄ, Fingrid
  M. PIIRONEN, Fingrid

- 15PESGM2054, A Hidden Markov Model Representing the Spatial and Temporal Correlation of Multiple Wind Farms
  J. FANG, Aalborg University
  C. SU, Aalborg University
  W. HU, Aalborg University
  Z. CHEN, Aalborg University

- 15PESGM2136, Grid-Adaptive Limitation of Short Circuit Current Contribution from Wind Power Plant with Superconducting Fault Current Controller
  S. KIM, Yonsei University
  J. SHIM, Yonsei University
  E. AL-AMMAR, King Saud University, Saudi Arabia
  K. HUR, Yonsei University

- 15PESGM2140, Line Transfer Margin-Based Congestion Management with Multi-Correlated Wind Power
  M. HE, Texas Tech University
  S. ABEDI, Texas Tech University
  B. AGILI, Texas Tech University

- 15PESGM2430, Reactive Power Coordination in DFIG Based Wind Farms for Voltage Regulation and Flicker Mitigation
  D. MASCARELLA, McGill University
  S. LI, McGill University
  P. VENNE, Hydro Quebec
  G. JOOS, McGill University

- 15PESGM2464, Adequacy of Operating Reserves for Power Systems in Future European Wind Power Scenarios
  K. DAS, Technical University of Denmark
  M. LITONG-PALIMA, Technical University of Denmark
  P. MAULE, Technical University of Denmark
  P. SØRENSSEN, Technical University of Denmark
Technical Committee Reorganization Town Hall Smart Buildings, Loads and Customer Systems (Town Hall)

Wednesday, 29 July, 1:00 PM–4:00 PM Terrace
Sponsored by: IEEE Power & Energy Society
Chairs: K. EDWARDS, BPA
M. P. SANDERS, Schweitzer Engineering Labs

New Technical Committee is being established and we are soliciting for participation in the committee to cover Smart Buildings, Smart Loads and Customer Sessions.

LEADER:
D. Houseman

Smart Village Information Session 5 (information)

Wednesday, 29 July, 1:00 PM–5:00 PM Director’s Row J
Sponsored by: IEEE Smart Village
Chair: R. PODMORE, Incremental Systems

1:00 PM–2:00 PM
Presentation: Example of Smart Village Plan for India
SPEAKER:
F. KHAN, MTekpro Technologies Private Ltd.
Smart Village Ambassadors in India, Recap of Intelect Market for Solar Lanterns, Solar Home Systems and Micro-Grids Role of IEEE Smart Village, Opportunities in Uttar Pradesh Potential Partnerships, Corporate Social Responsibility Opportunities Response to the Nepal Earthquake

2:00 PM–3:00 PM
Working Groups: Development of Smart Village plans for specific regions
There will be breakout sessions where attendees will be able to meet with people representing activities in different Smart Village regions to share experiences and develop a Smart Village Plan for your region of interest.
A leader and recorder will be appointed for each group.
Each group will develop strengths, weaknesses, opportunities and threats for their region. They will report back to the general session on recommended priorities for IEEE Smart Village in this region.
India – Ladakh, Nepal, Uttar Pradesh.
East Africa – Kenya, Uganda, Tanzania, Malawi, Zambia, DR Congo, South Sudan
West Africa – Namibia, Cameroon, Nigeria
Malawi – A special group is formed due to the intense activity in Malawi.
Central and South America

3:00 PM–4:00 PM
IEEE Smart Village – Engagement Committee Meeting

4:00 PM–5:00 PM
IEEE Smart Village – Operations Committee Meeting

Collaborative Centers on Renewable Energy at Colorado Universities (panel)

Wednesday, 29 July, 1:00 PM–5:00 PM Plaza Court 4
Sponsored by: Local Organizing Committee Committee and Power & Energy Education Committee and Energy Development and Power Generation Committee
Chair: S. SURYANARAYANAN, Colorado State University

The state of Colorado and its universities have embarked on an ambitious trajectory of promoting research, education, technology transfer, and economic development around renewable energy in the region. The Colorado Energy Research Collaboratory (CERC), a research consortium of the four leading research institutions located in the state, spearheads the initiative that brings together stakeholders such as industry partners, public agencies, and other universities and colleges to: create and accelerate the
commercialization of renewable energy technologies, energy management systems, and energy efficiency; support economic growth in Colorado and the nation with renewable energy industries; and supply well-prepared energy researchers and technicians to the workforce. This panel will bring together experts, center directors, researchers, and other administrators of these centers to showcase the efforts, successes, and the lessons learned.

PRESENTATIONS AND PANELISTS:

- **15PESGM2921, Building a Culture of Collaboration**
  D. HILLER, Colorado Energy Research Collaboratory

- **15PESGM2920, University/Industry Cooperation: Focusing Research in a Dynamic Regulatory and Industry Environment**
  D. ZIMMERLE, Colorado State University

- **15PESGM2924, The Renewable Energy Material Research Science and Engineering Center (REMRSEC) at Colorado School of Mines & the Center for Revolutionary Solar Photoconversion**
  P. TAYLOR, Colorado School of Mines

- **15PESGM2922, NREL's Energy Systems Integration Facility – Enabling Clean Energy Systems at Scale**
  B. HANNEGAN, National Renewable Energy Laboratory

- **15PESGM2923, Distributed Control of Both Demand Response and Generation with Smart Meters**
  F. BARNES, University of Colorado-Boulder

- **15PESGM2933, Microgrid and Smart Grid Research and Development at University of Denver**
  W. GAO, University of Denver

- **15PESGM2959, From Thermoelectric Generators to Utility Scale Wind Power: University of Colorado Denver's Efforts in Renewable Energy Research**
  S. GEDNEY, University of Colorado Denver

### Student Job Fair (panel)

**Wednesday, 29 July, 1:30 PM–3:00 PM**

**Grand Ballroom**

Ticket Required

### TF on Contribution to Bulk System Control and Stability by Distributed Energy Resources connected at Distribution Networks (panel)

**Wednesday, 29 July, 2:00 PM–6:30 PM**

**Governor's Square 10**

**Sponsored by:** Power System Dynamic Performance Committee

**Chair:** N. HATZIARGYRIOU, National Technical University of Athens

The penetration of Distributed Energy Resources (DER) at the Distribution Network increases worldwide. DER should be controlled in order to provide their full benefits and provide support to the network. Control can be basically exercised by exploiting the power electronic converters used to interconnect most types of DER. Since DER are mostly inertia-less or decoupled from the distribution network, power electronics are used to mimic the behavior of traditional machines using equivalent “droop” techniques. Similarly, support of voltage/reactive power is possible. The provision of support to transmission network operation by DER is already required by operating codes in some countries.

The panel will discuss control techniques for DER connected at the distribution level and their capabilities to provide frequency and voltage support to the transmission system also considering the characteristics of distribution networks. The following areas are of primary interest for the panel:

1. Actual or studied cases reporting problems at transmission due to increased DER penetration at distribution
2. Discussion on DER capabilities to provide frequency and voltage support
3. Regulations and network codes

PRESENTATIONS AND PANELISTS:

- **15PESGM2598, Impact on Transmission Voltages of an Advanced Distribution Voltage Control: Results of a Case Study**
  T. VAN CUTSEM, University of Liege

- **15PESGM2599, Power System Restoration by Taking into Account Renewable Power Generation**
  I. ERLICH, University of Duisburg-Essen
• 15PESGM2600, Distributed Reactive Support and Voltage Stability Limits: The Example of Peloponnese in the Hellenic Interconnected System
  C. VOURNAS, NTUA
  C. LAMBROU, NTUA
  I. ANAGNOSTOPOULOS, NTUA
  G. CHRISTOFORIDIS, Independent Power Transmission Operator
  J. KABOURIS, Independent Power Transmission Operator

• 15PESGM2601, Integration of Microgrid Controls with Building Automation Systems
  M. HONG, Case Western Reserve University

• 15PESGM2602, The Coordination of DER Support to Bulk System Operation
  N. HATZIARGYRIOU, National Technical University of Athens

• 15PESGM2603, Moving Toward a More Decentralized System in California
  J. WEN, Southern California Edison

• 15PESGM2604, Effects of Increased DER penetration – Current Challenges for the Transmission System Operator
  C. SCHNEIDERS, Amprion GmbH

• 15PESGM2605, Modelling of Active Distribution Networks for Large Power System Stability Studies
  J. MILANOVIC, University of Manchester

• 15PESGM2606, Innovative Methods and Tools for the Management of Active Distribution Networks: The SmartGen Project
  S. MASSUCCO, University of Genova

Review of IEEE Std. 1122 Digital Recorders for Measurements in High-Voltage Impulse Tests, and Its Comparison with IEC 61083-1 (panel)

Wednesday, 29 July, 2:00 PM–5:00 PM  Governor’s Square 9
Sponsored by:  Power System Instrumentation and Measurements
Chairs:  G. FITZPATRICK, National Institute of Standards and Technology
         J. BRITTON, Phenix Technologies

PRESENTATIONS AND PANELISTS:

• 15PESGM3047, Scope and Purpose of IEEE-1122
  J. MCBRIDE, JMX Services, Inc.

• 15PESGM3048, Technical Differences between IEEE-1122 and IEC 61083-1
  Y. ZHANG, NEETRAC

• 15PESGM3049, Scope Changes to IEEE 1122 for Software
  E. HANIQUE, DNV GL

• 15PESGM3050, Scope Changes to IEEE 1122 for Hardware
  J. RICKMANN, Phenix Technologies

Electric Machinery Transactions Session 01 (transactions paper)

Wednesday, 29 July, 3:00 PM–5:00 PM  Governor’s Square 14
Sponsored by:  Electric Machinery
Chairs:  O. MOHAMMED, Florida International University
         K. MAYOR, Alstom AG (Schweiz)

PAPERS AND AUTHORS:

• 15PESGM0277, Voltage Ride-Through Capability Verification of Wind Turbines with Fully-Rated Converters Using Reachability Analysis
  [Transaction Number: 10.1109/TEC.2013.2295168]
  H. VILLEGAS PICO, Purdue University
  D. ALIPRANTIS, Purdue University

• 15PESGM0446, A Multilayer Perceptron Controller Applied to the Direct Power Control of a Doubly Fed Induction Generator
  [Transaction Number: DOI: 10.1109/TSTE.2013.2293621]
  R. MARCHI, UNICAMP
  P. DAINEZ, UNICAMP
  F. VON ZUBEN, UNICAMP
  E. BIM, UNICAMP

• 15PESGM0456, Electric Machine Drive Design Improvements through Control and Digital Signal Processing Techniques
  [Transaction Number: TEC-00383-2014]
  M. BARZEGARAN, Lamar University
  O. MOHAMMED, Florida International University
Stochastic Scheduling vs. Smart Reserve Requirements: Which Will Win the Race? (panel)

Wednesday, 29 July, 3:00 PM–5:00 PM  Governor’s Square 12

Sponsored by:  Power System Operations
Chairs:  E. ELA, EPRI
         J.-P. WATSON, Sandia National Laboratories

With the increasing penetrations of variable renewable technologies, distributed generation, and responsive demand, the amount of uncertainty in balancing supply and demand is ever increasing. Traditionally, the uncertainty of generator availability and load forecasts were met using static reserve requirement rules. This did a generally good job of maintaining reliability at low cost. In the future, the distribution of errors is dependent on many different factors including weather and customer responsiveness. Advanced scheduling tools have been developed to explicitly model the uncertainty set using stochastic or robust scheduling applications which ensure some level of reliability and optimality based on multiple scenarios. Others have proposed keeping the same scheduling tools but with improved methods for defining the operating reserve requirements. This panel will gather experts to discuss the pros and cons of these different approaches to meeting the needs of a power system with increasing amounts of uncertainty.

PRESENTATIONS AND PANELISTS:

15PESGM2752, Reliability, Costs, and Pricing Impacts of Various Scheduling Strategies that Can Reduce the Impacts of Uncertainty
         E. ELA, EPRI
         H. WU, NREL

15PESGM1905, Scheduling the Management of Uncertainty
         T. HEIDEL, Advanced Research Projects Agency-Energy (ARPA-E)

15PESGM2725, Real-Time Flexible Ramping Markets Compared with Stochastic Unit Commitment
         B. HOBBS, Johns Hopkins University

15PESGM2724, Bridging the Gap between the Financial and Reliability Unit Commitments
         Y. DVORKIN, University of Washington
         H. PANDZIC, University of Washington
         D. KIRSCHEN, University of Washington
         M. ORTEGA-VAZQUEZ, University of Washington

15PESGM2501, Managing Uncertainties in Market Operations
         Y. CHEN, MISO
         A. CASTO, MISO
         D. SAVAGEAU, MISO
         R. SUTTON, MISO

15PESGM1907, Towards Electricity Markets with Probabilistic Offers
         P. PINSON, DTU, Denmark

15PESGM2750, Bridging the Gap: Scenarios, Stochastic Unit Commitment, and Flexible Reserves
         J. WATSON, Sandia National Laboratories

Distributed Control and Intelligence for Future Power System Networks (panel)

Wednesday, 29 July, 3:00 PM–5:00 PM  Governor’s Square 16

Sponsored by:  (PSACE) Computer Analytical Methods
Chairs:  S. MCARTHUR, University of Strathclyde
         I. KOCKAR, University of Strathclyde

A significant amount of research and development has been undertaken in the area of active network management. As a result of the rapidly growing number of control points in distribution networks, alongside the drive for enhanced observability and flexibility, there is a perceived need to move from cen-
centralised control to distributed operation approaches. The panelists will explore the justification and need for decentralisation and then discuss specific advances in the areas of decentralised market operation, novel methods for decentralised operation and control, and co-ordination of demand side and distribution network interaction at timescales that challenge centralised control methods.

PRESENTATIONS AND PANELISTS:

- 15PESGM2375, Distributed Control and Intelligence for Future Power System Networks
  C. LIU, Washington State University

- 15PESGM2374, Decentralised Demand Side Participation
  G. STRBAC, Imperial College London

- 15PESGM2376, Distributed Voltage Control for Multiple Wind Farms
  H. SUN, Tsinghua University

- 15PESGM3062, Distributed Control and Intelligence for Future Power System Networks
  C. MC CARTHY, S&C Electric

- 15PESGM2377, Distributed Control and Intelligence for Future Power System Networks
  S. MCARTHUR, University of Strathclyde

- 15PESGM2373, Integrating Consumer Participation within an Autonomic Power System
  I. KOCKAR, University of Strathclyde

PSACE Transactions Paper Session – T4 (transactions paper)

Wednesday, 29 July, 3:00 PM–5:00 PM
Dirctor’s Row H

Sponsored by: PSACE
Chair: N. SAMAAN, PNNL

PAPERS AND AUTHORS:

- 15PESGM0068, Development of Performance-Based Two-Part Regulating Reserve Compensation on MISO Energy and Ancillary Service Market [Transaction Number: TPWRS-00871-2013]
  Y. CHEN, MISO
  R. LEONARD, Iberdrola Renewables
  M. KEYSER, MISO

  A. NEGASH, University of Washington
  T. HARING, ETH, Zurich
  D. KIRSCHEN, University of Washington

  A. ALBERT, C3 Energy
  R. RAJAGOPAL, Stanford University

  P. MATHURIA, Malaviya National Institute of Technology Jaipur
  R. BHAKAR, University of Bath

  P. MATHURIA, Malaviya National Institute of Technology Jaipur
  R. BHAKAR, University of Bath

  W. LEE, Gyeongsang National University
  L. XIANG, Friedrich-Alexander-Universität Erlangen-Nürnberg
  R. SCHOBER, Friedrich-Alexander-Universität Erlangen-Nürnberg
  V. WONG, University of British Columbia

- 15PESGM1119, Wind Aggregation Via Risky Power Markets [Transaction Number: TPWRS-00204-2014]
  Y. ZHAO, Stony Brook University
  J. QIN, Stanford University
  R. RAJAGOPAL, Stanford University
  A. GOLDSMITH, Stanford University
  H. POOR, Princeton University

  P. REZAEI, University of Vermont
  P. HINES, University of Vermont
  M. EPPSTEIN, University of Vermont
Applications of IEEE Std 1564-2014 for Voltage Sag Indices  (panel)

Wednesday, 29 July, 3:00 PM–5:00 PM                  Plaza Court 1
Sponsored by: Transmission and Distribution Committee
Chair: D. SABIN, Electrotek Concepts

IEEE Std 1564-2014, Guide for Voltage Sag Indices, is a new standard that identifies voltage sag indices and characteristics of electrical power and supply systems as well as the methods for their calculation. The panel session will include examples of characterizing single events, computing indices for a single monitoring location, and computing indices for a system of monitors. Examples will be presented using data collected from power quality monitors, digital relays, digital fault recorders, and revenue meters. This panel session will first present an overview of IEEE 1564. It will then describe applications of voltage sag indices in transmission, distribution, and industrial electric power systems. It will include presentations on use of voltage sag indices in T&D research projects, and perspectives on voltage sag indices from CIGRÉ, CIRED, and IEC.

PRESENTATIONS AND PANELISTS:
• 15PESGM1529, Overview of IEEE Std. 1564-2014 Guide on Voltage Sag Indices
  D. SABIN, Electrotek
• 15PESGM1528, Voltage Sag Indices in Transmission Systems
  T. LAUGHNER, TVA
• 15PESGM1530, Voltage Sag Indices in Distribution Systems
  K. KITTREDGE, Salt River Project
• 15PESGM1531, Voltage Sag Indices in Industrial Power Systems
  U. ONYEWUCHI, Corning Incorporated
• 15PESGM1532, Voltage Sag Indices in the 2012-2013 EPRI DPQ/TPQ Project
  T. COOKE, EPRI
• 15PESGM1533, Voltage Sag Methods in IEC and CIGRÉ/CIRED
  M. BOLLEN, Luleå University of Technology

Transmission and Distribution Paper Session III – T17  (transactions paper)

Wednesday, 29 July, 3:00 PM-5:00 PM                  Plaza Court 5
Sponsored by: Transmission and Distribution Committee
Chair: D. JOVCIC, University of Aberdeen

PAPERS AND AUTHORS:
• 15PESGM0027, Enhanced Equivalent Model of the Modular Multilevel Converter  [Transaction Number: TPWRD-01158-2013]
  F. BADRKHANI AJAEI, University of Toronto
  R. IRAVANI, University of Toronto
• 15PESGM0218, Application of Frequency-Partitioning Fitting to the Phase-Domain Frequency-Dependent Modeling of Overhead Transmission Lines  [Transaction Number: Paper TPWRD-01356-2013]
  T. NODA, CRIEPI
• 15PESGM0427, The Use of Averaged-Value Model of Modular Multilevel Converter in DC Grid  [Transaction Number: TPWRD-00534-2013]
  J. XU, North China Electric Power University
  A. GOLE, University of Manitoba
  C. ZHAO, North China Electric Power University
  B. KAZEMTABRIZI, Durham University
  E. ACHA, Tampere University of Technology
• 15PESGM0706, Design Paradigm for Permanent Magnet Inductor-Based Power Converters  [Transaction Number: TEC-00676-2012]
  G. SHANE, John Deere
  S. SUDHOFF, Purdue University
• 15PESGM1276, LCL and L-VSC Converters with DC Fault Current-Limiting Property and Minimal Power Losses  [Transaction Number: TPWRD-01000-2013]
  W. LIN, University of Aberdeen
  D. JOVCIC, University of Aberdeen
• 15PESGM1286, Average Modelling of Medium Frequency DC-DC Converters in Dynamic Studies  [Transaction Number: TPWRD-00067-2014]
  W. LIN, University of Aberdeen
  D. JOVCIC, University of Aberdeen
Wednesday Afternoon, continued – Wednesday Evening – Thursday Morning

- 15PESGM1290, Phasor Model of Modular Multilevel Converter with Circulating Current Suppression Control [Transaction Number: TPWRD-00793-2014]
  D. JOVCIC, University of Aberdeen
  A. JAMSHIDIFAR, University of Aberdeen

Wednesday Evening

Networking Reception Hosted by PES and IEEE PES WIP (reception)

Wednesday, 29 July, 5:00 PM–6:30 PM Grand Ballroom II
Sponsored by: IEEE PES Women in Power

North American Chinese Power Professionals Association Panel Session for SGEPRI (panel)

Wednesday, 29 July, 5:00 PM–7:00 PM Governor’s Square 14
Sponsored by: North American Chinese Power Professionals Association
Chair: Y. XUE, State Grid EPRI, Nanjing, China

PES Young Professionals Seminar and Networking Reception (reception)

Wednesday, 29 July, 6:00 PM–7:30 PM Grand Ballroom I
Sponsored by: IEEE PES Young Professionals

Thursday Morning

Attendee Breakfast (breakfast)

Thursday, 30 July, 6:30 AM–8:30 AM Plaza Exhibit

Presenter Breakfast (breakfast)

Thursday, 30 July, 6:30 AM–8:30 AM Grand Ballroom

Challenges in Asset Management (super session – panel)

Thursday, 30 July, 8:00 AM–12:00 PM Majestic Ballroom
Sponsored by: PES Super Session
Chair: D. WATKINS, Xcel Energy

PRESENTATIONS AND PANELISTS:
Advanced Programs for System Renewal and Modernization
S. HENDERSON, P.E., Xcel Energy

Establishing Metrics for Asset Management
T. MCGRAIL, Doble Engineering Company

Implications and Importance of Aging Infrastructure
W. WILLIAMS, Black and Veatch Consulting

Asset-Centric Energy Management and Situational Awareness
S. MOHAGHEGHI, Ph.D., Colorado School of Mines

Online Noise Analysis for System Health Monitoring and Prognostics
K. HOLBERT, Nuclear Power Generation Program, School of Electrical, Computer and Energy Engineering

Electric Vehicle Grid Integration: Vehicles, Renewables, and Buildings Working Together
T. MARTEL, Senior Engineer, Electric Vehicle Grid Integration at National Renewable Energy Laboratory
Transmission System Security and Blackout Prevention (panel)
Thursday, 30 July, 8:00 AM–12:00 PM Governor's Square 11
Sponsored by: Energy Development and Power Generation Committee
Chair: R. KREBS, Siemens AG

The session is addressing European developments and activities for an intelligent improvement of the flexibility and utilization of transmission systems and blackout prevention. In Europe the amount of fluctuating renewable infeeds to transmission networks as bulk generation of large windfarms or as distributed generation in MV networks requires new strategies in the system operation.

The panel comprises contributions related to high speed cutting-edge solutions for the assessment of the dynamic and protection security as well as their application in planning and operation.

First analysis results of AC protection behavior during DC operation on planned hybrid AC/DC transmission corridors in Germany will be presented.

The increasing amount of fluctuating infeeds requires an increased observability by PMUs as well as fast acting wide-area protection schemes and new approaches for system control, based on streaming data, which will perfect the panel session's presentations.

PRESENTATIONS AND PANELISTS:
- 15PESGM2799, PMU-Based Wide-Area Protection-System. Concept and Application in a Large Longitudinal Transmission System
  R. KREBS, Siemens AG
- 15PESGM2800, Ensuring Transmission System Security Even During Highest Fluctuating Renewable Infeeds
  M. WOLTER, 50Hertz Transmission
- 15PESGM2801, Secure Operation of Large Offshore Windfarms by Increase of Observability and Intelligent Control
  C. WENGE, Fraunhofer
- 15PESGM2802, DSA with Wind Security Tool and Automatic Curtailment Suggestion
  C. HEYDE, Siemens AG
- 15PESGM2803, Protection Coordination Aspects of AC/DC Hybrid Line Corridors
  C. ROMEIS, University of Erlangen
- 15PESGM2804, Protection Security Assessment – Automated Approach and Practical Examples for Protection System Improvement
  M. DAUER, University of Erlangen
- 15PESGM2805, ELIA Experiences with Automated Protection System Assessments and Audits
  F. LAZAR, ELIA
- 15PESGM2806, Challenges for Future Power System Control based on PMU Streaming Data
  P. KOMARNICKI, Fraunhofer

Flexible Operation Scheduling and its Economic Impacts on Markets (panel)
Thursday, 30 July, 8:00 AM–10:00 AM Governor's Square 12
Sponsored by: Power System Operations
Chairs: J. PRICE, California ISO
F. RAHIMI, OATI

As the electric industry integrates increasing amounts of renewable energy, and as demand-side participation increases, a growing amount of literature has addressed probabilistic optimization, look-ahead economic dispatch, multi-stage optimization, and definition and optimization of ancillary services, to address the resulting uncertainty in the balancing process. This panel builds on previous panels and presentations on these topics by examining the implementation issues as these techniques begin to be used in system operations and market clearing. Issues that have begun to be addressed include asset modeling; treatment of new tradable products and services; strategic behavior by market participants; market clearing; pricing; energy and ancillary service scheduling, dispatch, pricing, payment and cost allocation; system robustness; flexibility; market efficiency; and transparency. These topics warrant further discussion.

PRESENTATIONS AND PANELISTS:
- 15PESGM1032, Evaluation of Stochastic Unit Commitment for Renewable Integration in California's Energy Markets
  J. PRICE, California ISO
- 15PESGM1030, Incentive-Compatible Market-Clearing, Pricing, and Cost Allocation for Conventional Ancillary Services and Emerging Flexibility Reserves
  F. RAHIMI, OATI
Advanced Applications of Dispatchable DER in a Smart Grid Environment (panel)

Thursday, 30 July, 8:00 AM–12:00 PM  Governor’s Square 17
Sponsored by:  Power System Planning and Implementation Committee
Chair:  H. WELLER, Leidos

This session will focus on the utilization of DR for the support of the improved reliability of the Smart Grid. These applications will focus on DR systems that are dispatchable. They can be either system wide or targeted in their design and capability. Some of the issues to be addressed are the load response characteristics (time delay, predictability of performance, etc.), interoperability of the various DR system components and what is being done to improve this aspect of DR (OpenADR, etc.).

PRESENTATIONS AND PANELISTS:
- 15PESGM3037, Load Management-Based Virtual Power Plant as a Dispatchable DER in Smart Grid Environment
  C. BATTISTELLI, Imperial College London
- 15PESGM3038, Integrating Demand-Side Resources into a Power System with High Penetration of Renewable Generation
  H. ASANO, Central Research Institute of Electric Power Industry (CRIEPI)

Benchmarking Challenges and Test Systems for Intelligent Control and Management (panel)

Thursday, 30 July, 8:00 AM–10:00 AM  Governor’s Square 10
Sponsored by:  (PSACE) Intelligent Systems
Chair:  G. KUMAR VENAYAGAMOORTHY, Clemson University

PRESENTATIONS AND PANELISTS:
- 15PESGM2929, Benchmarking Metaheuristic Algorithm Based Approaches for the Identification of Power System Dynamic Equivalents
  J. RUEDA, Delft University of Technology
- 15PESGM2969, Development of a Large Scale Power Grid Dynamic Model for Research Community
  Y. LIU, University of Tenn and Oak Ridge Nat Lab
- 15PESGM2928, Evaluating Performance of Synchronized Systems: Tools and Methodologies
  M. KEZUNOVIC, Texas A&M University
- 15PESGM2927, Dynamic Stochastic Optimal Power Flow
  G. KUMAR VENAYAGAMOORTHY, Clemson University
- 15PESGM2934, Electricity Market Participation Strategies Benchmarking Using an Adaptive Learning System
  Z. VALE, Polytechnic of Porto
Ensuring adequate resource to keep the risk of supply shortfalls to an acceptable level is one of the key issues in power system planning. This panel will survey the state-of-the-art in industrial adequacy assessment, with particular emphasis on key current issues driving research and development requirements. Particular topics covered will include inclusion of variable generation within adequacy risk models, large scale interconnection, extreme weather events such as the polar vortex conditions in N America in 2013–14, and energy-limited resources such as hydro generation, storage and demand side.

PRESENTATIONS AND PANELISTS:
- 15PESGM3065, Practical Experience of LOLE Calculation in the Western Interconnection  
  M. PAPIC, Idaho Power  
  E. PRESTON, Transmission Adequacy Consulting  
  R. DOFFLEY, Bonneville Power Administration  
  N. DAI, BC Hydro  
  M. ELKINS, WECC  
  M. PEACOCK, WECC  
  B. HEATH, MISO
- 15PESGM3066, Uncertainty Impact on Operation and Planning of North American Bulk Power System  
  N. ABDEL-KARIM, NERC
  J. BLACK, ISO-New England
- 15PESGM3068, MISO Resource Adequacy Studies  
  J. COLE, MISO
- 15PESGM3069, Infrastructure Planning in Power Systems at EDF: From Theoretical Considerations to Operational Tools and Current Practices  
  T. HINCHLIFFE, EDF
- 15PESGM3070, Current and Future Challenges for Resource Adequacy Estimation  
  E. IBANEZ, NREL
- 15PESGM3071, Expanding Adequacy Assessment: A Case Study from the Pacific Northwest  
  B. KUJALA, NWPCC
- 15PESGM3072, Statistical Modelling for Inclusion of Variable Generation in Industrial Adequacy Studies  
  A. WILSON, Durham University

Lessons Learned from the Smart Grid Demonstration Projects (panel)

Thursday, 30 July, 8:00 AM–12:00 PM  
Plaza Court 1
Sponsored by:  Transmission and Distribution Committee  
Chairs:  J. GREEN, EPRI  
G. HORST, Electric Power Research Institute (EPRI)

This session will cover the lessons learned, successes, challenges, and the next steps with the EPRI and DOE Smart Grid Demonstration Projects. Topical areas to be covered include one or more of the following depending on the length of the session: integration of DER, volt-var optimization, smart grid communications, management systems driving the smart grid, and use of AMI meters as distribution sensors.

PRESENTATIONS AND PANELISTS:
- 15PESGM0835, Transforming the Grid Through Integration at PNM  
  J. HAWKINS, PNM Resources
- 15PESGM0837, Transforming the Grid Through Integration at KCP&L  
  E. HEDGES, Kansas City Power and Light Company
- 15PESGM0838, Conservation and Optimization Via Volt-var Control at AEP  
  B. SCHELL, American Electric Power
- 15PESGM0839, Conservation and Optimization Via Volt-var Control at SMUD  
  J. PARKS, Sacramento Municipal Utility District
- 15PESGM2852, Conservation and Optimization Via Volt-var Control  
  T. ROUSAN, Ameren
• 15PESGM3021, Management Systems Driving the Integrated Grid at Southern Company
  V. HOLSOBACK, Georgia Power Company
• 15PESGM0841, DERMS Driving the Integrated Grid at Duke Energy
  M. MILLER, Duke Energy
• 15PESGM0842, Communications and Cyber Security: Foundations of the Modern Grid at SCE
  R. YINGER, Southern California Edison
• 15PESGM0843, Communications and Cyber Security: Foundations of the Modern Grid
  T. GODFREY, EPRI

Renewable Energy and Storage (paper forum)

Thursday, 30 July, 8:00 AM–12:00 PM        Plaza Ballroom BE
Sponsored by: IEEE Power & Energy Society
Chairs: Y. CHEN, MISO
        R. BO, MISO

PRESENTATIONS AND PANELISTS:
• 15PESGM0186, Active Power Deficit Estimation in Presence of Renewable Energy Sources
  B. HOSEINZADEH, Aalborg University
  F. FARIA DA SILVA, Aalborg University
  C. LETH BAK, Aalborg University
• 15PESGM0424, Design of a Control Limiter to Improve the Dynamic Response of Energy Storage Systems
  A. ORTEGA, University College Dublin
  F. MILANO, University College Dublin
• 15PESGM0614, Cost-Based Dimensioning of Battery Energy Storage and Energy Management System for Frequency Containment Reserves Provision
  J. JOMAJUX, Université Catholique de Louvain
  A. LATIERS, Université Catholique de Louvain
  E. DE JAEGER, Université Catholique de Louvain
• 15PESGM0627, Joint Estimation of Single Flow Zinc-Nickle Battery State and Parameter Using Unscented Kalman Filter
  X. LIN, Guangxi University
  J. QIN, Guangxi University
• 15PESGM0659, A Robust Method Based Storage Aggregator Model for Grid Dispatch
  Z. PAN, Tsinghua University
  Q. GUO, Tsinghua University
  H. SUN, Tsinghua University
• 15PESGM0936, Dispatch of Wind-Thermal Power System Containing Heat Storage Units with Fast Ramping Capabilities
  M. LI, State North China Electric Power University
  X. ZOU, State North China Electric Power University
  W. WANG, State North China Electric Power University
  Y. NIU, State North China Electric Power University
  J. LIU, State North China Electric Power University
• 15PESGM1387, Potential Revenue from Electrical Energy Storage in ERCOT: The Impact of Location and Recent Trends
  R. BYRNE, Sandia National Laboratories
  C. SILVA-MONROY, Sandia National Laboratories
• 15PESGM1568, Ramp Enhanced Unit Commitment for Energy Scheduling with High Penetration of Renewable Generation
  T. YONG, China Electric Power Research Institute
  J. YAO, China Electric Power Research Institute
  S. YANG, China Electric Power Research Institute
  Z. YANG, China Electric Power Research Institute
• 15PESGM1593, Optimizing a Virtual Impedance Droop Controller for Parallel Inverters
  M. KABALAN, Villanova University
  P. SINGH, Villanova University
• 15PESGM1623, Optimal Penetration of Renewable Sources for Distribution System Performance Improvement
  N. AGARWAL, Malaviya National Institute of Technology
  K. VERMA, Malaviya National Institute of Technology
  K. NIAZI, Taibah University
  A. SWARNKAR, Malaviya National Institute of Technology
  N. GUPTA, Malaviya National Institute of Technology
Thursday Morning, continued

- 15PESGM1856, On Storage and Renewables: A Theory of Sizing and Uncertainty
  R. SINGH, Texas A&M University
  L. XIE, Texas A&M University
  P. KUMAR, Texas A&M University

- 15PESGM2149, A Bilevel Planning Method of Active Distribution System for Renewable Energy Harvesting in a Deregulated Environment
  B. ZENG, North China Electric Power University
  S. OUYANG, North China Electric Power University
  J. WEN, North China Electric Power University
  J. ZHANG, North China Electric Power University
  Y. ZHANG, North China Electric Power University
  M. ZENG, North China Electric Power University
  J. SUN, North China Electric Power University

- 15PESGM2493, Single Bus Studies of Split, Multiple Battery Energy Storage Systems
  J. HILL, Drexel University
  C. NWANKPA, Drexel University

- 15PESGM2538, Stochastic Optimal Scheduling of Residential Appliances with Renewable Energy Sources
  H. WU, National Renewable Energy Laboratory
  A. PRATT, National Renewable Energy Laboratory
  S. CHAKRABORTY, National Renewable Energy Laboratory

HVDC Systems and AC Transmission Lines  
(paper forum)

Thursday, 30 July, 8:00 AM–12:00 PM                    Plaza Ballroom CF
Sponsored by:             IEEE Power & Energy Society
Chair:                           T. LAUGHNER, TVA

PRESENTATIONS AND PANELISTS:
- 15PESGM0031, Assessment of Shielding Performance of 69/138 kV Transmission Lines Exposed to Lightning Strikes
  N. MALCOLM, University of Bath

- 15PESGM0151, Optimal Ground Grid Design for Large EHV Substations with Auto-Transformer
  X. WU, AEP
  V. SIMHA, AEP
  R. WELLMAN, AEP

- 15PESGM0271, Analysis of Coupling Effect on LCC-MCC Hybrid HVDC from Parallel AC Lines in Close Proximity
  Y. LIN, Zhejiang University
  Z. XU, Zhejiang University
  L. XIAO, Zhejiang University
  Z. ZHANG, Zhejiang University
  H. XIAO, Zhejiang University

- 15PESGM0447, EMTP Modeling of Hybrid HVDC Breakers
  J. MARTINEZ, UPC
  J. MAGNUSSON, Royal Institute of Technology (KTH)

- 15PESGM1405, Fuzzy Probabilistic Expert System for Overhead Conductor Assessment and Replacement
  I. HATHOUT, Hydro One Inc.
  K. CALLERY-BROOMFIELD, Hydro One Inc.

- 15PESGM1493, Combining Multiple Sources of Data for Situational Awareness of Geomagnetic Disturbances
  C. BASU, IBM Research
  M. PADMANABAN, IBM Research
  S. GUILLON, Hydro-Quebec, TransEnergie
  M. DE MONTIGNY, Institut de recherche d’Hydro-Québec (IREQ)
  I. KAMWA, Institut de recherche d’Hydro-Québec (IREQ)

- 15PESGM1706, Modeling and Analysis of Superconducting Fault Current Limiters Applied in VSC-HVDC Systems
  F. MOURINHO, University of Sao Paulo
  D. MOTTER, University of Sao Paulo
  R. MONARO, University of Sao Paulo
  J. VIEIRA, University of Sao Paulo
  S. LE BLOND, University of Bath
  M. ZHANG, University of Bath
  W. YUAN, University of Bath
Transmission System  (tutorial)

Thursday, 30 July, 8:00 AM–5:00 PM  Silver  
Sponsored by: IEEE Power & Energy Society

Prerequisite for this course is Power System Basics or a familiarity with basic formulas and power system equipment. The focus of this course is to provide participants with knowledge of how electric power is transferred from generation sources to distribution systems via the interconnected electric bulk power system known as “the grid.” Basic physical laws governing the grid will be introduced, as well as the regulatory agencies involved in its governance. The great blackouts will be explored. This course is intended to increase participant’s understanding of the electric grid and how it functions in the electric power system.

Topics covered in the course include an introduction to the fundamental concepts of power, energy, and power system stability as they relate to the grid. The grid is explored in terms of its interconnections, power flow, North American interconnections, and governing bodies such as NERC/ERO, ISOs, and RTOs. Reliability standards and contingency analysis are addressed. Issues related to the planning and operation of the grid, such as transmission and economic constraints, determining transmission transfer capability, and dealing with congestion are reviewed. The course also discusses the great blackouts, their root causes, and lessons learned.

Smart Grid 204: Introduction to Smart Grid Data and Analytics  (tutorial)

Thursday, 30 July, 8:00 AM-12:00 PM  Gold
Sponsored by: IEEE Power & Energy Society  
Instructor: D. HOUSEMAN, EnerNex

This is an introductory level course to look at smart grid data and analytics, the focus is on the distribution and customer domains of the NIST model. The course covers the following key topics:

- What data is available from which devices, from the in home controller to meters to relays and substation automation.
- What applications can be done with the data, with a heavy focus on AMI and line devices.
- What is the value of each of the applications to the various stakeholders that are associated with the grid, using the Illinois Collaborative definitions of stakeholders.

The course will look at the process of collecting and verifying data, including all of the pitfalls that may occur and provide a 20 step process to go from no data to running analytics. The course is suitable for non-technical, as well as technical audiences, including regulatory, legislative, and utility staff members. The course will also compare and contrast the two major privacy contenders and the impact each would have on the ability to perform the analytic applications based on the principles of each contender. Included in the course will be a summary of the ARRA analytics that have been highlighted by the EPRI and DOE reports.
Workforce Development for Renewable Energy and Power Systems  (panel)

Thursday, 30 July, 8:00 AM–12:00 PM  Governor's Square 9
Sponsored by:  Local Organizing Committee Committee and Energy Development and Power Generation Committee and Power & Energy Education Committee
Chair:  B. O’NEILL, National Renewable Energy Laboratory

As solar and wind industries expand nationwide, they need qualified employees to respond to the growing market's staffing needs. Universities are promoting research, education, and training around clean energy's dramatic expansion. The associated economic development can be win-win for the community, especially considering the wide array of technical skills called for, such as system design, physical equipment components, project implementation, and integration into electrical systems, both in transmission and distribution. A supportive public policy is key to meeting the anticipated trajectory for Workforce Development for Renewable Energy and Power Systems. This panel will focus on what workforce skills, training and experience are needed to enable continued widespread deployment of wind and solar technologies and how best we can build a workforce with the required capabilities. Speakers will share their perspectives on the tangible benefits of past investment and potential future support for sustainable economics and knowledge longevity.

PRESENTATIONS AND PANELISTS:
• 15PESGM2916, Workforce Development
  B. RITTER, Center for the New Energy Economy
• 15PESGM2917, Workforce Development
  W. REDER, S & C Electric Company
• 15PESGM2918, Workforce Development
  S. TEGEN, NREL
• 15PESGM2919, Workforce Development
  T. KUROWSKI, Solar City
• 15PESGM2925, Addressing the Workforce Challenges of Distributed Technologies and the Evolving Smart Grid
  J. VENTRE, Florida Solar Energy Center

Ice-Breaking Projects in Power Systems  (panel)

Thursday, 30 July, 10:00 AM–12:00 PM  Plaza Court 6
Sponsored by:  Energy Development and Power Generation Committee
Chairs:  U. KERIN, Siemens AG
         A.-K. MARTEN, Technische Universität Ilmenau

The world’s growing demand for sustainable energy is the driving force behind many research and development and industrial projects. The world tallest building, unmanned offshore oil platforms, floating LNG processing vessels, HVDC multi-terminal power transmission, long-distance AC transmission, FACTS design and installation, integration of dispersed generation, implementation of energy efficiency, and, last but not least, power system control have one thing in common: superior electrical engineering.

This session presents an overview of the ice-breaking research and development and industrial projects from all over the world, many of them being unique or even world records, and their impact on the trends driving the electric power system development. The session aims at bringing together lead power-systems engineers from various disciplines to provide information on cutting-edge techniques and solutions.

PRESENTATIONS AND PANELISTS:
• 15PESGM2278, Delivering Energy Through the World Longest Submarine HVAC Cable
  N. VAN LUIJK, TOTAL Norge
  E. THIBAUT, TOTAL SA
• 15PESGM2189, Greenfield eLNG-Concept for Australia
  E. LERCH, Siemens AG
  U. KERIN, Siemens AG
• 15PESGM2853, Real-time Assessment and Short-Term Forecast of Operational Limits in the Slovenian Transmission Network
  M. MAKSIC, Elektroinstitut Milan Vidmar
  A. SOUVENT, Elektroinstitut Milan Vidmar
  G. LAKOTA, Elektroinstitut Milan Vidmar
  D. MATVOZ, Elektroinstitut Milan Vidmar
  J. KOSMAC, ELES
  J. KOSTEVC, ELES
Thursday Morning, continued – Thursday Afternoon

- 15PESGM2907, AC Interconnection between Longitudinal Power System – The Chilean Case
  K. KAROUI, Tractebel Engineering S.A.
  C. RAHMANN, University of Chile
  A. ARRIAGADA MASS, GDF Suez Energy Chile
- 15PESGM3046, Installation of Synchronous Condensers for Reliable HVDC Operation and Bulk Power Transfer
  H. ABILDGAARD, Energinet.dk

Effects of Contract Design on Electricity Market Performance with Increased Penetration of Distributed Energy Resources and Variable Generation (panel)

Thursday, 30 July, 10:00 AM–12:00 PM Governor’s Square 12
Sponsored by: Power System Operations
Chair: L. TESFATSION, Iowa State University

One critical aspect of the envisioned future smart grid is a flatter grid encompassing distributed energy resources (DER) and variable generation (VG). This development could require important changes to current electricity market designs, including in particular the design of the buyer-seller contracts in these markets. These contracts were instituted for markets dominated by dispatchable generation and relatively predictable conventional loads non-responsive to price. This session will focus on a reconsideration of contract design for electricity markets, with particular attention paid to new forms that could facilitate the efficient participation of DER and VG.

PRESENTATIONS AND PANELISTS:
  M. ILIC, Carnegie Mellon University
- 15PESGM0718, The Ramp Scheduling Approach: Energy-Based UC vs. Power-Based UC
  R. BALDICK, University of Texas
- 15PESGM0721, Scheduling and Pricing Mechanisms to Meet the Flexibility Needs on Systems with High Penetrations of Variable Energy Resources
  E. ELA, EPRI
- 15PESGM0722, Challenges and Opportunities for Participation of DER and VG in Wholesale Energy Markets: Current Examples and Future Possibilities
  N. NAVID, PG&E
- 15PESGM0723, Using Transactive Energy Systems to Enable Flexible Power-Market Participation by Demand-Side Resources
  A. SOMANI, PNNL
- 15PESGM0719, Facilitating Appropriate Compensation of Electric Energy and Reserve Through Standardized Contracts with Swing
  L. TESFATSION, Iowa State University
  D. HEO, Iowa State University

Thursday Afternoon

Introduction of Session and Panelists: Leveraging the Power Africa Initiative-Perspectives (panel)

Thursday, 30 July, 1:00 PM–5:00 PM Plaza Court 1
Sponsored by: Energy Development and Power Generation Committee
Chair: B. BLYDEN, BBRM Group

The Power Africa Initiative between the US and Africa towards the development of a massive energy development program is examined from various perspectives. Namely the various power generation technologies available today, design philosophies and strategies for Accelerating the development of technical skill sets to harness the potential of this initiative. This later aspect remains the primary focus of the IPSC Africa Panel.

PRESENTATIONS AND PANELISTS:
- 15PESGM2775, Leveraging the Power Africa Initiative-Perspectives
  B. BLYDEN, BBRM Group
- 15PESGM2776, Power Project Financing in Africa
  B. DESILETS, Claret Consulting
- 15PESGM2774, IEEE Smart Village – Experience and Trends in Africa
  R. PODMORE, Incremental Systems
This panel will invite experts and power grid planners from national labs, utilities, and Independent System Operators to discuss the challenges faced by the power industry to plan the future generation fleet when integrating new generation resources (primarily solar and wind). In addition, because of the implementation of smart grid technology, the penetration of energy efficiency and demand response programs as well as the new charging load of electric vehicles will keep increasing in the next 5–10 years. Thus, the grid operation and planning engineers are facing a variety of variability and uncertainty that may require new probabilistic-based approaches. The panelists will present the new methods and studies used in industry on stochastic operation and planning when integrating renewables and distributed generation resources.

**PRESENTATIONS AND PANELISTS:**
- **15PESGM2829, Stochastic Planning and Control for Renewable Integration**  
  Y. MAKAROV, Pacific Northwest National Laboratory
- **15PESGM2826, Three Stage Production Cost Modeling Approach for Evaluating the Benefits of Intra-Hour Scheduling between Balancing Authorities**  
  N. SAMAAN, Pacific Northwest National Lab  
  M. MILLIGAN, National Renewable Energy Laboratory (NREL)  
  M. HUNSAKER, Western Electricity Coordinating Council (WECC)  
  T. GUO, Energy Exemplar
- **15PESGM2825, A Case Study of Stochastic Planning: Probabilistic-Based Calculation of Available Transfer Capacity (1)**  
  P. DU, ERCOT
- **15PESGM2828, A Case Study of Stochastic Planning: Probabilistic-Based Calculation of Available Transfer Capacity (2)**  
  O. CINGLIO, Idaho Power
- **15PESGM2827, Stochastic Operation and Planning Practices at MISO (1)**  
  Y. CHEN, MISO
- **15PESGM2831, Stochastic Operation and Planning Practices at MISO (2)**  
  R. BO, MISO
- **15PESGM2830, Probabilistic Planning at ISO-NE**  
  F. ZHAO, ISO New England
- **15PESGM2832, Current Stochastic Planning Practices at ERCOT**  
  W. LASHER, ERCOT

With the recent rapid development of Distributed Energy Resources (DER), such as demand response, electric vehicles, distributed PV and distributed storage, distribution grids are becoming more active and the two-way interaction between transmission and distribution grids is increasing. The uncertain nature of some DER, particularly distributed PV, coupled with a lack of visibility and controllability of many DER could cause significant challenges to the transmission and distribution systems. Two topics which are becoming increasingly relevant and will be explored here are: (1) How significant are the impacts on power system operations caused by the interaction between transmission & active distribution grids? (2) What are the emerging operational methods to consider such impacts, for example coordinated
security assessment and optimization for integrated transmission and distribution grids in a distributed manner, or energy forecasting for DER. This panel explores those and other topics of relevance to transmission and distribution interaction.

PRESENTATIONS AND PANELISTS:

- **15PESGM1320, The Declining Inertia Response Caused by the Renewables: ERCOT’s Experiences and Solutions**
  P. DU, ERCOT

- **15PESGM1321, Distributed Global Power Flow Calculation Facilitating Interaction between Transmission and Distribution**
  H. SUN, Tsinghua University

- **15PESGM1322, Transmission Contingency Analysis Based on Integrated Transmission and Distribution Power Flow in a Smart Grid**
  J. WANG, Argonne National Laboratory

- **15PESGM1323, Power System Operation Incorporating Active Distribution Grids: A System of Systems Framework**
  Y. FU, Mississippi State University

- **15PESGM1324, Impacts of Distribution-Connected Variable Generation on Short-Term Load Forecasting and Operational Planning**
  B. HAYES, IMDEA Energy

- **15PESGM1325, Challenges of System Operations & Market Operations with Distributed Resources**
  J. TONG, PJM Interconnection

- **15PESGM1326, The Coordinated Interaction of Transmission and Distribution with the Objective of Maximizing Renewable Energy Accommodation: Strategy and Platform Construction**
  M. DING, Ningxia Provincial Power Company

- **15PESGM1327, The Exploration and Practice of the Coordination between Transmission Grid and Distribution Grid in Guangzhou City**
  L. GAN, Guangzhou Power Supply Co. Ltd, China Southern Grid

**Asset Management (panel)**

**Thursday, 30 July, 1:00 PM–5:00 PM**

**Governor’s Square 11**

**Sponsored by:** Power System Planning and Implementation

**Chair:** A. MCGRAIL, National Grid USA

Continuing previous asset management panel sessions, this session dives deeper into the specific elements of asset management of interest to PES 2014 attendees, against a backdrop of a new ISO standard on Asset Management. In addition, individual cases and benefits are identified and discussed – with particular reference to electric supply industry organizations, and asset intensive organizations. To take one subject: Specifications may be streamlined within an overall asset management framework, for example, but there needs to be an understanding of the impact of the specification on the whole life cycle of the asset, including capitalization, depreciation, operation and maintenance costs and, ultimately, disposal costs. Specifying a circuit breaker to have an expected life of 40 years may yield a very different design to one specified to last at least 5 years; similarly, requiring maintenance free breakers has implications for what is acceptable as maintenance and inspection practices. The panel will discuss many interrelated aspects of asset management and weave together an interesting and valuable session, with lessons learned and opportunities for development.

PRESENTATIONS AND PANELISTS:

- **15PESGM2884, Standards and Specifications**
  A. MCGRAIL, National Grid USA

- **15PESGM2889, Asset Health Indices – Standards and Developments**
  B. SPARLING, Dynamic Ratings

- **15PESGM2885, Asset Health Indices – Examples**
  A. MCGRAIL, National Grid USA

- **15PESGM2890, Maintenance Practices: RCM, RCBM, JIT etc.**
  E. HILL, Loma Consulting

- **15PESGM2891, Project Ranking and Decision Support Tools**
  G. SHEBLE, EPMT

- **15PESGM2892, Project Ranking Tools**
  A. GUBINA, Uni. Ljubljana

- **15PESGM2893, Cyber Security & Data Management**
  G. BENNETT, Xcel Energy

- **15PESGM2894, Condition Monitoring – Sensor Evaluation**
  K. ELKINSON, Doble Engineering
One key aspect envisioned for the emerging electric industry landscape is increased demand-side participation under a transactive framework complementing the more conventional Demand Response (DR), i.e., centrally-initiated demand adjustments, automated demand dispatch, and retail dynamic-price contracting. This emerging paradigm necessarily entails tighter linkages between retail and wholesale power market operations. This session will focus on opportunities and challenges arising from these developments. The opportunities include provision of tradable or otherwise financially actionable products and services by prosumers (consumers with roof-top solar or other types of distributed generation) and demand-side system operators (e.g., MicroGrids and Building Energy Management Systems). The challenges include regulatory uncertainties and barriers due to existing operating procedures. There are also paradigm transition challenges, including the need to ensure a business case is made and widely accepted for the transactive framework, and the need to ensure that the transactive framework roadmap is compatible with power system operational efficiency and reliability objectives.

PRESENTATIONS AND PANELISTS:

- **15PESGM1436, Emerging Electricity Industry Landscape**
  A. IPAKCHI, OATI

- **15PESGM1433, Possibilities and Limitations of Demand-Side Participation in Bulk Power and Wholesale Market Operations**
  J. PRICE, California ISO

- **15PESGM1437, Demand Response Exchange (DRX) for Day-Ahead Scheduling of Power Systems with Variable Renewable Energy**
  M. SHAHIDEHPOUR, IIT

- **15PESGM1435, Transactive Control of Demand-Side Assets**
  R. MELTON, PNNL

- **15PESGM1432, Intelligent Systems Support for Transactive Energy Systems**
  K. KOK, TNO

- **15PESGM1438, Integrated Transmission and Distribution Effects of Demand-Side Participation**
  A. THOMAS, Iowa State U

- **15PESGM1439, Demand-Side Requirements for the Integrated Grid**
  C. THOMAS, EPRI

- **15PESGM1434, A California Utilities Perspective on Demand-Side Participation**
  N. YU, University of California, Riverside

Large-Scale Electric Energy Storage Integration into the Grid: Current Practices and Emerging Applications (panel)

Energy storage is gaining increasing importance in today's transition toward a sustainable and resilient future power grid. As an example, California has adopted the United States' first energy storage mandate, requiring the state's three major power companies to have electricity storage capacity that can output 1325 megawatts in place by the end of 2020, and 200 MW by the end of next year. The mandate includes specific requirements for energy storage capacity at the transmission, distribution, and customer locations. This panel brings together distinguished subject matter experts and discusses the latest experiences and practices to increase the value and benefits that energy storage could provide to the grid.
Presentations and Panelists:

- **15PESGM1488**, Energy Storage Applications at ERCOT
  P. DU, ERCOT
- **15PESGM1489**, The California Push of Energy Storage Deployment
  G. GROSS, University of Illinois
- **15PESGM1490**, Non-Technical Barriers to Energy Storage Entering the Market
  R. SIOSHANSI, Ohio State University
- **15PESGM1491**, Energy Storage Applications at SCE
  M. IRWIN, Southern California Edison
- **15PESGM1492**, Economics and Optimization of Utilizing Storage for Market Applications
  R. FIORAVANTI, DNV-GL

Demand Response for Reliable Integration of Variable Renewable Energy

**Panel**

Thursday, 30 July, 1:00 PM-5:00 PM
Governor's Square 10

Sponsored by: *(PSACE)* Reliability and Risk Analysis

Chairs: M. PARVANIA, University of Utah  
M. O'MALLEY, University College Dublin

Renewable energy resources, notably wind energy and solar photovoltaic, are expected to provide considerable portion of the world energy requirements in the near future. However, variability and uncertainty associated with wind/solar energy impact the reliable and economic operation of power systems. As one of the potential solutions, demand response (DR) is expected to play a role for mitigating both the variability and uncertainty. This panel session aims to discover the emerging DR-based solutions that assist in the integration of wind and solar PV, and to highlight the analysis methods to quantify the impacts of DR on reliability of power systems with variable renewable energy.

Presentations and Panelists:

- **15PESGM1179**, Experience with Demand Response and Renewable Resources in the PJM Market
  A. OTT, PJM
- **15PESGM1176**, Whole-System Approach to Assessing Benefits of Demand Response in Supporting Cost Effective Integration of Renewables
  G. STRBAC, Imperial College London
- **15PESGM1177**, Grid Integration of Variable Generation Considering Demand Response Forecasting Errors
  J. WANG, Argonne National Laboratory
- **15PESGM1182**, Reducing Renewable Generation Integration Barriers with Demand Response
  M. HUMMON, NREL
- **15PESGM1205**, Integrating Variable Renewable Energy and the Synergies with Demand Response
  S. NOLAN, UCD
- **15PESGM2061**, Using the Demand Side to Reliably Integrate Variable Renewable Energy
  A. BREIDENBAUGH, EnerNOC, Inc.
- **15PESGM3055**, Drivers for the Value of Demand Response Under Increased Levels of Wind and Solar Power
  E. HALE, NREL

Distributed Energy Resources and Demand Response (Paper Forum)

Thursday, 30 July, 1:00 PM-5:00 PM
Plaza Ballroom CF

Sponsored by: IEEE Power & Energy Society

Chair: N. LU, NCSU

Papers and Authors:

- **15PESGM0729**, Determination of the Main Unbalance Sources on PCC in the Distribution System
  Y. SUN, Shandong University  
P. LI, Shandong University  
Y. WANG, Shandong University  
Z. YIN, Beijing Electric Power Company
- **15PESGM1139**, Management of Effective Factors in Availability of Distribution Transformers
  M. HONARMAND, Shahid Beheshti University  
M. HAGHIFAM, Tarbiat Modares University  
M. GHAZIZADEH, Shahid Beheshti University
• 15PESGM1527, Modeling the Impact of Electricity Market Structure on Optimal Behavior of Demand Response Aggregators
  M. SHAHIE-KHAH, University of Beira Interior
  J. LUJANO-ROJAS, University of Beira Interior
  J. CATALAO, University of Beira Interior
  E. POURESMAEIL, University of Southern Denmark

• 15PESGM1586, Investigating the Impact of Varying the Number of Distributed Energy Resources on Controlling the Power Flow within a Microgrid
  A. FAZELI, Alstom Grid

• 15PESGM1655, A Distributed Cooperative Power Allocation Method for Campus Buildings
  H. HAO, Pacific Northwest National Laboratory
  Y. SUN, Pacific Northwest National Laboratory
  T. CARROLL, Pacific Northwest National Laboratory
  A. SOMANI, Pacific Northwest National Laboratory

• 15PESGM1831, Investigating Effects of Changes in Power Market Regulations on Demand-Side Resources Aggregators
  M. RAHMANI-ANDEBILI, Clemson University
  G. KUMAR VENAYAGAMOORTHY, Clemson University

• 15PESGM2030, A Procedure to Analyze the Impact of Three-Phase Unbalanced Conditions on Switching Overvoltages in Systems with Distributed Generation
  L. OTREMBA, State University of Western Parana
  J. PESENTE, Itaipu Power Plant
  R. OTTO, Itaipu Technological Park Foundation
  R. RAMOS, Escola de Engenharia de Sao Carlos/USP

• 15PESGM2038, Distinct Approaches to Model Electricity Consumers for the Participation in Demand Response Programs
  F. PEREIRA, Polytechnic of Porto
  P. FARIA, Polytechnic of Porto
  Z. VALE, Polytechnic of Porto

• 15PESGM2221, Allocation of Power Losses to Multiple Distributed Generations in Distribution Grid
  Q. CHEN, Hohai University
  G. CAO, Hohai University

• 15PESGM2277, Identification and Reduction of Impact of Islanding Using Hybrid Method with Distributed Generation
  N. K, MNIT, JAIPUR
  S. SIDDIQUI, MNIT, JAIPUR
  M. FOZDAR, MNIT, JAIPUR

• 15PESGM2289, Optimal Voltage Regulation for Unbalanced Distribution Networks Considering Distributed Energy Resources
  G. LIU, Oak Ridge National Laboratory
  O. CEYLON, University of Tennessee, Knoxville
  Y. XU, Oak Ridge National Laboratory
  K. TOMSOVIC, University of Tennessee, Knoxville

• 15PESGM2659, Utilization of Low Voltage In-Line Power Regulator for Reliable Integration & Performance of DER Technologies
  M. AGHAZADEH TABRIZI, PWR Solutions – DNV GL
  M. SAHNI, PWR Solutions – DNV GL
  N. PRAKASH, PWR Solutions – DNV GL
  V. MARTINELLI, Gridco Systems
  J. SIMONELLI, Gridco Systems

• 15PESGM0602, A Two-Stage Energy Management Strategy for CCHP Microgrid Considering House Characteristics
  Z. LUO, Southeast University
  Z. WANG, Southeast University
  W. GU, Southeast University
  C. XU, Southeast University
  Y. TANG, Southeast University

• 15PESGM0655, Simulating Occupancy in Office Buildings with Non-Homogeneous Markov Chains for Demand Response Analysis
  C. SANDELS, Royal Institute of Technology
  J. WIDEN, Uppsala University
  L. NORDSTRÖM, Royal Institute of Technology

• 15PESGM0820, Approach for Load Frequency Control Participation by Decentralized Energy Devices
  R. SCHWERDFEGER, Technische Universität Ilmenau
  S. SCHLEGEL, Technische Universität Ilmenau
  T. JIANG, Technische Universität Ilmenau
  D. WESTERMANN, Technische Universität Ilmenau
• 15PESGM1318, Dynamic Distribution Grid Management through the Coordination of Decentralized Power Units
  I. BIELCHEV, Otto von Guericke University Magdeburg
  M. RICHTER, Otto von Guericke University Magdeburg
  M. BANKA, Otto von Guericke University Magdeburg
  P. TROJAN, Otto von Guericke University Magdeburg
  Z. STYCZYNSKI, Otto von Guericke University Magdeburg
  A. NAUMANN, Fraunhofer Institute IFF
  P. KOMARNICKI, Fraunhofer Institute IFF

• 15PESGM1556, Customer-Oriented Planning of Distributed Generations in an Active Distribution System
  X. XU, Clemson University
  E. MAKRAM, Clemson University
  T. WANG, American Electric Power
  R. MEDEIROS, Clemson University

• 15PESGM2704, Demand Response through Interactive Incorporation of Plug-In Electric Vehicles
  E. AKHAVAN REZAI, University of Waterloo
  M. SHABAN, University of Waterloo
  E. EL SAADANY, University of Waterloo
  F. KARRAY, University of Waterloo

• 15PESGM0987, Hybrid Control Scheme for Distributed Energy Resource Management in a Market Context
  X. HAN, Technical University of Denmark
  H. BINDNER, Technical University of Denmark
  J. MEHEDALIC, Danish Energy Association
  D. TACKIE, Danish Energy Association

Smart Grid, Microgrids and DC Systems (paper forum)

Thursday, 30 July, 1:00 PM–5:00 PM Plaza Ballroom BE
Sponsored by: IEEE Power & Energy Society
Chair: J. SOLANKI, West Virginia University

PAPERS AND AUTHORS:

• 15PESGM0074, A Communication-Assisted Protection for MVDC Distribution Systems with Distributed Generation
  M. MONADI, UPC University
  C. GAVRILUTA, UPC University
  J. CANDELA, UPC University
  P. RODRIGUEZ, UPC University

• 15PESGM0225, Geometry-Based Estimation of Stability Region for a Class of Structure Preserving Power Grids
  T. VU, Massachusetts Institute of Technology
  K. TURITSYN, Massachusetts Institute of Technology

• 15PESGM0418, Fully Distributed DC-OPF Approach for Power Flow Control
  J. MOHAMMADI, Carnegie Mellon University
  G. HUG, Carnegie Mellon University
  S. KAR, Carnegie Mellon University

• 15PESGM0453, Distributed Dynamic State Estimation: Fundamental Building Block for the Smart Grid
  S. MELIPOULOS, Georgia Institute of Technology
  R. HUANG, Georgia Institute of Technology
  E. POLYMENEAS, Georgia Institute of Technology
  G. COKKINIDES, Georgia Institute of Technology

• 15PESGM0792, Enabling the Big Data Analysis in the Smart Grid
  F. LUO, University of Newcastle
  Z. DONG, University of Sydney
  J. ZHAO, University of Newcastle
  X. ZHANG, University of Sydney
  W. KONG, University of Sydney
  Y. CHEN, University of Newcastle

• 15PESGM1258, Adaptive Virtual Impedance Scheme for Selective Compensation of Voltage Unbalance and Harmonics in Microgrids
  M. SAVAGHEBI, Aalborg University
  Q. SHAFIEE, Aalborg University
  J. VASQUEZ, Aalborg University
  J. GUERRERO, Aalborg University
Thursday Afternoon, continued

- **15PESGM1636, Study of the IEC 61850 Protocol on Multiagent Systems for Power System Applications**
  J. LEITE, São Paulo State University
  J. MANTOVANI, São Paulo State University

- **15PESGM1709, Microgrid Security Assessment and Islanding Control by Support Vector Machine**
  Y. ZHU, University of Tennessee
  R. AZIM, University of Tennessee
  H. SALEEM, University of Tennessee
  K. SUN, University of Tennessee
  D. SHI, NEC Laboratories America, Inc.
  R. SHARMA, NEC Laboratories America, Inc.

- **15PESGM1783, Estimation of Customer Voltages for Planning of Conservation Voltage Reduction**
  O. LEITERMANN, Gridco Systems, Inc.
  V. MARTINELLI, Gridco Systems, Inc.
  J. SIMONELLI, Gridco Systems, Inc.

- **15PESGM1839, Distributed Multi-Agent Scheme to Enhance Cyber Security of Smart Power Grids**
  M. RAHMAN, UNSW Canberra
  H. POTA, UNSW Canberra
  M. MAHMUD, Swinburne University of Technology
  M. HOSSAIN, Griffith University
  T. ORCHI, Swinburne University of Technology

- **15PESGM1910, SMART Power Flow Controller for Smarter Grid Applications**
  K. SEN, Sen Engineering Solutions, Inc.
  M. SEN, Sen Engineering Solutions, Inc.

- **15PESGM2144, Improved Controller Design of Grid Friendly™ Appliances for Primary Frequency Response**
  J. LIAN, Pacific Northwest National Laboratory
  Y. SUN, Pacific Northwest National Laboratory
  L. MARINOVICI, Pacific Northwest National Laboratory
  K. KALSI, Pacific Northwest National Laboratory

- **15PESGM2362, Residential Electric Load Disaggregation for Low-Frequency Utility Applications**
  A. PALIZBAN, BCIT
  G. ZHANG, SFU
  H. FARHANGI, BCIT
  G. WANG, SFU

- **15PESGM2466, Smart Hybrid House Test Systems in a Solid-State Transformer Supplied Microgrid**
  J. YAN, NCSU
  X. ZHU, NCSU
  N. LU, NCSU

- **15PESGM2504, Planning Distribution Primary Feeders for Smart-Grid Operation via Network Flow Analysis**
  J. MORILLO CARRILLO, Universidad de los Andes
  J. PÉREZ, Imperial College London
  N. QUIJANO, Universidad de los Andes
  A. CADENA, Universidad de los Andes

- **15PESGM2540, DC Distribution Systems for Homes**
  S. IYER, University of British Columbia
  W. DUNFORD, University of British Columbia
  M. ORDONEZ, University of British Columbia

- **15PESGM2573, Robust Power Injection Control of Distributed Generators in an Islanded LVDC Microgrid**
  A. MORENO, Universidad Nacional de Colombia
  E. MOJICA-NAVA, Universidad Nacional de Colombia

- **15PESGM2674, Experimental Implementation of Multi-Agent System Algorithm to Prevent Cascading Failure after N-1-1 Contingency in Smart Grid Systems**
  A. BABALOLA, Tennessee Technological University
  R. BELKACEMI, Tennessee Technological University
  S. ZARRABIAN, Tennessee Technological University
Review of Standards/Guides Produced by the Hydroelectric Power Subcommittee (panel)

Thursday, 30 July, 3:00 PM–5:00 PM  Governor’s Square 9
Sponsored by:  Energy Development and Power Generation Committee
Chair:  J. ANDERS, Black & Veatch

Review of the standards/guides produced by the Hydroelectric Power Subcommittee. Members of the subcommittee will provide insight on the content of the standards/guides and their application.

1. IEEE 1147 – Guide for the Rehabilitation of Hydroelectric Power Plants
2. IEEE 810 – Standard for Hydraulic Turbine and Generator Integrally Forged Shaft Coupling and Shaft Runout Tolerances
3. IEEE 1095 – Guide for Installation of Vertical Generators and Generator /Motors for Hydroelectric Application
5. IEEE 1207 – Guide for the Application of Turbine Governing Systems for Hydroelectric Generating Units
6. IEEE 125 – Recommended Practice for Preparation of Equipment Specifications for Speed Governing of Hydraulic Turbines Intended to Drive Electric Generators
7. IEEE 1010 – Guide for Control of Hydroelectric Power Plants

PRESENTATIONS AND PANELISTS:

• 15PESGM2877, P1147 Guide for the Rehabilitation of Hydroelectric Power Plants
  R. GROVES, Grant County Public Utility District
• 15PESGM2879, P1248 Guide for the Commissioning of Electrical Systems in Hydroelectric Power Plants
  J. YALE, Chelan County PUD
• 15PESGM2880, P1249
  J. VOLK, Segirty Consulting
• 15PESGM2878, P1827 – Guide for Electrical & Control Design of Hydroelectric Water Conveyance Facilities
  E. VAUGHN, Bureau of Reclamation Technical Service Center
• 15PESGM2881, Hydro Controls and Governors
  M. BERGERON, Alstom
Chair and Author Index, continued

Baghsorkhi, S. 78
Baghzouz, Y. 99
Bahaj, A. 51
Baheti, R. 53
Bai, E. 61
Bai, H. 69
Bai, J. 162
Bai, L. 90
Bai, L. 100
Bai, L. 114
Bai, W. 90
Bai, W. 115
Bai, Y. 85
Bai, Y. 118
Bajpai, P. 125
Bajracharya, L. 93
Bais, D. 86
Bak, C. 150
Bakirtzis, A. 105
Bakirtzis, A. 180
Bak-Jensen, B. 86
Balasubramaniam, K. 59
Balasubramanian, P. 113
Baldick, R. 55
Baldick, R. 93
Baldick, R. 205
Balducci, P. 60
Bandara, K. 114
Bandara, K. 114
Banerjee, B. 150
Banerjee, B. 130
Banerjee, B. 130
Banerjee, B. 150
Banka, M. 211
Banunaranayanan, V. 88
Bao, Y. 59
Bao, Y. 97
Baone, C. 96
Baran, M. 172
Barati, F. 169
Bareux, G. 160
Bark-Jensen, B. 86
Bargs, J. 66
Barik, M. 87
Barnes, F. 192
Barnett, S. 151
Barone, G. 86
Baros, S. 82
Bard, J. 116
Barrado-Rodrigo, J. 152
Barroso, L. 84
Barroso, L. 123
Barroso, L. 183
Barrows, C. 93
Bartlett, A. 117
Barzagaran, M. 193
Barzagaran, M. 194
Basler, M. 180
Basu, C. 202
Bates, C. 72
Battistelli, C. 199
Baudette, M. 171
Bauer, P. 76
Bauer, P. 157
Bautista Aldere, G. 181
Bayfield, C. 203
Bayne, S. 170
Bazargan, D. 136
Bazzi, A. 103
Beaudry, R. 91
Beerten, J. 60
Begovic, M. 50
Begovic, M. 178
Beierle, C. 73
Beihoff, B. 174
Belanger, J. 153
Belchior, F. 110
Belhomme, R. 143
Belkacemi, R. 83
Belkacemi, R. 212
Belli, G. 66
Ben Hamed, H. 77
Bengani, S. 83
Bennett, G. 207
Bennion, K. 159
Benson, B. 175
Bergen, M. 213
Bernal, F. W. 115
Bernaerd, W. 103
Berzoy, A. 84
Best, R. 91
Bettoli, A. 58
Bezerra, B. 120
Bhadra, M. 73
Bhakar, R. 101
Bhakar, R. 195
Bhaskara, S. 176
Bhatt, S. 83
Bhattacharya, K. 88
Bhattacharya, K. 99
Bhatta, I. 107
Bhattacharya, S. 51
Bhattacharya, S. 89
Bl, T. 132
Bl, T. 136
Blak, J. 144
Bian, D. 75
Bian, J. 146
Bian, J. 156
Bianchi, F. 137
Blie, Z. 127
Bielchev, I. 211
Biestosciuk, D. 103
Billinton, R. 205
Billo, J. 169
Billo, J. 190
Bim, E. 193
Bindewald, G. 135
Binder, H. 64
BINDER, H. 211
Biquez, F. 116
Birman, K. 183
Bitaraf, H. 67
Bizrath, H. 70
Bizzauyeh, A. 62
Blaboerg, F. 74
Black, J. 200
Bledow, J. 205
Blanchard, L. 55
Blavette, A. 51
Blavette, A. 77
Blevins, B. 85
Blevins, B. 123
Bloom, A. 53
Blyden, B. 76
Bo, R. 68
Bo, R. 124
Bo, R. 169
Bo, R. 201
Bo, R. 206
Bo, Z. 131
Bodson, M. 117
Boilott, M. 52
Boilott, M. 63
Bojanic, B. 107
Bojorquez, W. 57
Boillot, M. 150
Boillot, M. 152
Boillot, M. 186
Boillot, M. 196
Bonato, B. 70
Borges, D. 64
Borges, N. 102
Borodulin, M. 189
Boroojeni, K. G. 66
Boroughs, D. 133
Böre Eriksen, P. 70
Bortoni, E. 65
Bortoni, E. 71
Bose, A. 144
Bose, A. 156
Bosman, P. 102
Bosshard, F. 129
Bothwell, C. 94
Bottenus, A. 140
Bouffard, F. 185
Bourgignon, P. 64
Bowler, C. 168
Bowman, B. 78
Boyce, B. 188
Boyd, J. 169
Boyer, R. 124
Boyd, M. 176
Bragin, M. 151
Brahma, S. 48
Brahma, S. 77
Brahma, S. 125
Brahma, S. 165
Brahma, S. 175
Braun, M. 50
Braun, M. 139
Braunstein, S. 99
Bravo, R. 104
Brazil, M. 75
Breidenbaugh, A. 52
Breidenbaugh, A. 209
Breken, T. 51
Breken, T. 76
Breken, T. 77
Bretas, A. 58
Bretas, A. 99
Bretas, N. 99
Briegleb, F. 187
Bright, C. 177
Brinkman, G. 70
Britton, J. 193
Broadwater, R. 151
Brochu, J. 157
Brodén, D. 188
Brodersen, R. 189
Brooks, D. 129
Brown, D. 124
Brown, D. 175
Brown, M. 90
Brown, R. 169
Bryson, G. 188
Bu, G. 196
Bubshait, A. 105
Bucher, M. 62
Bubol, R. 129
Bulbul, R. 104
Burgess, T. 169
Burke, D. 52
Burr, D. 143
Burr, M. 155
Burroughs, J. 54
Burt, G. 94
<table>
<thead>
<tr>
<th>Author</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cox</td>
<td>79</td>
</tr>
<tr>
<td>China</td>
<td>108</td>
</tr>
<tr>
<td>Chirapongsanurak</td>
<td>79</td>
</tr>
<tr>
<td>Choi</td>
<td>81</td>
</tr>
<tr>
<td>Choi</td>
<td>86</td>
</tr>
<tr>
<td>Choi</td>
<td>103</td>
</tr>
<tr>
<td>Chokani</td>
<td>97</td>
</tr>
<tr>
<td>Chompoobuttrong, Y.</td>
<td>122</td>
</tr>
<tr>
<td>Chow</td>
<td>116</td>
</tr>
<tr>
<td>Chow</td>
<td>122</td>
</tr>
<tr>
<td>Chow</td>
<td>122</td>
</tr>
<tr>
<td>Chow</td>
<td>139</td>
</tr>
<tr>
<td>Chowdhury</td>
<td>60</td>
</tr>
<tr>
<td>Chowdhury</td>
<td>161</td>
</tr>
<tr>
<td>Chowdhury</td>
<td>176</td>
</tr>
<tr>
<td>Chowdhury</td>
<td>182</td>
</tr>
<tr>
<td>Christofidis, G.</td>
<td>193</td>
</tr>
<tr>
<td>Chu</td>
<td>86</td>
</tr>
<tr>
<td>Chu</td>
<td>176</td>
</tr>
<tr>
<td>Chu</td>
<td>74</td>
</tr>
<tr>
<td>Chuán</td>
<td>139</td>
</tr>
<tr>
<td>Chung</td>
<td>71</td>
</tr>
<tr>
<td>Chung</td>
<td>122</td>
</tr>
<tr>
<td>Ciappassoni, E.</td>
<td>168</td>
</tr>
<tr>
<td>Ciniglio</td>
<td>206</td>
</tr>
<tr>
<td>Ciniglio, O.</td>
<td>67</td>
</tr>
<tr>
<td>Cintuglu, M.</td>
<td>114</td>
</tr>
<tr>
<td>Clancy</td>
<td>70</td>
</tr>
<tr>
<td>Clark</td>
<td>79</td>
</tr>
<tr>
<td>Clark</td>
<td>79</td>
</tr>
<tr>
<td>Clements, K.</td>
<td>138</td>
</tr>
<tr>
<td>Clerc</td>
<td>153</td>
</tr>
<tr>
<td>Codani</td>
<td>62</td>
</tr>
<tr>
<td>Codani</td>
<td>115</td>
</tr>
<tr>
<td>Coddington, P.</td>
<td>86</td>
</tr>
<tr>
<td>Coffin</td>
<td>64</td>
</tr>
<tr>
<td>Cokutay, G.</td>
<td>211</td>
</tr>
<tr>
<td>Colas</td>
<td>190</td>
</tr>
<tr>
<td>Cole</td>
<td>200</td>
</tr>
<tr>
<td>Colwell</td>
<td>170</td>
</tr>
<tr>
<td>Conejo</td>
<td>178</td>
</tr>
<tr>
<td>Conrad</td>
<td>129</td>
</tr>
<tr>
<td>Conradi</td>
<td>142</td>
</tr>
<tr>
<td>Conte</td>
<td>137</td>
</tr>
<tr>
<td>Conto</td>
<td>190</td>
</tr>
<tr>
<td>Contreras, J.</td>
<td>62</td>
</tr>
<tr>
<td>Contreras, J.</td>
<td>101</td>
</tr>
<tr>
<td>Contreras, J.</td>
<td>130</td>
</tr>
<tr>
<td>Contreras, J.</td>
<td>139</td>
</tr>
<tr>
<td>Cooke, T.</td>
<td>64</td>
</tr>
<tr>
<td>Cooke, T.</td>
<td>128</td>
</tr>
<tr>
<td>Cooke, T.</td>
<td>196</td>
</tr>
<tr>
<td>Coppock, B.</td>
<td>140</td>
</tr>
<tr>
<td>Corea-Araujo</td>
<td>152</td>
</tr>
<tr>
<td>Corliss, G.</td>
<td>169</td>
</tr>
<tr>
<td>Corea-Posada, C.</td>
<td>60</td>
</tr>
<tr>
<td>Corson, G.</td>
<td>98</td>
</tr>
<tr>
<td>Corson, L.</td>
<td>112</td>
</tr>
<tr>
<td>Cortes De Almeida, M.</td>
<td>132</td>
</tr>
<tr>
<td>Cortés De Almeida, M.</td>
<td>86</td>
</tr>
<tr>
<td>Cortes, A.</td>
<td>189</td>
</tr>
<tr>
<td>Cotilla-Sanchez, E.</td>
<td>148</td>
</tr>
<tr>
<td>Coury, D.</td>
<td>88</td>
</tr>
<tr>
<td>Corson, L.</td>
<td>112</td>
</tr>
<tr>
<td>Coutinho, M.</td>
<td>64</td>
</tr>
<tr>
<td>Couture, P.</td>
<td>157</td>
</tr>
<tr>
<td>Cox, R.</td>
<td>79</td>
</tr>
<tr>
<td>Cramer, Z.</td>
<td>105</td>
</tr>
<tr>
<td>Craven, R.</td>
<td>83</td>
</tr>
<tr>
<td>Cress, S.</td>
<td>98</td>
</tr>
<tr>
<td>Cross, R.</td>
<td>183</td>
</tr>
<tr>
<td>Crow, M.</td>
<td>136</td>
</tr>
<tr>
<td>Crow, M.</td>
<td>180</td>
</tr>
<tr>
<td>Cuffe, P.</td>
<td>157</td>
</tr>
<tr>
<td>Cui, H.</td>
<td>98</td>
</tr>
<tr>
<td>Cui, H.</td>
<td>115</td>
</tr>
<tr>
<td>Cui, M.</td>
<td>67</td>
</tr>
<tr>
<td>Cui, M.</td>
<td>190</td>
</tr>
<tr>
<td>Cui, Y.</td>
<td>107</td>
</tr>
<tr>
<td>Cui, Y.</td>
<td>110</td>
</tr>
<tr>
<td>Culliss, J.</td>
<td>58</td>
</tr>
<tr>
<td>Cummings, B.</td>
<td>148</td>
</tr>
<tr>
<td>Cummings, B.</td>
<td>161</td>
</tr>
<tr>
<td>Cummings, B.</td>
<td>171</td>
</tr>
<tr>
<td>Cupelli, M.</td>
<td>76</td>
</tr>
<tr>
<td>Cupelli, M.</td>
<td>144</td>
</tr>
<tr>
<td>Cutululis, N.</td>
<td>60</td>
</tr>
<tr>
<td>Cvetkovic, M.</td>
<td>134</td>
</tr>
<tr>
<td>Cvicj, S.</td>
<td>61</td>
</tr>
<tr>
<td>Cvicj, S.</td>
<td>199</td>
</tr>
<tr>
<td>Czapp, S.</td>
<td>153</td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
<tr>
<td>D'Agostino, F.</td>
<td>73</td>
</tr>
<tr>
<td>D'Aquila, R.</td>
<td>79</td>
</tr>
<tr>
<td>Da Costa, G. R. M.</td>
<td>96</td>
</tr>
<tr>
<td>Da Silva, L. P.</td>
<td>73</td>
</tr>
<tr>
<td>Da Silveira, P.</td>
<td>75</td>
</tr>
<tr>
<td>Da Silveira, P.</td>
<td>95</td>
</tr>
<tr>
<td>Dabic, V.</td>
<td>151</td>
</tr>
<tr>
<td>Dabic, V.</td>
<td>172</td>
</tr>
<tr>
<td>Dadash Zadeh, M.</td>
<td>94</td>
</tr>
<tr>
<td>Dale, J.</td>
<td>122</td>
</tr>
<tr>
<td>Dai, N.</td>
<td>104</td>
</tr>
<tr>
<td>Dai, N.</td>
<td>200</td>
</tr>
<tr>
<td>Dai, Q.</td>
<td>168</td>
</tr>
<tr>
<td>Dai, R.</td>
<td>86</td>
</tr>
<tr>
<td>Dai, Z.</td>
<td>97</td>
</tr>
<tr>
<td>Dainez, P.</td>
<td>193</td>
</tr>
<tr>
<td>Dalal, A.</td>
<td>98</td>
</tr>
<tr>
<td>Dalal, A.</td>
<td>150</td>
</tr>
<tr>
<td>Dalhues, S.</td>
<td>73</td>
</tr>
<tr>
<td>Dallanese, E.</td>
<td>185</td>
</tr>
<tr>
<td>Dalske, L.</td>
<td>180</td>
</tr>
<tr>
<td>Damavandi, M.</td>
<td>101</td>
</tr>
<tr>
<td>Danesh, A.</td>
<td>73</td>
</tr>
<tr>
<td>Daneshkia, D.</td>
<td>111</td>
</tr>
<tr>
<td>Dang, X.</td>
<td>62</td>
</tr>
<tr>
<td>Daniel, J.</td>
<td>91</td>
</tr>
<tr>
<td>Danielsson, J.</td>
<td>58</td>
</tr>
<tr>
<td>Dardego, V. P.</td>
<td>132</td>
</tr>
<tr>
<td>Daryabak, M.</td>
<td>185</td>
</tr>
<tr>
<td>Das, K.</td>
<td>190</td>
</tr>
<tr>
<td>Das, R.</td>
<td>144</td>
</tr>
<tr>
<td>Dasgupta, S.</td>
<td>186</td>
</tr>
<tr>
<td>Davenhauser, P.</td>
<td>47</td>
</tr>
<tr>
<td>Davenhauser, P.</td>
<td>55</td>
</tr>
<tr>
<td>Davenhauser, P.</td>
<td>134</td>
</tr>
<tr>
<td>Davenhauser, P.</td>
<td>154</td>
</tr>
<tr>
<td>Davenhauser, P.</td>
<td>173</td>
</tr>
<tr>
<td>Davi Curi Busarello, T.</td>
<td>70</td>
</tr>
<tr>
<td>Davies, D.</td>
<td>178</td>
</tr>
<tr>
<td>Davoudi, A.</td>
<td>185</td>
</tr>
<tr>
<td>Dayal, A.</td>
<td>85</td>
</tr>
<tr>
<td>De Carne, G.</td>
<td>74</td>
</tr>
<tr>
<td>De Hoog, J.</td>
<td>75</td>
</tr>
<tr>
<td>De Jaeger, E.</td>
<td>201</td>
</tr>
<tr>
<td>De La Nieta, A.</td>
<td>62</td>
</tr>
<tr>
<td>De La Nieta, A.</td>
<td>130</td>
</tr>
<tr>
<td>De Melo Vieira, J.</td>
<td>103</td>
</tr>
<tr>
<td>De Montigny, M.</td>
<td>202</td>
</tr>
<tr>
<td>De Moraes, C.</td>
<td>64</td>
</tr>
<tr>
<td>De Paz Carro, M.</td>
<td>76</td>
</tr>
<tr>
<td>De Quevedo, P.</td>
<td>62</td>
</tr>
<tr>
<td>De Vasconcelos, F. M.</td>
<td>96</td>
</tr>
<tr>
<td>Deaver, B.</td>
<td>47</td>
</tr>
<tr>
<td>Deconinck, O.</td>
<td>56</td>
</tr>
<tr>
<td>Deering, M.</td>
<td>55</td>
</tr>
<tr>
<td>Deese, A.</td>
<td>176</td>
</tr>
<tr>
<td>Deffely, R.</td>
<td>104</td>
</tr>
<tr>
<td>Degela, M.</td>
<td>72</td>
</tr>
<tr>
<td>Dehghanpour, K.</td>
<td>115</td>
</tr>
<tr>
<td>Dehkiordi, A.</td>
<td>179</td>
</tr>
<tr>
<td>Dehkiordi, P. Z.</td>
<td>113</td>
</tr>
<tr>
<td>Deib, A.</td>
<td>168</td>
</tr>
<tr>
<td>Deka, D.</td>
<td>55</td>
</tr>
<tr>
<td>Del La Rea, J.</td>
<td>83</td>
</tr>
<tr>
<td>Del Rosso, A.</td>
<td>83</td>
</tr>
<tr>
<td>Delandre, M.</td>
<td>63</td>
</tr>
<tr>
<td>Delbem, A.</td>
<td>60</td>
</tr>
<tr>
<td>Delport, J.</td>
<td>83</td>
</tr>
<tr>
<td>Deng, R.</td>
<td>139</td>
</tr>
<tr>
<td>Deng, X.</td>
<td>107</td>
</tr>
<tr>
<td>Deng, Y.</td>
<td>85</td>
</tr>
<tr>
<td>Denholm, P.</td>
<td>70</td>
</tr>
<tr>
<td>Denholm, P.</td>
<td>138</td>
</tr>
<tr>
<td>Denis, G.</td>
<td>90</td>
</tr>
<tr>
<td>Dennetiere, S.</td>
<td>153</td>
</tr>
<tr>
<td>Dennetiere, S.</td>
<td>162</td>
</tr>
<tr>
<td>Dent, C.</td>
<td>103</td>
</tr>
<tr>
<td>Dent, C.</td>
<td>144</td>
</tr>
<tr>
<td>Dent, C.</td>
<td>200</td>
</tr>
<tr>
<td>Desilets, B.</td>
<td>205</td>
</tr>
<tr>
<td>Devlin, P.</td>
<td>189</td>
</tr>
<tr>
<td>Dhople, S.</td>
<td>81</td>
</tr>
<tr>
<td>Dhople, S.</td>
<td>185</td>
</tr>
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<td>91</td>
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<td>Dimitrovski, A.</td>
<td>95</td>
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<td>Dimoulkas, I.</td>
<td>130</td>
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<td>186</td>
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<td>Ding, C.</td>
<td>153</td>
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<td>46</td>
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<td>136</td>
</tr>
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<td>Dingxiang, D.</td>
<td>94</td>
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<td>Distani, V.</td>
<td>68</td>
</tr>
<tr>
<td>Distani, V.</td>
<td>101</td>
</tr>
<tr>
<td>Diwold, K.</td>
<td>139</td>
</tr>
</tbody>
</table>
Fernandes, T. 100
Fernandes, T. 82
Fernandes, T. 151
Fernandes, T. 171
Ferreira, G. 58
Ferreira, J. 76
Ferreira, R. 120
Ferreira, R. 124
Ferreira, R. 132
Ferris, M. 60
Ferris, M. 130
Fidal, M. 86
Fidal, M. H. 114
Figueroa, A. 115
Filizadeh, S. 136
Filizadeh, S. 179
Filizadeh, S. 185
Fioravanti, R. 209
Fischer, M. 129
Fitzpatrick, G. 193
Fletcher, I. 93
Florita, A. 57
Florita, A. 190
Fleck, A. 102
Flynn, D. 56
Flynn, D. 60
Flynn, D. 121
Flynn, D. 162
Foley, A. 61
Foley, A. 91
Foley, A. 189
Folium, J. 56
Folium, J. 139
Foo, Y. 144
Foo, Y. 187
Fox, M. 171
Fortmann, J. 133
Fortmann, J. 159
Fournaz, E. 96
Fotahi-Firuzabad, M. 156
Fox, B. 91
Fozdar, M. 210
Frankeny, K. 123
Fraughton, K. 161
Freitas, W. 176
Frias, P. 176
Friend, F. 54
Fries, W. 68
Fu, W. 95
Fu, X. 96
Fu, X. 102
Fu, Y. 131
Fu, Y. 163
Fu, Y. 207
Fu, Z. 107
Fu, Z. 109
Fu, Z. 165
Fuchs, K. 171
Fuerte-Espinoz, C. 135
Fujita, G. 108
Fujita, T. 166
Funabashi, T. 108
Furumusu, B. 19

G

Gad, A. 94
Gad, R. 74
Gahr, M. 83
Galkwad, A. 124
Galdi, V. 90
Gan, D. 75
Gan, D. 170
Gan, L. 207
Ganguly, S. 99
Ganguly, S. 139
Gantz, J. 174
Gantz, J. 176
Gao, D. 67
Gao, F. 104
Gao, H. 95
Gao, L. 56
Gao, L. 107
Gao, N. 101
Gao, N. 106
Gao, S. 58
Gao, S. 92
Gao, W. 57
Gao, W. 59
Gao, W. 61
Gao, W. 65
Gao, W. 91
Gao, W. 163
Gao, W. 165
Gao, W. 182
Gao, W. 192
Gao, X. 170
Gao, Z. 97
Gao, Z. 113
Garcia, J. 58
Garcia, M. 55
Garcia-González, J. 147
Garcia-González, P. 176
Gardner, A. 56
Gardner, A. 195
Gardner, M. 123
Gardner, M. 123
Garg, A. 189
Gavriluta, C. 211
Gazzana, D. 58
Ge, S. 131
Ge, Y. 118
Gedney, S. 118
Gegganage, J. 137
Geipel, D. 139
Gemell, B. 54
Geng, G. 185
Geng, H. 182
Geng, X. 129
Geng, Z. 58
Gente, J. 110
Gerald, J. E. 56
Gerald, J. E. 82
Gevorgian, V. 69
Gevorgian, V. 108
Ghaddar, B. 125
Ghaderi, A. 187
Ghahremani, E. 136
Ghahremani, E. 153
Ghanbari, N. 88
Gharehpetian, G. 163
Ghazvazdeh, M. 209
Ghiga, R. 83
Ghofrani, M. 58
Ghorbani, R. 110
Ghorbaniparvar, M. 80
Ghorbaniparvar, M. 116
Ghosh, P. 81
Ghosh, S. 81
Giacomoni, A. 176
Giani, A. 55
Giannakis, G. 178
Giannakis, G. 185
Gibescu, M. 125
Giesseleman, M. 170
Gil, E. 124
Girchrist, G. 47
Ginn, H. 125
Giraldez, J. 86
Giraldo, J. 97
Giri, J. 121
Glaesemann, K. 97
Glavic, M. 135
Onanam, G. 169
Go, S. 186
Godfrey, T. 201
Godoy Simões, M. 59
Godoy Simões, M. 70
Goel, S. 189
Gokaraju, R. 125
Gobalzi, A. 68
Goldsmith, A. 195
Gole, A. 136
Gole, A. 196
Golestanef, H. 91
Golshani, A. 93
Golshani, A. 130
Gomez, F. 171
Gomé, T. 166
Gómez-Expósito, A. 140
Gomez-Lazo, L. 69
Gomez-Lazo, E. 121
Gomez-Lazo, E. 174
Gomez-Quiles, C. 140
Gomi, T. 113
Gomis-Bellmunt, O. 179
Gomis-Bellmunt, O. 137
Gong, C. 105
Gonzalez, F. 108
Gonzalez, F. 152
Gonzalez, X. 87
Gonzalez-Longatt, F. 71
Gonzalez-Slezak-Morán, C. 60
Goodfellow, R. 53
Gool, H. 91
Gool, H. 144
Gool, H. 156
Gool, H. 187
Gopalakrishnan, A. 48
Grenevésky, D. 130
Gorur, R. 145
Gosinski, L. 58
Gottseff, P. 86
Gou, J. 82
Gouin, V. 93
Govindarasu, M. 53
Govindarasu, M. 72
Govindarasu, M. 90
Govindarasu, M. 126
Gracia, J. 93
Gras, H. 97
Gras, H. 98
Grassman, H. 63
Green, J. 129
Green, I. 167
Green, J. 200
Green, R. 158
Green, T. 57
Grijalva, S. 149
Grijalva, S. 174
Grijalva, S. 189
Grillo, S. 137
Grond, M. 102
Gross, G. 184
<table>
<thead>
<tr>
<th>Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haghifam, M.</td>
<td>209</td>
</tr>
<tr>
<td>Gu, C.</td>
<td>69</td>
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<td>61</td>
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<td>163</td>
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<td>169</td>
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<td>210</td>
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<td>85</td>
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<td>185</td>
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<td>94</td>
</tr>
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<td>67</td>
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<tr>
<td>Guasch-Pesquer, L.</td>
<td>152</td>
</tr>
<tr>
<td>Gubina, A.</td>
<td>207</td>
</tr>
<tr>
<td>Guerrero, J.</td>
<td>73</td>
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<td>Guerrero, J.</td>
<td>81</td>
</tr>
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<td>Guerrero, J.</td>
<td>211</td>
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<td>74</td>
</tr>
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<td>57</td>
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<td>Gugel, H.</td>
<td>168</td>
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<td>169</td>
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<td>71</td>
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<td>Guillaud, X.</td>
<td>162</td>
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<td>Guillaud, X.</td>
<td>190</td>
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<td>202</td>
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<td>Gunasekaran, D.</td>
<td>107</td>
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<td>Gunther, E.</td>
<td>64</td>
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<tr>
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<td>155</td>
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<td>59</td>
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<td>84</td>
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<td>96</td>
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<td>93</td>
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<td>124</td>
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<td>174</td>
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<td>175</td>
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<td>201</td>
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<td>138</td>
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<td>Guo, T.</td>
<td>181</td>
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<td>Guo, T.</td>
<td>206</td>
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<td>113</td>
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<td>103</td>
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<td>138</td>
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<td>76</td>
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<td>57</td>
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<td>144</td>
</tr>
<tr>
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<td>134</td>
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<tr>
<td>Guttmersom, R.</td>
<td>155</td>
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<td>Gyu Im, E.</td>
<td>165</td>
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</tbody>
</table>

**H**

<table>
<thead>
<tr>
<th>Name</th>
<th>Page</th>
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<tbody>
<tr>
<td>Hahne entitlement, T.</td>
<td>110</td>
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<td>176</td>
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<td>47</td>
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<td>194</td>
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<td>138</td>
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<td>123</td>
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<td>147</td>
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<td>148</td>
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<td>197</td>
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<td>96</td>
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<td>148</td>
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<td>48</td>
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<td>205</td>
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<td>130</td>
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<td>Heslop, S.</td>
<td>189</td>
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<td>Hess, H.</td>
<td>94</td>
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<td>Hess, T.</td>
<td>169</td>
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<td>198</td>
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<td>90</td>
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<td>145</td>
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<td>176</td>
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<td>Heydt, G.</td>
<td>182</td>
</tr>
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<td>Hidaya, M.</td>
<td>67</td>
</tr>
<tr>
<td>Higgins, P.</td>
<td>189</td>
</tr>
<tr>
<td>Hikita, M.</td>
<td>128</td>
</tr>
<tr>
<td>Hofmann, M.</td>
<td>127</td>
</tr>
<tr>
<td>Hill, D.</td>
<td>177</td>
</tr>
<tr>
<td>Hill, D.</td>
<td>188</td>
</tr>
<tr>
<td>Hill, E.</td>
<td>207</td>
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<tr>
<td>Hill, J.</td>
<td>202</td>
</tr>
<tr>
<td>Hiller, D.</td>
<td>192</td>
</tr>
<tr>
<td>Hilley, A.</td>
<td>189</td>
</tr>
<tr>
<td>Hilsap, R.</td>
<td>194</td>
</tr>
<tr>
<td>Hinchliffe, T.</td>
<td>200</td>
</tr>
<tr>
<td>Hines, P.</td>
<td>148</td>
</tr>
<tr>
<td>Hines, P.</td>
<td>171</td>
</tr>
<tr>
<td>Hines, P.</td>
<td>195</td>
</tr>
<tr>
<td>Hinge, T.</td>
<td>94</td>
</tr>
<tr>
<td>Hiramatsu, D.</td>
<td>142</td>
</tr>
<tr>
<td>Hiskes, I.</td>
<td>147</td>
</tr>
<tr>
<td>Hodge, B.</td>
<td>57</td>
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<tr>
<td>Hodge, B.</td>
<td>88</td>
</tr>
<tr>
<td>Hobb, B.</td>
<td>143</td>
</tr>
<tr>
<td>Hobb, B.</td>
<td>145</td>
</tr>
<tr>
<td>Hobb, B.</td>
<td>158</td>
</tr>
<tr>
<td>Hodge, B.</td>
<td>190</td>
</tr>
<tr>
<td>Hodge, B.-M.</td>
<td>62</td>
</tr>
<tr>
<td>Hoffmann, P.</td>
<td>63</td>
</tr>
<tr>
<td>Hofmann, L.</td>
<td>88</td>
</tr>
<tr>
<td>Hoke, A.</td>
<td>60</td>
</tr>
<tr>
<td>Holbert, K.</td>
<td>109</td>
</tr>
<tr>
<td>Holbert, K.</td>
<td>130</td>
</tr>
<tr>
<td>Holmbach, V.</td>
<td>201</td>
</tr>
<tr>
<td>Hottinen, H.</td>
<td>70</td>
</tr>
<tr>
<td>Hottinen, H.</td>
<td>121</td>
</tr>
<tr>
<td>Hottinen, H.</td>
<td>190</td>
</tr>
<tr>
<td>Homma, R.</td>
<td>58</td>
</tr>
<tr>
<td>Honarmand, M.</td>
<td>209</td>
</tr>
<tr>
<td>Honeth, U.</td>
<td>138</td>
</tr>
<tr>
<td>Honeth, N.</td>
<td>188</td>
</tr>
<tr>
<td>Hong, J.</td>
<td>118</td>
</tr>
<tr>
<td>Hong, L.</td>
<td>61</td>
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<tr>
<td>Name</td>
<td>Page</td>
</tr>
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<tr>
<td>Huang, A</td>
<td>180</td>
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<td>Hu, X</td>
<td>107</td>
</tr>
<tr>
<td>Hu, W</td>
<td>190</td>
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<tr>
<td>Hu, Q</td>
<td>180</td>
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<td>83</td>
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<td>89</td>
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<td>93</td>
</tr>
<tr>
<td>Hou, Y</td>
<td>148</td>
</tr>
<tr>
<td>Houseman, D</td>
<td>119</td>
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<td>Houseman, D</td>
<td>144</td>
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<td>160</td>
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<td>179</td>
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<td>Houseman, D</td>
<td>191</td>
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<td>203</td>
</tr>
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<td>69</td>
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<td>145</td>
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<td>88</td>
</tr>
<tr>
<td>Hsu, L</td>
<td>92</td>
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<td>111</td>
</tr>
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<td>65</td>
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<td>114</td>
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<td>130</td>
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<td>136</td>
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<td>Husain, D</td>
<td>152</td>
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<td>Husain, I</td>
<td>190</td>
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<tr>
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<td>106</td>
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</tr>
<tr>
<td>Lubosny, Z. .............................</td>
</tr>
</tbody>
</table>
Nedellec, R. .......................... 165
Negash, A. .......................... 129
Negash, A. .......................... 195
Negnevitsky, M. ...................... 61
Negnevitsky, M. ...................... 65
Negnevitsky, M. ...................... 85
Negnevitsky, M. ...................... 181
Negnevitsky, M. ...................... 182
Negrete-Pincetic, M. .............. 75
Negrete-Pincetic, M. .............. 120
Negrete-Pincetic, M. .............. 188
Neha, N. ............................. 117
Nehrir, H. ............................. 162
Nekkalapu, S. ....................... 65
Nelson, J. ............................. 62
Nelson, R. ............................. 120
Nelson, R. ............................. 132
Nelson, R. ............................. 167
Nelson, R. ............................. 187
Nepal, S. ................................ 112
Nethercutt, E. ......................... 169
Neti, P. ................................ 159
Neumann, T. .......................... 56
Nevejani, N. ........................... 101
Ng, T. .................................. 15
Ngoc An, L. ........................... 74
Nguefou, S. ............................ 157
Nguefou, S. ............................ 162
Nguyen Duc, T. ...................... 108
Nguyen Duc, T. ...................... 106
Nguyen, C. ............................. 102
Nguyen, H. ............................. 70
Nguyen, Q. ............................. 151
Nguyen-Dinh, C. ..................... 82
Nguyen-Duc, H. ........................ 82
Nguyen-Xuan-Hoang, V. ........ 82
Ni, M. .................................. 89
Ni, Z. ................................... 106
Niazi, K. ............................... 87
Niazi, K. ............................... 201
Nie, L. .................................. 95
Niemira, J. ............................. 48
Nikkhah Moidahi, M. ............. 188
Nikolai, S. ............................. 167
Niranjana, S. ........................... 102
Nirad, N. ............................... 105
Ning, J. ................................ 82
Ning, J. ................................ 83
Ning, J. ................................ 91
Niu, Y. ................................. 201
Noda, T. ............................... 196
Nolan, S. ............................... 209
Nomura, T. ............................. 105
Nong, J. ................................ 91
Noorizadeh, M. ...................... 116
Nordström, L. ......................... 86
Nordström, L. ......................... 106
Nordström, L. ......................... 188
Nordström, L. ......................... 210
Norniella, J. G. ....................... 100
Novosel, D. ............................ 62
Novosel, D. ............................ 144
Novosel, D. ............................ 172
Novotarski, J. ......................... 184
Ntakou, E. ............................. 137
Nunes, B. .............................. 71
Nuthalapati, S. ....................... 121
Nuthalapati, S. ....................... 122
Nuthalapati, S. ....................... 123
Nuthalapati, S. ....................... 138
Nwankpa, C. ......................... 202
O'Malley, M. ......................... 123
O’Malley, M. ......................... 135
O’Malley, M. ......................... 209
O’Neill, B. ............................. 204
O’Sullivan, D. ......................... 77
Obadina, D. ........................... 61
Obadina, D. ........................... 77
Ocana, J. E. C. ....................... 111
Ochoa, L. .............................. 93
Ochoa, L. .............................. 108
Ochoa, L. .............................. 164
Ochoa, L. .............................. 188
Ogunbeye, B. ......................... 206
Oh, H. ................................ 156
Ohio, M. ............................... 194
Ojeda, N. ............................... 83
Oleszkovicz, M. ...................... 88
Oliveira, R. ........................... 81
Oliveira, R. ........................... 162
Olsen, S. ............................... 171
Omi, S. ................................. 152
Onyewuchi, U. ....................... 196
Oo, A. ................................ 79
Oo, B. ................................ 67
Ooi, B. ................................. 106
Ooshima, M. ......................... 141
Ooshima, M. ......................... 142
Opathella, C. ......................... 156
Orcajo, G. A. ......................... 108
Orch, T. ............................... 212
Ordonez, M. ......................... 212
Oren, S. ............................... 88
Oren, S. ............................... 149
Orr, J. ................................. 151
Ortega, A. ............................. 201
Ortega-Vazquez, M. ............... 68
Ortega-Vazquez, M. ............... 148
Ortega-Vazquez, M. ............... 163
Ortega-Vazquez, M. ............... 176
Ortega-Vazquez, M. ............... 188
Ortega-Vazquez, M. ............... 194
Orths, A. .............................. 70
Orths, A. .............................. 121
Orths, A. .............................. 159
Osama, R. ............................. 170
Osipov, D. ............................ 82
Osório, G. ............................. 59
Ostergaard, J. ......................... 79
Ostergaard, J. ......................... 80
Othman, M. ........................... 68
Ottremba, L. ......................... 210
Ott, A. ................................. 135
Ott, A. ................................. 209
Ottens, E. ............................. 71
Otto, R. ............................... 210
Ottukuloth, S. ....................... 68
Ouriachi, A. ......................... 130
Ouyang, S. ........................... 202
Ouyang, W. ........................... 213
Overbye, T. ........................... 82
Overholt, P. .......................... 148
Overman, T. ......................... 126
Pacher, C. ............................ 92
Packard, J. ........................... 82
Padhy, N. ............................. 123
Padhy, N. ............................. 99
Padmanabhan, M. ................. 202
Pahwa, A. ............................. 47
Pajic, A. .............................. 139
Pajic, S. .............................. 79
Pal, A. ................................. 73
Pal, B. ................................. 122
Pal, B. ................................. 144
Palensky, P. ......................... 166
Palizban, A. ......................... 170
Palizban, A. ......................... 212
Palma-Behnke, R. ................. 150
Palmintier, B. ....................... 166
Paissson, M. ......................... 171
Pan, C. ................................. 125
Pan, C. ................................. 165
Pan, J. ................................. 91
Pan, M. ............................... 80
Pan, Y. ................................. 56
Pan, Y. ................................. 96
Papachristodoulou, A. .......... 88
Papalexopoulos, A. ............... 53
Papavasiliou, A. .................... 140
Papavasiliou, A. .................... 151
Papic, I. ............................... 150
Papic, M. ............................. 104
Papic, M. ............................. 147
Papic, M. ............................. 148
Papic, M. ............................. 168
Papic, M. ............................. 172
Papic, M. ............................. 200
Paramasivam, M. ................. 186
Parashar, M. ......................... 83
Parashar, M. ......................... 185
Paredes, M. ......................... 156
Pathi, S. .............................. 117
Parida, S. ............................ 99
Park, C. ............................... 83
Park, S. ............................... 89
Park, S. G. ........................... 111
Pariks, J. ............................. 200
 Parsa Moghaddam, M. ........ 72
Parsons, W. .......................... 110
Parvania, M. ......................... 156
Parvania, M. ......................... 209
Pasco, S. ............................. 112
Passacantando, L. ................. 109
Passos, L. ............................ 58
Patel, B. .............................. 62
Patel, D. .............................. 71
Paterakis, N. ......................... 105
Paterakis, N. ......................... 180
Patterson, R. ......................... 95
Paudyal, S. ........................... 56
Paudyal, S. ........................... 99
Paul, A. .............................. 73
Pavani, A. ............................ 132
Pawajeri, A. ......................... 193
Peacock, M. ......................... 68
Peacock, M. ......................... 104
Peacock, M. ......................... 200
Peacock, M. ......................... 204
Chair and Author Index, continued
<table>
<thead>
<tr>
<th>Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ulatowski, A.</td>
<td>103</td>
</tr>
<tr>
<td>Ulbig, A.</td>
<td>127</td>
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<td>Ullah, N.</td>
<td>70</td>
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<td>Uluski, B.</td>
<td>167</td>
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<td>Uluski, B.</td>
<td>172</td>
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<td>Uluski, R.</td>
<td>47</td>
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<td>Uzuncan, E.</td>
<td>101</td>
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<td>Venkatesh, B.</td>
<td>156</td>
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<td>Venkatraman, E.</td>
<td>71</td>
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<td>Venkata, S.</td>
<td>144</td>
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<td>Venayagamoorthy, G. K.</td>
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<td>Velummylum, G.</td>
<td>144</td>
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<td>Velummylum, G.</td>
<td>105</td>
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<td>Vega, M.</td>
<td>109</td>
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<td>96</td>
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<td>Vakilian, M.</td>
<td>131</td>
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<td>Vakilian, M.</td>
<td>169</td>
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<td>Vaidya, U.</td>
<td>71</td>
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<td>Vaidya, U.</td>
<td>186</td>
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<td>Vain, M.</td>
<td>90</td>
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<td>Vain, M.</td>
<td>191</td>
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<td>Vain, M.</td>
<td>169</td>
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<td>Vain, M.</td>
<td>171</td>
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<td>Vakilzadian, H.</td>
<td>136</td>
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<td>Van Cutsem, T.</td>
<td>135</td>
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<td>Van Cutsem, T.</td>
<td>123</td>
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<tr>
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<td>98</td>
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<td>Van Der Meijden, M.</td>
<td>125</td>
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<tr>
<td>Van Hertem, D.</td>
<td>60</td>
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<td>Van Hertem, D.</td>
<td>122</td>
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<td>Van Hertem, D.</td>
<td>159</td>
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<td>Van Horn, K.</td>
<td>87</td>
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<td>Van Luijk, N.</td>
<td>204</td>
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<td>Van Velsen, G.</td>
<td>123</td>
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<tr>
<td>Van Zandt, D.</td>
<td>166</td>
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<td>Vanfretti, L.</td>
<td>79</td>
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<td>Vanfretti, L.</td>
<td>122</td>
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<td>123</td>
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<td>Vanfretti, L.</td>
<td>131</td>
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<td>170</td>
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<td>171</td>
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<td>Varghese, M.</td>
<td>57</td>
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<td>Varma, R.</td>
<td>110</td>
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<td>111</td>
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<td>Varma, R.</td>
<td>157</td>
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<td>Varma, R.</td>
<td>163</td>
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<td>Vasireddy, J.</td>
<td>211</td>
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<td>Vasireddy, J.</td>
<td>74</td>
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<tr>
<td>Vázquez, J.</td>
<td>81</td>
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<td>Vázquez, J.</td>
<td>175</td>
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<td>Vázquez, J.</td>
<td>213</td>
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<td>108</td>
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<td>Vázquez, E.</td>
<td>95</td>
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<td>Veda, S.</td>
<td>96</td>
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<td>Vega, M.</td>
<td>109</td>
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<td>Velumnylum, G.</td>
<td>105</td>
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<tr>
<td>Velumnylum, G.</td>
<td>169</td>
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<tr>
<td>Venayagamoorthy, G. K.</td>
<td>180</td>
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<tr>
<td>Venkatraman, S.</td>
<td>141</td>
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<tr>
<td>Venkatraman, R.</td>
<td>71</td>
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<td>Venne, P.</td>
<td>190</td>
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<tr>
<td>Ventre, J.</td>
<td>204</td>
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<tr>
<td>Vercord, P.</td>
<td>73</td>
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<tr>
<td>Verma, K.</td>
<td>201</td>
</tr>
<tr>
<td>Versche, A.</td>
<td>77</td>
</tr>
<tr>
<td>Vesel, R. W.</td>
<td>49</td>
</tr>
<tr>
<td>Veyi Stock, S.</td>
<td>68</td>
</tr>
<tr>
<td>Vieira, J.</td>
<td>109</td>
</tr>
<tr>
<td>Vieira, J.</td>
<td>125</td>
</tr>
<tr>
<td>Vieira, J.</td>
<td>202</td>
</tr>
<tr>
<td>Vietcuong, N.</td>
<td>100</td>
</tr>
<tr>
<td>Vioetto, I.</td>
<td>71</td>
</tr>
<tr>
<td>Vignesh, V.</td>
<td>79</td>
</tr>
<tr>
<td>Villacencio, J.</td>
<td>88</td>
</tr>
<tr>
<td>Villegas Pico, H.</td>
<td>51</td>
</tr>
<tr>
<td>Villegas Pico, H.</td>
<td>193</td>
</tr>
<tr>
<td>Vilaksh, D.</td>
<td>55</td>
</tr>
<tr>
<td>Vilaksh, D.</td>
<td>173</td>
</tr>
<tr>
<td>Vinnakota, V. R.</td>
<td>177</td>
</tr>
<tr>
<td>Vishwanath, S.</td>
<td>55</td>
</tr>
<tr>
<td>Vithayasrichareon, P.</td>
<td>61</td>
</tr>
<tr>
<td>Vittal, E.</td>
<td>145</td>
</tr>
<tr>
<td>Vittal, V.</td>
<td>68</td>
</tr>
<tr>
<td>Vittal, V.</td>
<td>125</td>
</tr>
<tr>
<td>Vittal, V.</td>
<td>172</td>
</tr>
<tr>
<td>Vittal, V.</td>
<td>176</td>
</tr>
<tr>
<td>Vittal, V.</td>
<td>180</td>
</tr>
<tr>
<td>Vittulo, S.</td>
<td>192</td>
</tr>
<tr>
<td>Vivekananthan, C.</td>
<td>188</td>
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Zou, M. .......................... 92
Zou, P. .......................... 101
Zou, X. .......................... 201
Zu, G. .......................... 87
Zuluaga, L. ....................... 151
Zweigle, G. ....................... 103
Zwergel, D. ....................... 122
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Director's Row F
Director's Row G
Director's Row H
Director's Row I
Director's Row J

PLAZA BUILDING CONCOURSE LEVEL
Plaza Exhibit Foyer
Plaza Court 1
Plaza Court 2
Plaza Court 3
Plaza Court 4
Plaza Court 5
Plaza Court 6
Plaza Court 7
Plaza Court 8
Governor's Square 9
Governor's Square 10
Governor's Square 11
Governor's Square 12
Governors Square 13
Governor's Square 14
Governor's Square 15
Governor's Square 16
Governor's Square 17

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