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WELCOME FROM CONFERENCE CHAIRS

DARIO ZANINELLI | General Chair

POWERTECH 2019: we welcome all delegates and visitors to Milano, Italy! POWERTECH is the anchor conference of IEEE PES in Europe and provides a forum for engineers and scientists in electric power and energy systems to present their work and share information in this area of growing interest and importance in the Industry and Economy around the world.

I sincerely thank the International Steering Committee of the POWERTECH for the encouragement and support provided over the last few years to hold this conference in Italy for the second time and feel very honoured by the recognition they have demonstrated towards our activities.

My sincere gratitude is offered to the members of the Organizing Committee, who have worked tirelessly to prepare the Conference, for their efforts in the numerous tasks always required for such an event. I am sure that they will continue to do their best during your stay to render it a pleasant memory.

I sincerely thank my Institution, the Politecnico di Milano, and Fondazione Politecnico di Milano for the support provided in the administration, organization and logistics for the Conference.

I also wish to thank the International Advisory Committee, the Basil Papadias Award Committee and the paper reviewers for their precious work in order to guarantee the high quality of the Conference.

The sponsorships provided by ENGIE eps, RTDS Technologies, SCHNEIDER Electric, DIGSILENT, UNARETI, ETAP, RTE, OPAL RT Technologies, MONTE-LE, POWERSYS Solutions, SCHALTBAU, SORGENIA, TERNA, ABB, KIEPE Electric, SAET Padova, BOMBARDIER are greatly appreciated.

Sincere thanks to all Authors that made this conference possible by means of their participation and papers.

This conference happens in the context of an energy transition which brings new challenges and opportunities for all involved in the development of sustainable electrical energy networks in which new technologies and models for research study, industry development and business plan are being proposed, developed and tested. Leading innovation in this frame is a serious attempt to provide the best system at a given period, and succeeds in producing new workable solutions to invest for the future, reflecting the opportunities of the technological knowledge.

I and the Organizing Committee, we hope you will find the conference stimulating and enjoyable, have a memorable time in Milano, Italy and have the opportunity to renew old friendships and make new ones.

Prof. Dario Zaninelli
I am honored and delighted to welcome all of you, dear authors and participants, to Milan, my city, one of the most famous cities for arts, education, fashion and business. Our world is facing a technological revolution and a wise response is expected. A revolution characterized by a fusion of technologies, disrupting almost every industry in every country. The gathering of all stakeholders, from the public and private sectors to academia and civil society is the only answer in front of such challenge. We worked hard to create a real “arena” where academies, research centers and enterprises will enhance their cooperation in order to guide future developments in our sector: “Leading innovation for energy transition”.

A very ambitious program will include scientific, industrial and student track sessions and events, inspired by the aim of a cross-fertilization. A full day of tutorials will open the Conference. Then four intensive days will follow where several scientific sessions, both technical and poster, will show the most promising scientific results and special sessions and European project sessions will present actual and future solutions. Three prestigious plenaria sessions will introduce us into the most exciting challenges and opportunities coming from this technological revolution, disclosing how the breadth and depth of these changes herald the transformation of entire systems of production, management and governance and guiding us to new paths of research and scientific dissemination. Besides the program, other events such as laboratory tours, workshops and networking sessions will enrich the offer. I join the General Chair in thanking all the people who contributed to make this event possible.

I sincerely wish you to experience Powertech 2019 in Milan, breathing its air still full of the energy left by Leonardo da Vinci 500 years ago.

Prof. Federica Foiadelli

Dear Authors and Attendees at the 13th IEEE PowerTech 2019, I am honored to announce you that this year more than 900 papers from 65 countries around the globe have been submitted. The reviewer process took a huge amount of work. It involved all the International Steering Committee, International Advisory Committee, and Basil Papadias Award Committee members, including also about 480 reviewers spread all over the world. I sincerely thank all Committees’ members and the reviewers for their essential support of the 13th IEEE PowerTech 2019 Conference. None of this would have been possible without their passion, effort and voluntary assistance.

In the end of such process, experts from Universities, Research Centers and Industry selected more than 630 top-rated peer reviewed papers for their final presentation and debate participation during the conference. About 180 accepted papers are authored by PhD students and undergraduates. The papers address key issues related to the hot-topics currently leading the innovation for energy transition, in different research fields like: system operation and control, data science and ICT in power technologies, innovative grids with energy hybrid systems integration, and power industry leading innovation trends. Accepted and presented papers at the 13th IEEE PowerTech 2019 will be submitted to IEEEExplore, and will be also indexed by INSPEC®, EI’s engineering information index, Scopus and Web of Science. It has been a great privilege for me to serve as Publications Chair of this conference. I am mighty grateful to you for your support to the 13th IEEE PowerTech 2019 and your attendance, and I wish you a pleasant and rewarding experience in Milan.

Prof. Sonia Leva
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The Basil Papadias Award Committee is formed by the following members, who are also members of the International Advisory Committee:

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Antony Papavasiliou, Belgium
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Thierry Van Cutsem, Belgium
With a population of about 1.3 million, Milan, the capital of Lombardy, is located in the Po Valley, not far from the Alps with the great lakes (Lake Como, Lake Maggiore, Lake Lugano) to the North. Milan is considered the Italian economic and finance center, with the headquarters of the Stock Exchange and of many of the most important industrial and financial businesses of the Country. The city hosted the Universal Exposition in 2015 under the theme “Feeding the planet, energy for life.” It is also the Italian symbol of fashion and design: it hosts many of the main Italian fashion maisons and international design fairs, such as “Settimana della Moda” (Milan Fashion Week) and the “Salone Internazionale del Mobile” (Milan Furniture Fair); also, a Design School operates at Politecnico di Milano.

Milan hosts the “Teatro alla Scala,” considered the temple of lyrics all over the world, and several prose theatres such as the “Piccolo Teatro” founded by Giorgio Strehler. In Milan are located the headquarters of the main daily newspapers (Il Corriere della Sera, Il Sole 24 Ore) and many of the main Italian publishers (Mondadori, Feltrinelli, Garzanti, Rizzoli).

The city offers to visitors the possibility to admire a wide range of monuments, museums and buildings reflecting the vestiges of history and culture left by many people who lived here. The ancient Roman remains are preserved at the Colonne di San Lorenzo, whereas the Romanesque can be admired at Sant’Ambrogio, Sant’Eustorgio or San Simpliciano Basilicas. The Duomo is one of the largest cathedrals in the world and the most important example of Gothic architecture in Italy. The Castello Sforzesco, built on the wishes of the Duke Francesco Sforza, nowadays hosts the Michelangelo’s “Pietà Rondanini” and several museums.

The church of Santa Maria delle Grazie hosts the famous masterpiece “The Last Supper” by Leonardo da Vinci – declared part of the World Heritage by UNESCO. The city has always participated actively to the National History since its origins, contributing to the purposes and the aims that led to reunification of Italy in the 18th century.

Some distinguished people, who gave a significant contribution to Italian culture, lived in Milan, such as Leonardo da Vinci (who lived in Milan from 1482 to 1500), the poet and novelist Alessandro Manzoni, the musician Arturo Toscaneli, the writer Carlo Emilio Gadda, the film director Luchino Visconti. Two Nobel prizes operated in Milan: Giulio Natta (1963, in chemistry) and Dario Fo (1997, in literature).
Politecnico di Milano is a scientific-technological university which trains engineers, architects and industrial designers.

The University has always focused on the quality and innovation of its teaching and research, developing a fruitful relationship with business and productive world by means of experimental research and technological transfer.

Research has always been linked to didactics and it is a priority commitment which has allowed Politecnico Milano to achieve high quality results at an international level as to join the university to the business world.

The alliance with the industrial world, in many cases favored by Fondazione Politecnico and by consortiums to which Politecnico belong, allows the university to follow the vocation of the territories in which it operates and to be a stimulus for their development.

The challenge which is being met today projects this tradition which is strongly rooted in the territory beyond the borders of the country, in a relationship which is developing first of all at the European level with the objective of contributing to the creation of a single professional training market.

Politecnico takes part in several research, sites and training projects collaborating with the most qualified European universities.

Politecnico’s contribution is increasingly being extended to other countries: from North America to Southeast Asia to Eastern Europe.

Today the drive to internationalization sees Politecnico Milano taking part into the European and world network of leading technical universities and it offers several courses beside many which are entirely taught in English.

www.polimi.it
The 13th IEEE PES PowerTech Conference will be held at the Bovisa Campus of Politecnico di Milano, Italy on 23-27 June 2019. Welcome Reception will be in the historical Leonardo Campus in Piazza Leonardo da Vinci, Milano. Gala Dinner will be in Villa Castelbarco, Vaprio D’Adda (Milano).

CONFERENCE LOCATION

Politecnico di Milano, Campus Bovisa
Via Lambruschini, 4
20156 Milano (MI)
The Campus is located in the north side of Milano and can be easily reached by urban trains from the city center.
A new building equipped with a modern Conference Hall for more than 400 attendees has been recently delivered. In the same building and in the neighboring ones, several smaller conference rooms (200 attendees each) as well as spaces for posters presentation and exhibition are also available.

CONFERENCE REGISTRATION

Registration to the Conference will be available:

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<td>8:30 - 15:00</td>
<td>Campus Bovisa (Conference Location)</td>
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<td>18:00 - 20:00</td>
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<tr>
<td>Thursday</td>
<td>8:00 - 12:00</td>
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WELCOME RECEPTION

Sunday 23rd | 18:00 - 20:00
Politecnico di Milano, Campus Leonardo
Piazza Leonardo da Vinci, 32
20153 Milano (MI)

TRAVEL INFORMATION

GETTING TO MILANO
As you’re likely to land in Malpensa, in Linate or in Orio al Serio airport, you can plan how to reach Milano following these suggestions.

If you land at Linate Airport:
Air Bus to Centrale Railway Station: www.atm-mi.it
Bus no. 73 to Piazza San Babila: www.atm-mi.it

If you land at Malpensa Airport:
Malpensa Express Train to Cadorna Railway Station: www.malpensaexpress.it
Malpensa Shuttle to Centrale Railway Station: www.malpensashuttle.it

If you land at Orio al Serio Airport:
Terravision Bus to Centrale Railway Station: www.terravision.eu/milan_bergamo.html
Orio shuttle to Centrale Railway Station: www.oriashuttle.com
**GETTING TO THE BOVISA CAMPUS**

From the city centre, get to one of the following subway stops: **Porta Venezia** (red line), **Repubblica** (yellow line) or **Garibaldi** (green line), take one of the railways named “Passante ferroviario” and get off at either Bovisa Politecnico or Villapizzone stations.

Also, you can reach **Cadorna** subway stop (green and red line), go to its railway station, take any train that leaves from there (except Malpensa Express) and get off at **Bovisa Politecnico** stop.

Once you get out of Bovisa railway station, turn right to reach the Engineering Campus (Via Lambruschini 4).

**TIMINGS**

From the city center (subway stops):

- **Cadorna** (green&red line) | 6 min
- **Garibaldi** (green line) | 11 min
- **Repubblica** (yellow line) | 14 min
- **Porta Venezia** (red line) | 16 min
- **Centrale** (green&yellow) | 16 min

From **Malpensa airport**: Direct connection with the airport every 30 min - 32 min

**FARES** (ATM | Azienda Trasporti Milanesi)

**Urban Ticket** – Price: € 1.50

Valid for 90 minutes after stamping, gives you unrestricted travels for all the Milan Municipality area. The ticket is valid for a single journey on the underground or rail network, including the urban rail lines of Trenord and the ‘Passante Ferroviario’ (Urban Railway Network).

**One Day Ticket** – Price: € 4.50

Valid for 24 hours after stamping, gives you unrestricted travels for all the Milan Municipality area. The ticket is valid even on the rail network, including the urban rail lines of Trenord and the ‘Passante Ferroviario’ (Urban Railway Network).

**Two Day Ticket** – Price: € 8.25

Valid for 48 hours after stamping, gives you unrestricted travels for all the Milan Municipality area. The ticket is valid even on the rail network, including the urban rail lines of Trenord and the ‘Passante Ferroviario’ (Urban Railway Network).

**TAXI**

Taxi offer an easy way to get around the city. They can be found mainly at taxi stations, or can be called in advance.

- **Taxi 4040** Ph. +39 02 4040
- **Taxi 8585** Ph. +39 02 8585
- **Taxi 6969** Ph. +39 02 6969
- **Taxi 7777** Ph. +39 02 7777
Conference venue
Politecnico di Milano,
Campus Bovisa | via Lambruschini 4

Welcome Reception
Politecnico di Milano,
Campus Leonardo | piazza Leonardo da Vinci 32

Cadorna railway station
Connection with subway lines 1 and 2, train to Malpensa Airport T1 and T2

Milano Centrale railway station
Connection with subway lines 2 and 3, train to Malpensa Airport T1 and T2 and buses to Linate and Orio al Serio Airports

Porta Garibaldi railway station
Connection with subway lines 2 and 5, with Passante Ferroviario (Urban Railway Lines) and train to Malpensa Airport T1 and T2

Villapizzone railway station
Connection with Passante Ferroviario (Urban Railway Lines)

Bovisa railway station
Connection with Passante Ferroviario (Urban Railway Lines)

Duomo di Milano
(Cathedral of Milan, downtown)
Connection with subway lines 1 and 3
CONFERENCE LOCATION
Politecnico di Milano, Campus Bovisa | Via Lambruschini, 4 | Milano

WELCOME RECEPTION
Politecnico di Milano, Campus Leonardo | Piazza Leonardo da Vinci, 32 | Milano
SOCIAL PROGRAM & COMPANIONS ACTIVITIES

WELCOME RECEPTION IN CAMPUS LEONARDO

Sunday 23rd June at Leonardo Campus, Milano

Welcome Reception will be in the Leonardo Campus located in Piazza Leonardo da Vinci. Inaugurated in 1927, it is the oldest of Politecnico di Milano's campuses.

Over the course of the decades the campus has been expanded to encompass new campuses and given rise to a real and genuine university quarter commonly dubbed “Città Studi” (City of Studies).

The Milano Leonardo campus hosts the University's main management and administrative structures:

- The Rector’s Office and the governing bodies (Senate and Board of Governors),
- The offices of the Central Administration,
- The Dean’s Offices of the Schools of Engineering and Architecture,
- Most of the research Departments.

GALA DINNER AT VILLA CASTELBARCO

Wednesday 26th June at Villa Castelbarco, Vaprio d’Adda

Gala Dinner will be organized in Vaprio d'Adda, in the hearth of Lombardy, province of Milan, on the bank of Adda river and Naviglio canal.

Bus shuttle from Bovisa Campus to Gala dinner site will be available at the end of the afternoon sessions. Return shuttle to different areas in Milano (Cadorna, Centrale and Garibaldi railway stations). More details will be given on site.

Villa Castelbarco is dipped into an amazing natural frame made of eighty thousand square meters of park where it is still possible to catch sight of free deer.

Villa Castelbarco is a private House able to combine the requirements of functionality of the present and an elegant architectural frame of the past. It is possible to date the beginning of the settlement around the 1100 AD.

In the same period, according to some scholars, a monastery was built by the Cistercians friars in that area, following the wrecking of what was considered the “centre” of the Cistercians, which dates back to the VII century AD and maybe stood where today the church of “San Colombano”, in Vaprio d’Adda lies.

The original structure seems to be very simple, therefore attributable to monks, maybe to the austere tradition of the order of San Colombano (540-615), who followed the message of the Irish Saint.

In the architecture of the Villa it is still possible to indentify the different parts built around the court near the church, typical of a monastery. This court is characterized by a double portico that could be the double cloister of the monastery.

Up to now it is still possible to feel the sense of unity around the place of worship: the chapter house, the dorms, the refectory are all constructed around the church.

The function of the House as a monastery continued perhaps also after the creation of the noble residency, as witnesses a pastoral visitation of Padre Leonetto Clavonio in 1570 and a historic map of XVIIIth century AD that illustrated the presence of a Monastery in Concesa.

Read more about Villa Castelbarco https://www.villacastelbarco.com/en/

COMPANION ACTIVITIES

Please note that you must be a registered companion to enjoy social events like the Welcome Reception and Gala Dinner.

City tours

A tour operator has been selected to offer symposium attendees and companions the opportunity to explore the many facets of Milano. Particular tours are scheduled on 25th and 26th June, with required registration via the tour operator website.

https://www.neiade.com/it/neiade_per_powertech_2019/

Please take some time to review details carefully to make the best of your time in Milano.

TOURS:

MUST-SEE ATTRACTIONS OF MILAN

This is an immediate and smart guided tour in Milan, discovering the most important and iconic places, the ones represented on every manifest of the city. A guided visit dedicated to tourists but also to people that live every day the city without knowing entirely its artistic and architectural value.

THE FASHION DISTRICT OF MILAN

An original and exclusive tour in Brera, with art treasures of the most famous part of Milan, in the company of a tour guide to discover the most elegant boutiques in the area.

An original tour with art, design and fashion!
The Women in Power initiative has pulled together a Leadership Advisory Committee comprised of men and women from diverse backgrounds and cultures. Their stories and their positions in the industry help to demonstrate, first hand, the success that anyone can achieve with a lot of hard work. This leadership team is supported by mentors and role models who share their stories and share of themselves to help realize the potential of women in the power industry.

PES Women in Power’s mission is to advance the world through the creativity and innovation of diverse leadership, and to foster the careers, connections, and talent of women in the Power Industry to achieve their full potential to become the leaders of the future.

PES Women in Power serves ambitious, professional women in the power and energy industry who are looking for leadership positions and career advancement.

The skills, networking and mentorship that are offered benefit women throughout the industry, whether they are engineers, attorneys, policy makers or accountants.

But this is not just for women. Anyone could benefit from the professional development offered and everyone is welcome to join.
Dear Students and Guests of the 13th IEEE PowerTech 2019,
you are more than welcome to visit our laboratories. Numerous activities are carried out in these laboratories at Bovisa Campus – Politecnico di Milano, from basic activities to complex ones, including targeted activities agreed with clients with specific needs.
The wide range of Laboratories, together with the expertise and skills of those carrying out the activities, ensures the Department of Energy is a major ally for research concerning the energy world.
The following are available for a guided tour:

**Laboratory of Electric Converters, Machines and Drives** | Head: Roberto Perini
**LFM Laboratory of Fluid Machines** | Head: Roberto Perini
**LMGs Laboratory of MicroGrids** | Head: Sonia Leva, Giampaolo Manzolini
**MRT Fuel Cell Lab** | Head: Andrea Casalegno
**PhOS (Photovoltaic, Power Quality and Lighting System) Laboratory** | Head: Roberto Faranda
**STL SolarTechLab** | Head: Sonia Leva, Giampaolo Manzolini

Registration for the guided tour can be made at the registration desk during the conference.

The Laboratory ECMD is focused on the research Group “Converters, electrical machines and drives” activities and studies design and modeling aspects of standard and novel electrical machines; besides, it is involved in analysis of power electronics converters, electrical drives and related control systems.

One kind of electrical machine the group has been analyzing in depth for several applications is the permanent magnet machine, equipped with conventional or innovative windings (with tooth coils): wind power systems; special motors (with dual concentric rotors); high speed micromotors.

A second activity concerns the stability of isolated micro-grids, fed by power electronics converters non-interacting among them, and the problem of synthetic inertia.

Another research topic is the electromagnetic and dielectric analysis of reactors, transformers and magnetic devices in general.

A last but not least sector regards the sensorless control (without speed and position sensors) of doubly fed induction machines.

The research group working at the Lab. of Fluid Machines (LFM) is active in the field of experimental and numerical Fluid Dynamics, with particular emphasis on turbomachinery for compressible and incompressible fluids. The lab is equipped with a number of large-scale and advanced facilities for experimental research: two wind tunnels for transonic and supersonic linear cascades, a high-speed closed-loop test rig for turbine and compressor stages (800 kW); a closed-loop rig for large scale (1m) turbine stages operated up to transonic conditions; a test-rig for studying the supersonic fluid dynamics of organic vapours; and a test rig for hydraulic turbines and pumps (100 kW).

The available measurement techniques range from classical Hot Wires and multi-hole directional pressure probes, to the own developed single and multi-hole Fast Response Aerodynamic Pressure Probes (FRAPP), up to 80 KHz and optical systems (Schlieren, LDV and PIV). The numerical research group has developed several in-house codes for the performance and flow analysis and for the design and optimization of turbomachinery stages and components. The most common commercial codes, such as Ansys Fluent and CFX are also available at the LFM.

Many research contracts with major international companies operating in the turbomachinery market (GE Oil&Gas-NP, Ansaldo, Turboden, etc.) as well as the achieved competitive research funding (PRIN, FP7, etc.) demonstrate the capabilities of the research group operating at LFM Among the other facilities, two modern test sections for industrial R&D and product certification of safety valves operating in both air and water are also available.

The Laboratory of MicroGrids (LMGs) is an experimental Low Voltage rig operating in the Department of Energy of Politecnico di Milano since 2018 in collaboration with ENGIE EPS.

The LMGs includes programmable and non-programmable generation units (solar PV modules, natural gas fired combined heat and power engine), different types of storages (electrochemical batteries, bi-directional power-to-gas system and thermal storages) and various types of loads representative of the most future on- and off-grid applications for MultiGoods MicroGrids (electricity, heating and cooling, desalination, electric bikes and electric cars).

The LMGs has three power centers which serve as power hubs and local controllers. They ensure the electrical and logical connection between all MG assets, reproduce the electrical effect of long distribution lines in between the PCs and connect/disconnect to the main electrical grid.

A Programmable Logic Controller oversees real-time MG management and monitoring based on the deployed EMS.

This experimental setup is an effective testbench for developing innovative Energy Management Systems, implementing Artificial Intelligent tools in the MG management and load/RES forecast, testing innovative components and integrating Electric Vehicles with bidirectional power flows (from grid to vehicle and vehicle to grid) in the MG management.
MRT FUEL CELL LAB

The MRT Fuel Cell Lab contributes to the development of electrochemical technologies for energy conversion and storage. The research activities are focused on both experimental and theoretical-modeling studies of transport phenomena, with the aim to:

- characterize the limiting physical phenomena
- develop innovative components
- optimize system operation and lifetime

The ongoing projects regard polymer electrolyte fuel cells, redox flow batteries and Lithium-ion batteries for automotive application and stationary energy storage.

The lab experimental facilities are:

- experimental stations for automated characterization of performance, degradation and transport phenomena in single cell
- systems for local characterization by means of segmented cells and reference electrodes
- instrument for in-situ electrochemical characterization (EIS, CV, LSV)
- instrument for the analysis of gas composition

SOLAR TECH LAB

Established in 2011, Solar Tech Lab is located on the roof of the Department of Energy of Politecnico di Milano. The main research objective of this laboratory is the development through experimental investigation of electrical and thermal power generation systems based on solar energy.

The following research lines are addressed at the SolarTech Lab:

- Performance assessment of PV module under real operating conditions on energy base for long period. Typical measurements aim at evaluating the impact of innovative PV module design/components (bi-facial PV modules, advanced glass and PV cells) or typical degradation phenomena (i.e. snail trails)
- Robust modeling for predicting and optimizing the system production is critical to increase the interaction of PV systems with smart electricity grids and to optimize energy use, delivery and storage.
- Integrating PVT modules for heat production in the so-called Solar Assisted Heat Pump configuration. Innovative SAHP have been manufactured and tested to assess the energy and economic advantages;
- Application of UAV for monitoring of PV plants to control and monitor performance over time. The purpose of this research line is also to propose in the near future a reliable, fast and cost effective method for PV plant planning and performance analysis, using unmanned systems even in other energy sectors.

Solar Tech Lab provides qualified scientific research, technical consulting and testing services in the field of photovoltaic, photovoltaic-thermal and concentration systems.

PHOS (PHOTOVOLTAIC, POWER QUALITY AND LIGHTING SYSTEM) LABORATORY

Established in 2005, PhOS laboratory is located in the Department of Energy in Politecnico di Milano - Bovisa Campus, its activities are in Electric Power Systems field. Worldwide, in this area, the research is focused on the sustainability of generation and consumption.

Research group mainly works with Italian firms and the activities are mainly aimed at providing innovative solutions in real contexts to practical industrial problems. Therefore, generation from RES, Dispersed Generation, Smart Grids with storage (at different voltage levels both ac and dc), load management and power quality in LV network, are the main research topics considered.

Ongoing research activities are focused on: the development of power electronic devices to enable DSO to increase power quality of the network and the minimization of END USER electric bill; load behavior under voltage variation (providing experimental investigation and analysis on different load types behavior including traditional lighting loads, more recent lighting type specially LED systems and some thermal loads) and RES system design and optimization, inverter control and MPPT control algorithms, management of storage system and optimal inverter sizing for PV system.

The main highlights of PhOS Laboratory mission includes but are not limited to:

- Power Quality (PQ) and Custom Power (CP)
- Power Electronics, application in LV distribution network
- Smart Grid and Microgrid Systems
- Load Management
- PV systems
- Storage systems
- Lighting Systems
- Electro Magnetic Application
TUTORIALS

PowerTech 2019 tutorials are taking place on **Sunday 23rd June**

**T1** (full day)
*The Smart Transformer: Impact on the Electric Grid and Technology Challenges*

**T2** (full day)
*Probabilistic methods for power system management: state of the art, challenges and perspectives*

**T3** (full day)
*Computational Intelligence in Power System Applications*

**T4** (full day)
*Power System Optimization Modeling in GAMS*

**T5** (half day)
*Infrastructure planning under uncertainty: flexibility, resilience and multi-energy systems application*

**T6** (half day)
*Increasing the PV Hosting Capacity of Distribution Networks: The role of Smart Inverters and Storage*

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The increasing connection of renewables and new loads is challenging the distribution grids. For overcoming actual and foreseen challenges, a new concept, with the capability to form intelligent grid nodes, is proposed: the “Smart Transformer”.

The Smart Transformer is a power electronics-based transformer, aiming not only to adapt the voltage level from MV to LV grids but also providing ancillary services to the grid. In order to exploit its capability, the ST requires combining power system aspects and power electronics constraints, resulting in new requirements and challenges.

This tutorial introduces the Smart Transformer concept and takes into account power system environment.

### Structure:
- **From the Solid-State-Transformer (SST) to the Smart Transformer**
- **The Smart Transformer in the distribution grid: LV-ENGINE project**
- **The Smart Transformer: a grid-tailored Solid-State-Transformer**
- **ST virtuous loop: identify the LV-grid, control it, offer services to the MV-grid**
- **Questions and Answers**

### Abstract:
The tutorial highlights the current barriers for uncertainty modeling in current decision-aid problems under risk as well as the occurrence of extreme contingencies triggered by natural threats.

The drawbacks and the limits of conventional methods are discussed and the results of case studies on real world systems are described. After demonstrating the need for probabilistic methods, the tutorial presents an overview of state-of-art probabilistic methods for the planning and the operation of both transmission and distribution systems, taking into account the uncertainties due to growing penetration of renewables (which need accurate probabilistic modeling for decision-aid problems under risk) as well as the occurrence of extreme contingencies triggered by natural threats.

### Structure:
- **Introduction**
- **Probabilistic forecasting of renewable energy in decision aid problems under risk**
- **Probabilistic reliability analysis for transmission planning**
- **Reliability evaluation of active distribution systems**
- **Probabilistic methods for risk-based power system operation**
- **Questions and Answers**

### Organizers:
- **Marco Liserre**, Chair of Power Electronics, Kiel University, mll@tf.uni-kiel.de
- **Giovanni De Carne**, Chair of Power Electronics, Kiel University, gdc@tf.uni-kiel.de
- **Rongwu Zhu**, Chair of Power Electronics, Kiel University, rzh@tf.uni-kiel.de
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- **Michael Eves**, SP Energy Networks, meves@spenergynetworks.co.uk

### Organizers:
- **Andrea Pitto**, Ricerca sul Sistema Energetico – RSE S.p.A., andrea.pitto@rse-web.it
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- **Pierre Henneaux**, Université libre de Bruxelles, Pierre.Henneaux@ulb.ac.be
- **Aydogan Ozdemir**, Istanbul Technical University, ozdemiraydo@itu.edu.tr
- **Ricardo Jorge Bessa**, INESC TEC, ricardo.j.bessa@inesctec.pt
- **Louis Wehenkel**
- **Efthymios Karangelos**

### Abstract:
The increasing uncertainties in power systems due to the growing penetration of renewables and to market mechanisms as well as the increasing frequency of extreme weather events due to climate changes are major drivers for the application of probabilistic methods in a broad spectrum of activities aiming to assure the continuous operation of power systems: from long-term system development, through mid-term asset management towards short-term operational planning and real-time operation.
COMPUTATIONAL INTELLIGENCE IN POWER SYSTEM APPLICATIONS

Organizers:
Kalyanmoy Deb, Michigan State University, kdeb@egr.msu.edu
Marco Mussetta, Politecnico di Milano, marco.mussetta@polimi.it
Emanuele Ogliari, Politecnico di Milano, emanuelegiovanni.ogliari@polimi.it

Abstract:
- Module A: Machine Learning for power forecasting
  The variability of renewable energy represents a huge challenge in the integrated electricity systems: power production forecasts can help reducing the amount of operating reserves needed for the system, finally reducing the balancing costs. While physical prediction methods strongly rely on the accuracy of the weather forecast, Artificial Neural Networks are based on the learning process of the underlying models and are commonly referred to as a “data-driven” or “black box” approaches. In fact, they need historical data that, after being collected, are used to infer a general trend and behavior in order to predict future output of the power plant. Hybrid methods, consisting in any combination of the physical-based approach and Machine Learning can guarantees the highest level of accuracy when adopted to the power forecast of RES.

- Module B: Evolutionary Multi-Criterion Optimization with Case Studies on Power Dispatch Problem Solving
  Evolutionary optimization methods, proposed in early sixties and used in practice since eighties, are population-based algorithms which are easily customizable to suit different problem-solving tasks. Evolutionary multi-criterion optimization (EMO) algorithms, proposed since early nineties, revolutionized the solution of problems having multiple conflicting objectives. Starting with two and three-objective problems, EMO researchers have devised algorithms for solving up to 15-objective problems and applied to many engineering and practical problems. In this tutorial, we shall present a step by step account of the growth of EMO field by describing the principles of multi-criterion optimization, some key algorithms, and recent advances in the field. Case studies on power dispatch problem for single and multiple criteria aspects and its static and dynamic versions will be presented.

Structure:

08:30-09:00 Registration
09:00-10:30 Module A: Machine Learning techniques for power forecasting | Marco Mussetta
10:30-10:45 Coffee break
10:45-12:15 Module A: Hybrid methods for power forecasting | Emanuele Ogliari
12:15-12:30 Questions and Answers
12:30-13:30 Light lunch
13:30-15:00 Module B: Evolutionary Multi-Criterion Optimization with Case Studies on Power Dispatch Problem Solving – part 1 | Kalyanmoy Deb
15:00-15:15 Coffee break
15:15-16:45 Module B: Evolutionary Multi-Criterion Optimization with Case Studies on Power Dispatch Problem Solving – part 2 | Kalyanmoy Deb
16:45-17:00 Questions and Answers

POWER SYSTEM OPTIMIZATION MODELING IN GAMS

Organizer:
eza Soroudi, Energy Institute UCD, Alireza.soroudi@ucd.ie

Abstract:
The optimal decision making is a key part of any engineering problem. The General Algebraic Modeling System (GAMS) can be used to solve various power system operation and planning optimization problems. This tutorial is to provide the audience with a comprehensive overview of the GAMS capabilities solving for basic/advanced power system optimization problems. The theoretical background as well as the application examples and test case studies will be covered. It is suitable for dedicated and general audiences including power system professionals as well as researchers and developers from the energy sector and electrical power engineering community and will be helpful to undergraduate and graduate students.

Structure:

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<td>09:00-10:30</td>
<td>Basic GAMS features Economic dispatch problem</td>
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<td>PMU allocation problem Uncertainty modeling using GAMS</td>
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<td>16:45-17:00</td>
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INFRASTRUCTURE PLANNING UNDER UNCERTAINTY: FLEXIBILITY, RESILIENCE AND MULTI-ENERGY SYSTEMS APPLICATION

Organizers:
Mathaios Panteli, The University of Manchester, mathaios.panteli@manchester.ac.uk
Eduardo Alejandro Martinez Ceseña, The University of Manchester, alex.martinezcesena@manchester.ac.uk
Rodrigo Moreno, Universidad de Chile and Imperial College London, rmorenovieyra@ing.uchile.cl
Pierluigi Mancarella, The University of Manchester and The University of Melbourne, p.mancarella@manchester.ac.uk

Abstract:
Traditional investment planning practices are becoming less effective in the energy sector as uncertainties increase due to the integration of renewable energies and low carbon technologies (e.g., electric vehicles), and the increasing frequency and severity of extreme events due to climate change (e.g., droughts, earthquakes, etc.). To tackle these challenges, new tools that properly capture uncertainty and extreme events are required to develop more resilient and adaptive energy systems by capitalizing on emerging smart solutions based on active network management and different energy vectors (e.g., electricity, heat, gas and water). This tutorial provides an overview of recently developed state-of-the-art investment planning tools which explicitly address uncertainty (e.g., decision and real options theory) related to highly uncertain system evolution and low probability high impact events. Real world studies from international research projects are used to demonstrate the quantification of PV hosting capacity with uncertain demand growth, price variations and integration of low carbon technologies resulting from high penetrations. To remove these barriers, speed up connection times, and reduce costs, it is crucial for DNOs to increase the PV hosting capacity of their low and medium voltage networks. Adequately exploiting the capabilities of smart inverters and residential battery energy storage systems will be key.

This half-day tutorial will present and discuss different aspects required to assess the residential PV hosting capacity of distribution networks. Furthermore, it will explain and demonstrate the benefits but also the potential challenges from exploiting the capabilities of smart inverters (Volt-Watt, Volt-var, etc.). Real case studies from Australia will be used to demonstrate the quantification of PV hosting capacity considering potential strategies to make the most of smart inverters and storage.

Structure:
08:30-09:00 Registration
09:00-10:30 Infrastructure planning under uncertainty:
- The different levels of uncertainty
- Decision theory, robust and flexible decisions
- New stochastic programming approaches

10:30-10:45 Coffee break
10:45-12:15 Future and already emerging energy systems
Infrastructure planning for flexible and adaptive energy systems:
- Smart distribution networks: Flexible active network management to accommodate emerging low carbon technologies
- Building and community multi-energy systems: Use of multi-vector demand side flexibility to cope with uncertain demand growth, price variations and integration of low carbon technologies

12:15-13:00 Questions and Answers

13:00-13:30 Registration
13:30-15:00 Part 1. Distribution Networks and Solar PV | Ochoa
- PV Hosting Capacity, Challenges, and Potential Solutions
- Modelling of Distribution Networks
Part 2a. PV Hosting Capacity and PV Inverters | Procopiou
- Estimating Hosting Capacity with Stochastic Approaches

15:00-15:15 Coffee break
15:15-16:45 Part 2b. PV Hosting Capacity and PV Inverters | Procopiou
- Increasing PV Hosting Capacity with Smart Inverter Functions and Active Control
- Case Studies with French and Australian Networks
Part 3. PV Hosting Capacity and Residential Battery Storage Systems | Ochoa
- Limitations of Off-the-shelf Batteries and Solutions with Advanced Control
- Case Studies with Australian Networks

16:45-17:00 Questions and Answers
EUROPEAN PROJECT SESSIONS

EP1 | H2020 OSMOSE
Monday 24th June | 14:20–16:00

The Osmose project is an Horizon 2020 research and development project co-founded by the European Union (grant 773406). The 33 partners of the consortium aims to address, through a holistic approach, the identification and development of the optimal mix of flexibilities to enable the integration of renewable energy sources. The purpose is to consider the power system as a whole, embracing the necessary flexibility sources and identifying the techno-economic potential of technologies, regardless of traditional silos, in order to capture synergies and make the energy transition as affordable as possible. Osmose is contributing to this purpose:

- by forecasting the economically optimal mix of flexibilities for the pan-European power system, taking into account these synergies, for the maximum social welfare;
- by proposing evolutions of market designs and regulatory frameworks to enable this targeted optimal mix;
- and by increasing the techno-economic maturity and scalability of flexibility solutions enabling “silo-breaking synergies” with the development of 4 demonstrators.

During this special session, we will present you an overview of the activities developed during the project with a special focus on some key topics and activities such as, for instance, the Osmose Italian demonstration.

EP2 | CHALLENGES AND SOLUTIONS IN FUTURE TRANSMISSION NETWORKS WITH HIGH PENETRATION OF POWER ELECTRONICS
RESULTS OF EU H2020 PROJECT MIGRATE
Monday 24th June | 16:10–17:50

The increasing integration of power electronic generators into the power system is not only changing the dynamic system behavior but is also changing the ways how power systems of the future need to be planned, analyzed, and operated. This panel will present the latest results from EU H2020 project MIGRATE considering the aspects related to system stability, control, protection and power quality.

EP3 | H2020 SMARTNET
HOW TO GET FLEXIBILITY FROM RESOURCES CONNECTED TO DISTRIBUTION GRIDS?
THE RESULTS OF THE SMARTNET PROJECT
Wednesday 26th June | 8:30–10:10

The session presents the results of the Horizon2020 project SmartNet, aimed at investigating the possibility for flexible resources connected to distribution grids to provide system services. Scenario studies at 2030 for Italy, Denmark and Spain, three technological pilots and a hardware-in-the-loop test complete each other to provide a comprehensive analysis. Finally, project results are put in relationship to the present regulatory trends in Europe and in the three mentioned Countries and regulatory guidelines are elaborated.
**EP4 | UNITED-GRID – INTEGRATED CYBER-PHYSICAL SOLUTIONS FOR INTELLIGENT DISTRIBUTION GRIDS WITH HIGH PENETRATION OF RENEWABLES**

**Thursday 27th June | 08:30–10:10**

UNITED-GRID aims to secure and optimise operation of the future intelligent distribution networks by developing integrated cyber-physical solutions and efficiently exploiting the opportunities provided by the new actors and technologies.

The core deliverable is the UNITED-GRID tool-box that could be “plugged in” to the existing Distribution Management System (DMS) via a cross-platform for advanced energy management based on real-time system awareness and control, short term generation and load forecasting, advanced measurement-based protection schemes and new business models. This cross-platform allows interoperability from inverter-based distributed energy resources up to the distribution grid at the low and medium voltage levels, thus going beyond the state-of-the-art to optimise operation of the grid with real-time control solutions in a high level of automation and cyber-physical security. The solutions developed by the project will be demonstrated at three demo-sites provided by project partners.

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**SPECIAL SESSIONS**

**SS1 | MICROGRID FOR ELECTRIFICATION IN DEVELOPING COUNTRIES**

**Tuesday 25th June | 8:30–10:10**

Off-grid small scale power systems are expected to represent one of the key solutions for rural electrification. Despite a centralized electrification could be more energy efficient and cost-effective in the long term, it is accepted that bottom-up off-grid power systems represent the most viable solution in the medium-short term. The proposed Special Session aims to open a technical discussion about the design, the monitoring, and the impact evaluation of electrification process.

**Supported by:**

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**SS2 | EVOLUTION OF TECHNOLOGIES FOR THE INTEGRATION OF RENEWABLES**

**Tuesday 25th June | 14:20–16:00**

More and more distributed generation, based on renewable sources, is being connected to our distribution grids. New technologies are developing to support this trend, including protection systems, switching devices, control algorithms and more. At the same time, technologies need to work inside an operational framework given by standards and grid codes, in order to guarantee reliable and safe operation of the power grids.

The special session will focus on the evolution of technologies recently developed to ensure smooth integration of renewable energy sources, on the evolution of grid codes describing the rules of connection for such sources, and on how these two evolution paths influence each other.

**Supported by:**

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**SS3 | OPTIMIZATION TECHNIQUES FOR RENEWABLE ENERGY SOURCES INTEGRATION WITH ENERGY STORAGE DEVICES**

**Tuesday 25th June | 16:10–17:50**

The Panel Session focuses on the challenges introduced by the optimal management of energy storage systems (ESSs) coupled with renewable energy sources (RESs) in accordance with the stochastic behaviour of RESs and taking into account the intrinsic characteristics (dynamic behavior, ageing, etc.) of ESSs.

**Supported by:**
SS4 | ENABLING TECHNOLOGIES AND METHODOLOGIES FOR WIDE AREA MONITORING

Wednesday 26th June | 8:30-10:10

Synchronized Measurement Technologies, such as Phasor Measurement Units (PMUs) have resulted in the design and application of various wide area monitoring, protection and control (WAMPAC) schemes. Most provide significant reliability and financial benefits in the planning, operation and maintenance of smarter power networks at both the distribution and transmission level. This Special Section analyzes the design, operation and maintenance of synchronized measurement technology in WAMPAC applications, discussing best practices, proof of concepts and the most promising enabling technologies.

SS5 | EDUCATION AND FORMATION OF FUTURE POWER ELECTRICAL ENGINEERS

THE EXPERIENCE OF THE SCHOLARSHIP PLUS

Wednesday 26th June | 14:20-16:00

Considering the fundamental role of the power and energy sector in the sustainable growth of the economy, the function of the electrical engineer is becoming always more essential and therefore the challenge is in attracting students to the power sector. With a large number of other growing industries and manpower intensive sectors becoming the preferred choice for the best talent, the Power Sector needs to find innovative ways of attracting well qualified manpower and fresh talent. The PES Scholarship Plus Initiative provides scholarships and real world experience to undergraduates who are interested in power and energy engineering careers. Power and energy engineers work with some of today’s most exciting technologies, developing solutions to problems that affect our lives and lifestyles.

SS6 | NEW TRENDS IN EDUCATION AND TRAINING FOR THE ENERGY TRANSITION

Wednesday 26th June | 16:10-17:50

The transition to a low carbon society and in particular the crucial role of the energy sector in this transition dictate the development of new skills and expertise in different fields (e.g. electric power, ICT, economics, etc.).

The role of education and training is of utmost importance to address the current and emerging skill gaps and lead the way to a new generation of professionals and innovators. To this aim, recent technological advancements can revolutionize education by providing a plethora of new tools and possibilities.

At the same time, learner-centered and application-driven educational approaches are increasingly gaining interest. The presentations will address distributed generation and smart grids education focusing on, but not limited to the ongoing work of the ERIGrid project (H2020). The suggested topics include:

- New skills and educational needs for cyber-physical energy systems.
- New trends in laboratory education: Power Hardware in the Loop and Controller Hardware in the Loop simulation.
- Blended learning and applications of learner-centered educational methodologies.
- E-learning tools: interactive notebooks, virtual and remote laboratories etc.

SS7 | MICROGRID STABILITY DEFINITIONS, ANALYSIS, AND MODELING

Thursday 27th June | 10:30-12:10

The proposed microgrid stability definitions and classification will be first presented. The various models of the different microgrid components such as diesel generators, converters, RES, and associated controls, feeders, load models, and energy storage, will also be discussed, as well as the analysis techniques and tools used for stability studies. Finally, various examples of stability problems, controls, and modeling will be presented.

SS8 | UNDERSTANDING SYSTEM RESILIENCE IN CRITICAL INFRASTRUCTURES

Thursday 27th June | 14:20-16:00

Recent widespread outages and blackouts worldwide, often caused by extreme natural events, have brought to the fore the need for making the power system more resilient to extreme events. However, there is still lack of clarity about the concept of resilience itself, and as to what operational and planning tools may be required to enhance the resilience of power systems.

This special session will address a number of relevant issues, including what we actually mean by resilience and its relationship with security and reliability, its importance in future system planning, and practical transmission and distribution network applications to a number of events such as wildfires, windstorms, and earthquakes.

SS9 | VALIDATION AND DE-RISKING OF GRID MODERNIZATION TECHNOLOGIES WITH HARDWARE IN THE LOOP TESTING

Thursday 27th June | 10:30-12:10

This special session will explore hardware in the loop (HIL) testing as a tool for assessing novel power systems technologies and techniques prior to commercialization or deployment. Connecting protection, automation, and/or control schemes in a closed loop with a simulated network allows engineers to understand and mitigate the uncertainties of the modern power system – interoperability between devices of multiple vendors and communication types, vulnerability of low inertia systems, and AC-DC system interactions, for example. This session will provide an overview of real time simulation technology and examples of research done in this field.

Supported by:

SS10 | INTEGRATION OF PMU MEASUREMENTS INTO POWER SYSTEM STATE ESTIMATION

Thursday 27th June | 16:10-17:50

This special session addresses diverse aspects of synchronized phasor measurement technology contributions to power system situational awareness and state estimation. The presentations cover topics ranging from new hybrid algorithms for embedding phasor measurements into state estimation, to shared experiences on currently operating PMU-based estimators of distribution networks. Other applications of PMU measurements for power system modeling are also contemplated, such as parameter identification of renewable power plants and network model parameter estimation.

Finally, the session includes a contribution from PMU manufacturers concerning novel PMU applications to the secure operation of power systems.
## PROGRAM AT A GLANCE

**SUNDAY, June 23\(^{rd}\)**

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<td>TUTORIAL 1: The Smart Transformer: Impact on the Electric Grid and Technology Challenges</td>
<td>TUTORIAL 2: Probabilistic methods for power system management: state of the art, challenges and perspectives</td>
<td>TUTORIAL 3: Computational Intelligence in Power System Applications</td>
<td>TUTORIAL 4: Power System Optimization Modeling in GAMS</td>
<td>TUTORIAL 6: Increasing the PV Hosting Capacity of Distribution Networks: The role of Smart Inverters and Storage</td>
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BL28, Hall
MONDAY, June 24th

08:00
Registration full day

09:00 - 10:10
Opening Ceremony
BL28 | Room “Carassa Dadda” and streaming BL.270.1 and BL.270.2

10:10 - 10:30
Coffee Break

10:30 - 12:10
Plenary Session 1 - Bridging the gap: most promising technologies to invest in the future
BL28 | Room “Carassa Dadda” and streaming BL.270.1 and BL.270.2

12:10 - 13:00
Lunch
BL27 First Floor | Poster Area

13:00 - 14:20
PS 1A | Planning and Operation of Power Systems - Electricity Market and Pricing Mechanism
Session Chair: Marie-Cécile Alvarez Herault

PS 1B | Power System Dynamics, Stability and Control - Voltage Regulation and Stability, Reactive Power Control

PS 1C | Power System Dynamics, Stability and Control - Frequency Regulation and Active Power Flows

PS 1D | Network Modeling, Protection and Security - Load Models and Power Flows

PS 1E | State Estimation and Situational Awareness - Power System State Estimation

Session Chairs: Marie-Cécile Alvarez Herault, Eduardo Asada, Federico Silvestro, Luis Rouco, Sarah Rönnberg

14:20 - 16:00
EP 1 | H2020 OSMOSE
TS 1I | Power Industry Leading Innovation - Advanced Methods for System Modeling and Simulation

Session Chairs: Ilaria Losa, Stephanie Morello

TS 1J | System Operation and Control - Advanced Methods for Power Systems Analysis
Session Chair: Stefano Massucco

TS 1K | Innovative Grids in Energy Hybrid Systems Integration - Optimization of Energy Vectors
Session Chair: Patrick Panciatici

TS 1L | System Operation and Control - DC Grids: Modeling and Operation
Session Chair: Shmuel Oren

TS 1M | System Operation and Control - Grid Operation with EVs and RES
Session Chair: Shmuel Oren

TS 1N | System Operation and Control - Advance Methods for Security and Reliability Improvement
Session Chair: Martin Braun

TS 1O | Innovative Grids in Energy Hybrid Systems Integration - Technical and Regulatory Aspects
Session Chair: Martin Braun

EP 2 | H2020 MIGRATE - Challenges and Solutions in Future Transmission Networks with High Penetration of Power Electronics

Session Chair: Jako Kilter

16:10 - 17:50
TS 1M | System Operation and Control - Grid Operation with EVs and DERs
Session Chair: Mircea Eternia

TS 1N | System Operation and Control - Advanced Methods for Security and Reliability Improvement
Session Chair: Math Bollen

TS 1O | Innovative Grids in Energy Hybrid Systems Integration - Technical and Regulatory Aspects
Session Chair: Neville Watson

TS 1P | System Operation and Control - Trasmission Grid Expansion Planning
Session Chair: Maurizio Dellanti

Start-up Meet UP event
Session Chair: Jean-Luc Dormoy, Domenico Pennafino

17:50 - 18:10
Happy Hour Time

Dessert & Coffee
### TUESDAY, June 25th

#### 08.00
- WIP networking coffee session | BL.28.0.1
- Registration full day

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Room BL.27.0.1</th>
<th>Room BL.27.0.2</th>
<th>Room BL.27.0.3</th>
<th>Room BL.27.0.6</th>
<th>Room BL.27.0.7</th>
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<tbody>
<tr>
<td>08.00</td>
<td>SS1</td>
<td>Microgrid for Electrification in Developing Countries</td>
<td>TS 2A</td>
<td>Innovative Grids in Energy Hybrid Systems Integration - Forecasting and Mitigation of Variable Renewable Sources</td>
<td>TS 2B</td>
<td>System Operation and Control - Optimization Methods for Active and Reactive Power Flows</td>
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#### 08.30 - 10.10

- SS1 | Microgrid for Electrification in Developing Countries
- TS 2A | Innovative Grids in Energy Hybrid Systems Integration - Forecasting and Mitigation of Variable Renewable Sources
- TS 2C | System Operation and Control - Power Quality Mitigation in Power Systems
- TS 2D | System Operation and Control - Power System Stability with Large Renewable Sources

#### 10.10 - 10.30
- Coffee Break

#### 10.30 - 12.10

- Plenary Session 2 - Multidisciplinarity Research. Power System and Computational Intelligence
- BL28 | Room "Carassa Dadda" and streaming BL.27.0.1 and BL.27.0.2
- Lunch

#### 13.00 - 14.20

- PS 2A | Planning and Operation of Power Systems under Market Condition - Distributed Generation, Renewables and Energy Storage Systems
- PS 2B | Modelling, Analysis and Operation of HVDC and DC Distribution Systems
- PS 2C | Power Quality Issues in Power Systems
- PS 2D | Power System Dynamics, Stability and Control - Inverter-Connected Power Sources
- PS 2E | Network Modeling, Protection and Security - Fault Detection and Protection Coordination

- Session Chair: Davide Pali
- Session Chair: Morris Brenna
- Session Chair: Cristian Lazaroa
- Session Chair: Roberto Perini
- Session Chair: Héctor Chávez

#### 13:00 - 14:20

- PS 2F | Machine Learning and Computational Intelligence in Power Systems
- PS 2G | Modeling and Optimization of Hybrid and Multi-Energy Systems
- PS 2H | Power System Dynamics, Stability and Control - Inverter-Connected Power Sources
- PS 2I | Battery Energy Storage Systems

- Session Chair: Anna Mutule
- Session Chair: Mathaios Panteli
- Session Chair: Alessandro Massi Pavan
- Session Chair: Pavlos Georgilakis

#### 14:20 - 16.00

- SS2 | Evolution of Technologies for the Integration of Renewables
- TS 2I | Innovative Grids in Energy Hybrid Systems Integration - Optimization of Active Local Distribution Grids
- TS 2J | Data Science and ICT in Power Technologies - Smart Metering for State Estimation and Analysis
- TS 2K | System Operation and Control - Large Scale Wind Farm Integration in Power Systems
- TS 2L | System Operation and Control - Distribution Grid Expansion Planning

- Organizer: Michela Longo
- Session Chair: Joao Pecas Lopes
- Session Chair: Alex Stankovic
- Session Chair: Costas Vournas
- Session Chair: Zita A. Vale

#### 16:10 - 17.50

- SS3 | Optimization Techniques for Renewable Energy Sources Integration with Energy Storage Devices
- TS 2M | Innovative Grids in Energy Hybrid Systems Integration - Management of Smart Distribution Grids
- TS 2N | Data Science and ICT in Power Technologies - Advance Methods for Power System Analysis
- TS 2O | System Operation and Control - HVDC: Operation and Protection
- TS 2P | System Operation and Control - Medium and High Frequency Disturbances Issues

- Organizers: Gianfranco Chiocco, Samuele Grillo
- Session Chair: Mariacristina Roscia
- Session Chair: Charan Singh
- Session Chair: Nikola Voropai
- Session Chair: Alfredo Testa

### TUESDAY, June 25th

#### 17.50 - 18.10

- Happy Hour Time
# PROGRAM AT A GLANCE

### WEDNESDAY, June 26th

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Room BL 270.1</th>
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<th>Room BL 270.3</th>
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<tbody>
<tr>
<td>08:00 - 09:00</td>
<td>Registration Full Day</td>
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<tr>
<td>09:00 - 10:00</td>
<td>Coffee Break</td>
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<tr>
<td>10:00 - 12:00</td>
<td>Planar Session 3: Transfer of Knowledge; a guide to publish your research</td>
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<tr>
<td>12:30 - 13:00</td>
<td>Lunch</td>
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<tr>
<td>13:00 - 14:20</td>
<td>SS4</td>
<td>Educational Technologies for Wide-Area Monitoring Protection and Control Systems</td>
<td>Room BL.27 .0.1</td>
<td>Room BL.27 .0.2</td>
<td>Room BL.27 .0.3</td>
<td>Room BL.27 .0.6</td>
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<tr>
<td>14:20 - 16:00</td>
<td>SS5</td>
<td>Education and Training for the Energy Transition</td>
<td>Room BL.27 .0.1</td>
<td>Room BL.27 .0.2</td>
<td>Room BL.27 .0.3</td>
<td>Room BL.27 .0.6</td>
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<tr>
<td>16:10 - 17:50</td>
<td>TS 3</td>
<td>Innovative Grids in Energy Hybrid Systems: Modeling and Control on Microgrids</td>
<td>Room BL.27 .0.1</td>
<td>Room BL.27 .0.2</td>
<td>Room BL.27 .0.3</td>
<td>Room BL.27 .0.6</td>
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**Organizers:**
- SS4: Edvina Uzonovic, Carlo Alberto Nucci
- SS5: Eva LaZanovic, Chao Xing
- TS 3: Adam Chopra, Giovanni Lutzemberger
**THURSDAY, June 27th**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Session Chair</th>
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<tbody>
<tr>
<td>08:00 - 12:00</td>
<td>Registration</td>
<td></td>
</tr>
</tbody>
</table>
| 08:30 - 10:10 | EP4 | UNITED-GRID Integrated Cyber-Physical Solutions for Intelligent Distribution Grids with High Penetration of Renewables  
Session Chair: Tuan Le | Session Chair: Mario Paolone  
Session Chair: Jean Mahseredjian  
Session Chair: Gabriela Hug  
Session Chair: Alessandro Gandelli |
| 10:10 - 10:30 | Coffee Break                                |                                |
| 10:30 - 12:10 | SS7 | Microgrid Stability Definitions, Analysis and Modeling  
Organizer: Claudio Canizares | Session Chair: Raphael Caire  
Session Chair: Arturo Bretas  
Session Chair: Joe Chow  
Session Chair: Pablo Aboliaya  
Organizer: Kati Sidwall |
| 12:10 - 13:00 | Lunch                                       |                                |
| 13:00 - 14:20 | BL27 FIRST FLOOR | Poster Area |
| 14:20 - 16:00 | SS8 | Understanding System Resilience in Critical Infrastructures  
Organizer: Pierluigi Mancarella | Session Chair: Joao Paulo Tomé Saravia  
Session Chair: A.P. Sakis Meliopoulos  
Session Chair: Alberto Berizi  
Session Chair: Rachid Cherkaoui |
| 16:10 - 17:50 | SS10 | Integration of PMU Measurements into Power System State Estimation  
Organizer: Antonio Simoes Costa | Session Chair: Fabio Napolitano  
Session Chair: Giovanni Spagnuolo  
Session Chair: Enrico Tirani  
Session Chair: Ermano Cardelli |
| 17:50 - 18:10 | Happy Hour Time                             |                                |
09:00 – 10:10 | BL.28 Room “CARASSA DADDA”
Streaming BL.27 .0.1 and BL.27 .0.2

IEEE PowerTech Milano 2019 Opening Ceremony

Speakers:
- Dario Zaninelli | General Chair of the PowerTech Milano 2019
- Costas Vournas | Chair of the PowerTech International Steering Committee
- Saifur Rahman | President IEEE PES
- Fabio Inzoli | Head of Department of Energy – Politecnico di Milano
- Sonia Leva | Publication Chair of the PowerTech Milano 2019
- Federica Foiadelli | Program Chair of the PowerTech Milano 2019

10:30 – 12:10 | PLENARY SESSION 1 | BL28 Room “CARASSA DADDA”
Streaming BL.27 .0.1 and BL.27 .0.2

Bridging the gap: most promising technologies to invest in the future

Chair: Vincenzo Piuri | IEEE Past Vice President for Technical Activities

Keynote Speakers:
- Saifur Rahman | President IEEE PES
- Allan Tear | RevUp Capital Founder
- Carlalberto Guglielminotti | CEO, Engie EPS
- Adel El Gammal | Secretary General, EERA – European Energy Research Alliance
- Marco Gazzino | Head of Innovation and Product Lab, Enel X

13:00 - 14:20 | PS 1A | BL27 First Floor | Poster Area

Planning and Operation of Power Systems Under Market Condition - Electricity Market and Pricing Mechanism

Chair: Marie-Cécile Alvarez Herault | Univ. Grenoble Alpes, France

- ID 149 | The Impacts of an Integrated European Dayahead and Intraday Electricity Market on Market Performance: The Iberian Region Case
  Shaghayegh Zalzar, Ettore Bompard | Politecnico di Torino, Italy

- ID 572 | Pricing Mechanism Based on Losses Using Grid Topology
  Victor Reijnders, Marco Gerards, Johann Hurink | University of Twente, Netherlands

- ID 167 | Pricing Mechanism for Demand Response based on Penalty Paradigm
  Ashim Basnet, Jin Zhong | The University of Hong Kong, Hong Kong
- **ID 730** Integrated zonal-exchange and nodal-flow clearing model in multi-zonal spot electricity markets
  Andreas Viaches | Regulatory Authority for Energy, Greece
  Pandelis Biskas | Aristotle University of Thessaloniki, Greece

- **ID 160** Manipulability of Cost and Benefit Allocation in Cross-border Electrical Interconnection Projects
  Andrey Churkin, David Pozo, Janusz Białek | Skolkovo Institute of Science and Technology (Skoltech), Russia
  Nikolay Korgin | Institute of Control Sciences of Russian Academy of Sciences, Russia
  Enzo Sauma | Pontificia Universidad Católica de Chile, Chile

- **ID 285** Optimal Adjustments on the Market Dispatch Solution to Supply System Losses
  Rafael Zárate-Míñano, Miguel Carrón | University of Castilla - La Mancha, Spain

- **ID 582** Modelling of the Demand Curve of the Italian Capacity Market
  Ahmed Hussein | Othman Fouad, Egypt
  Cristian Bovo | Politecnico di Milano, Italy

- **ID 398** Accommodating Bounded Rationality in Pricing Demand Response
  Andrea Marín Radoszynski, Vladimir Dvorkin, Pierre Pinson | Technical University of Denmark, Denmark

- **ID 277** Value of Thermostatic Loads in Energy/Frequency Response Markets: a Mean Field Game Approach
  Antonio De Paola | University of Bath, United Kingdom
  Vincenzo Trovato | EDF Energy R&D, United Kingdom
  David Angelis, Goran Strbac | Imperial College London, United Kingdom

- **ID 822** Consumer Hedging Against Price Volatility Under Uncertainty
  Shantanu Chakraborty, Milos Cvetkovic, Renzo Verzijlbergh, Zofia Lukasz | Delft University of Technology, Netherlands
  Kyri Baker | University of Colorado at Boulder, United States

**13:00 - 14:20 | PS 1B | BL27 First Floor | Poster Area**

**Power System Dynamics, Stability and Control – Voltage Regulation and Stability, Reactive Power Control**

Chair: Eduardo Asada | University of São Paulo, Brazil

- **ID 797** Equivalent dynamic model of active distribution networks for large voltage disturbances
  Nuno Fulgêncio, Leonel Carvalho | INESC TEC, Portugal
  Carlos Moreira, João Peças Lopes | FEUP / INESC TEC, Portugal

- **ID 384** Voltage Support Scheme for Low Voltage Distribution Grids Under Voltage Sags
  Anastasios Charalambous, Lenos Hadjidentriou, Elias Kyriakides | KIOS Research and Innovation Center, University of Cyprus, Cyprus

- **ID 740** Impact of Varying Shares of Distributed Energy Resources on Voltage Stability in Electric Power Systems
  Sebastian Liemann, Lena Robitzky, Christian Rehtanz | ie3 - TU Dortmund, Germany

- **ID 439** Reactive Power Reserves Management by DGs for Voltage Stability Enhancement: A Case Study
  Abdulaziz Alkuhayli | King Saud University, Saudi Arabia
  Iqbal Husain | North Carolina State University, United States
  Thamer Alquthami | King Abdulaziz University, Saudi Arabia

- **ID 443** Reactive Power Dispatching Among Generating Units Connected to Point of Common Coupling
  Jasna Dragosavac, Zarko Janda, Jelena Pavlovic, Zoran Ćirić | Electrical Engineering Institute Nikola Tesla, Serbia

- **ID 751** Impact of Smart Inverter Functions on Dynamic Step Voltage Regulator Settings for Distribution Voltage Control
  H. M. Mesbah Maruf, Badrul Chowdhury | UNC Charlotte, United States

- **ID 783** Applying Steinmetz Circuit Design to Mitigate Voltage Unbalance using Distributed Solar PV
  Mengqi Yao, Ian A. Hiskens, Johanna L. Matheu | University of Michigan, United States

- **ID 124** A Parallel Processing Approach to Stability Analysis Considering Transmission and Distribution Systems
  Angie Daniela Vasquez, Thales Sousa | Federal University of ABC, Brazil

- **ID 669** Integration of Centralized and Local Voltage Control Scheme in Distribution Network to Reduce the Operation of Mechanically Switched Devices
  Salish Maharjan, Ashwin M. Khambadkone, Jimmy C. H. Peng | National University of Singapore, Singapore

**13:00 - 14:20 | PS 1C | BL27 First Floor | Poster Area**

**Power System Dynamics, Stability and Control - Frequency Regulation and Active Power Flows**

Chair: Federico Silvestro | University of Genova, Italy

- **ID 19** Impact of Realistic Bus Frequency Measurements on Wide-Area Power System Stabilizers
  Georgios Tzounas, Muyang Liu, Mohammed Ahsan Adib Murad, Federico Milano | University College Dublin, Ireland

- **ID 43** Extending the Reach of Traditional Frequency Control for Fast Responses
  Jean Ubeltalli, Timothy Littler | Queen’s Belfast University, United Kingdom

- **ID 352** On the Use of Thermostatically Controlled Loads for Frequency Control
  Maksim Parshin, Maryam Majidi, Federico Ibanez, David Pozo | Skolkovo Institute of Science and Technology, Russia

- **ID 402** ADRC for Decentralized Load Frequency Control with Renewable Energy Generation
  Sergio A. Dorado-Rojas | Rensselaer Polytechnic Institute, United States
  Alejandro Miranda-Rodriguez, Sergio Rivera, Eduardo Mojica-Nava | Universidad Nacional de Colombia, Colombia
MONDAY, June 24th

- **ID 289** | Delay-Robust Distributed Secondary Frequency Control: A Case Study
  Sultan Alghamdi, Nathan Smith, Petros Aristidou | University of Leeds, United Kingdom
  Johannes Schiffer Brandenburg | University of Technology Cottbus-Senftenberg, Germany

- **ID 712** | Comparison of two schemes for closed-loop decentralized frequency control and overload alleviation
  Oleg O. Khamisov, Tatiana Chernova, Janusz W. Bialek | Skolkovo Institute of Science and Technology, Russia

- **ID 578** | Smart Transformers - Enabling power-frequency regulation services for hybrid AC/DC networks
  Justino Rodrigues | INESC TEC, Portugal
  Carlos Moreira, Joao Pecas Lopes | FEUR University of Porto, Portugal

- **ID 142** | LFC model for frequency stability analysis of prospective power systems with high shares of inverter based generation
  Arun Kannan, Maria Nuschke, Diana Strauß-Mincu | Fraunhofer Institute for Energy Economics and Energy System Technology (IffE), Germany

**13:00 - 14:20 | PS 1E | BL27 First Floor | Poster Area**

Network Modeling, Protection and Security – Load Models and Power Flows

Chair: Luis Rouco | Universidad Pontificia Comillas, Spain

- **ID 177** | Feature- and Structure-Preserving Network Reduction for Large-Scale Transmission Grids
  Julia Sisttemanns, Matthias Hotz, Dominic Hewes, Rolf Witzmann, Wolfgang Utschick | Technische Universität München, Germany

- **ID 326** | Optimal Adaptive Power Flow Linearizations: Expected Error Minimization using Polynomial Chaos Expansion
  Tillmann Mühlpfordt, Veit Hagenmeyer | Karlsruhe Institute of Technology, Germany
  Daniel Mrozahn | Argonne National Laboratory, United States
  Sidhant Misra | Los Alamos National Laboratory, United States

- **ID 440** | Retrospective Optimal Power Flow for Low Discriminating Active Power Curtailment
  Friederike Meier, Christian Tobermann | Fraunhofer IEE, Germany
  Martin Braun | University of Kassel, Germany

- **ID 757** | A Co-simulation Framework for Distribution Network Analysis: Case Study of Hosting Capacity Analysis
  Xiao Xu, Jagadeesh Gunda, Sasa Djokic | The University of Edinburgh, United Kingdom

- **ID 836** | Conductor Temperature Estimation under Uncertain External Conditions Using a Temperature-Dependent Power Flow
  Valentina Cecchi, Mahbubur Rahman | University of North Carolina at Charlotte, United States

- **ID 616** | A Novel Improved Hilbert-Huang Transform Technique for Implementation of Power System Local Oscillation Monitoring
  Reza Zamani, Mohsen Parsa Moghadam, Maryam Imani | Tarbiat Modares University, Iran
  Hassan Haes Alhelou | Tishreen University, Syria
  Mohammad Esmail Hamedani Golshan | Isfahan University of Technology, Iran
  Pierluigi Siano | University of Salerno, Italy

- **ID 106** | Computation of subtransmission losses based on statistical optimization approach with network constraints
  Delberis Lima, Sergio Cárdenas | PUC-Rio (Pontifical Catholic University of Rio de Janeiro), Brazil

- **ID 597** | Performance Assessment of Kron Reduction in the Numerical Analysis of Polyphase Power Systems
  Andreas Martin Kettnner, Mario Paolione | École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

State Estimation and Situational Awareness - Power System State Estimation

Chair: Sarah Rönnberg | Luleå Technical University, Sweden

- **ID 75** | Equivalent Circuit Programming for Estimating the State of a Power System
  Marko Jereminov, Martin Wagner, Lary Pileggi | Carnegie Mellon University, United States
  Aleksandar Jovicic, Gabriela Hug | ETH Zurich, Switzerland

- **ID 188** | State estimation of low voltage distribution network with integrated customer-owned PV and storage unit
  Motaz Ayiad | UPorto/EFACEC, Portugal
  Onyema Nduka, Bikash Pal | Imperial College London, United Kingdom
  Hugo Martins | EFACEC, Portugal

- **ID 268** | Distribution Grid State Assessment for Control Reserve Provision Using Boundary Load Flow
  Volker Scheffer, Hanko Ipach, Christian Becker | Hamburg University of Technology, Germany

- **ID 378** | Robust State Estimation Using Node-Breaker Substation Models and Phasor Measurements
  Ali Abur, Bilgehan Donmez, Gianna Scioletti | Northeastern University, United States

- **ID 455** | Analysis of State Uncertainty for Distribution System State Estimation
  Annika Brueggemann, Christian Rehtanz | TU Dortmund University, Germany
  Theresa Noll | Westnetz GmbH, Germany

- **ID 466** | Assessing the Normalized Residuals Technique with AMB-SE for Non-Technical Loss Detection
  Rodrigo Sau, Luis Ugarte, David Sarmiento, Madson Almeida | Unicamp, Brazil

- **ID 576** | Inclusion of converter controller measurements into state estimation algorithm for hybrid ac-dc grid
  Gaurav Kumar Roy, Marco Pau, Abhinav Sadu, Ferdinanda Ponci, Antonello Monti | RWTH aachen University, Germany
MONDAY, June 24th

13:00 - 14:20 | PS 1F | BL27 First Floor | Poster Area

Microgrids, Market and Aggregators
Chair: Anna Pinnarelli | University of Calabria, Italy

- **ID 547** | Using the E covat system to supply the heat demand of a neighbourhood
Gis de Goedjen, Gerwin Hoogstee, Johann Hurink, Gerard Smit | University of Twente, Netherlands

- **ID 802** | Electricity and Gas Network Expansion Planning: an ADMM-based Decomposition Approach
Yinghui Nie, Meisam Farrokhhfard, David Pozo | Skolkovo Institute of Science and Technology, Russia

- **ID 129** | Operational Optimization of a Microgrid with Differential Algebraic Constraints
Ruben de Girardier, Anastasios Rousis, Ioannis Konstantelos, Goran Strbac | Imperial College London, United Kingdom

- **ID 651** | Solar Power Resource Assessment Using Light Detection and Ranging Data and Open Source Geographic Information System
Ellen Jane G. Gulben, Jeeng-Min Ling | Southern Taiwan University of Science and Technology, Taiwan

13:00 - 14:20 | PS 1G | BL27 First Floor | Poster Area

Modeling and Optimization of Hybrid and Multi-Energy Systems
Chair: Filippo Spertino | Politecnico di Torino, Italy

- **ID 586** | Prosumer Markets: A Unified Formulation
Thomas Baroe | ENS Rennes, France
Fabio Moret, Pierre Pinson | Technical University of Denmark, Denmark

- **ID 132** | Modeling an Optimal Peer-to-Peer Energy Sharing Between Prosumers in a South African Context
Kanziuma Kusakana | Central University of Technology, Free State South Africa

- **ID 304** | Stochastic Operation Scheduling Model for a Swedish Prosumer with PV and BESS in Nordic Day-Ahead Electricity Market
Christos Agathokleous, Anh Tuan Le, David Steen | Chalmers University of Technology, Sweden

- **ID 473** | Iterative Algorithm For Local Electricity Trading
Amin Shokri Gazafroudi, Juan Manuel Corchado | University of Salamanca, Spain

- **ID 486** | Techno-economic Assessment of Reserve Service Provision from Microgrids for Resilience Enhancement
Asimina Frosinou, Mathaios Panteli | The University of Manchester, United Kingdom

- **ID 665** | Optimal Operation Strategy for Community-based Prosumers through Cooperative P2P Trading
Wonpoong Lee, Daesoo Kim, Yunsun Jin, Minsu Park, Dongjun Won | Inha-University, South Korea

- **ID 544** | Impact of Grid Tariffs Design on the Zero Emission Neighborhoods Energy System Investments
Dimitri Pinel, Sigurd Bjarghov, Magnus Korpås | NTNU, Norway

- **ID 570** | PMUs and SCADA Measurements in Power System State Estimation through Bayesian Inference
Julio Augusto Druzina Massignan, João Bosco Augusto London Jr, Carlos Dias Maciel | University of São Paulo, Brazil
Michel Bessani | Federal University of Minas Gerais, Brazil
Vladimiro Miranda | INESC TEC and University of Porto, Portugal

- **ID 796** | Statistical Criteria for Evaluation of Distribution System State Estimators
Thiago Ramos Fernandes, Leonardo Ramos Fernandes, Luis Fernando Ugarte Vega, Rafael Schincariol da Silva, Madson Cortes de Almeida | University of Caminas, Brazil

- **ID 600** | An Improved UFLS Scheme based on Estimated Minimum Frequency and Power Deficit
Hassan Haes Ahelou, Mohammad Esmail Hamedani Golshan, Takawira Njenda | Isfahan University of Technology, Syria
Reza Zanani, Mohsen Parsa Moghaddam | Tarbiat Modares University, Iran
Perluigi Siano | University of Salerno, Italy
Mousa Marzband | Northumbria University Newcastle, United Kingdom

- **ID 121** | Nordic Day-Ahead Electricity Market
Ruben de Girardier, Anastasios Rousis, Ioannis Konstantelos, Goran Strbac | Imperial College London, United Kingdom

- **ID 473** | Iterative Algorithm For Local Electricity Trading
Amin Shokri Gazafroudi, Juan Manuel Corchado | University of Salamanca, Spain

- **ID 486** | Techno-economic Assessment of Reserve Service Provision from Microgrids for Resilience Enhancement
Asimina Frosinou, Mathaios Panteli | The University of Manchester, United Kingdom

- **ID 665** | Optimal Operation Strategy for Community-based Prosumers through Cooperative P2P Trading
Wonpoong Lee, Daesoo Kim, Yunsun Jin, Minsu Park, Dongjun Won | Inha-University, South Korea

- **ID 554** | Impact of Grid Tariffs Design on the Zero Emission Neighborhoods Energy System Investments
Dimitri Pinel, Sigurd Bjarghov, Magnus Korpås | NTNU, Norway
- **ID 718** | Techno-economic Planning Framework of a Household MicroGrid with Hybrid Energy Storage System
  Jeong-Min Ling, Meng-Hui Lin, Ming-Tsung Tsai | Southern Taiwan University of Science and Technology, Taiwan

- **ID 553** | Influence of Combining Real-time and Fixed Tariffs in the Demand Response Aggregation and Remuneration Schemes Definition
  Cáti Silva, Pedro Faria, Zita Vale | Polytechnic of Porto, Portugal

- **ID 260** | A Game Model Reflecting the Interaction between Supply and Demand of Power System and Its Q Learning Solution
  Bin Wang, Shining Li, Ruifeng Zhao, Wenxin Guo, Yueting Lin | Electric Dispatch and Control Center, Guangdong Power Grid Co., Ltd, China
  Kai ping Qu | College of Electric Power, South China University of Technology, China

13:00 - 14:20 | PS 1H | BL27 First Floor | Poster Area

Forecasting, Modeling and Management of Load and Renewable Energy Sources 1

Chair: Vincente Debusschere | Univ. Grenoble Alpes, France

- **ID 790** | Deep Learning Based Forecasting of Individual Residential Loads Using Recurrence Plots
  Roozbeh Rajabi | Qom University of Technology, Iran
  Abouzar Estebarsi | Politecnico di Torino, Italy

- **ID 901** | Deep Learning Application to Non-Intrusive Load Monitoring
  Pablo Arboleya, Viet Linh Nguyen | University of Oviedo, Spain

- **ID 427** | Electricity consumption forecasting in office buildings: an artificial intelligence approach
  Aria Jovi, Tiago Pinto, Goreti Marreiros | GECAD/IPP, Portugal
  Zita Vale | Polytechnic of Porto, Portugal

- **ID 623** | Forecasting the Electricity Hourly Consumption of Residential Consumers with Smart Meters using Machine Learning Algorithms
  Eduardo Martin Sobrino, Andrea Vega Santiago, Alicia Mateo Gonzalez | Endesa Energia, Spain

- **ID 899** | Load modeling and scheduling optimization for energy sharing in prosumers network
  Matteo Barsanti, Marco Mussetta | Politecnico di Milano, Italy

- **ID 520** | Influence of Flexibility Modeling Parameters on Residential-Scale Demand Response Assessment
  Karlis Balputnis, Zane Broka, Antans Sauhats | Riga Technical University, Latvia

- **ID 921** | RESs Integration and Transmission Expansion Planning Considering Load Shedding Costs
  Catalina Alexandra Sima, Mihai Octavian Popescu, Claudia Laurenta Popescu, Gheorghe Lazaroiu | University POLITEHNICA of Bucharest, Romania

- **ID 556** | Modeling of Consumer Preferences and Constraints for the Optimal Schedule of Consumption Shifting
  Pedro Faria, João Spinola, Zita Vale | Polytechnic of Porto, Portugal

- **ID 631** | The Effect of Inaccurate Load Composition on Power System Contingency Analysis and Planning
  Elena Polykarpou, Markos Aspiou, Elias Kyriakides | KIOS Research and Innovation Center of Excellence, University of Cyprus, Cyprus

13:00 - 14:20 | PS 1I | BL27 First Floor | Poster Area

Forecasting, Modeling and Management of Load and Renewable Energy Sources 2

Chair: Luis Ochoa | University of Melbourne, Australia

- **ID 12** | A Comparative Study on Feature Selection based Improvement of Medium-Term Demand Forecast Accuracy
  Engin Ilseven, Murali Goll | Middle East Technical University, Turkey

- **ID 162** | Load Forecasting of Privacy-Aware Consumers
  Jun-Xing Chiu, Thierry Zufferey, Etta Shyi, Gabriela Hug | ETH Zurich, Switzerland

- **ID 498** | A study of risk reduction for daily peak load demand forecasting
  Kodai Oghara, Shoichi Urano | Meiji University, Japan

- **ID 507** | Short-Term Probabilistic Load Forecasting at Low Aggregation Levels using Convolutional Neural Networks
  Alexander Elvers, Marcus Vöß, Sahin Albayrak | Technische Universität Berlin, Germany

- **ID 621** | Modelling and forecasting of electrical consumption for demand response applications
  Iacob Cruceanu, Otilia Bulcar | SIVECO Romania SA, Romania
  Ana-Maria Dumitrescu | Politehnica University of Bucharest, Romania

- **ID 262** | Ramp Analysis of the Portuguese Net Load under Different Decarbonization Scenarios
  Jorge Magalhães | Faculdade de Engenharia da Universidade do Porto, Portugal
  Jose Villar | INESC TEC (Institute for Systems and Computer Engineering, Technology and Science), Portugal

- **ID 397** | Modelling long-term electricity load demand for rural electrification planning
  Fabio Riva, Francesco Davide Sanvito, Francesco Tonini, Emanuela Colombo | Politecnico di Milano, Italy
  Fabrizio Colombelli | Ethenergie, Italy

- **ID 259** | Comprehensive analysis of Conservation Voltage Reduction: A real case study
  Igor Visconti | Electric Energy Research Center/PUC-Rio (Pontifical Catholic University of Rio de Janeiro), Brazil
  Delberis Lima | Pontifical Catholic University of Rio de Janeiro, Brazil
  Jovica Milanović | University of Manchester, United Kingdom
• **ID 654** | Impact of Residential Load Models for Overvoltage Prevention Studies in PV-Rich LV Grids
Fernando Bereta dos Reis, Kapil Dwadavi, Robert Fourney, Reinaldo Tonkoski, Timothy Hansen | South Dakota State University, United States
Mohammad Asif Iqbal Khan, Sumit Paudyal | Michigan Tech, United States

**13:00 - 14:20** | **PS 1J** | **BL27 First Floor** | **Poster Area**

**Design and Economic Assessment of Electric Vehicle Technologies**
Chair: Siddharth Suryanarayanan | Colorado State University, United States

• **ID 409** | Proposal for Modeling Electric Vehicle Battery Using Experimental Data and Considering Temperature Effects
Juan D. Vallsolol, Juan P. Ortiz | Universidad Politécnica Salesiana, Ecuador
Diego Patiño | Pontificia Universidad Javeriana, Colombia
Ismael Minchala | Universidad de Cuenca, Ecuador
Giambattista Gruosso | Politecnico di Milano, Italy

• **ID 464** | A Review on Dynamic Wireless Charging Systems
Davide De Marco, Alberto Dolara, Michela Longo | Politecnico di Milano, Italy

• **ID 772** | An Energy Saving Management Strategy for Battery-Aided Ship Propulsion Systems
Luisa Aferti | University of Naples Parthenope, Italy
Fabio Mottola, Mario Pagano | University of Naples Federico II, Italy

• **ID 166** | Electric Vehicles Charging Optimization Considering EVs and Load Uncertainties
Leonardo Bitencourt, Bruno Dias | UFJF - Federal University of Juiz de Fora, Brazil
Tiago Abud, Bruno Borba, Márcio Fortes | UFF - Fluminense Federal University, Brazil
Renan Maciel | Federal University of Technology – Paraná – UTFPR, Brazil

• **ID 577** | Online Load Control in Medium Voltage Grid by Means of Reactive Power Modification of Fast Charging Station
Xiang Gao, Giovanni De Carne, Marius Langwasser, Marco Liserre | Kiel University, Germany

• **ID 881** | A Power Demand Estimator for Electric Vehicle Charging Infrastructure
Mahmoud Draz, Sahin Albayrak | Technische Universität Berlin, Germany

• **ID 372** | Assessment of Real-Time Tariffs for Electric Vehicles in Denmark
Tiago Soares | INESC TEC, Portugal
Carlos Fonseca, Hugo Morais, Sergio Ramos | Polytechnic Institute of Porto (IPP), Portugal
Tiago Sousa | Technical University of Denmark (DTU), Denmark

• **ID 725** | Techno-Economic Assessment of EV Charging Infrastructure Development in Brazilian Universities
 Wanessa Guedes, José Carlos Faria, Bruno Dias, Leonardo de Oliveira, Matheus de Souza, José Luiz Pereira | UFJF - Federal University of Juiz de Fora, Brazil
Jairo Quirós-Tortós | University of Costa Rica, Costa Rica

• **ID 908** | An Optimization Model for Airport Infrastructures in Support to Electric Aircraft
Francesco Salucci, Lorenzo Trainelli, Roberto Faranda, Michela Longo | Politecnico di Milano, Italy

**14:20 - 16:00** | **TS 1I** | **Room BL27.0.2**

**Power Industry Leading Innovation – Advanced Methods for System Modeling and Simulation**
Chair: Stefano Masucco | University of Genova, Italy

• **ID 393** | A Comparative Analysis of LU Decomposition Methods for Power System Simulations
Lukas Razik, Lennart Schumacher, Antonello Monti | RWTH Aachen University, Germany
Adrien Guironnet, Gautier Bureau | RTE Réseau de Transport d’Electricité, France

• **ID 642** | Distribution Network Planning Tool for Rural Areas
Thai Phuong Do | CEA, France
Marie-Cécile Alvarez-Herault | Univ. Grenoble Alpes, France

• **ID 892** | Seamless Grid: an off-chain model proposal for scalable P2P electricity markets and grids management
Fabrizio Armani, Francesco Grimaccia, Sonia Levi, Marco Mussetta | Politecnico di Milano, Italy

• **ID 69** | Metaheuristic-based Design and Optimization of Offshore Wind Farms Collection Systems
Daniel Hermosilla Minguijón, Juan-Andrés Pérez-Rúa, Kaushik Das, Nicolaos A. Cutululis | DTU, Denmark

• **ID 895** | Minute Ahead Wind Speed Forecasting Using a Gaussian Process and Fuzzy Assimilation
Miltiadis Alamaniotis | University of Texas at San Antonio, United States
Georgios Karagiannis | Durham University, United States
14:20 - 16:00 | TS 1J | Room BL 270.3
System Operation and Control – Advanced Methods for Power Systems Analysis
Chair: Patrick Panciatici | Réseau de transport d’électricité, RTE (FR)

- **ID 366** | Dynamic equivalent of an active distribution network taking into account model uncertainties
Gilles Chaspiere, Thierry Van Cutsem | University of Liège, Belgium
Guillaume Denis, Patrick Panciatici | RTE, France

- **ID 603** | Critical Bus Voltage Mapping using ANFIS with regards to Max Reactive Power in PV buses
Fernando Fachini, Benedetto Isaia Lima Fuly | Federal University of Itajubá, Brazil

- **ID 482** | A Quasi-Dynamic Tool for Validation of Power System Restoration Strategies at Distribution Level
Davood Raoofsheibani, Philipp Hinkel, Wolfram Wellssow | TU Kaiserslautern, Germany

- **ID 74** | Application of Filippov Theory to the IEEE Standard 421.5-2016 Anti-windup PI Controller
Mohammed Ahsan Addi Murad, Federico Milano | University College Dublin, Ireland
Brendan Hayes | Dublin City University, Ireland

- **ID 543** | Data-driven Control Design Schemes in Active Distribution Grids: Capabilities and Challenges
Stavros Karagannopoulos, Gabriela Hug | ETH Zurich, Switzerland
Roel Dobbe, Duncan Callaway | UC Berkeley, USA
Petros Aristidou | University of Leeds, UK

- **ID 798** | Fast Calculation of the Transfer Capability Margins
Mazhar Ali, Elena Gryazina | Skolkovo Institute of Science and Technology, Russia
Konstantin Turitsyn | Massachusetts Institute of Technology, United States

14:20 - 16:00 | TS 1K | Room BL 270.6
Innovative Grids in Energy Hybrid Systems Integration – Optimization of Energy Vectors
Chair: Shmuel Oren | University of California, Berkeley, United States

- **ID 202** | On the Solvability of Steady-State Load Flow Problems for Multi-Carrier Energy Systems
Anne Markensteijn, Kees Vuijk | Delft University of Technology, Netherlands
Johan Romate | Shell Global Solutions International B.V. and Delft University of Technology, Netherlands

- **ID 347** | Energy hub modelling for multi-scale and multi-energy supply systems
Lahiru Jayesuriya, Modassar Chaudry, Maysam Gadrani, Jianzhong Wu, Nick Jenkins | School of Engineering, Cardiff University, United Kingdom

- **ID 470** | Coordination of Power and Natural Gas Systems: Convexification Approaches for Linepack Modeling
Anna Schweve, Christos Ordoudis, Jalal Kazempour, Pierre Pinson | Technical University of Denmark, Denmark

- **ID 433** | A Modelling Framework for a Virtual Power Plant with Multiple Energy Vectors Providing Multiple Services
James Naughton, Pierluigi Mancarella, Michael Cantoni | University of Melbourne, Australia

- **ID 388** | Implications of Power-to-Hot on Transmission Expansion Needs: A Real Life Case Study
Ankita Gaur, Desta Fititwi, John Curtis | Economic and Social Research Institute-Dublin, Ireland

- **ID 416** | Multi-vector energy optimization tools for energy islands
Sanket Pursani, Heidi Tuiskula, Ililiana Ilieva | Smart Innovation Norway, Norway
Ferran Torrent, Joan Colomer, Joaquim Meléndez | University of Girona, Spain

14:20 - 16:00 | TS 1L | Room BL 270.7
System Operation and Control - DC Grids: Modeling and Operation
Chair: Martin Braun | University of Kassel and Fraunhofer Institute for Energy Economics and Energy System Technology IEE, Germany

- **ID 396** | Efficient Isomorphism Based Simulation of Modular Multilevel Converters
Davide del Giudice, Federico Bizzarri, Daniele Linaro, Angelo Brambilla | Politecnico di Milano, Italy

- **ID 323** | A Real-Time Hardware-In-The-Loop Test Bench for Modular Multilevel Converter with Energy Based Control
Haibo Zhang, Moez Belhaouane, Frédéric Colas, Riad Kadri, François Gruson, Xavier Guillaud | Univ. Lille, Centrale Lille, Arts et Métiers Paris Tech, France

- **ID 341** | Dynamic Average Converter Model for MVDC Link Harmonic Analysis
Tibin Joseph, Jun Liang, Gen Li, Wenlong Ming | Cardiff University, United Kingdom
Senthooran Balasubramaniam | Swansea, United Kingdom
Andrew Moon, Kevin Smith, James Yu | SP Energy Networks, United Kingdom

- **ID 415** | On Stored Energy Requirement in the Alternate Arm Converter
Pierre Vermeersch, François Gruson, Xavier Guillaud | Univ. Lille, Centrale Lille, Arts et Métiers ParisTech, France
Philippe Egrot | Electricité de France R&D - EDF R&D, France
Michael M.C. Merlin | School of Engineering, University of Edinburgh, United Kingdom
H2020 MIGRATE - Challenges and Solutions in Future Transmission Networks with High Penetration of Power Electronics

Organizer: Jako Kilter | TalTech, Tallinn University of Technology, Estonia

- Mitigation approaches for power system stability under high PE penetration – preliminary results
  Sven Rüberg | TenneT
- Wide-Area-Controls for improved system stability – results of pilot tests in Iceland
  Birkir Heimisson | Landsnet
- From grid-forming definition to experimental validation with a VSC
  Thibault Prevost | ATE
- Protection principles and challenges in future power systems
  Jose Chavez | TU Delft
- Probabilistic approach for assessment of harmonic propagation in power networks
  Jovica Milanovic | The University of Manchester

System Operation and Control – Grid Operation with EVs and DERs

Chair: Mircea Eremia | University Politehnica of Bucharest, Romania

- ID 695 | Optimal charging coordination of electric vehicles considering distributed energy resources
  Adrian-Toni Radu, Mircea Eremia, Lucian Toma | University Politehnica of Bucharest, Romania
  Lars Herre, Jacob Dalton, Lennart Söder | KTH Royal Institute of Technology, Sweden
- ID 420 | A Hybrid Robust-Stochastic Approach for the Day-Ahead Scheduling of an EV Aggregator
  Simone Minniti, Niym Haque, Nikolaos Paterakis, Phuong Nguyen | Eindhoven University of Technology, Netherlands
- ID 746 | The Impact of Electric Vehicles Aggregator on the Stability Region of Micro-Grid System with Communication Time Delay
  Hakan Gündüz, Şahin Sönmez, Saffet Ayasun | Nigde Omer Halisdemir University, Turkey

- ID 679 | Identification of Stability Delay Margin for Load Frequency Control System with Electric Vehicles Aggregator using Rekasius Substitution
  Ausnain Naveed, Şahin Sönmez, Saffet Ayasun | Nigde Omer Halisdemir University, Turkey
- ID 469 | Medium- and Low-voltage Planning of Electric Power Distribution Systems with Distributed Generation, Energy Storage Sources, and Electric Vehicles
  Diogo Rupolo, José Roberto Sanches Mantovani | São Paulo State University, UNESP, Brazil
  Benvindo Rodrigues Pereira Junior | University of São Paulo, Brazil
**Innovative Grids in Energy Hybrid Systems Integration**

**Technical and Regulatory Aspects**

Chair: Neville Watson | University of Canterbury, New Zealand

- **ID 231** | Three-Phase Current-Limiting Droop Controlled Inverters Operating in Parallel
  Alexandros Paspatis, George Konstantopoulos | The University of Sheffield, United Kingdom

- **ID 209** | Critical Model Parameters: A Security Vulnerability in Electricity Market Operation
  Ali Abur | Northeastern University, United States
  Yuzhang Lin | University of Massachusetts-Lowell, United States
  Hanchen Xu | University of Illinois-UC, United States

- **ID 810** | Coordination between an Aggregator and Distribution Operator to Achieve Network-Aware Load Control
  Stephanie Ross, Necmiye Ozay, Johanna Mathieu | University of Michigan, United States

- **ID 844** | GDT Opportunity Method in the Trading Framework of Risk-Seeker Demand Response Aggregators
  Morteza Vahid-Ghavidel, Madreza Shafie-khah | INESC TEC, Portugal
  João P. S. Catalão | FEUP and INESC TEC, Portugal
  Sahar Seyyedeh Barhagh, Behnam Mohammad-Ivatloo | University of Tabriz, Iran

- **ID 779** | Analyses of electrification and battery ageing processes in a real offgrid hybrid microgrid
  Olivia Rigovacca, Pietro Raboni | Enge EPS, Italy
  Simone Polimeni, Giampaolo Manzolini, Sonia Leva | Politecnico di Milano, Italy

- **ID 187** | Joint investment and operation optimization of a distribution system in a market environment
  Xuejiao Han, Gabriela Hug | ETH Zurich, Switzerland

**System Operation and Control – Transmission Grid Expansion Planning**

Chair: Maurizio Delfanti | RSE S.p.A.

- **ID 84** | Impact of Carbon Tax Flexibility on the Chilean Power System Expansion Planning
  Andres Pereira, Enzo Sauma, Juan Montero | Pontificia Universidad Catolica de Chile, Chile

- **ID 735** | Robust Transmission Expansion Planning Associated with Wind Farms Integration
  Seyed Maziyar Mirhosseini Moghadam, Sanaz Mahmoudi, Behnam Alizadeh, Magnolia Khadir | Lahijan Branch, Islamic Azad University (IAU), Iran

- **ID 644** | An Ambiguity Averse Approach for Transmission Expansion Planning
  Alexandre Moreira da Silva, Goran Strbac | Imperial College London, United Kingdom
  Bruno Fanzeres | Pontifical Catholic University of Rio de Janeiro, Brazil

- **ID 334** | Integrated Grid Planning Model with High Distributed Solar PV
  Syahrul Nizam Md Saad, Adriaan Hendrik van der Weijde | University of Edinburgh, United Kingdom

- **ID 829** | A three-stage multi-year transmission expansion planning using heuristic, metaheuristic and decomposition techniques
  Luiz Eduardo de Oliveira, João Paulo Tomé Saraiva, Phillipe Vilaça Gomes | INESC TEC and the Faculty of Engineering of the University of Porto, Portugal
  Francisco Damasceno Freitas | University of Brasilia, Brazil

- **ID 154** | Governor Parameter Estimation Considering Upper/Lower Production Limits
  Mahsa Sajjadi, Hossein Seifi | Tarbiat Modares University, Iran

**ENERGY Start&Meet UP**

Deep Tech and R&D value: challenges to impact on strategic energy systems

Chairs:
  Jean-Luc Dormoy | Shaman
  Domenico Pannofino | PolHub Incubator
  Mauro Tosi | LEDCOM International
  Janati Nakimera | Solar Net Metering
  Manuele Aufloro | MilanoMultiphysics
  Nicola Fergnani | Hydro Smart
  Jacopo Berlusconi | USE54
  Elisa Baronchelli | Ecomet refining
DETAILED PROGRAM | TUESDAY, June 25th

08:30 - 10:10 | SS 1 | Room BL.270.1

Microgrid for Electrification in Developing Countries
Organizers:
Marta Molinas | NTNU
Marco Merlo | Politecnico di Milano, Italy

- Electrification pathways for sustainable development

- Energy for inclusive development in South Asia
  Reihana Mohideen | University of Melbourne, Australia

- ID 390 | Comparison among deterministic methods to design rural mini-grids: effect of operating strategies
  Davide Fioriti, Davide Poli, Paolo Cherubini, Giovanni Lutzemberger | University of Pisa, Italy
  Andrea Micangeli | University of Rome Sapienza, Italy
  Pablo Duenas-Martinez | Massachusetts Institute of Technology

- ID 726 | Two-stage stochastic sizing of a rural micro-grid based on stochastic load generation
  Nicolo’ Stevanato, Francesco Lombardi, Emanuela Colombo | Politecnico di Milano, Italy
  Sergio Balderama | University of Liège, Belgium
  Sylvain Quoilin | KU Leuven, Belgium

- ID 419 | Pre-feasibility techno-economic comparison of rural electrification options: exploitation of PV and wind
  Fabio Scazzosi, Stefano Mandelli, Alessandro Bertani | CESI S.p.A., Italy
  Matteo Moncecchi, Marco Merlo | Politecnico di Milano, Italy

- Industrial experience in electrification projects: “Hybrid Microgrid, on grid, off grid”
  Antonio Zingales | Sales Manager - SAET

- Eritrea Mobility and Cultural Heritage: New Frontiers of the Horn of Africa
  Susanna Bortolotto | Politecnico di Milano, Italy
Innovative Grids in Energy Hybrid Systems Integration – Forecasting and Mitigation of Variable Renewable Sources

Chair: Anastasios Bakirtzis | Aristotle University of Thessaloniki, Greece

- ID 130 | Risk-adjusted Cost Ratios for Quantifying Improvements in Wind Power Forecasting
  Fathallah Eltali, Siddharth Suryanarayan | Colorado State University, United States
  Mauricio Samper | Institute of Electric Energy, CONICET–UNSJ, Argentina

- ID 144 | Active Management of LV Residential Networks under High PV Penetration
  Seyed Mahdi Noori Rahim Abadi, Masoume Mahmoodi, Paul Scott, Lachlan Blackhall, Sylvie Thiebaux | Australian National University, Australia

- ID 418 | Dynamic Behavior of Conventional and Storage Power Plants in a Single Power System
  Harald Weber, Nayemuddin Ahmed, Martin Töpfer, Paul Gerdon, Vinaykumar Vernekar | University of Rostock, Germany

- ID 453 | Interval-Based Adaptive Inertia and Damping Control of a Virtual Synchronous Machine
  Uros Markovic, Nicolas Früh, Gabriela Hug | ETH Zurich, Switzerland
  Petros Aristidou | University of Leeds, United Kingdom

- ID 346 | Static vs. dynamic FRR sizing for power systems with increasing amounts of renewables
  Marie-Liesse Cauvet, Ethymios Karangelos | University of Liège, Belgium
  Louis Wehenkel | University of Liège, Belgium
  Bruno Georis | Engie, Belgium

- ID 502 | Sizing Storage for Reliable Renewable Integration
  Vivek Deulkar, Jayakrishnan Nair, Ankur Kulkarni | IIT Bombay, India

System Operation and Control – Optimization Methods for Active and Reactive Power Flows

Chair: Janusz Bialek | University of Bologna, Italy

- ID 598 | Lightning-Originated Overvoltages in a Multi-Circuit HV-MV Line
  Alberto Borghetti, Fabio Napolitano, Carlo Alberto Nucci, Juan Diego Rios Penaloza, Fabio Tossani | University of Bologna, Italy
  Guilherme Martinez Ferraz | High Voltage Equipment (HVEX) Itajubá, Brazil
  Alexandre Piantini | University of Sao Paulo, Brazil

- ID 488 | Optimal tuning and placement of POD for SSCI mitigation in DFIG-based power system
  Muhammad Taha Ali, Mehrdad Ghandhari, Lennart Harnefors | KTH Royal Institute of Technology, Sweden

- ID 508 | Modular White-Box Model of single-phase Photovoltaic Systems for Harmonic Studies
  Elias Kaufhold | TU Dresden, Germany

- ID 425 | Theoretical Potential of Dynamic Line Ratings for Congestion Management in Large-Scale Power Systems
  Maximilian Schneider, André Hoffrichter, Ralf Puffer | RWTH Aachen University, Germany

System Operation and Control – Power Quality Mitigation in Power Systems

Chair: Alberto Borghetti | University of Bologna, Italy

- ID 64 | Evaluation of the Uncertainties used to Perform Flow Security Assessment: A Real Case Study
  Maria Helena Vascconcelos | INESC TEC and FEUP, Portugal
  Carla Gonçalves | INESC TEC and FCUP, Portugal
  José Meirinhos | INESC TEC, Portugal
  Nicolas Orment | Réseau de Transport d’Electricité (RTE), France
  Andrea Pittro, Gaia Ceresa | Ricerca sui Sistema Energetico (RSE S.p.A.), Italy

- ID 687 | Performance Assessment of Linearized OPF-based Distributed Real-time Predictive Control
  Rahul Kumar Gupta, Fabrizio Sossan, Mario Paolone | EPFL, Switzerland

- ID 421 | Reliability improvement of distribution system through distribution system planning: MILP vs. GA
  Sanja Duvnjak Zarkovic, Stefan Stankovic, Ebrahim Shayesteh, Patrik Hilber | KTH Royal Institute of Technology, Sweden

- ID 727 | Reactive Power Provision with Distributed Energy Resources: Limitations, Potentials and Losses
  Hartmut Köppe, Merten Schuster | Technische Universität Braunschweig, Germany
  Robin Grab | Fraunhofer Institute for Solar Energy Systems ISE, Germany
  Bernd Engel | Technische Universität Braunschweig, Germany

Smart Transformer requirements for integration in distribution grids and power quality improvement

Giovanni De Carne, Xiang Gao, Zhiyong Zou, Marco Liserre | Kiel University, Germany
Ali Kazerooni, Michael Eves | SP Energy Networks, United Kingdom
• **ID 627** | Properties of Direct-Time and Reversed-Time Transfer Functions to Locate Disturbances along Power Transmission Lines
Zhe Chen, Zhaoyang Wang, Farhad Rachidi | Electromagnetic Compatibility (EMC) Laboratory, Swiss Federal Institute of Technology (EPFL), Switzerland
Mario Paolone | Distributed Energy System Laboratory (DESL), Swiss Federal Institute of Technology (EPFL), Switzerland

**08:30 - 10:10 | TS 2D | Room BL.270.7**

**System Operation and Control – Power System Stability with Large Renewable Sources**
Chair: Luigi Martirano | University of Rome

• **ID 456** | Improvement of the Consideration of Short-Circuit Current Contributions from Doubly-Fed Induction Generator Based Wind Turbines for Short-Circuit Current Calculation According to IEC 60909
Thomas Lager, Lutz Hofmann | Institute of Electric Power Systems, Germany

• **ID 688** | Impact of Inertia Distribution on Power System Stability and Operation
Bahman Alinezhad Osbouei, Gareth Taylor | Brunel University London, United Kingdom
Olivier Bronckart, Johan Maricq | Elia Group, Belgium
Martin Bradley | UK National Grid, United Kingdom

• **ID 835** | Measurement-based inertia estimation method considering system reduction strategies and dynamic equivalents
Guido Rossetto Moraes, Fabio Pozzi, Valentí Ilea, Alberto Berizi | Politecnico di Milano, Italy
Giorgio Giannuzzi, Roberto Zautini, Enrico Maria Carlini | Terna Rete Italia SpA, Italy

• **ID 301** | Assessing the Impact of Offshore Wind Farm Grid Configuration on Harmonic Stability
Matthias Quester, Viswaja Yellisetty, Felix Rafael Segundo Sevilla | RWTH Aachen University, Germany

• **ID 361** | Centralized Wide Area Damping Controller for Power System Oscillation Problems
Jean Dobrowolski, Petr Korba, Felix Rafael Segundo Sevilla | Zurich University of Applied Science (ZHAW), Switzerland
Walter Sattinger | Swissgrid Switzerland

**10:30 – 12:10 | PLENARY SESSION 2 | BL28 Room “CARASSA DADDA”**

**Streaming BL.270.1 and BL.270.2**

**Multidisciplinarity Research. Power System and Computational Intelligence**
Chair: Antonio Volpin | Senior Partner, McKinsey’s Electric Power & Natural Gas Practice in the Asia-Pacific region

Keynote Speakers:
• Ganesh Kumar Venayagamoorthy | Distinguished Professor of Electrical and Computer Engineering, Clemson University, Clemson, SC
• David Hill | Chair of Electrical Engineering, The University of Hong Kong
• Yilu Liu | Governor’s Chair Professor, The University of Tennessee, Knoxville
• Chicco Testa | Chairman, Sorgenia

**13:00 - 14:20 | PS 2A | BL27 First Floor | Poster Area**

**Planning and Operation of Power Systems under Market Condition - Distributed Generation, Renewables and Energy Storage Systems**
Chair: Davide Poli | Università di Pisa, Italy

• **ID 136** | Modelling the Growth of DG Market and the Impact of Incentives on its Deployment: Comparing Fixed Adoption and System Dynamics Methods in Brazil
Mario Domingos Pires Coelho | University of Porto, Brazil
João Tomé Saraiva | University of Porto, Portugal
Gabriel Konzen, Maria Cecilia Araujo | Energy Research Office, Brazil
Adelino Coelho Pereira | Instituto Superior de Engenharia de Coimbra, Portugal

• **ID 680** | Receding horizon algorithm for dynamic transformer rating and its application for real-time economic dispatch
Ilidar Daminov, Anton Prokhorov | Tomsk Polytechnic University, Russia
Raphael Caire, Marie-Cécile Alvarez-Herault | Univ. Grenoble Alpes, CNRS, France

• **ID 312** | The Role of Nuclear Power Plants in Electricity Systems with High RES Share
Timo Gerres, José Pablo Chaves Ávila, Francisco Martín Martínez, Michel Rivier Abbad, Tomás Gómez San Román | Universidad Pontificia Comillas, ICAI, Spain

• **ID 634** | A Long-term Reactive Power Planning Framework for Transmission Grids with High Shares of Variable Renewable Generation
Nikolaos Savvopoulos | National Technical University of Athens (NTUA), Greece
C. Yaman Evrenosoglu, Adamantios Marinakis, Alexandre Oudalov | ABB Power Grids Division, Switzerland
Nikos Hatzigiorgiou | National Technical University of Athens (NTUA), Greece

• **ID 353** | Allocation of Active Power Reserve from Active Distribution Networks using a Cost-Benefit Approach: Application to Swissgrid Network
Mohsen Kalantar-Neyestanaki, Mokhtar Bozorg, Fabrizio Sossan, Rachid Cherkaoui | EPFL, Switzerland
• ID 823 | Mitigation analysis of MV distribution network constraints thanks to a self-consumption policy for photovoltaic distributed units
Valentin Pailloux, Bruno Francois | L2EP - Centrale Lille, France

• ID 280 | Conversion of Balancing Energy Offers from Generating, Demand Response and Energy Storage Resources
Ilia Marneris, Christos Roumikos, Pandelis Biskas, Anastasios Bakirtzis | Aristotle University of Thessaloniki, Greece

• ID 87 | Two-Stage General Variable Neighborhood Search Algorithm to Solve the Static Transmission Network Expansion Planning
Gustavo Rebello, Edimar José de Oliveira, Marina Borges | Federal University of Juiz de Fora, Brazil

13:00 - 14:20 | PS 2B | BL27 First Floor | Poster Area
Modelling, Analysis and Operation of HVDC and DC Distribution Systems
Chair: Morris Brenna | Politecnico di Milano, Italy

• ID 228 | Benefit Analysis of a Hybrid HVAC/HVDC Transmission Line: a Swiss Case Study
Ognjen Stanojev, Jared Garrison, Turhan Demiray | Research Center for Energy Networks, ETH Zurich, Switzerland
Sören Hedtke, Christian Franck | High Voltage Laboratory, ETH Zurich, Switzerland

• ID 337 | Approximation of Current Contribution by Converters with DC Fault Ride-Through Capability for Short Circuit Current Calculation of DC Distribution Grids
Raphael Bleilevens, Alexander Jaschek, Albert Moser | RWTH Aachen University, Germany

• ID 383 | New Synchronous Condenser – Flywheel Systems for a Decarbonized Sardinian Power System
Francesco Palone | TERNA Rete Italia S.p.A., Italy
Fabio Massimo Gatta, Alberto Geri, Stefano Lauria, Marco Maccioni | Sapienza ” University of Rome, Italy

• ID 461 | Zonal DC Distribution System based on Multiport Converters: Fault Analysis and Protection Design
Simone Negri, Enrico Tironi | Politecnico di Milano, Italy
Giovanni Ubezio | Energy Components & Consulting S.r.l., Italy

13:00 - 14:20 | PS 2C | BL27 First Floor | Poster Area
Power Quality Issues in Power Systems
Chair: Cristian Lazaroiu | University POLITEHNICA of Bucharest, University MARITIMA of Constanta, Romania

• ID 325 | Impact of Load Unbalance on Low Voltage Network Losses
Nuno Fidalgo, Carlos Moreira | INESC TEC, Portugal
Rafael Cavalheiro | FEUP, Portugal

• ID 389 | On the Methods of Resonance Identification in Power Systems
Amir Arasteh, Ömer Göksu, Jayachandra Naidu Sakamuri, Nicolaos Antonio Cutululis | DTU Wind Energy (Technical University of Denmark), Denmark

• ID 527 | Measurement Based Identification of Equivalent Circuit Models for Aggregated Harmonic Impedances of Public Low Voltage Grids
Max Domagk, Robert Stiegler, Jan Meyer | Technische Universität Dresden, Germany

• ID 313 | Frequency-Domain Modeling of Nonlinear Power System Devices: the Quasi-Sinusoidal Volterra Approach
Christian Laurano, Sergio Toscani, Michele Zanoni | Politecnico di Milano, Italy

• ID 478 | The impact of voltage dips to low-voltage-ride-through capacity of doubly fed induction generator based wind turbine
Cheng Chen | Royal Institute of Technology (KTH), Sweden
Azam Bagheri, Math Bollen | Luleå University of Technology, Sweden
Massimo Bongiorno | Chalmers University of Technology, Sweden
• **ID 849** | Review of Responsibilities Assignment Methods for Harmonic Emission  
Camilo Garzón, Andrés Pávas | Universidad Nacional de Colombia, Colombia

• **ID 310** | Secondary Harmonic Emission in Wind Power Plants  
Daphne Schwan, Math Bollen, Anders Larsson | Luleå University of Technology, Sweden

• **ID 852** | Operational Dynamics and Instability of PV Inverters Under Different Control Methods  
Nan Zhang, Sasa Dyotic | The University of Edinburgh, United Kingdom  
Sergey Yanchenko | Moscow Power Engineering Institute, Russia  
Sarah Perera | University of Wollongong, Australia  
Igor Papic | University of Ljubljana, Slovenia

• **ID 864** | Iteratively-Coupled Co-simulation Framework for Unbalanced Transmission-Distribution System  
Gayathri Krishnamoorthy, Anamika Dubey | Washington State University, United States  
PK Sen | Colorado School of Mines, United States

13:00 - 14:20 | PS 2E | BL27 First Floor | Poster Area

*Power System Dynamics, Stability and Control – Inverter-Connected Power Sources*

Chair: Roberto Perini | Politecnico di Milano, Italy

• **ID 24** | Adaptive Fast Frequency Response for Power Electronic Connected Energy Sources  
John Fradley, Robin Preece, Mike Barnes | The University of Manchester, United Kingdom

• **ID 145** | Design of Proportional-Resonant Controller with Zero Steady-State Error for a Single-Phase Grid-Connected Voltage Source Inverter with an LCL Output Filter  
Ahmad Ali Nazari, Peter Zacharias | University of Kassel, Germany  
Federico Martin Ibanez | Skoltech Institute of Science and Technology, Russia  
Sakda Somkun | Naresuan University, Thailand

• **ID 710** | Grid Supporting VSCs in Power Systems with Varying Inertia and Short-Circuit Capacity  
Georgios Misiris, Jeanne Mermet-Guyennet, Spyros Chatzivasileiadis, Tilman Weckesser | Technical University of Denmark, Germany

• **ID 253** | Tuning of AC voltage-controlled VSC based Linear Quadratic Regulation  
Taoufik Qoria, Chuanyoutu Li, Ko Oue, François Gruson, Frédéric Colas, Xavier Guillard | L2EP, France  
Thibault Prévost | Réseau de Transport d’Electricité, France

• **ID 193** | An Event-Based Wide Area Control System Using Inverters of Photovoltaic Generation for Improvement of Transient Stability in Power Systems  
Kenichi Kawabe, Toshiya Nanahara | Tokyo Institute of Technology, Japan

• **ID 536** | Holistic Time-Varying Small Signal Stability Assessment in PV-Rich Power Systems  
William Nacmanson, Dillon Jaglal, Luis Ochoa | University of Melbourne, Australia

13:00 - 14:20 | PS 2E | BL27 First Floor | Poster Area

*Network Modeling, Protection and Security – Fault Detection and Protection Coordination*

Chair: Héctor Chávez | University of Santiago, Chile

• **ID 322** | Protection Issues in DC Traction System with Regenerative Braking  
Carola Leone, Morris Brenna, Federica Foiadelli, Michela Longo | Politecnico di Milano, Italy

• **ID 114** | Performance Assessment of Distance Protection in Systems with High Penetration of PVs  
Alexander Novikov | R&D Center for Power Engineering Moscow, Russia  
Jose de Jesus Chavez | Marjan Popov | TUDELFT, Netherlands

• **ID 484** | System of the Traveling-Wave Fault Location in 6(10) kV Treelike Distribution Electric Grids  
Rustem Khuzyashev, Igor Kuzmin, Vitaliy Vasilev, Samat Tukaev | Kazan State Power Engineering University, Russia

• **ID 613** | Impact of Distributed PV Generation on Relay Coordination and Power Quality  
Muhammad Akmal, Faris Al-Naemi | Sheffield Hallam University, United Kingdom  
Nusrat Iqbal, Anas Al-Tarabsheh | Abu Dhabi University, United Arab Emirates  
Lasantha Meegahapola | RMIT University, Australia

• **ID 126** | Locating Faults on Transmission Lines using Unscented Kalman Filter  
Sayari Das, Bijaya Ketan Panigrahi | Indian Institute of Technology, Delhi, India

• **ID 34** | Issues and Challenges of Steady-State Fault Calculation Methods in Power Systems With a High Penetration of Non-Synchronous Generation  
Rafat Aljarrah, Hesamoddin Marzooghi, Vladimir Terzija | The University of Manchester, United Kingdom  
James Yu | SP Energy Networks, United Kingdom

• **ID 295** | A Novel Model Recognition -based Current Differential Protection in Time-Domain  
Kaiq Ma, Zhe Chen, Claus Leth Bak, Zhou Liu | Aalborg University, Denmark

• **ID 321** | Comparative Study between Single-Objective and Multi-Objective Optimization Approaches for Directional Overcurrent Relays Coordination Considering Different Fault Locations  
Mohamed Afifi, Hebatallah Sharaf, Mahmoud Sayed, Doaa Khalil Ibrahim | Cairo University, Egypt
ID 606 | New Method Based on Wavelet Transform and ANN for Multiterminal HVDC System Protection  
Julio Torres, Ricardo Santos | Federal University of ABC, Brazil

ID 283 | An Application of Machine Learning for a Smart Grid Resource Allocation Problem  
Yingying Zheng, Siddharth Suryanarayanan, Howard Jay Siegel, Anthony A. Maciewjewski | Colorado State University, United States  
Berk Celik | Université de Toulouse, France  
Timothy M. Hansen | South Dakota State University, United States

ID 442 | State of Health Prediction of Li-ion Batteries using Incremental Capacity Analysis and Support Vector Regression  
Mohsen Vatani, Preben J.S. Vie | Institute for Energy Technology (IFE), Norway  
Mariusz Szerepko | University of Oslo (UiO), Norway

ID 897 | Intra-day forecasting of building-integrated PV systems for power systems operation using ANN ensemble  
Gabriel Mendonça de Paiva, Sergio Pires Pimentel, Enes Gonçalves Marra, Bernardo Pinheiro de Alvarenga | Federal University of Goias, Brazil  
Sonia Leva, Marco Mussetta | Politecnico di Milano, Italy

ID 549 | Day-ahead electricity market price forecasting using artificial neural network with spearman data correlation  
João Nascimento | Energia Simples, Portugal  
Tiago Pinto, Zita Vale | Polytechnic of Porto, Portugal

ID 335 | Soft Computing Techniques for Designing of Adaptive Power System Stabiliser  
Pimal Gandhi | Sardar Vallabhbhai Patel Institute of Technology, India  
Satish Joshi | The M.S. University of Baroda, India

ID 351 | On-line Voltage Instability Prediction using an Artificial Neural Network  
Hannes Hagmar, Le Anh Tuan, Ola Carlson | Chalmers University of Technology, Sweden  
Robert Eriksson | Svenska Kraftnät, Sweden

ID 759 | Islanding Detection Based on Artificial Neural Network and S-transform for Distributed Generators  
Thiago S. Menezes, Denis V. Coury | São Carlos School of Engineering, University of São Paulo, Brazil  
Ricardo A. S. Fernandes | Federal University of São Carlos, Brazil

ID 643 | Data-driven learning from dynamic pricing data - Classification and forecasting  
Morten Herget Christensen, Diego Cavigyes Nozal, Ioannis Kavadakis, Pierre Pinson | Technical University of Denmark, Denmark

ID 753 | Exploration of Machine Learning Methods for Predicting the Operation Schedule of a Combined Heat and Power Plant  
Johannes Mast, Stefan Rädle, Joachim Gerlach | Albertstadt-Sigmaringen University, Germany  
Oliver Bringmann | University of Tübingen, Germany

ID 808 | Exploration of Artificial Intelligence Approaches for the Integration of E-Mobility Energy Storage Systems into Virtual Power Plants  
Stefan Rädle, Johannes Mast, Joachim Gerlach | Albertstadt-Sigmaringen University, Germany  
Oliver Bringmann | University of Tübingen, Germany

ID 875 | Learning for DC-OPF: Classifying active sets using neural nets  
Deepjyoti Deka, Siddharth Misra | Los Alamos National Laboratory, United States

ID 350 | Modelling and Simulation of Hybrid PV & BES Systems as Flexible Resources in Smartgrids – Sundom Smart Grid Case  
Chethan Parthasarathy, Hossein Hafezi, Hannu Laaksonen, Kimmo Kauhanieni | University of Vaasa, Finland

ID 437 | Coordinated Power Smoothing Method of Wind Turbine Considering ESS Degradation Cost  
Chunghun Kim, Hongoon Kim, Se-Hee Lee, Sakyung Han | Kyungpook National University, South Korea

ID 590 | XSG-based control scheme for a grid-connected hybrid generation system  
Nadiya Chettibi, Adel Mellit | University of Jijel, Algeria  
Alessandro Massi Pawar, Vanni Lughi | University of Trieste, Italy  
Sonia Leva | Politecnico di Milano, Italy

Stefano Bracco, Federico Delfino, Giorgio Piazza | University of Genoa, Italy  
Sonia Leva | Politecnico di Milano, Italy

ID 814 | Modified Carbon Trading Based Low-carbon Economic Dispatch Strategy for Integrated Energy System with CCHP  
Li Yajing, Tang Wenhui, Wu Qinghua | South China University of Technology, China

ID 239 | Feasible Operation Regions of Electricity-gas Integrated Energy Distribution System  
Liu Lui, Dan Wang, Zhengji Meng, Hongjie Jia | Key Laboratory of Smart Grid of Ministry of Education, Tianjin University, China  
Weiliang Wang | State Grid Jiangsu Electric Power Company Maintenance Branch, China  
Menghua Fan | State Grid Energy Research Institute, China
• ID 887 | Overview on Photovoltaic Inspections Procedure by means of Unmanned Aerial Vehicles  
Alessandro Niccolai, Alessandro Gandelli, Francesco Grinaccia, Riccardo Enrico Zich, Sonia Leva | Politecnico di Milano, Italy

• ID 856 | Control of Interlinking Bidirectional Converter in AC/DC Hybrid Microgrid Operating in Stand-Alone Mode  
Abdullah Said, Reza Sabzehgar | San Diego State University, United States  
Mohammad Rasouli | Penn State Behrend, United States  
Poria Fajri | University of Nevada Reno, United States

13:00 - 14:20 | PS 2H | BL27 First Floor | Poster Area

Microgrids and Aggregators – Modeling, Design and Control
Chair: Alessandro Massi Pavan | University of Trieste, Italy

• ID 150 | Introduction of current limiting impedance for a previously solid grounded medium voltage distribution network  
Alex Castro | Inproel, Ecuador  
Dario Zaninelli | Politecnico di Milano, Italy

• ID 866 | Ground Fault Analysis in a Microgrid Scenario  
Alberto Dolara, Emanuele Ogliari | Politecnico di Milano, Italy  
Pietro Raboni | ENGIE EPS, Italy

• ID 711 | Multi-Objective Optimization of Urban Microgrid Energy Supply According to Economic and Environmental Criteria  
Nicoleta Cannata, Maurizio Cellura, Sonia Longo, Francesco Montana, Eleonora Riva Sanseverino | University of Palermo, Italy  
Quyen Le Luu, Ninh Quang Nguyen | Vietnamese Academy of Science and Technology, Vietnam

• ID 273 | Sizing and Operation of an Isolated Microgrid with Cold Storage  
Selmane Dakir, Ioannis Boukas, Vincent Lemort, Bertrand Cornélusse | University of Liège, Belgium

• ID 319 | Consensus-Based Distributed Control for Overvoltage Mitigation in LV Microgrids  
Tam Mai, Niyam Haque, Phuong Nguyen | Eindhoven University of Technology - TUE, The Netherlands, Netherlands

• ID 806 | A Guideline for Modeling Voltage and Frequency Controls in AC Microgrids: The Influence of Line Impedance on Transient Time  
Maryam Majdi, Ahmad Ali Nazeri | University of Kassel, Germany  
Federico Ibanez, David Pozo | Skolkovo Institute of Science and Technology, Russia

• ID 381 | Modelling and Transient Stability Analysis of Interconnected Autonomous Hybrid Microgrids  
Kishan Veerashekar, Stefan Eichner, Matthias Luther | University of Erlangen-Nuremberg, Germany

• ID 201 | Fault Detection and Localization in LV Smart Grids  
Nikolaos Sapountzoglou, Bertrand Raison | Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab, France  
Nuno Silva | Efacec, Portugal

• ID 803 | Intentional Island and Dynamic Analysis of a Microgrid  
Vandry Rodrigues Faria, Mario Oleszkovicz, Denis Vinicius Coury, Benvindo Rodrigues Pereira Junior | University of São Paulo, Brazil  
Rodrigo Bueno Otto | Itaipu Technological Park Foundation, Brazil

Forecasting and Management of Renewable Energy Sources
Chair: Reinaldo Tonkoski | South Dakota State University, United States

• ID 298 | A Hybrid Approach for Short-Term PV Power Forecasting in Predictive Control Applications  
Evangelios Vetos, Christoph Gehbauer | LBNL (Lawrence Berkeley National Laboratory), United States

• ID 573 | Development of a forecast model for the prediction of photovoltaic power using neural networks and validating the model based on real measurement data of a local photovoltaic system  
Michael Kelker, Katrin Schulte, Dirk Hansmeier, Felix Annen, Kenstir Kröger, Paul Lohmann, Jens Haubrock | University of Applied Science Bielefeld, Germany

• ID 605 | Improving Forecast Accuracy Using a Synthetic Weather Station: An Incremental Approach and BFCom2018 Lessons Learned  
Daniel L. Donaldson, Zafar A. Khan, Dilan Jayaweera | University of Birmingham, United Kingdom

• ID 677 | Sequence to sequence deep learning models for solar irradiation forecasting  
Bhaskar Mukhoty, Vikas Maurya, Sandeep Shukla | Indian Institute of Technology Kanpur, India

• ID 840 | Demand Response Program Implementation for Day-Ahead Power System Operation  
Mohamed Lotfi, João Catálio | INESC TEC and FEUP, Portugal  
Mohammad Sadegh Javadi | INESC TEC, Portugal  
Ali Esmaeel Nazhad | University of Bologna, Italy  
Miadreza Shafei-khah | University of Vaasa, Finland

• ID 900 | PV power forecasting improvement by means of a selective ensemble approach  
Sonia Leva, Marco Mussetta, Alfredo Nespoli, Emanuele Ogliari | Politecnico di Milano, Italy

• ID 587 | Renewable Energy Integration in India: Present State and Long-Term Perspective  
Subrata Mukhopadhyay | Netaji Subhas University of Technology (NSUT), India  
Sushil Soonee, Samir Saxena, Baba KVS, Narasimhan SR, Pawan Kumar KN | POSOCO, India  
Pankaj Batra | CEA, India  
Praveen Agarwal | POSOCO, India
• ID 676 | Distribution Voltage Regulation Using Combined Local and Central Control Based on Real-Time Data
Min-seung Ko, Saeh-wan Lim, Jae-kyeong Kim, Kyeeon Hur | Yonsei University, South Korea

• ID 876 | Assessing Impact of PV Systems on Centralised Generation
Michela Longo, Alessandro Corradi, Federica Foiaielli, Morris Brenna | Politecnico di Milano, Italy

• ID 524 | Capacity Value of Variable-Speed Wind Turbines
Hamed Farhadi Gharibeh | Sahand University of Technology, Iran
Leila Mokhtari Khavi | University of Tabriz, Iran
Meisam Farrokhifar, Arman Alahyari, David Pozo | Skolkoivo Institute of Science and Technology, Russia

• ID 88 | Battery Energy Storage Degradation Impact on Network Reliability and Wind Energy Curtailments
Mohamed Abogaleela, Konstantinos Kopsidas | University of Manchester, United Kingdom

• ID 358 | Operation Mode Transitions in the Kinetic Battery Model
Paul Dicke, Reinhard German | Friedrich-Alexander University Erlangen-Nürnberg (FAU), Germany
Frank Steinbacher, Barbara Schricker | Siemens AG, Germany

• ID 781 | Estimating the Value of Second Life Batteries for Residential Prosumers
Carmen Bas Doménech, Miguel Helero | Lawrence Berkeley National Laboratory, United States

• ID 611 | Impacts of Feeder Failure Statistics on EV-Supported Distribution System Reliability Improvement
Carmen Bas Doménech, Miguel Helero | Lawrence Berkeley National Laboratory, United States

• ID 655 | Frequency Stability Provision From Battery Energy Storage System Considering Cascading Failures, with Applications to Separation Events in Australia
Ahvand Jalali, Mehdi Ghazavi Dozein, Pierluigi Mancarella | The University of Melbourne, Australia

• ID 561 | Impact Index for Allocating Transportable Energy Storage Systems in Power Distribution Networks
José Angel Velasco, Hortensia Amaris | Universidade Carlos III de Madrid, Spain
Valentin Rigoni, Alireza Soroudi, Andrew Keane | University College Dublin, Ireland

• ID 791 | Impact of Operational Decisions and Size of Battery Energy Storage Systems on Demand Charge Reduction
Roozbeh Karadeneh, Tumininu Lawanson, Valentina Cecchi | University of North Carolina Charlotte, United States

• ID 824 | Massive Integration of Wind Power at Distribution Level Supported by Battery Energy Storage Systems
Juan. M. Lujano-Rojas, José A. Domínguez-Navarro, José M. Yusta | Univ. Zaragogoza, Spain
Gerardo J. Osório | C-MAST/UBI, Portugal
Mohamed Lotfi, João Catálalo | INESC TEC and FEUP, Portugal

• ID 474 | Evaluation of Customer-oriented Power Supply Risk with Distributed PV-Storge Energy Systems
Mike Brian Ndawula, Antonio De Paola | University of Bath, United Kingdom
Ignacio Hernando-Gil | University of Bordeaux, France

13:00 - 14:20 | PS 2J | BL27 First Floor | Poster Area

Battery Energy Storage Systems
Chair: Pavlos Georgilakis | National Technical University of Athens (NTUA), Greece

• ID 98 | Battery Energy Storage Degradation Impact on Network Reliability and Wind Energy Curtailments
Mohamed Abogaleela, Konstantinos Kopsidas | University of Manchester, United Kingdom

• ID 358 | Operation Mode Transitions in the Kinetic Battery Model
Paul Dicke, Reinhard German | Friedrich-Alexander University Erlangen-Nürnberg (FAU), Germany
Frank Steinbacher, Barbara Schricker | Siemens AG, Germany

• ID 781 | Estimating the Value of Second Life Batteries for Residential Prosumers
Carmen Bas Doménech, Miguel Helero | Lawrence Berkeley National Laboratory, United States

• ID 611 | Impacts of Feeder Failure Statistics on EV-Supported Distribution System Reliability Improvement
Carmen Bas Doménech, Miguel Helero | Lawrence Berkeley National Laboratory, United States

• ID 655 | Frequency Stability Provision From Battery Energy Storage System Considering Cascading Failures, with Applications to Separation Events in Australia
Ahvand Jalali, Mehdi Ghazavi Dozein, Pierluigi Mancarella | The University of Melbourne, Australia

• ID 561 | Impact Index for Allocating Transportable Energy Storage Systems in Power Distribution Networks
José Angel Velasco, Hortensia Amaris | Universidade Carlos III de Madrid, Spain
Valentin Rigoni, Alireza Soroudi, Andrew Keane | University College Dublin, Ireland

14:20 - 16:00 | SS 2 | Room BL.27.0.1

Evolution of Technologies for the Integration of Renewables
Organizer: Michela Longo | Politecnico di Milano, Italy

• BESS and automation for renewables grid integration
Pietro Serra | ABB

• Safety related components for the integration of RES
Ghulam Dar | SPII – Schaltbau

• Grid code definition to support high level of penetration of renewables
Antonello Monti | RWTH Aachen

• RES integration into energy vectors. The case of P2X: from Mirroring to Coupling
Guido Bortoni | President ARERA

• Battery Energy Storages for Offgrid Microgrids and novel Behind the Meter Installations
Pietro Raboni | Engie-EPS

14:20 - 16:00 | TS 2I | Room BL.27.0.2

Innovative Grids in Energy Hybrid Systems Integration – Optimization of Active Local Distribution Grids
Chair: Joao Pecas Lopes | FEUP / INESC TEC, Portugal

• ID 279 | Optimising Load Flexibility for the Day Ahead in Distribution Networks with Photovoltaics
José Angel Velasco, Hortensia Amaris | Universidad Carlos III de Madrid, Spain
Valentin Rigoni, Alireza Soroudi, Andrew Keane | University College Dublin, Ireland
**14:20 - 16:00 | TS 2J | Room BL.270.3**

**Data Science and ICT in Power Technologies – Smart Metering for State Estimation and Analysis**

Chair: Alex Stankovic | Tufts University, United States

- **ID 105** | Improving the Scalability of a Prosumer Cooperative Game with K-Means Clustering
  Liyang Han, Thomas Morstyn, Constance Crozier, Malcolm McCulloch | University of Oxford, United Kingdom

- **ID 591** | Numerical and experimental testing of predictive EMS algorithms for PV-BESS residential microgrid
  Simone Polimeni, Luca Moretti, Giampaolo Manzolini, Sonia Leva | Politecnico di Milano, Italy
  Lorenzo Meraldi, Pietro Raboni | Engie Eps, Italy

- **ID 494** | Energy Management of Buildings with Phase Change Materials Based on Dynamic Programming
  Zahra Rahimpour, Gregor Verbic, Archie Chapman | University of Sydney, Australia

- **ID 760** | Energy Storage in Madeira, Portugal: Co-Optimizing for Arbitrage, Self-Sufficiency, Peak Shaving and Energy Backup
  Md Umar Hashmi, Ana Busić | INRIA and Ecole Normale Supérieure, France
  Lucas Pereira | Madeira-ITI/LARSyS and prisma.com, Portugal

- **ID 80** | Verification of Linear Flexibility Range Assessment in Distribution Grids
  Daniel Contreras, Krzysztof Rudion | University of Stuttgart, Germany

- **ID 371** | Smart Meter Privacy Control Strategy Including Energy Storage Degradation
  Ramana Reddy Avula, Tobias Oechtering | KTH Royal Institute of Technology, Sweden
  Jun-Xing Chin, Gabriela Hug | ETH Zurich, Switzerland

**14:20 - 16:00 | TS 2K | Room BL.270.6**

**System Operation and Control – Large Scale Wind Farm Integration in Power Systems**

Chair: Costas Vournas | National Technical University of Athens, Greece

- **ID 170** | Economic Analysis on Multi-Terminal VSC HVDC Systems with Wind Farms based on Hierarchical Optimal Power Flow with Stability Constraint
  Sangwon Kim, Akihiko Yokoyama | The University of Tokyo, Japan
  Yusuke Takaguchi, Tomhiro Takeo, Kazuyuki Mori, Yoshio Izui | Mitsubishi Electric Corporation, Japan

- **ID 434** | Primary Frequency Support from Offshore Wind Power Plants Connected to HVDC Grid
  Ali Bidadfar, Oscar Saborio-Romano, Jayachandra Naidu Sakamuri, Müftü Altın, Nikolaos Antoniu Cutululis, Poul Einar Sørensen | Technical University of Denmark, Denmark

- **ID 660** | Techno-Economic Analysis of HVAC, HVDC and OFAC Offshore Wind Power Connections
  Stephen Hardy, Kristof Van Brusselen, Stijn Hendrix | CG Holdings Belgium NV, Belgium
  Dirk Van Hertem, Hakan Ergun | KU Leuven, Belgium

- **ID 211** | Primary Frequency Response from Offshore Wind Farms Connected to HVDC via Diode Rectifiers
  Oscar Saborio-Romano, Ali Bidadfar, Jayachandra Naidu Sakamuri, Ömer Gökşü, Nikolaos Antoniou Cutululis | Technical University of Denmark, Denmark

- **ID 468** | Effects of Wind Power Technology Development on Large-scale VRE Generation Variability
  Matti Koivisto, Petr Maule, Nikolaos Cutululis, Poul Sørensen | DTU Wind Energy, Denmark

- **ID 299** | Detailed vs. Aggregate Wind Farm representation for Transmission System Voltage Stability Support
  Theodoros Souris, Aristeidis Parasidis, Costas Vournas | National Technical University of Athens, Greece

**14:20 - 16:00 | TS 2L | Room BL.270.7**

**System Operation and Control – Distribution Grid Expansion Planning**

Chair: Zita A. Vale | Polytechnic of Porto, Portugal

- **ID 459** | A Literature Review of Intraday Electricity Markets and Prices
  Priyanka Shinde, Mikael Amelin | KTH Royal Institute of Technology, Sweden

- **ID 819** | Role of Flexible Demand in Supporting Market-Based Integration of Renewable Generation
  Gerasimos Takis-Detfairakis, Dimitrios Papadaskalopoulos, Yujian Ye, Rodrigo Moreno | Imperial College London, United Kingdom
• ID 465 | Considering local photovoltaic production in planning studies for low voltage distribution grids
Ahmed Hadjsaid, Vincent Debusschere, Marie-Cécile Alvarez-Herault, Raphaël Caire | Univ. Grenoble Alpes, CNRS, France

• ID 789 | Quantifying the Flexibility by Energy Storage Systems in Distribution Networks with Large-Scale Variable Renewable Energy Sources
Marco R. M. Cruz, Sérgio F. Santos | UBI, Portugal
Desta Z. Fitivi | ESRI, Ireland
João P. S. Catalão | INESC TEC and FEUP, Portugal

• ID 359 | Transmission Expansion Planning Considering Detailed Modeling of Expansion Costs
Marco Franken, Hans Barrios, Alexander B. Schrief, Ralf Puffer | RWTH Aachen University, Germany

16:10 – 17:50 | SS 3 | Room BL.27.0.1
Optimization Techniques for Renewable Energy Sources Integration with Energy Storage Devices
Organizers:
Gianfranco Chicco | Politecnico di Torino, Italy
Samuele Grillo | Politecnico di Milano, Italy

• Optimization Applications for Microgrid Operation and Planning
Claudio Caffenari | University of Waterloo, Canada

• Techniques for the optimal planning of distributed energy storage systems
Mario Paolone | École Polytechnique Fédérale De Lausanne, Swiss

• Challenges and solutions to maintaining security in future sustainable power systems
Florin Capitanescu | Luxembourg Institute of Science and Technology (LU)

• ID 487 | Optimal DER Regulation and Storage Allocation in Distribution Networks: Volt/Var Optimization and Congestion Relief
Federico Silvestro, Paola Pongiglione, Fabio D’Agostino, Matteo Saviozzi, Stefano Massucco | University of Genova, Italy

• Congestion management using electrical batteries for an efficient utilization of the existing grid assets
Patrick Piancastri | Réseau de transport d’électricité, RTE (FR)

16:10 – 17:50 | TS 2M | Room BL.270.2
Innovative Grids in Energy Hybrid Systems Integration – Management of Smart Distribution Grids
Chair: Mariacristina Roscia | University of Bergamo, Italy

• ID 88 | Transactive Energy Trading of Residential Prosumers Using Battery Energy Storage Systems
Mohammad Sohrab Hasan Nizami, Md. Jahangir Hossain, B M Ruhul Amin, Muhammad Kashif, Edstan Fernandez | Macquarie University, Australia
Khizar Mahmud | University of New South Wales, Australia

• ID 93 | Decentralized Charging Control of Battery Energy Storage Systems for Distribution System Asset Management
Riku Okubo, Shinya Yoshizawa, Yasuhiro Hayashi | Waseda University, Japan
Shunsuke Kawano, Tomohiro Takano, Nobuhiko Itaya | Mitsubishi Electric Corporation, Japan

• ID 269 | Comparison of MPC Formulations for Building Control under Commercial Time-of-Use Tariffs
Olivier Van Cutsem, Maher Kayal | EPFL, Switzerland
David Blum, Marco Pritoni | LBNL, United States

• ID 380 | Multiojective Home Appliances Scheduling Considering Customer Thermal Discomfort: A Multistep Look-ahead ADP-Based Approach
Babak Jeddi, Yateendra Mishra, Gerad Ledwith | Queensland University of Technology, Australia

• ID 324 | Shapley value analysis of distribution network cost-causality pricing
Donald Azutalam, Archie Chapman, Gregor Verbic | The University of Sydney, Australia

• ID 830 | EV smart charging in collective residential buildings: the BienVEnu project
Marc Petit, Martin Hennebel | GeePs, France

16:10 – 17:50 | TS 2N | Room BL.270.3
Data Science and ICT in Power Technologies – Advance Methods for Power System Analysis
Chair: Chanan Singh | Texas A&M University, United States

• ID 191 | Data Classification and Parameter Identification in Power Systems by Manifold Learning
Andrija Saric | University of Novi Sad, Serbia
Mark Transtrum | Brigham Young University, United States
Alex Stankovic | Tufts University, United States

• ID 771 | Deep Learning for Power System Security Assessment
Jose-Maria Hidalgo Arteaga, Florian Thams, Spyros Chatzivasileiadis | Technical University of Denmark, Denmark
Fiodar Hancharou | Skolkovo Institute of Science and Technology, Russia
• ID 838 | Predicting transmission line congestion in energy systems with a high share of renewables
Philipp Staudt, Benjamin Rausch, Johannes Gärttner, Christof Weinhardt | Karlsruher Institute of Technology, Germany

• ID 885 | Analytical Solutions for Power Flow Equations Based on the Multivariate Quotient-Difference Method
Chengxi Liu, Claus Leth Bak | Aalborg University, Denmark
Yongli Zhu | GEIRI North America, United States
Kai Sun | The University of Tennessee, United States

• ID 593 | A Method for Sizing Centralised Energy Storage Systems Using Standard Patterns
Shahab Karrari, Nicole Ludwig, Verit Hagenmeyer, Mathias Noe | Karlsruhe Institute of Technology (KIT), Germany

• ID 90 | Interharmonic Modeling and Simulation via the Flexible Extended Harmonic Domain
Uriel Vargas, Abner Ramirez | CINVESTAV-Guadalajara, Mexico
George Cristian Lazaroiu | University POLITEHNICA of Bucharest, University MARITIMA of Constanta, Romania
Mariacristina Roscia | Universita di Bergamo, Italy

16:10 - 17:50 | TS 2O | Room BL.270.6
System Operation and Control – HVDC: Operation and Protection
Chair: Nikolai Voropai | Irkutsk National Research Technical, Russia

• ID 363 | A framework for dynamic security assessment of combined multi-terminal HVDC and AC grids
Lampros Papangelis, Mevludin Glavic, Thierry Van Cutsem | University of Liege, Belgium

• ID 477 | Frequency support provision by parallel, hybrid HVDC-HVAC system with Voltage-based Load Control
Marius Langwasser, Giovanni De Carne, Marco Liserre | Kiel University, Germany
Matthias Biskoping | ABB AG, Germany

• ID 26 | Pole Voltage Balancing in HVDC Systems: Analysis and Technology Options
Mian Wang, Jef Beerten, Dirk Van Hertem | KU Leuven, Belgium

• ID 251 | Fault Location Dependency of Short-Circuit Currents in MMC based Meshed HVDC Cable Systems
Anna Pfendler, Andreas Saciak, Jutta Hanson, Gerd Balzer | TU Darmstadt, Germany

• ID 559 | Impact of harmonic pollution in junctions between DC cables with different insulating technologies: electrical and thermal analyses
Andrea Colavitto, Alfredo Contin, Andrea Vicenzutti, Giorgio Sulligoi | University of Trieste, Italy
Meghan McCandless | Massachusetts Institute of Technology, United States

• ID 584 | Pole-to-ground fault protection strategy for HVDC grids under symmetrical monopolar configuration
Alberto Bertinato, Pascal Torwelle, Guilherme Dantas de Freitas, Manuel Colmenero | SuperGrid Institute, France
Bertrand Raison | Univ. Grenoble Alpes, France

16:10 - 17:50 | TS 2P | Room BL.270.7
System Operation and Control – Medium and High Frequency Disturbances Issues
Chair: Alfredo Testa | University of Campania “Luigi Vanvitelli”, Italy

• ID 33 | Expression for Conductor Resistance in the Frequency Range 2-150 kHz
Angela Espin-Delgado, Sarah Rönningen, Math Bollen | Luleå Tekniska Universitet, Sweden

• ID 112 | Thermal Interactions in Modern Lighting Equipment due to Disturbances in the Frequency Range 2-150 kHz
Victor Khokhlov, Jan Meyer, Peter Schegner | Technische Universität Dresden, Germany

• ID 672 | Influence of measurement setup on the emission of devices in the frequency range 2-150 kHz
Daniel Agudelo-Martinez, Andrés Pava | Universidad Nacional de Colombia, Colombia
Ana Maria Blanco, Robert Stiegler, Jan Meyer | Technische Universität Dresden, Germany

• ID 674 | Harmonic Modeling of LED lamps by Means of Admittance Frequency Coupling Matrices
Roberto Langella, Adam Collin, Alfredo Testa | University of Campania “Luigi Vanvitelli”, Italy
Jiri Drapela | Brno University of Technology, Czech Republic
Sasa Djkic | The University of Edinburgh, United Kingdom
Neville Watson | University of Canterbury, New Zealand

• ID 118 | Evaluation of the Impact of LED and Compact Fluorescent Lamps on the PLC Transmission with X-10 Technology
Marcio Fortes, Allan Delfino, Roberto Brandão, Henrique Henriques, Vitor Ferreira, Thiago Bumpus | Fluminense Federal University, Brazil

• ID 510 | Challenges and Pitfalls of Implementing Realistic Simulations to Study Harmonic Levels in Public Low Voltage Networks
Sascha Müller, Jan Meyer | TU Dresden, Germany
### DETAILED PROGRAM | WEDNESDAY, June 26th

#### 08:30 – 10:10 | SS 4 | Room BL.27.0.1

**Enabling Technologies and Methodologies for Wide Area Monitoring Protection and Control Systems**

Organizers:
- Alfredo Vaccaro | SMIEEE, University of Sannio, Italy
- Kwok Cheung | FIEEE, Director of Global Market Management Solutions, General Electric Grid Solutions, Redmond, Washington

- Benefits of Synchrophasor Data and High-Bandwidth Communications in Monitoring, Protection and Control of Interconnected Power Systems  
  Dan Gabel | Senior Manager, Interconnection and System Studies, Commonwealth Edison Company (ComEd)

- Consideration of Communication Time Delays in Wide-Area Control  
  Anjan Bose | Washington State University

- Real-Time Power System Inter-Area Oscillation Detection Using Modal Analysis  
  Armando Guzmán | SMIEEE, Fellow Engineer, Schweitzer Engineering Laboratories

- On advance wide area control of future low inertia power systems  
  Vladimir Terzija | FIEEE, University of Manchester

- WAMPAC seduces SCADA in a control room  
  Srdjan Skok | University North, Varazdin, Croatia  
  Igor Ivankovic | Croatian Transmission System Operator, Croatia

#### 08:30 – 10:10 | TS 3A | Room BL.27.0.2

**Innovative Grids in Energy Hybrid Systems Integration – Advanced Methods for Smart Grids Operation**

Chair: Paolo Perani | ABB S.p.A.

- **ID 120 | A New Approach of Conti-Varlet Method Applied to a PV System to Size a Battery Energy Storage**  
  Paulo Vieira, Edson Bortoni | Itajubá Federal University, Brazil  
  Arturo Bretas | University of Florida, Brazil

- **ID 610 | Simplified Voltage Sensitivity Based curtailment Arrangement for Active Network Management**  
  Thiago Mendonca | Imperial College London, United Kingdom  
  Nathaniel Bottrell | Ricardo Energy and Environment, United Kingdom  
  Timothy Green | Imperial College London, United Kingdom
**System Operation and Control – Detecting Methods for Power System Reliability**

Chair: Enrico Zio | Politecnico di Milano, Italy

- **ID 403** | Tracking Transmission Line Parameters in Power Grids Observed by PMUs
  Ali Abur, Pengxiang Ren, Hanoch Lev-Ari | Northeastern University, United States

- **ID 178** | Assessing the Effect of Preventive Islanding on Power Grid Resilience
  Matthias Noebeis, Mathlaos Panteli | The University of Manchester, United Kingdom

- **ID 364** | Noncommunication Accelerated Sequential Tripping for Remote-End Faults on Transmission Lines
  Sadegh Azizi, Mingyu Sun | United Kingdom
  Marjani Popov | Delft University of Technology, Netherlands
  Vladimir Terzić | The University of Manchester, United Kingdom

- **ID 743** | Comparison of multi-megawatt LVRT testing setups for the certification of wind turbines
  Jonas Bielemeier, Anica Frehn, Antonello Monti | RWTH Aachen University, Germany
  Richard Frühmann, Fritz Santer | UL International GmbH, Germany

- **ID 604** | Reliability Evaluation of ICT Used on Dynamic Line Rating for Power System Flexibility
  Carlos Cruzat, Konstantinos Kopsidas | The University of Manchester, United Kingdom

- **ID 733** | Advanced Local Voltage Control through Polynomial P-Var Functions
  Carsten Heinrich, Charalampos Ziras, Henrik W. Bindner | Danish Technical University, Denmark

**08:30 – 10:10 | TS 3B | Room BL.270.3**
10:30 - 12:10 | PLENARY SESSION 3 | Room BL.27.0.4
Streaming BL.27.0.1, BL.27.0.2 and BL.27.0.3

Transfer of Knowledge: a guide to publish your research

Chairs:
Mohammad Shahidehpour | Founding EiC, IEEE Transactions on Smart Grid
Adam Fraser | Senior Publisher, Elsevier

Keynote Speakers:
• Badrul Chowdhury | EiC, IEEE Transactions on Sustainable Energy
• Nikos Hatziargyriou | EiC, IEEE Transaction on PWRS
• Carlo Alberto Nucci | EiC, Elsevier EPSR
• Vladimir Terzija | EiC, Elsevier JEPES

13:00 - 14:20 | PS 3A | BL27 First Floor | Poster Area
Planning and Operation of Power Systems under Market Condition – Distributed Generation, Renewables and Energy Storage Systems
Chair: Emilio Ghiani | University of Cagliari, Italy

• ID 94 | Market Operations using Swing Contracts for Demand Response and Energy Storage
Ashim Basnet, Jin Zhong | The University of Hong Kong, Hong Kong

• ID 845 | Impact of Energy Storage on Market-Based Generation Investment Planning
Temistayo Oderinwale, Yujian Ye, Dimitrios Papadaskalopoulos, Goran Strbac | Imperial College London, United Kingdom

• ID 445 | Annual Electricity Cost Minimization for South Australian Dwellings through Optimal Battery Sizing
Vanika Sharma, Mohammed H. Haque, Syed Mahfuzul Aziz | University of South Australia, Australia

• ID 317 | Estimating the Option Value of Grid-Scale Battery Systems to Distribution Network Service Providers
Yiju Ma, Gregor Verbic, Archie Chapman | The University of Sydney, Australia

• ID 595 | Coordinated Dispatch Performance of AC Grid-Connected Energy Storage Systems
Rebecca Todd, Alessandro Massi Pavan, Tom Feehally, Andrew Forsyth | The University of Manchester, United Kingdom
Shahab Nejad, Daniel Gladwin, David Stone, Martin Foster | The University of Sheffield, United Kingdom

• ID 784 | Contribution of Energy Storage to System Adequacy and its Value in the Capacity Market
Stefan Borozan, Michael Evans, Goran Strbac | Imperial College London, United Kingdom
Tiago Rodrigues | National Grid PLC, United Kingdom

13:00 - 14:20 | PS 3B | BL27 First Floor | Poster Area
Modeling and Monitoring of Harmonics in Power Systems
Chair: Roberto Langella | University of Campania "Luigi Vanvitelli," Italy

• ID 423 | Modeling of harmonic propagation of fast DC EV charging station in a Low Voltage network
Stefano Cassano, Federico Silvestro | University of Genova, Italy
Emmanuel De Jaeger, Caroline Leroi | Université Catholique de Louvain, Belgium

• ID 661 | Minimization of Radio Interference Levels in a Hybrid Transmission Line
Carlos Tejada-Martinez, Fermin P Espino-Cortes | Instituto Politecnico Nacional (IPN), Mexico
Aydogan Ozdemir, Suat Ilhan | Istanbul Technical University, Turkey

• ID 467 | Detection and Monitoring of Supraharmomic Anomalies of an Electric Vehicle Charging Station
Tim Streubel, Christoph Kattmann, Adrian Eisenmann, Krzysztof Rudion | Universität Stuttgart, Germany

• ID 615 | Power Quality Indicators in Electric Railway Systems: A Comprehensive Classification
Morris Brenna, Federica Foiaidei | Politecnico di Milano, Italy
Hamed Safari Kaleyar, Seyed Saeed Fazel | Iran University of Science and Technology, Iran

• ID 622 | Power Quality problems in hospital: a case study
Alberto Prudenzi, Andrea Fioravanti, Luigi Petricini | University of L’Aquila, Italy
V. Caracciolo | S. Giovanni-Addolorata General Hospital, Italy

• ID 567 | Corona Inception and Breakdown Voltages of Rod–Plane Electrode for Severe Ambient Conditions
Shayan Shahi Gharaaghaji, Hamza Fadil, Suat Ilhan, Aydogan Ozdemir | Istanbul Technical University, Turkey
Hadbi Ismailoglu | Kocaeli University, Turkey
Fermin Espino Cortes | Instituto Politécnico Nacional, Mexico

ID 225 | Value of Injection from Residential PV with Storage for the Bulk Power System
Sebastián Martín, Juan Pérez-Ruiz, Pablo López-Pérez | Universidad de Málaga, Spain

ID 491 | Evaluation of Impact of Regulation Signal on Energy Storage Operation in PJM Regulation Market
Yanzhu YE, Bo Yang, Penitam Chongfuangprinya, Sumito Tobe, Yasushi Tomita | Hitachi America, Ltd. R&D, United States
Power System Dynamics, Stability and Control – Control and Stability of Generators

Chair: Giorgio Sulligoi | University of Trieste, Italy

- **ID 563** | Provision of Ancillary Services by different Decentralized Energy Resources
  Christoph Strunck, Marvin Albrecht, Christian Rehtanz | TU Dortmund, Germany

- **ID 123** | Decision Making on Generator for Wind Turbines using the AHP Methodology
  Davi Paiva, Natan Santos, Edson Bortoni, Roberto Yamachita | Itajubá Federal University, Brazil

- **ID 306** | Analysis of the Integration of Type C Wind Turbines in Distribution Networks
  Fernando Arduini, André Pessoa, Eduard Asada, Mario Oleskovicz | University of Sao Paulo, Brazil

- **ID 243** | Stability Analysis of a 100MW Wind Power Plant with Type 3 Wind Turbines - A Field Test Verification of Generic Dynamic Models
  Maysam Esmaily-Radvar, Savio Yeung | Ready Technologies Inc., United States
  Seyed Ali Areififar | Oakland University, United States

- **ID 566** | New control approach for blackstart capability of full converter wind turbines with direct voltage control
  Abdul Korai, Jens Denecke | University of Duisburg-Essen, Germany
  José Luis Rueda Torres, Elys Rakshani | Delft University of Technology, Netherlands

- **ID 518** | Inertial response of isolated power networks with wind power plants
  Massimo Bongiorno | Chalmers University of Technology, Sweden
  Salvatore Favuzza, Mariano Giuseppe Ippolito, Rossano Musca, Gaetano Zizzo | University of Palermo, Italy

- **ID 263** | The Role of Energy Storage Systems in Reducing Effect of Load Models on Frequency Dynamics and Large Disturbance Rotor Angle Stability
  Atía Adrees, Yue Xing, Jovica Milanovic | The University of Manchester, United Kingdom

- **ID 83** | LPV Modeling of Clusters in Dynamic Power System Models
  Johnny Leung, Michel Kinnaert, Jean-Claude Maun | Université libre de Bruxelles, Belgium
  Fortunato Villella | Elia Grid International, Belgium

- **ID 580** | Stability of power networks with grid-forming converters
  Jeremy Watson, Yemi Ojo, Ioaninis Lestas | University of Cambridge, United Kingdom
  Chrysovalantis Spanias | Electricity Authority of Cyprus (EAC), Cyprus

- **ID 180** | Passivity-Based Control for a PV/Battery/Fuel Cell/Electrolyser Hybrid Power System
  Suyao KONG, Mickaël HILAIRET, Robin ROCHE | EMTD-ST, CNRS, Univ. Bourgogne Franche-Comte, UTBM, France

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Power System Dynamics, Stability and Control – Power System Stability and Grid Automation

Chair: Valentina Cecchi | University of North Carolina at Charlotte, United States

- **ID 400** | Finding Unstable Operating Points via One-Dimensional Manifolds
  Jonathan E. Sarmiento, Antonio C. Zambroni de Souza, Benedetto I. de Lima Lopes, Paulo F. Ribeiro, Cristian A. Alvez, Bruno de Nadai Nascimento, João Alvez da Silva Neto | Universidade Federal de Itajubá, Brazil

- **ID 200** | A Model-Independent Delay Compensation Method for Power Systems
  Muyang Liu, Georgios Tzounas, Federico Milano | University College Dublin, Ireland

- **ID 16** | Tuning of robust controllers for damping oscillations using particle swarm
  Felipe Fernandes da Silva, Alexandre Cézar de Castro | Universidade Federal do Paraíba, Brazil

- **ID 541** | Spectral properties of dynamical power systems
  Felix Koeth, Nicolas Retiere | G2Elab Grenoble, France

- **ID 861** | Damping Electromechanical Oscillations in a Load Frequency System Using Tabu Search
  CAMILA SANTOS, Alexandre Castro | UFPB, Brazil

- **ID 839** | Exploratory Study Towards Dynamic Equivalent Modelling of Hybrid Renewable Energy Source Plant Based on Historical Production Data
  Ana Radovanović, Jovica Milanović | The University of Manchester, United Kingdom

- **ID 532** | Flexible and Reconfigurable Automation Architecture for Electrical Power Systems
  Jorge Velasquez, Rajkumar Palaniappan, Bjoern Bauernschmitt, Dominik Hibrich, Christian Rehtanz | TU Dortmund University, Germany
  Carsten Kueger, Davood Babazadeh, Sebastian Lehnhoff | OFFIS, Germany

- **ID 557** | Congestion Management in distribution grid networks through active power control of flexible distributed energy resources
  Roberto Ciavarella, Marialaura Di Somma, Giorgio Graditi, Maria Valenti | ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development, Italy

- **ID 499** | Review of Asynchronous Interconnection Technology in China Southern Power Grid
  Bo Li, Jianing Liu, Zhu Chao | Guangdong Power Grid Power Dispatch Center, Guangzhou, China
  Zuo Wang, Dongui Zhang, Qi-Wang, Yufeng Guo | School of Electrical Engineering & Automation, Harbin Institute of Technology, Harbin, China
  Jin Zhong | The University of Hong Kong, Hong Kong, China

- **ID 196** | Harnessing the flexibility of energy management systems: a retailer perspective
  Sébastien Mathieu, Miguel Manuel de Villena, Damien Ernst | University of Liege, Belgium
  Eric Vermeulen | Haulogy, Belgium
13:00 - 14:20 | PS 3E | BL27 First Floor | Poster Area

Network Modeling, Protection and Security – Security and Contingency Analysis
Chair: Giambattista Gruosso | Politecnico di Milano, Italy

- **ID 868** | Two-Stage Stochastic Mixed Integer Programming Approach for Optimal SCUC by Economic DR Model
Mohsen Kia | Islamic Azad University, Iran
Reza Etemad | Shahid Beheshti University, Iran
Alireza Heidari | University of New South Wales, Australia
Mohamed Lotfi, João P. S. Catalão | FEUP and INESC TEC, Portugal
Miadreza Shafie-khah | University of Vaasa, Finland
Gerardo Osório | C-MAST/UBI, Portugal

- **ID 288** | Cascading Outage Assessment using Thévenin Equivalent Static Contingency Assessment
Pauli Fríðheim Petersen, Christian Oxlholm, Jakob Glarbo Møller, Hjörtur Jóhannsson | Technical University of Denmark, Denmark

- **ID 290** | Improved multi-objective evolutionary algorithm in subpopulation tables with features from NSGA-II for the service restoration problem
Leandro Tolomeu Marques, Jose Paulo R. Fernandes, Joao Bosco A. London Jr. | University of Sao Paulo, Brazil

- **ID 883** | Probabilistic Voltage Security Region based on Monte Carlo Reliability Evaluation
Carmen Borges | Federal University of Rio de Janeiro, Brazil
Nicolas Netto | CEPEL, Brazil

- **ID 377** | Operating Power Grids during Natural Disasters
Ali Abur, Ahmet Oner | Northeastern University, United States

- **ID 216** | Effect of interconnection lines on the vulnerability of power systems
Jesus Beyza, Jose A Dominguez-Navaro, Jose M Yusta | University of Zaragoza, Spain

- **ID 525** | A risk-based resilience assessment tool to anticipate critical system conditions in case of natural threats
Emanuele Ciapessoni, Diego Cirio, Andrea Pitto | RSE, Italy
Marino Storna | TERNA Rete Italia S.p.A., Italy

- **ID 658** | Towards Supervisory Protection Using Energy Functions for Relay Misoperations in a Stressed Power System During Blackout
Abhishek Banerjee, Rajesh Kawaseri | North Dakota State University, United States
Munim Bin Gani | New Mexico State University, United States
Sukumar Brahma | Clemson University, United States

13:00 - 14:20 | PS 3F | BL27 First Floor | Poster Area

Advanced Diagnostic and Power System Monitoring Techniques
Chair: Davide Falabretti

- **ID 32** | Power Quality Monitoring using Synchronized Phasor Measurements: An approach based on hardware-in-the-loop simulations
Igor Melo, José Luiz Pereira, Carlos Duque, Matheus Pereira, Leandro Manso Silva, Matheus de Souza | Federal University of Juiz de Fora, Brazil

- **ID 857** | Voltage Sag State Estimation using Compressive Sensing in Power Systems
Jairo Blanco-Solano, Johann F. Petit-Suárez, Gabriel Ordóñez-Plata | Universidad Industrial de Santander, Colombia
Nelson Kagan, Carlos FM Almeida | Universidade de São Paulo, Brazil

- **ID 281** | Identifying the Class of Disturbance Events Using Recurrence Quantification Analysis
Mahomaoudreza Arefi, Badrud Chowdhury | UNC Charlotte, United States

- **ID 602** | Performance Investigation of a Monitoring Scheme for Low Voltage Grids with a Single Grounded Neutral
Andreas Kotsonias, Lenos Hadjidemetriou, Markos Asprou, Elias Kyriakides | University of Cyprus, Cyprus

- **ID 512** | Voltage Unbalance Quantification and Mitigation Using a PMU-based Combined Transmission and Distribution System Linear State Estimator
Papiya Dutta, Aditya Nadkarni, Gopal Gajjar, Shreevardhan A. Soman | IIT Bombay, India

- **ID 264** | Efficient Monitor Placement and Voltage Sag Estimation Using System Impedance Matrix
Araceli Hernandez | Universidad Politécnica de Madrid, Spain
Jovica V. Milanovic | University of Manchester, United Kingdom

- **ID 314** | Data Driven Event Assessment in Power Systems using Gaussian Mixture Models
Sririn Dutta Chowdhury, Nilanjan Senroy, Swades De | Indian Institute of Technology Delhi, India

- **ID 179** | Adaptive Local-learning Models for Synchronphasor-based Dynamic Thermal Rating
Antonio Pepiciello, Guido Coletta, Alfredo Vaccaro | University of Sannio, Italy
• ID 745 | An MILP Approach for Distribution Grid Topology Identification using Inverter Probing
Sina Taheri, Vassilis Kekatos, Guido Cavraro | Virginia Tech, United States

13:00 - 14:20 | PS 3G | BL27 First Floor | Poster Area

Machine Learning and Computational Intelligence in Power Systems
Chair: Robin Preece | The University of Manchester, United Kingdom

• ID 138 | Line Selection and Algorithm Selection for Transmission Switching by Machine Learning Methods
Zhu Yang, Shmuel Oren | University of California, Berkeley, United States

• ID 535 | Using Causal Inference to Measure Residential Consumers Demand Response Elasticity
Kamalanathan Ganesan | University of Porto (FEUP), Portugal
Ricardo J Bessa | INESC Technology and Science (INESC TEC), Portugal
João Tomé Saraiva | University of Porto (FEUP) and INESC Technology and Science (INESC TEC), Portugal

• ID 670 | Subgradient Methods for Averaging Household Load Profiles under Local Permutations
Marcus Voß, Brijnesh Jain, Sahin Albayrak | Technische Universität Berlin, Germany

• ID 777 | PQ classification by way of parallel computing - A sensitivity analysis for a real-time LSTM approach using waveform and RMS data
Adrian Eisenmann, Tim Streubel, Krzysztof Rudion | University of Stuttgart, Germany

• ID 245 | Adaptive GMM Based Technique for Online Health Monitoring of the PMU Instrumentation Chain
Tabia Ahmad, Nilanjan Senroy | IIT Delhi, India

• ID 66 | Algorithm for driving a dual-axis solar tracker
Gerardo Garcia-Gil, Juan M Ramirez | CINVESTAV del IPN, Mexico

• ID 78 | Maximum Power Point Tracking of Photovoltaic System Using Taguchi-based Fuzzy Logic Control
Ying-Yi Hong, Peter Mark P Buay | Chung Yuan Christian University, Taiwan
Angelo A. Beltran Jr. | Adamson University, Philippines

• ID 234 | Low Voltage Grid Data Visualisation with a Frame Representation and Cognitive Architecture
Mário Pereira, Ricardo Bessa, Clara Gouveia | INESC TEC, Portugal

13:00 - 14:20 | PS 3H | BL27 First Floor | Poster Area

Microgrids and Aggregators – Management and Optimization
Chair: Johanna Mathieu | University of Michigan, United States

• ID 867 | Multi-Objective Optimisation of an Active Distribution System using Normalised Normal Constraint Method
M. Saffari, V. Vahidinasab | Shahid Beheshti University, Iran
M. Saeed Misaghian, D. Flynn | University College Dublin, Ireland
M. Kia | Islamic Azad University, Iran
Mohamed Lotfi, João P. S. Catalão | FEUP and INESC TEC, Portugal
Madiroza Shafe-khah | University of Vaasa, Portugal

• ID 436 | A Power-to-Gas Integrated Microgrid Optimal Operation Strategy Based on Rolling Horizon
Tongming Liu, Wang Zhang, Ke Meng, Zhao Yang Dong | The University of New South Wales, Australia

• ID 632 | Battery Energy Storage System and Improved Communication Topology for Enhancing Power Quality of Microgrid
Vishal Undre, Alberto Dolarà, Sonia Leva | Politecnico di Milano, Italy

• ID 716 | A Transmission System Friendly Micro-grid: Optimising Active Power Losses
Thomas Krechel, Francisco Sanchez, Francisco Gonzalez-Longatt | Loughborough University, United Kingdom
Harold Chamorro | KTH, Sweden
Jose Luis Rueda | TU Delft, Netherlands

• ID 429 | An ADMIM Approach for Day-Ahead Scheduling of a Local Energy Community
Camilo Orozco, Stefano Lilla, Alberto Borghetti, Fabio Napolitano, Fabio Tossani | University of Bologna, Italy

• ID 505 | Distributed Consensus Control with Event-Triggered Communication for Multi-Microgrid Cluster
Yaran Li, Ke Meng, Zhao Yang Dong | The University of New South Wales, Australia

• ID 278 | Distributed energy storage aggregation, quantitative evaluation of replicability and scalability
Andrea Michiorri | Mines ParisTech, France

• ID 38 | Sustainable Islanding System Based on Dual Power Inverters with Cooperative Generator
Sewan Heo, Jinsoo Han, Wan-Ki Park | Electronics and Telecommunications Research Institute, South Korea
13:00 - 14:20 | PS 3I | BL27 First Floor | Poster Area

Electric Vehicles Charging Infrastructure and V2G Technologies
Chair: Antonello Monti | RWTH Aachen University, Germany

• **ID 168** | A V2G Strategy for Cost-Competitive Primary Frequency Regulation Considering EV Battery Degradation
Shigeru Tamura | Meiji University, Japan

• **ID 315** | Impact Analysis of V2G Services on EV Battery Degradation - A Review
Jingli Guo, Jin Yang, Zhengyu Lin, Clara Serrano, Ana Maria Cortes | Aston University, United Kingdom

• **ID 513** | Economics of Vehicle-to-Grid application for providing ancillary services in Italy
Luca Latini | Siemens S.p.A., Italy
Sonia Leva, Fabrizio Bruno Armani | Politecnico di Milano, Italy
Fabio Di Ninno | Terna S.p.A., Italy
Giovanni Ravina | Engie EPS, Italy

• **ID 22** | Demand Response Application of Battery Swap Station Using A Stochastic Model
Ferinar Moaidi, Masoud Aliakbar Golkar | K. N. Toosi University of Technology, Iran

• **ID 489** | Infrastructureing of Canadian transport using hydrogen from RES: comparison between BEV and FCV
Morris Brenna, Federica Fiadelli, Michela Longo | Politecnico di Milano, Italy
Wahiba Yaci | CanmetENERGY Research Centre Natural Resources Canada, Canada

• **ID 843** | Evaluating Strategies for Decarbonising the Transport Sector in Great Britain
Peng Fu, Danny Pudjianto, Xi Zhang, Goran Strbac | Imperial College London, United Kingdom

• **ID 163** | Probabilistic Sizing of PV Generation on Commercial Parking Lot with PEVs to Avoid Transformer Aging
Carolina Affonso | Federal University of Para, United States
Mladen Kezunovic | Texas A&M University, United States

• **ID 382** | Behaviour Analysis of Electrical Vehicle Flexibility Based on Large-Scale Charging Data
Poria Hasanpor Divahali, Corentin Evens | VTT Technical research center of Finland, Finland

• **ID 924** | An improved Cell Transmission Model of Traffic Considering Electric Vehicles and Charging Stations
Enrico Zio | Politecnico di Milano, Italy
Hongping Wang, Yi-ting Fang | CentraleSupelec, Université Paris-Saclay, France

13:00 - 14:20 | PS 3J | BL27 First Floor | Poster Area

Battery Energy Storage Systems Optimization and Grid Integration
Chair: Giovanni Lutzemberger | University of Pisa, Italy

• **ID 52** | Optimal Operation of Battery Energy Storage System in Smart Grid for Reducing Tap Changer Operation under Photovoltaic Fluctuation Using Cuckoo Search
Keerachat Tantraporn, Peerapol Jirapong, Pandha Thararuk | Chiang Mai University, Thailand
Kannathat Mansuwan | Provincial Electricity Authority, Bangkok, Thailand, Thailand

• **ID 102** | Application of Utility-Connected Battery Energy Storage System for Integrated Dynamic Services
Mehti Ghazavi Dozein, Pierluigi Mancarella | The University of Melbourne, Australia

• **ID 233** | Placement of Virtual Synchronous Generator Controlled Electric Storage combined with Renewable Generation
Junru Chen, Muyang Liu, Federico Milano, Terence O'Donnell | University College Dublin, Ireland

• **ID 356** | Quantification and Verification of Residential Battery Response for Frequency Regulation in PV-Rich Power Systems
Dillon Jaglal, William Nacmanson, Luis Ochoa | University of Melbourne, Australia

• **ID 723** | Optimization of Frequency Controller Parameters of a BESS by considering Rate of Change Constraints
Francisco Sanchez, Francisco Gonzalez-Longatt | Loughborough University, United Kingdom

• **ID 774** | Optimal Planning and Operation Scheduling of Battery Storage Units in Distribution Systems
Hamideh Moradi, Alessandro Bortolotto, Maurizio Fantino | LINKS Foundation, Italy
Andrea Mazza | Politecnico di Torino, Italy
Mousa Marzband | Northumbria University, United Kingdom

• **ID 820** | Optimal BESS Scheduling Strategy in Microgrids Based on Genetic Algorithms
Dorin-Octavian Sidae, Lucian Toma, Mihai Sanduleac, Irina Pirogoara, Valentin-Adrian Boicea | University Politehnica of Bucharest, Romania

• **ID 521** | Frequency Regulation Services by a BESS-Generator System using Predictive Control
Stefano Massucco, Federico Silvestro, Francesco Conte, Giacomo-Piero Schiapparelli | University of Genova, Italy

• **ID 664** | Optimal Operation of Aggregated Industrial Loads Coupled with Energy Storage System
Minsu Park, Yunsun Jin, Wonpoong Lee, Dongjun Won | Inha University, South Korea

• **ID 628** | Total Cost of Ownership of electric vehicles using energy from a renewable-based microgrid
Alessandro Massi Pavan, Mariangela Scorrano, Vanni Lulli | University of Trieste, Italy
**14:20 – 16:00 | SS 5 | Room BL.27.0.1**

**Education and Formation of Future Power Electrical Engineers – the experience of the Scholarship Plus**

Organizers:
Edvina Uzunovic | PES VP Education
Carlo Alberto Nucci | Chair of the Region 8 Scholarship Plus Committee

- “Power Education worldwide and the experience of Scholarship Plus in the USA”
  Edvina Uzunovic | PES VP Education
- “Region 8 Scholarship Plus experience”
  Federica Foadelli | Politecnico di Milano, Italy
- Testimonials from industries and students participating in the project: results and future expectations
- “Future of the Project”
  Carlo Alberto Nucci | University of Bologna, Italy

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**14:20 – 16:00 | TS 3I | Room BL.27.0.2**

**Innovative Grids in Energy Hybrid Systems Integration – Grid-Connected and Stand-Alone Microgrids Operating Strategies**

Chair: Aydogan Ozdemir | Istanbul Technical University, Turkey

- **ID 320** | Protection of Distribution System Islands Fed by Inverter-Interfaced Sources
  Sukumar Brahma | Clemson University, United States

- **ID 155** | Power Flow Analysis of Islanded AC Microgrids
  Eleftherios Kontis, Georgios Kryonidis, Angelos Noudsiidis, Kyriaki-Nefeli Malamaki, Grigoris Papagiannis | Aristotle University of Thessaloniki, Greece

- **ID 249** | Flexibility options identification within Net Zero Energy Factories
  Pio Lombardi, Przemyslaw Komarnicki | Fraunhofer Institute for Factory Operation and Automation IFF, Germany
  Rongwu Zhu, Marco Liserre | Christian-Albrechts-Universität zu Kiel, Germany

- **ID 821** | Reducing the Unfairness of Coordinated Inverter Dispatch in PV-Rich Distribution Networks
  Peter Lusis, Lachlan Andrew, Ariel Liebman, Guido Tack | Monash University, Australia
  Shantanu Chakraborty | Delft University of Technology, Netherlands

- **ID 837** | A community microgrid control strategy to deliver balancing services
  Anna Pinnarelli, Daniele Menniti, Nicola Sorrentino, Giuseppe Barone, Pasquale Vizza | University of Calabria, Italy

- **ID 515** | Using Electric Vehicles and Demand Side Response to Unlock Distribution Network Flexibility
  Hasan Berkem Sonder, Liana Cipcigan, Carlos Ugalde-Loo | Cardiff University, United Kingdom

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**14:20 – 16:00 | TS 3J | Room BL.27.0.3**

**System Operation and Control - Optimization Methods for Active and Reactive Power Flows**

Chair: Federico Milano | University College Dublin, Ireland

- **ID 492** | Phase Balancing in Power Distribution Systems: A heuristic approach based on group-theory
  Miguel Angel Rios, Juan Camilo Castaño, Alejandro Garces, Alexander Molina | Universidad Tecnológica de Pereira, Colombia

- **ID 265** | Reactive Power Loop Flows in Transmission Grids
  Markus Knittel, Nils Namockel, Maximilian Schneider, Ralf Puffer | RWTH Aachen University, Germany

- **ID 172** | Intra-Area Mode: Measurement-Based and Model-Based Assessment in Indian Power System
  Chandan Kumar, Akhil Gupta, Pushpa Seshadri, Rahul Shukla, Pradeep Kumar Sanodiya | POSOCO, India

- **ID 441** | Validating Coordination Schemes between Transmission and Distribution System Operators using a Laboratory-Based Approach
  Filip Přestl Andře, Thomas I. Strasser, Julien Le Baut | AIT Austrian Institute of Technology, Austria
  Marco Rossi, Giacomo Vigano | Ricerca sul Sistema Energetico (RSE), Italy
  Giacomo Della Croce | SELTA S.p.A., Italy
  Seppo Horsmanheimo | VTT Technical Research Centre of Finland, Finland
  Armin Ghasem Azar | Technical University of Denmark (DTU), Denmark
  Adrian Ibanez | Our New Energy, Spain

- **ID 246** | Oscillation Damping Controller Design Using Ring-down Measurements for the Italian Power Grid
  Lin Zhu, Yi Zhao, Yiu Liu | The University of Tennessee, Knoxville, United States
  Evangelos Farantatos, Mahendra Patel, Papiya Dattaray, Deepak Ramasubramanian | Electric Power Research Institute (EPRl), United States
  Luigi Michi, Enrico Carlini, Giorgio Giannuzzi, Roberto Zaatini | TERNA, Italy

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**14:20 – 16:00 | TS 3K | Room BL.27.0.6**

**System Operation and Control - Islanding**

Chair: Akihiko Yokoyama | The University of Tokyo, Japan

- **ID 300** | Modeling of Distributed Energy Resources for Simulating Fault-Initiated Islanding of Microgrids
  Martijn Roos, Phuong Nguyen | Eindhoven University of Technology, Netherlands
  Johan Morren, Han Stootweg | Eindhoven University of Technology & Enexis Netbeheer, Netherlands

- **ID 663** | A Combinatorial Algorithm for Large-Scale Power System Islanding
  Georgios Patsakis, Shmuel Oren | University of California Berkeley, United States
**ID 250** | Experimental Analysis of Grid-Forming Frequency Control Strategies for Load Sharing in Low Voltage Islanded Microgrids  
Dominik Willenberg, Niklas Mierau, Sandor Simon, Reinhold Bertram | Institute for High Voltage Technology - RWTH Aachen University, Germany

**ID 475** | Impact of ROCOF-based Islanding Detection on the Stand-Alone Operation of a Distributed Synchronous Generator  
Artur Pardi, Rodrigo Otto | Itajubá Technological Park Foundation, Brazil  
Liciane Otremba, Daniel Motter | Western Paraná State University, Brazil  
Ahdia Pavan | Federal University of ABC, Brazil  
Rodrigo Ramos | University of São Paulo, Brazil

**ID 476** | Islanded Microgrid Voltage Control Structure Small-Signal Stability Analysis  
Guy Wanlongo Ndiwulu, Emmanuel De Jaeger | Université catholique de Louvain (UCLouvain), Belgium  
Angelo Kuti Lusala | Université Kongó (UK), Congo (DRC)

**ID 500** | Intentional Controlled Islanding of Power Systems Equipped With Battery Energy Storage Systems  
Panayiotis Demetriou, Alexis Kyrakoudis, Elias Kyriakides, Christos Panayiotou | KIOS Research and Innovation Center of Excellence, University of Cyprus, Cyprus

14:20 – 16:00 | TS 3L | Room BL.27.0.7

**System Operation and Control**  
Chair: Madeline Gibescu | Copernicus Institute of Sustainable Development, Netherlands

**ID 920** | A New Method for Dimensioning and Designing the Zero-Sequence Electromagnetic Filter Considering System Displacement Power Factor  
Ricardo Fonseca Buzo, Luis Carlos Origa de Oliveira, Fabio Bertequini Leão | São Paulo State University, Brazil

**ID 905** | A Model-Free Approach for Emergency Damping Control Using Wide Area Measurements  
Vedanta Pradhan | ABB GISPL, Corporate Research Center in India, India  
Anil M Kulkarni, Shrikrisna A Khaparde | Indian Institute of Technology Bombay, India

**ID 906** | Efficient Database Generation for Data-driven Security Assessment of Power Systems  
Florian Thams, Andreas Venzke, Spyros Chatzivasileiadis | Technical University of Denmark (DTU), Denmark  
Robert Eriksson | Svenska Kraftnet, Sweden

**ID 42** | Dispatching Stochastic Heterogeneous Resources Accounting for Grid and Battery Losses  
Eleni Stai, Lorenzo Reyes-Chamorro, Fabrizio Sossan, Jean-Yves Le Boudic, Mario Paolone | École Polytechnique Fédérale de Lausanne, Switzerland

**ID 67** | PMU-Based Event Localization Technique for Wide-Area Power System  
Do-In Kim, Yong-June Shin | Yonsei University, South Korea  
Austin White | Oklahoma Gas & Electric, United States

16:10 – 17:50 | SS 6 | Room BL.27.0.1

**New Trends in Education and Training for the Energy Transition**  
Organizers: Nikos Hatziargyriou, Panos Kotsampopoulos | National Technical University of Athens, Greece

- Power systems education: a new mix of disciplines, student engagements and laboratory capability  
  Graeme Burt | University of Strathclyde, Scotland

- Evolution of electrical power systems education offer in the last decade  
  Carlo Alberto Nucci | University of Bologna, Italy

- New trends in laboratory education: HIL simulation and remote labs  
  Panos Kotsampopoulos | National Technical University of Athens, Greece

- Blended-learning for power systems: the experience at RWTH Aachen University  
  Antonello Monti | RWTH Aachen University, Germany

- Research-driven power and energy systems education and training  
  Filip Pröstl Andrén, Thomas Strasser | Austrian Institute of Technology, Austria

16:10 – 17:50 | TS 3M | Room BL.27.0.2

**Innovative Grids in Energy Hybrid Systems Integration - Energy Management in Microgrids**  
Chair: Thierry Van Cutsem | University of Liegè, Belgium

**ID 79** | Centralized Identification of Imbalances in Power Networks With Synchrophasor Date  
Tirza Routtenberg | Ben Gurion University of the Negev, Israel  
Yoavina C. Eldar | Technion-Israel Institute of Technology, Israel

- Economic Impact of the Active Power Droop Gain in Droop-Based Islanded Microgrids  
  Pedro P. Vergara, Juan C. López, Luiz Carlos Pereira da Silva, Marcos J. Rider | University of Campinas, Brazil

- Impacts of Price-led Operation of Residential Storage on Distribution Networks: An Australian Case Study  
  Kyriacos Petrou, Andreas T. Procopiou, Luis (Nando) Ochoa | The University of Melbourne, Australia  
  Tom Langstaff, John Theunissen | AusNet Services, Australia

- On Feasibility and Flexibility Operating Regions of Virtual Power Plants and TSO/DSO interfaces  
  Sharig Riaz, Pierluigi Mancarella | The University of Melbourne, Australia
16:10 – 17:50 | TS 3O | Room BL.270.6

System Operation and Control – Optimal Operation of Primary and Secondary Distribution Grids

Chair: Jin Zhong | The University of Hong Kong, Hong Kong

ID 463 | Studying the impact of storage systems on the planning studies of low voltage distribution grids
Ahmed Hadjsaid, Vincent Debusschere, Marie-Cécile Alvarez-Herault, Raphaël Caire | Univ. Grenoble Alpes, CNRS, France

ID 309 | Simulation Approach to Integrated Energy Systems Study Based on Energy Hub Concept
Nikolai Voropai, Ekaterina Ukolova, Dmitry Gerasimov, Konstantin Suslov | Instutut National Research Technical, Russia
Pio Lombardi | Fraunhofer Institute IFF Magdeburg, Germany
Przemyslaw Komarnicki | University of Applied Science Magdeburg-Stendal, Germany

ID 141 | A Robust Optimization Framework for the Day-Ahead Scheduling of Active Distribution Networks including Energy Storage Systems
Mostafa Nick, Rachid Cherkaoui, Mario Paolone | Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Mokhtar Bozorg | University of Applied Sciences Western Switzerland, Switzerland

ID 224 | ADMM for Transaction Control of Microgrids
Oscar I. Parra, Joan Cruz, Eduardo Mojica-Nava | Universidad Nacional de Colombia, Colombia

ID 495 | Planning Model of Microgrids for the Supply of Ancillary Services to the Utility Grid
Andrés Felipe Peñaranda Bayona, Pablo Elver Mosquera Duarte, Camilo Andrés Cortes Guerrero | National University of Colombia, Colombia
Sergio Felipe Contreras Paredes, Johanna Myrzik | University of Bremen, Germany

ID 82 | Optimal Energy Management of Unbalanced Three-Phase Grid-Connected Microgrids
Juan Sebastian Girald, Jhon Alexander Castrillon, Carlos Alberto Castro | University of Campinas, Brazil
Federico Milano | University College Dublin, Ireland
16:10 – 17:50 | TS 3P | Room BL.270.7

Data Science and ICT in Power Technologies
Chair: Riccardo Zich | Politecnico di Milano, Italy

- **ID 307 | A Hybrid Monte Carlo Simulation and Multi Label Classification Method for Composite System Reliability Evaluation**
  Dogan Urgun, Chanan Singh | Texas A&M University, United States

- **ID 355 | Data Mining-Based Method to Reduce Multiple Estimation for Fault Location in Radial Distribution Systems**
  Denis Vinicius Coury, Evandro Agostinho Redé, Jeovane Vicente Sousa | University of São Paulo, Brazil
  Ricardo Augusto Souza Fernandes | Federal University of São Carlos, Brazil

- **ID 108 | In-Field Validation of a Real-Time Monitoring Tool for Distribution Feeders**
  Julio Augusto Druzina Massignan, João Bosco Augusto London Jr, Michel Bessani, Carlos Dias Maciel, Alexandre Claudio Botazzo Delbem, Marcos Henrique Marçal Camillo | University of São Paulo, Brazil
  Telma Woerle de Lima Soares | Federal University of Goiás, Brazil

- **ID 230 | Branch-and-Bound Guided Search for Critical Elements in State Estimation**
  Andre Abel Augusto, Milton Brown Do Couto Filho, Julio Cesar Stacchini de Souza, Marcio Andre Ribeiro Guimaraens | Fluminense Federal University, Brazil

- **ID 4 | Optimal scheduling of home appliances in home energy management systems using grey wolf optimisation (GWO) algorithm**
  Ahmad Rezaee Jordehi | Lashtenesha-Zibakenar Branch, Islamic Azad University, Iran

08:30 – 10:10 | EP 4 | Room BL.270.1

United Grid - Integrated Cyber-Physical Solutions for Intelligent Distribution Grids with High Penetration of Renewables
Organizer: Tuan Le | Chalmers University of Technology, Sweden

- General presentation of UNITED-GRID project
  Tuan Le | Chalmers University of Technology, Sweden

- Scenarios, pathways and business innovation plan for future intelligent distribution grids
  Joni Rossi | Research Institute of Sweden AB (RISE)

- Secure and scalable ICT infrastructure for future intelligent distribution grids
  Tuan Tran | Commissariat à l’Energie Atomique – Institut National de l’énergie solaire (CEA-INES), France

- Advanced forecasting and market-based congestion management
  David Steen | Chalmers University of Technology, Sweden

- Safe and secure real-time monitoring, control and protection
  Phuong Nguyen | Eindhoven University of Technology, The Netherlands

- Tool-box and cross-platform integration, demonstrators operations and assessment
  Lucile Lemius | Atos Worldgrid, France and Mouloud Guemri - Commissariat à l’Energie Atomique - Institut National de l’énergie solaire (CEA-INES), France

08:30 – 10:10 | TS 4A | Room BL.270.2

Innovative Grids in Energy Hybrid Systems Integration – New Technology Solutions for Power Applications
Chair: Mario Paolone | EPFL, Lausanne, Switzerland

- **ID 410 | Modelling of the PEM Fuel Cell and Design of a Closed Loop Control Based DC-DC Boost Converter For Locomotive Application**
  Upasana Sarma, Sanjib Ganguly | Indian Institute of Technology Guwahati, India

- **ID 96 | Design and Control of A Switched-Diode Multilevel Inverter for Photovoltaic Application**
  Kaibalya Prasad Panda, Prabhat Ranjan Bana, Gayadhar Panda | National Institute of Technology Meghalaya, India

- **ID 185 | Mitigation of Ignition Current Spike Causing from Forward Bias Drift for Laser Diode Driver**
  Kai-Jun Pai | Ming Chi, University of Technology, Taiwan
System Operation and Control – Transient Events Detection and Modeling

**Chair:** Jean Mahseredjian | Polytechnique Montreal, Canada

**ID 198** | A Piec-wise Linearized Transformer Winding Model for the Analysis of Internal Voltage Propagation
Andreas Theoharis | Karlstad University, KAU, Sweden
Marjan Popov | Technical University of Delft, TUDelft, Netherlands

**ID 629** | Measurement and FEM analysis of DC/GIC effects on transformer magnetization parameters
Hilary Chisepo, Trevor Gaunt | University of Cape Town, South Africa
Leslie Borriell | Eskom Holdings SOC, South Africa

**ID 793** | Two Variable Time-Step Algorithms for Simulation of Transients
Willy Nzaile, Jean Mahseredjian, Ilhan Kocar | Polytechnique Montreal, Canada
Xiaopeng Fu | Tianjin University, China
Christian Dufour | Opal-RT Canada

**ID 302** | Operation of Automatic Transfer Switches in the Networks with Distributed Generation
Pavel Ilyushin | Petersburg Power Engineering Institute of Professional Development, Russia
Konstantin Suslov | Irkutsk National Research Technical University, Russia

**ID 379** | Evaluating Internal Resonances in Power Transformers by Using Instrumental Variable Vector Fitting
Lucas Rodrigues, Ricardo Schumacher, Gustavo Oliveira | Federal University of Paraná, Brazil
Angelica Rocha | ATG Engenharia, Brazil
Diogo Santo | ESBR- Energia Sustentável do Brasil, Brazil

**ID 76** | A Proposal to Mitigate Over-Voltage Issue within Period of 2017-2020 and A Vision to 2025 in Central Vietnam
Hong Lam Le | The University of Da Nang - University of Science and Technology, Vietnam
Van Duong Ngo | The University of Da Nang, Vietnam

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**Innovative Grids in Energy Hybrid Systems Integration – Advanced Estimation Methods for Smart Energy Districts**

**Chair:** Gabriela Hug | ETH Zurich, Switzerland

**ID 291** | Optimal energy management of all-electric residential energy systems in the Netherlands
Tom Terlouw, Tarek AlSkaf, Wilfried van Sark | Utrecht University, Netherlands

**ID 546** | Inadequacy of Standard Algorithms and Metrics for Short-Term Load Forecasts in Low-Voltage Grids
Thierry Zufferey, Alice Lepouze, Gabriela Hug | ETH Zurich, Switzerland

**ID 625** | Photovoltaic Power Production Estimation Based on Numerical Weather Predictions
Frank Eduardo Atencio Espejo, Samuele Grillo, Lorenzo Luini | Politecnico di Milano, Italy

**ID 729** | A Close-to-Real-time Energy Management System for Smart Residential Buildings
Mohammad Ali Fotouhi Ghazvini, David Steen, Anh Tuan Le | Chalmers University of Technology, Sweden

**ID 812** | Spatial-Temporal Estimation of the PV Market Potential in Subareas
Joel Villavicencio Gastelo, Antonio Padilha Feltrin | UNESP - São Paulo State University, Brazil
Joel Melo Trujillo | Federal University of ABC, UFABC, Brazil

**ID 41** | How Can Smart Buildings Be Price-Responsive?
Ricardo Fernández-Blanco, Juan Miguel Morales, Salvador Pineda | University of Malaga, Spain

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**System Operation and Control**

**Chair:** Alessandro Gandelli | Politecnico di Milano, Italy

**ID 5** | Incorporating a Nodal Reactive Power Pricing Scheme into the DisCo’s Short-Term Operation
Marcel Chuma Cerbantes | China Three Gorges Corp, Brazil
Ricardo Fernández-Blanco | University of Malaga, Spain
Miguel A. Ortega-Vazquez | Electric Power Research Institute (EPRI), United States
José Roberto Sanches Mantovani | Universidade Estadual Paulista (UNESP), Brazil

**ID 161** | Reliable Renewable Generation and Transmission Expansion Planning: Co-Optimizing System’s Resources for Meeting Renewable Targets
Alexander Moreira | Imperial College London, United Kingdom
David Pazo | Skolkovo Institute of Science and Technology, Russia
Alexandre Street | Pontificia Catholic University of Rio de Janeiro, Brazil
Enzo Sauma | Pontificia Universidade Catolica de Chile, Chile
ID 240 | Service Restoration With Prioritization of Customers and Switches and Determination of Switching Sequence
Leandro Tolomeu Marques, Alexandre C. B. Delbem, Joao Bosco A London Jr. | University of Sao Paulo, Brazil

ID 7 | Unit Commitment With Inertia-Dependent and Multispeed Allocation of Frequency Response Services
Vincenzo Trovato, Agnes Bialecki, Anes Dallagi | EDF Energy R&D UK Centre, United Kingdom

ID 826 | Provision of Frequency Support by Wind Power Plants: Assessment of Compliance with Grid Codes
Ayman B. Atya | University of Huddersfield, United Kingdom

10:30 – 12:10 | SS 7 | Room BL.27.0.1
Microgrid Stability Definitions, Analysis, and Modeling
Organizer: Claudio Canizares | University of Waterloo, Canada

- Stability definitions and classification
  Mostafa Farrokhabadi | BluWave-ai, Ottawa, Canada

- Models and tools for stability studies
  Reinaldo Tonkoski | South Dakota State, SD

- Converter PLL impact on microgrid stability
  Mario Paolone | EPFL, Lausanne, Switzerland, and Marco Liserre - Kiel Univ., Kiel, Germany

- Alaska Power System Integration Laboratory examples
  Richard Wies | Univ. Alaska, Fairbanks, AK, US

- Hardware in the Loop (HIL) examples
  Nikos Hatzigiorgiou | NTUA, Athens, Greece

10:30 – 12:10 | TS 4F | Room BL.27.0.3
System Operation and Control – Reliability Analysis for Electrical Power Components
Chair: Edson Bortoni | Itajubá Federal University, Brazil

- ID 171 | Optimal Sensor Placement Methodology based on FDTD for Partial Discharge Detection in GIS
  Kwang-Seok Kim, Ju-Ik Oh, Jong-Won Yu | School of Electrical Engineering Korea Advanced Institute (KAIST), South Korea

- ID 681 | A Bayesian Network Framework for Operations of Circuit Breakers
  Alberto Carboni, Khaled ElShawarby, Enrico Ragagni, Francesco Amigoni | Politecnico di Milano, Italy

10:30 – 12:10 | TS 4E | Room BL.27.0.2
Innovative Grids in Energy Hybrid Systems Integration – Energy Storages for Power System Improvement
Chair: Raphael Caire | University Grenoble Alpes, CNRS, France

- ID 143 | The effects of residential battery storage on grid impact indicators
  Vladimir Gjorgievski, Snezana Cundeva | University Ss. Cyril and Methodius, Macedonia

- ID 235 | Congestion management within a multi-service scheduling coordination scheme for large battery storage systems
  Clementine Straub, Jean Maeght, Camille Pache, Patrick Panciatici | RTE (Réseau de Transport d’Electricité), France

THURSDAY, June 27th

- ID 411 | Energy Storage Sizing and Reliability Assessment for Power Systems with Variable Generation
  Abdullah Alamri, Maad AlOwaifeer, A.P Sakis Meliopoulos, George J. Cokkinides | Georgia Institute of Technology, United States

- ID 589 | Rapid Evaluation of Battery System Rating For Frequency Response Operation
  Vasileios Tsompatzoudis, Rebecca Todd, Andrew Forsyth | The University of Manchester, United Kingdom

- ID 645 | Intelligent management of battery system for energy arbitrage
  Jonas Souza, Antonio Momesso, Felipe Monteiro, Eduardo Asada | Sao Carlos School of Engineering - University of Sao Paulo, Brazil

- ID 274 | How and why the batteries in the sectors of photovoltaics and electric vehicles could have impact on the society
  Suad Halličević | University of Tuzla, Bosnia and Herzegovina

- ID 128 | Field measurements and model comparison for a very long submarine HV AC threecore cable
  Francesco Palone | TERNIA Rete Italia S.p.A., Italy

- ID 391 | EMD and MCSA Improved via Hilbert Transform Analysis on Asynchronous Machines for Broken Bar Detection Using Vibration Analysis
  Aline Treml, Rogério Fiauzino | University of Sao Paulo, Brazil

- ID 12 | Field measurements and model comparison for a very long submarine HV AC threecore cable
  Francesco Palone | TERNIA Rete Italia S.p.A., Italy

Pavlos Georgilakis | National Technical University of Athens, Greece

ID 411 | Energy Storage Sizing and Reliability Assessment for Power Systems with Variable Generation
Abdullah Alamri, Maad AlOwaifeer, A.P Sakis Meliopoulos, George J. Cokkinides | Georgia Institute of Technology, United States

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ID 12 | Field measurements and model comparison for a very long submarine HV AC threecore cable
Francesco Palone | TERNIA Rete Italia S.p.A., Italy
Fabio Massimo Gatta, Alberto Geri, Stefano Lauria, Marco Maccioni | “Sapienza” University of Rome, Italy
Bruno Ceresoli | CESI S.p.A, Italy
10:30 – 12:10 | TS 4G | Room BL.270.6


Chair: Joe Chow | Rensselaer Polytechnic Institute, United States

- **ID 157** | Archetypes of Country Energy Systems
  Martin Küppers, Michael Metzger, Matthias Huber, Simon Paulus | Siemens AG, Corporate Technology, Germany

- **ID 59** | On the Limitations of Volt-var Control in PV-Rich Residential LV Networks: A UK Case Study
  Andreas T. Procopiou, Luis F. Ochoa | The University of Melbourne, Australia

- **ID 485** | Improving Electricity and Natural Gas Systems Coordination Using Swing Option Contracts
  Conor O Malley, Stefanos Delikaraoglou, Gabriela Hug | ETH Zurich, Switzerland

- **ID 414** | Mixed integer quadratic programming receding horizon microgrid supervisor
  Martin Legry, Frederic Colas, Christophe Saudemont, Jean Yves Dieulot | Univ. Lille, Centrale Lille, Arts et Métiers Paris Tech, - L2EP - Laboratoire d’Electrotechnique et d’Electronique de Puissance, France
  Olivier Ducarme | Engie Lab Laborlec, France

- **ID 575** | Unlocking the Flexibility of CHP in District Heating Systems to Provide Frequency Response
  Xidong Xu, Yue Zhou, Meysam Qadrdan, Jianzhong Wu | Cardiff University, United Kingdom

- **ID 252** | The impact of energy dispatch strategy on design optimization of hybrid renewable energy systems
  Kun Lee, Dongsuk Kum | Korea Advanced Institute of Science and Technology (KAIST), South Korea

10:30 – 12:10 | SS 9 | Room BL.270.4

Validation and De-Risking of Grid Modernization Technologies with Hardware in the Loop Testing

Organizer: Kati Sidwall | RTDS

13:00 - 14:20 | PS 4A | BL27 First Floor | Poster Area

Planning and Operation of Power Systems under Market Condition – Grid Planning, Dispatch and Unit Commitment

Chair: Valentin Ilea | Politecnico di Milano, Italy

- **ID 2** | New Planning for the 500kV Vietnamese Grid with High Penetration of Renewable Energy Sources
  Minh Quan Duong, Huu Hieu Nguyen, Tuan Le | University of Danang, Vietnam
  Marco Mussetta | Politecnico di Milano, Italy

- **ID 533** | Upgrading studies for a 230 kV-50 Hz overhead line
  Luigi Michi, Enrico Maria Carlini, Michela Migliori, Francesco Palone | TERN, Italy
  Stefano Lauria | Sapienza University of Rome, Italy

- **ID 46** | Impact of Wind Speed Distortions on Chilean Power System Expansion Planning
  Enzo Sauma, Catalina Rosende | Pontificia Universidad Catolica de Chile, Chile

- **ID 818** | Combined Planning of Medium and Low Voltage Grids
  Roman Bolgaryn, Alexander Scheidler | Fraunhofer Institute for Energy Economics and Energy System Technology IEE, Germany
  Martin Braun | University of Kassel and Fraunhofer Institute for Energy Economics and Energy System Technology IEE, Germany

- **ID 601** | Impact of Gas Third Party Access in the Unit Commitment Optimal Solution
  Pedro Otoola-Arca, Javier García-González | Universidad Pontificia Comillas, Spain
  Fernando Marrino, Ignacio Rivera | Endesa, Spain
• ID 272 | Unit Commitment with ACOPF Constraints: Practical Experience with Solution Techniques
Diego A. Tejada-Arango, Sonja Wojgrin, Andrés Ramos Galán, Pedro Sánchez Martín | Universidad Pontificia Comillas, Spain

• ID 490 | A Quadratic Convex Approximation for the Short-Term Hydro-Thermal Dispatch
Juan Camilo Castaño, Alejandro Garces | Universidad Tecnológica de Pereira, Colombia
Olav B Fosso | Norwegian University of Science and Technology, Norway

• ID 756 | Load Dispatch Optimization using Dynamic Rating and Optimal Lifetime Utilization of Transformers
Nicola Vafara, Joachim Holbelt | Technical University of Denmark, Denmark
Syed Hamza H. Kazmi, Thomas H. Olsen, Troels S. Sørensen | Ørsted Offshore Wind A/S, Denmark

• ID 706 | Solving the stochastic transmission capacity expansion planning problem based on generalized partial transmission distribution factors
Victor Hinojosa, Joaquin Sepulveda | Universidad Tecnica Federico Santa Maria, Chile

• ID 451 | A Mixed Integer Second Order Cone Program for Transmission-Distribution System Co-Optimization
Ilyes Mezghani, Anthony Papavasiliou | Center for Operations Research and Econometrics, Belgium

13:00 - 14:20 | PS 4B | BL27 First Floor | Poster Area
Power System Stability
Chair: Stefano Bracco | University of Genoa, Italy

• ID 109 | Analysis of Angular Threshold Criteria for Transient Instability Identification in Uncertain Power Systems
Juan Dante Morales Alvarado, Jovica Milanovic | The University of Manchester, United Kingdom
Panagiotis Papadopoulos | University of Strathclyde, United Kingdom

• ID 115 | Model Order Reduction of Active Distribution Networks with TSO-DSO Interconnection Power Flow Control
Holm Hinners, Johanna Myrzik | University of Bremen, Germany
Daniel Mayorga Gonzalez | TU Dortmund, Germany

• ID 340 | Initial Study of the Power System Stability Boundary Estimated from Nonlinear Modal Decoupling
Xin Xu, Bin Wang, Kai Sun | University of Tennessee, Knoxville, United States

• ID 405 | Estimating Transient Stability Margin Regarding a Dominant Oscillation Mode
Wenjun Ju, Bin Wang, Kai Sun | University of Tennessee, Knoxville, United States

• ID 653 | A Sparse Grid Scheme for Fast Transient Stability Simulation with Reduced Redundancy
Yang Liu, Kai Sun, Bin Wang, Rui Yao | University of Tennessee, Knoxville, United States
Wei Kang | Naval Postgraduate School, United States

• ID 369 | Synchronous Machine Representations for Stability Studies of Power Systems with Inverters
Guilherme Santos Pereira | EDF / Centrale Lille, France
Valentin Costan | EDF, France
Antoine Bruyère, Xavier Guillaud | Centrale Lille, France

• ID 190 | Influence of Power System Stabilizers on HVDC Control Systems in an Asynchronous Interconnection Power Grid
Chunxiang Liu, Wei Liu, Qiang Zhang | China Southern Grid, China

• ID 552 | PSS modification to stabilize synchronous machines during events with high Rate of Change of Frequency
Amin Kerperin | Power Grid Services, Germany
All Assenkamp | TÜV Rheinland Industry Service GmbH, Germany
Christian Kreischer | Helmut Schmidt University/ Uni BWH, Germany

• ID 523 | Design of power system stabilizers to damp slow frequency interarea oscillations with limited information
Javier Renedo, Lukas Sigrist, Luis Rouco | Universidad Pontificia Comillas, Spain

• ID 203 | System value for wind farms providing frequency services under different control frameworks
Vincenzo Trovato | EDF Energy R&D UK Centre & Imperial College London, United Kingdom
Maria Diconato, Giuseppe Forte | Politecnico di Bari, Italy
Michele Trovato | DEI - Politecnico di Bari, Italy

13:00 - 14:20 | PS 4C | BL27 First Floor | Poster Area
Network Modeling, Protection and Security – Coordination Issues and System Reliability
Chair: Phuong Nguyen | Eindhoven University of Technology, Netherlands

• ID 526 | Fault Current Limiting Investigation for a Single-Phase Dynamic Voltage Conditioner
Roberto Faranda, Ali Bahrami | Politecnico di Milano, Italy
Hossein Hafezi | University of Vaasa, Finland

• ID 732 | Effect of Extensive Cabling on Efficiency of Resonant Earthing Applied in Medium-Voltage Distribution Networks: a Hungarian Case Study
Bálint Hartmann, István Vokony, István Táczi, József Kiss | Budapest University of Technology and Economics, Hungary

• ID 662 | Loss of Coordination in a Protection Scheme due to DG assessed by means of Reliability Analysis
Julian Valbuena G., Andrés Pavas | Universidad Nacional de Colombia, Colombia

• ID 540 | Impact on Reliability of Transformers on Account of Phase Unbalances in EHV Network
Abhishek Gautam, Aman Gautam, Rahul Shukla, Ashok Kumar, N. Nallarasan, S.R Narasimhan | Power System Operation Corporation Limited, India
• ID 56 | Transmission line unavailability due to correlated threat exposure
Erlend Sjøkrød Kjell | NTNU - Norwegian University of Science and Technology, Norway
Gerd Hovin Kjelle | SINTEF Energy Research/NTNU, Norway

• ID 647 | Towards On-line PMU-based Model Calibration for Look-ahead Frequency Analysis
Juan Quiroz, Hector Chavez | University of Santiago, Chile

• ID 438 | Open Phase Condition Scenarios for Nuclear Power Plant Electrical Network Studies
Anna Kulmala, Antti Alahäivälä | VTT, Finland

• ID 135 | Investment Model for Cost-effective Integration of Solar PV Capacity under Uncertainty using a Portfolio of Energy Storage and Soft Open Points
Spyros Giannelos, Ioannis Konstantelos, Goran Strbac | Imperial College London, United Kingdom

13:00 - 14:20 | PS 4D | BL27 First Floor | Poster Area

Advanced Monitoring for Equipment Reliability

Chair: Irene Y.H. Gu | Chalmers University of Technology, Sweden

• ID 890 | Analysis of Vibration Signals of HUV Shunt Reactor Based on CRP and ROA
Xuan Chen, Zhenyao Liu | State Grid Jiangsu Electric Power Co., Ltd. Maintenance Branch Company, China
XinCheng Pan, Hongzhong Ma | College of Energy and Electrical Engineering, Hohai University, China

• ID 891 | Application of Empirical Wavelet Transform in Vibration Signal Analysis of UHV Shunt Reactor
Ning Jiang, Baoxing Hao | State Grid Jiangsu Electric Power Company’s Maintenance Branch Company, China
Ruoyu Zhao, Hongzhong Ma | College of Energy and Electrical Engineering, Hohai University, China
Lei Xu, Li Li | NanJin Electric Company, China

• ID 362 | Dynamic Resistance Measurements and Result Interpretation for Various On-Load Tap Changers
Aleksandar Boricic, Danilo Laban, Bruno Moedim, Almudena Conde Lopez, Ben Molinari, Almudena Conde Lopez | KTH Royal Institute of Technology, Sweden
Roya Nikjoo | Megger Sweden AB, Sweden

• ID 257 | A Malfunction Detection Method For PV Systems
Tuna Yıldız, Murat Göl | Middle East Technical University, Turkey

• ID 511 | Identification and Diagnosis of a Photovoltaic Module based on Outdoor Measurements
Giovanni Spagnuolo | University of Salerno, Italy
Kari Lappalainen, Seppo Valkealahti | Tampere University, Finland
Patrizio Manganiello | IMEC, Belgium

• ID 635 | Relation of Winding Resistance Measurement and Dissolved Gas Analysis for Power Transformers
Roya Nikjoo | Megger, Sweden
Nami Mahmoudi | PENCO, Iran

• ID 241 | Dynamic analysis of thermal degradation of basin-type insulator
Hu Jin, Ruihui Li | Electric Power Research Institute, China Southern Power Grid, China
Peng Ren, Peng Peng, Wei Zhang, Yi Xiao, Haoxi Cong, Fucheng Wang | School of Electrical and Electronic Engineering, North China Electric Power University, China

• ID 697 | Electric field and Temperature Distribution along the Polymer Rod Type Suspension Insulator in Polluted Environment
Mirza Batalović, Halid Matoruga | Faculty of Electrical Engineering, Bosnia and Herzegovina
Mirza Matoruga | Elektroprivreda - Elektroprivreda BiH Sector for Power Lines, Bosnia and Herzegovina
Sead Berberović | Faculty of Electrical Engineering and Computing, Croatia

13:00 - 14:20 | PS 4E | BL27 First Floor | Poster Area

Big Data and Data Analysis in Power Systems

Chair: Raul Igual | Universidad de Zaragoza, Spain

• ID 117 | Statistical Methods for Condition Assessment of Low-Failure Assets
Maikel Klerx, Johan Morren, Han Slootweg | Eindhoven University of Technology, Netherlands

• ID 294 | Explanatory and Causal Analysis of the MIBEL Electricity Market Spot Price
Carla Gonçalves, Miguel Ribiero, João Viana, Renato Fernandes, José Villar, Ricardo Bessa | INESC TEC (Institute for Systems and Computer Engineering, Technology and Science), Portugal
Gonçalo Correia, José Sousa, Virgílio Mendes, Ana Cristina Nunes | EDP Produção, Portugal

• ID 367 | Data-driven Feature Description of Heat Wave Effect on Distribution System
Yang Zhang, Andrea Maza, Ettore Bombard | Politecnico di Torino, Italy
Emiliano Roggerto, Giuliana Galofaro | IRETI SpA, Italy

• ID 417 | An Advanced Tool for Data Analysis of Energy Management System Calculations
Domagoj Peharda | Koncar - Power Plant and Electric Traction Engineering Inc., Croatia
Renata Rubesa, Igor Ivanovkovic, Ana Kekelj | HOPS, Croatia

• ID 464 | Transmission Line Exclusion Algorithm to Solve the Expansion Planning Problem
Paula Pungo, Gustavo Rebello, Edinar José de Oliveira, Ivo da Silva | Federal University of Juiz de Fora, Brazil

• ID 619 | Learning from power system data stream
Mauro Escobar, Daniel Bienstock | Columbia University, United States
Michael Chertkov | Los Alamos National Laboratory, United States

• ID 657 | Predictive Modeling of Electricity Trading Prices and the Impact of Increasing Solar Energy Penetration
Soumyo Chakraborty, Virginia Tech, United States
Sandeept Shukla | Indian Institute of Technology – Kanpur, India
THURSDAY, June 27th

- **ID 666**: Toward Data-Driven Identification of Essential Factors Causing Seasonal Change in Daily Electricity Demand Curves  
  Nanae Kaneko, Yu Fujimoto, Yasuhiro Hayashi | Waseda University, Japan

- **ID 747**: Clustering Household Electrical Load Profiles Using Elastic Shape Analysis  
  Sutanoy Dasgupta, Jose Cordova, Anuj Srivastava | Florida State University, United States  
  Reza Arghandeh | Western Norway University of Applied Sciences, Norway

**13:00 - 14:20 | PS 4F | BL27 First Floor | Poster Area**

Computational Intelligence, Optimization Methods and Data Driven Approaches in Power Systems

Chair: Marco Pasetti | University of Brescia, Italy

- **ID 182**: State duration based event detection for domestic power disaggregation  
  Liya Ma, Peter Schegner | TU Dresden, Germany

- **ID 516**: Online Demand Response for End-User Loads  
  Arman Alahyari, David Pozo | Skolkovo Institute of Science and Technology, Russia

- **ID 636**: Detection and Characterization of Domestic Heat Pumps  
  Guillaume Le Ray, Morten Herget Christensen, Pierre Pinson | DTU, Denmark

- **ID 275**: Clustering-based Discrimination of multiple Partial Discharge Sources: A Case Study  
  Mauro Polo, Benjamin Schubert, Jangguo Wei, Weiling Liu | Global Energy Interconnection Research Institute (GEIRI) Europe GmbH, Germany

- **ID 422**: Smart Maintenance Model for Operational Planning of Static Synchronous Compensators  
  Manuel Alvarez-Alvarado, Dilan Jayaweera | University of Birmingham, United Kingdom

- **ID 748**: A Data-driven Approach to Grid Impedance Identification for Impedance-based Stability Analysis under Different Frequency Ranges  
  Chendan Li, Marta Molinas, Olav Bjarte Fosso | NTNU, Norway  
  Nan Qin | Energinet.dk, Denmark  
  Lin Zhu | UJK, United States

- **ID 923**: Implementation of PM Step Skew Technique to Optimum Design of a Transverse Flux PM Generator for Small Scale Wind Turbine  
  Reza Nasiri-Zarandi, Akbar Mohammad-Ajamloo | Niroo Research Institute (NRI), Iran

- **ID 139**: Topology Control in Power System Using Visualization  
  Rao Fu, Hyungseon Oh | University at Buffalo, United States  
  Ilya Grinberg | SUNY Buffalo State, United States

**13:00 - 14:20 | PS 4G | BL27 First Floor | Poster Area**

Advanced Metering and Cyber Security

Chair: Simone Franzò | Politecnico di Milano, Italy

- **ID 349**: Reliable Data Communications Device Configuration Using IEC61850  
  John O’Raw | Letterkenny Institute of Technology, Ireland  
  David Laverty, John Morrow | Queens University Belfast, United Kingdom

- **ID 311**: Dynamic Synchronphasor Estimation Algorithm for P-class Phasor Measurement Units  
  Lei Chen, Wei Zhao, Fuping Wang, Yiqing Yu, Songling Huang | Tsinghua University, China

- **ID 448**: Location of High Impedance Faults using Smart Meters in Distribution Systems with DGs, Power Electronic Loads and Electric Arc Furnaces  
  Asha Radhakrishnan, Sarasij Das | Indian Institute of Science, India

- **ID 454**: Real-time monitoring and control system for Trieste University Campus electrical distribution grid  
  Massimiliano Chiadone, Marco Dalle Feste, Giorgio Sulligoi | University of Trieste, Italy

- **ID 630**: Design of Interoperable Communication Architecture for TSO-DSO Data Exchange  
  Nermín Suljanić, Andrej Souvent | Electric Power Research Institute Milan Vidmar, Slovenia  
  Gareth Taylor, Mohammed Raddi | Brunel University, United Kingdom  
  Jérôme Cantenot, Eric Lambert, Hugo Morais | EDF Lab Paris-Saclay, France

- **ID 780**: Detection and localization of non-technical losses in distribution systems with future smart meters  
  Mattias Persson, Anders Lindskog | Research Institutes of Sweden (RISE), Sweden

- **ID 48**: An Increase in Information Security of Electric Power System with Wind Power Penetration under Low Redundancy of Measurements  
  Anna Glazunova, Elena Aksaeva | Melentiev Energy Systems Institute of Siberian Branch of the Russian Academy of Sciences, Russia

- **ID 248**: Challenges and opportunities for phasor data based event detection in transmission control centers under cyber security constraints  
  Andre Kummerow, Dennis Rösch, Cristian Monsalve, Steffen Nicolai, Peter Bretschneider | Fraunhofer IOSB-AST, Germany  
  Christoph Brossinsky, Dirk Westermann | Technische Universität Ilmenau, Germany

- **ID 375**: Reinforcement Learning for Cyber-Physical Security Assessment of Power Systems  
  Xiaoru Liu, Charalampos Konstantinou | FAMU-FSU College of Engineering, Center for Advanced Power Systems, Florida State University, United States

- **ID 62**: Efficient Convex Optimization for Optimal PMU Placement in Large Distribution Grids  
  Miguel Piccolo | ETH Zurich, Switzerland  
  Adolf Re Anti | Austrian Institute of Technology, Austria  
  Bart De Schutter | Delft University of Technology, Netherlands
13:00 - 14:20 | PS 4H | BL27 First Floor | Poster Area

**Co-Simulation of Electric Energy Systems and ICT Systems**
Chair: Carmen Borges | Federal University of Rio de Janeiro, Brazil

- **ID 51** | Implementation overview of a novel approach to Smart Microgrid Real Time Simulation
  Harshvardhan Palahalli Mallikarjun, Giambattista Grusso, Yujia Huo | Politecnico Di Milano, Italy

- **ID 137** | A Co-Simulation Framework for Power Systems and Communication Networks
  Weilin Zhong, Muyang Liu, Federico Milano | University College Dublin, Ireland

- **ID 329** | A Framework for the Integration of ICT-relevant Data in Power System Applications
  Michael Brand, Shoaib Ansari, Felipe Castro, Ranim Chakra, Batoul Hage Hassan, Carsten Krüger, Davood Babazadeh, Sebastian Lehnhoff | OFFIS - Institute of Information Technology, Germany

- **ID 395** | A REST based co-simulation interface for distributed simulations
  Mike Vogt, Frank Marten, Christian Tobermann, Martin Braun | Fraunhofer IEE, Germany

13:00 - 14:20 | SS 8 | Room BL.27.0.1

**Understanding System Resilience in Critical Infrastructures**
Organizer: Pierluigi Mancarella | University of Melbourne, Australia

- **ID 472** | Estimation of Expected Cost Curve on Operation Parameter Space for Planning Residential PEFC-CGS
  Yuta Tsuchiya, Yu Fujimoto, Akira Yoshida, Yoshiharu Amano, Yasuhiro Hayashi | Waseda University, Japan

- **ID 89** | Python based scenario design and parallel simulation method for transient rotor angle stability assessment in PowerFactory
  Sohail Khan | Austrian Institute of Technology, Austria
  Aadil Latif | National Renewable Energy Laboratory, United States

- **ID 236** | A Julia Module for Polynomial Optimization with Complex Variables applied to Optimal Power Flow
  Julie Slitwak | RTE, Polytechnique Montréal & LIPN, Université, France
  Manuel Ruiz | RTE, France
  Miguel F. Anjos | School of Mathematics, University of Edinburgh, United Kingdom
  Lucas Lédocart, Emiliano Traversi | LIPN, Université Paris 13, France

- **ID 911** | A Metamodel for Multi-utilities Asset Management
  Alessandro Bossoio | Politecnico di Milano, Italy
  Davide Della Giustina, Stefano Frati, Alessio Dedè, Stefano Gozzi | UNARETI S.p.a., Italy

14:20 – 16:00 | SS 8 | Room BL.27.0.1

**Smart Controls and Advanced Software Tools**
Chair: Samuele Grillo | Politecnico di Milano, Italy

- **ID 100** | Bidirectional back-to-back link based on the virtual synchronous machine approach
  Juan M Ramirez, Emmanuel Torres-Montalvo, César Ibarra-Nuño | CINVESTAV del IPN, Mexico
  Julio C. Rosas Caro, Antonio Valderrabano-Gonzalez | Universidad Panamericana Guadalajara, Mexico

- **ID 165** | Adaptive Asset Congestion Management in PV-Rich LV Networks
  Andreas T. Procopiou, Luis F. Ochoa | The University of Melbourne, Australia

- **ID 406** | Energy Management Modelling Under Real-time Approach
  Anna Mutule, Ervin Grebesh, Ivars Zikmanis | Institute of Physical Energetics, Latvia
  Irina Oleinikova | Norwegian University of Science and Technology, Norway
14:20 – 16:00 | TS 4I | Room BL.270.2
Innovative Grids in Energy Hybrid Systems Integration – Advanced Methods for Power Systems Planning and Modeling
Chair: João Paulo Tomé Saraiva | University of Porto (FEUP) and INESC Technology and Science (INESC TEC), Portugal

- **ID 703** | Mathematical Description of a Fundamental Transient Electric Load Model of Households
  Franz Chirstange, Andreas Stadler, Thomas Hamacher | Technical University of Munich, Germany

- **ID 564** | Taylor-Fourier PMU on a Real-Time Simulator: Design, Implementation and Characterization
  Guglielmo Frigo, Asja Derwishkadic, Yihui Zuo, Mario Paolone | École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
  Alexandre Bach | École Normale Supérieure de Cachan, France

- **ID 181** | Stochastic optimization framework for online scheduling of an EV charging station in a residential place with photovoltaics and energy storage system
  Gustavo Aragón, Otilia Werner Kytölä | Fraunhofer FIT, Germany
  Erdem Gümürkücü | RWTH Aachen University, Germany

- **ID 447** | Integrated Energy-Water Model for Interdependent Storage, Run-of-River and Pump Hydropower
  Eduardo Alejandro Martinez Ceseña, Mathaios Panteli, Joseph Mutale, Pierluigi Mancarella, James Tomlinson, Julier Harou | The University of Manchester, United Kingdom

- **ID 799** | A Novel Planning Method for Multi-Scale Integrated Energy System
  Jingjie Yang, Wei Sun, Gareth Harrison, James Robertson | The University of Edinburgh, United Kingdom

- **ID 859** | Optimal Operation of a Smart Multi-Energy Neighborhood
  Mustafa Ata, Ayşe Kubra Erenöğlu, İbrahim Şengör, Ozan Erdinç | YTU, Turkey
  Akin Taşçıkarağlı | MUGLA SITKI KOÇMAN University, Turkey
  João P.S. Catalão | FEUP and INESC TEC, Portugal

14:20 – 16:00 | TS 4K | Room BL.270.6
System Operation and Control – Mitigation Techniques for Power System Stability
Chair: Alberto Berizzi | Politecnico di Milano, Italy

- **ID 189** | Flicker Mitigation by Optimization of Voltage Control
  Reinhold Bertram | RWTH Aachen University, Germany

- **ID 392** | Evaluation of automatic power quality classification in microgrids operating in islanded mode
  Raul Igual, Carlos Medrano | Universidad de Zaragoza, Spain
  Franz Schubert | HAW Hamburg (Hochschule für Angewandte Wissenschaften Hamburg), Germany

- **ID 221** | Generative Adversarial Model-Guided Deep Active Learning for Voltage Dip Labelling
  Azam Bagheri, Math. H. J. Boillen | Luleå University of Technology, Sweden
  Irene Y.H. Gu | Chalmers University of Technology, Sweden

- **ID 386** | The Novel Method for Voltage Transient Detection and Characterization
  Azam Bagheri, Math H.J. Boillen | Luleå University of Technology, Sweden

14:20 – 16:00 | TS 4J | Room BL.270.3
System Operation and Control – Power Quality Mitigation Techniques
Chair: A.P. Sakis Meliopoulos | Georgia Institute of Technology, United States

- **ID 176** | Wideband Harmonic Voltage Distortion Mitigation in Distribution Networks using Virtual Synchronous Machines
  Jawwad Zafar, Agusti Egea-Alvarez | University of Strathclyde, United Kingdom
  Alan Collinson | SP Energy Networks, United Kingdom

- **ID 842** | Assessment of best practices for mitigation of rapid voltage change due to transformer inrush
  Gaurav Singh, Carl Miller, William Howe | Electric Power Research Institute, United States
14:20 – 16:00 | TS 4L | Room BL.27.0.7
System Operation and Control
Chair: Rachid Cherkaoui | EPFL, Switzerland

- **ID 37** | Controlling the Electrical State via Uncertain Power Injections in Three-Phase Distribution Networks
  Cong Wang, Jean-Yves Le Boudec, Mario Paolone | École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

- **ID 95** | Analytical Estimation of Reactive Power Capability of a Radial Distribution System
  Stefan Stanković, Lennart Söder | KTH Royal Institute of Technology, Sweden

- **ID 55** | Towards Distributed OPF using ALADIN
  Alexander Engelmann, Tillmann Mühlprobst, Timm Faulwasser | Karlsruhe Institute of Technology (KIT), Germany
  Yuning Jiang, Boris Houska | ShanghaiTech University, China

- **ID 39** | On the Properties of the Compound Nodal Admittance Matrix of Polyphase Power Systems
  Andreas Martin Kettner, Mario Paolone | École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

- **ID 237** | The Setting Map Methodology for Adjusting the DG Anti-Islanding Protection Considering Multiple Events
  Daniel Motter | Center of Engineering and Exact Sciences, Western Parana State University, Brazil
  Jose Carlos de Melo Vieira | São Carlos School of Engineering - University of São Paulo, Brazil

- **ID 360** | Analytical Approach for Active Distribution Network Restoration Including Optimal Voltage Regulation
  Hossein Sekhavatmanesh, Rachid Cherkaoui | EPFL, Switzerland

16:10 – 17:50 | SS 10 | Room BL.27.0.1
Integration of PMU Measurements into Power System State Estimation
Organizer: Antonio Simões Costa | University of Santa Catarina, Brazil

- The impact of PMUs on network model parameter estimation and error detection
  Ali Abur | Northeastern University, Boston, USA

- Experimental Validation of the PMU-based Linear State Estimation of Lausanne Power Distribution Network
  Mario Paolone | EPFL, Lausanne, Switzerland

- PMU-Based Estimation of Renewable Power Plants Parameters
  Miguel A. Gonzalez-Cagigal, Antonio Gomez-Exposito, Jose A. Rosendo-Macias | University of Seville, Spain

- **ID 649** | Correntropy-Based Fusion Strategy for Incorporating PMU Measurements into Power System State Estimation
  Larah Brüning Ascarì, Antonio Simões Costa | Federal University of Santa Catarina (UFSC), Brazil
  Vladimirio Miranda | University of Porto and INESC TEC, Portugal

16:10 – 17:50 | TS 4M | Room BL.27.0.2
System Operation and Control – Advanced Solutions for Voltage and Frequency Stability
Chair: Fabio Napolitano | University of Bologna, Italy

- **ID 101** | Optimum Communication Network Design for Distributed Secondary Voltage Control in Microgrids
  Farideh Doost Mohammadi, Hessam Keshtkar Yanashi | Christopher Newport University, United States
  Ali Felachi | West Virginia University, United States

- **ID 153** | RoCoF-based Improvement of Conventional Under-Frequency Load Shedding
  Urban Rudez, Rafael Mihalic | University of Ljubljana, Faculty of Electrical Engineering, Slovenia

- **ID 284** | Performance Evaluation of STATCOM Equipment using Ambient and Disturbance Data
  Christoph Lackner, Joe Chow | Rensselaer Polytechnic Institute, United States
  Felipe Wilches-Bernal | Sandia National Laboratories, United States

- **ID 766** | Power Oscillation Monitoring using Statistical Learning Methods
  Hallvar Haugdal, Kjetil Uhlen | Norwegian University of Science and Technology (NTNU), Norway

- **ID 919** | A Hybrid Analysis Approach for Transient Stability Assessment in Power Systems
  Michael Kyesswa, Hüseyin K. Çakmak, Lutz Gröll, Uwe Kühnapfel, Veit Hagenmeyer | Karlsruhe Institute of Technology (KIT), Germany

- **ID 678** | Simplified Models for Frequency Studies in Electrical Power Systems
  Francisco Casado-Machado, José Luis Martinez-Ramos, Alejandro Marano-Marcolini | Universidad de Sevilla, Spain

16:10 – 17:50 | TS 4N | Room BL.27.0.3
System Operation and Control – Methodologies for Uncertainties Mitigation in Power Systems
Chair: Giovanni Spagnuolo | University of Salerno, Italy

- **ID 877** | Optimal Scheduling of Generators and BESS using Forecasting in Power System with Extremely large Photovoltaic Generation
  Rajitha Udawapola | University of Ruhuna, Sri Lanka
  Taisuke Masuta | Meijo University, Japan
  Hideaki Ohtake | National Institute of Advanced Industrial Science and Technology, Japan
  Joao Gari da Silva Fonseca Junior | The University of Tokyo, Japan
• ID 242 | Pumped-Storage Hydropower Operation Scheduling Method for Net Load Ramp Leveling
Ryuya Tanabe | Central Research Institute of Electric Power Industry, Japan
Akiko Yokoyama | The University of Tokyo, Japan

• ID 208 | Comparison of stochastic and deterministic security constrained optimal power flow under varying outage probabilities
Elis Nylander, Lennart Söder | KTH Royal Institute of Technology, Sweden

• ID 496 | A Mixed-Integer Distributionally Robust Chance-Constrained Model for Optimal Topology Control in Power Grids with Uncertain Renewables
Mostafa Nazeri, Payman Dehghanian, Miguel Lejeune | George Washington University, United States

• ID 809 | Cloud-AC-OPF: Model Reduction Technique for Multi-Scenario Optimal Power Flow via Chance-Constrained Optimization
Vladimir Frolov | Skolkovo Institute of Science and Technology, Russia
Line Roald | University of Wisconsin, United States
Michael Chertkov | Center for Nonlinear Studies and Theoretical Division, United States

• ID 58 | Continuation Power Flow Analysis of Distribution Systems under Uncertainty using Modified Affine Arithmetic
Bala Surendra Adusumilli, Kalyan Kumar Boddeti | Indian Institute of Technology Madras, India

16:10 – 17:50 | TS 4O | Room BL.27.0.6
System Operation and Control – Multiterminal HVDC for Stability Improvement
Chair: Enrico Tironi | Politecnico di Milano, Italy

• ID 690 | HVDC developments for the all-island Cyprus system in a pan-European long-term perspective
Angelo L’Abbate, Roberto Calisti | RSE SpA, Italy

• ID 519 | Mutual Interactions and Stability Analysis of MMC-Based VSC-HVDC Link
Samad Dadjoo Tavakoli, Eduardo Prieto-Araujo, Enric Sánchez-Sánchez, Oriol Gomis-Bellmunt | Universitat Politècnica de Catalunya, Spain

• ID 858 | Impact on Power System Frequency Dynamics from an HVDC Transmission System With Converter Stations Controlled as Virtual Synchronous Machines
Francesco Palombi, Luigi Piegari | Politecnico di Milano, Italy
Atsede Endegnanew, Jon Are Suul, Salvatore D’Arco | SINTEF Energy Research, Norway

• ID 562 | Dynamic simulation of simultaneous HVDC contingencies relevant for vulnerability assessment of the Nordic power system
Espen Hafstad Solvang, Iver Bakken Sperstad | SINTEF Energy Research, Norway
Sigurd Hofsmo Jakobsen | SINTEF Energy Research / NTNU - Norwegian University of Science and Technology, Norway
Kjetil Uhlen | NTNU - Norwegian University of Science and Technology, Norway

• ID 204 | Energy Droop Control for MMC based Multiterminal HVDC Systems
Sven Baumann, Christoph Hahn, Johannes Porst, Matthias Luther | Friedrich-Alexander University Erlangen-Nürnberg (FAU), Germany

• ID 261 | Utilization of HVDC-Systems in the International Grid Control Cooperation
Arne Pawellek, Lutz Hofmann | Leibniz Universität Hannover, Germany

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16:10 – 17:50 | TS 4P | Room BL.27.0.7
Innovative Grids in Energy Hybrid Systems Integration
Chair: Ermanno Cardelli | Università degli Studi di Perugia, Italy

• ID 29 | Energy Systems Integration in Smart Districts: Robust Optimisation of Multi-Energy Flows in Integrated Electricity, Heat and Gas Networks
Eduardo Alejandro Martinez Ceseña, Pierluigi Mancarella | The University of Manchester, United Kingdom

• ID 394 | A Multiobjective Optimization Technique to Develop Protection Systems of Distribution Networks With Distributed Generation
Katiani Pereira | Center for Engineering and Exact Sciences at the State University of West Paraná – UNIOESTE, Brazil
Benvindo R. Pereira Junior | São Paulo University, São Carlos, Brazil
Javier Contreras | the E.T.S. of Industrial Engineering, University of Castilla - La Mancha, Spain
José R. S. Mantovani | Paulista State University, Ithá Solteira, Brazil

• ID 116 | Reliable Dispatch of Renewable Generation via Charging of Time-varying PEV Population
Riccardo Remo Appino, Miguel Muñoz-Ortiz, Jorge Ángel González Ordiano, Ralf Mikut, Veit Hagenmeyer, Timm Faulwasser | Karlsruhe Institute of Technology, Germany

• ID 446 | Trading Small Prosumers Flexibility in the Energy and Tertiary Reserve Markets
José Iria, Filipe Soares | INESC TEC, Portugal
Manuel Matos | FEUP, Portugal

• ID 297 | Local Energy Markets in LV Networks: Community based and Decentralized P2P Approaches
Jaysson Guerrero, Archie C. Chapman, Gregor Verbic | The University of Sydney, Australia
TECHNICAL SESSION (TS) PRESENTERS

Accepted papers will be presented on each day of the conference (24-27 June) in parallel sessions grouped by subject topics. Authors of accepted papers should be aware that they, or a delegate notified and approved by the conference organizers, are expected to present the paper in person at the conference, in order for their paper to be included in the conference proceedings and uploaded to IEEE Xplore.

Technical Session presentations are scheduled in the mornings (except on 24th) and in the afternoons, in time slots of 1 hour and 40 minutes, as detailed in the conference programme. Five parallel themed Special Sessions or European Projects Sessions or Technical Sessions or Transaction Sessions will be hosted in each of the time slots, with 6 papers presented in each session.

Each presenter will have **12 minutes for the presentation** followed by 3 minutes for clarifying questions from the audience. Timings will be strictly enforced.

No template is provided and presenters are encouraged to optimize their presentations for a 4:3 aspect ratio.

Only Microsoft Power Point (ppt/pptx) or PDF files will be accepted. Mac users should be advised that the display computers will be Windows and are strongly encouraged to check compatibility (including font and slide layout) before presentation.

Prior the Session

Presenters are asked to determine their scheduled slot for presentation in the conference programme. Presentation must be uploaded to the conference computer during the coffee break before the starting of the scheduled session. In particular:

- **session 08:30–10:10** Presenters must upload the presentation 15 minutes prior to the start of the session
- **10:30–12:10** Presenters must upload the presentation during the morning coffee break (10:10–10:30)
- **14:20–16:00** Presenters must upload the presentation during dessert&coffee break (14:00–14:20)
- **16:10–17:50** Presenters must upload the presentation during dessert&coffee break (14:00–14:20)

To ensure the smooth running of sessions with minimal delays, all presentations must be uploaded. It will not be possible to present from your own laptop.

Presenters are asked to contact their Session Chair before the session if they have any questions. Session chairs will be detailed in the programme once finalized.

During the Session

Each accepted paper must be presented in the scheduled session. Absence of the presenter will be taken as NO-SHOW by the Session Chair and the paper manuscript will be excluded from IEEE Xplore upload.

Please keep strictly to the time limit given (12 minutes per presentation), this will be strictly enforced.

POSTER SESSION (PS) PRESENTERS

The poster sessions form a key part of the conference programme and are scheduled without other presentations in parallel to ensure maximum delegate participation. Posters will be presented on each day of the conference (24-27 June) from 13:00 to 14:20 in the same area of the desserts and coffee after lunch. Small themed Poster Sessions (up to 10 papers) are organized in order to let oral presentations to the Chairs and delegates by the Authors.

The allowed formats to plot the poster are: A0 portrait: width 84.1 cm x length 118.9 cm (33.1 inch x 46.8 inch), and A1: 59.4 cm x 84.1 (23.4 inch x 33.1 inch). The poster boards will not be able to accommodate posters wider than this (so do not bring A0 landscape). Other formats will not be accepted. No template is provided.

A full poster is required. Printouts of presentation slides will not be displayed and will not be counted as presented. The corresponding paper manuscript will be excluded from the IEEE Xplore upload.

The absence of a presenter during the scheduled session will be taken as NO-SHOW by the Session Chair and the corresponding paper manuscript will be excluded from the IEEE Xplore upload.

Presenters are asked to contact their Session Chair before the session if they have any questions. Session chairs will be detailed in the programme once finalized.

Prior the Session

Presenters should display their posters starting from 10:10 of the day of their poster session. Suitable materials and volunteers will be on hand to help you.

Each poster board will be labelled with the number of the corresponding poster session and paper ID. Presenters are asked to look for their number in the conference programme.

During the Session

Presenters must attend their scheduled session 5 minutes prior to the start of the session.

Presenters are required to be in the session room at their poster location during the entire poster session.

Poster sessions will be led by dedicated Chairs who will introduce the presenters who have up to 5 minutes to present their work. Timings will be strictly enforced. This will be followed by a brief Q&A.

After the Session

Presenters are required to remove their posters after the session has ended.

INFORMATION FOR PRESENTERS
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Page 2 | Skyscrapers in Gae Aulenti Square, Milan
Page 4 | Interior Rector’s main building, Politecnico di Milano, Milan
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Page 8 | SCHOOL OF ARCHITECTURE, Politecnico di Milano, Milan
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Page 25 | Milan in bronze, sculpture in Corso Vittorio Emanuele with inscriptions in Braille, Milan
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