SEST'19

2nd International Conference on Smart Energy Systems and Technologies

9-11 September, 2019
Porto, Portugal

Organisers

U.PORTO FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

INESCTEC

Technical Sponsors

IEEE

PES

ICE

IET The Institution of Engineering and Technology

Welcome Message

On behalf of all Chairs and Program Committee members, I am pleased and honored to welcome you to the Second International Conference on Smart Energy Systems and Technologies – SEST 2019.

The SEST Conference Series is determined to establish itself as the venue to present top-tier scientific research in the field of Smart Energy Systems and Technologies.

We also hope to provide a forum for researchers from academia and professionals from industry, as well as government regulators to tackle the challenges in this field, discussing and exchanging knowledge and best practices.

We would like to use this opportunity to acknowledge the exceptional contributions of all TPC members.

Indeed, a comprehensive three-level review process of all submitted papers was carried out:

-1st stage: abstracts were assessed regarding scope and quality/interest, with 10% being rejected.

-2nd stage: full papers were thoroughly evaluated (averaging 4.2 reviews per paper) by TPC members and 383 external reviewers.

-3rd stage: revised full papers (and the response letters) were also evaluated by the conference chairs.

Overall, 420 abstracts were submitted to SEST 2019 from 55 countries. From those 420 abstracts, 42 were rejected, and then 250 full papers were submitted.

A total of 170 full papers were finally accepted to be presented from 46 countries, coming from all 5 continents.

The SEST 2019 acceptance rate from abstract submission to full paper acceptance (disregarding the full papers not submitted) was 58%.

We also have the privilege of having six outstanding Keynote Speakers, all world-renowned experts in the field, who will be presenting lectures on some of the most pressing and timely topics.

In addition, we are pleased to host panel sessions by three EU Horizon 2020 (H2020) Projects during the second day of the conference to disseminate their latest research progress and outcomes.

The SEST 2019 local organizing committee has done a tremendous job to ensure a well-equipped venue for all sessions, easy environment for technical discussions and networking, in addition to a fantastic social program.

We hope that you will enjoy this year's SEST conference with its high-quality papers, outstanding Keynote Speakers, panel sessions, and social program.

We also wish you a pleasant stay in the beautiful city of Porto. Thank you very much!

João P. S. Catalão

SEST 2019 General Chair

Faculty of Engineering of the University of Porto (FEUP) and INESC TEC

Porto, Portugal

On Behalf of all Chairs

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PROGRAM

SEST'19

2nd International Conference on Smart Energy Systems and Technologies

9-11 September, 2019
Porto, Portugal

PROGRAM

Organization and Sponsorship

Organizing Sponsors

U.PORTO
FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

INESCTEC

Technical Sponsors

IEEE

IEEE PES Power & Energy Society

ICS

IET The Institution of Engineering and Technology

Logistic Support

Porto.

Visit Porto.

Conference Venue

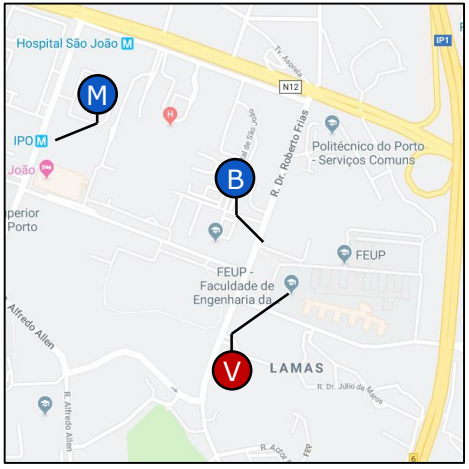
The SEST 2019 conference will be taking place at the **Faculty of Engineering of the University of Porto (FEUP)** (*Faculdade de Engenharia da Universidade do Porto*).

Address:

Rua Dr. Roberto Frias, s/n
4200-465 Porto

Coordinates:

41°10'40.8"N 8°35'52.3"W



Map Legend
(Indicating Nearest Bus and Metro Stations)

V

Venue
Faculty of Engineering, University of Porto
Faculdade de Engenharia da Universidade do Porto

B

Bus Stop
Faculdade de Engenharia (FEUP1), Lines: 204, 301, 803
Faculdade de Engenharia (FEUP1), *Linhas 204, 301, 803*

M

Metro Station
IPO, Line D (Yellow Line)
IPO, Linha D (Linha Amarela)

Program At-A-Glance

	Day 1	Day 2	Day 3
8:00	Registration Opens		
8:45 - 9:00	Opening Session	Registration	Registration
9:00 - 10:30	Keynote Address 1 Keynote Address 2	Keynote Address 3 Keynote Address 4	Keynote Address 5 Keynote Address 6
	Coffee Break	Coffee Break	Coffee Break
11:00 - 12:30	Parallel Sessions MS 1-4	Parallel Sessions TS 1-4	Parallel Sessions WS 1-4
	Lunch Break	Lunch Break	Lunch Break
13:30 - 15:00	Parallel Sessions MS 5-8	Parallel Sessions TS 5-8	Parallel Sessions WS 5-8
	Coffee Break	Coffee Break	Coffee Break
15:30 - 17:00	Parallel Sessions MS 9-13	Panel Sessions on EU Projects	Closing Session
17:00 - 19:00	Welcome Reception	-	-
19:00 - 23:00	-	Gala Dinner And Awards Ceremony	

Day 1

Opening Session

Keynote Address 1 by Bikash Pal:

Dynamic Modeling for Analysis of Wind Farm and Grid Interaction

Keynote Address 2 by Javier Contreras:

A non-simulation reliability assessment model based on linear programming and its application to distribution network expansion planning

Parallel Sessions (Morning)

Electricity Markets I (Auditorium)	**Communication and Data Analytics I (Sala de Atos)**
Forecasting (B001)	**Reliability (B002)**

Parallel Sessions (Afternoon)

Modeling and Simulation I (B001)	**Demand Response I (Sala de Atos)**
Stability and Protection I (B002)	**Electric Mobility (B012)**

Parallel Sessions (Evening)

Dynamics and Control I (B001)	**Prosumers and P2P Trading (Sala de Atos)**
Stability and Protection II (B002)	**Power System Operation I (B012)**
Power System Planning I (B016)	

Welcome Reception

Day 2

Keynote Address 3 by Nikos Hatziargyriou:

2050 vision of the European Technology Platform for the Energy Systems

Keynote Address 4 by Vladimiro Miranda:

Modern power systems: dealing with information, not only electrons

Parallel Sessions (Morning)	
Communication and Data Analytics II (Auditorium)	Demand Response II (Sala de Atos)
Power System Operation II (B001)	Power System Planning II (B002)

Parallel Sessions (Afternoon)	
Energy Storage I (B001)	Modeling and Simulation II (Sala de Atos)
Electricity Markets II (B002)	Dynamics and Control II (B012)

Panel Sessions on EU Projects		
INTERPLAN (B001)	**FEEdBACk** (B002)	**EU-SysFlex** (Sala de Atos)

Gala Dinner and Awards Ceremony

The gala dinner and awards ceremony will take place aboard a three-hour exclusive cruise of the Douro River.

Buses will depart at 18:30 from FEUP to the docks, and will be available for participants wishing to return to FEUP after the cruise has ended.

Day 3

Keynote Address 5 by Alberto Borghetti:

Distributed Energy Management in Local Communities

Keynote Address 6 by Ozan Erdinc:

Common Trends and Concepts in Smart Cities and Grids

Parallel Sessions (Morning)	
Economic Analysis (Auditorium)	Power System Operation III (Sala de Atos)
Modeling and Simulation III (B001)	Power Electronics I (B002)

Parallel Sessions (Afternoon)	
Power Electronics II (B001)	Communication and Data Analytics III (Sala de Atos)
Energy Storage II (B002)	Dynamics and Control III (B012)

Closing Session

Important Information

Parallel sessions have a total duration of 90 minutes. Presenting authors should be at their designated room at least 10 minutes prior to the session. The duration of each presentation should not exceed 12 minutes, followed by around 3 minutes of Q&A and discussion.

Every day, two consecutive keynote addresses will take place, also having a total duration of 90 minutes. Each keynote address will have a duration of about 40 minutes, followed by 5 minutes of Q&A and discussion.

PROGRAM

Keynote Addresses

Two keynote sessions will take place daily between 9:00 and 10:30 in the morning at the FEUP auditorium.

The auditorium is located in the 1st floor of the main building, directly above the main entrance.

FEUP's indoor campus is fully mapped by Google Maps, so it can be used for navigation within.

Direction signs will also be placed in-loco to guide participants from the main entrance.

tinyurl.com/FEUP-GMAPS

List of Keynote Addresses

Day 1:

"Dynamic Modeling for Analysis of Wind Farm and Grid Interaction"

- Bikash Pal

"A non-simulation reliability assessment model based on linear programming and its application to distribution network expansion planning."

- Javier Contreras

Day 2:

"2050 vision of the European Technology Platform for the Energy Systems"

- Nikos Hatziargyriou

"Modern power systems: dealing with information, not only electrons."

- Vladimiro Miranda

Day 3:

"Distributed energy management in local communities."

- Alberto Borghetti

"Common Trends and Concepts in Smart Cities and Grids."

- Ozan Erdinc

Day 1: Bikash Pal

"Dynamic Modeling for Analysis of Wind Farm and Grid Interaction"

Bio: Bikash Pal holds the Chair of Power Systems at Imperial College London. His research over the past 20 years has focused on designing robust control techniques to guard against power system stability problem. He has led strategic research in power transmission control and state estimation with lasting support from Engineering and Physical Research Council (EPSRC), UK, Council of the European Union and power industries: ABB, UK Power Networks and National Grid, UK. He led an eight-university UK-India research consortium on Smart Grid and Storage and a six-university UK-China research consortium in Smart Grid and Control. His research group have won President's outstanding research team award at Imperial College London, 2016. He has written two books on power system stability and control, published 75 IEEE/IET journal papers, graduated 18 PhDs and supervised 20 post docs. Prof Pal's DLP lectures have benefited many colleagues in power engineering profession worldwide. He was Editor-in-Chief of IET Generation, Transmission and Distribution journal (2005-2012) and Editor-in-Chief of IEEE Transactions on Sustainable Energy (2012-2017). He was honored by the German Research Foundation (DFG) with Mercator Professorship in 2011. Prof Pal is a Fellow of IEEE for his contribution to power system stability and control. He is also a visiting Professor at Tsinghua University.

Day 1: Javier Contreras

"A non-simulation reliability assessment model based on linear programming and its application to distribution network expansion planning."

Bio: Javier Contreras received the B.S. degree in Electrical Engineering from the University of Zaragoza, Zaragoza, Spain, in 1989, the M.Sc. degree in Electrical Engineering from the University of Southern California, Los Angeles, in 1992, and the Ph.D. degree in Electrical Engineering from the University of California, Berkeley, in 1997. Since 1998 he has been with the University of Castilla – La Mancha (UCLM), Ciudad Real, Spain, where he is currently Full Professor. Dr. Contreras has also been a visiting scholar at the University of Hong Kong and the University of Illinois at Urbana-Champaign. He has been a consultant for several electricity companies in Spain and has participated as principal investigator in national, European and international research projects. In particular, he was part of a European project devoted to the introduction of renewable generation in smart distribution grids. He has also been part of the evaluation committee of international research projects in the European Commission, Spain, Portugal, Italy, Cyprus and Colombia.

Day 2: Nikos Hatziargyriou

"2050 vision of the European Technology Platform for the Energy Systems."

Bio: Nikos D. Hatziargyriou is since 1984 a faculty member and since 1995, full professor in Power Systems at the Electrical and Computer Engineering School of the National Technical University of Athens. He is Director of the Energy Systems Laboratory and founder of the "SmartRue" research unit. He is visiting professor at Tsinghua and Hefei Universities in China. Since 2015 he is Chairman of the Hellenic Distribution Network Operator. From February 2007 until September 2012 he was executive Vice-Chair and Deputy CEO of the Public Power Corporation (PPC), responsible for the Transmission and Distribution Divisions. He is Fellow Member of IEEE, past Chair of the Power System Dynamic Performance Committee (PSDPC) and currently Editor in Chief of the IEEE Trans on Power Systems. He is honorary member of CIGRE and past Chair of CIGRE SC C6 "Distribution Systems and Distributed Generation". He is chair of the EU Technology and Innovation Platform on Smart Networks for Energy Transition. He has participated in more than 60 RD&D projects funded by the EU Commission, electric utilities and manufacturers for both fundamental research and practical applications.He is author of the book "Microgrids: Architectures and Control" and of more than 200 journal publications and 500 conference proceedings papers. He is included in the 2016 and 2017 lists of the top 1% most cited researchers.

Day 2: Vladimiro Miranda

"Modern power systems: dealing with information, not only electrons."

Bio: Vladimiro Miranda is Full Professor (Catedrático) of the University of Porto, Portugal. He is an IEEE Fellow since 2006 and recipient of the IEEE PES Excellence Award in Renewable Energy 2014. He is author or co-author of many scientific publications in the most relevant journals in Power Systems, and his innovative solutions have been incorporated in industrial products and are in use in several continents. He holds presently the following responsibilities: Member of the Board of Directors of INESC TEC, Portugal, for 18 years; President of the Board of INESC P&D Brasil, Brazil; Member of the Doctoral Council of UTAD (University of Trás os Montes e Alto Douro), Portugal; Member of the Board of Oceanus (University of Porto), Portugal; and Honorary Professor of the University of Novi Sad, Serbia. He is an International Scientific Advisor for: IRESEN, Ministry of Energy of the Government of Morocco; Hong Kong Polytechnic University; Instituto de Investigación Tecnológica (Madrid, Spain); Instituto de Energía Elétrica (San Juan, Argentina); and Laboratory for Biologic and Chemical Defense of the Portuguese Army. Besides having been responsible for many international projects, he has served also in the Board of start-up/spin-off companies generated by INESC TEC. His research focus is in computational intelligence and power systems. He authored many publications, being registered with more than 7,700 citations in Google Scholar (h-index 47) and more than 4000 citations in SCOPUS (h-index 35).

Day 3: Alberto Borghetti

"Distributed energy management in local communities."

Bio: Alberto Borghetti was born in Cesena Italy on May 29, 1967. He graduated (with honors) in electrical engineering from the University of Bologna, Italy, in 1992. Since then he has been working with the power system group of the same University, where is now a Professor of Electrical Power Systems. His research and teaching activities are in the areas of power system analysis, power system restoration after blackout, electromagnetic transients, optimal generation scheduling, and distribution system operation. He is the author or coauthor of over 150 scientific papers published in peer-reviewed journals or presented at international conferences. He has served as Technical Program Committee chairperson of the 2010 30th Int. Conf. on Lightning Protection, chair of the 2016 Bologna CIGRE Colloquium on Lightning and Power systems, and special reporter for CIGRE 2018. IEEE Fellow (class 2015) for contributions to modeling of power distribution systems under transients conditions, he received the ICLP Scientific Committee Award in 2016 and the 2018 CIGRE Technical Council Award for Study Committee C4. From 2010 to 2017 he served as an Editor of IEEE Transactions on Smart Grid. Currently he is serving as an Editor of IEEE Transactions on Power Systems and, since the beginning of 2019, as Editor-in-Chief of Electrical Engineering – Archiv fur Elektrotechnik.

Day 3: Ozan Erdinc

"Common Trends and Concepts in Smart Cities and Grids."

Bio: Ozan Erdinç received the B.Sc., M.Sc., and Ph.D. degrees from Yildiz Technical University (YTU), Istanbul, Turkey, in 2007, 2009, and 2012, respectively. Until May 2013, he worked in the private sector in different positions including electrical installations, renewable energy investments and as procurement expert. In June 2013, he became a Postdoctoral Fellow in Portugal, under the EU-FP7 funded Project "Smart and Sustainable Insular Electricity Grids Under Large-Scale Renewable Integration". He was also a Researcher with the INESC-ID, Lisbon, Portugal with FCT PostDoctoral Grant Award. Afterwards, he joined the Department of Electrical Engineering, YTU, Istanbul, where in April 2016 he obtained the title of Associate Prof. Dr. with the national habilitation exam. He is currently the Director of Energy Application and Research Center of YTU and Head of Alternative Energy Based Electric Systems Division at the Department of Electrical Engineering (YTU). Dr. Erdinç is currently the IEEE Power and Energy Society (PES) Turkey Chapter Chair. He is also a Senior Member of IEEE, an Editor of the IEEE Transactions on Sustainable Energy and an Associate Editor of the IET Renewable Power Generation. His research interests are hybrid renewable energy systems, electric vehicles, power system operation, and smart grid Technologies.

Parallel Sessions

Overall, there will be 170 paper presentations with authors from 39 countries from 46 countries. Papers have been grouped into the following topics to ensure the best opportunities for attendees with different interests:

Day 1:

Morning Sessions (from 11:00 to 12:30):

Electricity Markets I (Auditorium)	Communication and Data Analytics I (Sala de Atos)
Forecasting (B001)	Reliability (B002)

Afternoon Sessions (from 13:30 to 15:00):

Modeling and Simulation I (B001)	Demand Response I (Sala de Atos)
Stability and Protection I (B002)	Electric Mobility (B012)

Evening Sessions (from 15:30 to 17:00):

Dynamics and Control I (B001)	Prosumers and P2P Trading (Sala de Atos)
Stability and Protection II (B002)	Power System Operation I (B012)
Power System Planning I (B016)	

Day 2:

Morning Sessions (from 11:00 to 12:30):

Communication and Data Analytics II (Auditorium)	Demand Response II (Sala de Atos)
Power System Operation II (B001)	Power System Planning II (B002)

Afternoon Sessions (from 13:30 to 15:00):

Energy Storage I (B001)	Modeling and Simulation II (Sala de Atos)
Electricity Markets II (B002)	Dynamics and Control II (B012)

Day 3:

Morning Sessions (from 11:00 to 12:30):

Economic Analysis (Auditorium)	Power System Operation III (Sala de Atos)
Modeling and Simulation III (B001)	Power Electronics I (B002)

Afternoon Sessions (from 13:30 to 15:00):

Power Electronics II (B001)	Communication and Data Analytics III (Sala de Atos)
Energy Storage II (B002)	Dynamics and Control III (B012)

PARALLEL SESSIONS

Parallel Session Halls

The sessions will take place in the following halls:

Auditorium	**B002**
Sala de Atos	**B012**
B001	**B016**

The Auditorium and Sala de Atos are located in the 1st floor of the main building, directly above FEUP's main entrance.

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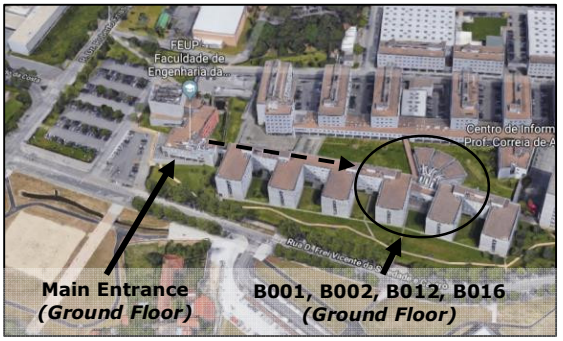
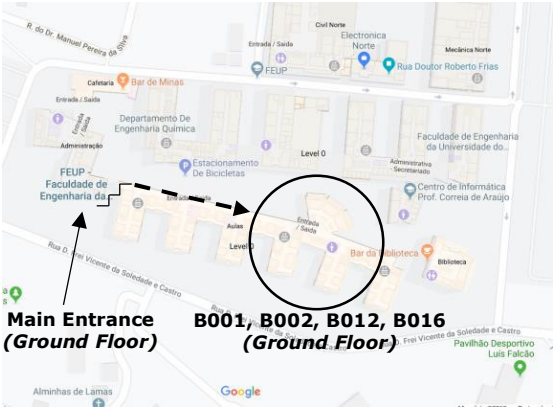
PARALLEL SESSIONS

Halls (BXXX) are in the B building, reachable by walking down the corridor starting at the main entrance. FEUP's indoor campus is fully mapped by Google Maps, so it can be used for navigation. Signs will be placed to guide participants on campus.





tinyurl.com/FEUP-GMAPS

PARALLEL SESSIONS

Monday Session 1: Electricity Markets I

Time: 11:00-12:30
Location: Auditorium
Chair: Javier Contreras

259	**An Incentive-Based Settlement Mechanism for Participation of Flexible Demands in Day-ahead Markets** *Shaghayegh Zalzar and Ettore Francesco Bompard*
96	**A Deep Q Network Approach for Optimizing Offering Strategies in Electricity Markets** *Yujian Ye, Dawei Qiu, Dimitrios Papadaskalopoulos, and Goran Strbac*
144	**Stochastic Demand Side Management in European Zonal Price Market** *Saber Talari, Denis Mende, David Sebastian Stock, Miadreza Shafie-khah, and João P. S. Catalão*
296	**A Centralized Building Energy Management System for Residential Energy Hubs** *Mohammad Ali Fotouhi Ghazvini, David Steen, and Le Anh Tuan*
243	**Elasticity Parameter Definition and Analysis for Real-Time Pricing Remuneration Basing on Different Users Cases** *Pierfrancesco Corsi, Pedro Faria, Zita Vale*
227	**Congestion relief market model based on load biddings** *Giuseppe Marco Tina, Claudio F. Nicolosi, and Pierluigi Siano*

Monday Session 2: Communication and Data Analytics I

Time: 11:00-12:30
Location: Sala de Atos
Chair: Manuel Matos

5	**Embedded Edge Computing for Real-time Smart Meter Data Analytics** *Sirojan Tharmakulasingam, Shibo Lu, Toan Phung, and Eliathamby Ambikairajah*
73	**Vertical Load Uncertainty at the T/D Boundary under different spatial DER allocation techniques** *Fabian Heymann, Joao Silva, Philipe Vilaca, Filipe Joel Soares, Pablo Duenas, Joel Melo,and Vladimiro Miranda*
74	**LoRa Communication as a Solution for Real-Time Monitoring of IoT Devices at UNICAMP** *Luis F. Ugarte, Maique C. Garcia, Enrico O. Rocheti, Eduardo Lacusta Jr., Leandro S. Pereira, and Madson C. de Almeida*
75	**A Low-cost Smart Plug with Power Quality and Energy Analyzer Features** *Tiago M. Serrano, Luiz C. P. da Silva, Leandro Pereira, Feliphe Andreoli, Tuo Ji, and Fabiano Fruett*
84	**Low Power IoT Network Sensors Optimization for Smart Cities Applications** *Vítor Fialho and Fernando Fortes*
159	**Energy Consumption by Cloud-based Vehicle Functions** *Farzaneh Milani, Lena Gollowitz, Mike Foell, and Christian Beidl*

PARALLEL SESSIONS

Monday Session 3: Forecasting

Time: 11:00-12:30
Location: B001
Chair: Gerardo Osório

22	**One-day ahead PV power forecasts using 3D Wavelet Decomposition** *Maria Malvoni and Nikos Hatziargyriou*
285	**Intelligent energy efficient street lighting system with predictive energy consumption** *Didar Tukymbekov, Ahmet Saymbetov, Madiyar Nurgaliyev, Nurzhigit Kuttybay, Yerkebulan Nalibayev, and Gulbakhar Dosymbetova*
343	**Optimization based Real-Time Home Energy Management in the Presence of Renewable Energy and Battery Energy Storage** *Mahmoud Elkazaz, Mark Sumner, Richard Davies, Seksak Pholboon, and David Thomas*
367	**Probabilistic Ampacity Forecasting for Overhead Transmission Lines** *Theodoros Konstantinou, Nikolaos Savvopoulos, and Nikos Hatziargyriou*
251	**Prediction of Power Outages in Distribution Network with Grey Theory** *Yang Zhang, Andrea Mazza, Pietro Colella, Ettore Bompard, Emiliano Roggero, and Giuliana Galofaro*

Monday Session 4: Reliability

Time: 11:00-12:30
Location: B002
Chair: Miadreza Shafie-khah

350	**Branch Grouping Algorithm for Enhancing Reliability of the Distribution System Restoration** *Yerassyl Olzhabay, Bexultan Nursultan, H.S.V.S. Kumar Nunna, and Suryanarayana Doolla*
240	**Disaggregation of Reported Reliability Performance Metrics in Power Distribution Networks** *Mike Brian Ndawula, Antonio De Paola, and Ignacio Hernando-Gil*
245	**Reliability Enhancement of LV Rural Networks using Smart Grid Technologies** *Maximilian L. Ellery, Mike Brian Ndawula, and Ignacio Hernando-Gil*
420	**Grid Friendly Operation of a PV-Storage System with Profit Maximization and Reliability Enhancement** *Lysandros Tziovani, Panayiotis Kolios, Lenos Hadjidemetriou, and Elias Kyriakides*
273	**Critical Outage Determination via a Sensitivity Study of the Portuguese Electric Transmission Network** *Salvador Carvalhosa, António M. Moura, Fernando Matos, Nélio Machado, and João P. Castro*
327	**Reliability-oriented DG allocation in radial Microgrids equipped with smart consumer switching capability** *Seyed Mohsen Hashemi, Vahid Vahidinasab, Mohammad Sadegh Ghazizadeh, and Jamshid Aghaei*

PARALLEL SESSIONS

Monday Session 5:
Modeling and Simulation I

Time: 13:30-15:00
Location: B001
Chair: Juan Miguel Morales González

42	**Day-ahead Operation of an Aggregator of Electric Vehicles via Optimization under Uncertainty** *Alvaro Porras Cabrera, Ricardo Fernandez-Blanco, Juan Miguel Morales, and Salvador Pineda*
70	**Equation-based modelling for dynamic optimization of district scale energy systems – a scalability study** *Gerald Schweiger, Filip Jorissen, Hakan Runvik, and Lieve Helsen*
80	**Losses Allocated to the Nodes of a Radial Distribution System with Distributed Energy Resources – A Simple and Effective Indicator** *Andrea Mazza and Gianfranco Chicco*
106	**Impact of different central path neighborhoods on gross error identification in State Estimation with generalized correntropy interior point method** *Hamed Moayyed, Shabnam Pesteh, Vladimiro Miranda, and Jorge Pereira*
153	**A Novel Extended Graph Strategy to Model Microgrids** *Angie K. Reyes, Andres I. Hernandez, Rafael M. Gutierrez, Nicolas Bolivar, Diego A. Jimenez, Juan D. Bastidas, and Javier Solano*
141	**Predictive Current Control of Six-Phase Permanent Magnet Synchronous Machines Based on Virtual Vectors with Optimal Amplitude and Phase** *Pedro F. C. Gonçalves, Sérgio M. A. Cruz, and André M. S. Mendes*

Monday Session 6:
Demand Response I

Time: 13:30-15:00
Location: Sala de Atos
Chair: Amjad Anvari-Moghadam

83	**Demand Response Methodology Applied on Three-Axis Constructed Consumers Profiles** *Benoit Durillon, Arnaud Davigny, Sabine Kazmierczak, Hervé Barry, Christophe Saudemont, and Benoît Robyns*
122	**A New Index of Power System Flexibility: Response Delay (θ) of Distributed Devices** *Baraa Mohandes, Mohamed Shawky El Moursi, and Sameh El Khatib*
232	**Optimizing Lighting in an Office for Demand Response Participation Considering User Preferences** *Mahsa Khorram, Pedro Faria, and Zita Vale*
210	**Residential demand-side flexibility in energy communities: a combination of optimization and agent modeling approaches** *Inês F. G. Reis, Ivo Gonçalves, Marta A. R. Lopes, and Carlos Henggeler Antunes*
226	**Demand Response in Energy Communities Considering the Share of Photovoltaic Generation from Public Buildings** *Pedro Faria, Rúben Barreto, and Zita Vale*
262	**Demand Response and Consumer Inconvenience** *Chittesh Veni Chandran, Malabika Basu, and Keith Sunderland*

Monday Session 7:
Power System Stability and Protection I

Time: 13:30-15:00
Location: B002
Chair: Agustin Sanchez de la Nieta

13	**A field measurements model for harmonic distortion estimation in low voltage systems** *José Baptista*
257	**Utilization of an Urban AC Microgrid for Improving Voltages Across a Distribution System** *Anastasios Oulis Rousis, Patompong Boonsiri, and Goran Strbac*
54	**Local anomaly detection analysis in distribution grid based on IEC 61850-9-2 LE SV voltage signals** *Dennis Rösch, Stephan Ruhe, Kevin Schäfer, and Steffen Nicolai*
315	**Maximum Loadability of Meshed Networks: A Sequential Convex Optimization Approach** *Danman Wu, Libin Yang, Wei Wei, Laijun Chen, Mohamed Lotfi, and João P. S. Catalão*
81	***Adaptive Protection of Distribution Systems with DERs Considering Consumer and Generation Profiles*** *Candra Agus Dwi Wahyudi, Nanang Hariyanto, and Reza Ganjavi*
100	**Minimum Required Inertia for a Fully Renewable AC Interconnected System** *Moisés García-Ruíz, Gabriel J. Cantos-Alcántara, José L. Martínez-Ramos, and Alejandro Marano-Marcolini*

Monday Session 8:
Electric Mobility

Time: 13:30-15:00
Location: B012
Chair: Ozan Erdinc

3	**Flywheel-based Micro Energy Grid for Reliable Emergency Back-up Power for Nuclear Power Plant** *Muhammad R. Abdussami and Hossam A. Gabbar*
302	**Operational Integration of Electric Bus Fleets, Charging Process Analysis, and Field Test Results** *Andreas F. Raab, Peter Teske, Enrico Lauth, Jan F. Heinekamp, Kai Strunz, and Dietmar Gohlich*
60	**A stochastic approximation method for price based assignment of Electric Vehicles to Charging Stations** *Georgios Tsaousoglou, Konstantinos Steriotis, and Emmanouel Varvarigos*
77	**Agent-based Modelling to Evaluate the Impact of Plug-in Electric Vehicles on Distribution Systems** *Michele Falco, Francesco Arrigo, Andrea Mazza, Ettore Bompard, and Gianfranco Chicco*
186	**Effect of Distributed Generation Based Campus Model Combined with Electric Vehicle Charging Stations on the Distribution Network** *Mehmet Tan Turan, Yavuz Ates, Ozan Erdinc, and Erdin Gokalp*
174	**An Interoperability Platform for Electric Vehicle Charging Service Considering Dual System Operator and Electric Vehicle Owner Sides** *Hilmi Cihan Güldorum, Ayşe Kübra Erenoğlu, İbrahim Şengör, Ozan Erdinç, and João P. S. Catalão*

Monday Session 9: Dynamics and Control I

Time: 15:30-17:00
Location: B001
Chair: Edris Pouresmaeil

107	**Voltage Coordination Control for Distributed PVs Clusters with Incomplete Measurements** *Hai Lu, Junnan Hao, Yuanyuan Chai, Xiaoyun Chen, Li Guo, and Fei Wang*
418	**Control Scheme for Phase Balancing of Low-Voltage Distribution Grids** *Lenos Hadjidemetriou, Anastasis Charalambous, and Elias Kyriakides*
185	**Advanced Autonomous Voltage-Control Method using Sensor Data in a Distribution Power System** *Naoyuki Takahashi*
151	**A Novel Unknown Input Observer-Based Optimal Load Frequency Control for Smart Power Systems Considering EV and DR Participation** *Hassan Haes Alhelou, M.E.H. Golshan, and Pierluigi Siano*
220	**Optimal Sizing and Tuning of Storage Capacity for Fast Frequency Control in Low-Inertia Systems** *Uros Markovic, Verena Häberle, Dmitry Shchetinin, Gabriela Hug, Duncan Callaway,* and *Evangelos Vrettos*
283	**Enhancing Short-Circuit Level and Dynamic Reactive Power Exchange in GB Transmission Networks under Low Inertia Scenarios** *Dimitrios Tzelepis, Qiteng Hong, Campbell Booth, Panagiotis N. Papadopoulos, Jayaraman Ramachandran, and Guangya Yang*

Monday Session 10: Prosumers and P2P Trading

Time: 15:30-17:00
Location: Sala de Atos
Chair: Tarek Alskaif

105	**Coordination for Prosumers' Electricity Trading Agents via Distributed Optimization** *Irena Dukovska, Nikolaos G. Paterakis, and Han J.G. Slootweg*
277	**A Power P2P Market Framework to Boost Renewable Energy Exchanges in Local Microgrids** *Pablo Baez-Gonzalez, Enrique Rodriguez-Diaz, Miguel A. Ridao Carlini, and Carlos Bordons*
281	**Reducing Neighborhood Peak Loads with implicit Peer-to-Peer energy trading under Subscribed Capacity tariffs** *Ola Mathias Almenning, Sigurd Bjarghov, and Hossein Farahmand*
325	**Optimal Prosumer Scheduling in Transactive Energy Networks Based on Energy Value Signals** *Mohamed Lotfi, Cláudio Monteiro, Mohammad S. Javadi, Miadreza Shafie-khah, and João P.S. Catalão*
332	**A Blockchain-Based Peer-to-Peer Trading Scheme Coupling Energy and Carbon Markets** *Weiqi Hua and Hongjian Sun*
396	**Impact of regional redispatching cooperation and involvement of distributed electricity prosumers** *Milan Vukasovic, Iva Mihajlovic Vlaisavljevic, Dusan Vlaisavljevic, Zoran Vujasinovic, and Viorel Marcu*

Monday Session 11:
Power System Stability and Protection II

Time: 15:30-17:00
Location: B002
Chair: Shamsodin Taheri

97	**Protection and Dynamic Analysis during Bottom-Up Restoration Process in MV/LV Microgrids** *Gourab Banerjee, Alexander Klingmann, Maria Valov, Dario Lafferte, Christian Hachmann, and Martin Braun*
103	**Dynamic Stability Assessment for Integrated Transmission-Distribution System Considering Distributed Energy Resources** *Xinyun Lu, Jianhui Wang, Zhengshuo Li, and Meng Yue*
128	**Symmetrical Components Detection With FFDSOGI-PLL Under Distorted Grid Conditions** *Benjamin Hoepfner and Ralf Vick*
189	**Voltage Regulation in Low-Voltage Distribution Grids with Reactive Power Control by Power Conditioning Subsystem Coordination** *Kentaro Fukushima, Takuya Nayuki, Hiroyuki Hatta, and Hiromu Kobayashi*
192	**Grid-Forming Inverters Sizing in Islanded Power Systems – a stability perspective** *José Gouveia, Carlos Moreira, and João Peças Lopes*
39	**Microgrid optimal energy and reserve scheduling considering frequency constraints** *Maryam Mohiti, Mohammadreza Mazidi, Amjad Anvari Moghaddam and Josep M. Guerrero*

Monday Session 12:
Power System Operation I

Time: 15:30-17:00
Location: B012
Chair: Jamshid Aghaei

111	**Impact of Network Parameters Uncertainties on Distribution Grid Power Flow** *Marco Pau, Ferdinanda Ponci, and Antonello Monti*
34	**A Study of the Impact of Solar Self-Generation via Optimal Power Flow** *Katia de Almeida and Yuri Berwanger*
351	**Implementation of Consensus-ADMM Approach for Fast DC-OPF Studies** *Mohammad Javadi, Ali Esmaeel Nezhad, Matthew Gough, Mohamed Lotfi, and João P.S. Catalão*
55	**What time-period aggregation method works best for power system operation models with renewables and storage?** *Sonja Wogrin, Diego Tejada-Arango, Salvador Pineda, and Juan Miguel Morales*
295	**On the development of a framework for the advanced monitoring of LV grids** *Konstantinos Kotsalos, Luís Marques, Gil Sampaio, Jorge Pereira, Clara Gouveia, Henrique Teixeira, Renato Fernandes, and Filipe Campos*
254	**Enhancing Distribution Network Indices Using Electric Spring under Renewable Generation Permission** Mohammadali Norouzi, Jamshid Aghaei, and Sasan Pirouzi

Monday Session 13:
Power System Planning I

Time: 15:30-17:00
Location: B016
Chair: Ozan Erdinc

6	**Analysis of Future Loading Scenarios in a Norwegian LV Network** *Merkebu Z. Degefa, Hanne Sæle, and Christian Andresen*
14	**Long Term analysis of submarine transmission grid extensions between the Greek islands and the mainland** *Eleni Zafeiratou and Catalina Spataru*
52	**Analysis of Smart Technical Measures Impacts on DER and EV Hosting Capacity Increase in LV and MV Grids in the Czech Republic in Terms of European Project InterFlex** *Stanislav Hes, Jan Kula, and Jan Svec*
194	**Increasing DG Integration Level by Network Configuration Subset Analysis** *Khachatur Torchyan and Jürgen Sachau*
402	**Localization of Energy Sources and Distribution System Sizing in a Low Voltage Isolated Microgrid** *Pedro Acevedo-Rueda, Cristian Camacho-Parra, German Osma-Pinto, and Rusber Rodríguez-Velásquez*
113	**A Compressive Sensing Approach for Fault Location in Distribution Grid Branches** *Daniele Carta, Paolo Attilio Pegoraro, Sara Sulis, Marco Pau, Ferdinanda Ponci, and Antonello Monti*

Tuesday Session 1:
Communication and Data Analytics II

Time: 11:00-12:30
Location: Auditorium
Chair: Miadreza Shafie-khah

145	**Classification of Buildings Energetic Performance Using Artificial Immune Algorithms** *Jose Pedro Alves and Jose Nuno Fidalgo*
307	**System-wide Traceability of Commands and Data Exchange in Smart Grids** *Christoph Ruland and Jochen Sassmannshausen*
179	**Development, implementation and evaluation of a wireless sensor network and a web-based platform for the monitoring and management of a microgrid with renewable energy sources** *Eduardo López, Jânio Monteiro, Pablo Carrasco, Jaime Sáenz, Nelson Pinto, and Gonzalo Blázquez*
57	**Machine Learning Algorithms in Forecasting of Photovoltaic Power Generation** *Di Su, Efstratios Batzelis, and Bikash Pal*
289	**Using Viable Systems Model and Big Data for Community Energy Systems** *Kevin Joshi and Krithi Ramamritham*
164	**Visualising high-resolution energy maps through the exploratory analysis of energy performance certificates** *Tania Cerquitelli, Evelina Di Corso, Stefano Proto, Alfonso Capozzoli, Daniele Mazzarelli, Andrea Nasso, Elena Baralis, Marco Mellia, Silvia Casagrande, and Martina Tamburini*

PARALLEL SESSIONS

Tuesday Session 2: Demand Response II

Time: 11:00-12:30
Location: Sala de Atos
Chair: Mohammad Javadi

394	**Optimal Day-Ahead Scheduling of the Renewable Based Energy Hubs Considering Demand Side Energy Management** *Mohammadreza Daneshvar, Behnam Mohammadi-ivatloo, Somayeh Asadi, Kazem Zare, and Amjad Anvari-Moghaddam*
173	**Development of a Smart Thermostat Controller for Direct Load Control Based Demand Response Applications** *Barış Yener, Ayşe Kübra Erenoğlu, İbrahim Şengör, Ozan Erdinç, Akın Taşcıkaraoğlu, and João P.S. Catalão*
299	**Consensus-Based Coordination of Time-Shiftable Flexible Demand** *Jing Li, Yujian Ye, Dimitrios Papadaskalopoulos, and Goran Strbac*
304	**Distribution Network Expansion Planning Considering the Flexibility Value for Distribution System Operator** *Ricardo Faia, Bruno Canizes, Pedro Faria, and Zita Vale*
158	**PV Self-Consumption Enhancement with Optimal Residential Thermal Energy Management** *Ali Baniasadi, Daryoush Habibi, Waleed Al-Saedi, and Mohammad A.S. Masoum*
291	**A Comparison of MILP and Metaheuristic Approaches for Implementation of a Home Energy Management System under Dynamic Tariffs** *Vahid Rasouli, Ivo Gonçalves, Carlos Henggeler Antunes, and Álvaro Gomes*

Tuesday Session 3: Power System Operation II

Time: 11:00-12:30
Location: B001
Chair: Tarek Alskaif

67	**Multi-Objective and Multi-Criteria Optimization of Microgrids for Nearly Zero-Energy Buildings** *Simone Galisai, Emilio Ghiani, and Fabrizio Pilo*
87	**Information Gap Decision Theory-Based Approach for Modeling Operation Problem of a Grid-Connected Micro-Grid With Uncertainties** *Salah Bahramara, Ramyar Mafakheri, Pouria Sheikhahmadi, Mohamed Lotfi, and João P. S. Catalão*
89	**Simultaneous Operation Scheduling of Generators and Battery Energy Storage System based on Actual and Forecasted Photovoltaic Power Outputs** *Kohei Takahashi, Taisuke Masuta, Rajitha Udawalpola, Kithsiri M. Liyanage, and Hideaki Ohtake*
267	**Optimal Scheduling Method of Community Microgrid with Customer-owned Distributed Energy Storage System** *Hyung-Chul Jo, Jong-Yul Kim, Gilsung Byeon, and Seul-Ki Kim*
95	**Optimal Operation of Nearly Zero Energy Buildings using Mixed Integer Linear Programming** *Sasan Rafii-Tabrizi, Jean-Regis Hadji-Minaglou, Frank Scholzen, and Florin Capitanescu*
93	**Decentralized Optimal Power Flow in Distribution Networks Using Blockchain** *Tarek AlSkaif and Gijs van Leeuwen*

Tuesday Session 4: Power System Planning II

Time: 11:00-12:30
Location: B002
Chair: Jamshid Aghaei

216	**Optimal battery systems designs for Distribution Grids: What size and location to invest in?** *Andres Antonio Seijas, Pedro Crespo del Granado, Hossein Farahmand, and Jose Rueda*
374	**Study on the Addition of Solar Generating and Energy Storage Units to a Power Distribution System** *Tatiane S. Costa, Dante I. Narváez, Karen B. Melo, Michelle Kitayama da Silva, and Marcelo G. Villalva*
230	**Hybrid Power Supply Assessment in Long Term Basis Considering Complementarity of Wind and Solar Resources** *Arilton Coutinho, Sefania Gomes Relva, Dorel Soares Ramos, and Miguel Edgar Morales Udaeta*
238	**What is the cost of disregarding market feedback in transmission expansion planning?** *Isaac-Camilo Gonzalez-Romero, Sonja Wogrin, and Tomás Gómez*
284	**Robust Transmission Network Expansion Planning Problem Considering Storage Units** *Álvaro García-Cerezo, Luis Baringo, and Raquel García-Bertrand*
255	**Effect of Smart Multiple Hub Planning on Distribution Networks Integrated Expansion** *Hosein Ghasemi, Jamshid Aghaei, G. B. Gharehpetian, and Homayoun Haeri*

Tuesday Session 5: Energy Storage I

Time: 13:30-15:00
Location: B001
Chair: Sonja Wogrin

63	**Feasibility study of the use of a hydrogen-based storage system as an alternative to battery storage of a standalone photovoltaic installation to supply a house's electric demand** *Salvador Delgado Fernández, Francisco Javier Pino Lucena, and Manuel Felipe Rosa Iglesias*
214	**Model Predictive Control for the Energy Management of A Hybrid PV/Battery /Fuel Cell Power Plant** *Adriana Aguilera Gonzalez, Matias Bottarini Ionel Vechiu,Luc Gautier, Ludovic Ollivier, and Loïc Carre*
223	**Power Supply System with Power Plant on Solid Oxide Fuel Cells** *Elena Sosnina, Andrey Shalukho, Ivan Lipuzhin, Leonid Veselov, and Anton Shashkin*
225	**Financial storage rights for hydroelectricity** *Leonardo Martins and Richard Hochstetler*
123	**Dynamic Operation of a Storage Power Plant (SPP) with Voltage Angle Control as Ancillary Service** *Paul Gerdun, Nayeemuddin Ahmed, Vinaykumar Vernekar, Martin Topfer, and Harald Weber*
268	**Optimal microgrid operation considering battery degradation using stochastic dual dynamic programming** *Per Aaslid, Michael M Belsnes, and Olav B Fosso*

PARALLEL SESSIONS

Tuesday Session 6:
Modeling and Simulation II

Time: 13:30-15:00
Location: Sala de Atos
Chair: Vitor Monteiro

166	***Comparative Study of Sky Diffuse Irradiance Models Applied to Photovoltaic Systems*** *Michelle Kitayama da Silva, Karen Barbosa de Melo, Tatiane Silva Costa, Dante Inga Narvez, Daniel de Bastos Mesquita, and Marcelo Gradella Villalva*
191	**Hierarchical Control Structure for Optimising Building Microgrid Self-consumption** *Daniela Yassuda Yamashita, Ionel Vechiu, and Jean Paul Gaubert*
231	**Experimental validation of an equivalent dynamic model for active distribution networks** *Nuno Fulgêncio, Justino Rodrigues, and Carlos Moreira*
258	**Modeling and Design of Electrical Power Subsystem for CubeSats** *Samrat Acharya, Fatama Alshehhi, Alexandros Tsoupos, Omair Khan, Mohamed Elmoursi, Vinod Khadkikar, Hatem Zeineldin, and Mohamed Al Hosani*
355	**Impedance modelling for European style Distribution Feeder** *Arpan Koirala, Reinhilde D'hulst, and Dirk Van Hertem*
341	**Home Energy Management for a AC/DC Microgrid Using Model Predictive Control** *Vlademir A. Freire, Lúcia Valéria R. de Arruda, Carlos Bordons, and Guillermo Teno*

Tuesday Session 7:
Electricity Markets II

Time: 13:30-15:00
Location: B002
Chair: Agustin Sanchez de la Nieta

393	**A Transactive Energy Management Framework for Regional Network of Microgrids** *Mohammadreza Daneshvar, Behnam Mohammadi-ivatloo, Somayeh Asadi, Mehdi Abapour, and Amjad Anvari-Moghaddam*
269	**Offering Strategy of a Price-Maker Virtual Power Plant** *Marta Freire-Lizcano, Luis Baringo, and Raquel García-Bertrand*
274	**Assessing the Impacts of Demand-Side Flexibility on the Performance of the Europe-Wide Integrated Day- Ahead Electricity Market** *Shaghayegh Zalzar and Ettore Francesco Bompard*
403	**Economic Load Dispatch Problem using Particle Swarm Optimization Technique Considering Wind Power Penetration** *Rana Al-Nahhal, Adel F. Naiem, and Yasser G. Hegazy*
364	**TSO-DSO Coordination in Decentralized Ancillary Services Markets** *Nikolaos Savvopoulos, Theodoros Konstantinou, and Nikos Hatziargyriou*
373	**A decision-making framework encouraging local energy exchanges among smart buildings** *Jose L. Crespo-Vazquez, Agustin A. Sanchez de la Nieta, and Madeleine Gibescu*

Tuesday Session 8: Dynamics and Control II

Time: 13:30-15:00
Location: B012
Chair: Jose Luis Martinez Ramos

222	**Robust PI control of a grid-connected voltage source inverter for virtual inertia response in weak grid conditions** *Clint Ally and Erik de Jong*
239	**Two-stage PV Converter Power Production Management During Grid Disturbances** *Ivana Isakov and Ivan Todorović*
241	**Closed-Loop Load Model Identification Using Small Disturbance Data** *Shangyuan Li, Deqiang Gan, and Deqiang Gan*
212	**Microgrid Frequency & Voltage Adjustment Applying Virtual Synchronous Generator** *Bahram Pournazarian, Edris Pouresmaeil, Meysam Saeedian, Matti Lehtonen, Ricky Chan, and Shamsodin Taheri*
298	**A Model Predictive Control Approach for Energy Management in Micro-Grid Systems** *Abdellatif Elmouatamid, Radouane Ouladsine, Mohamed Bakhouya, Najib El kamoun, Khalid Zine-Dine, and Mohammed Khaidar*
336	**Effect of the Integration of Disturbances Prediction in Energy Management Systems for Microgrids** *Carlos Bordons, Guillermo Teno, Juan J. Marquez, and Miguel A. Ridao*

Wednesday Session 1: Economic Analysis

Time: 11:00-12:30
Location: Auditorium
Chair: Nikos Paterakis

229	**Life Cycle Assessment of Locally Manufactured Small Wind Turbines and Pico-Hydro Plants** *Aikaterini Troullaki, Kostas Latoufis, Pedro Marques, Fausto Freire, and Nikos Hatziargyriou*
127	**Economic Analysis for Solar Energy Integration in a Microbrewery** *Alan Pino, Francisco Javier Pino Lucena, and José Guerra Macho*
24	**Economic Viability of Smart Charging EVs in the Dutch Ancillary Service Markets** *Sjoerd Doumen and Nikolaos G. Paterakis*
66	**Shared Self-Consumption Economic Analysis for a Residential Energy Community** *Roberto Alvaro-Hermana, Julia Merino, Jesús Fraile-Ardanuy, Sandra Castaño-Solis, and David Jiménez*
90	**Assessing the Economics of Residential Electricity Tariff Selection** *Frederik vom Scheidt, Philipp Staudt, and Christof Weinhardt*
371	**Combining PVT Generation and Air Conditioning: A Cost Analysis of Surplus Heat Utilization** *Armin Golla, Philipp Staudt, and Christof Weinhardt*

Wednesday Session 2:
Power System Operation III

Time: 11:00-12:30
Location: Sala de Atos
Chair: Mohammad Javadi

276	**Optimal Energy Management and Scheduling of a Microgrid in Grid-Connected and Islanded Modes** *L. Zacharia, L. Tziovani, M. Savva, L. Hadjidemetriou , E. Kyriakides, A. D. Bintoudi, A. Tsolakis, D. Tzovaras, J. L. Martinez-Ramos, A. Marano, B. Azzopardi, N. Martensen, M. Khiat, A. Onen, and S. Al-Agtash*
292	**Cost Allocation of Distribution Networks in the Distributed Energy Resources Era** *Tiago Soares, Miguel Cruz, and Manuel Matos*
176	**Using Smart Meters for Distribution Grid State Estimation** *Benjamin Matthiss, Jonathan Erb, and Jann Binder*
190	**Research on the Switching Process and Unanticipated Transient Event for Repurposing a AC Cable with DC-link in Distribution Network** *Tiago Elias Castelo de Oliveira, Frank Van Oberbeeke, Vladimir Cúk, and Erik de Jong*
15	**Interval Optimization for Robust Economic Dispatch in Active Distribution Networks Considering Uncertainty** *Cody Rooks, Xiao Kou, and Fangxing Li*
138	**Comparison of Swarm Optimization Methods for MPPT in Partially Shaded Photovoltaic Systems** *Hugo Soeiro Moreira, João Lucas de S. Silva, Guilherme C. S. Prym, Elson Yoiti Sako, Marcos Vinicios Gomes dos Reis, and Marcelo Gradella Villalva*

Wednesday Session 3:
Modeling and Simulation III

Time: 11:00-12:30
Location: B001
Chair: Gerardo Osório

65	**Day-ahead Scheduling in a Local Electricity Market** *Agustin A. Sanchez de la Nieta and Madeleine Gibescu*
119	**Modelling electrical interconnections for Rhodes island power system** *Eleni Zafeiratou and Catalina Spataru*
346	**Classification of Power Quality Disturbances using Hilbert Huang Transform and a Multilayer Perceptron Neural Network Model** *Miguel Angel Rodriguez, John Felipe Sotomonte, Jenny Cifuentes, and Maximiliano Bueno-Lopez*
79	**Distribution system state estimation based on the OpenDSS's detailed 4-wire model** *Paulo M. De Oliveira-De Jesus, David F. Celeita, and Gustavo A. Ramos*
370	**Performance analysis of upgraded university building of FERIT Osijek microgrid achieving nearly zero energy standard based on real measurement data** *Heidi Marguš, Matej Žnidarec, Damir Šljivac, and Marinko Stojkov*
416	**Putting Tensors Back in Power Systems Analysis** *Alejandro Garces, Juan Jose Mora, and Mario Useche*

Wednesday Session 4:
Power Electronics I

Time: 11:00-12:30
Location: B002
Chair: Edris Pouresmaeil

130	**Modular Architecture with Power Optimizers for Photovoltaic Systems** *Joao Lucas de Souza Silva, Hugo Soeiro Moreira, Daniel Bastos de Mesquita, Michelle Melo Cavalcante, and Marcelo Gradella Villalva*
136	**A Proposed Bidirectional Three-Level dc-dc Power Converter for Applications in Smart Grids: An Experimental Validation** *Vítor Monteiro, Tiago J. C. Sousa, M. J. Sepúlveda, Carlos Couto, António Lima, and João L. Afonso*
135	**Sliding Mode Control of an Innovative Single-Switch Three-Level Active Rectifier** *Vítor Monteiro, Tiago J. C. Sousa, Júlio S. Martins, M. J. Sepúlveda, Carlos Couto, and Joao L. Afonso*
134	**A Novel Multilevel Converter for On-Grid Interface of Renewable Energy Sources in Smart Grids** *Vítor Monteiro, Tiago J. C. Sousa, M. J. Sepúlveda, Carlos Couto, Júlio S. Martins, and João L. Afonso*
213	**Control of Grid-Tied Converters for Integration of Renewable Energy Sources into the Weak Grids** *Amir Sepehr, Edris Pouresmaeil, Meysam Saeedian, Mikko Routimo, Radu Godina, and Arzhang Yousefi-Talouki*

Wednesday Session 5:
Power Electronics II

Time: 13:30-15:00
Location: B001
Chair: Vitor Monteiro

400	**Virtual Synchronous Machine Control for Grid Transmission Compliance Studies** *Seksak Pholboon, Mark Sumner, and Richard Ierna*
149	**Asymmetry Between Main Channels of a Multilevel Buck Converter - Operation in Steady State** *Lilla Litvani and Janos Hamar*
76	**Development of a Proposed Single-Phase Series Active Power Filter without External Power Sources** *João L. Torre, Luis A. M. Barros, João L. Afonso, and J. G. Pinto*
204	**Reliability Analysis of Power Electronic-based Power Systems** *Martin Vang Kjaer, Huai Wang, Yongheng Yang, and Frede Blaabjerg*
357	**Adaptive Converter for Light Rail Traction Systems** *Paulo Mendonça and Duarte M. Sousa*
68	**Comparative Analysis of Power Electronics Topologies to Interface dc Homes with the Electrical ac Power Grid** *Tiago J. C. Sousa, Vítor Monteiro, Julio S. Martins, M. J. Sepulveda, António Lima, and João L. Afonso*

Wednesday Session 6: Communication and Data Analytics III

Time: 13:30-15:00
Location: Sala de Atos
Chair: Nikos Paterakis

347	**Measurement Data Acquisition System in Laboratory for Renewable Energy Sources** *Dario Došen, Matej Žnidarec, and Damir Šljivac*
379	**Machine Learning-based Service Restoration Scheme for Smart Distribution Systems with DGs and High Priority Loads** *I. Kalysh, M. Kenzhina, N. Kaiyrbekov,H.S.V.S. Kumar Nunna, Aresh Dadlani, and S. Doolla*
381	**Adaptive Coordination Mechanism of Overcurrent Relays using Evolutionary Optimization Algorithms for Distribution Systems with DGs** *D. Orazgaliyev, A. Tleubayev, B. Zholdaskhan, H.S.V.S Kumar Nunna, A. Dadlani, and S. Doolla*
401	**Q-Learning based Protection Scheme for Microgrid using Multi-Agent System** *B. Satuyeva, B. Sultankulov, H.S.V.S. Kumar Nunna, A. Kalakova, and S. Doolla*
363	**Co-Simulation Architecture: A Tool to Enable the State Estimator Application in Smart Grid Environment** *Luis F. Ugarte, Fransk A. Puma, and Madson C. de Almeida*
94	**Interlinking Heterogeneous Data for Smart Energy Systems** *Fabrizio Orlandi, Alan Meehan, Murhaf Hossari, Soumyabrata Dev, Declan O'Sullivan, and Tarek AlSkaif*

Wednesday Session 7: Energy Storage II

Time: 13:30-15:00
Location: B002
Chair: Ozan Erdinc

278	**Impacts of cell topology, parameter distributions and current profile on the usable power and energy of lithium-ion batteries** *Alexander Fill and Kai Peter Birke*
297	**Chalmers Campus as a Testbed for Intelligent Grids and Local Energy Systems** *Kyriaki Antoniadou-Plytaria, Ankur Srivastava, Mohammad Ali Fotouhi Ghazvini, David Steen, Le Anh Tuan, and Ola Carlson*
354	**Stochastic Unit Commitment of a Distribution Network with Non-ideal Energy Storage** *Alvaro Gonzalez-Castellanos, David Pozo, and Aldo Bischi*
378	**Unballanced Performance of Parallel Connected Large Format Lithium Ion Batteries for Electric Vehicle Application** *Elham Hosseinzadeh, Maria Ximena Odio, James Marco, and Paul Jennings*
417	**Analysis of Battery Energy Storage System Integration in a Combined Cycle Power Plant** *Francois Kremer, Maxime Buquet, Hervé Biellmann, Stéphane Rael, Matthieu Urbain, and Pierre Beaufrere*

Wednesday Session 8: Dynamics and Control III

Time: 13:30-15:00
Location: B012
Chair: Gabriel Pinto

35	**Local coordinated control of heat pumps and PV systems in residential distribution grids** *Panagiotis Damianos Cheilas, Rakesh Sinha, and Jayakrishnan Radhakrishna Pillai*
172	**Aggregate Modeling of Distribution System with Multiple Smart Inverters** *Hiroshi Kikusato, Taha Selim Ustun, Jun Hashimoto, and Kenji Otani*
207	**Development of Control System for New Medium Voltage Power Flow Control Device** *Elena Sosnina, Alexandr Chivenkov, Valery Sevastyanov, Andrey Shalukho, and Ivan Lipuzhin*
399	**Control of Energy Storage and Photovoltaic Systems using Model Predictive Control** *Mario Useche Arteaga, Alejandro Garces Ruiz, and Marco Rivera*
18	**Primary and Secondary Control in Lossy Inverter-Based Microgrids** *Jonathan Hermann, Bernhard Hammer, and Ulrich Konigorski*

Panel Sessions on EU Projects

Panel sessions for three EU Horizon 2020 (H2020) Projects will take place during the second day of the conference (in parallel):

INTERPLAN

FEEdBACk

EU-SysFlex

INTERPLAN

Tuesday 10 September @ 15:30

Location: B001

INTERPLAN is a project that aims to provide an **INTEgrated opeRation PLANning** tool towards the pan-European network, to support the EU in reaching the expected low-carbon targets, while maintaining network security. INTERPLAN will be holding a technical workshop:

"Innovative Network Operation Planning Tool for the TSO and DSO"

Abstract:

To deal with the rising challenges in operating the European power networks as a result of the increasing share of renewable energy resource, as well as penetration of emerging technologies such as storage and demand response, the H2020 project INTERPLAN is developing a tool to support TSOs and DSOs in the operation planning of the pan-European network.

In order to realize this, the future EU grid scenarios, the potential barriers in integrating these emerging technologies, new methodologies for planning the operation of such complex networks, as well as requirements and show cases for validating and proving the applicability of the tool are being developed.

EU PROJECTS

Session Chair

Helfried Brunner
(AIT)

External Experts

Erik de Jong
(DNV GL) Advisory Board

Alma Solar
(CEA-Alginet)

Alberto Borghetti
(University of Bologna)

Pierluigi Siano
(University of Salerno)

Agenda:

Project Introduction
- *Helfried Brunner (AIT)*

Future European Power Networks
- *Ata Khavari (DERlab)*

European Network Codes and Regulatory Framework
- *Christina Papadimitriou (FOSS)*

Power Network Operation Planning Challenges in Future:

- **TSO/DSO Perspectives**:
  - *Alma Solar (CEA-Alginet)*
- **INTERPLAN Perspective and Proposed Solution:**
  - **Network Integrated Operation Planning Tool and the Showcases** *–Marialaura Di Somma (ENEA)*
  - **Network Clustering and Equivalenting Methodology** *– Adolfo Anta (AIT)*

Discussion and Outlook

EU PROJECTS

FEEdBACk

Tuesday 10 September @ 15:30

Location: B002

"Fostering Energy Efficiency and BehAvioural Change through ICT – The FEEdBACk Project"

Abstract:

The core objective of FEEdBACk is to promote, stimulate and deliver energy efficiency through behavioral change. To encourage a more efficient energy utilization and a more responsible consumer behavior, the gamification platform will be used to motivate behavioral change by fostering awareness and consumer engagement through a pervasive application that analyses context, sends personalized messages and manages gamified peer competition and feedback.

The gamification platform will be embedded in a broader ICT-based platform for energy efficiency with an interactive energy management system, which will aid interested stakeholders optimizing "when and at which rate" energy is to be buffered and consumed, with several advantages, such as reducing peak load, maximizing local renewable energy consumption and delivering a more efficient use of the resources available in individual buildings or blocks of buildings. This system will also interact with an automation manager and a users' behavior predictor application.

EU PROJECTS

Panel Speakers

Session Chair:
Nilufar Neyestani
(INESC TEC)

Miguel Cruz
(DEXMA)
"Data Analytics to Foster Energy Efficiency"

Marina Dorokhova
(EPFL)
"Occupancy Forecasting and Load Disaggregation: An Energy Efficiency Perspective"

António Coelho
(INESC TEC)
"Gamification to Promote Behavioral Change"

Rick Fransman
(TU Delft)
"On Behavioral Change and Comfort Perception in Energy Efficiency Applications"

EU PROJECTS

EU-SysFlex

Tuesday 10 September @ 15:30

Location: Sala de Atos

"Pan-European system with an efficient coordinated use of flexibilities for the integration of a large share of RES - EU-SysFlex"

Abstract:

The EU-SysFlex project will test a high level of integration of renewable energy sources in the pan-European electricity system. The aim of the EU-SysFlex project is to identify issues and solutions associated with integrating large-scale renewable energy and create a plan to provide practical assistance to power system operators across Europe. This should ultimately lead to identification of a long-term roadmap to facilitate the large-scale integration of renewable energy across Europe. The EU-SysFlex project activities will through innovative processes bring new solutions to the market: from the development of new approaches for system operation with high renewables, to market design and regulatory requirements, as well as integration of new system services and data management plans to cover the pan-European market.

EU PROJECTS

Panel Speakers

Session Chair:
John Lowry
Project Director
EirGrid Transmission System Operator, Ireland

Hassan Qazi
Senior Engineer
EirGrid Transmission System Operator, Ireland

Kalle Kukk
Senior Advisor
Elering –Transmission System Operator,Estonia

Miguel Jorge Marques
Project Manager
EDP –R&D Centre Energy Technologies, Portugal

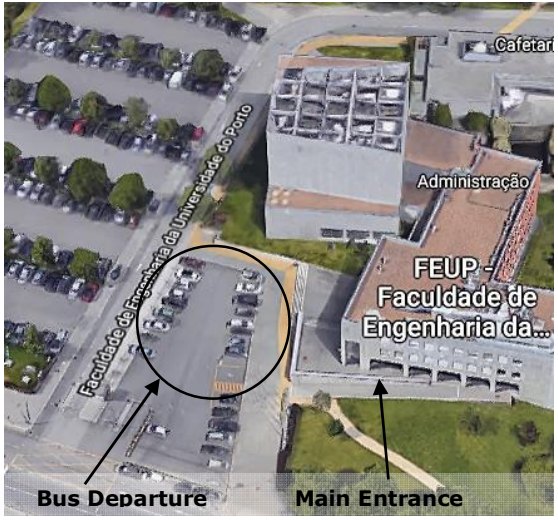
Maik Staudt
Project Engineer
Mitnetz-Strom, Germany

EU PROJECTS

Welcome Reception

The reception will be held at the historical Porto Cálem wine cellars on the evening of the first day. The reception will start with a guided tour, demonstrating the process of making and aging the world-renowned Port Wine: from the vineyard to the glass. The tour takes around 45 minutes and includes the Cálem museum and cellars. Afterwards, all participants are invited to a Port Wine tasting session included.

Buses will depart from FEUP starting 16:30. The last bus (for participants attending the evening sessions) will depart at 17:00. The buses will be available to return to FEUP starting 19:00.



Gala Dinner

The gala dinner and best paper awards ceremony will take place aboard a three-hour cruise of the Douro River on the second day of the conference.

Buses will be available to transport the attendees to the docks, departing from FEUP at 18:30. **Boarding will be** at the Vila Nova de Gaia Pier (Cais de Gaia) **at 19:00**. The pier's location is detailed below for participants who wish to go there directly. Please bear in mind that the embarking time is strict so make sure to arrive on time in order not to miss the cruise.

The cruise is scheduled to end around 22:00, returning to the same point. Buses will be available to return back to FEUP at 22:30.

Departure: Vila Nova de Gaia Pier (Cais de Gaia)

Coordinates: 41°08'14.4"N 8°36'55.9"W

See you next year in Istanbul!

SEST 2020

Every year, we strive to get bigger and better:

SEST 2018 (Seville, Spain):

Technically sponsorship by

IEEE, IEEE IES

110 accepted papers

3.7 rev/paper

64% acceptance rate

SEST 2019 (Porto, Portugal):

Technically sponsored by

IEEE, IEEE PES, IEEE IES, and IET

170 accepted papers

4.2 rev/paper

58% acceptance rate

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SEST 2020 Chairs:

Ozan Erdinc
General Chair

João P.S. Catalão
General Co-Chair

SEST 2020 Keynote Speakers:

Fangxing "Fran" Li

Josep M. Guerrero

Manuel Matos

Mohammad Shahidehpour

Saifur Rahman

Wei-Jen Lee

With technical co-sponsorship by IEEE, IEEE PES, IEEE IES and IEEE IAS, the top 20% of accepted and presented papers in SEST 2020 will be eligible for possible publication in the:

IEEE Transactions on Industry Applications (TIA)
or
IEEE Industry Applications Magazine

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