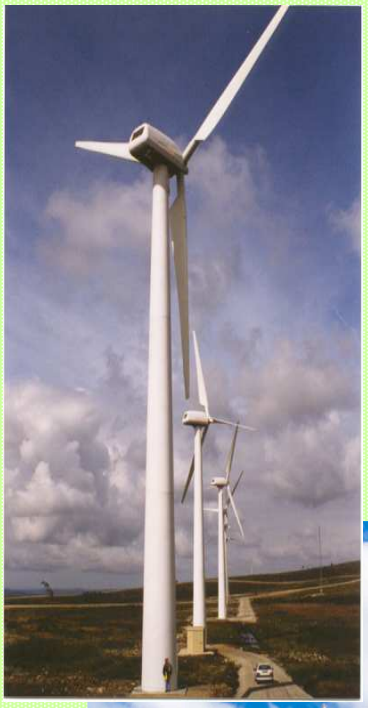
EA4EPQ

European Association for the Development of Renewable Energy, Environment and Power Quality

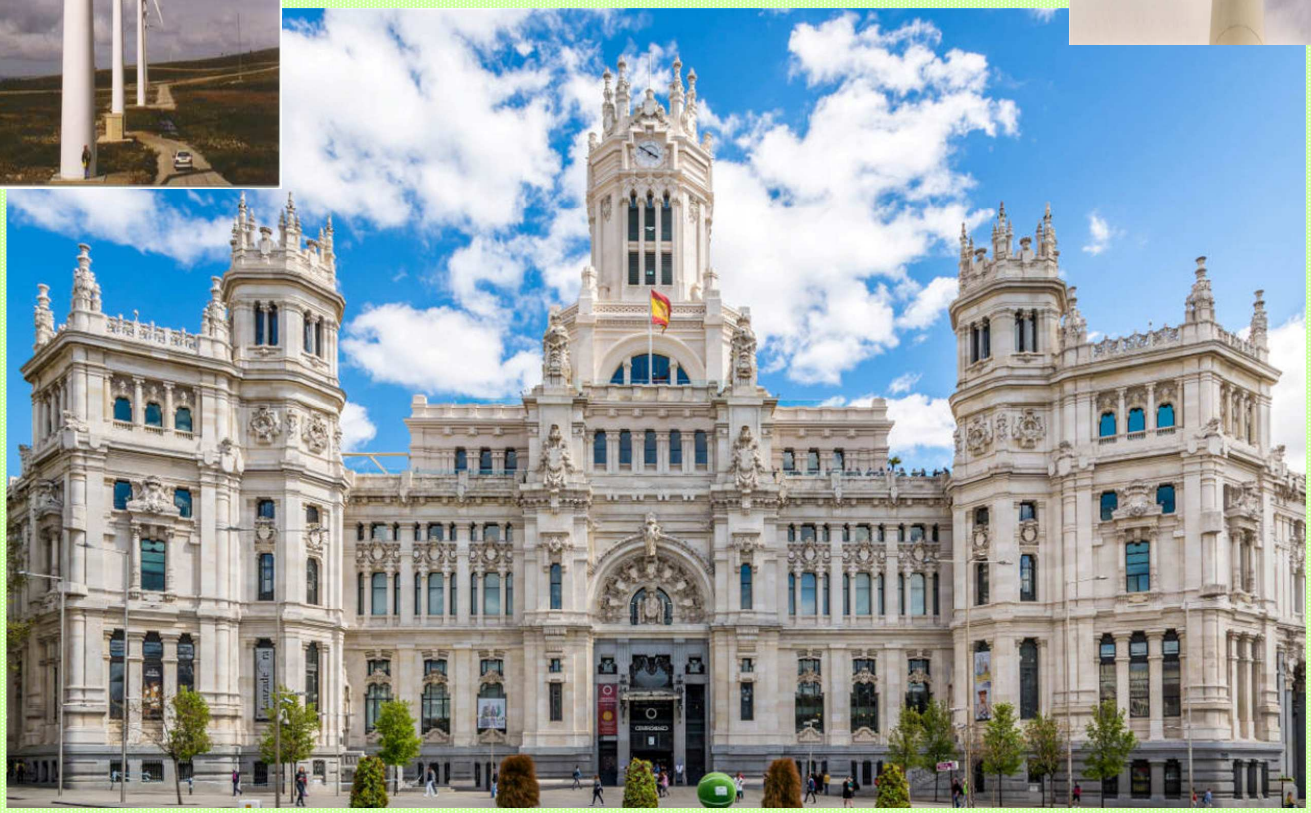
ICREPQ'23

INTERNATIONAL CONFERENCE ON RENEWABLE ENERGIES AND POWER QUALITY



Madrid, 24-26 May, 2022

PROGRAM OF ACTIVITIES



21th INTERNATIONAL CONFERENCE ON RENEWABLE ENERGY AND POWER QUALITY

(ICREPQ'23)

PROGRAM

INTERNATIONAL CONFERENCE ON RENEWABLE ENERGY AND POWER QUALITY (ICREPQ'23)

WELCOME TO ICREPQ'23

On behalf of the Steering Committee and the Local Organizing Committee we want to give you a very warm welcome to ICREPQ'23 and to Madrid.

The safety and health of our participants is our number one priority for that reason we have permitted that many of the presentations can be online.

Our International Programme Committee has selected a high quality 142 papers (among 246 proposals) from which 126 will be presented at the Conference, 46 at oral sessions and 80 at poster sessions, during the three days of the conference. All of these papers are included in the final program. Also five keynotes will be presented in plenary sessions and we'll have also one exhibit spaces of OPAL-RT Technologies.

ICREPQ'23 covers the whole range of problems and solutions especially concerning with renewable energies and power quality and all the papers have direct relationship with these two fields of research and practical work.

We would like to thank all the authors, session chairmen, participants without papers and the International Scientific Committee members who have made important contributions by reviewing the proposals.

In addition to the technical sessions, a number of social events have been arranged. On Wednesday evening, May 24th, at about 20:00 H, we'll can enjoy the **Welcome Dinner (Civic Reception)** at Casa de Valencia Restaurant and on Thursday, May 25th, 20:00 H, the **Conference Dinner** at the Hotel Preciados Restaurant. On Friday, May 26th, after the Farewell Lunch, from 14:30 H to 20:30 H we will enjoy one **Cultural Visit to Toledo**, the Primate Cathedral of Spain and the Monastery of San Juan de los Reyes and other monuments of the City.

We hope that you will find the conference intellectually stimulating and that you will make many fruitful personal contacts during the conference.

Best regards,

Prof. Manuel Pérez-Donsión
Chairman of the Steering Committee

Prof. Luis Rouco Rodríguez
Chairman of the Local Committee

ORGANISED BY:

The "21th International Conference on Renewable Energies and Power Quality (ICREPQ'23)", is organized by:

- European Association for the Development of Renewable Energy, Environment and Power Quality (EA4EPQ)
- Universidad Pontificia de Comillas
- University of Vigo

CONFERENCE LANGUAGE

The Conference language is English. All papers and presentations should be made in English.

OBJECTIVES AND TOPICS

The intention of the organisers is to give an opportunity to academics, scientists, engineers, manufacturers and users from all over the world to come together in a pleasant location to discuss recent development in the areas of Renewable Energy and Power Quality.

The "21th International Conference on Renewable Energy and Power Quality (ICREPQ´23)", is structured in:

- **Plenary Sessions:** Presentations of about 45 minutes (35 minutes for the presentation and 10 minutes for questions).
- **Oral Sessions:** Presentations in-person or on-line of about 15 minutes for each paper (12 minutes for the presentation and 3 minutes for questions). Simultaneously in two rooms.
- **Posters Sessions:** In 45-minute in-person and also on-line.

SOCIAL EVENTS

- **Welcome Dinner: May 24th**
- **Conference Dinner: May 25th**
- **Cultural Visit: May 26th**

VENUE

The "21th International Conference on Renewable Energies and Power Quality (ICREPQ'23)" will be held at the Universidad Pontificia de Comillas. C/ Alberto Aguilera, 23. Madrid. Spain.

TOPICS 1. RENEWABLE ENERGY:

- Wind Energy, Small Hydro Energy, Solar Energy, Photovoltaic Energy, Ocean Energy, Geothermal, Biomass, Cogeneration,…
- Classical and special electrical generators: Theory, design, analysis, losses, efficiency, heating and cooling, vibration and noise, modelling and simulation, control strategies, protection systems, maintenance, mechanical behaviour, new methods of testing, parallel operation, transmission system, stability,...
- Power plants. Distributed generation. Fuel cells. Co-generation. Hybrid Systems. Microgrids. Smart grids. Original solutions,...
- Energy conversion, conservation and energy efficiency.
- Energy saving policy. Energy storage. Batteries....
- Energy and the environment. Ecological balance. Ecosystem,...
- Application of the renewable energy. Best practice projects.
- Legislation in the area of renewable energies.
- Biomass combustion techniques. The energy use of agricultural and forest residues. Production and the energy exploitation of bio-gas. Environment. Social importance…
- Interconnection and transport problems.
- Planning and control of the power system take into account the renewable energy. Stability. Protection…
- Economic analysis of the power system take into account the renewable energy.
- Electricity Market Structures. Regulation/des-regulation of the power market. Influence of the renewable energy.
- Models and simulation of the power systems. Models and estimation of loads. Software tools.
- Application of the communications, internet, artificial intelligence for the renewable energy.
- Security assessment and risk analysis in renewable energy.
- Electric vehicles.
- Electrical Machines & Drives, Power electronics and Control strategies for renewable energy applications.
- Monitoring and Diagnostics of electrical machines & drives, Tools for Diagnostics, Test for Predictive Maintenance in Renewable…
- Sensors and actuators for renewable energy applications.
- Renewable Energies Teaching.

TOPICS 2. POWER QUALITY:

- Electromagnetic compatibility (EMC).
- Power Quality in Transport and Distribution. FACTS
- Economic Studies of the Power Quality.
- Low-frequency conducted disturbances: Voltage deviations, voltage fluctuations-flicker, voltage dips and short interruptions, harmonics and inter-harmonics, transient over-voltages, voltage unbalance (imbalance), temporary power-frequency variations.
- Sources, effects and mitigation methods of the disturbances.
- Measurements of the power quality in networks, industrial installations and Laboratories. Equipment, procedures and measurement methods. Standards.
- Modelling and simulation of the power quality. Software tools.
- Transmission of the disturbances.
- Filtering techniques.
- Power factor compensation. Capacitor switching techniques.

- Optimization techniques.
- Communication, internet and artificial intelligence.
- Permanent monitoring techniques and online diagnosis.
- Intelligent energy delivery systems. Uninterrupted power supplies.
- Expert systems applications.
- Devices, equipment and power systems. Control centres.
- Specific problems and studies cases.
- Power quality influence in deregulated markets.
- High frequency disturbances (radiated).
- Data security and electromagnetic pulses.
- Protection against natural and intentional EMI.

SPONSORSHIP

Sincere thanks are expressed to the organisations listed below who have given valuable support to ICREPQ'23: EA4EPQ (European Association for the Development of Renewable Energy, Environment and Power Quality), AEDIE (Asociación Española para el Desarrollo de la Ingeniería Eléctrica), University of Vigo, Universidad Pontificia de Comillas, RE&PQJ (Renewable Energy and Power Quality Journal), OPAL-RT TECHNOLOGIES and E&Q Journal (Energies and Power Quality Journal).

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Wednesday May 24, 2023											
9:00 – 9:30	**Welcome & Registration "ICREPQ'23 Secretariat"**										
9:30 – 10:15	**Opening Ceremony ROOM A *"Sala de Conferencias"***										
10:15 - 11:00	**ROOM A *"Sala de Conferencias"*. Plenary Session PL1**										
	A 100% Renewable, Flexible, and Robust Electric Power System Thanks to New Generation, Grid, and Demand Technologies: The FLEXENER Project by **Juan Carlos Pérez Campión.** Iberdrola. Madrid, Spain										
	EXTRA TIME FOR DISCUSSION										
11:00 – 11:45	**Posters Session at ROOM C *"AEDIE"* (Session P1) Coffee Break**	*Poster Session **P1***									
		200	214	215	218	225					
		228	229	232	236	244					
		245	251	340	393						
11:45 – 13:00	**ROOM A *"Sala de Conferencias"***				**ROOM B *"OPAL-RT"***						
	*Oral Session **A1***				*Oral Session **B1***						
	240	355	360		230	256	318				
	427				399						
	EXTRA TIME FOR DISCUSSION				EXTRA TIME FOR DISCUSSION						
13:00 -- 15:00	**Welcome Lunch**										
15:00 – 15:45	**ROOM A *"Sala de Conferencias"*. Plenary Session PL2**										
	Frequency stability constrained unit commitment in isolated power system with high penetration of renewables energy sources by **Dr. Lukas Sigrist.** ETSI ICAI-IIT Universidad Pontificia Comillas Madrid, Spain										
	EXTRA TIME FOR DISCUSSION										
15:45 – 16:30	**Posters Session at ROOM C *"AEDIE"* (Session P2)**	*Poster Session **P2***									
		254	255	258	260	266					
		273	283	286	288	289					
		290	291	295	296	304					
		310	311								
16:30 – 18:00	**ROOM A *"Sala de Conferencias"***				**ROOM B *"OPAL-RT"***						
	*Oral Session **A2***				*Oral Session **B2***						
	223	241	377		247	259	385				
	412				398	440					
	EXTRA TIME FOR DISCUSSION				EXTRA TIME FOR DISCUSSION						
20:00 -- 23:30	**Civic Reception Welcome Dinner Casa de Valencia Restaurant**										

ROOMS: Room A:"*Sala de Conferencias*". Room B:"*OPAL-RT*". Room C:"*AEDIE*".

Thursday May 25, 2023

9:00 – 12:30	**Registration "ICREPQ'23 Secretariat"**					
9:15 – 10:00	**ROOM A *"Sala de Conferencias"*. Plenary Session PL3**					
	PL3	***Energy Transition in the Middle East: Excitement & challenges ahead*, by Prof. Hashem Oraee**. Sharif University of Technology. Teheran, Iran				
	EXTRA TIME FOR DISCUSSION					
10:00– 11:00	**ROOM A *"Sala de Conferencias"***			**ROOM B *"OPAL-RT"***		
	*Oral Session **A3***			*Oral Session **B3***		
	210	265	271	284	357	430
	EXTRA TIME FOR DISCUSSION			EXTRA TIME FOR DISCUSSION		
11:00– 11:45	**Poster Session at ROOM C *"AEDIE"* (Session P3) Coffee Break**	*Poster Session **P3***				
		263	280	281	307	315
		316	319	325	326	335
		337	338	352	373	388
		418				
11:45 – 13:00	**ROOM A *"Sala de Conferencias"***			**ROOM B *"OPAL-RT"***		
	*Oral Session **A4***			*Oral Session **B4***		
	220	347	387	299	383	425
	436					
	EXTRA TIME FOR DISCUSSION			EXTRA TIME FOR DISCUSSION		
13:00 – 15:00	**Lunch**					
15:00 --15:45	**ROOM A *"Sala de Conferencias"*. Plenary Session PL4**					
	PL4	***Green Hydrogen Projects: From Power Point to Power Plant – Actual and Future Viable Projects* by Julio Hidalgo.** Head of Hydrogen Business Development, **Univergy.** Spain				
	EXTRA TIME FOR DISCUSSION			EXTRA TIME FOR DISCUSSION		
15:45 – 16:30	**Poster Session at ROOM C *"AEDIE"* (Session P4)**	*Poster Session **P4***				
		278	330	334	342	343
		344	390	395	407	409
		429	434	443	449	458
16:30 -- 18:00	**ROOM A *"Sala de Conferencias"***			**ROOM B *"OPAL-RT"***		
	*Oral Session **A5***			*Oral Session **B5***		
	275	323	380	212	226	348
	382	450		362	375	
	EXTRA TIME FOR DISCUSSION			EXTRA TIME FOR DISCUSSION		
20:00-23:30	**Conference Dinner (Optional) Hotel Preciados Restaurant**					

ROOMS: Room A:"*Sala de Conferencias*". Room B:"*OPAL-RT*". Room C:"*AEDIE*".

Friday May 26, 2023							
9:00 – 12:30	**Registration "ICREPQ'23 Secretariat"**						
9:30 - 10:15	**ROOM A *"Sala de Conferencias"*. Plenary Session PL5**						
	PL5	***The review of the European electricity market design after the energy crisis of 2021/22***, by **Dr. Juan J. Alba.** Director, Regulatory Affair. Endesa. Spain					
	EXTRA TIME FOR DISCUSSION						
10:15 -- 11:00	**Poster Session at ROOM C *"AEDIE"* (Session P5) Coffee Break**	*Poster Session **P5***					
		206	207	208	219	297	
		312	365	378	403	404	
		438	446	447	451	453	
		454	456	457			
11:00 – 12:00	**ROOM A *"Sala de Conferencias"***			**ROOM B *"OPAL-RT"***			
	*Oral Session **A6***			*Oral Session **B6***			
	306	350	368	250	328	363	
	EXTRA TIME FOR DISCUSSION			EXTRA TIME FOR DISCUSSION			
12:00– 13:00	**ROOM A *"Sala de Conferencias"*. CLOSING SESSION**						
	Conclusions and time for the next conference (ICREPQ'24) **Awards for the three best posters**						
13:00 – 14:30	**Farewell Lunch**						
14:30 – 20:30	**Cultural Visit to Toledo**						

ROOMS: Room A:"*Sala de Conferencias*". Room B:"*OPAL-RT*". Room C:"*AEDIE*".

AUTHORS

Oral Presentations (A, B)

Each speaker of one oral presentation, in-person or on-line, has an available time of 15 minute (12 minutes for the presentation and 3 minutes for questions) and the speaker must be stay in the session room 10 minutes before of the beginning of the session. The face-to-face speakers will need to test the audiovisual equipment and surely to exchange opinions with the Session Chairman. We suggest that the speakers of one oral presentation prepare their material in Power Point or, in the case of on-line presentations the speakers can prepare a video that they can send to the organizing committee before of the session for to check it, but we suggest that they present their paper on-line but in real time using Power Point.

Poster Presentations (P)

IN-PERSON. The posters presented in-person must be numbered, on the up left corner, with the number of the paper and it will be put, about 15 minutes before of the beginning of the session, on the pin board that you previously can chose and it must be taken out 15 minutes after of the end of the session. The author(s) must be stay near the poster during the 45 minutes of the session duration for to answer all the questions that the audience or the chairmen could formulate. The maximum available surface for each poster will be 1000 mm x 1500 mm (width x high). You must select your poster size take into account this maximum available surface (Perhaps an A0 size, 841×1189 mm, could be appropriate). Put on the pin board separated sheets of the paper are not allowed.

ON-LINE. The posters presented on-line must be numbered, on the up left corner, with the number of the paper and we suggest that the authors send us their posters in PDF format before April 24th. Then we will put the posters in the web and all the interested and registered people can send us questions about each of the posters that we will send to the authors for their answers and during their Poster Session the authors will have the opportunity of to present on-line the most relevant aspects of their research during 5 or 6 minutes and then the audience can make questions to each poster and the chairman of the session will organize the answers.

SESSION CHAIRMEN

On behalf of the International Scientific Committee, Steering Committee and the Organising Committee of the ICREPQ'23 and take into account their eminent position in the world of science we have selected 32 session chairmen. It is an honour for us their collaboration for to chair the sessions of ICREPQ'23 and their contribution would be greatly appreciated. We wish to express our warmest thanks.

Traditionally the Chairmen of each Session are independent in organising the Session. Nevertheless it is of special importance that the different session chairmen prepare some questions about the papers of their session in order to get a more dynamic one. Furthermore we expect of the session chairmen the following:

Oral sessions

Each oral paper presentation should not exceed 15 minutes including presentation and discussion (12 minutes for presentation and 3 minutes for questions).

Poster sessions

The author(s) of a poster presentation in-person must be stay near to their poster during the 45 minutes of the session duration and in order to get a more dynamic session it is important that along this period of time each of the chairmen of the poster sessions will formulate questions to the authors in-person or online through E-mail and check that all is OK. The chairmen of each of the poster sessions file up one sheet, with punctuations for each of the presented poster in that session and then, take into account these evaluations, the Organizers will deliver during the Closing Session one silver plate and one diploma to the three best posters selected.

Chairmen Session distribution

Wednesday 24th May, 2023		
HOUR	**SESSION**	**CHAIRMEN**
9:30 – 10:15	Opening Ceremony	
10:15 - 11:00	PLENARY SESSION PL1	Ahmad Pourmovahed
11:00 - 11:45	POSTER SESSION P1	Francisco Gil Montoya
		Elias Kaufhold
		Sergio Velázquez Medina
		Arif Malik
11:45 – 13:00	ORAL SESSION A1	Cătălin Alexandru
	ORAL SESSION B1	Pablo Eguía López
13:00 – 15:00	Welcome Lunch	
15:00 – 15:45	PLENARY SESSION PL2	Gianpaolo Vitale
15:45 – 16:30	POSTER SESSION P2	Daiane Rodrigues dos Santos
		Ranjith Embuldeniya
		Amit Ailon
		Alen Jakoplić
16:30 - 18:00	ORAL SESSION A2	Mario Mañana Canteli
	ORAL SESSION B2	Wolf-Gerrit Früh
Thursday 25th May, 2023		
9:15 - 10:00	PLENARY SESSION PL3	Mircea Ion Buzdugan
10:00 - 11:00	ORAL SESSION A3	Ángeles López Agüera
	ORAL SESSION B3	Mohamed Elgenedy
11:00 - 11:45	POSTER SESSION P3	Julio Tafur Sotelo
		Eloisa Torres Jiménez
		Jesús Rodríguez Vázquez
		Andrés Ortiz Salazar
11:45 - 13:00	ORAL SESSION A4	Kamel Ghali
	ORAL SESSION B4	Milan Belik
13:15 - 15:00	Lunch	
15:00 - 15:45	PLENARY SESSION PL4	Gorazd Štumberger
15:45- 16:30	POSTER SESSION P4	Michael Windisch
		José Yusta Loyo
		Carlos Roldan Blay
		Herminio Martínez García
16:30 - 18:00	ORAL SESSION A5	Domingos Simonetti
	ORAL SESSION B5	Edwin Chica Arrieta
Friday 26th May, 2023		
9:30 - 10:15	PLENARY SESSION PL5	Santiago Arnaltes Gómez
10:15- 11:00	POSTER SESSION P5	Mark Halpin
		Jesús Artal Sevil
		Steven Liu
		Bade Shrestha
11:00 - 12:00	ORAL SESSION A6	Alfredo Alcayde García
	ORAL SESSION B6	Antonio Notholt
12:00 - 13:00	Closing Session	
13:00 - 14:30	Farewell Lunch	

NOTE: When the Chairman of one Oral Session need to present his own paper in that session, then we suggest that he present his paper at the first or at the end of the

session. If you are the Chairman of one Poster Session in which you present a paper like poster, please, inform at the ICREPQ'23 Secretariat about it.

ICREPQ'23 KEYNOTES

PL1. *A 100% Renewable, Flexible, and Robust Electric Power System Thanks to New Generation, Grid, and Demand Technologies: The FLEXENER Project*

Mr. **Juan Carlos Pérez Campión**
Iberdrola. Madrid, Spain

Achieving the EU goal of carbon neutrality by 2050 will require a 100% Renewable, Flexible, and robust electric power system. It will require major developments in generation, grid, and demand sides.
The Spanish Centre for the Development of Industrial Technology (CDTI) awarded a consortium led by Iberdrola a project under 'Misiones 2019' call to contribute to building such an electric power system.
The contribution will explain how the project is organized into activities and the roles assigned to the consortium members. In addition, it will detail the expected outcomes and the Key Performance Indexes to assess them. The contribution will provide initial results of the project.

Acknowledgements
Iberdrola, i-DE, Ingeteam R&D Europe, Indar, Siemens Gamesa Renewable Energy, Balantia, Wallbox, Open Systems International Europe are the consortium members.

Short biography of Mr. Juan Carlos Pérez-Campión

Juan Carlos Pérez-Campión has 23 years' experience in wind energy. He began his career with Gamesa Eólica in 1999 working in the Engineering Department as head of the Control and Regulation team. In this role, he led the design and implementation of control strategy for wind turbines, regulation strategies for wind farms (Active Power, Reactive Power and Voltage controllers) and he carried out multiple studies to meet the requirements described in grid codes of several countries. In 2006 Juan Carlos joined Iberdrola Renovables as head of Control Systems, Grid Integration and Cybersecurity team. He has been involved in a variety of projects such as new software control validations designs, wind turbine due diligences in onshore and offshore wind farms, wind energy integration, new SCADA design, impact of harmonics and sub-synchronous resonances in wind farms and monitoring projects in wind turbines and solar power plants.

PL2. *Frequency stability constrained unit commitment in isolated power system with high penetration of renewables energy sources*

Dr. Lukas Sigrist
ETSI ICAI-IIT. Universidad Pontificia Comillas
Madrid, Spain

Islands are facing considerable challenges in meeting their energy needs in a sustainable, affordable and reliable way. This is mainly due to the isolated nature and small size of island power systems and the cost of the fuel for power generation. According to local resource

availability, renewable energy sources (RESs) offer an interesting solution to decrease the dependency on fossil fuels and increase island sustainability [1]. Other actions such as including energy storage devices can further increment RES penetration.

Intermittent behavior of RES affects both the stability of isolated island power systems as well as their economic operation. On the one hand, RESs allow reducing system operation costs for having lower marginal costs than conventional generation. On the other hand, the substitution of conventional generation by RESs in the dispatch may reduce system inertia and frequency control capacity, further jeopardizing frequency stability, which is already a challenge for isolated power systems. Currently, RESs do not provide reserve and inertia, but they are technically able to do so and it may be actually viable under high RES penetration scenarios [2].

Reserve requirements serve as the nexus between operation and frequency stability in isolated power systems. Nowadays, reserve requirements contemplate the size of the disturbance but they do not take into account the dynamics of the power system, which govern the stability of the system. This presentation will start with a techno-economic analysis of island power system under high RES penetration. The impact of RES providing reserve on the economic operation and frequency stability will be shown. The impact on frequency stability will lead to an operation planning approach, formulated as a unit commitment, that contemplates frequency dynamics explicitly. Both, analytical and data-driven formulations of the constraints of frequency dynamics will be presented [3].

References

[1] L. Sigrist, E. Lobato, L. Rouco, M. Gazzino, M. Cantù. Economic assessment of smart grid initiatives for island power systems. Applied Energy. Vol. 189, pp. 403 - 415, March 2017.

[2] M. Rajabdorri, L. Sigrist, E. Lobato, M.C. Prats, F.M. Echavarren. Viability of providing spinning reserves by RES in Spanish island power systems. IET Renewable Power Generation. Vol. 15, nº. 13, pp. 2878 - 2890, October 2021.

[3] M. Rajabdorri, E. Lobato, L. Sigrist. Robust frequency constrained uc using data driven logistic regression for island power systems. IET Generation Transmission & Distribution. Vol. 16, nº. 24, pp. 5069 - 5083, December 2022.

Short biography of Dr. Lukas Sigrist

Lukas Sigrist received his MSc degree in Electrical and Electronics Engineering from École Polytechnique Fédérale de Lausanne (EPFL) in 2007 and his PhD degree from Universidad Pontificia Comillas in 2010. At present he is a researcher at the Instituto de Investigación Tecnológica (IIT) of Universidad Pontificia Comillas de Madrid. He is also the secretary of the council of IIT. His areas of interest are modeling, analysis, and control of electric power systems. Dr. Sigrist is a member of the IEEE, and the Treasurer of the Spanish Chapter of the Power and Energy Society of IEEE.

PL3. *Energy Transition in the Middle East: Excitement & challenges ahead*

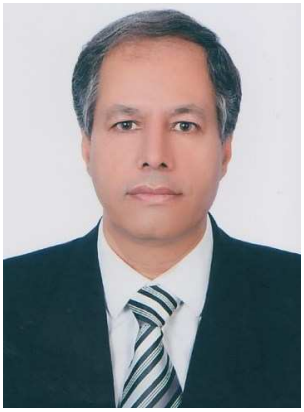
Prof. Hashem Oraee
Sharif University of Technology. Teheran, Iran

The current Energy Transition started around the beginning of millennium. Among its main objectives are Electrification, Energy Efficiency, Renewable Energy and Decarbonzation. Continued reduction in Renewable Energy costs coupled with increased attention to environmental issues ensured a sustained increase in the share of Renewable Energy

throughout the world. The Russian invasion of Ukraine on 24 February 2022, however created uncertainty in this trend. In response to acute energy shortages brought about by the war, some believed that expansion of Renewable Energy will no longer be the top priority and the new geopolitical circumstances has given a second life to fossil fuels including coal. Only a year after the war, it has become clear that Renewable Energy is at full swing.

The Economist has concluded that the Ukraine war has brought worldwide expansion of Renewable Energy forward by five to ten years! Sharp increase in oil price brought windfall of fund to oil and gas exporting countries in the Middle East. This has enabled them to accelerate their transition from "Petrostates" to "Electrostates". With considerable capacities for Renewable Energy, notably wind and solar, the region is on course to become a major Renewable Energy hub. It can therefore be safely assumed that excitement lies ahead in the region. But the transition from fossil to Renewable Energy will certainly not be an easy ride! The proposed presentation will look into the situation and examine the challenges that lie ahead.

Short biography of Prof. Hashem Oraee



Hashem Oraee graduated with a first class honours degree in Electrical Engineering from University of Wales, UK in 1980 and PhD in Electrical Machines from University of Cambridge, UK in 1984. He is currently a Professor at Sharif University of Technology, President of Energy Associations Syndicate in Iran and an international consultant on Renewable Energy. He is a Chartered Engineer and Fellow of The Institution of Engineering and Technology, IET in the UK.

PL4. *Green Hydrogen Projects: From Power Point to Power Plant – Actual and Future Viable Projects*

Mr. Julio Hidalgo
Head of Hydrogen Business Development, **Univergy.** Spain

Hydrogen is currently fashionable but, of the dozens of projects that are announced in the press every week, how many, which and when they will materialize into real projects?

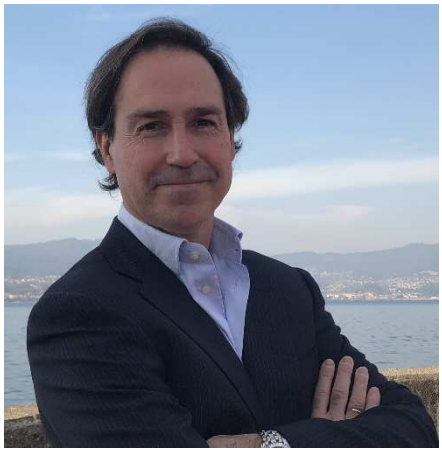
We will try to answer that question during our session. We will go over the different targets that several countries have stablished to help and promote hydrogen technologies deployment. We will also go over their different programs they have in place to help with the deployment.

In the end, viable and profitable projects will be the ones to be implemented first. Hydrogen, as a flexible vector, may replace several fossil fuel consumption applications and every application has its pros and cons.

It is well known and commonly mentioned, the "chicken and egg" problem. Should hydrogen generation push the demand or vice versa?

We will present our "Julio Verne" project in Vigo that has recently been awarded with EU subsidies and will be implemented by mid 2024. We will also talk about some other viable projects in our portfolio form mid/long term implementation.

Short biography of Mr. Julio Hidalgo



He joined Univergy in 2021 to set up the Green Hydrogen Division.
Univergy Group is a relevant player in the development and construction of big renewable energy facilities and is present in more than 20 countries.
Julio Hidalgo is a professional with more than 25 years of experience in engineering, operations and business development in companies from various sectors like Biotechnology, Pharma, Chemical and Renewable Energy.
Julio Hidalgo has a MSc in mechanical engineering from Universidad Pontificia de Comillas in Madrid and an MBA from CEPADE (Universidad Politecnica in Madrid).

PL5. *The review of the European electricity market design after the energy crisis of 2021/22*

Dr. Juan J. Alba.
Director, Regulatory Affair. Endesa. Spain

The increase of natural gas prices from summer 2021 onwards, accelerated by the invasion of Ukraine, has led to an energy price crisis affecting the European electricity. A wide range of emergency interventions in markets and taxes have been implemented by most governments of the European Union, or by the European Union itself, with varying success. But at the beginning of 2023 the discussion of emergency interventions has been replaced by proposals to modify the design of the electricity market, leading to a legislative initiative expected to be approved before the end of this year. What are the main elements of the debate? How will the European electricity market look like from 2024 onwards?"

Short biography of Dr. Juan J. Alba

He joined Endesa in July 1997. He is currently in charge of regulatory affairs, where he is involved in all the aspects of the business: wholesale and retail market design and regulation, remuneration of distribution, tariffs and grid access charges, capacity payments, etc., as well as European legislation.

Between 2000 and October 2004 he was the managing director of the European trading unit of Endesa and oversaw the Joint Venture with Morgan Stanley to develop this activity. Before 2000 he was in charge of regulatory affairs of the generation business at Endesa. Between 1986 and 1997 he was a researcher at the Instituto de Investigación Tecnológica (IIT), where he worked on regulation, modelling electricity markets and application of computer techniques to power systems and equipments.

Juan J. Alba is member of the Management Committee of aelec (the association of the Spanish electricity industry) and the Advisory Council of ENTSO-e, he has been chairman of the Markets and Investments Committee of Eurelectric, member of the board of directors of EFET (the European Federation of Energy Traders), and co-chairman of its WG on financial regulation. He has been a member of the Supervisory Boards of Powernext (French Power Exchange) and Gielda Energii S.A. (Polish Power Exchange). He has a PhD in electrical engineering from Universidad Pontificia Comillas in Madrid.

Wednesday May 24th, 2023

9:30– 10:15 Opening Ceremony ROOM A "*Sala de Conferencias*"

10:15-11:00 Plenary Session PL1 ROOM A "*Sala de Conferencias*"

Chairman: **Ahmad Pourmovahed**

PL1. *A 100% Renewable, Flexible, and Robust Electric Power System Thanks to New Generation, Grid, and Demand Technologies: The FLEXENER Project*

By **Mr. Juan Carlos Pérez Campión.** Iberdrola. Madrid, Spain

Wednesday May 24th, 2023
11:00-11:45 Poster Session P1 – Coffee Break ROOM C "AEDIE"

Chairmen: **Adam Muc, Elias Kaufhold, Sergio Velázquez Medina, Arif Malik**

200 **Energy capacity of the geothermal resource and its integration in the electrical energy demand of the island of Tenerife (Spain)**

F. Montesdeoca-Martínez(1), S. Velázquez-Medina(2)
1. School of Industrial and Civil Engineering, University of Las Palmas de Gran Canaria, Canary Islands. Spain
2. Department of Electronics and Automatics Engineering, University of Las Palmas de Gran Canaria, Canary Islands. Spain

214 **Reconversion of the shipbuilding sector: from production by project to mass production. What is its effect on the LCOE of a wave energy farm?**

L. Castro-Santos(1), P. Rubial-Yáñez(2), I. Lamas-Galdo(3), D. Cordal Iglesias (4), A. Alcayde(5), F.G. Montoya(5), A. Filgueira-Vizoso(6)

1. Universidade da Coruña, Departamento de Enxeñaría Naval e Industrial, Escola Politécnica de Enxeñaría de Ferrol. Spain
2. Universidade da Coruña, Escola Politécnica de Enxeñaría de Ferrol. Spain
3. Universidade da Coruña, Departamento de Ciencias da Navegación e Enxeñaría Mariña, Escola Politécnica de Enxeñaría de Ferrol. Spain
4. Universidade da Coruña, Escola Politécnica de Enxeñaría de Ferrol. Spain
5. Universidad de Almería, Escuela Superior de Ingeniería. Spain
6. Universidade da Coruña, Departamento de Química, Escola Politécnica de Enxeñaría de Ferrol. Spain

215 **A tool to select offshore renewable energy facilities. The case of study of shipyards and ports in Spain**

F. Fernández-Leal(1), L. Castro-Santos(2), P. Rubial-Yáñez(3), I. Lamas-Galdo (4), D. Cordal Iglesias (5), A. Alcayde(6), F.G. Montoya(6), A. Filgueira-Vizoso(7)

1. Universidade da Coruña, Escola Politécnica de Enxeñaría de Ferrol. Spain
2. Universidade da Coruña, Departamento de Enxeñaría Naval e Industrial, Escola Politécnica de Enxeñaría de Ferrol. Spain
3. Universidade da Coruña, Escola Politécnica de Enxeñaría de Ferrol. Spain
4. Universidade da Coruña, Departamento de Ciencias da Navegación e Enxeñaría Mariña, Escola Politécnica de Enxeñaría de Ferrol. Spain
5. Universidade da Coruña, Escola Politécnica de Enxeñaría de Ferrol. Spain
6. Universidad de Almería, Escuela Superior de Ingeniería. Spain
7. Universidade da Coruña, Departamento de Química, Escola Politécnica de Enxeñaría de Ferrol. Spain

218 **Algae bioreactor for biodiesel production**

A. Williams, E. Krupp, C. Ybarra, M. Willing, A. Wagner, A. Pourmovahed
Mechanical Engineering Department Kettering University Flint, Michigan.U.S.A

225 **An Enhanced Hybrid Grid Connected Photovoltaic System Using Voltage Oriented Controller and Class D Chopper**

Maamar Taleb, Mohamed Amine Fnaiech, Khaled Zehar
Department of Electrical and Electronics Engineering, College of Engineering, University of Bahrain, Isa Town. Bahrain

228 **Sizing of on-grid photovoltaic systems for water pumping in irrigation communities**

Angel A. Bayod-Rújula(1), Rodolfo Dufo-López(1), Amaya Martínez Gracia(2)

1. Department of Electrical Engineering E.I.N.A., Zaragoza University. Spain

2. Department of Mechanical Engineering E.I.N.A., Zaragoza University. Spain

229 **Model Based Systems Engineering Concepts and Methodologies for Modeling of Renewable Power Plants**

R. Rosa Sanabria, P. Eguia López, I. Aranzabal Santamaría, I. Zamora Belver
Department of Electrical Engineering Universidad del País Vasco / Euskal Herriko Unibertsitatea Escuela de Ingeniería de Bilbao. Spain

232 **Efficient utilization of solar PV for corporate building in Riyadh, Saudi Arabia**

Fahad Saeed Alharthi(1,3), Abdulrahman Alamoud(2,3)
1. Research & Development Department, Saudi Electricity Company, Riyadh. Saudi Arabia
2. Electrical Engineering Department, King Saud University. Saudi Arabia
3. Sustainable Energy Center, King Saud University, Riyadh. Saudi Arabia

236 **Verification of the uninterrupted transition from grid parallel to island grid operation of the Virtual Synchronous Machine in a microgrid**

Steven Reineke, Dirk Turschner, Ines Hauer, Hans-Peter Beck
Institute of Electrical Power Engineering and Energy Systems Clausthal University of Technology. Germany

244 **Integration of renewable resources into the electricity energy matrix. Practical case applied to a small rural municipality**

D. Dasí-Crespo, C. Roldán-Blay, G. Escrivá-Escrivá, C. Roldán-Porta
Institute for Energy Engineering Universitat Politècnica de València. Spain

245 **Dynamic algorithm to boost the synergy between biogas plants and photovoltaic plants**

C. Roldán-Blay(1), D. Dasí-Crespo(1), C. Roldán-Porta(1), G. Escrivá-Escrivá(1), E. Quiles-Cucarella(2)
1. Institute for Energy Engineering, Universitat Politècnica de València. Spain
2. Instituto Universitario de Automática e Informática Industrial. Universitat Politècnica de València. Spain

251 **Experimental set-up to study power quality in single-phase split-phase distribution systems**

I. Vicente(1), A. Arrinda(2), J.E. Rodríguez-Seco(1), L. Piyasinghe(3)
1. TECNALIA, Basque Research and Technology Alliance (BRTA) Bilbao, Spain
2. Department of Communications Engineering, University of the Basque Country Bilbao. Spain
3. Hubbell Incorporated, Saint Louis, MO, USA

340 **The Role of Municipalities in Renewable Energy Transition:**

Providing Drinking Water Supply of Kocaeli Province with Renewable Energy

I. Gulsoy(1), M. Ozcan(2)
1. Directorate of Information Technologies Kocaeli Metropolitan Municipality. Turkey
2. Department of Energy Systems Engineering, Faculty of Technology, Kocaeli University Kabaoğlu. Turkey

393 **Technical evaluation of hybrid super capacitor technologies for local energy communities**

L. Vargas, R. Rengel, J. Caparrós, D. Tejada-Guzmán, E. López
Instituto Nacional de Técnica Aeroespacial (National Institute of Aerospace Technology). Huelva. Spain

Wednesday May 24th, 2023

Wednesday May 24th, 2023
11:45-13:00 Oral Session A1 ROOM A "*Sala de Conferencias*"

Chairman: **Cătălin Alexandru**

240 **A path planning approach for unmanned solar-powered aerial vehicles**

Amit Ailon
School of Electrical and Computer Engineering Ben Gurion University of the Negev Beer Sheva. Israel

355 **Sky Image Analysis and Solar Power Forecasting: A Convolutional Neural Network Approach**

A. Jakoplić(1), S. Vlahinić(2), B. Dobraš(1), D. Franković(1)
1. Department of Electric Power Systems
2. Department of Automation and Electronics University of Rijeka, Faculty of Engineering. Croatia

360 **Reducing Fossil Fuel Consumption by Incorporating Renewable Energy Sources in Wastewater Treatment Processes**

Hen Friman
Faculty of Engineering. H.I.T - Holon Institute of Technology. Israel

427 **Design of a solar mango dryer for rural sectors located in Piura-**

Peru
Freddy J. Rojas, David Huarcaya
Department of Mechanical Engineering Pontifical University Catholic of Peru.Peru

Wednesday May 24th, 2023
11:45-13:00 Oral Session B1 ROOM B "OPAL-RT"

Chairman: **Pablo Eguía López**

230 **Accurate Power Sharing in Islanded AC Microgrid Using A Virtual Complex Impedance**
Ahmed M. Abouassy(1,2), Diaa-Eldin A. Mansour(1,3), Tamer F. Megahed(1,4)
1. Electrical Power Engineering Department, Faculty of Engineering, Egypt-Japan University of Science and Technology (E-JUST), Alexandria. Egypt
2. Electrical Engineering Department, Benha Faculty of Engineering, Benha University. Egypt
3. Electrical Power and Machines Engineering Department, Faculty of Engineering, Tanta University. Egypt
4. Electrical Engineering Department, Mansoura University. Egypt

256 **Phase Identification in Smart Grids – Case Study**
Lluc Crespí-Castañer(1), Miquel Roca(1), Josep Lluís Rosselló(1), Lluís Juncosa(2), Vicente Canals(1)
1. Department of Industrial Engineering and Construction University of the Balearic Islands. Spain
2. Vall de Sóller Energía SLU. Spain

318 **The Power Link Caribbean Project**
F. Nuñez(1), G. Magallanes(1), L. Pacheco(2), N. Luo(2), J. Vilà(2)
1. Department of Electrical Engineering Universidad Federico Henríquez y Carvajal UFHEC. Rep. Dominicana
2. Polytechnic School, University of Girona. Spain

399 **Two-step optimization algorithm for energy management and calculation of active and reactive power commands for real-time operation of hybrid microgrids**
Marcial González de Armas, Santiago Arnaltes Gómez, Francisco Arredondo, José Luis Rodríguez Amenedo
Departamento de Ingeniería Eléctrica E.P.S., Universidad Carlos III de Madrid. Spain

Wednesday May 24th, 2023

15:00-15:45 Plenary Session PL2 ROOM A "*Sala de Conferencias*"

Chairman: **Gianpaolo Vitale**

PL2. *Frequency stability constrained unit commitment in isolated power system with high penetration of renewables energy sources*

by **Dr. Lukas Sigrist.** ETSI ICAI-IIT. Universidad Pontificia Comillas**.** Madrid, Spain

Wednesday May 24th, 2023
15:45-16:30 Poster Session P2 ROOM C "AEDIE"

Chairmen: **Daiane Rodrigues dos Santos, Ranjith Embuldeniya, Amit Ailon, Alen Jakoplić**

254 **Evaluation of the Potential of Ethyl Esterification Reaction Catalyzed by the Enzyme to Improvement the Quality of Bio-Oil**
Cândida Luiza Simonato, Aline Gonçalves, Bruno Eduardo Piske, Luana Marcele Chiarello, Vanderleia Botton, Laércio Ender, Vinicyus Rodolfo Wiggers
Department of Chemical Engineering FURB, University of Blumenau. Brazil

255 **Small-scale Waste Heat Recovery through incineration – a brief review**
Bruno Eduardo Piske, Fernanda Lopes, Jonathan Utzig, Vinicyus Rodolfo Wiggers
Department of Chemical Engineering FURB, University of Blumenau. Brazil

258 **Stabilizing multimachine power systems with fuzzy logic using artificial bee colonies**
Waleed M. Hamanah(1), Abdullah Baraean(2), A. Hussein(1,2), Mohammad A. Abido(1,2,3)
1. Interdisciplinary Research Center of Renewable Energy and Power Systems, (IRC-REPS), Research Institute
2. Department of Electrical Engineering, College of Engineering and Physics
3. K.A.CARE Energy Research & Innovation Center, King Fahd University for Petroleum and Minerals, Dhahra. KSA

260 **Protection of DC grids with renewable energy sources and electrolyzers for green hydrogen production**

D.M. Larruskain, P. Eguia, A. Iturregi, E. Torres, V. Valverde, A. Blazquez
Department of Electrical Engineering, Faculty of Engineering of Bilbao, University of the Basque Country UPV/EHU. Spain

266 **Trends in Centralized Protection and Control in Digital Substations**

E. Torres, P. Eguia, O. Abarrategi, D.M. Larruskain, V. Valverde, G. Buigues
Department of Electrical Engineering, Faculty of Engineering of Bilbao, University of the Basque Country. Spain

273 **Multivariate analysis of CO2 emissions by energy generation in IEA member countries**

Tuany Esthefany Barcellos de Carvalho Silva(1), Daiane Rodrigues dos Santos(2), Reinaldo Castro Souza(1)
1. Industrial Engineering Department PUC-RJ, Pontifical Catholic University of Rio de Janeiro Gávea - Rio de Janeiro. Brazil
2. Graduate Program in Economic Sciences State University of Rio de Janeiro. Brasil

283 **Evaluation of the generation and protection capabilities of a grid-connected microgrid**

J. García, J. Rey, G. Osma
Department of Electrical, Electronic and Telecommunications Engineering Universidad Industrial de Santander, Bucaramanga. Colombia

286 **DSUALMH- A new high-resolution dataset for NILM**

Rodriguez-Navarro(1), A. Alcayde(1), V. Isanbaev(1), L. Castro-Santos(2), A. Filgueira-Vizoso(3), F.G. Montoya(1)
1. Universidad de Almería, Escuela Superior de Ingeniería. Spain
2. Universidade da Coruña, Departamento de Enxeñaría Naval e Industrial, Escola Politécnica de Enxeñaría de Ferrol. Spain
3. Universidade da Coruña, Departamento de Química, Escola Politécnica de Enxeñaría de Ferrol. Spain

288 **A Benchmark and Validation Guide for the Hungarian Implementation of the Common European Requirements for Electricity Generators**

I. Vokony
Department of Electric Power Engineering Budapest University of Technology and Economics. Hungary

289 **Market Design for Cross-Border Co-Optimised Energy-Reserve Allocation**

I. Vokony, P. Sőrés, B. Németh, B. Hartmann
Department of Electric Power Engineering, Budapest University of Technology and Economics. Hungary

290 One Network for Europe- Scalabilit and Replicabilit in View of Harmonised Electricity Markets

I. Vokony(1), G. M. Péter(2), P. Sőrés(1), B. Hartmann(1)
1. Department of Electric Power Engineering Budapest University of Technology and Economics. Hungary
2. Grid innovation expert .E.ON Észak-dunántúli Áramhálózati Zrt. Győr. Hungary

291 Analysis of market entry, restructuring and economic risks at energy companies – literature review

I. Vokony, M. Csete Szalmáné
Department of Environmental Economics and Sustainability, Budapest University of Technology and Economics. Hungary

295 Single -Phase Hybrid Converter With Series Voltage Compensation On The DC Bar Applied to Micro grids

D. Matos(1), D. Rodrigues(1), M. R. Albertini(1), C.Bernardelli(1),F. A. Moura(1), M. V. Mendonça(1), A. J. Rosentino(1), R. Rimoldi de Lima(1), P. H. Rezende(2), G. Lima(2), J. O. Rezende(3)
1. Department of Electrical Engineering Triangulo Mineiro Federal University. Brazil
2. Department of Electrical Engineering of University of Uberlândia. Brazil
3. Department of Electrical Engineering of Federal Institute of Goias. Brazil

296 Analysis of Synthetic Inertia Applied to Wind Farms

F. Mendes(1), F. A. Moura(1), M. R. M. Albertini(1), M. V. Mendonça(1), A. J. Rosentino(1), D. B. Rodrigues(1), R. Rimoldi de Lima(1), P. H. Rezende(2), G. Lima(2), J. O. Rezende(3)
1. Department of Electrical Engineering Triangulo Mineiro Federal University. Brazil
2. Department of Electrical Engineering of University of Uberlândia. Brazil
3. Department of Electrical Engineering of Federal Institute of Goias. Brazil

304 A bibliometric study on the nexus of economic growth and renewable energy in Brazil

Maria Laura Victória Marques, Daiane Rodrigues dos Santos
Graduate Program in Economic Sciences State Univ. of Rio de Janeiro. Brazil

310 Inverter Control Design for the optimal management of electrical Micro-grids

J. R. Vázquez, N. Magro, R. S. Herrera, A. D. Martin
Department of Electrical Engineering, E.T.S.I. Huelva University. Spain

311 A First Approach on the Impact of Distributed Generation and

Fault Impedance on Studies on domain of frequency of Voltage Sags

A. C. L. Ramos(1), A. J. Batista(2), R. C. Leborgne(3), E. G. Domingues(4), W. P. Calixto(4)
1. EDP Transmission Goias S.A. Brazil
2. School of Electrical and Computer Engineering, Federal University of Goias. Brazil
3. Department of Electrical Engineering, Federal University of Rio Grande do Sul. Brazil
4. Nucleus of Studies Experimental and Technological, Electrotechnical Department - Federal Institute of Goias. Brazil

Wednesday May 24th, 2023

Wednesday May 24th, 2023
16:30-18:00 Oral Session A2 ROOM A "*Sala de Conferencias*"

Chairman: **Mario Mañana Canteli**

223 **An Equivalent Voltage Index to Quantify the Impact of Harmonics on Shunt Capacitors**
Tian Yu, Jing Yong, Wilsun Xu
Department of Electrical and Computer Engineering University of Alberta Edmonton. Canada

241 **Considerations about the measurement of electromagnetic emissions**
Mircea Buzdugan
Department of Buildings Engineering Technical University of Cluj-Napoca. Romania

377 **Effect of Supply Unbalance on Harmonic Emissions of Uncontrolled Six-Pulse Rectifiers**
G. Austin Taylor, Mark Halpin
Department of Electrical and Computer Engineering Auburn University, Alabama. USA

412 **Longterm optimization model for the Gambia's energy transition**
Moses s Bass, Angeles Lopez-Agüera
Department of Physics, Santiago de Compostela University. Spain

Wednesday May 24th, 2023

16:30-18:00 Oral Session B2 **ROOM B "OPAL-RT"**

Chairman: **Wolf-Gerrit Früh**

247 **Impact of electric vehicles fast frequency regulation and charging strategies on grid frequency stability**
A. Ordoño(1), F.J Asensio(1), J.I. San Martín(1), M. González-Pérez(1), J.A. Cortajarena(2)
1. Department of Electrical Engineering Engineering School of Gipuzkoa (Eibar) University of the Basque Country. Spain
2. Department of Electronic Technology Engineering of Gipuzkoa (Eibar) University of the Basque Country. Spain

259 **Design of a predictive control system for the smart regulation of renewable climatization systems**
R. Felez(1,2), J. Castro(2), J. Felez(2)
1. IGNIS Energía. Madrid. Spain
2. ETS Ingenieros Industriales, Universidad Politécnica de Madrid. Spain

385 **Assessing the effects of energy efficiency and different tariff policies on energy mix for decarbonization**
D. Ferreira- Martínez, C. Barruso, A. Lopez-Agüera
Department of Physics Facultad de Física, Santiago de Compostela University. Spain

398 **Prediction models and their role in advanced energy management systems supporting energy flexibility services**
N. Uremović, N. Lukač, P. Sukic, G. Štumberger
Faculty of Electrical Engineering and Computer Science University of Maribor. Slovenia

440 **Self-Heating Induced Instability of a Non-Linear Inductor in a SMPS: a Case Study**
Daniele Scirè(1), Giuseppe Lullo(1), Gianpaolo Vitale(2)
1. Department of Engineering, University of Palermo. Italy
2. ICAR, Institute for high performance computing and networking, National Research Council (CNR). Palermo. Italy

20:00 -- 23:30	**Civic Reception** **Welcome Dinner** **Casa de Valencia Restaurant** **Paseo Pintor Rosales, 58. Madrid**

Thursday May 25th, 2023

9:15-10:00 Plenary Session PL3 ROOM A "*Sala de Conferencias*"

Chairman: **Mircea Ion Buzdugan**

PL3. *Energy Transition in the Middle East: Excitement & challenges ahead*

Prof. Hashem Oraee
Sharif University of Technology. Teheran, Iran

Thursday May 25th, 2023
10:00-11:00 Oral Session A3 ROOM A "*Sala de Conferencias*"

Chairwoman: **Ángeles López Agüera**

210 **Impact of Uncertainty Quantification on Small Signal Stability of Power System**
Suravi Thakur, Nilanjan Senroy
Department of Electrical Engineering, Indian Institute of Technology, Delhi. India

265 **Optimal Allocation of Curtailment Level of PV Power Output in Different Regions in Consideration of the Reduction in Aggregated PV Power**
N. Harag, C. Urabe, T. Kato
Department of Electrical Engineering, Nagoya University Furo-cho, Chikusa-ku, Nagoya. Japan

271 **Technical versus socio-economic and environmental criteria in power transmission projects**
N. Naval, J.M Yusta
Department of Electrical Engineering EINA, University of Zaragoza. Spain

Thursday May 25th, 2023

Thursday May 25th, 2023
10:00-11:00 Oral Session B3 ROOM B "*OPAL-RT*"

Chairman: **Mohamed Elgenedy**

284 **A novel approach for hybrid system simulation and design based on an enhanced load flow calculation methodology**
A. Notholt(1), D. Coll-Mayor(1), A. Balakhontsev(2)
1. School of Engineering Reutlingen University Alteburgstr. Germany
2. Department of Electric Drives Dnipro University of Technology Dnipro. Ukraine

357 **Wind turbine blade damage detection using data-driven techniques**
D. Velasco(1), L. Guzman(1) , B. Puruncajas(1,3), C. Tutiven(1,2,3), Y.

Vidal(3,4)
1. Mechatronics Engineering Faculty of Mechanical Engineering and Science, FIMCP Escuela Superior Politecnica del Litoral, Guayaquil. Ecuador
2. Universidad ECOTEC. Ecuador
3. Control, Data, and Artificial Intelligence, CoDAlab Department of Mathematics, Escola d'Enginyeria de Barcelona Est, EEBE Universitat Politecnica de Catalunya. Spain
4. Institut de Matematiques de la UPC - BarcelonaTech, IMTech ` Barcelona. Spain

430 **Energy and Capacity Saving Potential in the Residential Sector of Oman**

A. AlWaaili, A. Malik
Department of Electrical and Computer Engineering Sultan Qaboos University Muscat. Sultanate of Oman

Thursday May 25th, 2023
11:00-11:45 Poster Session P3 – Coffee Break ROOM C "AEDIE"

Chairmen: **Julio Tafur Sotelo, Eloisa Torres Jiménez, Jesús Rodríguez Vázquez, Andrés Ortiz Salazar**

263 **Energy Flows Optimization in a Renewable Energy Community with Storage Systems Integration**

I. Araújo(1), A. Cerveira(2,3), J. Baptista(1,3)
1. Department of Engineering
2. Department of Mathematics
3. INESCTEC UTAD Pole University of Trás-os-Montes and Alto Douro Quinta de Prados –Vila Real. Portugal

280 **IoT-Internet of Thinks in Floating Solar Photovoltaic Systems**

Paulo Vargas(1), António Valente(1,2)
1. Department of Engineering University of Trás-os-Montes and Alto Douro Portugal
2. INESC TEC—INESC Technology and Science, Porto. Portugal

281 **Thermal and electrical performance prediction of an FSPV system: a case study in the Douro/Portugal climatic conditions**

Paulo Vargas(1), Salviano Pinto Soares(1,2), Sérgio Silva(1,3)
1. School of Sciences and Technology Engineering Department UTAD, Vila Real – Portugal
2. IEETA UA, Aveiro. Portugal
3. INESC TEC Porto. Portugal

307 **Micro Phasor Measurement Units: a Review from the Prosumer Point of View**

F. Ciancetta, A. Fioravanti, E. Fiorucci, Simone Mari, A. Prudenzi, A. Silvestri

Department of Industrial and Information Engineering and Economics University of L'Aquila. Italy

315 **Linear Fresnel reflector technology in Brazil: a techno-economic evaluation**

G.F. Azevedo(1), M. E. Lopes(1), B.A. Menezes(1), O.H.F. Rabelo(1), L.B. Brito(1), A.B. Dias(1) , A. L. F. Filho(1), E. G. Domingues(2)
1. Department of Electrical Engineering - University of Brasília Darcy Ribeiro University. Brazil
2. Electrical Engineering/Control and Automation Engineering Program – Federal Institute of Goiás. Brazil

316 **Technical-economic feasibility analysis of a large-scale parabolic trough collectors solar power plant in Brazil**

M. E. Lopes(1), G.F. Azevedo(1), B.A. Menezes(1), O.H.F. Rabelo(1), L.B. Brito(1), A.B. Dias(1), A. L. F. Filho(1), E. G. Domingues(2)
1. Department of Electrical Engineering - University of Brasília Darcy Ribeiro. Brazil
2. Electrical Engineering/Control and Automation Engineering Program - Federal Institute of Goiás. Brazil

319 **Modeling and optimization of biogas production in a batch bioreactor**

Tina Kegl(1), Eloísa Torres-Jiménez(2)
1. Faculty of Chemistry and Chemical Engineering University of Maribor. Slovenia
2. Department of Mechanical and Mining Engineering University of Jaén. Spain

325 **Optimal placement of heat exchangers in a carbon capture-based ventilation system**

J.P. Harrouz, K. Ghali, N. Ghaddar
Department of Mechanical Engineering American University of Beirut. Lebanon

326 **Use of building façade for active indoor humidity control**

K. Ghali, J.P. Harrouz, N. Ghaddar
Department of Mechanical Engineering American University of Beirut. Lebanon

335 **State of the art of the optimisation of the selection and use of renewable energies for the agricultural environment**

A. León-Vinet, E. Peñalvo-López, I. Valencia-Salazar, J. Cárcel-Carrasco
Universitat Politècnica de València, Department of Electrical Engineering. Spain

337 **Analytical model of the refrigeration system for cooling in a Hygroscopic Cycle Power Plant**

Roberto Martínez Pérez(1), Bernardo Peris Pérez(2), Juan Carlos Ríos Fernández(1), Juan M. González-Caballín(1), Francisco Rubio Serrano(3),

Antonio J. Gutiérrez Trashorras(1)
1. Energy Department Escuela Politécnica de Ingeniería Energy Building, University of Oviedo, Gijón. Spain
2. Department of Mechanical, Thermal and Fluid Engineering Escuela de Ingenierías Industriales, Málaga. Spain
3. IMATECH, IMASA Technologies, S.L.U. St. Villaviciosa de Odón, Madrid. Spain

338 **Analytical study of the absorber performance of a Hygroscopic cycle for low concentrations of LiBr solutions**

Malena Potesta González(1), Roberto Martínez Pérez(1), Andrés Meana Fernández(1), Juan M. GonzálezCaballín Sánchez(1), Francisco J. Rubio Serrano(2), Antonio J. Gutiérrez Trashorras(1)
1. Energy Department Escuela Politécnica de Ingeniería Energy Building, University of Oviedo, Gijón. Spain
2. IMATECH, IMASA Technologies, S.L.U. St. Villaviciosa de Odón, Madrid. Spain

352 **Energy Consumption Optimisation of Emergency Shelters for Ukrainian War Refugees**

Olena Rubanenko
Department of Power Station and System Vinnytsia National Technical University. Ukraine

373 **Digital Signal Processor Programming using MATLAB Simulink Embedded Coder**

N. Magro, J. R. Vázquez, A. D. Martin, R. S. Herrera
Department of Electrical Engineering, E.T.S.I., Huelva University. Spain

388 **Construction of pavers from drilling cuttings as an alternative for environmental management of waste**

J. Gómez, N. Santos, R. Martinez
Grupo de Investigación en Tomografía Computarizada-GIT Universidad Industrial de Santander, Bucaramanga. Colombia

418 **Analytical Design Methodology for Wind Power Permanent Magnet Synchronous Generators**

V. Ballestín-Bernad, J. S. Artal-Sevil, J. A. Domínguez-Navarro
Department of Electrical Engineering EINA, University of Zaragoza. Spain

Thursday May 25th, 2023

Thursday May 25th, 2023
11:45-13:00 Oral Session A4 ROOM A "*Sala de Conferencias*"

Chairman: **Kamel Ghali**

220 **Optimal active power control of wind turbines in grid-forming mode**
Bashar Mousa Melhem, Steven Liu
Institute of control systems. Kaiserslautern- Landau Technical University. Germany

347 **Very Short-Term Wind Power Forecasting Using a Hybrid LSTMMarkov Model Based on Corrected Wind Speed**
A. Nuttapat Jittratorn(1), B. Chao-Ming Huang(2),C. Hong-Tzer Yang(1)
1. Department of Electrical Engineering, National Cheng Kung University Tainan. Taiwan
2. Department of Electrical Engineering, Kun Shan University Tainan. Taiwan

387 **Preliminary Identification of the Dynamics of a Floating Offshore Wind Turbine Barge**
I. Galeote(1), S. Esteban(1), M. Santos(2)
1. Dept. of Computer Architecture and Automatics Complutense University of Madrid Faculty of Physics. Spain
2. Institute of Knowledge Engineering Complutense University of Madrid. Spain

436 **A method to assess the performance of small wind turbines**
W.-G. Früh
Institute of Mechanical, Process and Energy Engineering Heriot-Watt University, Riccarton, Edinburgh. Scotland. UK

Thursday May 25th, 2023

Thursday May 25th, 2023
11:45-13:00 Oral Session B4 ROOM B "*OPAL-RT*"

Chairman: **Milan Belik**

299 **Real-time Simulation Framework for Validating Controllers of Virtual Synchronous Generators**
M. M. R. Chowdhury, L. Stranyóczky, Z. Süto
Department of Automation and Applied Informatics, Budapest University of Technology and Economics. Hungary

383 **Modelling and Simulation of a Hydraulically Operated Solar Tracker**
C. Alexandru
Department of Product Design, Mechatronics and Environment Transilvania University of Brașov. Romania

425 **Design, Modelling and Simulation of Hybrid Vibration Energy Harvesting System using Integration of Piezoelectricity and Electro-Magnetism**
R. Embuldeniya, A. Merabet
Division of Engineering Saint Mary's University, Halifax. Canada

15:00-15:45 Plenary Session PL4 ROOM A "*Sala de Conferencias*"

Chairman: **Gorazd Štumberger**

PL4. ***Green Hydrogen Projects: From Power Point to Power Plant – Actual and Future Viable Projects***

By **Mr. Julio Hidalgo**
Head of Hydrogen Business Development, **Univergy.** Spain

Thursday May 25th, 2023

Thursday May 25th, 2023
15:45-16:30 Poster Session P4 ROOM C "AEDIE"

Chairmen: **Michael Windisch, José Yusta Loyo, Carlos Roldan Blay, Herminio Martínez García**

278 **A capacitor-free driving stage for light emitting diodes**
F.A. Himmelstoss, M. Windisch
Faculty of Electronic Engineering & Entrepreneurship University of Applied Sciences Technikum Wien. Austria

330 **Lighting characterization of an Italian beginning twentieth-century school building**
A. Moschella(1), D. Amato(2), A. Gagliano(3)
1. Department of Civil Engineering and Architecture University of Catania. Italy
2. Freelance
3. Department of Electrical, Electronic and Computer Engineering University of Catania. Italy

334 **Evaluation of XGBoost vs. other Machine Learning models for wind parameters identification**
B. García-Puente(1), A. Rodríguez-Hurtado(1), M. Santos(2), J.E. Sierra-García(3)
1. Faculty of Computer Sciences, Complutense University, Madrid. Spain
2. Institute of Knowledge Technology, Complutense University -Madrid. Spain
3. Electromechanical Engineering Department, University of Burgos. Spain

342 **Control a Photovoltaic/Wind Turbine/Diesel generator with storage battery**
D. Rekioua, K. Kakouche, T. Rekioua, Z. Mokrani
Laboratoire LTII, Département de Génie électrique, Faculté de Technologie, Université de Bejaia. Algerie

343 **Power management strategy for photovoltaic system with hybrid storage (Batteries/Supercapacitors)**
Z. Mokrani, D. Rekioua, N. Mebarki, A. Oubelaid, K. Kakouche, T. Rekioua
Laboratoire LTII, Faculté de Technologie, Université de Bejaia. Algerie

344 **Power Management Control of photovoltaic/Batteries/Fuel cells System**
D. Rekioua, F. Zaouche, Z. Mokrani, T. Rekioua
Laboratoire LTII, Faculté de Technologie, Université de Bejaia. Algerie

390 **A Qualitative method for PQ assessing: EDA tools using traditional indices and Higher-order Statistics**

P. Remigio-Carmona, O. Florencias-Oliveros, J. J. González-de-la-Rosa
Research Group PAIDI-TIC-168. Dept. of Automation Engineering, Electronics, Architecture and Computers Networks University of Cadiz. Algeciras. Spain

395 **Study of the Relationship between Temperature and Efficiency in Photovoltaic Systems**

Andres O. Salazar(1), Diego A. de M. Fonseca(1), Caio M. L. Ribeiro(1), Vinicius M. Xavier(2), Gabriela M. S. Lopes(3), Kalynne G. da S. Maciel(3)
1. Department Computer Engineering and Automation Federal University of Rio Grande do Norte Natal. Brazil
2. School of Science and Technology Federal University of Rio Grande do Norte, Natal. Brazil
3. Department of Electrical Engineering Federal University of Rio Grande do Norte Natal. Brazil

407 **Characterisation of Electrical Power Systems Based on Electrical Curves and their properties**

J. Ventura(1), F. Martínez(1), L. Castro-Santos(2), A. Filgueira-Vizoso(3), A. Alcayde(1), F. G. Montoya(1)
1. Universidad de Almería, Escuela Superior de Ingeniería. Spain
2. Universidade da Coruña, Departamento de Enxeñaría Naval e Industrial, Escola Politécnica de Enxeñaría de Ferrol. Spain
3. Universidade da Coruña. Spain

409 **The use of innovative tools in the medium-voltage grid development, a case study of Series Voltage Regulator**

B. Tozser, I. Taczi, A. Torok
Department of Electrical Engineering Budapest University of Technology and Economics. Hungary

429 **MATLAB Modeling of a Microgrid: Towards a Vision based on Entropy Balance**

Ameer Abdullah Khan, Herminio Martinez Garcia, Ángel Cuadras Tomas
Department of Electronics Engineering Escola d'Enginyeria de Barcelona Este (EEBE) Technical University of Catalonia (UPC). BarcelonaTech. Spain

434 **I-V Characteristics Measuring System for PV Generator based on PDM Inverter**

A. Sandali(1), A. Cheriti(2)
1. Department of Electrical Engineering ENSEM., Hassan II Casablanca University. Morocco
2. Department of Electrical and Computer Engineering Université du Québec.

Canada

443 **Modeling of a stand-alone solar photovoltaic water pumping system for irrigation**

J.S. Artal-Sevil, V. Ballestín-Bernad, J. Lujano-Rojas, R. Dufo-López, J.L. Bernal-Agustín
Department of Electrical Engineering. University Technical School of Engineering and Architecture. University of Zaragoza. Spain

449 **Effect of cloud transits in a stand-alone solar photovoltaic water pumping system**

J.S. Artal-Sevil(1), T. Vazquez-Pulido(2), S. Bea-Alvarez(2), R. Dufo-López(1)
1. Department of Electrical Engineering. University Technical School of Engineering and Architecture. University of Zaragoza. Spain
2. Bombeatec. Research and Development Center. Zaragoza. Spain

458 **Free Simulation Tools for Power Quality and Grid-Integration of Renewable Energies Cases**

M. Mañana, A. Arroyo, R. Martínez, S. Bustamante, A. Laso, E. Sainz
Department of Electrical and Energy Engineering. Universidad de Cantabria. Spain

Thursday May 25th, 2023

Thursday May 25th, 2023

16:30-18:00 Oral Session A5 ROOM A "*Sala de Conferencias*"

Chairman: **Domingos Simonetti**

275 **Framework to assess the stable operation of commercially available single-phase inverters for photovoltaic applications in public low voltage networks**
E. Kaufhold(1), J. Meyer(1), J. Myrzik(2), P. Schegner(1)
1. Institute of Electrical Power Systems and High Voltage Engineering TU Dresden Germany
2. Institute of Automation Technology Bremen University Bremen. Germany

323 **Implementation and Testing of a Practical Product to Balance Single-Phase Loads in a Three-Phase System at the Distribution and Unit Levels**
Moustapha El Hassan, Maged Najjar, Ramez Tohme, Jihad Daba, Rafic Ayoubi
Department of Electrical Engineering University of Balamand Kura. Lebanon

380 **STATCOM Effect on Voltage Profile of a Distributed Network Considering Two Different Measurement Positions**
E.P. Simonetti(1), S.P. Simonetti(2), L.S. Ribeiro(1), D.S.L. Simonetti(1)
1. Department of Electrical Engineering Federal University of Espirito Santo Vitória – Espírito Santo. Brazil
2. AEVO Solar. Vitória-Espírito Santo. Brazil

382 **Development and testing midpoint voltage balance algorithms of three-level inverters**
L. Stranyóczky, A. Balogh, Z. Süto, I. Varjasi
Department of Automation and Applied Informatics, Budapest University of Technology and Economics. Hungary

450 **Performance of an OVT inverter reliant on the switching frequency of the filtering inverter**
A. Muc, J. Iwaszkiewicz
Department of Ship Automation Gdynia Maritime University. Poland

Thursday May 25th, 2023

Thursday May 25th, 2023
16:30-18:00 Oral Session B5 ROOM B "*OPAL-RT*"

Chairman: **Edwin Chica Arrieta**

212 **Important indicators within decision-making process in sustainable energy transition**
K. Deželak
Environment and Energy Statistics Section Statistical Office of the Republic of Slovenia (SURS) Ljubljana. Slovenia

226 **Dynamic energy prices for residential users based on Deep Learning prediction models of consumption and renewable generation**
J. Cano-Martínez, E. Peñalvo-López, V. León-Martínez, I. Valencia-Salazar
Institute of Energy Engineering, Polytechnic University of Valencia. Spain

348 **Review of the Energy transition assessment methods in touristic municipalities**
C. Andrada-Monrós(1), E. Peñalvo-López(1), I. Valencia-Salazar(1), J. Cárcel-Carrasco(2)
1. Universitat Politècnica de València, Department of Electrical Engineering. Spain
2. Universitat Politècnica de València, Department of Architectural. Spain

362 **Modelling a Decarbonization Agenda for Bembibre's Industrial Park**
Mahamat Habib Bechir, R. Ramos Alor-Rodriguez, A. Lopez-Agüera
Department of Physics. Facultad de Física, Santiago de Compostela University. Spain

375 **Analysis of current barriers in the implementation of energy efficiency methods in the European industry**
L. Molina Cañamero, E. Peñalvo-López, I. Valencia-SalazarV. León-Martínez
Universitat Politècnica de València, Department of Electrical Engineering. Spain

20:00-23:30	**Conference Dinner (Optional)** **Hotel Preciados Restaurant** **C/ Preciados, 37. Madrid**

Friday May 26th, 2023

9:30-10:15 Plenary Session PL5 ROOM A "*Sala de Conferencias*"

Chairman: **Santiago Arnaltes Gómez**

PL5. *The review of the European electricity market design after the energy crisis of 2021/22*

By **Dr. Juan J. Alba**.
Director, Regulatory Affair. Endesa. Spain

Friday May 26th, 2023
10:15-11:00 Poster Session P5 ROOM C "AEDIE"

Chairmen: **Mark Halpin, Jesús Artal Sevil, Steven Liu, Bade Shrestha**

206 **Energy arbitrage in PV-PHS systems**
Rodolfo Dufo-López, Juan M. Lujano-Rojas, José L. Bernal-Agustín, Jesús S. Artal-Sevil, Ángel A. Bayod-Rújula
Department of Electrical Engineering E.I.N.A., Zaragoza University. Spain

207 **Electricity price arbitrage in utility-scale PV-plus-battery systems**
Rodolfo Dufo-López(1), Juan M. Lujano-Rojas(1), José L. Bernal-Agustín(1), Jesús S. Artal-Sevil(1), Ángel A. Bayod-Rújula(1), Tomás Cortés-Arcos(2), Javier Carroquino Oñate(3), Cristina Escriche Martínez(3)
1. Department of Electrical Engineering E.I.N.A., Zaragoza. Spain
2. Escuela Universitaria Politécnica de La Almunia, EUPLA, Universidad de Zaragoza. Spain
3. Intergia Energía y Sostenibilidad. Zaragoza. Spain

208 **Utility-scale renewable hydrogen generation by wind turbines**
Rodolfo Dufo-López(1), Juan M. Lujano-Rojas(1), José L. Bernal-Agustín(1), Jesús S. Artal-Sevil(1), Ángel A. Bayod-Rújula(1), Tomás Cortés-Arcos(2), Javier Carroquino Oñate(3), Cristina Escriche Martínez(3)
1. Department of Electrical Engineering E.I.N.A., Zaragoza. Spain
2. Escuela Universitaria Politécnica de La Almunia, EUPLA, Universidad de Zaragoza. Spain
3. Intergia Energía y Sostenibilidad. Zaragoza. Spain

219 **Photovoltaic assessment to achieve energy neutral buildings and cities in equatorial Andean climate**
E. Zalamea-Leon(1), A. Barragán-Escandón(2), A. Ordoñez-Castro(1)
1. Virtualtech-Facultad de Arquitectura y Urbanismo, Cuenca. Ecuador
2. Energy Research Group, Politécnica Salesiana University. Ecuador

297 **Consumption prediction and evaluation of harmonic distortion in a hospital using neural networks**

N. Tolentino(1), D. Borges(1), M. R. Albertini(1), L. P. Pires(1), F. A. Moura(1), M. V. Mendonça(1), A. J. Rosentino(1), D. Rodrigues(1), R. Rimoldi de Lima(1), P. H. Rezende(2), G. Lima(2), J. O. Rezende(3)
1. Department of Electrical Engineering Triangulo Mineiro Federal University. Brazil
2. Department of Electrical Engineering of University of Uberlândia. Brazil
3. Department of Electrical Engineering of Federal Institute of Goias. Brazil

312 **Cosine Windows in Interpolated DFT-based Method for an Accurate High-Frequency Distortion Assessment in Power Systems**

A. Bracale(1), P. Caramia(1), G. Carpinelli(2), P. De Falco(1), P. Verde (3)
1. Department of Engineering University of Naples Parthenope Centro Direzionale.
2. Retired. Former Professor of Electrical Power Systems Naples. Italy
3. Department of Electric and Information Engineering Engineering & DIAEE University of Cassino and Lazio Meridionale & La Sapienza University of Roma.

365 **Forecasting of wind turbine synthetic signals based on convolutional neural networks**

C. Blanco(1), J. E. Sierra-García(2), M. Santos(3)
1. ETSI Informática, UNED. Madrid. Spain
2. Electromechanical Engineering Department University of Burgos. Spain
3. Institute of Knowledge Technology University Computense of Madrid. Spain

378 **Modelling Wind Turbine Power Curves based on Frank's copula**

M.A. Garcia-Vaca(1), J.E. Sierra-García(2), M. Santos(3), R. Pandit(4)
1. Computer Science Faculty Complutense University of Madrid. Spain
2. Department of Electromechanical Engineering University of Burgos. Spain
3. Institute of Knowledge Technology, Complutense University of Madrid. Spain
4. Centre for Life-cycle Engineering and Management (CLEM) Cranfield University. United Kingdom

403 **Power Quality Analysis of Six Phase Indirect Matrix Converter Based on Multi Phase Generator**

Chabi S. SANNI(1,3), Augustin MPANDA(2), A. El HAJJAJI(1)
1. Laboratoire MIS, UPJV, Amiens. France
2. SYMADE, UniLaSalle Amiens. France
3. ADEME 20, Angers Cedex. France

404 **Performance evaluation of grid connected T-Type multilevel inverters**

Kevin ACADINE(1), Augustin MPANDA(2), Ahmed EL HAJJAJI(1)
1. Laboratoire MIS, UPJV, Amiens. France
2. SYMADE, UniLaSalle Amiens. France

438 **On Single-Input Dual-Output(SIDO) DC/DC Multi-Port Converters for DC Microgrid Applications**

Herminio Martínez-García, Encarna García-Vílchez
Electronic Engineering Department Eastern Barcelona School of Engineering (EEBE) Technical University of Catalonia – BarcelonaTech (UPC). Spain

446 **Performance of Resonant Chambers in Oscillating Water Column Devices**

Juan D. Parra-Quintero(1), Ainhoa Rubio-Clemente(1,2), Edwin Chica(1)
1. Grupo de Investigación Energía Alternativa, Facultad de Ingeniería, Universidad de Antioquia, Medellín. Colombia.
2. Escuela Ambiental, Facultad de Ingeniería, Universidad de Antioquia UdeA, Medellín. Colombia

447 **An experimental facility for the development of a gravitational water vortex turbine**

Johan Betancour(1), Rubio-Clemente A(1,2), Chica E(1)
1. Grupo de Investigación Energía Alternativa, Facultad de Ingeniería, Universidad de Antioquia, Medellín. Colombia.
2. Escuela Ambiental, Facultad de Ingeniería, Universidad de Antioquia UdeA, Medellín. Colombia

451 **Power Quality Analysis of Photovoltaic Systems**

M. Barreto(1), A. Guananga(1), A. Barragán(1), E. Zalamea(2), X. Serrano(1)
1. Grupo de Investigación en Energía Universidad Politécnica Salesiana. Ecuador
2. Facultad de Arquitectura y Urbanismo Universidad de Cuenca. Ecuador

453 **Modulating Functions Analysis Analysis for Wireless Data Transmission Because of Advanced Sensors In Energy-Saving Process of Washing**

J. Alan Calderón(1,2,3) , Julio C. Tafur S.(2), E. Benjamín Barriga G.(2), Jorge Alencastre(2), Alex Quispe(2), F. Alan Ccarita(2)
1. Applied Nanophysics, Institute for Physics, Technical University of Ilmenau. Germany
2. Control Engineering and Automation Master Program, Mechatronic Engineering Master Program, Engineering Department, Pontifical Catholic University of Peru
3. Aplicaciones Avanzadas en Sistema Mecatrónicos JACH S.A.C.

454 **Technical, economic, and environmental analysis to define the conditions for the implementation of charge stations, a case study in the city of Azogues - Ecuador**

E. Barragán(1), E. García(1), C. Minchala(1), E. Zalamea(2)
1. Carrera de Ingeniería Eléctrica, Universidad Politécnica Salesiana, Cuenca. Ecuador

2. Facultad de Arquitectura y Urbanismo, Universidad de Cuenca. Ecuador

456 **Output voltage control of the OVT inverter**

J. Iwaszkiewicz, A. Muc
Department of Ship Automation. Gdynia Maritime University. Poland

457 **Power Sharing Control for a Microgrid with PV Power Plants, Batteries and Quasi-Z-source Cascaded H-bridge Multilevel Inverter**

Pablo Horrillo-Quintero(1), Pablo García-Triviño(1), Raúl Sarrias-Mena(2), Carlos Andrés García-Vázquez(1), Luis M. Fernández-Ramírez(1))
1. Department of Electrical Engineering. Higher Technical School of Engineering of Algeciras (ETSI Algeciras), University of Cadiz. Spain
2. Department of Engineering in Automation, Electronics, Computer Architecture & Networks Higher Technical School of Engineering of Algeciras (ETSI Algeciras), University of Cadiz. Spain

Friday May 26th, 2023

Friday May 26th, 2023
11:00-12:00 Oral Session A6 ROOM A "*Sala de Conferencias*"

Chairman: **Alfredo Alcayde García**

306 **Correlation Between Costs of Congestion Management and Share of Renewables in the ENTSOE Continental Europe Synchronous Area**

D. Coll-Mayor(1), A. Balakhontsev(2), A. Notholt(1)
1. Technical Faculty Reutlingen University Reutlingen. Germany
2. Department of Electric Drives Dnipro University of Technology. Ukraine

350 **Battery storage technology optimisation for Ukrainian War Refugees Emergency Shelters**

Milan Belik
Department of Electrical Power Engineering University of West Bohemia, Plzen. Czech Republic

368 **Alternative Uses of Hydroelectric Power Plants in a Decarbonized Energy Scenario**

M. Remiro-Cinca, L. Elorza-Uriarte, G. Fernandez, L. Luengo-Baranguan, D. Martínez, N. Galán Hernández
Electrical Systems Department CIRCE Technology Centre, Zaragoza. Spain

Friday May 26th, 2023

Friday May 26th, 2023
11:00-12:00 Oral Session B6 ROOM B "*OPAL-RT*"

Chairman: **Laura Castro Santos**

250 **Technology S-curves in wind energy: a comparative analysis**
Fernando Estévez Garcia(1), Jeanne-Marie Dalbavie(2)
1. IKOS Iberia Madrid. Spain
2. IKOS Consulting, Levallois Perret. France

328 **Experimental and Numerical Investigation of Channeling Effects on Noise and Aerodynamic Performance of NACA 0012 Aerofoil in Wind Turbine Applications**
Hussein K. Mohammad(1,2), S. M. Jali(3,4), Arz Y. Qwam Alden(4), Viktor Kilchyk(5), Bade Shrestha(1)
1. Western Michigan University, Mechanical and Aerospace Department. USA
2. University of Tikrit, College of Science, Physics Department. Iraq
3. Michigan State University, Department of Mechanical Engineering. USA
4. University of Anbar, Engineering College, Mechanical Department. Iraq
5. Principle Aerothermal Engineer, Collins Aerospace, Windsor Locks, CT

363 **Implementation of Grid-Connected Wind Energy during Fault Analysis Using Moth Flame Optimization with Firebug Swarm Optimization**
Prasad Kumar Bandahalli Mallappa, Herminio Martínez García, Guillermo Velasco Quesada
Electronic Engineering Department Eastern Barcelona School of Engineering (EEBE) Technical University of Catalonia – BarcelonaTech (UPC). Spain

12:00– 13:00	**ROOM A *"Sala de Conferencias".* CLOSING SESSION** **Conclusions and time for the next conference (ICREPQ'24)** **Awards for the three best posters**
13:00 – 14:30	**Farewell Lunch**
14:30 – 20:30	**Cultural Visit to Toledo**