

# FINAL FULL PROGRAMME

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## MONDAY 4/11

**9:00 – 11:00 PLENARY OPENING SESSION**

**Chairs: Nikos Hatziargyriou, Apostolos Kokkosis**

**Welcome Speeches:**

**Ioannis Koutras, IET Hellas Local Network**

**Christos Christou, IET Cyprus Local Network**

**Brian Azzopardi, Malta Group of Professional Engineering Institutions (MGPEI)**

**Jovica V Milanović, VP Publications, IEEE Governing Board,**

**Opening Speeches**

**Konstantin Papailiou, President of CIGRE**

**Manos Manousakis, Chairman and CEO of Independent Power Transmission Operator (IPTO)**

**11:00 - 11:30 *Coffee Break***

**11:30 – 13:30 Super Session**

**Massive electrification for achieving NetZero Grid: Challenges and Opportunities**

**Moderator: Mladen Kezunovic, Texas A&M University, USA**

In the European Union (EU), the “clean energy for all Europeans” package in 2016 and the REPowerEU in 2022 aim to accelerate the transition to clean energy and enhance energy efficiency. This effort comprises several key directives and regulations (e.g., Renewable Energy Directive – 2018/2001/EU, Energy Efficiency Directive – 2018/2002/EU, Electricity Market design – 2019/943/EU), investments, and partnerships. Key objectives were increasing the share of renewable energy source (RES) to at least 32% by 2030, improving energy efficiency to reduce energy consumption by 32.5% by 2030, enhancing consumer rights and protections in the energy market, and promoting greater integration and competition in the electricity market.

The leading experts in the power systems will elaborate on how the massive electrification expected in the future may impact the NetZero goals, and how such goals were achieved in the different regions around the world. The examples and expertise will illustrate possible ways how the different countries in the Mediterranean Region may approach the NetZero goals.

### **Honorary speakers:**

**Vera Silva**, Chief Strategy and Technology Officer of GE Vernova's Electrification Systems,

**Andreas Poullikkas**, past-Chairman of the Cyprus Energy Regulatory Authority,

**Pantelis Capros**, Emeritus Professor at National Technical University of Athens,

**Antonio Iliceto**, CIGRE - Chair SC C1, ENTSO-E, MedTSO Terna Group, Italian TSO,

**Antonello Monti**, Professor, Director in Institute for Automation of Complex Power System at RWTH Aachen University

**13:30 – 14:30 Lunch**

**14:30 – 16:00**

### **PS1. Energy Demand Clustering and Monitoring**

**Chair: Fotios Kanellos** (Technical University of Crete)

[0578] Vassiliki Mpelogianni (PPC Group), Eleni Boukouvala (PPC Group), Kyriakos Pantziris (PPC Group) and Iraklis Skoteinos (PPC Group). ***Unveiling Patterns: Time Series Clustering of Energy Consumption in the Greek Energy Sector.***

[6415] Luis Lopez (Carleton University) and Kristen Schell (Carleton University). ***Data-Driven Power Demand Disaggregation to the Substation Level.***

[3201] Junxi Hua (ARUP), Mert Kesici (Imperial College London) and Bikash Pal (Imperial College London). ***Privacy-Preserving Energy Theft Detection Based on Federated Learning.***

[8726] Alexandre Gouveia (KU Leuven), Reinhilde D'Hulst (VITO), Md. Umar Hashmi (KU Leuven) and Dirk Van Hertem (KU Leuven). ***Data-driven Photovoltaic Installed Capacity Detection at Low Voltage Substation Level.***

[9984] Diogo Viana (Universidade de Trás-os-Montes e Alto Douro), Rita Teixeira (University of Trás-os-Montes and Alto Douro), José Baptista (University of Trás-os-Montes and Alto Douro / CPES -INESCTEC UTAD Pole) and Tiago Pinto (Universidade de Trás-os-Montes e Alto Douro / INESC-TEC). ***Synthetic time series data generation using deep learning models.***

[0743] Pourandokht Behrouz (National Technical University of Athens), Alireza Khaksari (National Technical University of Athens), Aris Pagourtzis (National Technical University of Athens), Orestis Konstantinidis (National Technical University of Athens) and Marianna Spyrou (National Technical University of Athens). ***Privacy-Preserving Methods for Smart Meter Data - A Systematization of Knowledge.***

## **PS2. Flexibility by DER**

**Chair: Dimitris Papadaskalopoulos, (University of Patras)**

[7247] Christos Kaskouras (Department of Statistics, Athens University of Economics and Business, Athens 10434, Greece), Konstantinos Krommydas (Research, Technology and Development Department, Independent Power Transmission Operator S.A., Athens 10443, Greece), Ioannis Baltas (Department of Financial and Management Engineering, University of Aegean, Chios 82100, Greece), George Papaioannou (Center for Research and Applications of Nonlinear Systems, CRANS, University of Patras, Rion 26504, Greece), Georgios Papayiannis (Department of Statistics and Insurance Science, University of Piraeus, Piraeus 18534, Greece) and Athanasios Yannacopoulos (Department of Statistics, Athens University of Economics and Business, Athens 10434, Greece). ***A New Approach on Conducting Flexibility Studies Based on Neural Networks – Application on the Hellenic Transmission System.***

[2278] Costas Mylonas (UBITECH), Donata Boric (KONCAR-Digital Ltd.), Leila Luttenberger Maric (KONCAR-Digital Ltd.), Alexandros Tsitsanis (Suite5 Data Intelligence Solutions), Eleftheria Petrianou (UBITECH) and Magda Foti (UBITECH). ***Empowering Aggregators with Practical Data-Driven Tools: Harnessing Aggregated and Disaggregated Flexibility for Demand Response.***

[2546] Dimitra Kyriakou (Technical University of Crete) and Fotios Kanellos (Technical University of Crete). ***Efficient real-time optimal power management of large-scale building prosumers.***

[4474] Zunaib Ali (London Southbank University), Raheel Tariq (London Southbank University), Komal Saleem (University of East London) and Nicholas Christofides (Frederick University, Cyprus). ***Navigating the impact of huge electrical demand on grid through intelligently controlled renewables and emerging V2G technology.***

[7641] Emmanuel Karapidakis (Hellenic Mediterranean University), Marini Markaki (Hellenic Mediterranean University), Marios Nikologiannis (Hellenic Mediterranean University) and Georgios Kouzoukas (Chalkiadakis S. A.). ***Optimum Utilization of Renewable Energy to Generate Electricity for chain-markets in Crete.***

[8939] Melina Gurcke (Hochschule Bielefeld – University of Applied Sciences and Arts), Mara Cziomer (Hochschule Bielefeld – University of Applied Sciences and Arts), Katrin Schulte (Hochschule Bielefeld – University of Applied Sciences and Arts) and Jens Haubrock (Hochschule Bielefeld – University of Applied Sciences and Arts). ***Grid-Assistive Use of Private Battery Energy Storage Systems based on Fuzzy Logic.***

### **PS3. Distribution Management Systems and Distribution Grids**

**Chair: Brian Azzopardi,** (Malta College of Arts, Science and Technology (MCAST))

[0024] Antonin Colot (University of Liège), Bertrand Cornélusse (University of Liège), Jorge Cortés (University of California San Diego) and Emiliano Dall'Anese (University of Colorado Boulder). ***Feedback-based safe gradient flow for optimal regulation of virtual power plants.***

[6503] Saad A Alyoubi (University of Manchester) and Jovica V Milanović (University of Manchester). ***Dynamic Interactions of Active Distribution Network and Transmission Network at Multiple Grid Supply Points.***

[2250] Pelin Angin (Middle East Technical University), Alparslan Zehir (Marmara University), Oguzhan Ceylan (Kadir Has University), Murat Can Yuksel (Boğaziçi EDAŞ (DSO)), Umur Deveci (Boğaziçi EDAŞ (DSO)), Seyit Cem Yilmaz (Boğaziçi EDAŞ (DSO)) and Murat Gol (Middle East Technical University). ***Permissioned Blockchain Based Monitoring Framework for Distribution Networks.***

[8484] Periklis Chinaris (School of Electrical and Computer Engineering, National Technical University of Athens (NTUA)), Georgios Psarros (School of Electrical and Computer Engineering, National Technical University of Athens (NTUA)), Pantelis Dratsas (School of Electrical and Computer Engineering, National Technical University of Athens (NTUA)) and Stavros Papathanassiou (School of Electrical and Computer Engineering, National Technical University of Athens (NTUA)). ***Front- and behind-the-meter storage needs of the Greek power system under high RES penetration levels.***

[7001] Vassilis Nikolaidis (School of Electrical and Computer Engineering, National Technical University of Athens) and Konstantinos Michailidis (Department of Electrical and Computer Engineering, Democritus University of Thrace). ***Coordinated Control of Load Tap Changers and Distributed Energy Resources for Voltage Regulation in Active Distribution Systems.***

[8948] Miltos Alamaniotis (University of Texas at San Antonio). ***Intelligent Management of Integrated Energy Systems in Remote Maritime Environments Utilizing Fuzzy Modes .***

## PS4. Forecasting

**Chair: Alexis Polycarpou** (Frederick University)

[0121] Iasonas Kouveliotis-Lysikatos (University of Peloponnese), Panagiotis-Christos Kotsias (KTH Royal Institute of Technology) and Mikael Amelin (KTH Royal Institute of Technology). ***Forecasting Electricity Prices for Intraday Markets using Machine Learning***

[5231] George Sideratos (National Technical University of Athens), Aris Evangelos Dimeas (National Technical University of Athens) and Nikos Hatziargyriou (National Technical University of Athens). ***Solar power nowcasting and short-term forecasting using satellite images and deep learning advances.***

[4533] Ioannis Bazionis (National Technical University of Athens) and Pavlos Georgilakis (National Technical University of Athens). ***LSTM-Based Hybrid Approaches for Short-Term Photovoltaic Power Forecasting***

[9058] Maja Celeska Krstevska (University of Ss. Cyril and Methodius in Skopje, Faculty of Electrical Engineering and Information Technologies), Mare Srbinovska (University of Ss. Cyril and Methodius in Skopje, Faculty of Electrical Engineering and Information Technologies), Vesna Andova (University of Ss. Cyril and Methodius in Skopje, Faculty of Electrical Engineering and Information Technologies), Petar Krstevski (University of Ss. Cyril and Methodius in Skopje, Faculty of Electrical Engineering and Information Technologies) and Aleksandra Krkoleva Mateska (University of Ss. Cyril and Methodius in Skopje, Faculty of Electrical Engineering and Information Technologies). ***Energy Production Forecast for the purpose of a Technical Virtual Power Plant.***

[4003] Georgios Vontzos (Department of Electrical and Computer Engineering, University of Thessaly, Volos), Vasileios Laitos (Department of Electrical and Computer Engineering, University of Thessaly, Volos), Paschalis Paraschoudis (Department of Energy Systems, University of Thessaly, Larisa) and Dimitrios Bargiotas (Department of Electrical and Computer Engineering, University of Thessaly, Volos). ***Energy usage prediction with Graph Recurrent Neural Networks (GRNN): Case study of Greek Islands.***

[2790] Markos A. Kousounadis-Knousen (National Technical University of Athens) and Pavlos S. Georgilakis (National Technical University of Athens). ***A fully co-optimized hybrid approach for short-term PV power forecasting that addresses the challenges of diurnal trends and residuals.***

**16:00 – 16:30 Coffee Break**

16.30-18.00

## PS5. Integrated Energy Systems

Chair: Hannu Laaksonen (University of Vaasa)

[1641] Arman Alahyari (Newcastle university), Liaz Sutto (Bristol university), Haris Patsios (Newcastle university) and Philip Taylor (Bristol university). ***Understanding the Impact of Weather Conditions on the Future Electrified Transportation and Distribution Grids: A Case Study of Northeast UK.***

[3811] Paul Maximilian Röhrig (RWTH Aachen - IAEW). ***Investigation of the influence of hybrid heating technologies on the development path of gas networks in the context of the municipal energy transition.***

[9997] Akshaya Tammanur Ravi (Research Institute of Sweden), Yelena Vardanyan (Research Institute of Sweden) and Henrik Lindståhl (Tekniska verken i Linköping AB). ***Optimal operation and analysis of a district heating supplier's portfolio: The Swedish case.***

[9868] Federico Pedroletti (Autoguidove S.p.A, Milan, Italy), Andrea Di Martino (Politecnico di Milano, Dept. of Energy, Milan, Italy), Michela Longo (Politecnico di Milano, Dept. of Energy, Milan, Italy), Stefano Rossi (Autoguidove S.p.A, Milan, Italy) and Dario Zaninelli (Politecnico di Milano, Dept. of Energy, Milan, Italy). ***Electric Bus as a Service: Techno Economic Evaluation of e-Bus Procurement Models.***

[1397] Sahar Seyyedeh-Barhagh (University of Vaasa), Hosna Khajeh (University of Vaasa), Hannu Laaksonen (University of Vaasa) and Mazaher Karimi (University of Vaasa). ***Optimization of a Multi-Energy System with the Application of Info-Gap Approach in Different Risk Attitudes.***

[8881] Lina Fischer (Institute for High Voltage Equipment and Grids Digitalization and Energy Economics, RWTH Aachen University), Samuel Koblinger (Institute for High Voltage Equipment and Grids Digitalization and Energy Economics, RWTH Aachen University) and Albert Moser (Institute for High Voltage Equipment and Grids Digitalization and Energy Economics, RWTH Aachen University). ***Impact of Demand Uncertainties on the Optimal Design of the Integrated Energy System: Determining No-Regret Infrastructure Needs.***

## PS6. High Voltage Engineering

Chair: Constantinos Psomopoulos (University of West Attica)

[9124] Robert Madarasz (Megger Ltd). ***3-Level Strategy of Insulation Status Monitoring for Critical HV Motors and Generators.***

[8665] Ivan Vujovic (power systems and telecommunications), Zeljko Djuricic (power systems) and Mladen Koprivica (telecommunications). ***Design and monitoring of a large data center lightning protection system.***

[2485] Thaleia Flessa (Castalia Technologies SMPC), George Bonias (Castalia Technologies SMPC), Angelos Skembris (Castalia Technologies SMPC), Despoina Makrygiorgou (Independent Power Transmission Operator) and Dimitris Melissaris (Independent Power Transmission Operator). ***A Framework for the Robotic Automation of Ultra-High Voltage Substation Inspection Tasks.***

[8210] Nikolaos Karanikiotis (Aristotle University of Thessaloniki) and Pantelis Mikropoulos (Aristotle University of Thessaloniki). ***Investigation on electrical discharge growth over solid insulating surfaces using a 3D fractal-based model.***

[0173] Konstantina Kouteri (University of West Attica, Department of Electrical and Electronics Engineering), Dimitrios Barkas (University of West Attica, Department of Electrical and Electronics Engineering), Apostolos Kokkosis (University of West Attica, Department of Electrical and Electronics Engineering) and Constantinos Psomopoulos (University of West Attica, Department of Electrical and Electronics Engineering). ***Critical Comparison of SF6 Alternative Insulating Gases and their Potential for replacing SF6.***

[3913] Petros Tsouris (Aristotle University of Thessaloniki) and Pantelis Mikropoulos (Aristotle University of Thessaloniki). ***Lightning impulse flashover modelling of a typical MV porcelain insulator using ATP-EMTP: Application to a MV overhead distribution line.***

## **PS7. Power Quality and Efficiency**

**Chair: Christos Christodoulou (National Technical University of Athens)**

[8185] Fayezeah Mahmoudnezhad (Escuela Tecnica Superior de Ingenieros Industriales Universidad Politecnica de Madrid), Araceli Hernández (Escuela Tecnica Superior de Ingenieros Industriales Universidad Politecnica de Madrid), Alberto Contreras (Escuela Tecnica Superior de Ingenieros Industriales Universidad Politecnica de Madrid) and Pablo Rodríguez-Pajarón (EDP Innovation). ***Interaction Between Harmonic Current Injections from Residential Loads and Electric Vehicles in Low Voltage Networks.***

[5263] Alexis Polycarpou (Frederick University) and Marios S. Georgiou (Nicosia Municipality). ***Energy and Cost Benefits of Advanced Lighting Technology Applications in Traffic Light Systems.***

[6369] Anastasios Dimitrakis (National Technical University of Athens), Evangelos-Nikolaos D. Madias (National Technical University of Athens), Athanasios Kotsenos (National Technical University of Athens) and Frangiskos V. Topalis (National Technical University of Athens). ***Advancements Energy Saving, Enhanced Public Safety and Improved Quality of Life with Sensor-Based Street Lighting Systems Enabled by IoT Technologies.***

[1369] Styliani Sarri (Hellenic Electricity Distribution Network Operator (HEDNO)). ***Impact of Renewable Energy Penetration on the Greek Distribution Network.***

[9863] Evangelos-Nikolaos Madias (Lighting Laboratory, School of Electrical & Computer Engineering, National Technical University of Athens), Athanasios Kotsenos (School of Architecture, National Technical University of Athens), Anastasios Dimitrakis (Lighting Laboratory, School of Electrical & Computer Engineering, National Technical University of Athens), Christos Christodoulou (High Voltage Laboratory, School of Electrical & Computer Engineering, National Technical University of Athens), Ioannis Gonos (High Voltage Laboratory, School of Electrical & Computer Engineering, National Technical University of Athens) and Lambros Doulos (School of Applied Arts & Sustainable Design, Hellenic Open University). ***Evaluation of temporal light artefacts in tunable white solid-state light sources.***

[3207] Egil Schultz (Department of Electrical Engineering, Uppsala University) and Karin Thomas (Department of Electrical Engineering, Uppsala University). ***Mapping grid impedance effect by aggregated loads in LV grids.***

## **PS8. Energy and Ancillary Services Markets**

**Chair: Antonis Papavassiliou** (National Technical University of Athens)

### ***Invited Speech***

Iraklis Skotinos (PPC Group) ***Balancing Market in Greece: current status & evolution***

[0240] Shilpa Bindu (Universidad Pontificia de Comillas), José Pablo Chaves Ávila (Universidad Pontificia de Comillas), Luis Olmos (Universidad Pontificia de Comillas) and Tomás Gómez San Román (Universidad Pontificia de Comillas). ***The need for system balance restoration after congestion management: An examination of Iberian congestion management markets.***

[0655] Georgios Papazoglou (School of Electrical & Computer Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece), Aikaterini Forouli (Department of Strategy & Business Development, Hellenic Energy Exchange S.A., Athens, Greece), Emmanouil Bakirtzis (Department of Strategy & Business Development, Hellenic Energy Exchange S.A., Athens, Greece), Pandelis Biskas (School of Electrical & Computer Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece) and Anastasios Bakirtzis (School of Electrical & Computer Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece). ***Novel market desings for flexibility trading: a scalability analysis for the Day Ahead market.***

[2186] Ilias Stavropoulos (Independent. Power Transmission Operator), Efthymios Karangelos (National Technical University of Athens / University of Liege) and Anthony Papavasiliou (National Technical University of Athens). ***Cost Sharing Methodologies for Remedial Actions in Cross-Border Cooperation between Electricity Transmission System Operators.***



[6021] Su-Won Ryu (Korea Institute of Energy Technology (KENTECH), Korea Power Exchange (KPX)), Hae-Min Ju (Korea Institute of Energy Technology (KENTECH)), Se-Eun Lee (Gwangju Institute of Science Technology (GIST)), Seung-II Moon (Korea Institute of Energy Technology (KENTECH)) and Gyu-Sub Lee (Seoul National University (SNU)). *An Analysis of Social Welfare and Profitability in VPP Bidding Strategies on Korean Power Market.*

[9277] Konstantinos Moustakas (Hellenic Energy Exchange S. A.), Georgios K. Papazoglou (School of Electrical and Computer Engineering, Aristotle University of Thessaloniki), Emmanouil A. Bakirtzis (Hellenic Energy Exchange S. A.), Efthymios Karangelos (School of Electrical and Computer Engineering, National Technical University of Athens) and Anthony Papavasiliou (School of Electrical and Computer Engineering, National Technical University of Athens). *Impact Assessment of the Order Types Mix in the Greek Day-Ahead Electricity Market.*

## **TUESDAY 5/11**

### **9:00 – 11:00 KEYNOTE SPEECHES**

**Chair: João A. Peças Lopes** (University of Porto)

#### **Keynote 1. Holistic approach to stability analysis of sustainable power systems**

**Jovica V Milanović, University of Manchester**

Due to the evident climate change and environmental pressures the future power/energy systems will have to operate, sooner rather than later, in a net-zero environment. This will manifest in a mix of wide range of electricity generation, storage and demand technologies (increasingly power electronics interfaced); blurred boundaries between transmission and distribution system; significantly higher reliance on the use of legacy and measurement data including global signals for system identification, characterization and control and Information and Communication Technology embedded within the power system network and its components. The key characteristics of such a complex system, would certainly be proliferation of power electronic devices in different shapes and forms and for different purposes, increased uncertainties in system operation and parameters and much larger reliance on the use of measurement and other data collected.

This presentation will first briefly introduce some of the key characteristics of future net-zero, sustainable power systems and the need for holistic approach to solving the identified challenges and then illustrate as an example a holistic approach to dynamic analysis of net zero power systems focusing on applications of nondeterministic approaches, use of data analytics and machine learnin

## **Keynote 2. Physics and ML/AI meet to manage uncertainties on the path to reliable decarbonization**

**Marija Ilic, Massachusetts Institute of Technology (M.I.T.)**

In this talk we first describe different new major sources of uncertainties, such as intermittent resources, and (N-k) equipment outages caused by climate effects on the infrastructure during extreme weather conditions, and even by the cyber-attacks on the grid. In addition, parts of the world which have undergone industry restructuring of one form or the other have electric energy markets in which stakeholders' actions are the very sources of uncertainties to both system operators/planners and to the other stakeholders. We suggest that planning and operating for reliable and resilient, cost-effective electricity services in such environment requires systematic information processing needed to support probabilistic decision-making in feedforward manner by both utilities and stakeholders, such as reinforcement learning and model predictive control. At the same time, it becomes necessary to enable more adaptive automated feedback control by the diverse grid users to avoid fast instabilities and cascading. We discuss how a Dynamic Monitoring and Decision Systems (DyMonDS) framework evolves from today's Supervisory Control and Data Acquisition (SCADA) as a way to gather and use data and convert into minimal information needed to ensure reliable and clean, yet cost-effective, service.

The good news is that sensing, monitoring and computing technologies have advanced, and it is becoming possible to implement such dynamic data-enabled protocols. Missing is an integration framework based on standardized physics-supported information exchange. In this talk we share our new unified modeling of energy dynamics which can be used to support standardized information processing and exchange. We provide several examples of what may go wrong without such information exchange, and provide quantifiable benefits from having it. Notably, the proposed DyMonDS framework is shown to be a natural evolution from today's Automatic Generation Control. It supports a synergic use of physics and ML.

## **Keynote 3. Stability Modelling and Analysis of Converter Driven Power System**

**Bikash Pal, Imperial College London (ICL)**

The number of power electronics converters connected to electrical networks has been growing exponentially as they are part of all new generation connected to the grid. While the rapid control and fast electronic switching available with this technology offer flexibility in network operation, the dynamic interactions between several of them threaten the operational stability of the transmission grid is a concern. It is required to develop a methodology for identifying the risks associated with the stability and control interaction before a new power electronic device (e.g. Windfarm, interconnector, STATCOM) is introduced to the network

The talk will focus on an analytical framework in impedance domain to quantify the interaction between the new plant and the rest of the network for setting additional grid connection study specifications which will include detail technical study to check and mitigate the risks associated with new power electronics interfaced generation. The framework developed is to support MMC technology, control delay, system strength and FRT capability of dynamic voltage support devices and windfarm through technical case study conducted at the research group of Bikash Pal at Imperial College London. Future research challenges and opportunities will be highlighted.

**11:00 – 11:30 Coffee Break**

**11:30 – 13:30**

**PANEL 1. EU-India collaboration for smarter energy systems: The RE-EMPOWERED and SUSTENANCE projects**

India is undertaking ambitious policies for the energy transition, while striving to increase electricity access and reliability of supply. The country has become one of the largest PV markets globally, with large-scale solar farms and rooftop installations growing rapidly, while it is also a major player in wind energy and biomass. Moreover, it has made significant progress in rural electrification and the development of microgrids over the past decade. To facilitate this process, international collaborative research projects are currently taking place. The EU-India RE-EMPOWERED project is developing and demonstrating novel tools for microgrids / energy islands, including planning and operation tools, digital platforms, power electronic converters etc. The EU-India SUSTENANCE project develops smart technological concepts to allow higher share of local renewable energy and efficient integrated energy solutions for the electrical, heat, water, waste as well as transportation infrastructure. The developed solutions/methods have been tailored to the specific needs of pilot cases in India and EU but aim at a wide target group for replication and exploitation in both the developed and developing world. This session will present the final outcomes of these two India-EU projects, highlighting the main achievements and lessons learnt.

**Moderators**

**Panos Kotsampopoulos**, National Technical University of Athens (NTUA), Greece

**Birgitte Bak-Jensen**, Aalborg University, Denmark

**Panelists:**

**Bikash Pal**, Imperial College London (ICL)

**Athanasios Vasilakis**, National Technical University of Athens

George Milionis, National Technical University of Athens

**Aysegul Kahraman**, Technical University of Denmark (DTU)

**Srinivas Bhaskar Karanki**, Indian Institute of Technology Bhubaneswar

**Krzysztof Rafał**, Polish Academy of Sciences.

**PANEL 2. Resilience Against Natural Disasters and Extreme Weather: Innovations, Applications and Policies in Power Systems**

In an era characterized by increasing reliance on interconnected electrical grids and growing threats from climate change, cyber-attacks, and other disruptive events, the need for resilient power systems has never been more critical. Hosted by the R2D2 ([“Reliability, Resilience and Defense technology for the grid”](#)) Horizon Europe project, this panel session brings together leading experts from academia, industry, and research institutions to explore the latest technological advancements and future challenges in power system resilience. The panelists will present a wide range of topics on technological innovations driving advancements in power system resilience. From advanced monitoring and control systems to the integration of renewable energy sources and the deployment of microgrids, data analytics and data-

driven applications, risk-aware investment planning and policy and regulatory frameworks, the panel will showcase cutting-edge solutions and real-world examples that enhance grid resilience and adaptability to uncertain system and climatic conditions.

**Moderator:**

**Mathaios Panteli**, KIOS Research and Innovation Centre of Excellence, University of Cyprus

**Panelists:**

**Nuno de Souza e Silva** R&D Nester, Portugal,

Key challenges for operating future grids under a carbon-neutral Europe

**George Andreakos** Hellenic Distribution Network Operator (HEDNO), Greece,

HEDNO: Climate Resilience Strategy

**Jin Zhao**, Trinity College Dublin, Ireland,

Building Machine Learning Supported Resilient Power Grids

**Maria Fotopoulou**, Centre for Research and Technology Hellas (CERTH), Greece, Resilient, reliable and secure power systems: the eFORT project

**Dimitris N. Trakas**, SMPnet,

Operational and Infrastructure Planning to Enhance Resilience

**Aleksandra Krkoleva Mateska**, Ss Cyril and Methodius University, North Macedonia, Regulatory Frameworks and Standards for Resilient Power Systems

### **PANEL 3. Energy Data Spaces**

The *Energy Data Spaces* panel will explore the transformative potential of data integration and sharing within the power and energy sector. By leveraging Energy Data Spaces, power system engineers, industry leaders and policymakers can enhance collaboration, optimize energy systems, and drive innovation in the power system value chain. Key experts from the Power and Energy community will present their insights from their active involvement in the Energy Data Spaces Cluster of Projects. The panel will address key issues such as data accessibility in a decentralized energy system, security and privacy of prosumer data, valorisation and business models for data sharing, the role of artificial intelligence in managing complex energy data, et al. The emerging discussion will address key Technical, Engagement and Business challenges. Participants will gain insights into how data spaces can support sustainable energy transition, improve efficiency, and foster more resilient and intelligent smart grids.

**Moderator**

**Aris Dimeas**, National Technical University of Athens (NTUA), Greece

**Panelists**

**Elena Boskov Kovacs**, Blueprint Energy Solutions, Austria

**Martina Galluccio**, RINA Consulting Spa, Italy

**Massimo Bertoncini**, Engineering Ingegneria Informatica, Italy

**Antonello Monti**, RWTH Aachen University, Germany

**Tasos Tsitsanis**, Suite5 Data Intelligence Solutions Limited, Greece

**Georg Hartner**

**13:30 – 14:30 Lunch Break**

**14:30 – 16:00**

#### **PANEL 4. Advanced simulation and laboratory methods in power systems**

In the complex digital and multi-energy era, the role of simulation and testing is expected to play an increasingly important role. Advanced simulation and laboratory methods and tools are needed in order to analyse complex interactions and effectively test hardware equipment. Examples of such approaches are hardware in the loop simulation, digital twins and various digital tools/services. This panel will explore next-generation research infrastructure methods, tools, and digital services. Advances on hardware in the loop simulation will be presented, focusing on recent standardization activities. Distributed simulations across different research infrastructures will be discussed, along with a live demonstration, based on the H2020 ERIGrid 2.0 project experiences. The role of digital twin as the next step in simulation and advanced test-bed will be explained. The panel will include important insights from the industry (vendors and users)

#### **Moderator**

**Panos Kotsampopoulos**, National Technical University of Athens (NTUA), Greece

#### **Panelists**

**Thomas Strasser**, AIT Austrian Institute of Technology, Austria

**Natalie Samovich**, MCPV.eu,

**Georg Lauss**, AIT Austrian Institute of Technology, Austria

**Giuseppe Silano**, Ricerca sul Sistema Energetico (RSE), Italy

**Marija Stevic**, OPAL-RT Germany

**Vasileios Kleftakis**, PROTASIS S.A., Greece

#### **PS9. Energy Storage**

**Chair: John Karakitsios** (National Technical University of Athens)

[1263] Pantelis Dratsas (School of Electrical and Computer Engineering, National Technical University of Athens), Georgios Psarros (School of Electrical and Computer Engineering, National Technical University of Athens) and Stavros Papathanassiou (School of Electrical and Computer Engineering, National Technical University of Athens). *Energy Storage Capacity Credit Variation with System Adequacy*.

[8852] Konstantinos Krommydas (Independent Power Transmission Operator), Akylas Stratigakos (Imperial College London), Efthimia Chassioti (Independent Power Transmission Operator) and Ioannis Moraitis (Independent Power Transmission Operator). ***A Two-Stage Stochastic Unit-Commitment Formulation for Evaluating the Impact of Battery Energy Storage Systems on Reserve Requirements.***

[6133] Athanasios Zournatzis (School of Electrical and Computer Engineering, National Technical University of Athens), Vassiliki Kontargyri (Department of Electrical and Electronics Engineering, Faculty of Engineering, University of West Attica), Eleni Nicolopoulou (School of Electrical and Computer Engineering, National Technical University of Athens) and Christos Christodoulou (School of Electrical and Computer Engineering, National Technical University of Athens). ***Optimizing the Operation of Energy Storage Systems Using Artificial Intelligence for Economic Performance and Energy Transition.***

[8083] Dhanuja Lekshmi J (University of Bristol), Philip C Taylor (University of Bristol), Antonios Banos (University of Bristol) and Thomas B Scott (University of Bristol). ***Lower Carbon Power Systems Through Longer Duration Energy Storage: Hydrogen in Depleted Uranium (HyDUS) .***

[8395] Kypros Tillyros (Frederick University, Cyprus), Michalis Komodromos (Frederick University, Cyprus) and Nicholas Christofides (Frederick University, Cyprus). ***Battery Storage at Home: Assessing Feasibility and Viability for Residential Energy Solutions.***

[8561] Panagiotis Nastoulis (Department of Electrical and Computer Engineering, National Technical University of Athens, Greece), Olga Schina (Department of Electrical and Computer Engineering, National Technical University of Athens, Greece), Georgios Psarros (Department of Electrical and Computer Engineering, National Technical University of Athens, Greece) and Stavros Papathanassiou (Department of Electrical and Computer Engineering, National Technical University of Athens, Greece). ***Sizing of PV-BESS Systems for Industrial Consumers.***

## **PS10. Local Energy Communities – Local Energy Markets**

**Chair: José Pablo Chaves Ávila** (Universidad Pontificia Comillas)

[0882] Thomas Stegen (Université de Liège), Mevludin Glavic (Université de Liège) and Bertrand Cornélusse (Université de Liège). ***Impact of DER investment capacities on the carbon footprint of renewable energy communities.***

[7726] João Sousa (INESC TEC), Alexandre Lucas (INESC TEC) and José Villar (INESC TEC). ***Maximization of Self-consumption in Energy Communities.***

[8349] Eliana Carolina Ormeño Mejía (Instituto de Investigación Tecnológica (IIT)), Matteo Troncia (Instituto de Investigación Tecnológica (IIT)), José Pablo Chaves Ávila (Instituto de Investigación Tecnológica (IIT)) and Orlando Mauricio Valarezo Rivera (Instituto de Investigación Tecnológica (IIT)). ***Integrating third-party flexibility resources into distribution networks: A quantitative assessment on the combined potential of network tariffs and local markets.***

[5737] Matteo Troncia (Instituto de Investigación Tecnológica (IIT), Universidad Pontificia Comillas), José Pablo Chaves-Ávila (Instituto de Investigación Tecnológica (IIT), Universidad Pontificia Comillas), Tommaso Ferrucci (DESTEC, University of Pisa), Dimitrios Lagos (IREC Catalonia Institute for Energy Research), Sotirios Pantelis (Electrical and Computer Engineering Department, University of Patras) and Josh Eichman (IREC Catalonia Institute for Energy Research). ***Integrating Energy Communities into the Electricity Market: Overcoming Barriers and Enhancing Flexibility in Spain, Italy, and Greece.***

[9314] Carlos Pereira (INESC TEC) and José Villar (INESC TEC). ***A new semantic framework for fast and easy interoperability and its application to energy services .***

[5705] Dimitrios Stamatakis (University of West Attica (UNIWA)), Dimitrios Kogias (University of West Attica (UNIWA)) and Eleni-Aikaterini Leligkou (University of West Attica (UNIWA)). ***Genera: A Serious Game Leveraging Blockchain Technology for Renewable Energy Education.***

## **PANEL 5. Ensuring Flexibility, Stability and Controllability of Power Grids in the Energy Transition: The TRANSIT project**

As part of the Horizon Europe project TRANSIT, this panel will explore innovative strategies to enhance the flexibility, stability, and controllability of power grids amidst the ongoing energy transition.

Bringing together leading experts and professionals from renowned international institutions, this session aims to discuss key challenges and opportunities on how to effectively monitor, manage and optimize power grids to support the increasing integration of renewable energy.

Attendees will gain insights into the TRANSIT project's approaches to addressing the challenges posed by the energy transition, ensuring reliable and efficient power grid performance. From flexible demand-side management to wide area monitoring and control, this session will delve into cutting-edge research and innovative strategies shaping the future of power systems.

Join us for insightful discussions and collaboration towards sustainable and efficient energy solutions for future power grids.

### **Moderator**

**Araceli Hernández**, Universidad Politécnica de Madrid, Spain

### **Panelists**

**Brian Azzopardi**, Malta College of Arts, Science and Technology (MCAST),  
*Shaping the Future of Power Grids for a Sustainable Energy Transition through TRANSIT Project*

**Markos Asprou**, KIOS, University of Cyprus,  
*Real Time Monitoring and Control of Future Power Systems*

**José Miguel Riquelme**, Universidad de Sevilla, Spain,  
*Flexible Operation of Storageless Grid-connected Photovoltaic Systems for Frequency Support*

**Igor Kuzle**, University of Zagreb, Croatia,

*Fast Frequency Control in Low-Inertia Power Systems*

**Petar Krstevski**, Ss Cyril and Methodius University, North Macedonia,

*Regional Electricity Balancing Markets – Integration of Flexibility from RES generation, Demand Response and Storage*

**16.00-16.30 Coffee Break**

**16.30-18.00**

## **PS11. DER Integration in Distribution Networks**

**Chair: Suad Halilčević** (University of Tuzla)

[4984] Vasileios Evangelopoulos (PROTASIS Engineering & Consulting (PROTASIS SA)), Georgios Karvelis (PROTASIS Engineering & Consulting (PROTASIS SA)), Theodora Anastopoulou (Hellenic Electricity Distribution Network Operator (HEDNO SA)), Stefanos Kokkinelis (Hellenic Electricity Distribution Network Operator (HEDNO SA)) and Andreas Reppas (Hellenic Electricity Distribution Network Operator (HEDNO SA)). ***Assessing the impact of RES on the grid of autonomous electrical systems using representative operation scenarios: The case of Chios Island.***

[8281] **Luka Strezoski** (University of Novi Sad, Faculty of Technical Sciences, Department for Power, Electronics, and Telecommunications) and Izabela Stefani (Schneider Electric). ***Hosting Capacity Within DERMS: Seamless Integration of Distributed Energy Resources and Electric Vehicles.***

[1246] Klajdi Kamberi (Albanian), Donard Shaliu (Albanian), Marialis Çelo (Albanian) and Rajmonda Bualoti (Albanian). ***Hosting capacity calculation of photovoltaic penetration in a closed loop distribution network: A case study.***

[4101] Vlad Costea (The Foundation for Innovation and Research – Malta (FiR.mt), Design Center Tower Road, Birkirkara, Malta), Brian Azzopardi (Azzopardi and Associates, Birkirkara, Malta) and Kenneth Scerri (Department of System and Control Engineering, Faculty of Engineering, The University of Malta (UM), Msida, Malta). ***A Robust Optimization Formulation for the Integration of Photovoltaics in a Low-Voltage Distribution Network: Malta Case Study.***

[5501] Michalis Bratitsis (University of West Attica) and John Kaldellis (University of West Attica). ***Solar Energy Solution for Small Autonomous Islands.***

[2535] Everton Alves (INESC TEC), Cleberton Reiz (INESC TEC), André Melim (INESC TEC) and Clara Gouveia (INESC TEC). ***Enhancing Power Distribution Protection: A Comprehensive Analysis of Renewable Energy Integration Challenges and Mitigation Strategies.***



## PS12. Power Electronics

**Chair: George Vokas** (University of West Attica)

[0558] Armel Asongu Nkembi (University of Parma), Iñigo Kortabarria (University of the Basque Country), Paolo Cova (University of Parma), Nicola Delmonte (University of Parma), Danilo Santoro (University of Parma) and Emilio Sacchi (Poseico Spa). ***An Adaptive Phase Shedding and Interleaving Technique for Modular Dual Active Bridge Converter Applied to Fast Battery Charging.***

[7314] Christos Loukakis (National Technical University of Athens), Theofilos Papadopoulos (National Technical University of Athens) and Antonios Antonopoulos (National Technical University of Athens). ***Zero-Voltage-Switching Conditions for Half-Controlled Secondary LLC Converter using Phase-Shift Modulation.***

[1846] Yunchae Na (Korea Institute of Energy Technology), Seungil Moon (Korea Institute of Energy Technology) and Gyusub Lee (Seoul National University). ***Analytical Calculation of MMC-based 2-terminal DC Grid Pole-to-Pole Fault Current.***

[3972] Apostolos Manasis (University of Patras), Panos Papageorgiou (University of Patras) and George Konstantopoulos (University of Patras). ***Non-linear control with inherent overcurrent protection for EV charging unit consisting of Single Active Bridge converter***

[3425] Seong-Cheon Cho (Korea Institute of Energy Technology (KENTECH)) and Gyu-Sub Lee (Seoul National University (SNU)). ***A Local Control of Interlinking DC/DC Converters in DC Microgrid Clusters for Global Power Sharing.***

[6070] Pranjal Barman (IIT Guwahati-TIDF Division, Guwahati, Assam, India), Manash Pratim Sarma (Gauhati University, Guwahati, India), Lachit Dutta (Gauhati University, Guwahati, India), Anamika Kalita (Institute of Advanced Study in Science and Technology, Guwahati, India) and Brian Azzopardi (Malta College of Arts, Science and Technology (MCAST), Institute of Engineering and Transport, PLA9032 Paola, Malta.). ***Traction control and antilock braking control performance analysis in distributed drive electric vehicle on split ramps.***

## PS13. Power System Planning

**Chair: Mathaios Panteli** (University of Cyprus)

[1561] Marija Ilic (Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology), Laurentiu Lucian Anton (Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology) and Rupamathi Jaddivada (SmartGridz, Inc Sudbury, MA 01776, USA). ***Key Role of AC OPF in Support of Energy Transition: The Case of Puerto Rico.***

[8521] Evangelos Chatzistylianos (National Technical University of Athens), Georgios Psarros (National Technical University of Athens) and Stavros Papathanassiou (National Technical University of Athens). ***A capacity expansion planning model integrating hybrid PV-storage stations with grid export constraints.***

[8483] Markus von Heel (IAEW at RWTH Aachen University), David Trinkewitz (IAEW at RWTH Aachen University) and Albert Moser (IAEW at RWTH Aachen University). ***Decentralised Assessment of Future Capacities for Resource Adequacy Studies in the European Power System.***

[9280] Maria Fotopoulou (University of West Attica), George Tsekouras (University of West Attica), Fotios Kanellos (Technical University of Crete), Vassiliki Kontargyri (University of West Attica) and Dimitrios Rakopoulos (Centre for Research and Technology Hellas). ***Optimal Combination of Stochastic Renewables Installation.***

[8980] Teresa Freire (IIT Comillas Pontifical University), Francisco Martín-Martínez (IIT Comillas Pontifical University) and Michel Rivier Abbad (IIT Comillas Pontifical University). ***Exploring a 2030 nearly 100% renewable Spanish electricity system from a capacity-mix adequacy perspective.***

[7506] Philipp Thunshirn (University of Applied Sciences Technikum Wien), José Manuel Ribeiro Baptista (University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal) and Tiago Manuel Campelos Ferreira Pinto (University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal). ***Comparative analysis of Multi-Attribute Decision Making Methods for the Evaluation of Renewable Energy Options***

## **PS14. Inverter Dominated Power System Stability**

**Chair: Panagiotis Papadopoulos** (University of Manchester)

[2576] Xi Luo (University of Southampton), Efstratios Batzelis (University of Southampton), Abhinav Singh (University of Southampton), Georgia Saridaki (National Technical University of Athens) and Panos Kotsampopoulos (National Technical University of Athens). ***Stability Boundary Analysis of Grid-forming and Grid-following Inverters.***

[0993] Georgia Saridaki (School of Electrical and Computer Engineering National Technical University of Athens), Panos Kotsampopoulos (School of Electrical and Computer Engineering National Technical University of Athens), Nikos Hatziargyriou (School of Electrical and Computer Engineering National Technical University of Athens), Xi Luo (School of Electronics and Computer Science, University of Southampton), Stratis Batzelis (School of Electronics and Computer Science, University of Southampton) and Abhinav Kumar Singh (School of Electronics and Computer Science, University of Southampton). ***MIMO Impedance Modelling of Grid Following Inverter with Local Voltage Control.***

[2972] Seo-Rin Yoo (Korea Institute of Energy Technology), Seung-II Moon (Korea Institute of Energy Technology) and Gyu-Sub Lee (Seoul National University). ***Stability Analysis of Power System with IBRs Using an Impedance-Based Method.***

[4488] Luke Benedetti ([University of Strathclyde](#)), Agustí Egea-Alvarez ([University of Strathclyde](#)) and Panagiotis N. Papadopoulos ([University of Manchester](#)). *Probabilistic Small-Signal Analysis Case Studies in Detailed Power System Models with Converter-Interfaced Generation*.

[6880] Theodoros Kavvathas ([University of Patras](#)) and George Konstantopoulos ([University of Patras](#)). *Enhancing the resilience of inverter-dominated power networks via novel distributed secondary integral control*.

[9311] Luis Rouco ([Universidad Pontificia Comillas](#)), Lukas Sigríst ([Universidad Pontificia Comillas](#)) and Alvaro Benitez ([Universidad Pontificia Comillas](#)). *Understanding Generator Droop Voltage Control*.

## **WEDNESDAY 6/11**

### **9:00 – 11:00 KEYNOTE SPEECHES**

**Chair: Nuno de Souza e Silva** (R&D Nester)

#### **Keynote 4. Green hydrogen seasonal storage and generation adequacy**

**João A. Peças Lopes** [Porto University \(FEUP\)](#)

Europe has developed roadmaps for deploying hydrogen as a crucial energy vector of the energy transition towards carbon neutrality. This transition includes a significant shift towards the electrification of society, creating synergies between the electric and gas systems, with hydrogen emerging as a renewable energy carrier. The increased variability of generation from variable renewable power sources will create challenges regarding the security of supply, requiring investment in storage solutions to minimize renewable energy curtailment and to provide dispatchability to the electric power system in order to keep security of supply. Hydrogen can be produced with a surplus of renewable electricity from wind and solar, allowing a long-term energy seasonal storage strategy, namely by using underground salt caverns, to be subsequently transformed into electricity when demand cannot be supplied due to a shortage of renewable generation ensuring adequate security of supply levels of the power system and thus contribute to accelerating the energy transition. The Portuguese study case between 2030 and 2040 will be used to demonstrate application of this approach. A novel regulatory strategy for the P2P solution will be also described. Electrolysers can also be used a flexible load to provide ancillary frequency services to help balancing the power system. Results from the adoption of this approach will be also presented for scenarios of 2040 in the Iberian Peninsula.

## **Keynote 5. From Sensors to High-Impact Applications supporting Net-Zero Transition**

### **Vladimir Terzija, Haris Patsios, Newcastle University, UK**

The 4th Industrial Revolution, Industry 4.0, is significantly changing the shape of Critical Infrastructure Systems and societies in 21st century. Through introduction of smart technologies, involving smart sensors, cyber-secure communication infrastructure, supercomputers, application of AI/ML and big-data paradigm, doors for designing and implementing smart solutions contributing to security, dependability, stability, flexibility and resilience of modern energy systems, are widely opened. They are considered as one of the most important factors leading to low-carbon economies and supporting the net-zero transition. Newly designed concept of “digital substations”, supported by cyber secure communication channels, are enabling a rapid and efficient transfer of information from the actual electricity network to hierarchically higher centers in which information is processed to derive decisions of different nature. Through application of data science-based solutions, integration of renewable energy sources is maximized, different energy vectors are integrated into single multi-energy systems, optimizing processes, making them more efficient and contributing to a smooth transformation of the existing energy systems to a sustainable and low carbon systems. The abovementioned topics will be discussed from the new technology perspective, expected benefits and its impact to new solutions/applications, e.g. ancillary services, measures supporting the system integration after large-scale perturbations, or design and operation of customized autonomous net-zero microgrids. To support better understanding of the lecture, two representative high TRL projects, VISOR and EFCC, will be described.

## **Keynote 6. Achieving Energy Transition Towards Climate Neutrality: The Potential of Smart Cities and Renewable Energy Communities in the EU**

**Carlo Alberto Nucci, DEI- University of Bologna, Italy**

The goal of achieving global climate neutrality through the energy transition envisaged by the Conference of Parties and the EU Green Deal is discussed, with a focus on smart cities and renewable energy communities.

The continued high consumption of fossil fuels necessitates multiple actions: enhancing the efficiency of existing power plants and shifting from fossil fuels to less climate-impacting sources. Utilizing renewable energy sources like solar, wind, and hydroelectric power is becoming increasingly essential. The gradual electrification of various sectors and diversification to reduce dependence on both energy sources and materials and technologies is viewed as a key strategy for the energy transition. Research into hydrogen and nuclear energy is also a crucial component of a diversified energy strategy.

Renewable energy communities of prosumers, supported by European directives, could potentially supply 20% of cities' energy needs by 2030, underscoring the significance of electricity systems and smart grids. An analysis of the role of energy communities is presented in this respect, focusing on the importance of storage systems, transaction pricing, reactive power control, and provision of ancillary services.

Within this context, Europe aims to help 100 cities achieve climate neutrality by 2030 through the Climate Neutral and Smart Cities mission, fostering innovation and providing 100 concrete examples for other cities to follow to reach climate neutrality by 2050. To support the selected cities, Europe intends to offer financial instruments, regulatory measures, and a 'climate city contract' (CCC)

**11:00 – 11:30 Coffee Break**

**11:30 – 13:30 PANELS**

## **PANEL 6. Decentralized flexibility for grid services: The OpentUnity Project**

Technology and software solutions of the EU-funded Opentunity project (January 2023-December 2026) aim to increase the use of distribution flexibility for grid services across all grid levels and overall to ensure a secure and reliable data exchange among market agents. The project consortium develops innovative methodologies and technology solutions backed by advanced and interoperable software modules to support stakeholders and market agents to cope with the challenges of the energy transition.

The Opentunity solutions cover 4 core elements:

**OpenGrid** – Advanced technologies for Distribution System Operators and Transmission System Operators to optimize the network management.

**OpenFlex** – Innovative Technologies to increase flexibility in prosumer environments.

**OpenSpace** – Energy data storage and exchange.

**OpenAbility** – Procedures for enhancing interoperability.

Opentunity solutions are tested in 4 pilot locations; Greece, Switzerland, Slovenia and Spain.

This panel will present the roles and requirements of the System Operators, Flexibility Service Providers and the NODES flexibility market within the flexibility value chain. The discussion will be centred on the experiences and solutions of the Opentunity flexibility market pilot in Mesogeia/Athens, Greece. The panellists will bring their expertise on innovative solutions for grid management and flexibility provision, NODES flexibility market and TSO-DSO coordination tools.

Panel Content:

1. Introduction: Opentunity – Decentralized flexibility for grid services
2. Introduction pilot partners/panellists
3. Panel discussion: Exploring the design of a decentralized bottom-up flexibility market in Greece + Q&A
4. Short Demo of the Greek Pilot

### **Moderator**

**Gesa Milzer**, NODES AS

### **Panelists**

**Svein Jørgen Sønning**, NODES AS,

**Vasileios Boglou**, Hellenic Electricity Distribution Network Operator (HEDNO), Greece.

**Antonis Papanikolaou**, Hypertech, Greece

**Serafeim Panidis**, Independent Power Transmission System Operator (IPTO), Greece

**Thanos Lagos**, National Technical University of Athens (National Technical University of Athens)

## **PANEL 7. Power Systems Cybersecurity and Cyber Resiliency**

The panel discussion on Power Systems Cybersecurity and Cyber Resiliency brings together leading experts from academia and industry to explore the critical challenges and opportunities in securing modern power systems. Topics will include the latest cyber threats, such as man-in-the-middle attacks, ransomware, and targeted attacks, and their impact on grid reliability. The panel will evaluate existing cybersecurity measures, discuss strategies for enhancing system resilience, and examine the role of policy and regulation in promoting cybersecurity. Future directions, including advancements in AI, blockchain, digital twins-based cybersecurity, and secure communication protocols, will also be covered. This engaging dialogue aims to deepen understanding of how to protect and maintain the security and resilience of increasingly interconnected and digitized power systems.

### **Moderator**

**Hassan Haes Alhelou**, Massachusetts Institute of Technology (MIT)

### **Panelists**

**Amer Al-Hinai**, Sultan Qaboos University

**Helen C. (Nelly) Leligou**, University of West Attica

**Charalambos (Harrys) Konstantinou**, King Abdullah University of Science and Technology (KAUST), Saudi Arabia.

**Alexandru Ştefanov**, TU Delft, The Netherlands

**Ömer Sen**, Fraunhofer Institute of Technology (FIT), Germany

[7271] Immanuel Hacker (Fraunhofer FIT), Ömer Sen (Fraunhofer FIT) and Andreas Ulbig (RWTH Aachen University). *Graph-based Impact Analysis of Cyber-Attacks on Behind-the-Meter Infrastructure*.

[7918] Ömer Sen (Fraunhofer FIT) and Andreas Ulbig (IAEW at RWTH Aachen University). *Towards a Comprehensive Framework for Cyber-Incident Response Decision Support in Smart Grids*.

## **PANEL 8. Navigating the evolution of Energy Communities in Europe**

This panel session will explore the dynamic landscape of energy communities in Europe, focusing on the transformative changes and emerging challenges. As the energy sector undergoes rapid shifts towards sustainability, energy communities play a pivotal role in fostering local energy production and consumption. Experts will discuss policy developments, technological advancements, and innovative practices shaping these communities. Attendees will gain insights into regulatory frameworks, financial models, and community engagement strategies. The session aims to highlight best practices, identify obstacles, and propose solutions to enhance the resilience and effectiveness of energy communities across Europe.

### **Moderators**

**Alexandros-Georgios Chronis**, National Technical University of Athens (NTUA), Greece

**Athanasios Vasilakis**, National Technical University of Athens (NTUA), Greece

## Panelists

**Johannes Vollmer**, EREF (European Renewable Energies Federation)

**Chris Vrettos**, REScoop.eu

**Tara Esterl**, AIT Austrian Institute of Technology

**Maria Margosi**, Collective Energy Cooperative

**Sandy Fameliari**, Electra Energy Cooperative

**13:30 – 14:30 Lunch Break**

**14:30 – 16:00**

## PS15. Power System Stability and Control

**Chair: Vassilis Nikolaidis** (National Technical University of Athens)

[8211] Grigoris Dourbois (Southeast Electricity Network Coordination Center), Alexandros Gisis (Southeast Electricity Network Coordination Center), Petros Peitsinis (Southeast Electricity Network Coordination Center), Chrysi Panopoulou (Southeast Electricity Network Coordination Center), Andronikos Koumis (Southeast Electricity Network Coordination Center), Yannis Kampouris (Independent Power Transmission Operator) and Eleftherios Kontis (Univeristy of Thessaly). **Total Transfer Capacity of the North Greece Border: Where Are We Now?**

[4804] Theodosis Alexandridis (School of Electrical and Computer Engineering, National Technical University of Athens, Greece), Maria Barbagianni (Department of Electrical and Computer Engineering, University of Patras, Greece) and Antonio Alexandridis (Department of Electrical and Computer Engineering, University of Patras, Greece). **Design and Tuning Aspects of Power System Stabilizers Based on the Complete Nonlinear Synchronous Generator Model.**

[9396] Marija Ilic (Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology), Riley Emerson Lawson (Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology) and Sayyeda Umbereen (Department of Electrical Engineering, KTH, Stockholm, Sweden). **Practical Method for Monitoring Slow Electromechanical Oscillations.**

[4546] Simon Thams (RWTH Aachen University), Leonard Schulte (RWTH Aachen University), Christian Gerdon (RWTH Aachen University) and Albert Moser (RWTH Aachen University). **Power Flow Approximation Methodology for Integrated Active and Reactive Power Optimization in Critical Transmission Grid Outage Situations.**

[8344] Theodosis Alexandridis (National Technical University of Athens) and Haris Psillakis (National Technical University of Athens). **Enhanced oscillation damping in power systems by extending VSI control**

[9729] Samuel Forsberg (Uppsala University), Erik Jonasson (Uppsala University), Geoffrey De Sena (Uppsala University), Irina Temiz (Uppsala University), Malin Göteman (Uppsala University) and Mikael Bergkvist (Uppsala University). ***The impact of data time resolution on long-term voltage stability assessment: a case study with offshore wind-solar hybrid power plants.***

## PS16. Protection and State Estimation

**Chair: George Korres** (National Technical University of Athens)

[5509] Mirko Ginocchi (RWTH Aachen University), Thanakorn Penthong (RWTH Aachen University), Muhammad Zeeshan Khattak (RWTH Aachen University), Ferdinanda Ponci (RWTH Aachen University) and Antonello Monti (RWTH Aachen University). ***Global Sensitivity Analysis of the Distance Protection Performance for Submarine Power Transmission Systems.***

[1085] Antigona Selimaj (IAEW at RWTH Aachen University), Ronja Steinfurth (RWTH Aachen University), Immanuel Hacker (IAEW at RWTH Aachen University) and Andreas Ulbig (RWTH Aachen University). ***Grid State Classification Using the Time Coordination of Definite-Time Overcurrent in Adaptive Protection Systems.***

[0780] Somesh Bhattacharya (University of Malta), Cedric Caruana (University of Malta), Reiko Raute (University of Malta), Alexander Micallef (University of Malta) and Kenneth Scerri (University of Malta). ***Optimal MBU Positioning under Emergency Scenario for Distribution Networks with High PV Penetration.***

[6041] Themistoklis Xygkis (National Technical University of Athens), Orestis Darmis (National Technical University of Athens) and George Korres (National Technical University of Athens). ***Impact of Current Measurement Configuration on Power System State Estimation.***

[5066] Sanjeev Bangali (Indian Institute of Science, Bangalore), Athanasios Vassilakis (National Technical University of Athens), Dimitrios Lagos (National Technical University of Athens), Prasoon Arya (IISc Bangalore), Jigyasa Singhai (SGSITS Indore) and Sarasij Das (Indian Institute of Science, Bangalore). ***Smart Meter-based Outage Detection Algorithm and Fault Location in a Microgrid in Gaidouromantra, Greece.***

[2397] Georgios Karvelis (National Technical University of Athens, NTUA) and George Korres (National Technical University of Athens, NTUA). ***A State Estimator Using Synchronized Phasor Measurements for Power Systems Containing VSC-HVDC Links with Converter Losses.***



## PS17. HVDC & HVAC Transmission Systems

**Chair: Thomas Strasser** (Austrian Institute of Technology)

[1006] Nikola Rajaković (University of Belgrade, School of Electrical Engineering), Bojan Ivanović (Electric Distribution of Serbia (EDS)), Ilija Batas Bjelić (Institute of Technical Sciences, Serbian Academy of Sciences and Arts (SANU)) and Tomislav Rajić (University of Belgrade, School of Electrical Engineering). ***Analysis of the Renewable Energy Sources Integration in Serbia's Power Energy System.***

[0818] Féres Benothman (Tractebel), Lampros Papangelis (Tractebel), Pieter Tielens (Tractebel), Christian Merckx (Tractebel) and Karim Karoui (Tractebel). ***HVDC support for optimal black start power system restoration.***

[6836] Georgios Tsourakis (IPTO), Panagiotis Mandoulidis (IPTO), Raveen Gunarath (TGS) and Chandana Karawita (TGS). ***Grid-Following and Grid-Forming Technology Options for Korinthos - Kos HVDC Interconnection.***

[8530] Muriel Krüger (Institut for High Voltage Equipment and Grids, Digitalization and Energy Economics, RWTH Aachen University), Marten Simon Thams (Institut for High Voltage Equipment and Grids, Digitalization and Energy Economics, RWTH Aachen University), Sven Ratajczak (Institut for High Voltage Equipment and Grids, Digitalization and Energy Economics, RWTH Aachen University) and Albert Moser (Institut for High Voltage Equipment and Grids, Digitalization and Energy Economics, RWTH Aachen University). ***Modelling of faults in HVDC systems in the outage calculation for congestion management.***

[6931] Iordanis Chaleplidis (Hellenic Cables), Andreas I. Chrysochos (Hellenic Cables), Dimitrios Chatzipetros (Hellenic Cables), Konstantina Bitsi (Hellenic Cables), Dimitrios Gkitsos (Hellenic Cables), Pavlos Zairis (Hellenic Cables), Vasileios Souglakos (Hellenic Cables), Ioannis Ztoupis (Hellenic Cables) and Vasileios Kanas (Hellenic Cables). ***Positive Sequence Impedance in Three-Core Armoured Cables: Measurement and Modelling Aspects.***

[9931] Mohd Norhakim Bin Hassan (University of Manchester, Manchester, United Kingdom) and Cheng Zhang (University of Manchester, Manchester, United Kingdom). ***Investigation into the Impacts of Self-inductance and Mutual Inductance on Saggy Winding Inductive Coupling Power Transmission.***

## PS18. Condition Monitoring and Asset Management

**Chair: Konstantinos Kalkanis** (University of West Attica)

[3966] Konstantinos Kaousias (HEDNO), Georgios Doukakis (HEDNO), Georgios Lampsidis Tompros (HEDNO), Dimitrios Stimoniaris (Innora), Konstantinos Mariolis (HEDNO), Nikolaos Avagianos (HEDNO), Georgios Loukos (HEDNO), Nikolaos Stefanakis (HEDNO), Sotirios Christopoulos (HEDNO), Athanasios Kaousias (School of Electrical and Computer Engineering, National Technical University of Athens) and Georgios Chatzargyros (Renel). **Advanced Grid Inspection Methodologies for Enhancing Electrical Infrastructure in Greece.**

[6485] Vasileios Vlachou (National Technical University of Athens), Antonios Kladas (National Technical University of Athens) and Theoklitos Karakatsanis (Democritus University of Thrace). **Fault Tolerant Real Time Monitored Elevator System Development**

[1343] Thanasis Papafilippopoulos (University of West Attica, Department of Electrical and Electronics Engineering), Ioannis Chronis (University of West Attica, Department of Electrical and Electronics Engineering), Antonios Moronis (University of West Attica, Department of Electrical and Electronics Engineering), Apostolos Kokkosis (University of West Attica, Department of Electrical and Electronics Engineering) and Constantinos Psomopoulos (University of West Attica, Department of Electrical and Electronics Engineering). **Critical Comparison of the measurement accuracy of DGA techniques for the timely detection of emerging faults.**

[7219] Efstathios Fiorentis (National University of Science and Technology Politehnica Bucharest). **Classification Method for LI-Ion Batteries State of Health Estimation**

[4263] Jelisaveta Krstivojevic (University of Belgrade - School of Electrical Engineering) and Jelena Stojkovic Terzic (University of Belgrade - School of Electrical Engineering). **Improvement of Reliability Performance in Distribution Network by Optimal Investment Selection.**

[9970] Dimitra Milioni (University of West Attica, Department of Electrical and Electronics Engineering), Ioannis Liapis (HELLENIC ELECTRICITY DISTRIBUTION NETWORK OPERATOR S.A.), Dimitrios Barkas (University of West Attica, Department of Electrical and Electronics Engineering), Stavros Kaminaris (University of West Attica, Department of Electrical and Electronics Engineering) and Constantinos Psomopoulos (University of West Attica, Department of Electrical and Electronics Engineering). **Evaluation of the operational condition of a 150kV power transformer operating in the Hellenic Electricity Distribution System.**

**16.00-16.30 Coffee Break**

16.30-18.00

## PS19. RES Integration in Power Systems

Chair: Charalambos (Harrys) Konstantinou (KAUST)

[7805] Vladimir Shiljkut (Joint Stock Company "Elektroprivreda Srbije", Belgrade). ***Principles and Approaches for Successful Energy Transition***

[3008] Thomas Strasser (AIT Austrian Institute of Technology), Edmund Widl (AIT Austrian Institute of Technology), Rene Kuchenbuch (OFFIS e.V.), Laura Lazaro Elorriaga (Fundacion Tecnalia Research & Innovation), Borja Tellado Laradogoitia (Fundacion Tecnalia Research & Innovation), Mirko Ginocchi (RWTH Aachen University), Thanakorn Penthong (RWTH Aachen University), Ferdinanda Ponci (RWTH Aachen University), Amélie Gyrard (Trialog), Antonio Kung (Trialog), Carlos Ayon Mac Gregor (B.A.U.M Consult), Carmen Garcia Montero (ENTSO-E), Relano Algaba (ENTSO-E). ***Towards Interoperability Testing of Smart Energy Systems – An Overview and Discussion of Possibilities***

[2522] Asimina Founta (National Technical University of Athens (NTUA)), Georgios Psarros (National Technical University of Athens (NTUA)) and Stavros Papathanassiou (National Technical University of Athens (NTUA)). ***Evaluation of the Regional Impact of High PV Penetration in Greece via modeling the Pan-European Power System.***

[2314] J.K. Kaldellis (Department of Mechanical Engineering, University of West Attica), St. Miliarakis (Department of Mechanical Engineering, University of West Attica) and G. Tzanes (Department of Mechanical Engineering, University of West Attica). ***Estimating the Real Contribution of Wind Parks in Covering the Greek Mainland Load Demand***

[2258] Somesh Bhattacharya (The Foundation for Innovation and Research – Malta (FiR.mt), Design Center Tower Road, Birkirkara, Malta), Vlad Costea (The Foundation for Innovation and Research – Malta (FiR.mt), Design Center Tower Road, Birkirkara, Malta) and Brian Azzopardi (Department of System and Control Engineering, Faculty of Engineering, The University of Malta (UM), Msida, Malta). ***Optimal PV placement in Emergency Scenario with Virtual Inertia Provision.***

[7108] Juan F. Gutierrez-Guerra (Institute for Research in Technology, Comillas Pontifical University), José Pablo Chaves-Ávila (Institute for Research in Technology, Comillas Pontifical University) and Andrés Ramos (Institute for Research in Technology, Comillas Pontifical University). ***Biomass top-cycle CHP with high-temperature heat pump coupling: economic insights for industrial decarbonization.***

## PS20. Renewable Energy Technologies

Chair: Antonios Moronis (University of West Attica)

### *Invited Speech*

Amartyadeep Pal (Technical University of Denmark). **Repowering Legacy Wind Farms- A Techno-Economic Analysis**

[1672] Andi Hida (Department of Electrical Power Systems, Faculty of Electrical Engineering, Polytechnic University of Tirana), Viktor Rrotani (Department of Electrical Power Systems, Faculty of Electrical Engineering, Polytechnic University of Tirana), Rajmonda Bualoti (Department of Electrical Power Systems, Faculty of Electrical Engineering, Polytechnic University of Tirana), Donard Shaliu (Department of Electrical Power Systems, Faculty of Electrical Engineering, Polytechnic University of Tirana) and Klajdi Kamberi (Department of Electrical Power Systems, Faculty of Electrical Engineering, Polytechnic University of Tirana). ***Optimization and Performance of Bifacial PV System Compared to Monofacial.***

[6376] Dimitrios Rimpas (Department of Electrical and Electronic Engineering, University of West Attica, P. Ralli & Thivon 250, Egaleo, Greece), Stavros Kaminaris (Department of Electrical and Electronic Engineering, University of West Attica, P. Ralli & Thivon 250, Egaleo, Greece), Dimitrios Piromalis (Department of Electrical and Electronic Engineering, University of West Attica, P. Ralli & Thivon 250, Egaleo, Greece), Georgios Vokas (Department of Electrical and Electronic Engineering, University of West Attica, P. Ralli & Thivon 250, Egaleo, Greece), Vasilios Orfanos (Department of Electrical and Electronic Engineering, University of West Attica, P. Ralli & Thivon 250, Egaleo, Greece) and Ioannis Katsis (Department of Electrical and Electronic Engineering, University of West Attica, P. Ralli & Thivon 250, Egaleo, Greece). ***Power control strategy of an off-grid PV/Battery hybrid system for improving autonomy and lifespan.***

[0104] George Konstantinidis (Department of Electrical and Computer Engineering, Hellenic Mediterranean University), Alexandros Paspatis (Manchester Metropolitan University) and Emmanouel Karapidakis (Department of Electrical and Computer Engineering, Hellenic Mediterranean University). ***Analysis of Off-Grid Charging Stations with Photovoltaics and Battery Energy Storage Systems along Highways for Electric Vehicles.***

[1741] Thomas Mazarakos (Assistant Professor, School of Engineering, Department of Naval Architecture, University of West Attica). ***Wind energy calculations and hydrodynamic analysis of a 20 MW floating wind turbine.***

[9028] Maria Sofia Pechlivanidou (National Technical University of Athens), Pavlos Polymenakos (National Technical University of Athens) and Antonios Kladas (National Technical University of Athens). ***Coupled Electromagnetic-Thermal Modelling of 3D-Printed Iron Core of High Speed PM Motor.***

[3476] Admitos A. Bideris-Davos (Dept. of Electrical and Computer Engineering, University of Patras) and Panagis N. Vovos (Dept. of Electrical and Computer Engineering, University of Patras). ***Assessing the Impact of Voltage Control Schemes on the Penetration Level of Micro-Scale Hydroelectric Power Generation in Water Distribution Systems .***

## PS21. Microgrids

**Chair: Iasonas Kouveliotis-Lysikatos** (University of Peloponnese)

[0551] Suad Halilčević (University of Tuzla) and Bojan Ivanović (Power Distribution of Serbia, Bulevar Umetnosti 12, Belgrade, Serbia). ***Inertia of the electric power system with micro grids and renewable energy sources.***

[3301] Hannu Laaksonen (University of Vaasa) and Nikos Hatziargyriou (National Technical University of Athens). ***Reconnection of MV Microgrid with Universal Grid-forming Inverter-based Resources.***

[7640] Athanasios Vasilakis (Electrical and Computer Engineering department of the National Technical University of Athens), Dimitrios Lagos (Electrical and Computer Engineering department of the National Technical University of Athens), Ilias Katsambiris Grapsas (Electrical and Computer Engineering department of the National Technical University of Athens) and Nikos Hatziargyriou (Electrical and Computer Engineering department of the National Technical University of Athens). ***Evaluating Microgrid Controllers Using an Advanced Hardware-in-the-Loop Testing Chain Integrated with Digital Twin Technology.***

[0376] Georgios Lampsidis Tompros (HEDNO) Konstantinos Kaousias (HEDNO), Sotirios Christopoulos (HEDNO), Georgios Loukos (HEDNO), Nikolaos Stefanakis (HEDNO), Maria Fotopoulou (CERTH), Kyriaki N. Malamaki (IPTO), ***Green energy and Storage integration – the case study of Ikaria.***

[8292] Marios Nikologiannis (Hellenic Mediterranean University), Alexandros Paspatis (Manchester Metropolitan University), Emmanuel Karapidakis (Hellenic Mediterranean University), Bamidele Adebisi (Manchester Metropolitan University), Athanasios Portokalidis (Hellenic Mediterranean University), Minas Papadakis (Heraklion Port Authority) and Minas Seimenis (Heraklion Port Authority). ***Towards Net-zero Maritime Port Microgrids: The case study of the Heraklion Port.***

[8104] Cyril Spiteri Staines (University of Malta) and John Licari (University of Malta). ***Voltage regulation system in LV networks with high level of renewables and electric vehicles.***

## PS22. Reliability and Resilience

**Chair: Jin Zhao** (Trinity College Dublin)

[9487] Petar Krstevski (Ss. Cyril and Methodius University in Skopje, Faculty of Electrical Engineering and Information Technologies), Aleksandra Krkoleva Mateska (Ss Cyril and Methodius University in Skopje, Faculty of Electrical Engineering and Information Technologies), Vesna Borozan (Ss Cyril and Methodius University in Skopje, Faculty of Electrical Engineering and Information Technologies) and Rubin Taleski (Ss Cyril and Methodius University in Skopje, Faculty of Electrical Engineering and Information Technologies). ***European Regulatory Framework for Resilient Power Systems – Aspects of Implementation.***

[0878] Konstantinos Tatos (University of West Attica, Department of Electrical and Electronics Engineering), Nikolaos Manousakis (University of West Attica, Department of Electrical and Electronics Engineering), Konstantinos Kalkanis (University of West Attica, Department of Electrical and Electronics Engineering), Apostolos Kokkosis (University of West Attica, Department of Electrical and Electronics Engineering) and Constantinos Psomopoulos (University of West Attica, Department of Electrical and Electronics Engineering). ***Impact of fires and smoke on the development and occurrence of short circuits and secondary fires in electricity transmission and distribution networks. A Review.***

[5481] Saeed Nematshahi (University of Denver), Amin Khodaei (University of Denver) and Ali Arabnya (Quanta Technology, University of Denver). ***An Investment Prioritization Model for Wildfire Risk Mitigation Through Power Line Undergrounding.***

[1836] George Paphitis (University of Cyprus), Balaji Venkateswaran Venkatasubramanian (School of Technology, Woxsen University, Telangana, India) and Mathaios Panteli (Department of Electrical and Computer Engineering, University of Cyprus, Nicosia, Cyprus). ***Identifying Critical Components in Cascading Power Outages through Machine Learning.***

[5877] Alinane Kilembe (University of Strathclyde) and Panagiotis Papadopoulos (University of Manchester). ***Deep Reinforcement Learning Adaptive Under-Frequency Load Shedding for Frequency Control Under Extreme Events.***

[8008] Alkistis Kontou (National Technical University of Athens), Nikos Hatziargyriou (National Technical University of Athens), Mazheruddin Syed (WSP) and Alexandros Paspatis (Metropolitan University of Manchester). ***Impact of microgrid design parameters on secondary distributed control under FDI attack.***

**18.00-19.00**

**Closing Session**

**Chairs: Apostolos Kokkosis, Nikos Hatziargyriou**