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Cristian Bovo was born in Sesto San Giovanni (Milan) on 20 December 1973. He received his MS degree in Electrical Engineering at the Politecnico di Milano on 21th December 1998. In 1999 he obtained the habilitation to the engineer activity. In 2002, he received the PhD Degree discussing a thesis titled "Application of multi objective methodologies in the context of the electricity market" at the Department of Electrical Engineering, Politecnico di Milano.

In the field of study related to the electric power systems and issues related to the liberalized electricity market, he participated in the following courses/meetings and seminars:

1. "Recent advances in optimization of generation operation" organized by Electricité de France (EdF) and coordinated by Dr. A. Renaud, Clamart, France, March 25-26, 1999.
2. "Tariffs for electric transmission in a liberalized market regime" organized by the Institute of Energy Economics (IEFE) of Bocconi University in Milan and the Association of Energy Economists, Lombardy section (AIEE), Milan, April 19, 1999.
3. Update course on "The new structure of electrical energy in Italy following the implementation of EU Directive 92/1996 for the liberalization of the electricity market" at the University of Pavia; Pavia, October 19-21, 1999.
4. Course on "The electricity market" organized by Prof. A. Berizzi at the Department of Electrical Engineering of the Polytechnic University of Milan with lecturers Prof. C. Canizares from the University of Waterloo (Canada) and Prof. G. Gross from the University of Illinois at Urbana-Champaign (USA), Milan, April 10-14, 2000.
5. Advanced course in "Management, Economics and Law of Networks (MEDIR)" organized by MIP of the Polytechnic University of Milan (320 hours). Participation in the course was made possible by a Scholarship issued by the Authority for Electricity and Gas (AEEG, now ARERA).

Employment history

- From March 2002 to 31 July 2002 he joined as Postdoctoral Researcher at the Department of Electrical Engineering, Politecnico di Milano.

- From 1 August 2002, he joined as Assistant Professor at the Electrical Department of Politecnico di Milano and from 1 January 2008 he is Assistant Professor at the Department of Energy, Politecnico di Milano.
- Since July 13, 2015, he has been an associate professor in Electric power systems at the Department of Energy of the Politecnico di Milano.
- Starting from January 1, 2021, he holds the position of associate professor at the Department of Electrical, Computer and Biomedical Engineering of the University of Pavia.
- As of November 1, 2023, he has been promoted to the position of full professor at the Department of Electrical, Computer and Biomedical Engineering of the University of Pavia.

Research activity

The research activity carried out by Cristian Bovo focuses on various aspects of the electric power systems area. Special attention is given to the interaction between the planning and operation of power systems and the electricity market, as well as the strategic behaviors of players operating within it. The research encompasses both methodological aspects and more applied aspects, often in collaboration with companies in the electrical sector.

The following is a description of the main research topics.

Methodological Aspects, Optimization Techniques, and Artificial Intelligence. One of the research themes receiving attention involves methodological aspects related to optimization problems. The research activity is oriented towards both adapting classical optimization techniques (based on gradients) to optimization problems typical of electric power systems and studying optimization techniques based on artificial intelligence, such as genetic algorithms. More generally, the topics of interest in this field concern the applicability of neural networks, neuro-fuzzy systems, and fuzzy-genetic systems. Within this context, applications of Monte Carlo techniques have been studied to assess the reliability level of complex systems and their implications for security during operation.

In this context, starting from 2020, a research activity in collaboration with Terna (the Italian TSO) has been initiated to introduce suitable constraint formulations within the Optimal Power Flow (OPF) algorithms. These formulations aim to address dynamic issues related to both voltage stability and frequency stability.

Furthermore, in this same domain, the research has also been directed towards the use of both probabilistic and robust optimization techniques for the planning and operation of electrical networks in the presence of a significant penetration of non-programmable renewable energy sources.

Congestion Management: The research focuses on studying the effects of congestion on the electricity market, considering economic aspects such as calculating and allocating financial instruments to cover price volatility risks following congestions. This includes analyzing the effects of the Unique National Price that characterizes the Italian electricity market.

Zonal Structure Definition and TTC Calculation: In this context, innovative methodologies have been studied and applied to determine the Total Transfer Capacity (TTC) in a market context, with particular reference to the zonal model. The value of the TTC limit between two zones is used as input data in the electricity market, although its value is a function of the generation profile, known only downstream of the energy market. The adopted approach is based on the use of Monte Carlo techniques.

Within this research area, starting from 2019, in collaboration with the Italian Transmission System Operator (TSO), Terna, a study has been initiated to determine the zonal structure of an electrical

network to be adopted in the day-ahead market. This study is based on model-based algorithms rather than relying solely on the experience and knowledge within a TSO. Specifically, the research aims to identify and calculate appropriate nodal indicators for use in clustering algorithms to define the zonal structure.

Market Models: The research activity has been oriented towards the definition of market models in order to have simulation tools capable of evaluating, both technically and economically, the consequences of operators' choices. The developed models allow for the calculation of production profiles and power flows both on the zonal model and on the physical network. In particular, the study has focused on the analysis and modeling of strategic behaviors using game theory. This includes short-term analyses related to implementable bidding strategies in the day-ahead market, as well as medium to long-term studies on investments in new generation capacity by companies operating in the production sector. In this context, the interaction between the CO₂ market and the electricity market has been taken into account.

In recent years, since the establishment of the European market coupling for electric energy, research activities have been concentrated on studying and modeling algorithms for resolving the European market. This includes both the day-ahead market session and the intraday market sessions. The developed market models allow for realistic simulation of electric market sessions at the European level, serving as an important computational tool to analyze the impacts of potential changes in the regulatory framework. In this context, a collaboration with Terna was initiated in 2019 to assess the effects of extending the Flow Base methodology on the interface of the North market zone with neighboring foreign countries, currently managed with an ATC approach.

Security and Market: The research activity has investigated the interaction between the electricity market and the security, including the events of the 2003 blackouts. These aspects have been studied in reference to both coordination issues between the development of the generation fleet and the electrical grid, and the operation of the electrical system in the short term, including interactions with the energy market. In relation to short and very short-term operation, the research has explored, using multi-objective optimization techniques, the possible objectives pursued by operators (with a particular focus on the Transmission System Operator) and how these entities interact with each other and with the market.

Optimization for Optimal Reactive Power Flow Problems: The objective of this research area concerns the definition of new objective functions directly related to the security for the operation of the electric power systems, to be employed in Optimal Reactive Power Flow (ORPF) problems instead of the classical minimization of active power losses. Various identified functions, some of which are multi-objective, have been tested on models of the Italian transmission grid model. Additionally, through the adoption of genetic algorithms, an ORPF model has been developed that allows for the implementation and testing of new optimization functions more straightforwardly than traditional gradient-based optimization techniques.

In recent years, in collaboration with the Irish Transmission System Operator (EirGrid), procedures have been established for planning reactive power resources in the transmission network in the presence of a significant penetration of wind generation (both onshore and offshore). In this work, the management of a mixed AC/DC grid has been addressed, taking into account the potential development of the network through submarine cables for connecting offshore wind farms.

Ancillary Services and Ancillary Services Market: In this sector, various topics have been addressed during the research activity. Notably, the issue of dividing active power losses among transactions between buyers and sellers of energy has been highlighted, considering the simultaneous presence of bilateral (or multilateral) transactions and the pool market model.

In recent years, research efforts have focused on opening the dispatch services market to new entities such as Virtual Power Plants and demand-side participation. Specifically, taking into account the evolving regulatory framework characterizing various national and international electricity markets, attention has been directed towards different degrees of coordination between global ancillary services (that impact the overall system) and those that have a local impact on distribution networks, as provided by entities aggregated in Virtual Power Plants whose facilities are connected to distribution networks. This theme has also been developed within Work Package 2 (WP2) of the European OSMOSE project (H2020), specifically aimed at managing flexibility in a system experiencing a significant penetration of non-programmable renewable energy sources.

Evolution of the Distribution System: In recent years, Cristian Bovo has also been involved in studying the impact of non-programmable renewable energy sources on the electric power system, with a particular focus on distribution networks.

In collaboration with SIEMENS Italia, new automation functions have been explored, involving dispatching both active and reactive power of Station Automation Systems (SAS) for AAT/AT and AT/MT stations. The objective of this activity was to define procedures for voltage regulation and congestion management in the presence of renewable sources, typically wind generation. In this context, a procedure has been developed to verify the possible islanding operation of a portion of the sub-transmission network. Starting from real-time measurements, the procedure determines control actions to be taken to ensure, if possible, the power supply of the maximum load following the formation of the island. Additionally, in collaboration with SIEMENS, a research activity is underway, with Professor Bovo as the scientific coordinator, to develop methodologies for real-time control and management of distribution networks. The initial phase of the research focused on defining a system capable of real-time monitoring of the MT distribution grid and providing a suitable computational model for performing network calculations, such as power flow and short circuit. Subsequently, the research activity shifted towards estimating the state of the MV network based on the knowledge of a limited set of real-time measurements. Following this, voltage control algorithms based on both local and centralized architectures were developed. Lastly, algorithms are being defined to determine the optimal configuration of the distribution network both in the planning phase and under post-fault conditions. The work conducted so far has led to the definition of calculation algorithms and their implementation in appropriate libraries installed by Siemens in its own DMS (Distribution Management System) environment named Ingrid, currently in the testing phase at some Italian distributors.

In collaboration with Unareti, a distribution network planning model is being developed, with a specific focus on the issue present in the Milan area. This issue stems from the development, in the years preceding the liberalization of the electricity sector, of two distribution networks managed at that time by Unareti and e-distribuzione in the same municipal territory. Following the Bersani Decree, the entire distribution network is now owned and operated by Unareti, leading to the challenge of defining specific procedures for planning and rationalizing the existing system. This planning procedure must also consider certain topological constraints adopted by Unareti for the network's operation related to MV feeders.

Finally, the research activity is also oriented towards the development of procedures for optimizing energy networks (including electrical networks) and their integration in rural contexts typical of developing countries. This work aims to define methodologies (including multi-objective approaches) that assist in choosing the optimal configuration, taking into account the technical, economic, social, and environmental constraints characteristic of these rural areas. Specifically, this issue is addressed by adopting stochastic optimization techniques for planning and robust optimization for operation.

Cristian Bovo received the award for the best paper for the paper A. Berizzi, C. Bovo, "The use of genetic algorithms for the localization and sizing of passive filters," presented at 9th International

Conference on Harmonics and Quality of Power (ICHQP), Orlando, Florida, 1-4October, 2000
This work was also presented as an invited paper at the International Conference on Intelligent System Application to Power Systems (ISAP), Budapest, Hungary, 18-21 June, 2001.
Prof. Bovo received the Best Paper Award session paper at the IEEE Power Tech conference in 2003 for the work: A. Berizzi, C. Bovo, M. Delfanti, E. Fumagalli, M. Merlo: "Simulation of a bid-based dispatch subject to inter-zonal transmission constraints."

Scientific Activity

Part of Professor Bovo's research activity has also taken place within consulting contexts for public entities and private companies. In particular, in collaboration with the Regulatory Authority for Electricity, Gas, and Water (ARERA), he participated in the investigative inquiry established by the authority following the blackout that affected the entire national electrical system in September 2003.

In 2004-2005, he was jointly responsible with Professor Berizzi for the "Market and Security" working group of the Forum RESCOM (Reliability of Electric Energy Supply in a Competitive Market) organized by the Politecnico di Milano Foundation.

Since May 2006, he has been a member of the Technical Committee CT3/16 "Information structures, documentation, graphic symbols, signs, and other identifications (formerly CT 3, formerly CT 16)" of the Italian Electrotechnical Committee (CEI).

Since 2013, he has been a member of the Faculty Board of the PhD program in Electrical Engineering at the Politecnico di Milano, and from 2016 to 2018, he served as vice-coordinator of the same board.

Starting from 2021, he is a member of the Steering Committee of the Interdepartmental Center Institute for Transformative Innovation Research (ITIR) of the University of Pavia, which he contributed to founding. He is also responsible for the laboratory within this Center focusing on energy transition (Energy Transition Lab).

Participation in Editorial Committees

He serves as a reviewer for several international journals:

- ELSEVIER Electric Power Systems Research since 2007;
- ELSEVIER Sustainable Energy, Grids and Networks since 2017;
- ELSEVIER Applied Energy 2017;
- ELSEVIER International Journal of Electrical Power and Energy Systems since 2017;
- ELSEVIER Energy for Sustainable Development since 2022;
- IEEE Transactions on Smart Grid since 20-02-2020;
- Frontiers in Energy Research since 2021;
- Energies since 2016;
- Energy since 2021.

He has also served as a Guest Editor for the special issue of Energies on "Electricity Markets: Modelling, Simulation, and Analysis" in 2022.

Business organization and coordination of contracts for consulting and/or research.

The familiarity with the models for calculating the power flows, and experience gained from models of the electricity network of high dimensions (such as those of the national transmission

grid) have allowed the business of consulting in the field of power system. This activity is closely linked to both the ability to estimate the evolution of the zonal model in our country, and to calculate the TTC values between two different zones. After the Italian blackout of Sept. 2003, the research group of Milan became technical consultant for the Italian Authority for Electricity and Gas (AEEG) to define the responsibility of the blackout.

The research group of Milano, moreover, started in 2004 a public Forum (organized by the Politecnico di Milano and by the Fondazione Politecnico) titled Reliability of Electric Energy Supply in a Competitive Market (RESCOM). In this contest, Eng. Bovo organized, together with prof. Berizzi, the activity of Market and Security Working Group.

Since 2007 he is reviewer of the international journal Electric Power System Research.

Below, it is report a list of research contracts in which Cristian Bovo was involved or was a scientific responsible:

- “Possibility to adopt multiobjective optimization in the balance market”, (ENEL Research, 1999).
- “Technical and economic requirements for the connection of power stations to the transmission system in Italy”, Electricité de France, 1999.
- “Simulation of the operation of Market Splitting in Italy”, Electricité de France, 2002.
- “Innovative methods for the management of electrical systems under the free market in electricity”, MURST.
- “Technical issues regarding the authorization and construction of lines with priority access to the electricity grid interconnection (merchant lines)”, Techprom Srl, 2003.
- “Estimation of the incremental capacity for the merchant line Cagno Mendrisio”, Techprom Srl, 2003.
- “Tools for performance evaluation of static and dynamic control of voltage and reactive power flows in the electricity transmission network”, CESI SpA, 2003-2004.
- “Order of Service to the technical assistance activities in the investigation by the Electricity and Gas with Resolution n.112/03”, AEEG 2004.
- “Study the impact of the flexible mechanisms under the Kyoto Protocol on the cost of electricity in Italy in a competitive electricity market”, Fondazione Luigi Einaudi, 2004.
- “Evaluation of instability voltage of the power system”, CESI SPA, 2004-2005.
- “Order of Service for investigation regards the deliberations of 09/09/04 n.152/04" AEEG, 2004-2005.
- “Order of Service for analysis of the functioning of the electricity system-rif.M04/265”, AEEG, 2004-2005.
- “Optimization of the voltage profiles”, CESI SPA, 2005.
- “Estimation of the national electricity system of new network investments”, REF 2005.
- “Analysis of network aimed at determining the structure and zonal limits and their TTC”, Energia SpA, 2005.
- “Studies aimed at the preliminary design of the power plant of the New Bastioni”, EDERA SRL, 2005.
- “Analysis of the zonal structure and limitations of transport between the market areas in South and Central-South”, RETRASM SRL, 2006.
- “Searching for the optimal mix of energy sources for the future generation of national park”, Politecnico di Milano - Enel Produzione, 2006.
- “Order of service for technical assistance activities with regard to analysis of the functioning of the electricity system,” AEEG, 2006-2007.
- “Analysis of the zonal structure and limitations of transport between the market areas in Calabria, Rossano, South and Central-South”, RETRASM SRL, 2007.

- “Study to 2008 of the Gissi power plant in relation to the possible evolution of the electricity grid and the zonal structure and its limitations in transport”, RETRASM SRL, 2008.
- “The security of the voltage profiles to face the uncertainties induced by the presence of electricity markets”, Cofinanziamento MIUR, 2005.
- “Grid code and market rules for the Popular Republic of Congo” (Eni, 2009).
- “Islanding operation of subtransmission/distribution systems” (Siemens Italia, 2010-12).
- “Tools for MV distribution network online operation” (Siemens Italia, 2010-11), scientific responsible.
- “DMS for distribution systems” (Siemens Italia, 2010-12).
- “Software for simulation of smart grids” (LMS, France, 2011).
- “Advance tools for MV distribution network for online operation: state estimation and voltage regulation” (Siemens Italia, 2012-13), scientific responsible.
- In 2014, as part of a collaboration with REC Srl (a company controlled by Repower SpA), he co-supervised, with Prof. Berizzi, a contract for studying the impact on the electrical network and dispatching services market of a pumping plant to be developed in Campania.
- In 2015, within the collaboration between Fondazione Politecnico and Siemens Italia, he served as the scientific head of a three-year research contract between Politecnico di Milano and Fondazione Politecnico, aimed at developing advanced algorithms for network calculations for Distribution Control Centers (Project INGRID 4).
- In 2019, still within the collaboration between Fondazione Politecnico and Siemens Italia, he was the scientific head of a three-year research contract between Politecnico di Milano and Fondazione Politecnico, focused on the development of additional advanced algorithms for network calculations for Distribution Control Centers (Project INGRID 5).
- Starting from 2019, within the ENSIEL consortium, he has been involved in the research contracts between ENSIEL and Terna, focusing on the following topics:
 - Simulation of market coupling between Italy and the rest of Europe, with a particular focus on managing exchanges at the northern border;
 - Development of Optimal Power Flow problems with static and dynamic security constraints.
- In 2019, he was responsible for the contract Ensiel/Terna/Politecnico di Milano on "Model-based methodologies for defining alternative zonal structures."
- In 2022, he is responsible for the contract Ensiel/Terna/University of Pavia for the development of "model-based" procedures for defining alternative zonal structures.
- In 2022, he is responsible for the contract Ensiel/Terna/University of Pavia for the development of new algorithms to improve the accuracy of estimating exchange limits between areas on the forecast network.

Collaboration with International Research Centers

- Collaboration with the Electrical Engineering Department at Shahid Chamran University of Ahvaz, Ahvaz, Iran, on the topic of islanded operation of certain portions of sub-transmission networks in the presence of renewable generation. This collaboration resulted in the following publication in an international journal:
 - Alavi, S.A., Ilea, V., Saffarian, A., Bovo, C., Berizzi, A., Seifossadat, S.G., Feasible islanding operation of electric networks with a large penetration of renewable energy sources considering security constraints (2019) *Energies*, 12 (3), art. no. 537.
- Collaboration with the Department of Electrical Engineering, Shanghai Jiao Tong University, Shanghai, China, regarding cooperative trading mechanisms in the context of

multi-energy communities. This collaboration led to the following publication in an international journal:

- Wang, J., Xie, N., Ilea, V., Bovo, C., Xin, H., & Wang, Y. (2021). Cooperative trading mechanism and satisfaction-based profit distribution in a multi-energy community. *Frontiers in Energy Research*, 9 doi:10.3389/fenrg.2021.723192.
- Collaboration with the Faculty of Electrical Engineering, University of Danang—University of Science and Technology, Vietnam, on various topics such as new clearing price models in the European electricity market, modeling of intraday markets, and optimal location of energy storage systems with wind plants. This collaboration resulted in the following publications:
 - Le, H. L., Ilea, V., & Bovo, C. (2019). Integrated European intra-day electricity market: Rules, modeling, and analysis. *Applied Energy*, 238, 258-273. doi:10.1016/j.apenergy.2018.12.073;
 - Lam, L. H., Ilea, V., & Bovo, C. (2020). New clearing model to mitigate non-convexity in the European day-ahead electricity market. *Energies*, 13(18) doi:10.3390/en13184716;
 - Nguyen, N. T. A., Le, D. D., Moshi, G. G., Bovo, C., & Berizzi, A. (2016). Sensitivity analysis on locations of energy storage in power systems with wind integration. *IEEE Transactions on Industry Applications*, 52(6), 5185-5193. doi:10.1109/TIA.2016.2600669.
- Collaboration with the H. Milton Stewart School at the Georgia Institute of Technology, United States, on optimal feeder routing in the planning of urban distribution networks considering topological constraints and the impact on energy losses. This collaboration resulted in the following publication:
 - Bosisio, A., Berizzi, A., Amaldi, E., Bovo, C., & Sun, X. A. (2020). Optimal feeder routing in urban distribution networks planning with layout constraints and losses. *Journal of Modern Power Systems and Clean Energy*, 8(5), 1005-1014. doi:10.35833/MPCE.2019.000601.
- Collaboration with the University Politehnica of Bucharest, Romania, on the resilient management of urban distribution networks in the presence of distributed generation resources and optimization models for reactive power flow with secondary voltage control. This collaboration resulted in the following publications:
 - Picioroaga, I., Eremia, M., Ilea, V., & Bovo, C. (2020). Resilient operation of distributed resources and electrical networks in a smart city context. *UPB Scientific Bulletin, Series C: Electrical Engineering and Computer Science*, 82(3), 267-278;
 - Ilea, V., Bovo, C., Merlo, M., Berizzi, A., & Eremia, M. (2009). Reactive power flow optimization in the presence of secondary voltage control. Paper presented at the 2009 IEEE Bucharest PowerTech: Innovative Ideas Toward the Electrical Grid of the Future, doi:10.1109/PTC.2009.5281973.
- Collaboration with the Department of Electrical Engineering, Universidad Carlos III de Madrid, Spain, on the optimal scheduling of hydro basins in a pool-based electricity market with considerations for transmission constraints. This collaboration was part of the project "Coordinated Actions of Renewable Production in Multi-Areas, considering the Market Environment (IT2009-0063, AI IT10425C7D)," funded by the Italian and Spanish governments. The research activity resulted in the following publication:
 - Castronuovo, E. D., Hermida, G., Gholami, M., Bovo, C., & Berizzi, A. (2016). Optimal scheduling of a hydro basin in a pool-based electricity market with

consideration of transmission constraints. *Electric Power Systems Research*, 131, 255-263. doi:10.1016/j.epr.2015.10.023.

- Collaboration with the Department of Electrical Engineering, CRNB, Djelfa, Algeria, and the Electrical and Industrial Systems Laboratory, University of Sciences and Technology Houari Boumediene of Algiers, Algeria, on optimization models for the optimal placement of FACTS devices in the presence of secondary voltage regulation. This collaboration resulted in the following publications:
 - Benabid, R., Berizzi, A., Bovo, C., Ilea, V., & Boudour, M. (2014). A new modeling and placement of shunt FACTS devices in the secondary voltage regulation environment. *Electrical Engineering*, 96(4), 359-366. doi:10.1007/s00202-014-0303-4;
 - Benabid, R., Boudour, M., Berizzi, A., Bovo, C., & Ilea, V. (2012). Multi-objective optimization of static var compensator in the presence of secondary voltage regulation using NSGA-II. Paper presented at the 2012 IEEE International Energy Conference and Exhibition, ENERGYCON 2012, 783-788. doi:10.1109/EnergyCon.2012.6348257.
- Collaboration with the Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, IL 61801, United States, and Research on the Energetic System - RSE, S.p.A., Milan, Italy, regarding a probabilistic approach to power system security assessment under uncertainty. This collaboration resulted in the following publication:
 - Le, D. D., Berizzi, A., Bovo, C., Ciapessoni, E., Cirio, D., Pitto, A., & Gross, G. (2013). A probabilistic approach to power system security assessment under uncertainty. Paper presented at the Proceedings of IREP Symposium: Bulk Power System Dynamics and Control - IX Optimization, Security and Control of the Emerging Power Grid, IREP 2013, doi:10.1109/IREP.2013.6629411.
- Collaboration with the School of Electrical Engineering and Computer Science, Queensland University of Technology, Australia, on oligopolistic market models for the development of generation capacity in the presence of transmission constraints. This collaboration led to the following publication:
 - Abeygunawardana, A. M. A. K., Bovo, C., Gholami, M., & Berizzi, A. (2013). Generation capacity expansion with CO2 emission and transmission constraints in an oligopolistic market. *Research Journal of Applied Sciences, Engineering and Technology*, 6(23), 4474-4484. doi:10.19026/rjaset.6.3455

Institutional and service-related activities

- In 2020, he served as a board member of the consortium LEAP (Laboratorio Energia Ambiente Piacenza), appointed by the Politecnico di Milano.
- From 2011 to 2022, he has been a member of the Council of the Electrical Engineering degree program at the Politecnico di Milano.
- From 2013 to 2020, he was a member of the Teaching Board of the Ph.D. program in Electrical Engineering at the Politecnico di Milano.
- From 2016 to 2018, he was the vice-coordinator of the Teaching Board of the Ph.D. program in Electrical Engineering.
- From 2003 to 2020, he was a member of the Council of the Energy Engineering degree program at the Politecnico di Milano.

- Since 2021, he has been a member of the Council of the Industrial Engineering degree program at the University of Pavia.
- Since 2021, he has been a member of the Council of the Electrical Engineering degree program at the University of Pavia.
- Since 2021, he has been a member of the Council of the Automation Engineering degree program at the University of Pavia.
- Since 2021, he has been a member of the teaching board of the Ph.D. program in Electronic, Computer, and Electrical Engineering at the University of Pavia.
- From 2022, he represents the University of Pavia in the National Interuniversity Consortium "Energia e Sistemi Elettrici," EnSiEL.
- He is a full member of the Examination Board for the first and second sessions of the state exams for professional engineering practice, appointed by the University of Pavia in 2022.
- He has participated as member in various recruitment committees for researchers/assistant professors.

Vision for teaching and research

Over the years, the research activity has been focused on issues related to the electric power systems, with particular emphasis on aspects related to operational planning and long-term planning in the context of a liberalized electricity market.

This research activity has always been conducted using a multidisciplinary approach that characterizes this research area, where technical expertise converges with economic and legal skills. Specifically, in terms of technical expertise, the research activity has been based on a rigorous approach to the theoretical foundations of electrical disciplines, as well as the mathematical foundations necessary for the development of rigorous and scientifically valid models.

Alongside this rigorous technical-scientific approach, the research activity has always been embedded in an operational context, thanks to the strong applied research conducted in close collaboration with Transmission System Operators (TSO), Distribution System Operators (DSO), and electricity generation companies. Through these collaborations with key players in the electrical sector, it is possible to achieve significant added value in both problem identification and the formulation of scientifically and technologically high-profile solutions.

Such an approach has been applied in all research areas developed over the years, as well as those more recently initiated, related to the development of distribution networks and the integration of non-programmable renewable sources. This includes the involvement of new entities tasked with providing ancillary services.

Regarding teaching, the objective is to develop students' skills, helping them achieve a high level of autonomy in analysing issues and identifying solutions in the field of electric power systems. To achieve this goal, the topics covered in various courses have been developed on solid and rigorous methodological foundations, which I consider necessary for a correct, comprehensive, and multidisciplinary understanding of the processes characterizing this sector. However, on these methodological foundations, it is essential to build an approach to teaching that is closely related to the practical aspects that characterize the electric energy sector. Therefore, references to the experience gained in research and collaboration with key players in the electrical system (TSO, DSO, Generating Companies, etc.) must find a place in the course programs.

Teaching portfolio

As for the teaching methods, I have always sought to incorporate elements of self-learning where possible. For example, in the Electricity Markets course, the understanding of market rules and possible strategies that can be adopted in the power exchange was acquired through a repeated game lasting two and a half months. In this game, the class is divided into groups (each representing a generation company), and I take on the role of Power Exchange. Participation in this electricity market simulation, along with changes in some input data during the simulation, facilitated the understanding of issues related to market power and the impact of network constraints on bidding strategies. At the end of the simulation period, three hours of class were dedicated to a discussion of the results obtained. Each team has the opportunity to present in the classroom their considerations, describing and justifying the strategies developed in formulating the bids presented during the simulation. They also discuss how these strategies were modified over the course of this repeated game and how changes in some input data led to adjustments in the strategies themselves.

This approach, where applicable, aids in self-learning of even very complex concepts and develops the ability to work in a team.

In selecting participants for various teams, I have given particular importance to creating multiethnic workgroups with students from different countries and bachelor's programs obtained at different universities, aiming to enhance diverse technical-scientific and cultural backgrounds. In this way, the student is prompted to develop skills in the areas of communication, work organization, and leadership while always respecting differences with other students.

In addition, the concepts covered in the courses always find applications in practical problems to be solved, including from a numerical perspective. This approach develops the ability to apply the methodological and theoretical aspects introduced in class to practical problems. Moreover, it helps the student become aware of typical values that characterize specific problems, such as the sizing of conductors or energy prices, for example.

Another element that is included in the teaching methods involves the use of industrial software for the analysis of the electric power systems. This approach allows students, with the assistance of the instructor, to conduct simulations in the classroom, gaining an understanding of specific phenomena and the factors that influence them most. The opportunity to apply the methods and theoretical models discussed in class to real-world cases enables a deeper and better comprehension of the phenomenon itself. As an example, a complex phenomenon such as voltage collapse can be simulated and studied using software like Matlab or other industrial tools (such as DigSilent).

Finally, within the teaching methods, there is also room for the organization of seminars conducted by industry specialists. For instance, in the 'Planning and Operation of Power Systems' course offered in the second year of the master's degree in electrical engineering at University of Pavia, I organized a seminar featuring executives from a prominent Italian Distribution System Operator (DSO). During these sessions, the invited specialists share their own experiences, providing a strong connection between theoretical aspects and more directly applicable insights.

As for assessing the skills acquired and developed by the student, it is important to design the course-end evaluation test structure correctly. Generally, in the universities where I have worked and currently serve, a final assessment test is scheduled at the end of the course, while no tests are administered during the lecture semester for master's courses. In any case, the final test for credit acquisition is typically oriented toward a numerical examination where theoretical concepts must be applied to a numerical problems. These numerical problems consist of various questions, some requiring a straightforward application of methodologies, while others involve a more personalized reworking of the concepts covered in class.

Typically, following the written test, there is an oral examination where the student is required to present and discuss certain theoretical aspects covered in class. The purpose of this oral test is to evaluate the student's ability to communicate and articulate their own way of presenting these concepts, as well as their capability to connect different themes.

During my academic career, I have been actively involved in teaching, both in undergraduate courses and in University Master's programs. Below is the list of educational activities I have undertaken until now.

Curricular Educational Activities

Academic Year 2000-2001:

- In charge of laboratory for the course "Principi di ingegneria elettrica" (Principles of Electrical Engineering) under the guidance of Professor A. Gandelli in the Engineering Management degree program.
- Assigned numerical applications for the course "Sistemi elettrici industriali e impianti elettrici" (Industrial Electrical Systems and Electrical Plants) by Professor Alberto Berizzi in the Energy Engineering degree program.

Ph.D. Period (1999-2001)

Responsible for numerical applications for the course "Sistemi elettrici industriali e impianti elettrici" under Professor Alberto Berizzi.

Conducted exercises related to short circuit current calculations and determination of series faults in the course "Sistemi elettrici per l'energia" by Professor A. Silvestri (1st year of Master's degree in electrical engineering).

Early Years as Researcher at Politecnico di Milano

In charge of exercises for the course "Distribuzione e utilizzazione dell'energia elettrica" (Distribution and Utilization of Electrical Energy) by Professor Alberto Berizzi in the second year of the undergraduate degree in electrical engineering.

Academic Year 2003-2004 to 2016-2017 and 2019-2020:

Course instructor for the course "Sistemi e macchine elettriche" (later Electric Power System) – initially 5 ECTS, later increased to 8 ECTS from the academic year 2010-11, in the first year of the Master's degree program in Energy Engineering. The course covers models of rotating machines, particularly induction and synchronous machines in the first part. The second part addresses key topics in electric power systems, including power flow calculations and security criteria, with a focus on the N and N-1 security criteria. Finally, it covers the characteristics of ancillary service markets, with specific reference to the Italian case.

Academic Year 2010-2011 to 2013-2014:

Course instructor for the course "Pianificazione ed esercizio delle reti elettriche" (Planning and Operation of Electrical Networks) – 6 ECTS, in the final year of the Master's degree in electrical engineering.

Academic Year 2014-2015 to 2022-2023:

Course instructor for the course "Electricity Markets" – 8 ECTS, in the first year of the Master's degree program in Electrical Engineering. The course, initiated in the academic year 2014-2015, was developed and overseen by Cristian Bovo from its inception, shaping its content, structure, and evolution over the years.

Academic Year 2017-2018 to 2018-2019:

Course instructor for the course "Impianti di produzione dell'energia" (Energy Production Systems) – initially 8 ECTS, later increased to 10 ECTS, in the first year of the Master's degree in Electrical Engineering.

Year 2020:

Responsible for a course offered in the context of the Ph.D. school: "Power system dynamics and controls of in the presence of large penetration of renewables."

Year 2021:

Assigned a lecture in the module "Power network definition and tools 1" within the course "A Smart Grid for Energy Management: the IoT approach," organized by the Intensive School for Advanced Graduate Studies for the Ph.D. programs in Electrical and Electronics Engineering, Computer Science, and Microelectronics at the University of Pavia.

Year 2021 to Present:

Course instructor for "Elementi di Impianti elettrici" (Elements of Electrical Systems) – 6 ECTS, in the second year of the industrial engineering degree at the University of Pavia.

Year 2022 to Present:

Course instructor for "Electric power systems" – 6 ECTS, in the first year of the Master's degree program in Electrical Engineering at the University of Pavia.

Year 2023 to Present:

Course instructor for the course "Planning and operation of power systems systems" – 3 ECTS out of 6 ECTS, in the second year of the Master's degree program in Electrical Engineering at the University of Pavia.

Non-Curricular Educational Activities

In 2004 and 2005, participated in the Scientific Commission of the first-level University Master's program in Engineering and Management of Power Systems (MISP), where he was also responsible for the module "Mercato Elettrico" (Electricity Market).

From 2005 to 2019, served as an instructor in the second-level Master's program RIDEF - Energia per Kyoto: energie rinnovabili, decentramento, efficienza energetica, organized by Politecnico di Milano and Università Iuav di Venezia.

In 2007, instructed the international course "Sustainable strategies and programmes for energy and environmental management," organized by Fondazione Politecnico di Milano and MIP.

In 2007, served as an instructor in the second-level University Master's program "Progettazione, produzione ed esercizio delle turbomacchine nel settore energetico," contributing to the organization of the module on electrical systems.

Since 2007, has been an instructor in the Advanced Training Course in Energy Finance & Commodity Trading (MEF), focusing on topics related to the Ancillary Service Market.

In 2012, instructed the course "GARP ERP Certification Preparation Course - Examination preparation for Energy Risk Professional certification" organized by Energisk.org in collaboration with CASS Business School London, Université de Genève, and AIGET. The course covers topics related to electricity production from traditional and renewable sources, electricity market models,

and their implementations in specific situations (PJM Market, Nordpool market), the Kyoto Protocol, and the European Union Emission Trading Scheme for CO₂.

Tutor for Thesis

Tutor of about 30 Master's theses on topics related to his research activities.

He was tutor for 4 doctoral theses in electrical engineering. Two of these focus on the application of game theory in studying the electricity market, both in the short and long term. The third one is centered on the development of new methods for estimating the state of medium-voltage distribution networks. Lastly, the fourth thesis is concentrated on the study and integration of electricity market models within the European context.

List of publications

- [1] Wang J., Ilea V., Bovo C., Xie N., Wang Y., Optimal self-scheduling for a multi-energy virtual power plant providing energy and reserve services under a holistic market framework (2023), *Energy*, 278, DOI: 10.1016/j.energy.2023.127903
- [2] Nebuloni R., Meraldi L., Moretti L., Ilea V., Bovo C., Berizzi A., Raboni P., A Real-Time Cycle Counting Method for Battery Degradation Calculation in MILP Models (2023), *Proceedings - 2023 IEEE International Conference on Environment and Electrical Engineering and 2023 IEEE Industrial and Commercial Power Systems Europe, IEEEIC / I and CPS Europe 2023*, DOI: 10.1109/IEEEIC/ICPSEurope57605.2023.10194776
- [3] Fusco, A., Gioffrè, D., Francesco Castelli, A., Bovo, C., & Martelli, E. (2023). A multi-stage stochastic programming model for the unit commitment of conventional and virtual power plants bidding in the day-ahead and ancillary services markets. *Applied Energy*, 336 doi:10.1016/j.apenergy.2023.120739
- [4] Nebuloni, R., Meraldi, L., Bovo, C., Ilea, V., Berizzi, A., Sinha, S., . . . Raboni, P. (2023). A hierarchical two-level MILP optimization model for the management of grid-connected BESS considering accurate physical model. *Applied Energy*, 334 doi:10.1016/j.apenergy.2023.120697
- [5] Nebuloni R., Ilea V., Berizzi A., Bovo C., Arrigoni C., Corti F., Conte B., Bonera R., OPTIMAL MANAGEMENT OF FLEXIBILITY SERVICES IN LV DISTRIBUTION GRIDS (2023) *IET Conference Proceedings*, 2023 (6), pp. 2034 – 2038, DOI: 10.1049/icp.2023.1156
- [6] Quaglia F., Limone M., Screpanti G., Chicco G., Colella P., Mazza A., Russo A., Bovo C., Ilea V., Advanced Model-based Approaches to be Applied in the Context of a Bidding Zone Review (2023) *2023 115th AEIT International Annual Conference, AEIT 2023*, DOI: 10.23919/AEIT60520.2023.10330340
- [7] Wang J., Ilea V., Bovo C., Xie N., Wang Y., SELF-SCHEDULING PROBLEM OF A RENEWABLE COMMUNITY AGGREGATOR TRADING IN ENERGY AND RESERVE MARKETS (2023) *IET Conference Proceedings*, 2023 (15), pp. 310 - 315, DOI: 10.1049/icp.2023.2159
- [8] Wang, J., Xie, N., Ilea, V., Bovo, C., Xin, H., & Wang, Y. (2021). Cooperative trading mechanism and satisfaction-based profit distribution in a multi-energy community. *Frontiers in Energy Research*, 9 doi:10.3389/fenrg.2021.723192
- [9] Petrelli, M., Fioriti, D., Berizzi, A., Bovo, C., & Poli, D. (2021). A novel multi-objective method with online pareto pruning for multi-year optimization of rural microgrids. *Applied Energy*, 299 doi:10.1016/j.apenergy.2021.117283
- [10] Bovo, C., Ilea, V., Carlini, E. M., Caprabanca, M., Quaglia, F., Luzi, L., & Nuzzo, G. (2021). Optimal computation of network indicators for electricity market bidding zones configuration considering explicit n-1 security constraints. *Energies*, 14(14) doi:10.3390/en14144267

- [11] Bovo, C., Ilea, V., Colella, P., Bompard, E., Chicco, G., Mazza, A., . . . Luzi, L. (2021). Model-based determination of bidding zones: An approach based on multiple scenarios, optimal power flow and clustering algorithms. Paper presented at the 2021 AEIT International Annual Conference, AEIT 2021, doi:10.23919/AEIT53387.2021.9626860
- [12] Berizzi, A., Ilea, V., Petrelli, M., Vicario, A., Bovo, C., Carlini, E. M., . . . Zaottini, R. (2021). OPF model with dynamic security constraints: A state of the art review. Paper presented at the 2021 AEIT International Annual Conference, AEIT 2021, doi:10.23919/AEIT53387.2021.9627047
- [13] Bosisio, A., Berizzi, A., Amaldi, E., Bovo, C., Morotti, A., Greco, B., Iannarelli, G.. A GIS-based approach for high-level distribution networks expansion planning in normal and contingency operation considering reliability, (2021) Electric Power Systems Research, 190, art. no. 106684, DOI: 10.1016/j.epsr.2020.106684
- [14] Carlini, E.M., Coluzzi, C., Lanzellotto, F., Pascucci, A., Monopoli, F., Ilea, V., Bovo, C., Le, H.L., Simulation of Euphemia's Market Coupling using a flow-based model for the Region Italy North, (2020) 12th AEIT International Annual Conference, AEIT 2020, art. no. 9241090, DOI: 10.23919/AEIT50178.2020.9241090
- [15] Lam, L.H., Ilea, V., Bovo, C., New clearing model to mitigate the non-convexity in European day-ahead electricity market (2020) Energies, 13 (18), art. no. 4716, DOI: 10.3390/en13184716
- [16] Bosisio, A., Berizzi, A., Amaldi, E., Bovo, C., Sun, X.A., Optimal feeder routing in urban distribution networks planning with layout constraints and losses, (2020) Journal of Modern Power Systems and Clean Energy, 8 (5), pp. 1005-1014, DOI: 10.35833/MPCE.2019.000601
- [17] Bovo, C., Ilea, V., Carlini, E.M., Caprabanca, M., Quaglia, F., Luzi, L., Nuzzo, G., Optimal Computation of Network Indicators for Electricity Market Bidding Zones Configuration (2020), UPEC 2020 - 2020 55th International Universities Power Engineering Conference, Proceedings, art. no. 9209847, DOI: 10.1109/UPEC49904.2020.9209847
- [18] Ilea, V., Bovo, C., Falabretti, D., Merlo, M., Arrigoni, C., Bonera, R., Rodolfi, M., Voltage control methodologies in active distribution networks (2020) Energies, 13 (12), art. no. 3293, DOI: 10.3390/en13123293
- [19] Picioroaga, I., Eremia, M., Ilea, V., Bovo, C., Resilient operation of distributed resources and electrical networks in a smart city context (2020) UPB Scientific Bulletin, Series C: Electrical Engineering and Computer Science, 82 (3), pp. 267-278. ,
- [20] A. Bosisio, A. Berizzi, E Amaldi, C. Bovo, A. Morotti, B. Greco, G. Iannarelli, A GIS-based approach for high-level distribution networks expansion planning in normal and contingency operation considering reliability, 21st Power Systems Computation Conference, PSCC 2020, June 29-July 3, 2020, Porto, Portugal.
- [21] V. Ilea, C. Bovo, E. Carlini, M. Caprabanca, F. Quaglia, L. Luizi, G. Nuzzo, Review of the Mathematic Models to Calculate Network Indicators for Bidding Zones Definition (2019), 54th International Universities Power Engineering Conference, UPEC 2019, University POLITEHNICA of Bucharest (UPB), 3-6 September 2019.
- [22] Michi, L., Ilea, V., Caprabanca, M., Nuzzo, G., Colella, P., Russo, A., Quaglia, F., Bompard, E., Griffone, A., Bovo, C., Carlini, E.M., Luzi, L., Chicco, G., Mazza, A., Optimal Bidding Zone Configuration: Investigation on Model-based Algorithms and their Application to the Italian Power System (2019), 2019 AEIT International Annual Conference, AEIT 2019.
- [23] G. Rimini, V. Ilea, C. Bovo, Generation Companies Agent-Based Modelling: Application to the Colombian Day-Ahead Market (2019), 54th International Universities Power Engineering Conference, UPEC 2019, University POLITEHNICA of Bucharest (UPB), 3-6 September 2019.
- [24] Fouad, A.H.O., Bovo, C., Modelling of the demand curve of the Italian capacity market (2019) 2019 IEEE Milan PowerTech, PowerTech 2019.
- [25] Le, H.L., Ilea, V., Bovo, C., Integrated European intra-day electricity market: Rules, modeling and analysis (2019) Applied Energy, 238, pp. 258-273.

- [26] Alavi, S.A., Ilea, V., Saffarian, A., Bovo, C., Berizzi, A., Seifossadat, S.G., Feasible islanding operation of electric networks with large penetration of renewable energy sources considering security constraints (2019) *Energies*, 12 (3), art. no. 537.
- [27] Bosisio, A., Berizzi, A., Bovo, C., Amaldi, E., Fratti, S., GIS-based urban distribution networks planning with 2-step ladder topology considering electric power cable joints (2018) 2018 110th AEIT International Annual Conference, AEIT 2018, art. no. 8577391 .
- [28] Michi, L., Carlini, E.M., Cacioli, L., Polinelli, D., Capurso, P., Proietti, A., Berizzi, A., Bovo, C., The effects of new 2030 scenario: Reduction of short-circuit power and widening of voltage dips (2018) 2018 110th AEIT International Annual Conference, AEIT 2018, art. no. 8577274.
- [29] Bovo, C., Ilea, V., Rolandi, C., A Security-Constrained Islanding Feasibility Optimization Model in the Presence of Renewable Energy Sources (2018) *Proceedings - 2018 IEEE International Conference on Environment and Electrical Engineering and 2018 IEEE Industrial and Commercial Power Systems Europe, IEEEIC/I and CPS Europe 2018*, art. no. 8494427.
- [30] Bovo, C., Ilea, V., Subasic, M., Optimization of Measurement Equipment Placement in Distribution Networks by Genetic Algorithms (2018) *Proceedings - 2018 IEEE International Conference on Environment and Electrical Engineering and 2018 IEEE Industrial and Commercial Power Systems Europe, IEEEIC/I and CPS Europe 2018*, art. no. 8494477.
- [31] Lam, L.H., Ilea, V., Bovo, C., A thorough comparison among various mathematical approaches to compute PUN in Italy (2018) *International Conference on the European Energy Market, EEM, 2018-June*, art. no. 8469818.
- [32] Lam, L.H., Ilea, V., Bovo, C., European day-ahead electricity market coupling: Discussion, modeling, and case study (2018) *Electric Power Systems Research*, 155, pp. 80-92.
- [33] Lam, L.H., Ilea, V., Bovo, C., Impact of the price coupling of regions project on the day-ahead electricity market in Italy (2017) *2017 IEEE Manchester PowerTech, Powertech 2017*, art. no. 7981215.
- [34] Bosisio, A., Berizzi, A., Bovo, C., Amaldi, E., Urban distribution network planning with 2-step ladder topology considering joint nodes (2017) *2017 IEEE Manchester PowerTech, Powertech 2017*, art. no. 7980959.
- [35] N.T.A. Nguyen, D. Duong, C. Bovo, A. Berizzi, Optimal Siting and Sizing of Energy Storage Systems for Wind Integration, (2017), *IREP'2017 Symposium: X Bulk Power Systems Dynamics and Control Symposium*, from August 27th to September 1st, 2017.
- [36] Nguyen, N.T.A., Le, D.D., Moshi, G.G., Bovo, C., Berizzi, A., Sensitivity Analysis on Locations of Energy Storage in Power Systems With Wind Integration (2016) *IEEE Transactions on Industry Applications*, 52 (6), art. no. 7544567, pp. 5185-5193.
- [37] Nguyen, N.T.A., Le, D.D., Bovo, C., Berizzi, A., Energy storage operation in power systems considering correlation between wind farms (2016) *IEEEIC 2016 - International Conference on Environment and Electrical Engineering*, art. no. 7555725.
- [38] Moshi, G.G., Bovo, C., Berizzi, A., Taccari, L., Optimization of integrated design and operation of microgrids under uncertainty (2016) *19th Power Systems Computation Conference, PSCC 2016*, art. no. 7540870.
- [39] Castronuovo, E.D., Hermida, G., Gholami, M., Bovo, C., Berizzi, A., Optimal scheduling of a hydro basin in a pool-based electricity market with consideration of transmission constraints (2016) *Electric Power Systems Research*, 131, pp. 255-263.
- [40] Le, D.D., Berizzi, A., Bovo, C., A probabilistic security assessment approach to power systems with integrated wind resources (2016) *Renewable Energy*, 85, pp. 114-123.

- [41] Arrigoni, C., Bigoloni, M., Rochira, I., Bovo, C., Merlo, M., Ilea, V., Bonera, R., Smart Distribution Management System: Evolution of MV grids supervision & control systems (2016) AEIT 2016 - International Annual Conference: Sustainable Development in the Mediterranean Area, Energy and ICT Networks of the Future, art. no. 7892740.
- [42] Moshi, G.G., Bovo, C., Berizzi, A., Optimal operational planning for PV-Wind-Diesel-battery microgrid (2015) 2015 IEEE Eindhoven PowerTech, PowerTech 2015, art. no. 7232461.
- [43] Nguyen, N.T.A., Le, D.D., Bovo, C., Berizzi, A., Optimal Power Flow with energy storage systems: Single-period model vs. multi-period model (2015) 2015 IEEE Eindhoven PowerTech, PowerTech 2015, art. no. 7232438.
- [44] Bosisio, A., Amaldi, E., Berizzi, A., Bovo, C., Fratti, S., A MILP approach to plan an electric urban distribution network with an H-shaped layout (2015) 2015 IEEE Eindhoven PowerTech, PowerTech 2015, art. no. 7232652.
- [45] Bovo, C., Ilea, V., Subasic, M., Rochira, I., Arrigoni, C., Innovative methodology for observability improvement of distribution networks (2015) 2015 IEEE Eindhoven PowerTech, PowerTech 2015, art. no. 7232660.
- [46] Nguyen, N.T.A., Le, D.D., Moshi, G.G., Bovo, C., Berizzi, A., Sensitivity analysis on locations of energy storage in power systems with wind integration (2015) 2015 IEEE 15th International Conference on Environment and Electrical Engineering, EEEIC 2015 - Conference Proceedings, art. no. 7165323.
- [47] Berizzi, A., Bovo, C., Ilea, V., Merlo, M., Miotti, A., Zanellini, F., Decentralized congestion mitigation in HV distribution grids with large penetration of renewable generation (2015) International Journal of Electrical Power and Energy Systems, 71, pp. 51-59.
- [48] SET4food guidelines on sustainable energy technologies for food utilization in humanitarian contexts and informal settlements, J Barbieri, E Colombo, M JEROME NDAM, F Riva, A Berizzi, C Bovo, Dipartimento di Energia, Politecnico di Milano
- [49] Moshi, G.G., Pedico, M., Bovo, C., Berizzi, A., Optimal generation scheduling of small diesel generators in a microgrid, 2014 IEEE International Energy Conference, ENERGYCON 2014; Dubrovnik; Croatia; 13 May 2014 through 16 May 2014
- [50] Berizzi, A., Bovo, C., Falabretti, D., Ilea, V., Merlo, M., Monfredini, G., Subasic, M., Bigoloni, M., Rochira, I., Bonera, R., Architecture and functionalities of a smart Distribution Management System, Proceedings of 16th International Conference on Harmonics and Quality of Power, ICHQP 2014; Bucharest; Romania; 25 May 2014 through 28 May 2014
- [51] Bovo, C., Ilea, V., Subasic, M., Zanellini, F., Arigoni, C., Bonera, R., Improvement of observability in poorly measured distribution networks, Proceedings 2014 Power Systems Computation Conference, PSCC 2014; Wroclaw University of TechnologyWroclaw; Poland; 18 August 2014 through 22 August 2014
- [52] Benabid, R., Berizzi, A., Bovo, C., Ilea, V., Boudour, M., A new modeling and placement of shunt FACTS devices in the secondary voltage regulation environment, Electrical Engineering, Volume 96, Issue 4, 2014, Pages 359-366
- [53] Bovo, C., Radaelli, L., Berizzi, A., Mansoldo, A., Norton, M., A thorough comparison among impact of different technologies on power system reactive planning, Proceedings 2014 Power Systems Computation Conference, PSCC 2014; Wroclaw University of TechnologyWroclaw; Poland; 18 August 2014 through 22 August 2014
- [54] Bovo, C., Merlo, M., Monfredini, G., Subasic, M., Bonera, R., Arrigoni, C., Bigoloni, M., Rochira, I., Rodolfi, M., Zanellini, F., Smart distribution system the Ingrid project and the evolution of supervision & control systems for smart distribution system management, AEIT Annual Conference 2013: Innovation and Scientific and Technical Culture for Development, AEIT 2013 - Selected Proceedings Papers, 2013, Article number 6666786, Mondello, Palermo; Italy; 3 October 2013 through 5 October 2013; Code 102357.
- [55] M. Merlo, F. Parma, S. Pasquini, M. Pozzi, C. Bovo, G. Giannuzzi, R. Zaottini (2013). A tool to investigate the PV and Storage Plants effective integration in the european interconnected transmission network. In: 4th

International Conference on Clean Electrical Power: Renewable Energy Resources Impact, ICCEP 2013. p. 262-269, ISBN: 978-1-4673-4429-6, Alghero, 11/6/2013 - 13/6/2013, doi: 10.1109/ICCEP.2013.6586998

- [56] A. Berizzi, C. Bovo, S. Cuni, R. Zuelli, A. Mansoldo, M. Norton (2013). Var Planning Assessment in a meshed AC/DC System: The future Irish Transmission System. In: IX Bulk Power System Dynamics and Control Symposium. p. 1-8, Rethymnon, Island of Crete, Greece, 25/8/2013 - 30/8/2013
- [57] D. D. Le, A. Berizzi, C. Bovo, E. Ciapessoni, D. Cirio, A. Pitto, G. Gross (2013). A Probabilistic Approach to Power System Security Assessment under Uncertainty. In: IX Bulk Power System Dynamics and Control Symposium. p. 1-7, ISBN: 978-1-4799-0199-9, Rethymnon, Island of Crete, Greece, 25/8/2013 - 30/8/2013
- [58] A. Berizzi, C. Bovo, V. Ilea, M. Merlo, G. Monfredini, M. Subasic, C. Arrigoni, F. Zanellini, F. Corti, I. Rochira (2013). Advanced Functions for DSOs Control Center. In: IEEE Grenoble PowerTech 2013. p. 1-6, ISBN: 978-1-4673-5667-1, Grenoble France, 16/06/2013 - 20/06/2013
- [59] J. Allahdadian, A. Berizzi, C. Bovo, V. Ilea, M. Gholami (2013). Islanding Feasibility Considering Reactive Power in the Subtransmission Systems. In: 48th International Universities' Power Engineering Conference UPEC 2013. p. 1-6, Dublin, Ireland, 2/9/2013 - 5/9/2013
- [60] A.M.A.K. Abeygunawardana, C. Bovo, M. Gholami, A. Berizzi (2013). Generation Capacity Expansion with CO2 Emission and Transmission Constraints in an Oligopolistic Market. RESEARCH JOURNAL OF APPLIED SCIENCES, ENGINEERING & TECHNOLOGY, vol. 6, p. 4474-4484, ISSN: 2040-7467
- [61] J. Allahdadian, A. Berizzi, C. Bovo, M. Gholami, V. Ilea, M. Merlo, A. Miotti, F. Zanellini (2013). Detection of Islanding Feasibility in Subtransmission Systems. INTERNATIONAL REVIEW OF ELECTRICAL ENGINEERING, vol. 8, p. 1108-1118, ISSN: 1827-6660
- [62] Berizzi, C. Bovo, M. Merlo, M. Delfanti (2012). A GA approach to compare ORPF objective functions including Secondary Voltage Regulation. ELECTRIC POWER SYSTEMS RESEARCH, vol. 84, p. 187-194, ISSN: 0378-7796, doi: 10.1016/j.epsr.2011.11.014
- [63] D. D. Le, C. Bovo, A. Berizzi, E. Ciapessoni, D. Cirio, A. Pitto (2012). A detailed comparison of cumulant-based probabilistic power flow methods. INTERNATIONAL REVIEW OF ELECTRICAL ENGINEERING, vol. 7, p. 3562-3572, ISSN: 1827-6660
- [64] A. Berizzi, C. Bovo, V. Ilea, A. Mansoldo (2012). Verso le Supergrid: il caso irlandese. AEIT, vol. 99, p. 34-41, ISSN: 1825-828X
- [65] R. Benabid, A. Berizzi, C. Bovo, V. Ilea, M. Boudour (2012). A new modeling and placement of shunt FACTS devices in the secondary voltage regulation environment. In: 4th INTERNATIONAL CONFERENCE ON ELECTRICAL ENGINEERING. Algiers, Algeria, 7/5/2012-9/5/2012, p. 1-6, ISBN: 9789947340103
- [66] C. Bovo, A. Berizzi, D.D. Le, E. Ciapessoni, D. Cirio, A. Pitto (2012). Probabilistic Power Flow Analysis for Modern Power System under Uncertainty. In: Vietnam Clean Energy Conference (UK-VN CECE 2012). Danang (Vietnam), Settembre 2012, p. 1-7
- [67] R. Benabid, M. Boudour, A. Berizzi, C. Bovo, V. Ilea (2012). Multi-objective Optimization of Static var Compensator in the Presence of Secondary Voltage Regulation using NSGA-II. In: Energycon 2012. p. 1-7, ISBN: 978-1-4673-1453-4, Florence (Italy), doi: 10.1109/EnergyCon.2012.6348257
- [68] A. Berizzi, C. Bovo, M. Delfanti, D. Falabretti, V. Ilea, M. Merlo, G. Monfredini, V. Olivieri (2012). Exploitation of ICT for the control and protection of transmission and distribution grids in the presence of DG. In: Energycon 2012. Florence (Italy), p. 1-8
- [69] Berizzi, C. Bovo, V. Ilea, M. Merlo, A. Miotti, F. Zanellini (2012). Decentralized Reactive Power Control of Wind Power Plants. In: Energy Conference and Exhibition (ENERGYCON), 2012 IEEE International. p. 1-7, ISBN: 978-1-4673-1453-4, Florence (Italy), doi: 10.1109/EnergyCon.2012.6348237

- [70] E. Colombo, S. Mandelli, G. Casseti, A. Berizzi, C. Bovo (2012). Access to Energy: Mini Integrated Renewable Systems for facing the technical problem. In: 2012 Tech4Dev International Conference. p. 1-6, Lausanne, Switzerland, 29/5/2012-31/5/2012
- [71] Bovo, A. Mansoldo, M. Soranno, A. Berizzi (2012). Expansion Var planning model in a meshed/mixed AC/DC network. In: The 2012 IEEE PES General Meeting. p. 1-8, ISBN: 978-1-4673-2727-5, San Diego, California, 22/07/2012-25/07/2012, doi: 10.1109/PESGM.2012.6345325
- [72] M. Merlo, C. Bovo, R. Bonera, F. Corti, I. Rochira, F. Zanellini, M. Rodolfi (2012). COMPUTATION SERVER ARCHITECTURE AND ADVANCED FUNCTIONS FOR DISTRIBUTION CONTROL CENTERS. In: Energy Conference and Exhibition (ENERGYCON), 2012 IEEE International. p. 569-573, ISBN: 978-1-4673-1453-4, Florence, 9/9/2012 - 12/9/2012, doi: 10.1109/EnergyCon.2012.6348217
- [73] Bovo C., Berizzi A., Merlo M., Bonera R., Corti F., Miotti A., Rochira I., Zanellini F. (2011). INGRID: Struttura e funzione per i centri di controllo dei DSO. In: Riunione AEIT. Milano, 27/6/2011-29/6/2011, p. 1-6
- [74] Berizzi A., Bovo C., Ilea V. (2011). Optimal placement of FACTS to mitigate congestions and inter-area oscillations. In: IEEE PES Power Tech. p. 1-8, ISBN: 9781424484195, Trondheim (Norway), 19/6/2011-23/6/2011
- [75] Ilea V., Bovo C., Merlo M., Berizzi A., Marannino P. (2011). Reactive power flow optimization in power systems with hierarchical voltage control. In: Power Systems Computation Conference. Stockholm (Sweden), 22/8/2011-26/8/2011, p. 1-7, ISBN: 9789175012575
- [76] Allahdadian J., Berizzi A., Bovo C., Gholami M., Ilea V., Merlo M., Miotti A., Zanellini F. (2011). ISOLDE project: Advanced Control Functions of the Subtransmission Substations in the Italian Power System. In: Riunione AEIT. Milano, p. 1-5
- [77] Bovo C., Berizzi A., Merlo M., Bonera R., Corti R., Miotti A., Zanellini F. (2011). INGRID: Structure and functions for modern distribution systems. In: CIGRE Symposium The electric power system of the future. p. 1-9, ISBN: 9782858731657, Bologna (Italy), 13/9/2011-15/9/2011
- [78] Berizzi A., Bovo C., Allahdadian J., Ilea V., Merlo M., Miotti A., Zanellini F. (2011). Sistemi di automazione avanzata nelle stazioni di subtrasmissione per il dispacciamento decentralizzato. In: Forum telecontrollo reti acqua gas ed elettriche. Torino, 3/11/2011-4/11/2011, p. 1-7
- [79] Berizzi A., Bovo C., Allahdadian J., Ilea V., Merlo M., Miotti A., Zanellini F. (2011). Innovative automation functions at a substation level to increase RES penetration. In: CIGRE Symposium The electric power system of the future. p. 1-7, ISBN: 9782858731657, Bologna (Italy)
- [80] A.Abeygunawardana, A Berizzi, C.Bovo (2010). Implications of CO2 prices on the generation capacity expansion in the Italian electricity market. In: 45 th UPEC 2010. p. 1-6, ISBN: 9781424476671, Cardiff (UK), 31/8/2010-3/9/2010
- [81] J.Allahdadian, A.Berizzi, C.Bovo, V.Ilea (2010). Reactive Planning Considering Offshore Wind Power Generation. In: 14th ICHQP. p. 1-7, ISBN: 9781424472444, Bergamo (Italy), doi: 10.1109/ICHQP.2010.5625432
- [82] A.Berizzi, C.Bovo, G.Tiburzio (2010). Bid analysis of the Italian electricity market for the identification of players' strategic behavior. In: 7th Conference on European Energy Markets. p. 1-7, ISBN: 9781424468386, Madrid, 23/6/2010-26/6/2010, doi: 10.1109/EEM.2010.5558707
- [83] A. Berizzi, M.Baioni, C.Bovo (2010). Power quality impact of cogeneration modules in urban networks. In: 14th ICHQP. p. 1-7, ISBN: 9781424472444, Bergamo, Italy, 26/9/2010-29/9/2010, doi: 10.1109/ICHQP.2010.5625463
- [84] A. Berizzi, C. Bovo, M. Delfanti, D. Cirio, M. Merlo, M. Pozzi (2009). Online Fuzzy Voltage Collapse Risk Quantification. ELECTRIC POWER SYSTEMS RESEARCH, vol. 79, p. 740-749, ISSN: 0378-7796, doi: 10.1016/j.epsr.2008.10.010

- [85] A.V. MORAR, BERIZZI A, C. BOVO, M. MERLO, M. EREMI (2009). Voltage control and reactive power management in the day-ahead electricity market. In: 4th International conference on Energy and Environment. Bucharest (Romania), p. 1-8
- [86] A. Berizzi, V. Ilea, M. Merlo, C. Bovo, M. Eremia (2009). Reactive Power Flow Optimization in the Presence of Secondary Voltage Control. In: 2009 IEEE Power Tech. p. 1-8, ISBN: 9781424422357, Bucharest (Romania), doi: 10.1109/PTC.2009.5281973
- [87] A.M.A.K. Abeygunawardana, C. Bovo, A. Berizzi (2009). Market Power Analysis in the Italian Electricity Market using a Supply Function Equilibrium Model. In: UPEC09. p. 1-5, ISBN: 9781424468232, Glasgow, Scotland
- [88] A.M.A.K. Abeygunawardana, C. Bovo, A. Berizzi (2009). Analysis of Impacts of Carbon Prices on the Italian Electricity Market using a Supply Function Equilibrium Model. In: The 9th WSEAS International Conference on POWER 09. p. 1-8, ISBN: 9789604741304, Genova, Italy, 17 - 19 October 2009
- [89] A.M.A.K. ABEYGUNAWARDANA, BOVO C, A. BERRIZI (2009). Applicazione al mercato elettrico di modelli SFE mediante GA. In: Convegno Nazionale AEIT. Catania, Italy, 27-29 settembre 2009, p. 1-6
- [90] ABEYGUNAWARDANA A, A. BERIZZI, C. BOVO, M. INNORTA (2008). Impacts of European Union Emissions Trading in Italian Power sector. In: International Conference on Energy Security and Climate Change: Issues, Strategies, and Options (ESC. Bangkok, Thailand, 06/08/2008-08/08/2008, p. 1-10
- [91] A.M.A.K. Abeygunawardana, A. Berizzi, C. Bovo, M. Innorta (2008). A conjectural supply function model for the Italian electricity market. In: 43rd International Universities Power Engineering Conference. p. 1-5, ISBN: 9781424432943, Padova, Italy, 01/09/2008-04/09/2008, doi: 10.1109/UPEC.2008.4651515
- [92] A. BERIZZI, C. BOVO, M. DELFANTI, M. MERLO, M. S. PASQUADIBISCEGLIE (2008). Locational signal for TTC investment by sensitivity calculations. In: Power and Energy Society General Meeting - Conversion and Delivery of Electrical Energy in the 21st Century, 2008 IEEE. p. 1-8, IEEE, ISBN: 978-1-4244-1905-0, Pittsburgh (USA), 20-24/7/2008, doi: 10.1109/PES.2008.4596734
- [93] A. Berizzi, C. Bovo, M. Merlo, G. Callegari, M. Porcellini, M. Pozzi (2008). Second order voltage sensitivities for security-constrained optimization problems. In: 2008 PROCEEDINGS OF THE 43RD INTERNATIONAL UNIVERSITIES POWER ENGINEERING CONFERENCE. p. 1-7, Padova (Italy), 1/9/2008-4/9/2008, doi: 10.1109/UPEC.2008.4651487
- [94] A. BERIZZI, C. BOVO, M. DELFANTI, M. MERLO, P. MARANNINO (2008). Reactive power pricing: a proposal for the Italian market. In: Power and Energy Society General Meeting - Conversion and Delivery of Electrical Energy in the 21st Century, 2008 IEEE. p. 1-7, IEEE, ISBN: 978-1-4244-1905-0, Pittsburgh, 20-24/7/2008, doi: 10.1109/PES.2008.4596704
- [95] A. BERIZZI, BOVO C (2008). Il controllo delle potenze con dispositivi FACTS. SERVIZI A RETE, vol. VI, p. 35-42
- [96] A: BERIZZI, C. BOVO, M. DELFANTI, M. MERLO (2008). SECURITY OPTIMIZATION OF BULK POWER SYSTEMS IN THE MARKET ENVIRONMENT. In: Edgardo Castronuovo. Optimization Advances in Electric Power Systems. p. 181-224, Edgardo Castronuovo, ISBN: 978-1-60692-613-0
- [97] A. Berizzi, C. Bovo, M. Delfanti, M. Merlo, M. Pasquadibisceglie (2007). A Monte Carlo Approach for TTC Evaluation. IEEE TRANSACTIONS ON POWER SYSTEMS, vol. 22, p. 735-743, ISSN: 0885-8950, doi: 10.1109/TPWRS.2007.895163
- [98] BERIZZI, BOVO C (2007). Sicurezza e mercato elettrico. In: Forum sull'energia elettrica - Sicurezza, affidabilità, mercato. Milano, 28 maggio 2007, p. 36-47
- [99] BERIZZI A., BOVO C., DELFANTI M., MERLO M. (2007). Enforcing ramp rate limits on Italian adjustment market. In: 2007 IEEE Power Tech. p. 1-6, ISBN: 9781424421893, Lausanne (Switzerland), July 1-5, 2007, doi: 10.1109/PCT.2007.4538428

- [100] Bovo, M. Delfanti, M. Merlo, M. Pasquadibisceglie (2007). Coordination of Transmission Network and New Power Plants. In: IEEE PowerTech. p. 1-6, Lausanne, Switzerland, July 1-5, doi: 10.1109/PCT.2007.4538513
- [101] N. BOMBIERI, BOVO C, M. DELFANTI, M. S. PASQUADIBISCEGLIE, M. POZZI (2007). Voltage dips analysis by Monte Carlo approach. In: CIRED International Conference on Electricity Distribution. Vienna - Austria, 21-24 May, p. 1-5
- [102] A. BERIZZI, C. BOVO, CHEMELLI, PASQUADIBISCEGLIE M (2007). Sicurezza e mercato elettrico. AEIT, vol. 94, p. 46-57, ISSN: 1825-828X
- [103] BOVO C, M. DELFANTI, M. PASQUADIBISCEGLIE, M. POZZI, E. ZIO (2006). Indirect Monte Carlo approach to test the distribution supply quality. In: Int. Congress on Electricity Distribution - CIDEL -. Buenos Aires, Argentina, 27-29 November 2006, p. 1-6
- [104] BERIZZI A, C. BOVO, M. DELFANTI, A. SILVESTRI (2006). The 28 September 2003 blackout in Italy: external causes and emergency procedures. In: Int. Work. on Complex Network and Infrastructure Protection - CNIP -. Rome, March, 28-29, p. 1-7
- [105] A. Berizzi, C. Bovo, M. Delfanti, M. Merlo, A. Silvestri (2006). Reliability of the Electric Energy Supply in a Competitive Market. In: World Energy System Conference - WESC -. Turin (Italy), July 10-12, p. 1-6, ISBN: 9789604741328
- [106] A: Berizzi, C. Bovo, M. Delfanti, M. Pasquadibisceglie (2006). Monte Carlo selection of the bilateral contracts in the Italian power Exchange. In: 9th International Conference on Probabilistic Methods Applied to Power Systems, PMAPS 2006. p. 1-8, ISBN: 978-917178352-3, Stockholm (Sweden), June 11-15, doi: 10.1109/PMAPS.2006.360217
- [107] BERIZZI A, C. BOVO, M. EREMIA, M. MERLO, V. ILEA (2006). Implementation of various objective functions for Reactive Optimal Power Flow in the presence of the Hierarchical Voltage Control System. In: Modern Power System. Cluj-Naploca (Romania), Nov. 8-11, p. 1-8
- [108] A. Berizzi, C. Bovo, M. Delfanti, M. Merlo, M. Pozzi, M. Sforza (2006). Reactive power management in the Italian system. A proposal for an economic compensation. In: Mediterranean Electrotechnical Conference – MELECON 2006. p. 1-5, ISBN: 1424400872, Malaga (Spain), May 16-19, doi: 10.1109/MELCON.2006.1653246
- [109] Berizzi, C. Bovo (2006). Effects of markets on system reliability and dynamic performance. In: IEEE Power System Conference and Exposition - PSCE 2006. p. 1-6, ISBN: 1424401771, Atlanta (USA), Oct 29- Nov 1, doi: 10.1109/PSCE.2006.296327
- [110] BERIZZI A, C. BOVO, M. DELFANTI, M. MERLO, M. PASQUADIBISCEGLIE, A. SILVESTRI (2006). Limiti di transito interarea e congestioni. In: Convegno nazionale AEIT. Capri (Italy), Sept. 16-20, p. 1-7
- [111] BERIZZI A, C. BOVO, M. DELFANTI, M. MERLO, M. PASQUADIBISCEGLIE, A. SILVESTRI (2006). Un'analisi ad ampio spettro del sistema elettrico italiano. In: Convegno AEIT. Capri (Italy), Sept. 16-20, p. 1-8
- [112] A. Berizzi, C. Bovo, M. Delfanti, M. Merlo, F. Tortello (2006). Singular Value Decomposition for an ORPF formulation in presence of SVR. In: Mediterranean Electrotechnical Conference - MELECON -. p. 1-5, ISBN: 1424400872, Malaga (Spain), May, 16-19, doi: 10.1109/MELCON.2006.1653260
- [113] BERIZZI A, C. BOVO, MERLO M, DELFANTI M, POZZI M (2006). Metodi innovativi per la valutazione della sicurezza dei piani di tensione. AEIT, vol. 93, p. 30-40, ISSN: 1825-828X
- [114] A. BERIZZI, C. BOVO, DELFANTI M, E. MACCHI, M. MERLO, A. SILVESTRI (2005). L'affidabilità della fornitura di energia elettrica in un sistema competitivo. AEIT, vol. 92, p. 38-45, ISSN: 1825-828X
- [115] C. BOVO, D. BRAUN, DELFANTI M, M. PALAZZO (2005). Affidabilità e disponibilità di stazioni AT di centrale. POWDER TECHNOLOGY, vol. 3, p. 2-8, ISSN: 0032-5910

- [116] C. BOVO, DELFANTI M, M. GALLANTI, F. LUISO, G. MIGLIAVACCA (2005). Copertura dei rischi derivanti dalle congestioni di rete CCC e CCCI. L'ENERGIA ELETTRICA, vol. 82, p. 1-12, ISSN: 0013-7308
- [117] Berizzi, C. Bovo, Bruno, M. Delfanti, M. Merlo, M. Pozzi (2005). ORPF Procedures for Voltage Security in a Market framework. In: Proc. IEEE Power Tech. p. 1-7, ISBN: 9785932080344, S. Pietroburgo - Russia, June 27-30, doi: 10.1109/PTC.2005.4524698
- [118] BERIZZI A, C. BOVO (2005). Sicurezza e mercato elettrico. In: Forum sull'energia elettrica: sicurezza, affidabilità, mercato. Milano, Italia, p. 21-28
- [119] A. Berizzi, C. Bovo, M. Delfanti, Dell'Olio, M. Merlo, M. Pozzi (2005). Coordination of the Hierarchical Voltage Control with the Reactive Power Economic Compensation. In: IEEE Power Tech. p. 1-8, ISBN: 978-5-93208-034-4, S. Pietroburgo - Russia, June 27-30, doi: 10.1109/PTC.2005.4524720
- [120] C. Bovo, M. Delfanti, M. Pasquadibisceglie, M. Pozzi, E. Zio (2005). Indirect Monte Carlo approach to evaluate reliability and availability indices of distribution networks. In: 18th International Conference on Electricity Distribution, CIRED. p. 1-5, Torino, Italia, 6/6/2005-9/6/2005
- [121] C. Bovo, M. Delfanti, M. Gallanti, G. Migliavacca (2005). Hedging Volatility of Differences Between Sell and Purchase Prices in the Italian Energy Market. In: CIGRE/Proc. IEEE PES International Symposium Congestion Management in a Market Environment. p. 52-60, ISBN: 0-7803-9191-8, San Antonio(TX) - USA, 5 October 2005 through 7 October 2005, doi: 10.1109/CIGRE.2005.1532726
- [122] C. BOVO, DELFANTI M, M. MERLO, F. ASTORI, P. MARANNINO (2004). Mercato zonale e determinazione dei transiti massimi. AEI AUTOMAZIONE ENERGIA INFORMAZIONE, vol. 91, p. 33-41, ISSN: 1122-2824
- [123] A. BERIZZI, C. BOVO, DELFANTI M, A. SILVESTRI (2004). Punti di vista (italiani e stranieri) sul blackout del 28 settembre 2003: una riflessione critica. AEI AUTOMAZIONE ENERGIA INFORMAZIONE, vol. 91, p. 26-29, ISSN: 1122-2824
- [124] BERIZZI, C. BOVO, M. DELFANTI, FUMAGALLI E., PASQUADIBISCEGLIE M (2004). Progetto Simulazione Borsa Elettrica: un'analisi del mercato elettrico al 2005. AEI AUTOMAZIONE ENERGIA INFORMAZIONE, vol. 91, p. 26-33, ISSN: 1122-2824
- [125] BOVO C, M. DELFANTI (2004). Una simulazione del mercato elettrico italiano in un contesto di emission trading. In: Stefano da Empoli. Il protocollo di Kyoto, i meccanismi flessibili e gli effetti attesi sul sistema energetico nazionale. p. 101-151
- [126] BERIZZI A, C. BOVO, M. DELFANTI, M. MERLO, M. PASQUADIBISCEGLIE, ZANELLINI (2004). Simulazione human-based del mercato elettrico italiano con modello completo della rete di trasmissione. In: Convegno Nazionale Anipla - Sistemi Elettrici per l'elettricità e il gas. Milano, Apr. 1-2, p. 1-8
- [127] BERIZZI A, C. BOVO, M. DELFANTI, M. MERLO, M. POZZI (2004). Procedure di ORPF per la definizione del profilo di tensione di un sistema elettrico in regime di libero mercato. In: Convegno Nazionale Anipla - Sistemi Elettrici per l'elettricità e il gas. Milano, Apr. 1-2, p. 1-8
- [128] A. Berizzi, C. Bovo, M. Delfanti, M. Merlo, M. Pozzi (2004). A Neuro-Fuzzy Inference System for the Evaluation of Voltage Collapse Risk Indices. In: Bulk Power System Dynamics and Control. p. 1-7, ISBN: 8887380473, Cortina d'Ampezzo - Italy, Aug. 22-27
- [129] Berizzi, C. Bovo, M. Delfanti, M. Pasquadibisceglie (2004). Impact of bilateral contracts on the Italian electricity market. In: Bulk Power System Dynamics and Control. vol. -, p. 1-8, ISBN: 8887380473, Cortina d'Ampezzo - Italy, Aug. 22-27
- [130] BOVO, M. DELFANTI, SILVESTRI A (2003). In federalismo energetico? Vincoli di sistema e prospettive future. AEI AUTOMAZIONE ENERGIA INFORMAZIONE, vol. 90, p. 22-29, ISSN: 1122-2824

- [131] Bovo, M. Delfanti, E. Fumagalli, A. Silvestri, G. Urveti (2003). Teoria dei giochi: le possibilità offerte all'analisi dei mercati elettrici. L'ENERGIA ELETTRICA, vol. 80, p. 27-36, ISSN: 0013-7308
- [132] BOVO C, M. DELFANTI, E. FUMAGALLI, A. SILVESTRI, G. URVETTI (2003). Teoria dei giochi: le possibilità offerte all'analisi dei mercati elettrici. ENERGIA ELETTRICA, vol. 80, p. 27-36, ISSN: 1590-7651
- [133] BOVO C, M. DELFANTI, M. SAPIENZA (2003). Il mercato elettrico e la dimensione territoriale. In: Stefano da Empoli. Il federalismo possibile nel settore dell'energia. p. 17-51
- [134] A. Berizzi, C. Bovo, M. Delfanti, E. Fumagalli, M. Merlo (2003). Simulation of a bid-based dispatch subject to inter-zonal constraints. In: IEEE Power Tech. p. 1-7, ISBN: 9780780379671, Bologna - Italy, July, 23-26, doi: 10.1109/PTC.2003.1304388
- [135] Berizzi, C. Bovo, E. Fumagalli, E. Alfassio Grimaldi (2003). Security assessment in operation: a comparative study of probabilistic approaches. In: IEEE Power Tech. p. 1-7, ISBN: 0780379675, Bologna - Italy, July, 23-26, doi: 10.1109/PTC.2003.1304150
- [136] BOVO C, M. DELFANTI, M. MERLO (2002). Dispacciamento e servizi ancillari: esperienze internazionali. AUTOMAZIONE E STRUMENTAZIONE, vol. XLIX, p. 135-142, ISSN: 0005-1284
- [137] BERIZZI A, C. BOVO, P. MARANNINO (2002). The influence of the market models on the congestion management. In: 39th CIGRE Session. Paris - France, 25-30 August 2002, p. 1-7
- [138] BOVO C, M. DELFANTI, M. MERLO, ZANELLINI (2002). Improving Italian Interconnection with Facts Devices. In: Proc. Med Power. Athens - Greece, p. 1-6
- [139] BERIZZI A, C. BOVO, M. DELFANTI (2001). Evoluzione delle procedure di OPF. AUTOMAZIONE E STRUMENTAZIONE, vol. 49, p. 135-142, ISSN: 0005-1284
- [140] A. Berizzi, C. Bovo, M. Delfanti, Marannino (2001). The evolution of the OPF functions for the security assessment in a competitive market structure. In: Bulk Power systems dynamics and control. p. 1-11, Onomichi - Japan, 26-31 Aug 2001
- [141] Berizzi, C. Bovo, Marannino (2001). Allocation of transmission losses in a mixed bilateral and pool market. In: IEEE Power Industry Computer Applications Conference. p. 1-8, ISBN: 0780366816, Sydney - Australia, doi: 10.1109/PICA.2001.932374
- [142] Berizzi, C. Bovo, Canizares, Rosehart (2001). Comparison of voltage security constrained optimal power flow techniques. In: IEEE Power Engineering Society Summer Meeting. p. 1-7, ISBN: 0780371739, Vancouver (BC) - Canada, July 15-19, doi: 10.1109/PSS.2001.970328
- [143] Berizzi, C. Bovo, P. Marannino (2001). The surrogate worth trade off analysis for power system operation in electricity markets, In: IEEE Power Engineering Society Summer Meeting. p. 1-7, ISBN: 0780371739, Vancouver (BC) - Canada, doi: 10.1109/PSS.2001.970201
- [144] Berizzi, C. Bovo (2001). The use of genetic algorithms for the localization and the sizing of passive filters. In: International Conference on Intelligent system application to power systems (ISAP). p. 1-7, Budapest - Hungary, 18-21 Jun 2001
- [145] Berizzi, C. Bovo, M. Delfanti, P. Marannino, A. Silvestri (2001). Cost analysis of the frequency regulation service for the Italian system. In: IEEE Porto Power Tech. p. 1-7, ISBN: 0780371399, Porto - Portugal, Sep 2001, doi: 10.1109/PTC.2001.964578
- [146] Berizzi, C. Bovo, M. Innorta, P. Marannino (2001). Multiobjective optimization techniques applied to modern power systems. In: IEEE Power Engineering Society Winter Meeting. p. 1-6, ISBN: 0780366727, Columbus (Ohio) - USA, 28 Gen - 1 feb 2001, doi: 10.1109/PESW.2001.917333

- [147] BOVO C, M. DELFANTI, MARANNINO (2001). Fact in OPF with (N-1) security for congestion relief in Italian market. In: International Conference Power and Energy Systems (Euro - PES). Rhodes - Greece, p. 1-6 2000 –
- [148] Articolo in rivista BOVO C (2000). Dottori di ricerca offresi, ma non cercasi. AEI AUTOMAZIONE ENERGIA INFORMAZIONE, vol. 87, p. 1-7, ISSN: 1122-2824
- [149] A. Berizzi, C. Bovo (2000). The use of genetic algorithms for the localization and the sizing of passive filters. In: Proc. International Conference on Harmonics and Quality of Power. p. 19-25, ISBN: 0780364996, Orlando - USA, October 4-7, doi: 10.1109/ICHQP.2000.896992

Ospedaletto Lodigiano, 21 May 2024

I authorize the processing of my data according to Legislative Decree 30 June 2003, n. 196 "Code regarding personal data protection" and the GDPR (EU Regulation 2016/679).

A handwritten signature in black ink, consisting of two distinct parts. The first part is a stylized, cursive letter 'U' followed by a horizontal line. The second part is a more complex, cursive signature that appears to be 'B' followed by several loops and a final horizontal stroke.