

ANNUAL ACADEMIC REPORT

Academic Year

2024-2025

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Director's greeting

Dear reader,

This report summarizes the work carried out at the Institute for Research in Technology (IIT) of the ICAI School of Engineering at the Comillas Pontifical University during the last academic year.

The overview presented in the annual report underlines the position we have been able to consolidate, both nationally and internationally, in our chosen areas of research. It showcases the strength of the research teams, who also make an important contribution to our internationally-oriented doctoral programs. The IIT thus continues a successful history of collaboration between the University and the world of industry, a partnership that we celebrated in 2024 on the occasion of the Institute's 40th anniversary, while looking toward the future by promoting new lines and areas of research.

All of the activity described in this report would not have been possible without the work and commitment of all the professionals at the institute: professors, researchers, administrative staff, post-graduate students and representatives of the industrial sector. If the work of the IIT has become an international benchmark in its areas of research over the past 40 years, it is without doubt entirely their achievement.

The goal is to build on our success and advance further in our areas of expertise thanks to our continuing commitment and our professionalism. We are convinced that this professionalism will enable us to continue enjoying the confidence of the national and international companies and organizations we collaborate with as well as the ICAI School of Engineering itself, the Comillas Pontifical University, and ICAI Engineers Association. We highly appreciate their valuable support.

We wish to continue earning this confidence by dint of our efforts to produce qualified professionals who are highly sought after by companies in the industrial sector, to encourage applied research which adds to the engineering knowledge base, and to pass on this knowledge so that it may be of use to society.

We are conscious that this is a difficult challenge in the current globalized and interdependent economy with faster and deeper technology change, especially in the energy, transport, telecommunication sectors and with the profound impact of

Artificial Intelligence. We face this challenge with enthusiasm, commitment and optimism. Technology is to play a crucial role in the history of humanity over the upcoming decades and we want to be part of this adventure.

I cordially invite you to get to know us better by reading these pages.

A handwritten signature in blue ink, consisting of stylized, overlapping loops and curves, likely representing the initials 'PCG'.

Paloma Cucala García

1. Introduction

The Institute for Research in Technology (IIT) is a University Research Institute that belongs to the ICAI School of Engineering of Comillas Pontifical University. Its primary objective is to promote research and postgraduate training in various technological fields through participation in specific projects of interest to the industry and the administration. It is a nonprofit institute that seeks to be flexible and pragmatic in the way they work. Its funding comes mainly from projects contracted with companies and, therefore, meet the social demand proven.

The results of this research are specified in the following products:

- Advanced computer applications, usually developed to customer specifications and used in many different companies, and innovative engineering equipment design.
- Analysis, consulting and technical, statistical, regulatory and econometric studies developed for companies and institutions in various countries.
- Doctoral theses defended at the University and publications in conferences and international journals.

The core of IIT is composed of a group of Professors and Researchers. This group is supplemented by postgraduate researchers as Research Assistants, dedicated to the Institute exclusively. Work teams are formed between both groups for the development of research projects, some of which are made dissertations.

This report covers the period for the academic year 2024 - 2025, from September 1, 2024 to August 31, 2025.

2. Organizational structure

2.1 Management

The management of the IIT during the course 2024 - 2025 has been carried out by the following Professors and Researchers:

- **Chaves Ávila, José Pablo.** Deputy Director for Research Development
- **Cucala García, Asunción Paloma.** Director
- **Lumbreras Sancho, Sara.** Deputy Director for Research Results
- **Sigrist, Lukas.** Deputy Director for Economic Affairs

2.2 Council

The members of the Council of IIT during the course 2024 - 2025 were the following ones:

- **Chaves Ávila, José Pablo.** Deputy Director for Research Development
- **Cossent Arín, Rafael.** Researcher Representative
- **Cucala García, Asunción Paloma.** Director
- **Fernández Rodríguez, Adrián.** Secretary General
- **Gómez San Román, Tomás.** Researcher Representative
- **Lumbreras Sancho, Sara.** Deputy Director for Research Results
- **Paolis Robles, Carlo de.** IEF Representative
- **Ramos Galán, Andrés.** Researcher Representative
- **Ríos Ocampo, Miguel Ángel.** IEF Representative
- **Rivier Abbad, Michel.** Researcher Representative
- **Rodilla Rodríguez, Pablo.** Researcher Representative
- **Sigrist, Lukas.** Deputy Director for Economic Affairs

2.3 Area coordinators

The coordinators of the nine research areas that group the different activities carried out in the IIT during the course 2024 - 2025 are the following ones:

- **Cantizano González, Alexis.** PCI Coordinator
- **Fernández Rodríguez, Adrián.** ASF Coordinator
- **Mateo Domingo, Carlos.** REDES Coordinator
- **Olmos Camacho, Luis.** RYE Coordinator
- **Paz Jiménez, Eva.** BIO Coordinator
- **Portela González, José.** ASI Coordinator
- **Ramos Galán, Andrés.** SADSE Coordinator
- **Roch Dupré, David.** SMS Coordinator
- **Rouco Rodríguez, Luis.** MAC Coordinator

2.4 Scientific advisory board

The members of the SAB are the following ones:

- **Andersson, Göran** (Chairman), ETH Zurich, Switzerland
- **Miranda, Vladimiro** (Vice chairman), INESC TEC, Univ. of Porto, Portugal
- **Hobbs, Benjamin F.** (Member), Johns Hopkins University, USA
- **Miyatake, Masafumi** (Member), Sophia University, Japan
- **Neuhoff, Karsten** (Member), DIW Berlin, Technical Univ. Berlin, Germany
- **Wehenkel, Louis** (Member), University of Liège, Belgium

2.5 Academic staff

The permanent staff of IIT consisted of the following Professors and Researchers:

- **Alfaya Sánchez, David.** Associate Professor
PhD in Mathematics . Universidad Autónoma de Madrid (UAM)
Bachelor Degree in Mathematics. Universidad Autónoma de Madrid (UAM)
Education, Culture and Sports).
Computer Science Engineer. Universidad Autónoma de Madrid (UAM)
Master in Mathematics and Applications . Universidad Autónoma de Madrid (UAM)
Master in Research and Innovation in Communications and Information Technologies. Universidad Autónoma de Madrid (UAM)

Areas of interest: Pure and applied mathematics.

Study of the geometry of moduli spaces (specially moduli of decorated bundles including, among others, Higgs bundles, connections and parabolic structures).
Information Retrieval, Information Geometry, Blockchain technologies and interactions between Artificial Intelligence and Mathematics.

- **Alonso Rivas, Eduardo.** Assistant Professor

Electronics Engineer (Comillas)

Automatics and Electronics degree (Comillas)

M.Sc. in Research in Engineering Systems Modeling (Comillas)

Ph.D. in Industrial Engineering (Comillas)

Areas of interest: Biomedical electronics. Digital systems.

- **Aracil Fernández, Elisa María.** Associate Professor

Ph.D. in Sustainable Banking. Universidad Rey Juan Carlos de Madrid.

Degree in Law. Universidad Nacional de Educación a Distancia (UNED).

Degree in Business Administration. Universidad Complutense de Madrid.

Areas of interest: Corporate strategy, sustainability, innovation and digitalization, development economics, savings and investment products, sustainable finance, financial markets, stakeholder capitalism.

- **Baringo Morales, Ana.** Assistant Professor

B.S. degree in Electrical Engineering and the M.S. degree in Industrial Engineering. Universidad de Castilla-La Mancha.

Master Degree in Secondary School Teaching, Universidad de Castilla-La Mancha.

PhD in Science and Technologies Applied to Industrial Engineering, Universidad de Castilla-La Mancha (2016-2020)

Areas of interest: Electricity markets, uncertainty modeling, virtual power plants, optimization models and automatic generation control.

-

- **Barrella, Roberto.** Research Assistant Professor

PhD in Engineering Systems Modelling, Escuela Técnica Superior de Ingeniería (ICAI), Comillas Pontifical University

Master's Degree Energy Engineering, Renewable Energy. Faculty of Civil and Industrial Engineering, Università degli Studi di Roma La Sapienza

Bachelor's Degree Energy Engineering. Faculty of Civil and Industrial Engineering, Università degli Studi di Roma La Sapienza

Areas of interest: Energy poverty, Residential Energy Demand, Energy Efficiency, HVAC systems, Energy Policy, Just energy transition, Climate change.

- **Batlle López, Carlos.** Senior Associate Professor

Ph.D. in Industrial Engineering (Comillas)

Electrical Engineer (Comillas)

Areas of interest: Economics and regulation of the electricity industry. Electricity markets modelling.

- **Bello Morales, Antonio.** Research Associate Professor
Ph.D. in Industrial Engineering (Comillas), M.Sc. in Power Systems (Comillas),
Mechanical Engineer (Comillas),
Areas of interest: Risk management support, energy forecasting, energy market modelling, planning of electricity and gas markets, artificial intelligence.
- **Boal Martín-Larrauri, Jaime.** Associate Professor
Ph.D. in Engineering Systems Modeling (Comillas ICAI)
M.Sc. in Research in Engineering Systems Modeling (Comillas ICAI)
Electronics Engineer (Comillas ICAI)
Areas of interest: Autonomous mobile robots · Computer vision · Reinforcement learning · Internet of Things (IoT) · Industry 4.0 · Energy efficiency and flexibility
- **Calderón Cuadrado, María Reyes.** Senior Associate Professor
Degree in Economics and Business Administration. University of Valladolid.
PhD in Economics. University of Navarra.
PhD in Philosophy. University of Navarra.
Areas of interest: Ethics and CSR
- **Calvo Báscones, Pablo.** Assistant Professor
Electromechanical Engineer (Comillas).
M.Sc. in Industrial Engineering (Comillas)
Ph.D. in Engineering Systems Modeling (Comillas)
Areas of interest: Big data & analytics, intelligent systems, predictive maintenance, process automation, artificial vision & image processing.
- **Campos Fernández, Francisco Alberto.** Research Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Mathematics Science degree (UCM)
Areas of interest: Operations research. Optimization. Nash equilibrium. Planning and operation of energy systems. Hydrogen, Gas and Electricity Markets. Cryptology. Security and Defense.
- **Castro Ponce, Mario.** Professor
Ph.D. in Physics Science (UCM)
Physics Science degree (UCM)
Areas of interest: Biophysics, Statistical and Nonlinear Physics, Theoretical Immunology, Bayesian Statistics, Epidemiology, Forest Fires
- **Centeno Hernández, Efraim.** Professor
Ph.D. in Industrial Engineering (Comillas)
Electronics Engineer (Comillas)
Master's Degree in Coaching Psychology (UNED)

Areas of interest: Electric power system operation models. Hydrothermal coordination. Electric power markets. Just energy transition and energy poverty.

- **Chaves Ávila, José Pablo.** Associate Professor
Ph.D. in Electrical Engineering (Comillas), Ph.D. in Electrical Engineering (Delft University of Technology - TU Delft, The Netherlands), Ph.D. in Electrical Engineering (Royal Institute of Technology - KTH, Stockholm, Sweden), Economics (University of Costa Rica), M.Sc. in Electric Power Industry (Comillas), M.Sc. in Network Industries and Digital Economics (University Paris-Sud 11, France)

Areas of interest: Energy economics, integration of renewable resources and distributed energy resources in the electricity sector, smart grids and regulation of the electricity and other energy sectors.

- **Contreras Bárcena, David.** Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Computing Engineer (Comillas), Postgraduate in Management Information Systems (Comillas)

Areas of interest: Wireless Networks. Bluetooth architecture. Information Retrieval Systems. Software development. IoT, Cloud and Big Data. Blockchain.

- **Cossent Arín, Rafael.** Research Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)

Areas of interest: Power system economics and regulation, energy transition, integration of renewable and distributed generation, smart grids, hydrogen and decarbonization.

- **Cuadra García, Fernando de.** Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)

Areas of interest: Large-scale modelling, simulation and optimisation problems. Knowledge engineering. Intelligent CAD. Control theory. Power systems. Railways systems. Software engineering and graphical languages for the specification of digital systems.

- **Cucala García, Asunción Paloma.** Professor
Ph.D. in Industrial Engineering (Comillas)
Electronics Engineer (Comillas)

Areas of interest: Modelling, simulation, design, management and control of railway systems, and their optimisation

- **Domínguez Gago, María.** Research Assistant Professor
Industrial Engineer. Universidad Pontificia Comillas.
Ph.D. in Industrial Engineering. Universidad Pontificia Comillas.

Areas of interest: Modelling, análisis and simulation of railways systems. Optimization and energy efficiency. Eco-driving. ATO.

- **Dueñas Martínez, Pablo.** Research Assistant Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)
Areas of interest: Mathematical modeling of energy systems, bottom-up decarbonization, energy regulation and policy, energy economics.
- **Echavarren Cerezo, Francisco Miguel.** Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)
Areas of interest: Modeling, analysis and simulation of power systems.
- **Egido Cortés, Ignacio.** Senior Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electronics Engineer (Comillas)
Areas of interest: Load-frequency control and voltage control. System modeling and control. Power system stability.
- **Fernández Cardador, Antonio.** Professor
Ph.D. in Industrial Engineering (Comillas)
Physics Science degree (UCM)
Areas of interest: Systems modelling, analysis and simulation. Simulation techniques for optimisation and control problems. Design, management and control of railway systems.
- **Fernández Rodríguez, Adrián.** Research Associate Professor
Ph.D. in Engineering (Comillas)
Electrical Engineer (UPM)
Master's Degree in Research in Engineering Systems Modeling (Comillas)
Areas of interest: Train simulation, energy efficiency in railway operation and nature inspired optimisation.
- **Frías Marín, Pablo.** Senior Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)
Areas of interest: Operation and planning of electric power systems. Power economics. Integration of distributed generation in power systems. Advanced electric machines. Electric Vehicles and Sustainable Mobility.
- **García Cerrada, Aurelio.** Professor
Ph.D. in Electrical and Electronics Engineering (University of Birmingham, U.K.)
Electrical Engineer (UPM)

Areas of interest: Power electronics. Control of electrical drives. FACTS. System identification and control.

- **García González, Javier.** Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (UPC)

Areas of interest: Decision support models in the electric power industry

- **García González, Pablo.** Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)

Areas of interest: Control. Power electronics. Power electronics applied to the electric power systems (FACTS devices, active filters, HVDC, etc.). Electric power systems stability and control.

- **Gómez San Román, Tomás.** Professor
Ph.D. in Industrial Engineering (UPM)
Electrical Engineer (Comillas)

Areas of interest: Economics and regulation of the energy sector. Planning and operation of transmission and distribution electricity networks. Integration of renewable and distributed energy resources in power systems. Power quality standards and regulation. Electric vehicles. Smart grids.

- **Güitta López, Lucía.** Assistant Professor
Degree in Electromechanical Engineer (Comillas)
Master's Degree in Industrial Engineering (Comillas)
Master in Smart Industry (Comillas)
Ph.D. in Engineering Systems Modeling (Comillas)

Areas of interest: Industry 4.0, Industrial Automation, Smart Systems, Robotics, Machine Learning, Reinforcement Learning, Deep Learning and Computer Vision.

- **Linares Llamas, Pedro.** Professor
Ph.D. in Agricultural Economics (UPM)
Agricultural Engineering degree (UPM)

Areas of interest: Energy economics. Energy planning models. Integration of renewable energies. Environmental economics. Environmental policy instruments. Multiple criteria decision making.

- **Lobato Miguélez, Enrique.** Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)

Areas of interest: Analysis, planning, operation and economics in electric power systems.

- **López López, Gregorio.** Associate Professor
PhD in Telecommunications Engineering. Universidad Carlos III de Madrid.
Areas of interest: Optimization of M2M communications networks based on analysis and simulation, cybersecurity and data analytics for the IoT, and the use of technology and the Internet.
- **López López, Álvaro Jesús.** Research Associate Professor
PhD in Engineering (Comillas)
Electronics degree (Comillas), M.Sc. in Automatics and Electronics (Comillas)
M.Sc. in Research in Engineering Systems Modeling (Comillas)
Areas of interest: Smart Industry, Artificial Intelligence, Reinforcement Learning, Generative AI, Representation Learning, Synthetic Data Generation, LLM-based Agent Systems
- **López Valdés, Francisco José.** Associate Professor
Mechanical Engineering, Mechanics Universidad de Valladolid (Spain)
PhD. Mechanical and Aerospace Engineering. University of Virginia (USA)
Areas of interest: Biomechanics, Injury prevention, biological tissue characterization, injury thresholds, automotive safety
- **Lumbreras Sancho, Sara.** Senior Associate Professor
Ph.D. in Industrial Engineering (Comillas)
M.Sc. Systems Modelling (Comillas)
Electrical Engineer (Comillas)
Areas of interest: Decision methods applied to complex problems.
---Techniques:--- decision under uncertainty, stochastic optimization, Benders' decomposition, risk analysis, heuristics, metaheuristics, genetic algorithms, ordinal optimization. ---Areas of application:--- power systems, planning, network design, transmission expansion planning, wind energy, offshore windfarm design, finance, risk analysis, derivatives.
- **Martín Martínez, Francisco.** Associate Professor
Electrical Engineer (Comillas)
Master's degree in Research in Engineering Systems Modeling (Comillas)
Ph.D. in Industrial Engineering (Comillas)
Areas of interest: My research focuses on demand flexibility, energy usages, optimization models, and specifically on aggregation and microgrids issues. I am developing studies in electrical systems and the impact of different energy resources. I am also working with digital electronics systems for the control and monitoring of residential consumption.

- **Mastropietro, Paolo.** Research Associate Professor
 Ph.D. in Electrical Engineering (Comillas), Ph.D. in Electrical Engineering (Delft University of Technology - TU Delft, The Netherlands)), Ph.D. in Electrical Engineering (Royal Institute of Technology - KTH, Stockholm, Sweden), M.Sc. in Environmental Engineering (University of Rome Tor Vergata, Italy), Environmental Engineer (University of Rome Tor Vergata, Italy)
Areas of interest: Energy economics and policy; power sector regulation; security of supply; capacity remuneration mechanisms; integration of renewable energies; tariff and subsidy design; support mechanism design; hydrogen sector regulation.
- **Matanza Domingo, Javier.** Associate Professor
 Ph.D. in Industrial Engineering (Comillas)
 Telecommunications Engineer (Technical University of Valencia)
Areas of interest: Signal processing. Communication systems. Power Line Communication. Wireless communications.
- **Mateo Domingo, Carlos.** Research Associate Professor
 Ph.D. in Industrial Engineering (Comillas)
 Electronics Engineer (Comillas), Computer Systems Engineer (UNED)
Areas of interest: Models of electricity distribution networks. Integration of distributed energy resources.
- **Montero Guirao, Luis Manuel.** Research Assistant Professor
 Bachelor's degree in Chemical Engineering. Universidad de Granada.
 Master's degree in Chemical Engineering. Universidad de Salamanca.
 Ph.D. in Power Systems. Comillas Pontifical University.
Areas of interest: Operation, regulation and planning of power and natural gas systems. Modeling and optimization techniques, artificial intelligence and forecasting techniques.
- **Muñoz San Roque, Antonio.** Professor
 Ph.D. in Industrial Engineering (Comillas)
 Electrical Engineer (Comillas)
Areas of interest: Time series forecasting. Machine learning. Application of Artificial Intelligence techniques to the operation and maintenance of industrial processes. Electricity markets analysis and optimal operation.
- **Olmos Camacho, Luis.** Senior Research Associate Professor
 Ph.D. in Industrial Engineering (Comillas)
 Electrical Engineer (Comillas)
Areas of interest: Regulation of the energy sector. Transmission of electricity. Power economics. System identification.

- **Ortega Manjavacas, Álvaro.** Assistant Professor
Ph.D. in Electrical Engineering. University College Dublin, Ireland.
Industrial Engineering, Itinerary of Electrical, Electronic and Automation.
University of Castilla-La Mancha, Spain.
Areas of interest: Modeling, control and stability of energy storage systems connected to transmission and distribution systems; and frequency estimation, control and stability in low-inertia systems.
- **Palacios Hielscher, Rafael.** Professor
Ph.D. in Industrial Engineering (Comillas)
Mechanical Engineer (Comillas)
Areas of interest: Advanced data analysis (including vibration analysis, optical handwritten character recognition, image processing, artificial intelligence and data mining). Parallel processing. Thermoelectric applications. Failure detection and maintenance. Aviation safety. Cybersecurity.
- **Pérez Arriaga, José Ignacio.** Professor Emeritus
Ph.D. and M.Sc. in Electrical Engineering (Massachusetts Institute of Technology - MIT, U.S.A.), Ph.D. in Industrial Engineering (UPM)
Electrical Engineer (Comillas)
Areas of interest: Regulation, economics, planning, operation and control of electric power systems. Sustainability of the energy model. Electricity access in developing countries.
- **Pizarroso Gonzalo, Jaime.** Assistant Professor
Electromechanical Engineer. Universidad Pontificia Comillas.
Master's Degree in Industrial Engineering (MII) and Master's Degree in Smart Industry (MIC). Universidad Pontificia Comillas.
Ph.D. in Industrial Engineering. Universidad Pontificia Comillas.
Areas of interest: Artificial Intelligence, Machine Learning, Explainable Artificial Intelligence.
- **Portela González, José.** Associate Professor
PhD in Engineering (Comillas), Electronics Engineer (Comillas), M.Sc. in Research in Engineering Systems Modeling (Comillas)
Areas of interest: Functional Data Analysis, Machine Learning, Neural Networks, time series models
- **Rajabdorri, Mohammad.** Research Assistant Professor
Bachelor's degree of Electrical Power Engineering. Shiraz University, Iran.
Master's in Electrical Power Systems. Shiraz University of Technology, Iran.
Ph.D. in Power Systems. Universidad Pontificia Comillas.
Areas of interest: Isolated power systems, electricity markets, dispatching renewable energies, and power system operation.

- **Ramos Galán, Andrés.** Professor

Ph.D. in Industrial Engineering (Universidad Politécnica de Madrid)
Electrical Engineer (Universidad Pontificia Comillas)

Areas of interest: Development of new algorithms and computer implementation. Modeling of complex systems. Mathematical techniques of operations research and their application to large-scale problems. Large-scale optimization techniques. Stochastic optimization. Benders decomposition. Planning and operation of electric energy systems -models for generation and transmission network planning, generation operation models-. Economy of the electric sector. Computational techniques and analytical methods for planning, operations, and control. Economics, market organization, cost structures, pricing, and risk management. Reliability, uncertainty, and probability, and stochastic system applications. Emerging methods for restructured systems. Generation system resource planning. Transmission system planning. Industry restructuring planning and policy issues.

- **Rivier Abbad, Michel.** Professor

Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)

Areas of interest: Electric power systems analysis, optimisation, regulation economic, operation and planning. Optimisation techniques.

- **Roch Dupré, David.** Associate Professor

Ph.D. (with International Mention) in Engineering Systems Modeling.(Comillas)
Electromechanical Engineer. (Comillas)
M.Sc. in Industrial Engineering. (Comillas)
Official Master's Degree in Research in Engineering Systems Modeling (MRE) (Comillas)

Areas of interest: Socioeconomic indicators. Longevity Economy. Modeling, simulation, and optimization. Energy efficiency in electrified railway systems.

- **Rodilla Rodríguez, Pablo.** Senior Research Associate Professor

Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)

Areas of interest: Fundamental and quantitative electricity market modeling. Market design and regulation for wholesale electricity markets. Competition and strategic behavior analysis. Security of supply mechanisms in competitive power systems. Regulatory mechanisms focused on environmental policies

- **Rodríguez Mondéjar, José Antonio.** Associate Professor

Ph.D. in Industrial Engineering (Comillas)
Electronics Engineer (Comillas)

Areas of interest: Communication and control in electric power systems and railway systems.

- **Rodríguez Pérez, Néstor.** Assistant Professor
Ph.D. in Engineering Systems Modeling. Universidad Pontificia Comillas.
University Master's Degree in Industrial Engineering - Pontifical University of Comillas, ICAI (2020)
Master in Smart Grids - Pontifical University of Comillas, ICAI (2020)
MSc in Smart Grids - University of Strathclyde (2020)
Bachelor's Degree in Electromechanical Engineering - Pontifical University of Comillas, ICAI (2018)
Areas of interest: Smart and Sustainable Grids, Cybersecurity for Power Systems, Smart Cities, IoT in power grids, Information and Communication Technologies for Smart Grids
- **Rodríguez Santana, Simón.** Assistant Professor
Bachelor's degree in Physics. Universidad Autónoma de Madrid.
Master's degree on Theoretical Physics. Universidad Complutense de Madrid.
PhD in Mathematical Engineering, Statistics and Operations Research. Universidad Complutense de Madrid.
Areas of interest: Probabilistic Machine Learning, Bayesian Statistics, Approximate Inference, Operations Research
- **Rodríguez-Morcillo García, Carlos.** Research Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electronics Engineer (Comillas)
M.Sc. in Communication Technologies and Systems (UPM)
Areas of interest: Embedded systems. Digital systems. Autonomous systems (batteries). HW design. PCB design. PCB manufacturing. Digital communications (wired and wireless). Communication protocols. Programmable logic. Microcontrollers programming.
- **Romero Mora, José Carlos.** Associate Professor
PhD in Engineering (Comillas)
Electrical and Power Systems Engineer (University of Malaga), M.Sc. in Research in Engineering Systems Modeling (Comillas)
Areas of interest: Energy Sustainability; Fuel Poverty; Energy Transition
- **Rouco Rodríguez, Luis.** Professor
Ph.D. in Industrial Engineering (UPM)
Electrical Engineer (UPM)
Areas of interest: Modelling, simulation, simulation, control and identification of electric power systems
- **Sánchez Fornié, Miguel Ángel.** Research Associate
Electromechanical Engineer de ICAI (Comillas)
Nuclear Security Diploma (MIT)

Areas of interest: Power engineering. Power systems regulation. Power systems planning and operation.

Power systems asset management. Smart grids. Telecommunications systems and operations. Telecommunications for power systems. Cybersecurity, Big data analysis and artificial intelligence on power systems.

- **Sánchez Martín, Pedro.** Senior Associate Professor

Ph.D. in Industrial Engineering (Comillas)

Industrial Engineer (Comillas)

Areas of interest: Transmission and generation electric system modeling. Industrial process planning and scheduling. Work system design. Manufacturing and logistics simulation

- **Sánchez Merchante, Luis Francisco.** Assistant Professor

Telecommunications Engineer (Universidad Politécnica de Madrid)

Master's degree in Multimedia and Communications (Universidad Carlos III de Madrid)

PhD in Information Technology (Universidad Tecnológica de Compiègne)

Areas of interest: Advanced analytics on Big Data platforms

Machine Learning

Smart cities

- **Sánchez Miralles, Álvaro.** Senior Associate Professor

Ph.D. in Industrial Engineering (Comillas)

Electronics Engineer (Comillas)

Areas of interest: Smart grids. Smart cities. Security systems. Mobile robotics.

- **Sánchez Úbeda, Eugenio Francisco.** Senior Associate Professor

Ph.D. in Industrial Engineering (Comillas)

Electronics Engineer (Comillas)

Areas of interest: Machine learning – Forecasting – Data analysis and visualization - Non-linear statistical modeling - Deep learning

- **Sanz Bobi, Miguel Ángel.** Professor

Ph.D. in Industrial Engineering (UPM)

Electrical Engineer (UPM)

Areas of interest: Life condition monitoring and analysis of industrial processes. Modeling and simulation of the expected behavior of industrial components. Artificial Intelligence: knowledge-based systems, fuzzy logic, machine learning algorithms, reinforcement learning. Techniques for incipient detection of failure modes and risk assessment. Reliability. Predictive Maintenance. Asset Management. Image and voice treatment.

- **Sigrist, Lukas.** Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical and Electronics Engineer (École Polytechnique Fédérale de Lausanne - EPFL, Switzerland)
Areas of interest: Modeling, analysis and control of electric power systems.
Energy Systems Models.
- **Tordesillas Torres, Jesús.** Assistant Professor
BS in Industrial Engineering. Universidad Politécnica de Madrid.
MS in Industrial Engineering. Universidad Politécnica de Madrid.
MS in Aeronautics and Astronautics. Massachusetts Institute of Technology.
PhD in Robotics. Massachusetts Institute of Technology.
Areas of interest: Deep Learning, Autonomous Navigation for Robots, Artificial Intelligence, Optimization.
- **Troncia, Matteo.** Research Assistant Professor
Ph.D. in Industrial Engineering. University of Cagliari.
M.Sc. in Electrical Engineering. University of Cagliari.
B.Sc. in Electrical Engineering. University of Cagliari.
Areas of interest: Electricity markets, system service markets, energy economics, integration of renewable and distributed energy resources in the electricity sector, smart grids, techno-economic appraisal and cost-benefit analysis for initiatives concerning the electricity sector, power system planning and operation.
- **Ventosa Rodríguez, Mariano.** Professor
Ph.D. in Industrial Engineering (Comillas)
Electronics Engineer (Comillas)
Areas of interest: Application of operations research in electric energy markets.
Smart industry.
Generative Artificial Intelligence.
- **Zamora Macho, Juan Luis.** Senior Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electronics Engineer (Comillas)
Areas of interest: Drive control. System identification. Signal processing.

2.6 Associated academic staff

The following professors have collaborated with IIT as Associate Researchers:

- **Arenas Pinilla, Eva María.** Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Mechanical Engineer (Comillas)
MSc Thermal Power and Fluids Engineering (University of Manchester. Institute of Science and Technology)
Areas of interest: S-CO₂ turbomachinery, hydro-powered pumping, hydraulic turbomachinery, energy poverty
- **Ayala Santamaría, Pablo.** Assistant Professor
Ph.D. in Industrial Engineering (Comillas, Mechanical Engineer (Comillas),
Master's degree in Research in Engineering Systems Modeling (Comillas)
Areas of interest: CFD, fire modelling, fire protection installation, smoke movement
- **Ballesteros Iglesias, Yolanda.** Associate Professor
Ph.D. in Chemistry Science (UAM)
Chemistry Science degree (UAM)
Areas of interest: Materials. Environment. Biomaterials. Nondetructive testintg (NDT). Adhesives.
- **Cantizano González, Alexis.** Senior Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Mechanical Engineer (Comillas), M.Sc. in Thermal Power and Fluids Engineering (University of Manchester Institute of Science and Technology - UMIST, U.K.), Psychology degree (UNED)
Areas of interest: Fire Protection Engineering, Fire Dynamics, Computational Fluid Dynamics (CFD), Hydraulic and Thermal Turbomachines
- **Carnicero López, Alberto.** Senior Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Mechanical Engineer (Comillas)
Areas of interest: Numerical methods in engineering. Railway Catenary. Catenary-pantograph dynamic interaction
- **Carpintero Rubio, Carlos Javier.** Lecturer
Doctor of Physical Therapy. Complutense University of Madrid.
Bachelor's degree in Kinesiology. National San Martín University of Buenos Aires.
Degree in Physiotherapy. Comillas Pontifical University.
Areas of interest: Neuromusculoskeletal physiotherapy, Inductive Therapeutic Exercise (ETI), biomechanics, and therapeutic communication, particularly in the context of therapeutic expectations.

- **Cifuentes Quintero, Jenny Alexandra.** Assistant Professor
Mechatronic Engineering (Universidad Nacional de Colombia).
Master in Industrial Automation (Universidad Nacional de Colombia).
Phd in Engineering- Mechanical and Mechatronic Engineering (Universidad Nacional de Colombia).
Phd in Automation (Institute National des Sciences Appliquées de Lyon-France)
Areas of interest: Modeling and analysis of dynamical systems, signal processing and pattern recognition using machine learning strategies.
- **Ciller Cutillas, Pedro.** Lecturer
B.S. in Industrial Engineering. Universidad Pontificia Comillas.
B.S. in Mathematics. Universidad Complutense de Madrid.
Ph.D. in Electrical Energy. Universidad Pontificia Comillas.
Areas of interest: Rural electrification. Distribution networks.
- **Claeys, Peter.** Assistant Professor
PhD in Economics, European University Institute.
Masters of Science in Economics. Katholieke Universiteit Leuven.
Areas of interest: International macroeconomics, public economics, fiscal federalism, fiscal consolidation, interaction between monetary and fiscal policy, fiscal policy and redistribution.
- **Cledera Castro, M^a del Mar.** Associate Professor
Industrial Engineer. Universidad Politécnica de Madrid.
Ph.D. in Industrial Engineering. Universidad Pontificia Comillas.
Areas of interest: Energy and Environment. Materials.
- **Díaz Lanchas, Jorge.** Associate Professor
PhD in Economics. Universidad Autónoma de Madrid.
MSc in International Economics. Universidad Autónoma de Madrid.
Degree in Economics. Universidad Rey Juan Carlos.
Areas of interest: International trade, regional, and urban economics.
- **Fernández Bernal, Fidel.** Senior Associate Professor
Ph.D. in Electrical Engineering (ICAI - Univ. Pontificia Comillas)
MSc. in Electrical Engineering (ICAI - Univ. Pontificia Comillas)
BSc. in Electrical Engineering (ICAI - Univ. Pontificia Comillas)
Areas of interest: Electric Machines and Electric Drives, Electrical Generation, Renewable Generation, Wind Generation.
- **Figuerola-Ferreti Garrigues, Isabel Catalina.** Associate Professor
Bachelor of Science in Economics. Queen Mary, University of London.
Master in Economics. London School of Economics.
PhD in Financial Economics. Queen Mary. University of London.

Areas of interest: Financial Econometrics, energy markets, commodity markets, Green Finance and ESG investment, risk management volatility and trading strategies.

- **Garrido Merchán, Eduardo César.** Assistant Professor
Degree in Computer Engineering. Pontifical University of Comillas.
Master in Artificial Intelligence. Polytechnic University of Madrid.
PhD in Computer and Telecommunications Engineering. Autonomous University of Madrid.
Areas of interest: Connected industry: design of artificial agents using deep reinforcement learning
Social inclusion, vulnerability, aging and well-being
Connected industry: application of deep learning techniques to industrial processes
Ethical issues arising from technological management
Data analysis
- **Giannetti, Romano.** Professor
Ph.D. in Electronics and Computing Engineering (University of Padua, Italy)
Electronics Engineer (University of Pisa, Italy)
Areas of interest: Measurement instrumentation and methodology. Biomedical instrumentation. Noise measurements.
- **González Arechavala, Yolanda.** Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Computing Engineer (UPV-EHU)
Areas of interest: Software engineering: software development process, programming paradigms, software quality assurance and control, CASE tools. RAMS: standards and analysis. Safety-critical and real time systems. Railway systems. Sustainability assessment of energy generation using LCA. Promotion of STEM vocations in women and provoke a change in trend.
- **González-Ruano Iriarte, César.** Assistant Professor
Double degree in Mathematics and Physics. Universidad Complutense de Madrid.
Master's Degree in Nanophysics and Advanced Materials. Universidad Complutense de Madrid.
PhD in Condensed Matter Physics, Nanoscience and Biophysics. Universidad Autónoma de Madrid.
Areas of interest: Superconductivity, magnetism, nanotechnology, materials physics, quantum materials, quantum computing, thermoelectricity.
- **Herraiz Martínez, Francisco Javier.** Associate Professor
Engineer and Ph.D. degrees in Telecommunications. Carlos III University of Madrid (Spain)

Areas of interest: Passive sensors and RFID systems. Electromagnetic metamaterials. Antennas. Microwave circuits.

- **Jiménez Octavio, Jesús.** Senior Associate Professor
PhD Industrial Engineering (Universidad Pontificia Comillas)
MSc Mechanical Engineering (Universidad Pontificia Comillas)
Areas of interest: Computational mechanics; Biomechanics; Road Safety; Odontology
- **Laloux Dallemagne, Damián.** Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electrical Engineer (Comillas)
Areas of interest: Modelling, analysis and control of electric power systems. Sustainable development.
- **Lecca, Patrizio.** Associate Professor
PhD in Economics. University of Cagliari and Strathclyde Business School.
Areas of interest: Energy economics, environmental economics, economic geography and regional economics
- **López de Armentia Hernández, Sara.** Assistant Professor
Bachelor Degree in Industrial Technology Engineering. Universidad Politécnica de Madrid.
Master Degree in Materials Science and Engineering. Universidad Carlos III de Madrid.
Ph.D. in Engineering Systems Modeling. Universidad Pontificia Comillas.
Areas of interest: Biomaterials, Composite materials, Nanocomposites, Carbon based materials, Additive manufacturing, Mechanical Characterisation.
- **Megía Macías, Ana María.** Assistant Professor
Doctoral Degree in Science and Technology Applied to Industrial Engineering. Universidad de Castilla - La Mancha.
Areas of interest: Production, diagnosis and applications of plasmas. --- Techniques: --- Plasmas for ion sources, cold atmospheric plasma, diagnostic tools with temporal resolution. --- Areas of application: --- Ion sources, particle beam medical therapies, surface cleaning and treatment, disinfection, plasma medicine.
- **Mochón Castro, Luis Manuel.** Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Mechanical Engineer (Comillas)
Areas of interest: Computacional fluid dynamic. Fluid control. Hydraulic energy. Heat transfer. Olehidraulic systems.

- **Mompó Pavesi, Emanuel Gastón.** Assistant Professor
Ph.D. Mathematical Engineering, Universidad Carlos III de Madrid.
M.Sc. Industrial Mathematics, Universidad Carlos III de Madrid.
M.Sc. on Mathematics Teaching, Universidad Nacional de Educación a Distancia.
B.Sc. & M.Sc. Mathematics, Universitat de València.
Areas of interest: Non-linear dynamical systems. Statistical mechanics out of equilibrium. Complex systems.
- **Morales Contreras, Manuel Francisco.** Associate Professor
Industrial Engineer ICAI, master in Mechanics
PhD Economics and Business Administration ICADE
Areas of interest: Sustainability and global supply chain management; lean and efficient operations; process innovation; hospitality and healthcare sectors.
- **Morales Polo, Carlos.** Assistant Professor
Industrial Engineer.Comillas Pontifical University.
PhD. Industrial Engineer. Comillas Pontifical University
Areas of interest: Waste management and treatment. Water technologies. Energy use. Environmental Impact Study through Life Cycle Assesment.
- **Muñoz Frías, José Daniel.** Associate Professor
Ph.D. in Industrial Engineering (Comillas)
Electronics Engineer (Comillas)
Areas of interest: Digital systems design. Computer architecture. Motor drives control. Design of embbeded systems for automatic control applications.
- **Occhipinti Liberman, Andrés.** Assistant Professor
Ph.D. in Artificial Intelligence and Logic. Technical University of Denmark.
M.Sc. in Logic. University of Amsterdam.
Master in Development and International Aid. Universidad Complutense de Madrid.
Bachelor's in Philosophy. Universidad Autónoma de Madrid
Areas of interest: Planning algorithms and mathematical logic
- **Paz Jiménez, Eva.** Associate Professor
PhD in Engineering (Comillas)
Industrial Technical Engineering in Industrial Chemistry (UPM), M.Sc. in Production Engineering (UPM)
Areas of interest: Biomaterials, Bone cements, Composite materials, Nanocomposites, Carbon based nanomaterials, Mechanical Characterisation.
- **Pérez Domínguez, José Rubén.** Lecturer
Degree in Industrial Engineering. University of Valladolid.
Degree in Industrial Organization Engineering. University of Valladolid.
Ph.D. in Industrial Engineering. University of Valladolid.

Areas of interest: CFD, numerical modeling of processes and systems, solar thermal power plant, and hydrogen.

- **Real Romero, Juan Carlos del.** Senior Associate Professor

Ph.D. in Industrial Engineering (Comillas)

Industrial Engineer (Comillas)

Areas of interest: Adhesive bonding: adhesives suitable for each application; mechanical characterization of adhesive bonding; durability studies and failure modes; surface treatments to improve durability of the adhesive joints. Composites: preparation of polymer matrix composites reinforced by micro and nanoparticles; mechanical characterization; thermal analysis; applications as coatings; biomedical applications. Carbon based nanomaterials. Nanocomposites

- **Rico Cabrera, Javier.** Assistant Professor

Energy Engineering Degree. Universidad de Málaga.

Master in Industrial Mathematics. Universidad Carlos III de Madrid.

PhD Aerospace Engineering. Universidad Politécnica de Madrid.

Areas of interest: Perturbation methods, numerical modelling and analysis, fluid dynamics and computational fluid dynamics, heat transfer and renewable energy.

- **Rodríguez Pecharromán, Ramón.** Senior Associate Professor

Ph.D. in Industrial Engineering (Comillas)

Electronics Engineer (Comillas)

Areas of interest: Control systems. Railway electrification. Thermoelectricity.

- **Sáenz Nuño, María Ana.** Assistant Professor

Ph.D. in Industrial Engineering (Comillas)

Physics Science degree (UCM)

Areas of interest: Dimensional metrology.

- **Sánchez Pérez, Pablo.** Assistant Professor

Bachelor degree in Computer Science. Universidad Autónoma de Madrid.

Master's degree in Research and Innovation in Information and Communication Technologies. Universidad Autónoma de Madrid.

PhD degree in Computer and Telecommunication Engineering. Universidad Autónoma de Madrid.

Areas of interest: Machine learning, recommender systems, information retrieval.

- **Santos Montes, Ana María.** Senior Associate Professor

Ph.D. in Chemistry Science (UCM)

Chemistry Science degree (UAM)

Areas of interest: Development, optimization and validation of chromatographic analytical methods for high-performance liquid chromatography (HPLC) to determine steroids, diuretics and contaminants in urine samples, feed and water. Analysis of the life cycle of crops for biofuels.

- **Tercero Lucas, David.** Assistant Professor

Ph.D. in Applied Economics. Universitat Autònoma de Barcelona.

Master's in International Economics. Universidad Autónoma de Madrid.

Master's in International Economic Policy. Kiel Institute for the World Economy.

Bachelor's Degree in Economics. Universidad de Castilla-La Mancha.

Areas of interest: Digital currencies, cryptocurrencies, stablecoins, central bank digital currencies (CBDCs), payment systems, monetary policy, financial stability, and applied economics.

- **Valdano, Manuel.** Assistant Professor

Mechanical Engineering. Universidad Nacional de Rio Cuarto (Argentina).

Ph.D. in Engineering Systems Modeling. Universidad Pontificia Comillas.

Areas of interest: Computational Mechanics, Biomechanics.

- **Valor Martínez, Carmen.** Professor

Ph.D. in Information Sciences. Universidad Complutense de Madrid.

Master in Business Administration (MBA). Universidad Carlos III de Madrid.

MSc Business and Community. University of Bath.

Areas of interest: Sustainable Consumption. Sustainable brands. Innovation for sustainability. Collaborative consumption. Social Change.

- **Vaquero Lafuente, Esther.** Associate Professor

Bachelor in Business and Economic Sciences. Universidad Pontificia Comillas.

Ph.D. in Business and Economic Sciences. Universidad Pontificia Comillas.

Areas of interest: Sustainable Finance and Teaching Methods.

- **Wuebben, Daniel Lewis.** Assistant Professor

Ph.D. Doctor of Philosophy in English. City University of New York. EE.UU.

Bachelor in English. Hunter College CUNY. EE.UU.

Areas of interest: Energy Humanities, Communication of Climate Science and Energy Transitions, Ecocriticism, Community Engagement with Smart Grids, history of AI

2.7 Pre- and postdoctoral fellows

The Research Assistants (PhD students and post-docs) that developed their activity at the IIT during the academic course 2024 - 2025 were the following ones:

- **Arenas Crespo, Oswaldo.** Bachelor's degree in Electrical Engineering. Universidad Pontificia Bolivariana.
Master of Science in Electrical Engineering. Universidad Nacional de Colombia.
- **Asensio Gil, Juan Manuel.** Master's Degree in Engineering for Mobility and Safety. Universidad Pontificia Comillas.
Master's Degree in Industrial Engineering (Mechanical Engineering). Universidad Pontificia Comillas.
Bachelor's Degree in Industrial Engineering (Mechanical Engineering). Universidad Pontificia Comillas.
Bachelor's Degree in Higher Artistic Music Education. Real Conservatorio Superior de Música de Madrid.
- **Ávila Martínez, Régulo Enrique.** Bachelor Degree in Electrical Engineering. University of Oriente. Venezuela.
Master degree in Renewable Energies in Electrical Systems. Carlos III University of Madrid.
Ph.D. degree in Power Systems. Universidad Pontificia Comillas.
- **Bagheri-Gisour Marandyn, Farid.** Bachelor Degree in Telecommunications Technologies and Services Engineering. Technical University of Madrid.
Master's degree in Cybersecurity. Technical University of Madrid.
Master's Degree in Teacher Training. Villanueva University Centre.
- **Baños Ramos, Andrea.** Degree in Economics. Carlos III University of Madrid.
Master's Degree in Economics. Carlos III University of Madrid.
- **Barruso Recuero, Miguel Ángel.** Bachelor's Degree in Engineering for Industrial Technologies. Universidad Pontificia Comillas.
Official Master's Degree in the Electric Power Industry (MEPI). Universidad Pontificia Comillas.
Master's Degree in Industrial Engineering (MII). Universidad Pontificia Comillas.
- **Bellido López, Francisco Javier.** Degree in Industrial Technologies. Universidad Politécnica de Madrid.
Master in Industrial Engineering. Universidad Politécnica de Madrid.
Master in Electrical Engineering. Universidad Politécnica de Madrid.
- **Benítez Domínguez, Álvaro.** Master in Aerospace Engineering. Universidad Carlos III de Madrid.
Máster de Energías Renovables y Medio Ambiente. Universidad Politécnica de Madrid.
- **Blanco Castillo, Manuel.** Bachelor's Degree in Mechanical Engineering. University of Jaén.
Master's Degree in Industrial Engineering. University of Málaga.

- **Brito Pereira, Paulo.** Degree in Electrical Engineering and Masters Degree in Industrial Engineering (University of Las Palmas of Gran Canaria).
Masters Degree in the Electric Power Industry (Comillas Pontifical University).
- **Cidoncha González, Álvaro.** Bachelor's Degree in Industrial Technologies Engineering. Comillas Pontifical University.
Master's Degree in Industrial Engineering. Comillas Pontifical University.
- **Coll Franck, Anne Maren.** Bachelor's Degree in Industrial Technologies Engineering. University Carlos III of Madrid.
Master's Degree in Industrial Mathematics. University Carlos III of Madrid.
- **Collado Van-Baumberghen, Natalia.** Bachelor's Degree in Economics. Universidad Carlos III de Madrid.
Master's degree in Industrial Economics and Markets. Universidad Carlos III de Madrid.
- **Córdoba Ocaña, Miguel.** Bachelor's Degree in Engineering for Industrial Technologies. Universidad Pontificia de Comillas.
Master's Degree in Industrial Engineering. Universidad Pontificia de Comillas.
- **Cubillo Llanes, Diego.** Bachelor's Degree in Engineering for Industrial Technologies. Comillas Pontifical University
Official Master's Degree in Industrial Engineering. Comillas Pontifical University
- **Díaz Pastor, Santos José.** Industrial Engineering. Polytechnic University of Madrid and the Karlsruher Institut für Technologie (KIT).
Master's Degree in Industrial Engineering and the Master's Degree in the Power Sector. Universidad Pontificia Comillas.
- **Elabbas, Mohamed Abbas Eltahir.** Bachelor of Science in Electrical and Electronic Engineering. University of Khartoum, Sudan.
Master of Sustainable Energy Technology. Delft University of Technology, The Netherlands.
- **Fernández Palomino, Luis Jesús.** Bachelor in Industrial Technologies Engineering. Universidad Carlos III de Madrid. Master in Industrial Mathematics. Universidad Carlos III de Madrid.
- **Gegúndez Nogueroles, Fernando.** Degree in Industrial Engineering. Polytechnic University of Madrid.
Master's degree in Industrial Engineering. Polytechnic University of Madrid.
- **Gesteira Miñarro, Roberto.** BSc. in Telecommunication Engineering (ICAI)
MSc. in Telecommunication Engineering (ICAI)
MSc. in Cybersecurity (ICAI)
- **Gómez Pérez, María del Socorro.** Electrical Engineer and Master in Electrical Engineering. Universidad Tecnológica de Pereira (Colombia).
Specialist in Analytics. Universidad Nacional de Colombia.
- **Gómez Sánchez, Stefanía.** Degree in Industrial Engineering. (Escuela Colombiana de Ingeniería Julio Garavito, Colombia)
Master's Degree in Optimization. (Universidad Autónoma Metropolitana, México)

- **Gutiérrez Guerra, Juan Francisco.** Chemical Engineering Degree. Instituto Tecnológico de Buenos Aires (Argentina).
M.Sc. in Mechanical Engineering, Energy and Environment. Karlsruher Institut für Technologie (Germany).
Master in Energy and Environment. Instituto Tecnológico de Buenos Aires (Argentina).
- **Herrero Rozas, Luis Alberto.** Degree in Chemical Engineering. Universidad de Cantabria.
Master's degree in Chemical Engineering. (Universidad de Cantabria (UC) and Universidad del País Vasco (UPV/EHU)
- **Insunza Díaz, Eloy Jesús del Gran Poder.** Industrial Engineering Master's Degree. Universidad Politécnica de Madrid.
Generalist Engineer. École Centrale de Lyon.
Industrial Technologies Engineering Degree. Universidad Politécnica de Madrid.
- **Khalifa, Mahmoud Khalifa Abdelhamid.** B.Sc. degree in Electrical Engineering. Minia University. Egypt.
M.Sc. degree in Electrical Engineering. Minia University. Egypt.
- **Labora Gómez, Francisco.** Bachelor's degree in Industrial Technologies. Universidad Pontificia Comillas.
Master's degree in Industrial Engineering. Universidad Pontificia Comillas.
- **Lefranc, Léonard.** Master's Degree in General Engineering. École Centrale Paris.
Master's Degree in Industrial Engineering. Universidad Pontificia Comillas.
Master's Degree in Business Administration (MBA). Universidad Pontificia Comillas.
- **Lorente Benítez, Irene.** Bachelor's degree in Mathematical Engineering. Complutense University of Madrid.
Master's in Big Data. Universidad Pontificia Comillas.
- **Manzanares Domínguez, Ignacio.** Master's degree in Computing and Intelligent Systems. University of Deusto.
Master's degree in Control, Automation and Robotics. University of the Basque Country.
Bachelor's degree in Industrial Technologies. University of the Basque Country.
- **Martínez Velázquez, Miguel.** Bachelor's Degree in Engineering for Industrial Technologies. Comillas Pontifical University
MSc in Wind Energy. Technical University of Denmark (DTU)
Official Master's Degree in Industrial Engineering. Comillas Pontifical University
- **Marulanda García, Geovanny Alberto.** Electrical Engineer, Universidad Tecnológica de Pereira (Colombia).
Master in Electrical Engineering, Universidad Tecnológica de Pereira (Colombia).
Ph.D. in Electrical Energy. Universidad Pontificia Comillas.

- **Meressa Weldu, Hagos.** BA Degree in Management. Mekelle University, Meqhele – Tigray.
Master of Public Policy. KDI School of Public Policy & Management – Korea.
Master in Electric Power Industry. Universidad Pontificia Comillas, Madrid – Spain.
Master in Digital Economics & Network Industries. Université Paris Sud-11, Paris – France.
- **Modrego Arceo, Fernando David.** Degree in Physics. University of Zaragoza.
- **Morán Camacho, María.** Industrial Engineering. Energy Speciality. University of Seville
- **Moreno, Valeria Karina.** Industrial Engineer . National Technological University (Argentina).
Master's Degree in Energy Engineering. Polytechnic University of Catalonia (Spain)
- **Mutuyimana, Jean Pierre.** Bachelor of Science in Mechanical Engineering. Kigali Institute of Science and Technology, Rwanda.
Master of Engineering (M.Eng.) in Mechanical Engineering/Mechatronics. Germany's University of Applied Sciences. (Hochschule Kaiserslautern).
- **Nasrollahei, Navid.** MSc Energy for Smart Cities. KTH Royal Institute of Technology. Stockholm, Sweden.
MSc Energy for Smart Cities, KU Leuven. Leuven, Belgium.
BSc Electrical Engineering - Electronics. Babol Noshirvani University of Technology. Babol, Iran.
- **Navarrete Cruz, Diana María.** Master degree in Data Mining and Business Intelligence (Complutense University of Madrid)
Industrial Engineering (Universidad del Valle. Colombia)
- **Nematbakhsh, Emad.** Bachelor Degree in Electrical Power Engineering. Islamic Azad University of Najafabad.
Master's degree in Electrical Power Engineering. University of Esfahan.
- **Nemati, Hadi.** B.Sc. degree in Electrical Engineering (Shiraz University)
M.Sc. degrees in Electrical Engineering (Isfahan University of Technology)
- **Ormeño Mejía, Eliana Carolina.** Bachelor's degree in Electrical Engineering. Escuela Superior Politécnica del Litoral (ESPOL), Guayaquil-Ecuador.
Master's Degree in Energy Engineering. Universidad Politécnica de Madrid.
Diploma in Electricity Markets of the Future and its Regulation. Pontificia Universidad Católica of Chile.
- **Oviedo Gómez, Andrés Felipe.** PhD in Engineering (2023), Universidad del Valle, Cali, Colombia.
MSc Applied Economics (2017), Universidad del Valle, Cali, Colombia.
BSc in Electronic Engineering (2014), Pontificia Universidad Javeriana, Cali, Colombia.
- **Paolis Robles, Carlo de.** Bachelor's Degree in Electromechanical Engineering. Comillas Pontifical University.
Master's Degree in Industrial Engineering. Comillas Pontifical University.

- **Paredes Miguel, José Rodrigo.** Bachelor's Degree in Communications and Electronics Engineering. University of Guanajuato (Mexico).
Master's Degree in Electrical Engineering. University of Guanajuato (Mexico).
- **Pérez Bravo, Manuel.** Graduado en Ingeniería de Tecnologías Industriales. Universidad de Sevilla.
Máster Universitario en Ingeniería Industrial. Universidad de Sevilla.
- **Polo Molina, Alejandro.** Master in Big Data & Visual Analytics. Universidad Internacional de La Rioja.
Master in Big Data & Advanced Analytics. Universidad Pontificia Comillas.
Degree in Mathematics. Universidad de Granada.
- **Rajora, Gopal Lal.** Master in applied Telecommunication & Engineering Management. Polytechnic University of Catalonia
Master of Science in Finance. University of Siena.
Bachelor of Technology in Electronics Instrumentation & Control. Rajasthan Technical University.
- **Reneses Botija, María.** Degree in Psychology. Universidad Complutense de Madrid.
Degree in Anthropology. Universidad Autónoma de Madrid.
Master's degree in Psychoanalysis and Philosophy of Culture . Universidad Complutense de Madrid.
Master's degree in Secondary Education. Universidad Camilo José Cela.
Ph.D. in Health Sciences. Universidad de Castilla-La Mancha.
- **Rezaeian-Marjani, Saeed.** Ph.D. in Electrical Power Engineering. Urmia University (Urmia, Iran)
M.Sc. in Electrical Power Engineering. Urmia University (Urmia, Iran)
B.Sc. in Electrical Power Engineering. Urmia University (Urmia, Iran)
- **Ríos Ocampo, Miguel Ángel.** B.Sc and M.Sc in Electrical Engineering. Technological University of Pereira (UTP).
- **Rodrigo Tobías, Ignacio de.** Bachelor's Degree in Electromechanical Engineering (Comillas Pontifical University)
Official Master's Degree in Industrial Engineering (Comillas Pontifical University)
Master of Engineering in Mobility and Safety (Comillas Pontifical University)
- **Rodríguez Cuenca, Francisco.** Degree in Software Engineering. Polytechnic University of Madrid.
Master's degree in Big Data and Advanced Analytics. Comillas Pontifical University.
- **Rodríguez Matas, Antonio Francisco.** Degree in Industrial Engineering (University of Seville)
Master's Degree in Economics (Complutense University of Madrid)
Master's Degree in Energy Management (Repsol)
- **Romeo Monterde, Manuel.** Degree in Physics. Universidad de Zaragoza.
Master in Energy Engineering and Management. Instituto Superior Técnico (IST, Lisbon).
Master in Energy Innovation. Royal Institute of Technology (KTH, Stockholm).

- **Ruiz González, Berta.** Bachelor's degree in Mathematics. Universidad Complutense de Madrid.
Master's degree in Disaster management. Universidad Complutense de Madrid y Universidad Politécnica de Madrid.
- **Ruiz Hernández, Miguel Ángel.** Bachelor's degree in Industrial Engineering. University Carlos III of Madrid.
MsC in Industrial Engineering. University of Puerto Rico.
- **Sarvarizadeh Kouhpaye, Miad.** Bachelor in Electrical Engineering. Shiraz University (Irán).
Master in Electrical Power Systems. Shiraz University of Technology (Irán).
- **Sonowal, Devashish.** Bachelor's and Master's degrees in Mathematics. National Institute of Science Education and Research (NISER).
Master's degree in Computational and Applied Mathematics. Universidad Carlos III de Madrid.
- **Stampatori, Daniele.** Energy engineer. University of Padua (Italia)
- **Tomás Martín, Andrés.** University Degree in Communications Electronic Engineering. Complutense University of Madrid.
Master's Degree in Energy. Complutense University of Madrid.
- **Trabelsi Karoui, Alí.** PhD in Finance. University of Sfax. Tunisia.
Master's degree in Finance. Sfax Business School. Tunisia.
Bachelor's degree in Management and Finance. University of Sfax. Tunisia
- **Trindade Ribeiro, Karina.** BSc in Physics. University of Valencia.
MSc in Optics and Photonics (Solar Energy specialization). Karlsruhe Institute of Technology (Germany).
- **Valarezo Rivera, Orlando Mauricio.** Bachelor's degree in Electrical Engineering (Escuela Superior Politécnica del Litoral - ESPOL)
Master's degree in Power System and its Automation (Shandong University)
Master's degree in Computational Engineering and Mathematics (Universitat Rovira i Virgili)
- **Valdez, William Ricardo.** Master's of Science. University of California San Diego. (USA)
Bachelor's of Science. University of Utah. (USA)
- **Wagh, Chinmayi Mukund.** Bachelor of Engineering. University of Mumbai.
Master of Electrical Engineering. University of Mumbai.

2.8 Services staff

2.8.1 Systems administrator staff

The staff responsible for managing networks and computer systems consists of:

- **Martín Tena, Julián.** Computer Expert

2.8.2 Administrative staff

The staff that manage the documentation, the general and technical secretariat and the trips consist of:

- **García Lecuona, Paula.** Degree in Hispanic Philology. Universidad Complutense de Madrid.
- **Gisbert García, Silvia.** Bachelor's degree in Law. Universidad Autónoma de Madrid.
Bachelor's degree in Business Administration and Management. Universidad Autónoma de Madrid.
- **Ruiz González-Mateo, Cristina.** Law and Legal Advisor Companies degree. Universidad Pontificia Comillas.
- **Sánchez Alfayate, María Belén.** Social Education Diploma. Universidad Complutense de Madrid.
- **Sánchez Ortega, María Isabel.** Librarianship and Information Science Diploma. University of Granada.
- **Tamudo González, Isabel.** Bachelor's Degree in Criminology. Universidad Europea de Madrid.
Criminology Diploma. Universidad Complutense de Madrid.

3. Research

3.1 Research areas

The IIT is divided into nine research areas.

3.1.1 Electric Power Systems (MAC)

Area dedicated to the development of computer tools for electrical studies related to such aspects as load flows, stability, transients, frequency-power control, power plant regulators, voltage control, design of systems of electric feeding, protection, harmonics, and the impact of the distributed generation.

Coordinator: Luis Rouco Rodríguez

Web page: <https://www.iit.comillas.edu/research-area/mac>

3.1.2 Smart and Sustainable Grids (REDES)

The Smartgrids and RES integration Group investigates the challenges of future power systems from a technical, economic and regulatory perspectives. On the one hand, it covers the techno-economic evaluation of the impact of distributed energy resources in distribution networks (such as distributed generation, demand management, electric vehicles and storage). Based on the cost & benefit and scalability & replicability analysis different proposals for standards and regulation are presented. On the other hand, the research in this area also covers the impact of high levels of renewable energy penetration in power systems, and new market and ancillary services designs for their optimal integration.

Coordinator: Carlos Mateo Domingo

Web page: <https://www.iit.comillas.edu/research-area/redes>

3.1.3 Energy Economics and Regulation (RYE)

Area centred on research into the organization, remuneration and regulation of the power systems (sector structure, market models, economic signals, tariffs and quality of service, etc.).

Coordinator: Luis Olmos Camacho

Web page: <https://www.iit.comillas.edu/research-area/rye>

3.1.4 Energy Systems Models (SADSE)

Area which goal is to provide assistance in the taking of decisions and in the technical-economic analysis of the generation, transport and distribution systems in the energy sector.

Coordinator: Andrés Ramos Galán

Web page: <https://www.iit.comillas.edu/research-area/sadse>

3.1.5 Fire Safety, Thermal and Fluids Engineering (PCI)

This area is dedicated to mechanical elements design and to running complex simulations using a computer, specially for general mechanical purposes as well as electromagnetism, wind grounds, etc.

Coordinator: Alexis Cantizano González

Web page: <https://www.iit.comillas.edu/research-area/pci>

3.1.6 Railway Systems (ASF)

This area aims to develop models and other custom-made software tools, safety analysis and quality control, related with different topics of railway systems. These topics include the infrastructure design and management, the power systems planification and operation, as well as the railway traffic planification and operation.

Coordinator: Adrián Fernández Rodríguez

Web page: <https://www.iit.comillas.edu/research-area/asf>

3.1.7 Intelligent Systems (ASI)

This area deals with the monitoring, diagnosis, reliability and maintenance of industrial processes, and modelling and prediction of industrial and economic systems.

Coordinator: José Portela González

Web page: <https://www.iit.comillas.edu/research-area/asi>

3.1.8 Bioengineering (BIO)

This group works to develop electronic instrumentation and microprocessors, power electronics, control engineering applications, signal analysis, electronic design, automatization and digital communications.

Coordinator: Eva Paz Jiménez

Web page: <https://www.iit.comillas.edu/research-area/bio>

3.1.9 Smart Management for Sustainability (SMS)

Area aimed at building and promoting firms' competitive advantages. Its research focuses on the two main strategic challenges faced by companies: transitions to sustainability under the framework of the Sustainable Development Goals (SDG), and Environmental, Social and Governance (ESG) management.

Coordinator: David Roch Dupré

Web page: <https://www.iit.comillas.edu/research-area/sms>

3.2 Research projects

This section includes all the research projects developed at IIT during this academic year grouped by area and type of funding. A brief description of them and the most relevant data (collaborating institution, dates, staff involved) are also included.

3.2.1 Research and development projects

3.2.1.1 Private funding

- **Cátedra CTR**

Cátedra CTR. June 2022 - January 2025. (Sara Lumbreras Sancho)

Cátedra CTR

- **CEVESA: A long term planning model for investment decisions in electricity generation and transportation**

Institute for Systems and Computer Engineering, Technology and Science (INESC TEC). November 2022 - April 2025. (Francisco Alberto Campos Fernández, Luis Alberto Herrero Rozas)

CEVESA is a dynamic multizonal generation expansion planning model for the Spanish power system (assumed as a single-node), that considers both

investments made by distributed customers in Distributed Energy Resources (DER: generation and storage) and by generation companies (GENCOs) in Centralized Resources (CR: conventional thermal generation plants, renewable generation and centralized storage). It is also connected with the transport sector by including investments decisions on Electric Vehicles (PEV) and Internal Combustion Engine Vehicles (CEV), considering infrastructure deployment, fuel, and social and environmental costs of both technologies. The model is based on a multizonal conjectural-variation equilibrium with price-response conjectures with hourly detail, energy and endogenous secondary reserve requirements, ramping constraints, and start-ups and shut-downs.

- **Correlation of biometric data with cognitive and emotional states in vehicle interior scenarios and investigation of corrective stimuli and advanced control functions**

Grupo Antolin Ingeniería S.A.U. December 2022 - October 2024. (Álvaro Jesús López López, Berta Ruiz Gonzalez)

The objective of the project is to develop cognitive models specialized in analyzing a series of variables related to the state of health of the occupants of a vehicle.

The models developed are based on data of a heterogeneous nature that may well have been collected in real scenarios or generated synthetically.

- **ATMOSPHERE. New methodologies for the storage, generation and safety of green hydrogen plants**

Iberdrola Energía España S.A.U. December 2022 - June 2025. (Andrés Ramos Galán, Jesús María Latorre Canteli, Juan Francisco Gutiérrez Guerra, Pedro Sánchez Martín)

In the project, a model is developed that determines the optimal sizing of the electrolyzers for the production of green hydrogen for industrial applications, which are hybridized together with hydrogen and electricity storage equipment, and renewable electricity production sources and all of this is connected to the national electricity grid.

Project of the Science and Innovation Missions Program 2022 of the State Program to Catalyze Innovation and Business Leadership of the State Plan for Scientific Research and Innovation 2021-2023 within the framework of the Recovery, Transformation and Resilience Plan financed by the Ministry of Science and Innovation (MIG-20221006)



- **ENDESA Chair for applications of artificial intelligence to data-driven maintenance**

Endesa Generación, S.A. January 2023 - December 2026. (Miguel Ángel Sanz Bobi, Antonio Muñoz San Roque, Francisco Javier Bellido López, Eugenio Francisco Sánchez Úbeda, Álvaro Jesús López López, Mario Castro Ponce, Pablo Sánchez Pérez)

The main goal of the Chair is to help ENDESA, in particular, and the energy sector in general, to take advantage of the opportunities offered by Artificial Intelligence by generating knowledge and disseminating it to society. Its main objectives are to investigate and share AI applications in the Maintenance and Management of generation assets to facilitate the energy transition towards a long-term sustainable model following the Sustainable Development Goals.

- **ATMOSPHERE. New methodologies for the storage, generation and safety of green hydrogen plants**

Innometrics S.L. January 2023 - June 2025. (José Portela González, Alejandro Polo Molina, Irene Lorente Benítez)

The project consists in the construction of a digital twin of a green hydrogen production plant and its validation with real operation data. IIT contributes in the development of the library of mathematical models representative of the different elements that constitute an industrial green hydrogen production plant and in the subsequent integration of these models with scientific machine learning algorithms, in order to merge models based on physical equations with operational data using machine learning techniques.

In addition, IIT approaches the definition of the input data for the design of heat networks to take advantage of the waste heat from hydrogen production plants, as well as in their storage format and in the research of the algorithms for the calculation of the necessary models.

Project of the Science and Innovation Missions Program 2022 of the State Program to Catalyze Innovation and Business Leadership of the State Plan for Scientific Research and Innovation 2021-2023 within the framework of the Recovery, Transformation and Resilience Plan financed by the Ministry of Science and Innovation (MIG-202210)

- **Hympulso: Comprehensive project on rail mobility through hydrogen: from generation to the track**

Patentes Talgo S.L.U. January 2023 - July 2025. (Antonio Fernández Cardador, Asunción Paloma Cucala García, Adrián Fernández Rodríguez, Manuel Blanco Castillo)

Eleven institutions are collaborating in this project, led by Patentes Talgo, to advance in the transition towards clean mobility based on green hydrogen. The project integrates the entire value chain in the generation of green hydrogen and its use in the railroad, also analyzing the impact that this transition has on the different assets of the railway infrastructure, such as the track or maintenance facilities.

Within the consortium, the Railway Systems Area of IIT collaborates in the development of a prototype train powered by fuel cells and batteries. In

particular, IIT is responsible for the development of the digital twin that simulates in detail the behavior of the hydrogen train, as well as the model that optimizes the driving of the train by combining the use of different energy sources (hydrogen cell, battery, catenary and regenerative braking). It also collaborates in real driving tests and energy efficiency analysis.

- **Specification of the Planning and Rescheduling modules of a TMS for Mass Transit (CBTC)**

CAF Signalling. February 2023 - February 2025. (Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez)

The objective of this project is the specification of the Planning and Rescheduling modules of a TMS (Traffic Management System) for Mass Transit (CBTC).

- **Energy storage methods in railway systems**

Union Internationale des Chemins de Fer (UIC), ADIF, Infrabel, Network Rail, RFI. April 2023 - March 2025. (Antonio Fernández Cardador, Asunción Paloma Cucala García, Adrián Fernández Rodríguez, María Domínguez Gago)

The goal of the project is to provide a decision-making tool based on simulation, and guidance to assist infrastructure managers when planning to increase the energy efficiency of railway stations by using the energy regenerated in braking trains by means of Energy Storage Systems located in stations.

This goal of the project is decomposed into three specific objectives: (1) to study the latest and different technologies in energy storage that could be suitable for this application; (2) to develop a decision software tool based on simulation to analyse the best ESS solution for each station type, based on its consumption and traffic; (3) to develop an IRS (International Railway Solution) draft on the implementation of ESS technologies in railway stations to make them more sustainable.

- **Development of a multi-axis control system for test machines and systems**

S.A. Española Ibertest. June 2023 - May 2026. (Juan Luis Zamora Macho, Aurelio García Cerrada)

The aim of this project is to develop and program an application that automates all the control tasks of an industrial testing machine. The proposed system must allow all kinds of tests, both static and dynamic, whether single-axis or multi-axis. In addition, it must incorporate all the auxiliary functions required to facilitate its commissioning.

- **Applications of computational methods and artificial intelligence to the study of moduli spaces**

Convocatoria de Financiación de Proyectos de Investigación Propios 2023. September 2023 - August 2026. (David Alfaya Sánchez, José Portela González, Jaime Pizarroso Gonzalo, Luis Ángel Calvo Pascual, Anitha Srinivasan, Javier Rodrigo Hitos)

It is common to find applications of mathematics to AI and computation. Recent breakthroughs like ChatGPT have increased the interest on the opposite process: the ability of computers to help proving new theorems. This project deepens in this question, exploring the following lines of research in which AI and computation are used to study open problems related with moduli spaces which are very relevant in the current mathematical landscape.

Analysis of the stability chambers of the moduli space of parabolic bundles:
The geometry of these moduli spaces depends on certain weights which are chosen for their construction. These are grouped in stability chambers in which the moduli space remains constant, represented by regions in a hypercube and there exist transformations identifying moduli from certain different chambers. Our goal is to estimate the number of different moduli spaces that there exist and to study their birational geometry through the study of the geometry of these chambers with computer assisted techniques.

Decompositions of motives of moduli:
Motives are invariants which provide a lot of geometric information. Manipulating motivic formulas and understanding when can two different expressions represent the same variety is a problem of great interest. We will develop a software package for manipulating and comparing motives efficiently and we will apply it to Mozgovoy's conjecture on the L-Higgs moduli and to obtain formulas with positive coefficients for the moduli of vector bundles.

Study of Markoff m-triples and its relation to Higgs moduli:
Markoff triples are integral solutions to $x^2+y^2+z^2=3xyz$. They are structured in trees, subject of the famous Markoff Conjecture. m-triples are solutions to $x^2+y^2+z^2=3xyz+m$ and their theory is yet to be developed. We will use computational techniques to research conjectures about its structure and, starting from the relations between triples and points in the moduli of representations, we will explore the relations between m-triples and the Higgs moduli.

Project members from other research centers:

- Tomás Luis Gómez de Quiroga (ICMAT, UAM-UCM-UC3M-CSIC)

Visiting students of the project:

- Sergio Herreros Pérez (ICAI)
- Alejandro Martínez de Guinea García (ICAI)
- Daniel Sánchez Sánchez (ICAI)

- **Artificial intelligence for safety in e-scooters**

Universidad Pontificia Comillas. September 2023 - November 2024. (Alberto Carnicero López, Luis Francisco Sánchez Merchante, Carlos Rodríguez-Morcillo García, Jesús Jiménez Octavio, Juan Manuel Asensio Gil, Francisco José López Valdés, Laura Savall Climent)

The aim of the project is to analyze the positions and driving patterns of scooter users based on data obtained from an instrumented scooter, using artificial

intelligence techniques. To achieve this, an experimental study is conducted with volunteers, and algorithms are developed for reconstructing a 3D model of the use

- **Self-sensing implants based on additive manufacturing techniques**

Universidad Pontificia Comillas. September 2023 - December 2024. (Eva Paz Jiménez, Francisco Javier Herraiz Martínez, Paraskevas Sofokleous, Javier Matanza Domingo, Sara López de Armentia Hernández, Yolanda Ballesteros Iglesias, Romano Giannetti)

The objective of this project is the manufacture of self-sensing implants for biomedical applications through 3D printing using filaments reinforced with ceramic particles. The development of functional materials that can provide particular properties beyond the mere structural support (biological, chemical, electromagnetic properties,...) has been enormous in recent years. In this project, it is intended to use polymeric filaments (PLA-based) for 3D printing by fused filament deposition (FDM), loaded with zirconia and hydroxyapatite ceramic particles. These particles give the polymer a high dielectric permittivity and high biocompatibility, which makes them ideal candidates for the design of electromagnetic sensors in the biomedical field.

- **Multi Energy System Smart Linking Integration**

Collaborative Research for Energy SYstem Modelling (CRESYM). October 2023 - September 2027. (Luis Olmos Camacho, Andrés Ramos Galán, Sara Lumbreras Sancho, Emad Nematbakhsh)

A multinational consortium of world-class companies and universities in the energy sector will develop and model advanced strategies for coordinating the planning of the expansion and operation of different activities within the electricity, gas, and hydrogen sectors. This work takes place in coordination with a team of researchers from the universities of the consortium and in contact with leading professionals from the companies in it to propose solutions of relevance to these companies.

- **Monophasic osseointegrated dental implants**

Clínica Dental Santamaría. October 2023 - September 2024. (Jesús Jiménez Octavio)

This project is focused on the analysis of the structural behavior of a single-phase osseointegrated dental implant. These also called mono-implants include the osseointegrated implant itself and the transmucosal abutment in a single piece, eliminating the structural weakness typical of a classic two-piece implant. For this reason, they can be manufactured in narrow diameters, being an option in cases of limited bone availability.

The purpose of the analysis will be to evaluate the structural resistance of this specific type of implants subjected to occlusal loads, when due to anatomical requirements the abutment is permanently deformed. The structural response will be evaluated under different loads and angulations, contrasting the commercial limits.

- **Wide-area oscillation of low frequency & IBRs**

Collaborative Research for Energy SYstem Modelling (CRESYM). December 2023 - December 2027. (Luis Rouco Rodríguez, Lukas Sigrist)

This collaboration supports the supervision of a doctoral student who is employee of Cresym and student of Comillas in the topic of the impact of inverter based resources on low frequency oscillations. This research is also supported by RTE.

- **Design of railway traffic regulation algorithms of Mass Transit lines**

CAF Signalling. December 2023 - December 2025. (Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez, Álvaro Cidoncha González)

The aim of this project is the specification and design of rail traffic regulation algorithms for Mass Transit and with continuous communication signalling systems

- **Collaboration with JRC on Scenario Discovery**

Unisys Belgium N.V./S.A. December 2023 - April 2025. (Pedro Linares Llamas, Antonio Francisco Rodríguez Matas)

The goal of this collaboration is to support the research of JRC on Scenario Discovery, in the framework of their joint project with Pacific Northwest National Laboratory, USA

- **Assistance and maintenance of Middle Office models**

Endesa Medios y Sistemas S.L. January 2024 - December 2024. (Antonio Bello Morales, Geovanny Alberto Marulanda García, Luis Manuel Montero Guirao)

This project between IIT and Endesa focuses on the assistance and maintenance of Middle Office tools VALORE (with its three users LPM, HEPLASE, and SEIE), OMEGA, ACUARIO and VALORE-CLOUD.

- **Silver Economy Tracker - National and International Dissemination**

Fundación MAPFRE, MAPFRE Global Risks, Compañía Internacional de Seguros y Reaseguros, S.A, Centro de Investigación Ageingnomics. January 2024 - December 2024. (Elisa María Aracil Fernández, David Roch Dupré, Pablo Calvo Báscones)

This project aims to disseminate the Silver Economy Tracker. This tool measures, for all European countries, the advancement and progress of the silver economy using the Silver Economy Tracker methodology, proposed by the research team in previous works.

- **ABanca - Friendly aging Indicator**

ABANCA Corporación Bancaria, S.A. February 2024 - November 2024. (Elisa María Aracil Fernández, Pablo Calvo Báscones, David Roch Dupré)

This proposal includes the methodological development and measurement of the Senior-friendly Banking Index, taking into consideration the stakeholder

networks or interest groups of ABANCA, with special attention to the group of clients and employees

- **Prevention of cervical injuries of e-scooter riders**

Fundación MAPFRE. February 2024 - January 2025. (Francisco José López Valdés, Juan Manuel Asensio Gil, Manuel Valdano, Jaime Alvarez Fernández)

Strategies to prevent cervical injuries in riders of electric scooters exposed to traumatic events

- **Improvements in the integration of OMEGA and VALORE**

Endesa S.A, Endesa Medios y Sistemas S.L. March 2024 - November 2024. (Antonio Bello Morales, Diana María Navarrete Cruz, Pablo Rodilla Rodríguez)

The final objective of the project is to carry out different developments in order to improve the coordination between OMEGA and VALORE in the context of their respective Monte Carlo simulations.

- **Inclusion of France in the simulations**

Endesa S.A, Endesa Medios y Sistemas S.L. March 2024 - December 2024. (Antonio Bello Morales, Pablo Rodilla Rodríguez, Diana María Navarrete Cruz)

This project focuses on including France in OMEGA's simulations to improve forecasts and achieve better integration with current VALORE-LPM executions.

- **Improvements in VALORE execution**

Endesa S.A, Endesa Medios y Sistemas S.L. March 2024 - December 2024. (Antonio Bello Morales, Geovanny Alberto Marulanda García, Pablo Rodilla Rodríguez, Luis Manuel Montero Guirao, Devashish Sonowal)

Current markets are undergoing a series of transformations due to the emergence of new factors and trends in the sector, which must be incorporated into the development of the company's future strategies. In this task, progress will be made in the hourly execution and in the detailed representation of renewable technologies (solar and wind) as well as nuclear, with a particular focus on improving their representation during periods when they set the market price.

- **Improved characterisation of renewable assets**

Endesa Medios y Sistemas S.L. March 2024 - October 2024. (Antonio Bello Morales, Paulo Brito Pereira, Pablo Rodilla Rodríguez)

This project focuses on achieving a better characterization of the renewable resources in Endesa's portfolio, which is essential for proper risk management.

- **Improvements and extension of hourly execution**

Endesa S.A, Endesa Medios y Sistemas S.L. March 2024 - November 2024. (Antonio Bello Morales, Luis Manuel Montero Guirao)

This project aims to improve the quality of future forecasts by carrying out different developments in VALORE-HEPLASE regarding executions with hourly detail.

- **Improvements in the treatment of correlations between assets and nuclear characterization based on fundamentals**

Endesa Medios y Sistemas S.L. March 2024 - October 2024. (Antonio Bello Morales, Paulo Brito Pereira, Pablo Rodilla Rodríguez)

The objectives of this project are:

- Improve the representation of the dependency relationships both between renewable assets and between renewable assets and the electricity price.
- To achieve a representation of the nuclear portfolio using information based on fundamentals.

- **Identification of the models to be used in the global weather scenario generator**

Endesa S.A. April 2024 - December 2024. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

The fundamental objective of the project is to design a set of models that allow the generation of realistic and coupled medium-term scenarios for the main meteorological variables, directly influencing system demand for electricity and renewable production for Spain, Portugal, and France.

- **Generation-grid models**

Iberdrola Renovables Energía, S.A.U. April 2024 - December 2024. (Luis Rouco Rodríguez, Francisco Miguel Echavarren Cerezo, Enrique Lobato Miguélez)

The aim of this work is to develop generation-grid models for simulation and analysis. Wind generator based on DFIG and MSG and solar PV inverters models will be developed.

- **Improvements in the execution of VALORE-LPM in the Cloud**

Endesa S.A, Endesa Medios y Sistemas S.L. April 2024 - December 2024. (Antonio Bello Morales, Geovanny Alberto Marulanda García, Devashish Sonowal)

The purpose of this project is to improve the quality of the forecasts made with VALORE-LPM by implementing enhancements to achieve a more efficient execution of Monte Carlo simulations, maximizing the use of the technological resources currently available.

- **Improvements in the integration of VALORE LPM and VALORE SENP**

Endesa S.A, Endesa Medios y Sistemas S.L. May 2024 - December 2024. (Antonio Bello Morales, Pablo Rodilla Rodríguez, Rodrigo Saldaña Esteban, Geovanny Alberto Marulanda García, Devashish Sonowal)

This project aims to improve the quality of forecasts made with VALORE-SENP by implementing evolutionary updates to achieve Monte Carlo execution and proposing modeling improvements in the optimization process.

- **Improvements in the characterisation of renewable assets and capturing negative prices in simulations**

Endesa S.A, Endesa Medios y Sistemas S.L. June 2024 - December 2024. (Antonio Bello Morales, Devashish Sonowal)

This project aims to improve the quality of future predictions by carrying out different developments in VALORE-HEPLASE around the consideration of negative prices in forecasts and a more detailed representation of renewable assets.

- **Modeling the PMHS experiments of the ENOP project with the SAFER HBM**

Autoliv Development AB. June 2024 - June 2025. (Francisco José López Valdés)

This research proposal details the collaboration between Autoliv and MOBIO Lab of

Instituto de Investigación Tecnológica (IIT) at Universidad Pontificia Comillas to model

the experiments performed with Post Mortem Human Subjects (PMHS) using the SAFER

Human Body Model (HBM).

- **Modeling the evolution of electricity demand profiles in Spain**

Endesa S.A., Endesa Medios y Sistemas S.L. July 2024 - October 2024. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

The aim of the project is to analyse and model the evolution of hourly profiles of electricity demand in mainland Spain.

- **VALORE - SENP extension for short-term simulations**

Endesa Medios y Sistemas S.L. September 2024 - October 2024. (Antonio Bello Morales, Luis Manuel Montero Guirao, Geovanny Alberto Marulanda García, Pablo Rodilla Rodríguez)

The purpose of this project is to implement various improvements in VALORE-SENP to adapt the model's operation to current short-term needs.

- **CODEX: output enhancement**

Endesa Medios y Sistemas S.L. September 2024 - December 2024. (Efraim Centeno Hernández, Luis Jesús Fernández Palomino, Francisco Alberto Campos Fernández)

This project consists of completing three tasks. The first task involves expanding the outputs related to company balances. The second task involves developing outputs related to the sensitivity of responses to certain variables. The third task involves expanding the outputs related to the balances of countries in the European model.

- **Oral and dental structural damage from endodontics, treatments, and dental implants**

Universidad Pontificia Comillas. September 2024 - September 2026. (Jesús Jiménez Octavio)

One of the current challenges in oral and dental biomechanics is the study and development of materials used in treatments and prostheses, such as implants, crowns, and occlusal veneers, through an understanding of the loads to which biological tissues are subjected.

The objective of this project is twofold: firstly, to identify the crack thresholds under chewing and bruxism loads in the first premolars and molars, considering both healthy teeth and those subjected to endodontic treatments, through computational simulation and experimental validation; and secondly, to assess the risk of fracture of commercial single-phase dental implants during their insertion and their subsequent structural behavior under chewing and bruxism loads. Additionally, a computational model of the structural response in single-phase dental implants is developed and validated.

Given the interdisciplinary nature of the project in the fields of biomechanics and health sciences, it has a marked social character. This is rooted in improving the well-being and oral health of individuals through the search for more effective dental practices. The risk of dental fracture and structural failure of single-phase dental implants represent two significant issues in the field of dental treatments. It is estimated that approximately 80% of dental pieces subjected to dental treatment tend to be extracted or fractured within the following decade. Furthermore, single-phase dental implants, which have recently emerged in clinical practice, are known to present a high risk of fracture starting from the second year after placement.

Thus, identifying the mechanisms of dental fracture and single-phase dental implants allows for better clinical evaluation of patients and the selection of personalized, precise, and less invasive dental treatments, with the goal of extending the lifespan of the treated tooth as much as possible. Additionally, the structural analysis of single-phase dental implants helps assess the suitability of this type of prosthesis, as well as potential improvements in geometric design, biomimetic features, and the materials used.

- **Adaptation of TOOLTRAIN for the analysis of lines operated under Hybrid Train Detection (HTD) principles**

CAF Signalling. September 2024 - November 2024. (Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez, María Domínguez Gago)

The main objective of this collaboration is to equip TOOLTRAIN with the ability to calculate the minimum headway on lines equipped with signaling systems that implement Hybrid Train Detection (HTD)

- **Analysis of heavy transport electrification**

Iberdrola S.A. September 2024 - December 2024. (Michel Rivier Abbad, Francisco Martín Martínez, Fernando David Modrego Arceo, Manuel Romeo Monterde)

The project investigates methodologies to analyze strategies for the deployment of charging points for the electrification of heavy road transport. After

identifying the most relevant Spanish and European regulations in this regard, a technical-economic evaluation of the different options for the electrification of such transport is carried out and a tool is developed to optimize the location and size of recharging points according to various criteria, including, at an advanced stage of the project, the impact on the distribution networks themselves.

- **Guidelines for data-driven maintenance of OCL and power substations in railways**

Union Internationale des Chemins de Fer (UIC). September 2024 - May 2027. (Miguel Ángel Sanz Bobi, Adrián Fernández Rodríguez, Antonio Fernández Cardador, Asunción Paloma Cucala García, Gopal Lal Rajora, José Rodrigo Paredes Miguel)

The main goal of this project is the definition of a set of guidelines for components of overhead cable and traction power substations for the identification of symptoms of anomalies that could produce some failure modes, how to diagnose their causes, and what could be the recommendations from a maintenance point of view to prevent or mitigate the effect of these failure modes. In this study, different algorithms based on data are considered to alert of any abnormal behavior observed and assess the health conditions of components to propose a data-driven maintenance approach

- **Assessment of NeCk loads in Head/neck mOtions within the physiological Range**

Universidad Pontificia Comillas. September 2024 - September 2025. (Francisco José López Valdés, Juan Manuel Asensio Gil, Sara Sochor, Mark Sochor, Carlos Javier Carpintero Rubio)

Assessment of NeCk loads in Head/neck mOtions within the physiological Range

- **Effect of cold plasma treatment on the cell viability of scaffolds obtained by stereolithography**

Universidad Pontificia Comillas. September 2024 - September 2026. (Sara López de Armentia Hernández, Ana María Megia Macías, Eva Paz Jiménez, Yolanda Ballesteros Iglesias, Juan Carlos del Real Romero)

The repair of bone tissue when defects occur has led to extensive research over many years. So far, the most commonly used solution has been autografts, a technique that involves using the patient's own bone tissue to repair the defect. However, this method has many disadvantages, such as the need for a second surgery, damage to the donor site, or a limited amount of donor bone.

Currently, an alternative to autografts for bone repair in cases of irregular or large defects has been found. This alternative is known as scaffolds, which are structures with high interconnected porosity that promote cell proliferation and differentiation, leading to bone tissue regeneration. The use of 3D printing techniques like stereolithography for their fabrication is of great interest because it offers excellent control over geometry, pore size, and porosity.

However, to date, commercially available photocurable resins are classified at most as Class VI, which limits their use to external or temporary contact with biological tissue.

The main objective of this research project is to improve the biological properties of a photocurable resin through cold plasma treatment to be used as a scaffold for bone regeneration. This plasma treatment has shown that it can modify the surface energy of materials and, therefore, their wettability. In general, polymeric materials have low surface energy, which results in low cell adhesion due to poor wettability. The ability of cells to adhere to the surface is a critical parameter for the growth, proliferation, and differentiation of preosteoblasts, which will differentiate to form bone tissue.

- **Design of a new intra-abdominal pressure measurement device for critically ill patients**

Universidad Pontificia Comillas. September 2024 - September 2025. (Ana María Megia Macías)

Accurate measurement of intra-abdominal pressure in critical patients is essential for proper clinical management. Currently, an analog liquid column device connected to the bladder catheter is used for this purpose. However, this technique has several limitations. To obtain reliable results, the device must be carefully positioned, with the measuring element placed perpendicularly to the abdomen and the “zero” level aligned with the pubic symphysis. Additionally, the patient must be in a supine position with the head of the bed at zero degrees, which can be difficult to achieve in certain clinical situations.

These variables make the measurement highly dependent on both the operator and the clinical condition of the patient. The operator must have a deep understanding of the technique and rigorously follow certain guidelines to obtain accurate results. Furthermore, the patient must be stable enough to tolerate the supine position with the head flat.

To overcome these limitations, the main objective of this project is to validate the use of an alternative, preferably digital, device for measuring intra-abdominal pressure. The aim is to find a device with specific characteristics, such as a small size, single-use design, and minimally invasive nature. Additionally, it is prioritized that the measurement be independent of both the operator and the patient's position, which would significantly improve reliability and ease of use in critical clinical settings.

- **Assessing the social implications of senior energy poverty. The Spanish case**

Fundación "La Caixa". September 2024 - September 2025. (José Carlos Romero Mora, Roberto Barrella, Elisa María Aracil Fernández, David Roch Dupré, Pablo Calvo Bascónes)

SENIOVERTY aims to analyze energy poverty among people over 65 in Spain, assessing its social impact, the specific characteristics of this population, and the effectiveness of current policies. Given the aging population trend, the study is relevant for anticipating future challenges and designing effective

strategies. Additionally, it project the evolution of this issue over the next decade and estimate the public budget needed to support this vulnerable group, aiming to inform policies that promote energy justice.

Project funded by the Social Observatory of the "la Caixa" Foundation.

Proyecto financiado por:

ElObservatorioSocial



- **EXLA-Proof of concept for optimizing hydraulic unit downtimes**

Endesa Medios y Sistemas S.L. September 2024 - December 2024. (Javier García González, Andrés Felipe Oviedo Gómez)

The objective of this proof of concept is to develop a prototype that optimizes maintenance downtimes for representative basin groups (SIL and EUME) to evaluate the outcome against various objective functions.

- **Power market analysis in Iberia**

China Three Gorges Corporation. September 2024 - September 2026. (Francisco Alberto Campos Fernández)

This project aims to estimate the needs for ancillary services in Spain and Portugal and simulate the Iberian system's response to disturbances to identify new frequency services. Another objective is to represent the MIBEL market using the CEVESA market model, focusing on the participation of electricity generators in the energy and ancillary services markets, implementing the coordination of interconnections between Spain and Portugal, and developing techno-economic assessment methodologies for the participation of existing and new resources in these markets.

- **Quantifying the techno-economic benefits of distributed storage deployment and demand response**

Samso EDS S.L, UNEF, AEPIBAL, PIMEC, OCTOPUS. September 2024 - January 2025. (Carlos Mateo Domingo, José Pablo Chaves Ávila, Andrés Ramos Galán, Francisco Martín Martínez, Tomás Gómez San Román, Miguel Martínez Velázquez)

The main objective of the proposed collaboration is to quantify the value of distributed batteries and demand response in the context of the National Integrated Energy and Climate Plan (PNIEC). To achieve this objective, the following sub-objectives are pursued: 1) To assess the benefits of storage and demand response in the wholesale market, quantifying the differences between different storage technologies. 2) To assess the benefits of avoiding or deferring investments in distribution systems using distributed batteries. 3) To scale the benefits of battery and demand response at national level in Spain.

- **Excom-Siroco Planning: Consideration of renewable assets for SRS service**

Endesa Medios y Sistemas S.L. September 2024 - November 2024. (Javier García González, Andrés Felipe Oviedo Gómez)

The general objective of the project is to carry out the necessary developments so that the production version of the Excom-Siroco Planning model (ExSp) allows for the consideration of secondary regulation services provision by renewable assets

- **Analysis of energy scenarios for Spain 2030-2050**

Naturgy Innovahub SLU. September 2024 - December 2024. (Pedro Linares Llamas, José Pablo Chaves Ávila, Antonio Francisco Rodríguez Matas)

The goal of this work is to contribute to the design of robust investment strategies for Naturgy in the 2030-2050 horizon, with a case study for Spain. In a first phase, the goals are: - Define scenarios for the evolution of the Spanish energy sector for 2030-2050, both from the point of view of supply and demand, based on the Spanish NECP and other global scenarios; and to - Build a conceptual map that will allow the identification of the relevant variables and their impacts on the potential investments of Naturgy in the 2030-2050 horizon.

- **Evaluation of the ADAMO-Robot device for the treatment of cervicothoracic pathologies**

Adamo Robot, S.L, Comunidad de Madrid. October 2024 - September 2025. (Carlos Javier Carpintero Rubio, Jesús Jiménez Octavio, Francisco José López Valdés, Juan Manuel Asensio Gil, Carlos Rodríguez-Morcillo García)

The main objective of this project is to evaluate the capacity of pressurized air and heat delivered by the ADAMO-robot rehabilitation device to reach deep anatomical planes of the cervicothoracic and scapular region.

The secondary objective is to clarify the therapeutic potential of the ADAMO-robot technology on cervical pain based on the penetration capacities analyzed and to propose intervention protocols as a previous step to its use in clinical trials with non-specific mechanical cervicalgia and whiplash.

To do so, the project require the preparation and instrumentation of post-mortem individuals, performing a posterior approach to the cervicothoracic area to expose the right laminae of the cervical and thoracic vertebrae, the first three right costal tubercles and arches and the posterior face of the right scapula, where pressure and temperature sensors will be installed.

- **Cervical injuries in vehicle occupants subjected to low-speed rear impacts**

Centro de Experimentación y Seguridad Vial MAPFRE (CESVIMAP). October 2024 - April 2025. (Jesús Jiménez Octavio, Francisco José López Valdés, Carlos Javier Carpintero Rubio, William Ricardo Valdez, Juan Manuel Asensio Gil, Carlos Rodríguez-Morcillo García)

The purpose of the collaboration is the experimental collection of kinematics, dynamics, and cervical muscle activation data from vehicle occupants

subjected to low-speed rear impacts under different conditions, without involving any risk of injury whatsoever.

The data gathered on body kinematics and cervical muscle activity, by the nature of the experiment itself, remain below the thresholds typically associated with potentially injurious collisions. While this information holds intrinsic value, it could also have a valuable secondary use in the validation of anthropometric computational models capable of accurately predicting the musculoskeletal loads on vehicle occupants subjected to low-speed rear impacts, which are commonly associated with cervical injuries.

- **Demand representation for hydrogen in Continental MoDEM**

Endesa S.A., Endesa Medios y Sistemas S.L. October 2024 - December 2024. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

The project's objective is to incorporate the energy consumption associated with hydrogen production into the modelling of Spain's electricity demand, integrating this new consumption variable into the current projections.

- **Investigation of submarining risk in reclined postures**

Transportation Research Center. October 2024 - July 2025. (Francisco José López Valdés)

Analysis of the effect of the lap belt position in submarining

- **CODEX: Outputs extension**

Endesa Medios y Sistemas S.L. October 2024 - December 2024. (Francisco Alberto Campos Fernández, Luis Alberto Herrero Rozas)

This project consists of completing three tasks. The first task involves expanding the outputs related to company balances. The second task involves developing outputs related to the sensitivity of responses to certain variables. The third task involves expanding the outputs related to the balances of countries in the European model.

- **Studies assessing the potential of different generative AI-based strategies to improve internal processes**

Ferrovial Corporación, S.A.U. October 2024 - December 2024. (Álvaro Jesús López López, Jaime Boal Martín-Larrauri, Ignacio de Rodrigo Tobías)

In this project, we collaborated with Ferrovial's Innovation Department to apply generative artificial intelligence (LLM) techniques to certain company processes identified as suitable for optimization through this technology.

- **Forecasting model for clearing price in the real-time congestion management market and identification of functional time series models**

Endesa S.A. November 2024 - January 2025. (José Portela González, Antonio Muñoz San Roque, Eloy Jesús del Gran Poder Insunza Díaz)

This project aims to identify a strategy for predicting the maximum clearing price in the real-time congestion management market, characterized as a "Pay

as Bid" system. Time series prediction methods are applied. Additionally, functional time series identification and prediction models are used for forecasting residual demand curves in the market. This approach allows for characterizing the bidding strategy of market participants.

- **EXCOM: Flexible Operation of Nuclear Assets (POC)**

Endesa Medios y Sistemas S.L. November 2024 - December 2024. (Javier García González, Andrés Felipe Oviedo Gómez)

The overall objective of the project is to conduct a proof of concept to model the operation of nuclear power plants managed by Endesa under the specified technical requirements. Additionally, a functional analysis is carried out to explore how this functionality could be integrated into the Excom tool in a second phase.

- **Analysis of Transmission Expansion Planning in Latin America and the Caribbean**

Banco Interamericano de Desarrollo (BID). December 2024 - July 2025. (Paolo Mastropietro, Andrés Ramos Galán, Sara Lumbreras Sancho, Luis Olmos Camacho, María del Socorro Gómez Pérez)

This project critically evaluates current transmission expansion planning practices in the electricity sectors of the Latin American and Caribbean region, considering criteria, methodology, transmission system expansion tools, environmental and social criteria, and other relevant aspects, in order to identify strengths and weaknesses in existing processes, and propose recommendations to improve the efficiency, sustainability, and adaptability of transmission systems in the region. The project reviews the state of the art and international best practices on transmission expansion planning, reviews the planning processes of five countries in the Latin American and Caribbean region (both at the regulatory/institutional level and in terms of modelling and optimisation tools) and makes recommendations for improvement.

- **Study of New Equilibria in the Secondary Reserve Market SRS**

Endesa S.A. December 2024 - January 2030. (José Portela González, Antonio Muñoz San Roque, Eloy Jesús del Gran Poder Insunza Díaz)

In November 2024, market regulation in the Spanish Iberian electricity market changed to split the secondary regulation market into two separate markets: one for the upward reserve and another for the downward reserve. This project aims to analyze and characterize the new bidding strategies that result from this regulatory change by applying advanced data analysis techniques and functional analysis to characterize the supply curves in these markets. Additionally, various strategies for predicting curves in these markets are evaluated, analyzing the existing correlations between them.

- **Blackstart of renewable energy plants with battery energy storage systems**

Iberdrola Renovables Energía, S.A.U. December 2024 - December 2024. (Luis Rouco Rodríguez, Régulo Enrique Ávila Martínez, Lukas Sigrist, Mohammad Rajabdorri)

The aim of the project is to identify and to test the adaptations of the grid architecture and the control and protections schemes to allow renewable energy plants with battery storage systems.

- **Implementation of hourly Monte Carlo simulations in long-term forecasting**

Endesa S.A. December 2024 - May 2025. (Antonio Bello Morales, Luis Manuel Montero Guirao, Pablo Rodilla Rodríguez, Geovanny Alberto Marulanda García)

The aim of this project is to improve the quality of future forecasts by performing a new hourly Monte Carlo simulation in VALORE-HEPLASE for the BIP horizon.

- **Improvements in the execution of OMEGA Montecarlo**

Endesa S.A. December 2024 - March 2025. (Antonio Bello Morales, Pablo Rodilla Rodríguez)

This project aims to enhance the Monte Carlo simulation capabilities of OMEGA, improving forecast accuracy in a probabilistic environment while maximizing the use of available computational resources. The OMEGA tool has been in production at Endesa for several years, supporting mid-term gas system forecasts within the General Directorate of Energy Management.

- **Improvements in the reserve market and the operation of generation assets**

Endesa S.A. December 2024 - April 2025. (Antonio Bello Morales, Luis Manuel Montero Guirao, Geovanny Alberto Marulanda García, Pablo Rodilla Rodríguez)

The objective of this project is to improve the quality of forecasts generated with VALORE through the implementation of evolutionary developments focused on the reserve market and the feasibility of operating various assets, in both deterministic executions and Monte Carlo simulations.

- **Assistance and maintenance of Middle Office tools**

Endesa S.A, Endesa Medios y Sistemas S.L. January 2025 - December 2025. (Antonio Bello Morales)

This project between IIT and Endesa focuses on the assistance and maintenance of Middle Office tools VALORE (with its three users LPM, HEPLASE, and SEIE), OMEGA, ACUARIO and VALORE-CLOUD.

- **Intelligent selection and execution of deterministic cases in VALORE**

Endesa S.A. January 2025 - September 2025. (Antonio Bello Morales, Varios General Contratado, Luis Manuel Montero Guirao)

The objective of this task is to analyze and define the optimal scheme to provide users with a selector of uncertainty variables. This selector should allow users to easily configure any desired combination of these variables and subsequently launch an individual (deterministic) simulation automatically. The purpose of this deterministic simulation is to provide full detail and enable a deeper analysis of the selected specific cases.

- **CODEX: optimization of nuclear power plants operation and improvements of storage representation**

Endesa S.A. January 2025 - March 2025. (Efraim Centeno Hernáez)

This project involves the completion of two tasks. The first task focuses on optimizing nuclear operation, specifically improving the representation of nuclear technology flexibility in the European CODEX model, as well as optimizing its scheduled maintenance. Task 2 involves enhancing the representation of storage technologies when CODEX is run by states, aiming to reduce discrepancies compared to the chronological representation.

- **CODEX: Optimization of nuclear power plant operation and enhancements in state-based representation of batteries**

Endesa S.A. January 2025 - March 2025. (Francisco Alberto Campos Fernández, Luis Alberto Herrero Rozas)

This project involves the completion of two tasks. The first task focuses on optimizing nuclear operation, specifically improving the representation of nuclear technology flexibility in the European CODEX model, as well as optimizing its scheduled maintenance. Task 2 involves enhancing the representation of storage technologies when CODEX is run by states, aiming to reduce discrepancies compared to the chronological representation.

- **Identification of balancing needs and services in the Spanish electricity system**

Iberdrola S.A. January 2025 - December 2025. (Michel Rivier Abbad, Luis Rouco Rodríguez, Lukas Sigrist, Ignacio Egido Cortés, Miguel Córdoba Ocaña)

The evolution of electricity systems towards the massive incorporation of renewable generation requires rethinking the identification of balancing needs and, where appropriate, the identification new balancing services. This research project analyses the needs of current and future balancing services, the determination of reserves and their allocation among the different suppliers.

- **Systematic specification of the models and derived variables to be used in the global weather scenario generator**

Endesa S.A. January 2025 - December 2025. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

The fundamental objective of the project is to design the complete set of models that allow the generation of realistic and coupled medium-term scenarios for the main meteorological variables, directly influencing system demand for electricity and renewable production for Spain, Portugal, and France.

- **Review and recalibration of medium-term predictive models of demand for non-peninsular electricity systems in Spain**

Endesa S.A. January 2025 - April 2025. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

The objective is to conduct a comprehensive review and precise recalibration of the mid-term predictive models used in the MODEM-SNP tool to estimate

the demand for Spain's non-peninsular electrical systems to maintain their accuracy.

- **OECD Senior Economy Tracker estimation and Senior Economy Tracker dissemination**

Fundación MAPFRE. January 2025 - December 2025. (David Roch Dupré, Pablo Calvo Báscones, David Tercero Lucas, Elisa María Aracil Fernández)

This project develop an indicator, under the philosophy of the Senior Economy Tracker, for OECD countries, which allow a wider geographical coverage and a more global analysis of the longevity economy (the current Senior Economy Tracker is calculated only in EU countries).

It also allow for further dissemination of the Senior Economy Tracker.

- **Assessment of Time and Cost Dynamics in Metropolitan Transport: National Urban and Peri-Urban Mobility Mapping Plan**

Fundación De Los Bancos Y Cajas De Ceca. January 2025 - June 2025. (José Carlos Romero Mora, Manuel Pérez Bravo, Antonio Francisco Rodríguez Matas, Miguel Angel Rios Ocampo, Pedro Linares Llamas)

The project focuses on the analysis and management of large volumes of data on mobility patterns, aiming to identify specific dynamics related to travel times and the associated costs for different population segments. Additionally, specific vulnerabilities in accessibility are analyzed, including geographic, economic, and social barriers. This information help to establish patterns and vulnerability profiles to guide interventions at the municipal level and, in the future, at the state level.

Project funded by FUNCAS

- **Modeling of Acciona's Hydraulic Assets (Phase 1)**

Endesa S.A. January 2025 - February 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

The general objective of the project is to carry out a first phase to integrate Acciona's new hydroelectric assets into EXLA, EXCOM and EXSP.

- **Refinement of the coordination of RES assets with the rest of the portfolio for secondary reserve provision**

Endesa S.A. January 2025 - March 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

This project is part of the developments of the Excom-Siroco Planning (ExSP) model, which enables the planning of the operation of Endesa's entire generation portfolio in the Iberian Peninsula, considering both the energy market and the secondary regulation reserve market. The modeling of the generation equipment is carried out with a high level of detail (thermal unit and hydraulic turbine) in a coordinated manner with other models developed by the same IIT team (EXCOM and EXLA models).

This collaboration focuses on improving the scheduling of thermal unit shutdowns and refining the decomposition strategy of hydraulic subsystems.

- **Sensitivity analysis with respect to gas, oil, and temperature indices**

Endesa Medios y Sistemas S.L. March 2025 - December 2025. (Antonio Bello Morales)

This task aims to implement a more advanced and realistic methodology for PVB price sensitivity analysis. A new procedure is developed to more accurately estimate the impact of PVB price in response to variations in primary variables such as temperature, Brent and Henry Hub (HH) indices, MIBEL market prices, and TTF and NBP indices.

To achieve this, the Omega tool need to be adapted to coherently integrate and process all relevant information available across the different scenarios.

- **Enhancement of Post-Border Country Representation in the Model**

Endesa S.A. March 2025 - December 2025. (Antonio Bello Morales, Geovanny Alberto Marulanda García)

The modeling of post-border countries (Belgium, Germany, Switzerland, Italy, and the United Kingdom) is improved through the use of functional relationships based on market fundamentals. These relationships is tailored to each country and time granularity, and is automatically integrated into the simulation processes.

This approach enable the generation of price scenarios that are consistent with those in France. The entire methodology is seamlessly and compatibly integrated into the current Monte Carlo execution framework.

- **Analysis of the hourly dynamics of business variables and enhancements in LPM execution**

Endesa S.A. March 2025 - December 2025. (Antonio Bello Morales, Luis Manuel Montero Guirao, Karina Trindade Ribeiro)

The objective of this project is to improve the forecasting quality achieved with VALORE by analyzing the hourly dynamics of business variables within the simulations and proposing enhancements to the hourly execution process.

- **Minor developments of the ExEx tools to adapt them to the new operating conditions in the market**

Endesa Medios y Sistemas S.L. March 2025 - May 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

This project is part of the ongoing development of the ExEx models and incorporates a series of enhancements needed to update the tools and adapt them to the current requirements for the optimal management of hydropower plants and renewable generation assets.

- **Functional specification of the DSS-Decision Support System**

CAF Signalling. March 2025 - April 2025. (Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez, Ignacio Manzanares Domínguez, María Domínguez Gago)

The objective of this project is to provide a functional specification of the DSS (Decision Support System) as well as define the system's use cases. This system will assist traffic operators in their decision-making process in response to specific events and incidents on the railway line, a process that can also be automated

- **Review of numerical accuracy in intermediate calculations of Excom**

Endesa Medios y Sistemas S.L. March 2025 - May 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

This project is part of the ongoing development of the ExEx models and incorporates a series of improvements in the handling of intermediate results.

- **Optimization algorithm for the DSS-Decision Support System**

CAF Signalling. April 2025 - April 2026. (Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez, Ignacio Manzanares Domínguez, María Domínguez Gago)

The objective of this project is to develop the specification of the algorithm required for the DSS (Decision Support System), as well as its development into a prototype and testing on a test platform. The DSS system optimizes decision-making in response to certain events and incidents on the line. The designed algorithm is an evolutionary optimization algorithm based on simulation, in which each scenario is evaluated through simulation and measured with the defined indicators

- **Modeling of new supply curves in the day-ahead market and improvement of forecasting models in the real-time constraints markets**

Endesa S.A. April 2025 - November 2025. (José Portela González, Antonio Muñoz San Roque, Eloy Jesús del Gran Poder Insunza Díaz)

In 2025, regulatory changes affecting the day-ahead electricity market led to the elimination of Complex Conditions (CIM) in bids as of March 2025. These were replaced by new complex conditions: Scalable Complex Orders and Block Offers. Additionally, a quarter-hourly regime is introduced for this market in June 2025. Therefore, this project addresses a redefinition of the modeling of supply curves and a study of the impact of the new bidding conditions on market clearing.

- **ADS FERRARI WP-2 Project (PIROUTTE)**

Airbus Defence and Space S.A.U. April 2025 - December 2025. (Jesús Tordesillas Torres)

This project aims to develop a learning-based trajectory planning system for UAVs operating in complex environments with multiple agents, dynamic obstacles, and static obstacles. Traditional optimization-based planners, while precise, are often computationally expensive and fragile in dynamic settings. To

address these limitations, the proposed approach leverages imitation learning to initialize a reinforcement learning policy, combining the efficiency of learned behaviors with the adaptability of Reinforcement Learning. This hybrid method enables fast, robust, and scalable trajectory planning capable of handling uncertainty and complex UAV dynamics in real time.

- **CODEX: Implementation of successive Montecarlo simulation and enhancement of combined heat and power representation**

Endesa S.A, Endesa Medios y Sistemas, S.L. May 2025 - July 2025. (Efraim Centeno Hernández, Luis Jesús Fernández Palomino)

This project consists of carrying out two tasks. The first task involves implementing a chained execution mode for the Monte Carlo simulation of the CODEX system. Task two focuses on improving the representation of cogeneration as a function of the daily spread between the electricity and gas prices.

- **CODEX: chained Montecarlo execution and improved cogeneration modelling**

Endesa S.A, Endesa Medios y Sistemas, S.L. May 2025 - July 2025. (Francisco Alberto Campos Fernández, Luis Alberto Herrero Rozas)

This project consists of carrying out two tasks. The first task involves implementing a chained execution mode for the Monte Carlo simulation of the CODEX system. Task two focuses on improving the representation of cogeneration as a function of the daily spread between the electricity and gas prices.

- **Study on how to adapt the EXFACT model to consider quarterly time periods**

Endesa S.A. May 2025 - June 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

This project is part of the development of the EXFACT model, which belongs to the EXCOM-EXLA family of models and aims to optimally disaggregate and make feasible the cleared schedules of each UGH in the energy market and secondary regulation band. Specifically, the goal of this project is to adapt the tool to work with quarter-hourly schedules instead of hourly time periods.

- **Models of grid forming converters to improve power system stability**

Iberdrola Renovables Energía, S.A.U. May 2025 - August 2025. (Luis Rouco Rodríguez, Mohammad Rajabdorri)

The aim of the project is the study of the contribution of converters with grid-forming control to the stability of the Spain mainland power system.

- **Development of a prototype to digitize pipe diagrams using advanced Artificial Intelligence techniques**

Innomerics S.L. June 2025 - July 2025. (José Portela González, Jaime Pizarroso Gonzalo, Irene Lorente Benítez)

The objective of the proposed collaboration is to explore the possibility of designing an Artificial Intelligence system capable of reading piping diagrams

and generating a code that allows the construction of the 3D model using some engineering software.

The application must be able to read a 2-dimensional isometric diagram and extract the necessary features to generate its 3-dimensional representation.

- **Analysis and modeling of the arbitrage between gas and electricity demand**

Endesa S.A, Endesa Medios y Sistemas S.L. June 2025 - December 2025. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

The aim of the project is to analyse and model the arbitrage between the demand for natural gas and electricity in mainland Spain.

- **Design of a Triple-Band Feed**

Prodetel S.A. June 2025 - December 2025. (Francisco Javier Herraiz Martínez)

The principal investigator at IIT and Prodetel have been collaborating for over ten years on the design, manufacturing, and testing of parabolic antenna feeds. Initially, they replaced commercial dipole-based designs with printed microstrip patch antennas, achieving dual-frequency feeds for the S and C bands with optimal characteristics for their application. PRODETEL has been installing prototypes of these designs over the years, which have performed well for the required applications.

Currently, there is a need to extend the operation of the feeds to an additional band (L band). It is worth noting that there are no commercial alternatives covering all these bands, or, if they exist, they are bulky and expensive. In this context, a new collaboration has emerged to develop an integrated feed design that maintains the performance of the S and C band feeds while adding L band functionality.

- **Improvements in the prototype that optimizes the scheduled maintenance outages of the hydropower generating units**

Endesa Medios y Sistemas S.L. June 2025 - October 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

This project is aimed at providing greater functionality to the prototype developed in a previous collaboration for optimizing maintenance outage decisions. Specifically, it incorporates increased flexibility in scheduling (allowing exceptions and partial availability of the units), adapts the way such availability is expressed to facilitate implementation, and expands the results with economic, productive, probabilistic, and spillage information at a higher level of detail, so that the tool better represents operational reality and provides key metrics for decision-making. plants.

- **Adaptation of the Exfact model to fifteen-minute intervals**

Endesa Medios y Sistemas S.L. June 2025 - September 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

The EXFACT model is part of the EXCOM-EXLA family. Its purpose is to ensure the feasibility of the schedule following the clearing results of the day-ahead

market and the secondary regulation band market for Endesa's hydro portfolio. It includes the highest possible level of detail regarding all the hydraulic constraints to be met, as it is the last model run before energy delivery and serves as the basis for the energy-price offer curves used in subsequent markets (TERRE, Tertiary, and MIC). The general objective of this project is to adapt EXFACT to operate with fifteen-minute granularity in order to comply with the new rules of the electricity market.

- **Improvements in modeling the impact of self-consumption on electricity demand in Spain**

Endesa S.A, Endesa Medios y Sistemas S.L. July 2025 - December 2025. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

The objective of this project is to review and improve the modeling of the impact of self-consumption on electricity demand in Spain.

- **Modeling the impact of self-consumption on electricity demand in Portugal**

Endesa S.A, Endesa Medios y Sistemas S.L. July 2025 - December 2025. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

The objective of this project is to model the impact of self-consumption on electricity demand in Portugal.

- **Analysis and Study on the Flexible Operation of Spanish Nuclear Power in HEPLASE Executions**

Endesa S.A. July 2025 - December 2025. (Antonio Bello Morales)

The aim of this project is to improve the quality of future forecasts by developing a study that realistically represents the flexible operation of Spanish nuclear power plants in HEPLASE model runs, always seeking an appropriate balance between accuracy and computational load.

- **Knowledge transfer of the Excom, Exla, Exval, Exfact, and Siroco-Planning models**

Endesa Medios y Sistemas S.L. July 2025 - November 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

This project focuses on carrying out the knowledge transfer of the ExEx family of models to Endesa's staff.

- **Optimization of thermal unit shutdown decisions to improve their participation in the secondary reserve market**

Endesa Medios y Sistemas S.L. July 2025 - November 2025. (Javier García González, Andrés Felipe Oviedo Gómez)

This project is part of the developments of the ExEx models. The collaboration aims to improve the Siroco-Planificación (ExSP) model in order to assess the potential postponement of thermal unit outage decisions to provide secondary reserve.

3.2.1.2 Public funding

- **RESPONSE. integRatEd Solutions for POSitive eNergy and reSilient CitiEs (Horizon 2020. Grant agreement No. 957751)**

European Commission. October 2020 - September 2026. (Néstor Rodríguez Pérez, Gregorio López López, Javier Matanza Domingo, Rafael Cossent Arín, José Pablo Chaves Ávila, Tomás Gómez San Román, Carlos Rodríguez-Morcillo García, María Reneses Botija, Farid Bagheri-Gisour Marandyn)

RESPONSE supports the Lighthouse cities of Dijon (FR) and Turku (FI) and their Fellow cities Brussels (BE), Zaragoza (ES), Botosani (RO), Ptolemaida (GR), Gabrovo (BU) and Severodonetsk (UA) to facilitate them deliver positive energy blocks and districts. Through RESPONSE, the two LHs will achieve a local RES penetration of 11.2 GWh/y, energy savings of 3,090 MWh/y and an emission reduction of 9, 799 tons CO₂eq/y within their districts. To achieve this goal, RESPONSE demonstrates 10 Integrated Solutions (ISs), comprising of 86 innovative elements (technologies, tools, methods), that are being monitored with specific impact metrics (KPIs). It attracts the interest of various stakeholders by generating innovative business models enabling the upscale and replication of the solutions forming a validated roadmap for sustainable cities across Europe and beyond. RESPONSE adopts an energy transition strategy, which includes 5 Transformation Axes (TAs), encompassing the 10 ISs. TA#1 focuses on transforming existing and new building stock into Energy Positive and Smart-ready. TA#2 focuses on the decarbonization of the electricity grid and the district heating/cooling systems, supporting fossil-based regions in transition and the development of energy communities. TA#3 proposes grid flexibility strategies and novel storage systems for optimizing energy flows, maximize self-consumption and reduce grid stress. TA#4 links existing CIPs with apps and other digital infrastructure to enable digitalisation of services and connected city ecosystems, integrating also smart e-Mobility to promote the decarbonisation of the mobility sector. TA#5 offers interdisciplinary citizen engagement and co-creation practices putting citizen at the forefront of shaping the cities they live in and towards the development of each city's 2050 own bold city-vision. Special focus is given to creating resilient and safe cities increasing quality of life and lowering the impacts of climate change.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957751



- **Implementing network codes**

Research Council of Norway (RCN), Statkraft, Statnett, Ministry of Petroleum and Energy, Nord Pool. January 2021 - December 2024. (Paolo Mastropietro)

The project investigates the implementation of European Network Codes and Guidelines'. These are detailed rules on electricity trade intended to improve and harmonize the EU internal energy market. They could have far-reaching consequences for how we use our electricity network, but so far, they have largely escaped scholarly attention. This project asks several fundamental questions: i) how have network codes and guidelines been designed and outlined at the general level? ii) how have they been further specified in various 'terms, conditions and methods' (TCMs) across Europe? iii) how have they actually worked in practice? iv) have they been able to deliver on the fundamental goal of increasing the efficiency of electricity trade within Europe?

- **ECEMF. European Climate and Energy Modelling Forum (Horizon 2020. Grant agreement No. 101022622)**

European Commission. May 2021 - December 2024. (Sara Lumbreras Sancho, Andrés Ramos Galán, Luis Olmos Camacho, Carlos Mateo Domingo, Dilayne Santos Oliveira, Miguel Martínez Velázquez, María del Socorro Gómez Pérez)

The aim of ECEMF is to provide the knowledge to inform the development of future energy and climate policies at national and European levels. In support of this aim, ECEMF proposes a range of activities to achieve five objectives and meet the four challenges set out in the call text.

ECEMF's programme of events and novel IT-based communications channel will enable researchers to identify and co-develop the most pressing policy-relevant research questions with a range of stakeholders to meet ambitious European energy and climate policy goals, in particular the European Green Deal and the transformation to a climate neutral society.

Answers will be provided by the first inclusive and open full-scale model comparison exercise on achieving climate neutrality in Europe, including from the outset over 20 models and 15 top research groups, to produce a coherent and relevant evidence-base for energy and climate policy impact assessment.

ECEMF's evidence-base will support the development of policy-relevant insights which will be communicated to and discussed with the key decision makers via a range of novel methods, including interactive embeddable visualisation blocks, policy briefs, workshops and high-profile events.

This loop of knowledge co-production stands on two pillars.

First, ECEMF will advance the state-of-the-art of energy and climate modelling by enabling sharing of: input data using open standards, methods for model comparison building on the vast experience of the consortium, scientific software tools such as the IIASA scenario explorer and hands-on training for researchers.

Second, ECEMF will be established as a long-term, open and welcoming European focal-point for researchers and policy makers with unparalleled international connections to the EMF, JMIP, IAMC and IPCC. Through extensive links to ongoing H2020 projects, research and policy communities & networks ECEMF will reduce fragmentation of the European energy and climate research landscape.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101022622



- **Next generation urban rail transport: smart planning and regulation for capacity and energy efficiency [FUTURRAIL]**

MICIU/AEI /10.13039/501100011033 y por la Unión Europea NextGenerationEU/ PRTR. July 2022 - September 2025. (Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez, Manuel Blanco Castillo, Fernando Conde Montero, María Domínguez Gago, Álvaro Cidoncha González, Ignacio Manzanares Domínguez)

The main objective of the FUTURRAIL project is to provide an integrated model to manage transport capacity efficiently in highly demanded urban and metropolitan railway lines, and software tools to implement it. This way, it will be possible to increase the transport capacity in urban railway lines maximizing the usage of the rail infrastructure.

The project is structured into three main pillars:

- Planning module: related to infrastructure and new signalling systems.
- Timetabling and transport demand coverage: related to the generation of efficient timetables.
- Traffic operation platform: related to traffic operation and regulation of trains in real-time.

Grant CPP2021-008372 funded by MICIU/AEI/ 10.13039/501100011033 and by “European Union NextGenerationEU/PRTR”.



- **BeFlex- Boosting Engagement to increase FLEXibility**

European Commission. September 2022 - August 2026. (José Pablo Chaves Ávila, Carmen Valor Martínez, Javier Matanza Domingo, Tomás Gómez San Román, Pablo Calvo Báscones, Matteo Troncia, Shilpa Bindu, Jesús José Fernández García, Eliana Carolina Ormeño Mejía, Valeria Karina Moreno, Miguel Angel Ruiz Hernández, Morsy Abdelkader Morsy Mohammed Nour, Leslie Herding)

Be-Flex project aims to overcome the existing limitations by demonstrating the implementation of versatile solutions that enable grids to become adaptable to upcoming scenarios, boosting mechanisms that will provide benefits to all actors in the energy market (from market and system operators to final users), giving response to all type of consumers' needs. BeFlex aims at increasing energy system flexibility, enhancing cooperation among DSOs and with TSOs and easing participation of all energy-related actors through the validation and large-scale demonstration of adapted and proven cross-sectoral services, interoperable data exchange platforms for smart grids operation and the creation of required system architecture framework that will enable the creation of new business models providing additional value to meet consumers' needs in compliance with a stable regulatory framework.

Comillas is in charge of: 1) developing the Regulatory Framework and Proposal for Efficient Flexibility Mechanisms, 2) Define the value proposition and engagement strategies of market actors 3) Guide the project the evaluation, lessons learnt, market uptake of the solutions and scalability of the project.

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101075438



- **Counteracting the REDuction of Synchronous Inertia in Power Systems: Diagnosis and optimal deployment of solutions (PID2021-125628OB-C21)**

MICIU/AEI /10.13039/501100011033 y por FEDER, UE. September 2022 - December 2025. (Aurelio García Cerrada, Francisco Miguel Echavarren Cerezo, Fidel Fernández Bernal, Luis Rouco Rodríguez, Enrique Lobato Miguélez, Ignacio Egido Cortés, Álvaro Ortega Manjavacas, Régulo Enrique Ávila Martínez, Jorge Suárez Porras)

Modern power systems are characterised by (a) a gradual reduction of the number of synchronous generators powered by fossil or nuclear (fully controllable!) fuels; (b) proliferation of fast acting and smart generation units; (c) proliferation of renewable resources, not always fully controllable (wind and solar are two clear examples); and (d) proliferation of smart and robust loads.

The main objective of the coordinated project (with Comillas [SP1] and Uni. de

Alcalá [SP2]) is the comprehensive and holistic analysis and design of modern frequency-control-proving solutions in power systems with a high penetration of renewable resources with no inertia. First subproject (SP1) will review the concept of inertia in modern power systems and its importance in frequency and angle stability, with special attention to modern technology scenarios. Along these lines, SP1 will firstly review the concept of inertia in grid codes. Secondly, it will review currently used inertia estimation techniques. Since nowadays it seems that frequency does not change uniformly across the power system any more, SP1 will investigate inertia global estimation and estimation at bus level. Thirdly, the project will study algorithms to control variable inertial levels across the power system taking advantage of the flexibility of electronic generation and modern energy storage systems such as batteries or supercapacitors. Finally, SP1 will set up an experimental test rig to validate the most important contributions. The test rig will be integrated in the Electric Machine Laboratory of ICAI School of Engineering (Comillas) where several motor+synchronous generator groups are being prepared to have speed and voltage control. Unlike in SP2, the experimental focus will be placed on a system-wide approach.

Project PID2021-1-125628OB-C21 funded by MCIN/AEI/10.13039/501100011033 and by ERDF/EU.



- **eFORT- Establishment of a FramewORK for Transforming current EPES into a more resilient, reliable and secure system all over its value chain (Horizon Europe. Grant agreement No. 101075665)**

European Commission. September 2022 - August 2026. (Gregorio López López, José Pablo Chaves Ávila, Javier Matanza Domingo, Rafael Palacios Hielscher, Néstor Rodríguez Pérez, Miguel Ángel Sánchez Fornié, Lukas Sigrist, María del Valle Varo García, Mario Castro Ponce, Jaime Pérez Sánchez, Farid Bagheri-Gisour Marandyn)

Prompted by the need to comply with environmental and societal concerns, Electrical Power and Energy Systems are undergoing an unprecedented transformation, demanding urgent upgrades to make them more reliable, resilient and secure. Modernization of current grids will greatly reduce the frequency and duration of power blackouts, diminish the impact of disruptive events and restore service faster when outages occur, creating broad benefits to society and economy. eFORT approach will enable the further upgrading of the energy grid without affecting the security of supply and increasing their reliability and resiliency against extreme weather events, manmade hazards

and equipment failures. eFORT addresses this complex challenge by gathering a consortium of 23 partners, from 10 EU countries, that provides the needed expertise. The project will put in place a set of solutions at the cyber and physical layers for detecting, preventing and mitigating vulnerabilities and threats. Among them, an interoperable Intelligent Platform will set a common foundation for grid characterization and vulnerability overseeing, as well as gather information from smart grid components and apply heavy-duty algorithms, whereas Asset Management developments will strengthen grid infrastructure robustness, which will be empowered by the addressed Digital Technologies. All these elements will be validated in relevant environments coming from 4 demo cases covering the whole grid value chain: (i) a transmission network (The Netherlands); (ii) a remote distribution grid (Italy); (iii) a digital substation in Ukraine; and (iv) a micro-grid in Spain. Moreover, eFORT relies on several horizontal actions aiming at empowering EPES players by establishing a common regulatory and standardisation framework, performing technical and cost-benefit analysis, and evaluating new related business models and replication potential, in the pathway towards a more sustainable energy system.

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101075665



- **HVDC-Wise - HVDC-based grid architectures for reliable and resilient WIdeSprEad hybrid AC/DC transmission systems (Horizon Europe. Grant agreement No. 101075424)**

European Commission. October 2022 - April 2026. (Lukas Sigrist, Aurelio García Cerrada, Phillipe Vilaça Gomes, Illia Diahovchenko, Saeed Rezaeian-Marjani)

The HVDC-WISE project overall objective is to propose, analyse, design, and validate HVDC-based grid architecture concepts that enable the deployment of reliable and resilient widespread AC/DC transmission grids to achieve the European energy transition. The HVDC-WISE project aims to: a) Propose a set of innovative HVDC-based grid architecture concepts (technological solutions) to harness the full potential of HVDC to increase the R&R of the AC/DC system and reduce the associated threats of HVDC systems, while providing transmission capacity. b) Provide the necessary tools and methodologies to analyse the R&R levels of future AC/DC systems integrating the different HVDC-based grid architecture concepts enabling their selection and design. c) Validate the proposed HVDC-based grid architecture concepts (using the provided tools) implemented on three complementary realistic use cases

representing different grid situations in Europe.

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101075424



- **AVANHID. Advanced hydraulic generation systems: modeling, control and optimized integration to the energy system**

MICIU/AEI /10.13039/501100011033 y por la Unión Europea NextGenerationEU/ PRTR. October 2022 - November 2025. (Andrés Ramos Galán, Luis Rouco Rodríguez, Jesús María Latorre Canteli, Jesús David Gómez Pérez, Lukas Sigrist, Ignacio Egido Cortés, Pablo Dueñas Martínez, Francisco Labora Gómez, Régulo Enrique Ávila Martínez)

Development of an advanced model of hydraulic simulators that can be validated in the rehabilitation project and improvement of the turbine and pumping capacities that are currently being developed in the Torrejón-Valdecañas complex (Tajo basin). Therefore, these advanced hydraulic generation systems are integrated into Iberdrola's generation portfolio. The optimization of the economic operation of a hydraulic basin and of a generation portfolio requires the development of economic optimization models.

Grant CPP2021-009114 funded by MICIU/AEI/ 10.13039/501100011033 and by "European Union NextGenerationEU/PRTR".



- **DEFINER. Management of flexible electricity demand in markets with very high penetration of renewable energies**

MICIU/AEI /10.13039/501100011033 y por la Unión Europea NextGenerationEU/ PRTR. October 2022 - September 2025. (Andrés Ramos Galán, Pablo Rodilla Rodríguez, Jesús María Latorre Canteli, Paolo Mastropietro, Antonio Bello Morales, Carlos Batlle López, Erik Francisco Álvarez Quispe, Diana María Navarrete Cruz, Pedro Sánchez Martín, Orlando Mauricio Valarezo Rivera)

Study of how flexible demand, with a focus on electricity markets and hydrogen production, is integrated into the electricity market, adequately contributing to flexibility in demand management as a necessary mechanism to maximize the integration of renewables and the reduction of CO2 emissions.

Grant CPP2021-008786 funded by MICIU/AEI/ 10.13039/501100011033 and by “European Union NextGenerationEU/PRTR”.



- **DIAMOND. Delivering the next generation of IAMs for net-zero, sustainable, development (Horizon Europe. Grant agreement No. 101081179)**

European Commission. December 2022 - November 2026. (Sara Lumbreras Sancho, Luis Olmos Camacho, Andrés Ramos Galán, María del Socorro Gómez Pérez)

Further development of IAMs and their interface with sectorial models. Development by Comillas of an interface between the power system expansion planning model openTEPES and several IAMs.

This project has received funding from the European Union’s Horizon Europe research and innovation programme under grant agreement No 101081179



- **OptiREC. Local markets for energy communities: designing efficient markets and assessing the integration from the electricity system perspective**

Ministerio de Ciencia e Innovación (MCIN). December 2022 - July 2025. (Andrés Ramos Galán, José Pablo Chaves Ávila, Jesús María Latorre Canteli, Matteo Troncia, Seyed Amir Mansouri, Orlando Mauricio Valarezo Rivera, Jesús José Fernández García, Javier García González, Morsy Abdelkader Morsy Mohammed Nour)

The project address several of the challenges that limit the effectiveness and proliferation of energy communities. OptiREC develops methods, tools, and solutions for optimal design, operation, and integration into energy systems and energy markets for local energy communities. To ensure effective implementation, energy communities need to be assessed and integrated from several different perspectives. These aspects include the design and internal operation of the energy communities' participants and assets, aggregation of energy communities and integration into distribution networks, as well as design and participation of local flexibility markets and participation in wholesale markets.

Grant TED2021-131365B-C43 funded by MCIN/AEI/ 10.13039/501100011033 and by "European Union NextGenerationEU/PRTR"



- **Improvement of tools for the analysis of AC/DC hybrid power systems with massive penetration of renewable energy sources and test-case scenarios (TED2021-130610B-C22)**

MICIU/AEI /10.13039/501100011033 y por la Unión Europea NextGenerationEU/PRTR. December 2022 - May 2025. (Aurelio García Cerrada, Andrés Tomás Martín, Francisco Miguel Echavarren Cerezo, Fidel Fernández Bernal, Luis Rouco Rodríguez, Enrique Lobato Miguélez, Ignacio Egido Cortés, Javier García Aguilar, Carlos David Zuluaga Ríos)

Meshed DC grids have been possible for many years but the fantastic development of Voltage Source Converter (VSC) technology has made them practical, now. A hybrid DC-AC grid can make power systems more flexible than conventional AC systems although the specific advantages would strongly depend on the size of the power converters and energy reserves available. More specifically: DC/AC converter stations can support the voltage control in the AC system reducing the risk of voltage instability in the AC grid; DC/AC converter stations can support the AC system with additional damping in case of power oscillations in the AC grid, reducing the risk of angle instability due to poor damping in the AC grid; a DC grid can quickly supply additional power in a controlled manner to an area of the AC grid in case of emergency by

extracting it from another area or from internal storage elements, reducing the risk of frequency instability. Noticeably, a DC grid can connect asynchronous AC grids to make a more efficient use of the spinning reserves in both systems. The purpose of this subproject is threefold. Firstly, researchers use tools for the analysis and operation of hybrid AC/VSC-based DC system, already developed in previous projects, to investigate all the above advantages and contributions of VSC-based DC grids at system level and, when necessary, extended those tools. Secondly, researchers collaborate with the other subproject to elaborate demonstration cases for the above properties to be tested in a laboratory prototype the other subproject built. The prototype have to be scaled to represent important characteristics of a real power system. Finally, researchers simulate the case studies experimentally verified in characteristic test power systems in the literature (larger size, voltage and power than those of the prototype) to confirm the results obtained. Among others, these simulation cover two specific aspects: (a) the two subprojects collaborate to use similar real-time platforms they are currently equipped with and (b) long term simulation runs are carried out to validate the results from the smart energy management systems investigated by members of the other subproject. A clear understanding of the potential contributions of DC meshed grids to improve the flexibility of AC bulk power systems should help to integrate renewable energy sources (often non-dispatchable) to the generation mix and, consequently, to the decarbonization of the electricity sector, which could then supply clean electricity to many other industrial sectors.

Grant TED2021-130610B-C22 funded by MICIU/AEI/10.13039/501100011033 and by “European Union NextGenerationEU/PRTR”.



- **Myoelectric orthoses with implantable electrodes: optimization of bionic reconstruction**

Instituto de Salud Carlos III. January 2023 - December 2025. (Romano Giannetti, José Daniel Muñoz Frías, Eduardo Alonso Rivas)

Peripheral nerve injuries manifest themselves as loss of motor function and loss of sensitivity, which can be very disabling for the patient. Despite the progress made in recent years in reconstructive surgery, the results do not always allow a functional limb. Therefore, myoelectric orthoses (exoskeletons) have been developed to improve the function of the affected limb (also known as bionic reconstruction). Current models are composed of sensors on the skin to communicate muscle contraction to the orthosis, often with a weak and unstable signal for various reasons (movement, sweat, etc.). In addition, the high cost of these orthoses makes it impossible to use them in national health

systems such as the one in our country.

The objective of our project is to improve human-machine communication sensors. To this end, we propose four phases: 1. modification of the current electromyography sensors; 2. encapsulation of the sensor with 3D printing with autologous cells; 3. implantation of these sensors in an animal model; 4. pilot study in patients with these lesions with no other therapeutic alternative. Finally, we propose the development and 3D printing of these orthoses in order to reduce their price.

- **Rwanda Integrated Clean Cooking Plan- Phase II**

Sustainable Energy for All (SE4All). January 2023 - December 2024. (Fernando de Cuadra García, Andrés González García, Pablo Dueñas Martínez, José Ignacio Pérez Arriaga, Carlos Mateo Domingo, Rafael Palacios Hielscher, Santos José Díaz Pastor, Olga Rico Díez)

Project for Sustainable Energy for All (SEforALL), towards the development of an Integrated Clean Cooking Plan for Rwanda, supported by geospatial information. Collaboration between the IIT-Comillas and MIT.

This is the Phase II of the project, devoted to the implementation and development of methods and tools, and the elaboration of some integrated plans (examples).

The methodology proposed for the preparation of integrated plans will include a large-scale optimization tool, with widespread use of geospatial information, which proposes detailed solutions (at a national level) on infrastructure developments and pricing policies (subsidies), seeking the maximum benefit/cost ratio. The benefits will be social, environmental and health-related, but the model must also include business benefits - as such a large-scale transformation needs to attract investment in a sustainable way. The tool will produce detailed and georeferenced results, to allow the planner to carry out sensitivity analyses with respect to input parameters and constraints.

- **Day-ahead market price simulation tool [HESIME] (CPP2022-009809)**

Ministerio de Ciencia, Innovación y Universidades (MICIU), Agencia Estatal de Investigación (AEI) /10.13039/501100011033, y por la Unión Europea NextGenerationEU/ PRTR. April 2023 - March 2026. (Luis Olmos Camacho, Andrés Ramos Galán, Stefanía Gómez Sánchez, Pedro Sánchez Martín)

The objective of the HESIME project is the research, definition, design and development of a disruptive system for simulating the behaviour of the daily market in Spain for future years (horizons 2030 and 2050) considering different scenarios of system evolution based on the use of artificial intelligence techniques, mathematical programming and the application of advanced algorithms based on the above. HESIME will make it possible to anticipate the behaviour of the market, given its current design, depending on the energy policies that are planned to be applied, with a reliability never before achieved. This tool will make it possible to calculate the price signals produced by the market, which are critical for investment planning and their impact on consumers, as well as the operating regimes of each existing technology or new technology entering the electricity system.

Grant Day-ahead market price simulation tool [HESIME] (CPP2022-009809) funded by MICIU/AEI/ 10.13039/501100011033 and by the “European Union NextGenerationEU/PRTR”.



- **SEO2-CDR. Strategies for the evaluation and assessment of ocean-based carbon dioxide removal (Horizon Europe. Grant agreement No. 101081362)**
European Commission. June 2023 - May 2027. (Pedro Linares Llamas, Varios General Contratado, Antonio Francisco Rodríguez Matas)

Strategies for the Evaluation and Assessment Of Ocean based Carbon Dioxide Removal (SEO2-CDR) is an ambitious project that develop OCDR beyond current feasibility studies by establishing the mechanisms and frameworks required to support the evaluation and application of archetypal biological, chemical and physical OCDR techniques. Common assessment processes, governance structures and technologies are used to explore system-level interactions between different approaches in order to deliver the insights, tools and guidelines required for the safe and effective implementation of OCDR. These advancements enable SEO2-CDR to establish the extent to which OCDR can support climate change mitigation and adaptation strategies, and hence the transition to a climate-neutral and resilient society and economy.

This project has received funding from the European Union’s Horizon Europe research and innovation programme under grant agreement No. 101081362



- **Open Modelling toolbox for development of long-term pathways for the energy system in Africa**

European Commission. July 2023 - June 2026. (Luis Olmos Camacho, Andrés Ramos Galán, Sara Lumbreras Sancho, Mohamed Abbas Elabbas)

OpenMod4Africa aims to develop an Open Energy System Modelling Toolbox (hereinafter referred to as OM4A Toolbox), which is adapted to African needs and uses based on collaboration between African and European partners. The toolbox provide science-based results to policymakers and local actors, to assist them in analyzing the environmental, social and economic synergies and

trade-offs to be achieved in a clean energy transition in African countries, as well as the impact of increasing clean energy generation. The capacity-building program, replication strategy and strong involvement of African academic institutions and other stakeholders guarantees that OpenMod4Africa can help increase African energy modeling competence and establish a network of local experts and users of the open Toolbox in the long term.

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101118123



- **Emerging porcine influenza and coronaviruses (PCI2023-143376)**

Ministerio de Ciencia, Innovación y Universidades (MICIU), Agencia Estatal de Investigación (AEI), 10.13039/501100011033 y Cofinanciado por la Unión Europea. September 2023 - August 2026. (Mario Castro Ponce, Juan Iribas De la Puerta)

Influenza viruses and coronaviruses have caused some of the deadliest pandemics in humans, and pigs are natural reservoirs. Swine influenza A viruses (swIAV) and porcine respiratory coronavirus (PRCV) are enzootic in pigs, infecting airway epithelial cells. However, they differ in their pathogenicity and immune response. Cattle are the natural host for influenza D virus (IDV), but it is now an emerging virus in swine (swIDV), and its pathogenesis is unknown. The genetic diversity of the swine influenza virus is enormous and continues to increase, with many "reassortant" genotypes co-circulating and constituting a zoonotic threat with proven pandemic characteristics. The pandemic potential of PRCV and swIDV is not known.

We compare the transmission, pathogenesis, and host tropism of six different genotypes of swIAV, swIDV, and PRCV to answer the following four questions:

1) What are the transmission dynamics of swIVs and PRCV between pigs and from pigs to ferrets? The latter is a model for humans.

2) What key early events and immune mediators govern the outcome of swIV and PRCV exposure that may tip the balance toward mild or severe disease?

3) What is the zoonotic potential of swIV and PRCV? Do some new H1 swIAV genotypes pose a higher risk than those already known? How efficiently do swIDV and PRCV replicate in the human airways?

What viral traits can contribute to host switching?

4) Can an integrated mathematical model of viral replication, transmission, pathogenesis, and immune control identify key events in virus-host interaction to inform control strategies?

We perform in vivo studies (Q1, 2) in the porcine and ferret host and in vitro studies (Q3) in discrete cultures of the porcine, human, and ferret airways, with

maximum similarity to the in vivo situation. Finally, we use novel mathematical models to provide quantitative information from the integrated data (Q4).

Our results help predict the zoonotic potential, transmission, and pathogenicity of existing and emerging swIVs and PRCVs.

Grant PCI2023-143376 funded by MICIU/AEI/ 10.13039/501100011033 and by the “European Union”.



- **Transport and policies for the transition to a low-carbon economy in Spain (PID2022-136376OB-I00)**

Ministerio de Ciencia, Innovación y Universidades (MICIU), Agencia Estatal de Investigación (AEI), Fondo Europeo de Desarrollo Regional (FEDER). September 2023 - August 2027. (Pedro Linares Llamas, José Carlos Romero Mora, José Pablo Chaves Ávila, Xiral López Otero)

The energy transition is one of the most important challenges facing our economies in the coming years in order to reduce greenhouse gas emissions (to which the energy sector contributes 60-70% globally). This transition requires moving away from fossil fuels and towards a more decarbonised, more distributed, and more consumer-centred energy system, while maintaining an affordable and reliable energy service.

Spain is one of the countries with the most ambitious targets for decarbonisation, renewable energy penetration and energy savings (European Climate Foundation, 2019), as set out in the National Integrated Energy and Climate Plan 2021-2030 (currently under review). Meeting these targets will require effective, efficient and equitable policies to be deployed in order to achieve them at the lowest possible cost, while ensuring the fairness of the transition. It is therefore essential to design these policies correctly, based on a rigorous assessment of similar policies and appropriate modelling of the expected effects of these policies.

The challenge is particularly complex in sectors such as transport or industry, where emission trends show little improvement, and which are additionally crucial for employment and economic growth.

In this context, the objectives of the proposal are:

- To improve the energy-economic-environmental modelling capacity for Spain, to expand the capabilities to represent the expected evolution of energy use in Spain and the potential impacts of different policies. In particular, we aim to improve the modelling of the transport sector, industry, the so-called circular economy, and of consumer decisions on energy efficiency, which are not yet sufficiently explored. We also aim to improve the representation of

robust and flexible decision-making in the construction of energy scenarios. Where possible, these developments will be integrated into integrated models such as TIMES.

- Using the developed models, or other models based on micro-data, to evaluate different policy instruments for energy transition contributing to a better design and implementation. In particular, we intend to evaluate transport decarbonisation policies (both fiscal and technological), energy efficiency subsidies for households, and transport fuel poverty policies.

Grant “Evaluation of policies for energy transition” (PID2022-136376OB-I00) funded by MICIU/AEI/ 10.13039/501100011033 and by ERDF/EU.



- **Probabilistic modelling of complex systems with uncertainty: from molecules to human interactions (PID2022-140217NB-I00)**

MICIU/AEI /10.13039/501100011033/ y por FEDER, UE. September 2023 - August 2026. (Mario Castro Ponce, Juan Luis Gómez González, Jaime Pérez Sánchez)

Some of the most exciting phenomena that have aroused scientific curiosity in recent decades (such as genomics, the emergence of pandemics, the collaborative economy, or the immune response to a pathogen) are collective phenomena out of equilibrium and result from the interactions of simple basic units. In these systems converge (although to different degrees) a set of similar problems common to Complexity science: they occur at different scales (many of them unobservable), they cannot be explained by knowledge of the essential components, and, finally, they are fluctuating, and uncertainty cannot be controlled experimentally. Although many of these problems have already been successfully addressed in recent years, pursuing a unifying theory that is universally valid in all situations is unrealistic. While some patterns can be transferred from one field to another, it is imprecise to generalize from pure metaphor to the quantitative, systematic, and rigorous scientific analysis that characterizes physics. However, it is possible to unify the methodology by considering the specific knowledge of the problem. The novelty of this project is to focus on the universality of the probabilistic description of uncertainty to systematically model each problem using the language of probability. Specifically, using Bayes' Theorem to capture the particular mechanism and the evolution of uncertainty. In the case of physicochemical phenomena, this is reduced to the probabilistic inference of the model parameters. However, as microscopic knowledge of the problem becomes less detailed, the weight of probabilistic modeling becomes more important. In particular, we propose to study diverse systems, from the physics of vapor reservoirs (which gives rise to

fractal surfaces) to the dynamics of a sharing economy system, where modeling is based on the maximum entropy principle to determine the variability of mobility patterns in a bike-sharing system. Other examples are epidemiology or immunology. We combine Langevin equations and Markov chains to, through stochasticity, integrate experimentally unobservable degrees of freedom, again described by probability distributions compatible with empirical evidence. In summary, we propose a theoretical framework with uncertainty at the heart of the problem. However, we illustrate it (in the absence of genuinely universal models) using examples from various disciplines. The project team has established expertise in these problems to achieve the project objectives. We also introduce machine learning methodology to analyze experimental data and use it to generate new hypotheses. The project's ultimate goal is to realize models that can help to contrast alternative hypotheses of a problem and help, with the help of experiments, to falsify those contradictory to them.

Grant PID2022-140217NB-I00 funded by MICIU/AEI/10.13039/501100011033 and by ERDF/EU.



- **REliability and RESilience of Island Power Systems (PID2022-141765OB-I00)**

MICIU/AEI /10.13039/501100011033/ y por FEDER, UE. September 2023 - August 2027. (Lukas Sigrist, Enrique Lobato Miguélez, Mohammad Rajabdorri, Miad Sarvarizadeh Kouhpaye, Luis Rouco Rodríguez, Ignacio Egido Cortés)

Island power systems (IPs) are different from large interconnected systems because they are smaller in size and they are usually not interconnected to other systems. The lack of technical and economic support from neighboring systems makes IPs more vulnerable to disturbances and causes higher system operating costs than interconnected systems. In addition to the small size, the increasing penetration of RES further challenges the reliability and in particular, frequency stability. Cascading failures underlie recent black-outs in IPs and the mitigation of the propagation of such failures is widely recognized as a crucial aspect in increasing resilience. This proposal aims at addressing reliability and resilience of IPs under high penetration of RES from an operation planning point of view by considering both preventive and corrective actions. This proposal consider preventive, frequency-stability-based power system splitting as a preventive action that can potentially enhance resilience, whereas preventive frequency-dynamic-based and corrective load-shedding-driven economic dispatches and unit commitments are implemented to improve reliability and frequency stability in particular.

Grant PID2022-141765OB-I00 funded by MICIU/AEI/10.13039/501100011033 and by ERDF/EU.



- **Synthetic distribution system of continental United States**

National Renewable Energy Laboratory (NREL). September 2023 - December 2025. (Carlos Mateo Domingo, Tomás Gómez San Román, Pablo Dueñas Martínez)

The Reference Network Model USA (RNM-US) is used to build a synthetic atlas of the distribution system of the Continental United States. A set of representative networks are planned in detail from substations to low voltage consumers, and compared with actual networks. The model designs the electrical equipment (power lines, transformers, switching devices, capacitors, voltage regulators, etc.) of the distribution system to deliver power to consumers, aiming to minimize system costs while complying with the technical and geographical constraints of every distribution area.

- **New tools for the integration of energy systems: Spain's role in Europe's energy transition [ONESYSTEM] (CPP2022-009711)**

Ministerio de Ciencia, Innovación y Universidades (MICIU), Agencia Estatal de Investigación (AEI) /10.13039/501100011033, y por la Unión Europea NextGenerationEU/ PRTR. November 2023 - January 2028. (Pablo Rodilla Rodríguez, Carlos Batlle López, Paolo Mastropietro, Antonio Bello Morales, Devashish Sonowal, Miguel Angel Barruso Recuero)

The main energy carriers that will lead the energy transition are electricity and decarbonised gases, in particular green hydrogen. In the energy system of the future, the decarbonisation of industrial cooling/heating processes, the central role of hydrogen, the activation of demand and the coordination of the different energy vectors and markets through efficient economic signals will be key aspects. This necessary transformation of the economy in general and the energy sector in particular poses innumerable challenges. In this context, it will be essential to have tools to evaluate strategies that allow the Spanish economy to be relevant in the European decarbonization process.

In order to provide solutions to the current challenges and constraints, the aim of the ONESYSTEM project is to research and develop tools for the integration of energy carriers that allow the exploitation of synergies between them to improve the efficiency of energy supply and minimise the cost of decarbonising the economy. These tools are of two types: modelling tools and regulatory tools. The former are based on the development of techno-economic analyses, which are essential in a context of unparalleled technological and economic uncertainty. The latter, crucial in a sector in which public-private coordination

is essential, are focused on the design of the regulatory framework necessary for the appropriate development of new business models. This project aims to develop models for analysing possible future routes for the integration of energy systems, focusing on Spain and its interaction with the rest of Europe. As part of the project, it will also seek to ensure that the tools developed can be replicated in other European markets.

Grant New tools for the integration of energy systems: Spain's role in Europe's energy transition [ONESYSTEM] (CPP2022-009711) funded by MICIU/AEI/10.13039/501100011033 and by the “European Union NextGenerationEU/PRTR”.



- **Contracting the reduction of inertia from synchronous generators in electric energy systems: diagnosis and solution placement**

Ministerio de Ciencia e Innovación (MCI). November 2023 - February 2028. (Aurelio García Cerrada, Jorge Suárez Porras)

Inertia in bulk electric power systems is being gradually reduced due to the integration of renewable energy sources which substitute conventional synchronous generators, because the former resources are most often interfaced with the grid through electronic power converters with no rotating masses. Inertia is important in bulk electric power systems to maintain stability (especially frequency and angle stability) and its reduction must be addressed to ease the sustainability of electric power systems in the future.

This research project will try to understand the nature and extent of the problem described, and will study possible solutions and their optimal distribution.

- **Development of a new voltage control system for the penetration of renewable electricity production, storage and demand flexibilisation [PERAL] (CPP2022-009713)**

Ministerio de Ciencia, Innovación y Universidades (MICIU), Agencia Estatal de Investigación (AEI) /10.13039/501100011033, y por la Unión Europea NextGenerationEU/ PRTR. December 2023 - November 2026. (Luis Rouco Rodríguez, Enrique Lobato Miguélez, Ignacio Egido Cortés, Francisco Miguel Echavarren Cerezo, Álvaro Benítez Domínguez, Fernando Gegúndez Nogueroles)

This project is aimed at developing a voltage control system for renewable energy sources, storage and flexible demand that complies with the procedure

of voltage control in the Spanish mainland transmission grid.

Grant Development of a new voltage control system for the penetration of renewable electricity production, storage and demand flexibilisation [PERAL] (CPP2022-009713) funded by MICIU/AEI/ 10.13039/501100011033 and by the “European Union NextGenerationEU/PRTR”.



• Digital Twin for Europe

European Commission. January 2024 - December 2026. (Néstor Rodríguez Pérez, Javier Matanza Domingo, José Pablo Chaves Ávila, Gregorio López López, Miguel Ángel Sánchez Fornié, José Portela González, Carlos Mateo Domingo, Farid Bagheri-Gisour Marandyn)

The TwinEU project is at the forefront of transforming the energy sector through a series of innovative actions aimed at enhancing the capabilities, interoperability, and performance of Digital Twins (DTs) across Europe.

- Cross-Domain Federated DTs: Bridging the gap between different DTs by utilizing existing Smart Grid standards, open APIs, and integration with TensorFlow Hub, fostering a seamless exchange of data and models across various stakeholders.
- HPC-coupled Federated DTs Infrastructure: Leveraging High-Performance Computing (HPC) to boost the computational power of DTs, ensuring faster and more accurate data processing for real-time applications.
- Dataspace Adaptation for Pan-European DTs: Facilitating the sharing and exchange of AI/ML models and data across Europe, with a focus on improving interoperability, lifecycle management, and cross-stakeholder collaboration.
- Closed Loop Adaptive Digital Twins: Evolving DTs to be context-aware, autonomous, and adaptive, capable of real-time decision-making and self-learning to enhance grid monitoring and operation.
- Immersive Metaverse-oriented DTs: Integrating DTs with immersive technologies to create user-friendly and engaging Metaverse-oriented experiences, improving workflows and stakeholder collaboration in smart grids.

The project's objective is to set the stage for a more integrated, efficient, and innovative energy sector, paving the way for smarter grids and a sustainable future.

- **Injury mitigation to promote vision-zero achievement**

European Commission. June 2024 - May 2028. (Francisco José López Valdés, Manuel Valdano, Jean Pierre Mutuyimana, Luis Francisco Sánchez Merchante)

Until now, the approach to road safety has primarily focused on analyzing the most common types of injuries based on road user types and crash characteristics. However, recognizing the need for a more comprehensive and proactive strategy, there is a growing consensus to shift the paradigm towards a user-centric approach that considers the specific needs (incl. their diversity) and behaviors of road users.

IMPROVA project will focus on current knowledge regarding the conditions and mechanisms leading to serious injuries of all road user types, and both physical and psychological long-term consequences as well as future scenarios regarding the overall crash occurrence considering changes due to vehicle automatization. IMPROVA will introduce a formula that will predict a likelihood of

sustaining LTC. This will allow stakeholders to estimate physical and psychological long-term consequences due to road traffic accidents in a compact manner directly after the crash. HBMs will be specifically upgraded in their capabilities to depict LTC-relevant injury mechanisms. This will be achieved through validation of mode responses against experimental tests and through the development and tailoring of risk curves, using the latest available biomechanical data. Virtual

testing procedures will be developed and demonstrated for future application environments, specifically through the involvement of industrial partners and NCAP labs.

IMPROVA network consisting of NCAPs, US, Australian and Asian entities and medical and psychological expert panel group will help the harmonization not only of the knowledge of the long-term consequences but also to harmonize the data collection, evaluation of such injuries leading to LTC and to use appropriate tools validated for this purpose. The communication with regulatory authorities, NCAPs, rescue team and end-user will enable the awareness of the topic and implementation of appropriate countermeasures.

- **Flexibility solutions for electricity distribution networks (S2F)**

Instituto para la Diversificación y Ahorro de la Energía (IDAE). June 2024 - May 2026. (Tomás Gómez San Román, José Pablo Chaves Ávila, Matteo Troncia, Leslie Herding, Miguel Angel Ruiz Hernández, Miguel Martínez Velázquez, Orlando Mauricio Valarezo Rivera)

The regulatory innovation project S2F is developed under Royal Decree 568/2022, of 11 July. The objective of the S2F pilot project is to test the implementation of flexibility services in electricity distribution networks as a complementary and valid solution to improve grid efficiency and accelerate the decarbonization of the economy, identifying possible technical and regulatory barriers, as well as best practices for their national implementation. The flexibility services to be implemented are organized into two use cases: i) local flexibility markets, and ii) flexible access capacity. These two use cases are tested in 28 demonstrators selected by the different distribution companies participating in the project.

The project with reference number: PR-NMN-01-2023-000048 has been granted under the call of new business models in the energy transition within the framework of the "Recovery, Transformation and Resilience Plan - Funded by the European Union - NextGenerationEU".



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Plan de Recuperación,
Transformación y Resiliencia

**NUEVOS MODELOS
DE NEGOCIO**

- **System for an automatic allocation of loads to the steps of UFLS schemes**

Ministerio de Ciencia, Innovación y Universidades (MICIU), Agencia Estatal de Investigación (AEI), FEDER. October 2024 - September 2027. (Lukas Sigrist, Luis Rouco Rodríguez, Enrique Lobato Miguélez, Mohammad Rajabdorri, Oswaldo Arenas Crespo)

The objective of the ASIGNA project is to develop an automatic system for the robust assignment of HV/MV transformers to the steps of the load shedding scheme in order to increase the security and resilience against high-impact disturbances leading to large frequency deviations.

- **Development of a High Dynamic Actuator (HDA) to simulate pitch and vertical acceleration in frontal impacts**

MICIU/AEI /10.13039/501100011033/ y por FEDER, UE. October 2024 - September 2027. (Francisco José López Valdés, William Ricardo Valdez, Manuel Valdano, Alberto Carnicero López, Jesús Jiménez Octavio, Raquel María Lorente Pedreille, Alexandro Badea)

The primary objective of the project is to develop the first compact sled-based vehicle crash simulation system on the market, capable of replicating the typical pitch motion observed in frontal impacts by incorporating additional degrees of freedom in movement. This system enable an accurate recreation of frontal impact dynamics by systematically adding vertical motion components, associated with pitch, to the sled's horizontal movement. This innovation aims to enhance the reliability and cost-effectiveness of safety testing within the automotive and component manufacturing industries.

Grant CPP2023-010854 funded by MICIU/AEI/10.13039/501100011033 and by ERDF/EU.



- **Efficient Methanol from Pumped Heat and Calcium Looping**

European Commission. November 2024 - April 2029. (Pedro Linares Llamas, Léonard Lefranc)

The highly energy intensive metallurgical industry and fossil fuel-based methanol production processes account for over 35% of the overall worldwide industrial CO₂ emissions. Efficient Methanol from Pumped Heat and Calcium Looping (EMPHATICAL) targets residual CO/CO₂ containing gases from the metallurgical industry for processing through the energy efficient integration of innovative oxy-blown calcium-looping capture technology, purification and conversion of CO₂ to e-methanol with green H₂ as a feedstock. This culminates in a first of a kind TRL7 demonstrator for establishing the economic viability and sustainability of the integrated process capable of achieving net zero for the metallurgical and methanol production industries.

- **Functional definition of a dynamic temporary speed limiting system for application at high-speed trains**

Administrador de Infraestructuras Ferroviarias (ADIF). November 2024 - June 2025. (Antonio Fernández Cardador, Asunción Paloma Cucala García, Adrián Fernández Rodríguez)

This project defines the functionality of a system that aims to reduce the speed of high-speed trains in real time when they are expected to cross with a freight train, to prevent shock waves and air vortices during the crossing from affecting the stability of the vehicles, increasing the risk of accidents. The aim is to manage rail traffic efficiently, optimizing travel times and reducing possible delays caused by these speed reductions.

- **Advanced Network Planning for Decision-Making in the Electrification of road and maritime Transport**

Agencia Estatal de Investigación (AEI). November 2024 - November 2027. (José Pablo Chaves Ávila, Carlos Mateo Domingo, Matteo Troncia, Miguel Martínez Velázquez, Manuel Pérez Bravo, Javier Matanza Domingo, Néstor Rodríguez Pérez)

The new loads associated with electrification may require high power peaks, such as the high-power chargers needed for the electric charging of heavy vehicles (trucks and buses) and Onshore Power Supply (OPS) for maritime transport (Cold ironing). In this scenario, current grid planning tools are very limited in ensuring optimal planning of investments in electric distribution networks and accurately predicting the power flows, given the many variables, disturbances, and sources of uncertainty.

In this context, i-DE Smart Electric Networks, the Pontifical University Comillas, the Energy Technology Institute and PLEXIGRID have come together in the PlaReDET project with the aim of researching and developing new analysis and calculation tools for advanced distribution network planning. These tools aim to incorporate uncertainty in investment decision-making for the electrification of heavy road and maritime transport, promoting the transition toward cleaner and more sustainable mobility.

The proposed tools focus on two key elements: managing uncertainty and integrating flexibility into network planning in scenarios dominated by electric mobility, with special attention to heavy land and maritime transport.

The PlaReDET project work on characterizing uncertainty by modeling observed and projected patterns of net demand and flexibility assets, considering factors such as the degradation of components that incorporate power electronics and charging strategies. Flexibility is seen as a solution to address uncertainty and mitigate the potential impact of electric mobility and other distributed energy resources (DER).

The developed analysis tools are validated with real data from the Mediterranean Corridor of the Trans-European Transport Network (TEN-T), evaluating how this high-specific-power electrification affects the distribution network and what actions should be taken in its planning and operation.

Thanks to the PlaReDET project, technical criteria and new tools are consolidated for the planning of electrical distribution networks, integrating

DER and their flexibility while addressing uncertainty in the forecasting of electrical flows, facilitating optimal decision-making regarding investments.

- **Analysis and preparation of the SENIORS PMHS data to be used by the THUMS USERS COMMUNITY**

Institut für Rechtsmedizin Ludwig-Maximilians-Universität. November 2024 - December 2024. (Francisco José López Valdés, Carlos Rodríguez-Morcillo García)

The objective of the collaboration is to prepare the experimental data obtained in the PMHS performed within the SENIORS project so that it is readily useful as a one case in the validation repository of the TUC website.

This study will:

- Review the data from the SENIORS project that is currently available in the validation repository of the TUC website.
- Review all the data that were collected in the PMHS tests of the SENIORS project and re-analyze them in a format similar to other cases in the validation repository of the TUC website.
- Prepare a publication to be submitted to either an international conference such as IRCOBI or a scientific journal (open access preferred). Relevant data from the experiments will be included in this publication either within the main body of the article or as supplementary material.

The results of the project comprise this publication including the additional materials so that the SENIORS PMHS experiments can be used within the TUC group.

- **Digital, flexible and estable electric power grids**

Comunidad de Madrid. January 2025 - December 2029. (Aurelio García Cerrada, Matteo Troncia, Lukas Sigrist, José Pablo Chaves Ávila, Javier García González, Luis Rouco Rodríguez, Eliana Carolina Ormeño Mejía, Carlo de Paolis Robles, Hennry Gonzalo Villanueva Panocca)

The PREDFLEX-CM R&D activity program aims to develop and implement an intelligent system for energy monitoring and management in medium and low voltage networks, facilitating the transition towards greater electrification and the integration of distributed generation, electric vehicles, and electrolyzers. To achieve this, it rely on modern concepts such as Virtual Power Plants (VPPs), Flexibility markets (FMs) and Digital Twins (DTs).

This research project is a joint venture of IMDEA Energy, Alcalá University, Madrid Carlos III University, Rey Juan Carlos University, and Comillas Pontifical University.

This project has been granted through R+I activities programme with reference TEC-2024/ECO-287 and acronym PREDFLEX-CM by the Community of Madrid, ORDER 3177/2024, Councilor of Education, Science and Universities.



- **Assistance in the Automation of a Biosensor Production Process on a Graphene Substrate**

Universidad Rey Juan Carlos. January 2025 - October 2025. (Álvaro Jesús López López, Jaime Boal Martín-Larrauri, Raquel María Lorente Pedreille, Mariano Jiménez Calzado)

In this project, we collaborate in the development of a biological sample analysis system. Our contribution is structured along two dimensions: 1) the mechanical design of key components in the robot responsible for oxidizing the graphene; 2) the design of the vision system that determines the positions of the cells to be oxidized.

- **National plan for the implementation of RAYUELA project in Portugal**

European Anti-Cybercrime Technology Development Association (EACTDA). February 2025 - December 2025. (Gregorio López López, Mario Castro Ponce, María Reneses Botija, Farid Bagheri-Gisour Marandyn, Néstor Rodríguez Pérez)

The RAYUELA videogame is used in Missão Cibersegura, a nationwide prevention campaign carried out by Polícia Judiciária and the Portuguese Ministry of Education which aims to reach thousands of children and adolescents in Portugal. As part of the RAYUELA-PT project, funded by EACTDA under ISF, Comillas analyze the data gathered through this prevention campaign to draw conclusions related to the cybercrimes considered in the videogame for the specific case of Portugal.

- **Mathematicae Lingua Franca: Bridging the linguistic gap between the mathematician and the machine (project 101167526 ERC-2024-SyG)**

European Research Council Executive Agency (ERCEA). March 2025 - February 2031. (David Alfaya Sánchez)

Proof assistants have seen growing adoption among researchers and scientists in recent years, thanks to their ability to efficiently formalise large bodies of mathematics. They have been used to certify major results such as the Scholze liquid tensor challenge and the Kepler conjecture. However, current proof assistants are limited to formal settings and cannot process the flexible, semi-formal language commonly used by mathematicians. The ERC-funded MALINCA project (ERC-2024-SyG - ERC Synergy Grant 101167526) aims to develop a new proof assistant technology that preserves the precision of formal language and mathematical meaning while incorporating greater versatility. It will be designed to understand and represent the dynamic linguistic structures mathematicians use in practice.

- **AI-powered nutrition platform providing personalized meal plans for renal transplant patients**

Fundación para el Conocimiento Madri+d. July 2025 - September 2025. (José Portela González, Jaime Pizarroso Gonzalo, Irene Lorente Benítez)

The objective of the proposed collaboration is to develop and implement a web application for nutritional support tailored to people with chronic kidney disease.

Despite clinicians' efforts to provide individualized guidance, many patients lack practical tools to manage their daily diet. In this context, there is a need for an accessible digital solution that integrates personalized nutritional recommendations, educational support, and features adapted to different user profiles.

The proposed system offer specific functionalities that address the needs of the various stakeholders involved in caring for these patients. Specifically, the application include:

1. Personalized dietary recommendation system: generates a table or list of recommended and to-be-avoided foods, tailored to the patient's clinical situation (stage of kidney disease, type of treatment, comorbidities), type of food, and time of day (breakfast, lunch, dinner, or snacks).
2. Food search tool: allows users to enter a food item and obtain its nutritional characteristics, as well as the recommended consumption limit based on their renal condition.

The application is developed in collaboration with Hospital Clínico San Carlos in Madrid and is funded by the "HealthStart Madrid" call from the "Fundación para el Conocimiento madri+d" of the Government of the Comunidad de Madrid.

3.2.2 Consultancy and technological support

3.2.2.1 Private funding

- **ACG-IIT maintenance services**

Acciona Generación Renovable S.A. January 2022 - December 2024. (Ignacio Egidio Cortés, Luis Rouco Rodríguez)

Acciona participates in the secondary regulation in the Spanish power system. Acciona is using two licenses of AGC-IIT for its two regulation zones. This project covers the AGC-IIT maintenance services

- **Metro Manila Metro Line 4 Transport Capacity Analysis**

IDOM Consulting, Engineering, Architecture, S.A.U. May 2022 - November 2025. (Antonio Fernández Cardador, Asunción Paloma Cucala García, Adrián Fernández Rodríguez, Gonzalo Sánchez Contreras, Manuel Blanco Castillo)

In this project, an analysis of the transport capacity of Metro Manila Line 4 is carried out, based on information on track infrastructure, train characteristics and the type of signalling.

- **Supply of the AGC-IIT and commissioning in the Acciona SCADA system**

Acciona Generación Renovable S.A. May 2023 - December 2024. (Ignacio Egido Cortés, Luis Rouco Rodríguez)

Acciona participates in the secondary regulation in the Spanish power system. This project consists in the supply of AGC regulator AGC_SRS-IIT to Acciona and the assistance to both Acciona and the SCADA provider in its integration in the system.

- **Supply of the AGC-IIT and commissioning in the BBE SCADA system**

Bahía Bizkaia Electricidad, S.L. May 2023 - December 2024. (Ignacio Egido Cortés, Luis Rouco Rodríguez)

BBE participates in the secondary regulation in the Spanish power system. This project consists in the supply of AGC regulator AGC_SRS-IIT to BBE and the assistance to both BBE and the SCADA provider in its integration in the system.

- **Quantitative assessment of Regional Cost Allocation Methods in the West African Power Pool**

CESI S.p.A. July 2023 - January 2026. (Luis Olmos Camacho, Mohamed Abbas Elabbas, Stefanía Gómez Sánchez)

Application of several methodologies for the computation of electricity transmission tariffs to allocate the cost of the regional transmission grid in the West Africa Power Pool (WAPP). Analysis of the results and derivation of relevant policy conclusions.

- **Supply of the AGC-IIT and commissioning in the Nexus SCADA system**

Nexus Energía, S.A. July 2023 - December 2024. (Ignacio Egido Cortés, Luis Rouco Rodríguez)

Nexus participates in the secondary regulation in the Spanish power system. This project consists in the supply of AGC regulator AGC_SRS-IIT to Nexus and the assistance to both Nexus and the SCADA provider in its integration in the system.

- **Supply of the AGC-IIT and commissioning in the Alpiq SCADA system**

Alpiq Energía España S. A. U. December 2023 - June 2025. (Ignacio Egido Cortés, Luis Rouco Rodríguez)

Alpiq participates in the secondary regulation in the Spanish power system. This project consists in the supply of AGC regulator AGC_SRS-IIT to Alpiq and the assistance to both Alpiq and the SCADA provider (the current one and the future one) in its integration in the system.

- **Drone-Controller Decoding System for Enhanced WiFi Protocol**

TRC Informática S.L. January 2024 - July 2025. (Javier Matanza Domingo, Eduardo Alonso Rivas)

The project aims to develop a system for decoding communication between drones and their controllers using the Enhanced WiFi protocol. Through reverse engineering, the transmitted information is interpreted and integrated into a drone detection system.

- **Assistance and maintenance of tools CODEX, SIROCO and DESI**

Endesa Medios y Sistemas S.L. January 2024 - December 2024. (Francisco Alberto Campos Fernández, Efraim Centeno Hernández, Luis Alberto Herrero Rozas)

Assistance and maintenance of tools CODEX, SIROCO-Ofertas Y DESI developed by IIT for Endesa

- **Local flexibility market and sandbox proposal for the AD-GRHID project**

Magtel Operaciones S.L.U. February 2024 - September 2024. (Tomás Gómez San Román, José Pablo Chaves Ávila, Miguel Angel Ruiz Hernández, Miguel Martínez Velázquez, Eliana Carolina Ormeño Mejía, Matteo Troncia)

In the first part of the project, a cost/benefit analysis is carried out to identify the benefits derived from the provision of flexibility services by a microgrid connected to a distribution transformer and its associated costs. It also establishes the technical-economic basis of the agreement between the distributor and the microgrid manager to determine the price of the provision of those services.

In the second part of the project, a proposal for a regulatory sandbox is made to implement the local flexibility market business model, identifying the barriers and the necessary regulatory developments so that this business model can be scaled at a national level as required by European regulations.

- **Spillage of a solar pv plant connected to Escatron bus**

Repsol Renovables S.A. February 2024 - September 2024. (Luis Rouco Rodríguez, Francisco Miguel Echavarren Cerezo, Enrique Lobato Miguélez)

This collaboration is aimed at estimating the spillage of a renewable generation plant connected to Escatron bus.

- **Assessment express rehabilitations 2024**

Fundación Naturgy. February 2024 - September 2024. (Roberto Barrella, José Carlos Romero Mora, Efraim Centeno Hernández)

This project aims to carry out a mixed assessment (with objective and subjective data) of the impact on energy poverty of the shallow renovations carried out by the Naturgy Foundation and the collaborating NGOs within the framework of the Solidarity Fund for Energy Rehabilitation. The impact analysis is carried out based on the characteristics of the home and the energy bills before and after the refurbishment, comparing the actual expenditure with the required energy expenditure of the household. The calculation of a hidden energy poverty indicator is also proposed to measure the objective impact of

the intervention on energy poverty. Finally, the subjective indicators of inadequate temperature (both in winter and summer) are estimated to analyse the change in the perception of comfort in the dwelling.

- **Proyecto de Integración TSO-DSOs en Brasil**

PSR Soluções e Consultoria em Energia Ltda. April 2024 - December 2024. (José Pablo Chaves Ávila, Carlos Batlle López, Matteo Troncia)

This project aims to develop recommendations to improve TSO-DSO coordination in the Brazilian system. For this purpose, IIT collaborates in the following tasks:

1. to contribute recommendations to the review of international experience in the integration between the Distribution System Operator (DSO) and the Transmission System Operator (TSO), including proposals for conceptual designs, pilot projects carried out, case studies, among others. Among the main subtopics related to international experience, special attention is given to the institutional concepts of distribution and transmission system operators, the regulation and business models applicable to the networks, and critical analysis and/or proposals for regulatory modification in the countries analyzed.
2. Provide recommendations, contributions and critical analysis of the proposed formulation for the Brazilian System, including price signals provided to decentralized agents, products to be provided by and to the DSO, physical interface between the transmission and distribution systems, allocation of responsibilities between DSO, TSO and agents, management mechanism of the products offered, institutional arrangements for the operational interface of both networks and governance model, related to the process of operation, planning and information flow between the TSO and DSO.
3. Details of international practical experiences on TSO-DSO (regulations, tools used, information and/or commercial structures, etc.)

- **Analysis and improvement of optimization models of the Colombian electricity system**

XM S.A. E.S.P. May 2024 - December 2025. (Andrés Ramos Galán)

The project consists of:

- Analysis of the numerical difficulties arising from the creation of the model and proposals for improvement.
- Improvements in the use of Gurobi optimizer parameters to reduce resolution time.
- Analysis of the mathematical formulations used in the model for its possible strengthening for optimization.

- **Application of the ENTSO-e cost-benefit analysis method to Aguayo II pumped-hydro storage 2024**

Repsol Generación Eléctrica, S.A.U. June 2024 - September 2024. (Andrés Ramos Galán, Luis Olmos Camacho, Luis Rouco Rodríguez, Enrique Lobato Miguélez)

Report on the application of the ENTSO-e 2024 cost-benefit analysis method to Aguayo II pumped-hydro storage.

- **Training and exploration in Artificial Intelligence techniques for risk detection in high voltage insulators through leakage current monitoring**

VERESCENCE La Granja S.L. June 2024 - October 2024. (Miguel Ángel Sanz Bobi, Gopal Lal Rajora)

The objective of this collaboration is to carry out training and subsequent application of machine learning algorithms aimed at characterizing the condition of high voltage electrical insulators through monitoring the leakage current and the most relevant environmental factors.

- **Support to the assessment of impacts and risks derived from climate change in Spain**

Fundación Tecnalia Research & Innovation. July 2024 - February 2025. (Pedro Linares Llamas)

Participation in a group of experts supporting the project "Assessment of impacts and risks derived from climate change in Spain". This group, with a consultative character, bring an external and independent perspective on the methodology and sources to analyze in the different sectoral chapters, collectively or individually.

- **Analysis of the legislative piece Orden TED/728/2024 developing the mechanism to promote biofuels and other renewable fuels for transport purposes**

Asociación Ibérica de Gas Natural, Hidrógeno y Gas Renovable para la Movilidad (GASNAM). August 2024 - September 2024. (Rafael Cossent Arín, Santiago Serna Zuluaga)

The aim of the collaboration is to produce a summary regarding the main legislative changes introduced in the aforementioned Order that affect the transport sector. This analysis pays particular attention to the promotion of biofuels, as well as to the transposition of provisions contained in the recently revised European Renewable Energy Directive. In this regard, the limits and targets set for fuel suppliers are examined, with a special focus on the national transposition decisions concerning areas where Member States have some degree of flexibility, or on elements whose transposition remains pending.

- **Consultancy on Artificial Intelligence**

Netex Knowledge Factory, S.A. September 2024 - October 2024. (David Contreras Bárcena, Mario Castro Ponce)

Advisory on Artificial Intelligence for Assistance in the Acquisition of a Technology-Based Company, Specifically LLM Tools

- **Application of the ENTSO-e cost-benefit analysis method to Conso II pumped-hydro storage**

Iberdrola Generación España, S.A.U. September 2024 - September 2024. (Luis Rouco Rodríguez, Enrique Lobato Miguélez, Andrés Ramos Galán, Luis Olmos Camacho)

The aim of this work is the application of the ENTSO-e cost-benefit analysis method to Conso II pumped-hydro storage.

- **Technological migration of the demand scenario generator MODEM to the cloud environment (electricity demand phase 1)**

Endesa S.A. September 2024 - September 2024. (Eugenio Francisco Sánchez Úbeda)

The main objective of this project is migrating the demand scenario generator MODEM to the cloud environment. MDDEM consists of models based on machine learning techniques that generate coherent probabilistic predictions for the medium term of the demand. This project focuses on the migration of electricity demand models.

- **Extension on the adjustment and validation of the new Secondary Regulation Service (SRS)**

Red Eléctrica de España, S.A. September 2024 - December 2025. (Ignacio Egido Cortés, Álvaro Ortega Manjavacas)

Red Eléctrica is studying the implementation of the SRS (Secondary Regulation System, already implemented on the Spanish power system) in the electrical systems of non-mainland territories (TNP). The TNP systems have unique characteristics that prevent the simple transfer of the SRS as it is in operation in the Spanish power system. The most relevant characteristic in TNP systems is the frequency dynamics. This project develops a general model of a TNP system. This model is then parametrized for specific characteristics of different TNP systems. The parametrized model is then used to perform detailed simulations that allow designing the most suitable control system for the TNP and evaluating its behavior.

- **Technical support to Cartagena power plant to participate in the voltage control system of the transmission system**

Engie Cartagena S.L. October 2024 - December 2024. (Luis Rouco Rodríguez, Enrique Lobato Miguélez)

IIT provide technical support to Engie to facilitate the participation of Cartagena power plant to participate in the voltage control system of the transmission system.

- **Technical support to Castelnou power plant to participate in the voltage control system of the transmission system**

Engie Castelnou S.L.U. October 2024 - December 2024. (Luis Rouco Rodríguez, Enrique Lobato Miguélez)

IIT provide technical support to Engie to facilitate the participation of Castelnou power plant to participate in the voltage control system of the transmission system.

- **Technical Assesment for a joint venture associated with the EVE project (INCIBE)**

UTE TICSMART SL, TECHHEROX SLU, SOFT COM, INFORMATICA SL. October 2024 - November 2024. (Mario Castro Ponce, Gregorio López López)

The objective of the proposed collaboration is to monitor and evaluate the adequacy of the data analysis obtained from the EVE (INCIBE) project,

developed by the joint venture UTE TICSMART SL, TECHHEROX SLU, SOFT COM, and INFORMATICA SL within the framework of said project. The project will develop a system to estimate a company's risk of suffering a phishing attack.

- **Implementation of robust extrapolation of the forecasted residual demand curves in the day-ahead market**

Endesa Medios y Sistemas S.L. October 2024 - December 2024. (José Portela González)

The main objective of this project is to design a robust extrapolation outside the discretization axes for the forecasted residual demand curves in the day-ahead market.

- **Smartworker, the connected employee in Industry 5.0**

ZERINTIA & KEBALA, S.L. October 2024 - October 2026. (Álvaro Jesús López López)

Integration of the connected employee with IT/OT investments to enhance productivity and optimize the use of business resources.

- **Valuation of the distribution assets of the closed network**

BASF Española, Tarragona Power. November 2024 - February 2025. (Carlos Mateo Domingo, Tomás Gómez San Román, Rafael Cossent Arín, Miguel Angel Ruiz Hernández, Miguel Martínez Velázquez, Pablo Frías Marín)

The objective of the collaboration is to carry out an objective valuation of the distribution assets of the closed network, currently owned by BASF Española and Tarragona Power, to be able to appoint a manager of the closed network, and to transfer the assets to it, if appropriate, in line with the requirements of Royal Decree 314/2023, article 16.a.

As a result of the project, a methodology and the criteria that should guide are first defined, and as a result of this a valuation of the assets of each of the companies are obtained, applying homogeneous criteria for the valuation of the assets, resulting in a final asset valuation report.

- **Analysis of the transposition of the Renewable Energy Directive for the transport sector**

Asociación Ibérica de Gas Natural, Hidrógeno y Gas Renovable para la Movilidad (GASNAM). November 2024 - January 2025. (Rafael Cossent Arín, Santiago Serna Zuluaga, Manuel Pérez Bravo)

The objective of the proposed collaboration is to analyse the implications of different alternatives for the transposition of transport decarbonisation objectives in the new European renewable energy directive (RED III), with particular emphasis on the treatment of gaseous fuels.

- **Development of a computer tool for electrical calculations in hydro generators**

Iberdrola Generación España, S.A.U. December 2024 - March 2025. (Luis Rouco Rodríguez, Enrique Lobato Miguélez)

The aim of the project is the development of a computer tool for electrical calculations in hydro generators. It contains a tool to calculate the reactive power capability at the point of connection and to perform the time domain simulation of the direct start-up of synchronous motors of pumped storage plants.

- **Access capacity to the grid of a demand at Muniesa substation**

Endesa Energía, S.A.U. December 2024 - December 2024. (Luis Rouco Rodríguez, Enrique Lobato Miguélez, Francisco Miguel Echavarren Cerezo)

The aim of the collaboration is the study of the factors that may affect the access capacity of a demand in the Muniesa 499 substation.

- **Contribution of the Spanish nuclear power plants to the stability of the power system**

Iberdrola Generación Nuclear, S.A.U. January 2025 - May 2025. (Luis Rouco Rodríguez, Enrique Lobato Miguélez)

This work investigates the contribution of the Spanish nuclear power plants to the stability of the power system.

- **Assistance and maintenance of tools CODEX, SIROCO and DESI**

Endesa S.A. January 2025 - December 2025. (Francisco Alberto Campos Fernández, Efraim Centeno Hernández, Luis Alberto Herrero Rozas, Luis Jesús Fernández Palomino, Javier García González, José Portela González)

Assistance and maintenance of tools CODEX and SIROCO developed by IIT for Endesa

- **Ultra-fast start-up system of gas turbines**

Unión Eléctrica De Canarias Generación S.A.U. (UNELCO). January 2025 - May 2025. (Luis Rouco Rodríguez, Lukas Sigrist)

This work is aimed at elaborating a report that shows the technical and economical advantages of a ultra-fast start-up system of gas turbines. In addition, it addresses how to fit this novel system within the regulatory framework of the Spanish island systems.

- **Renewable energy curtailments due to transmission network**

EDP Renováveis, S.A. January 2025 - May 2025. (Luis Rouco Rodríguez, Enrique Lobato Miguélez, Francisco Miguel Echavarren Cerezo)

The aim of the work is the calculation of renewable energy curtailments due to transmission networks in specific zones of them.

- **Evaluation of responses to the public consultation on firm demand connection**

Asociación de Empresas de Energía Eléctrica (aelec), Asociación de Empresas Eléctricas (ASEME), Asociación de Distribuidores de Energía Eléctrica (CIDE), UFD Distribución Electricidad S.A. February 2025 - April 2025. (Tomás Gómez San Román, Leslie Herding, Miguel Martínez Velázquez, Eliana Carolina Ormeño Mejía)

The objective of this project is the evaluation of the responses received to the public consultation on the "Detailed specifications for the firm connection of demand to the networks" prepared by the distribution system operators, supporting AELEC, ASEME, CIDE, and UFD in this task.

- **Access capacity to the grid of a demand at Muniesa substation**

Endesa S.A. February 2025 - May 2025. (Luis Rouco Rodríguez, Enrique Lobato Miguélez, Francisco Miguel Echavarren Cerezo)

The aim of the collaboration is the study of the factors that may affect the access capacity of a demand in two substations of the transmission network.

- **Fulfillment of the Technical Supervision Standard of JEMA inverters without power plant controllers**

Jema Energy S.A. March 2025 - April 2025. (Luis Rouco Rodríguez)

This work is aimed at testing the fulfillment of the Technical Supervision Standard of JEMA inverters without power plant controllers.

- **Allocation and settlement of the costs of ancillary and balancing services in Spain**

Asociación de Empresas con Gran Consumo de Energía (AEGE). April 2025 - July 2025. (Paolo Mastropietro, José Pablo Chaves Ávila, Tomás Gómez San Román, Matteo Troncia)

The costs of ancillary and balancing services in the Spanish electricity system has increased significantly in recent years and this has also exacerbated their volatility. In Spain, the cost of these services is recovered through components passed on to each end user in proportion to their final consumption. This financing scheme for ancillary and balancing services is very unorthodox, as in most European countries these costs are financed through network charges. The aim of this project is to advance recommendations for defining an efficient cost allocation and settlement scheme for ancillary and balancing services in the Spanish electricity system that reflects, as far as possible, the causality of costs and, on the other hand, addresses concerns regarding the volatility of these costs and the impossibility of managing the associated risk. To identify alternative financing schemes, the project analyses the experience of other European countries that share the same high-level regulation as Spain, selecting those systems that have also experienced recent increases in these costs.

- **Assessment of shallow renovations 2025**

Fundación Naturgy. April 2025 - November 2025. (Roberto Barrella, José Carlos Romero Mora, Efraim Centeno Hernández)

This project aims to carry out a mixed assessment (with objective and subjective data) of the impact on energy poverty of the shallow renovations carried out by the Naturgy Foundation and the collaborating NGOs within the framework of the Solidarity Fund for Energy Rehabilitation. The impact analysis is carried out based on the characteristics of the home and the energy bills before and after the refurbishment, comparing the actual expenditure with the required energy expenditure of the household. The calculation of a hidden

energy poverty indicator is proposed to measure the objective impact of the intervention on energy poverty. Moreover, the subjective indicators of inadequate temperature (both in winter and summer) are estimated to analyse the change in the perception of comfort in the dwelling. Finally, and depending on data availability, a disproportionate expenditure indicator is also calculated.

- **Migration to the Python environment of residual demand curve prediction models for electricity markets**

Endesa Medios y Sistemas S.L. May 2025 - July 2025. (José Portela González, Eloy Jesús del Gran Poder Insunza Díaz)

The main objective of this project is the migration to the Python environment of residual demand curve prediction models for electricity markets. These models include models based on Machine Learning techniques, as well as time series and functional data analysis.

- **Regulatory analysis on the production and use of low-carbon hydrogen**

Asociación Ibérica de Gas Natural, Hidrógeno y Gas Renovable para la Movilidad (GASNAM). May 2025 - June 2025. (Rafael Cossent Arín, Santiago Serna Zuluaga)

The objective of the collaboration is to analyze the Delegated Regulation on rules for the production of low-carbon fuels and to prepare a summary sheet of it. This regulation is currently under development and is expected to be approved and published in its final version around June–July 2025.

The result of the collaboration will be a summary sheet containing key information on the most relevant contents of the Delegated Regulation, as well as an annex with provisions from other legislative documents (RED III, ReFuel EU Aviation, Gas Market Directive, etc.) that are most relevant for the use of hydrogen and low-carbon fuels.

- **Analysis of the application of computer vision techniques and Machine Learning for the identification of cork oak trees using satellite images in forest regions of Portugal**

Enel Green Power España, S.L. June 2025 - July 2025. (Antonio Muñoz San Roque, Jaime Pizarroso Gonzalo, Jaime Boal Martín-Larrauri)

The objective of this project is to review the state of the art of the main automatic cork oak identification techniques based on computer vision and deep learning, highlighting their data requirements and reported performance.

- **Support for the review of the IBHYX calculation tool for a renewable hydrogen price index for the Iberian Peninsula and assistance with its implementation**

MIBGAS S.A. June 2025 - May 2026. (Rafael Cossent Arín, Isabel Catalina Figuerola-Ferretti Garrigues, Santiago Serna Zuluaga)

MIBGAS Derivatives has created an “Ask Price” index for renewable hydrogen, called IBHYX, whose objectives are to promote the development of a hydrogen market and to provide a price signal for it.

The objective of the proposed collaboration is to provide support and follow-up to MIBGAS Derivatives in the reviews and extensions of the renewable hydrogen price index. Support is given to the design of updates and to the development of the necessary calculation tools.

- **Evaluation of responses to the public consultation on flexible demand connection**

Asociación de Empresas de Energía Eléctrica (aelec), Asociación de Empresas Eléctricas (ASEME), Asociación de Distribuidores de Energía Eléctrica (CIDE), UFD Distribucion Electricidad S.A. August 2025 - October 2025. (Tomás Gómez San Román, José Pablo Chaves Ávila, Manuel Romeo Monterde, Miguel Martínez Velázquez, Eliana Carolina Ormeño Mejía)

The objective of this project is the evaluation of the responses received to the public consultation on the "Detailed specifications for the determination of the access flexible capacity of demand to the distribution networks under permits type O(profiles) and tupe 1 (Remote disconnection after N-1 contingency" prepared by the distribution system operators, supporting AELEC, ASEME, CIDE, and UFD in this task.

3.2.2.2 Public funding

- **Licensing and application of a reference network model by a colombian distribution system operator**

Empresas públicas de Medellín E.S.P. October 2021 - December 2026. (Carlos Mateo Domingo, Fernando de Cuadra García, Tomás Gómez San Román)

The objective of the project is to license and support EPM in the use of a reference network model, to determine the expansion needs in real distribution networks of Empresas Públicas de Medellín (EPM). The tool provides support in investment decisions in distribution system operators by DSOs, allowing to analyze future demand scenarios, as well as higher penetrations of distributed energy resources.

- **Consulting services for the tariff reform in Slovenia**

Agencija za Energijo. May 2022 - December 2025. (Tomás Gómez San Román, José Pablo Chaves Ávila, Nicolás Mariano Morell Dameto, Eliana Carolina Ormeño Mejía, Matteo Troncia)

Consulting services for the study on the Slovenian tariff reform project (preparation of expert opinions, participation in explanatory meetings, participation in public consultation, etc.)

- **Member of the Monitoring Board of the Wholesale Electricity Market of Panama**

Autoridad Nacional de los Servicios Públicos (ASEP) de la República de Panamá. September 2024 - September 2025. (Tomás Gómez San Román, Paolo Mastropietro)

Advice providing consulting services as a member of the wholesale electricity market monitoring board applied to the conceptual design and operation of electricity markets.

- **Study of the thermal response of geothermal heat exchangers based on boreholes with oblique or curved drilling**

Universidad Politécnica de Madrid. October 2024 - February 2025. (Javier Rico Cabrera)

This project focuses on studying the thermal response of geothermal heat exchangers based on boreholes with oblique or curved drilling.

The main motivation for this analysis is to enhance the feasibility of shallow geothermal energy projects when using buried heat exchanger configurations that include oblique or curved drilling.

This approach not only allows for a reduction of borehole length by 30% compared to conventional boreholes, as reported in some studies, but also helps decrease the surface footprint of the geothermal installation and increases the amount of accessible land per unit of surface area.

While this option is highly attractive, it also entails higher drilling costs. Therefore, conducting a rigorous comparison between both configurations is crucial to determine the project's economic feasibility.

This comparison involves performing detailed numerical comparisons among all configurations of interest, managing the large computational domains required, and ensuring high mesh precision around the slender geothermal boreholes.

- **Evolution of the billing methodology of the complementary traction current supply service in the ADIF and ADIF Alta Velocidad rail networks**

Adif Alta Velocidad. January 2025 - April 2026. (Tomás Gómez San Román, José Antonio Rodríguez Mondéjar, Asunción Paloma Cucala García, Antonio Fernández Cardador, Ramón Rodríguez Pecharromán, Adrián Fernández Rodríguez, Carlos Mateo Domingo, Rafael Cossent Arín, María Domínguez Gago, Yolanda González Arechavala)

The purpose of this project is to establish an evolution of the regulatory considerations and operating procedures for the billing of the traction current of trains to railway operators, taking into account:

- The integration of the invoicing system into the EREX platform.
- The new energy efficiency measures adopted by ADIF-Alta Velocidad about installing renewable energy generation plants by railway companies for ADIF-Alta Velocidad's self-consumption.
- Other methodological evolutions such as:
 - o Review and update, if necessary, of the procedure for registration in check-in with on-board measurement.
 - o The regulatory framework's evolution and its implications on the billing system.

- o Evolution of management with on-board measurement for invoicing.
- o Evolution of the main parameters of the billing methodology.
- o Analysis of the evolution of the calendar of closures and settlements.

- **Open-source modeling for electric company resource planning research**

Electric Power Research Institute, Inc. March 2025 - December 2025. (Andrés Ramos Galán)

The objective of this project is to better understand the existing functionalities of openTEPES, as well as explore additional capabilities of interest to EPRI that could be relevant for future studies. These include energy storage, integrated energy systems considering gas, heat, and electric coupled networks, and hydro systems modeling, among others.

- **Integration of RES in power systems – the Spanish case**

World Bank. April 2025 - June 2025. (Lukas Sigrist, Rafael Cossent Arín, Pablo Rodilla Rodríguez, Luis Rouco Rodríguez)

The objective is to develop the Spanish case study on the integration of RES in power systems.

3.2.3 Services and analysis projects

3.2.3.1 Private funding

- **Discerning leadership: systematisation of content and methodologies in MOOCs and a book**

Universidad Pontificia Comillas. September 2023 - October 2024. (David Roch Dupré)

This project, a continuation of DISCERN_2, tries to systematize the contents of the LiDE program on discerning leadership in 3 online MOOC courses and a book.

- **Coordination of the secretariat of the EES-UETP network during the year 2024**

Electric Energy Systems - University Enterprise Training Partnership Association (EES-UETP). January 2024 - December 2024. (Luis Olmos Camacho)

Management of the financial issues and administrative matters related to the «Electrical Energy Systems, University-Enterprise Training Partnership». This association is aimed at promoting the exchange of knowledge among its members (universities and companies that are active in the electricity sector). Courses are organized for members of the association to attend them. Besides, other people not belonging to the association that have experience in this field may also attend them.

- **Technical support for the tools DECA, HADES and MODEM**

Endesa Medios y Sistemas S.L. January 2024 - December 2024. (Eugenio Francisco Sánchez Úbeda, José Portela González, Javier García González)

The objective of this project is to provide ENDESA with technical support and maintenance of the tools DECA, MODEM, HADES, EXLA and EXCOM developed by IIT.

- **Development of a tool to calculate a renewable hydrogen price index for the Iberian Peninsula and support for its implementation**

Mercado Ibérico del Gas (MIBGAS). September 2024 - December 2024. (Rafael Cossent Arín, Isabel Catalina Figuerola-Ferretti Garrigues, Santiago Serna Zuluaga, Antonio Bello Morales, Pablo Rodilla Rodríguez)

MIBGAS develop and publish a renewable hydrogen price index to promote the development of a hydrogen market. In the absence of a mature market for renewable hydrogen, this price index initially must be based on a cost assessment. Furthermore, given that the index aims to become a widely accepted reference in the sector, it is developed in collaboration with the relevant agents in a transparent, reliable manner, seeking representativeness within the Iberian Peninsula.

The cost-based index includes two complementary approaches. On the one hand, evaluating the production costs ("ask price") of electrolytic hydrogen and, on the other hand, the adaptation and use costs of renewable hydrogen by demand or offtakers ("bid price").

The objective of the collaboration is to support MIBGAS in defining a renewable hydrogen price index and develop the necessary calculation tools.

- **Coordination of the secretariat of the EES-UETP network during the year 2025**

Electric Energy Systems - University Enterprise Training Partnership Association (EES-UETP). January 2025 - December 2025. (Luis Olmos Camacho, Álvaro Ortega Manjavacas)

Management of the financial issues and administrative matters related to the «Electrical Energy Systems, University-Enterprise Training Partnership». This association is aimed at promoting the exchange of knowledge among its members (universities and companies that are active in the electricity sector). Courses are organized for members of the association to attend them. Besides, other people not belonging to the association that have experience in this field may also attend them.

- **Technical support for the tools DECA, HADES and MODEM**

Endesa S.A. January 2025 - December 2025. (Eugenio Francisco Sánchez Úbeda, José Portela González, Javier García González)

The objective of this project is to provide ENDESA with technical support and maintenance of the tools DECA, MODEM, HADES, EXLA and EXCOM developed by IIT.

- **Long-term vision of Spanish energy consumption: analysis of decarbonized alternatives and scenarios**

Enagás, S.A. May 2025 - July 2025. (Rafael Cossent Arín, Santiago Serna Zuluaga, Manuel Pérez Bravo, Pablo Dueñas Martínez, Pedro Linares Llamas)

The objective of this collaboration is to update and expand the technical-economic analysis of the alternatives for the decarbonization of heavy transport and industry in Spain for the 2030–2050 timeframe, with intermediate milestones in 2035 and 2040.

3.2.3.2 Public funding

- **Fire modeling on a vessel located under the Bay of Cádiz bridge**

Universidad de Jaén. October 2024 - June 2025. (Pablo Ayala Santamaría, Alexis Cantizano González)

This document is a collaboration proposal for the study of the conditions generated by a fire caused by a fuel spill on a cargo ship in the Bay of Cádiz through numerical simulations.

- **Madrid LivingLab EP forum**

Unión Europea. January 2025 - December 2025. (José Carlos Romero Mora, Roberto Barrella, Efraim Centeno Hernández)

The Madrid LivingLab EP forum is a multidisciplinary collaboration space where various actors, including affected communities, energy experts, government institutions, and non-profit organizations, work together to develop, implement, and evaluate effective policies to combat energy poverty in Spain. More than just a simple laboratory, this approach adopts a participatory methodology that involves all relevant actors in the process of co-creating solutions.

Erasmus + project: 101124223 — EUPeace —
ERASMUS-EDU-2023-EUR-UNIV

3.3 Publications

3.3.1 Books

- A. Betancourt, D. Roch Dupré, A. Zapatero González, *"Investigación Operativa"*. Publisher: Editorial Universitas, S.L.. ISBN: 978-84-7991-645-9. January 2025.

- A. Morales Arizmendi, B. Blanco Rubio, D. Roch Dupré, et al., *"Liderazgo de Discernimiento Eclesial: Método Lide"*. Publisher: PPC Editorial. ISBN: 978-84-288-4291-4. July 2025.

3.3.2 Chapters in books

- R. Barrella, *"The Role of Technologies in Dealing with Energy Poverty Issues"*. Chapter in the book "The Palgrave Handbook of Cybersecurity, Technologies and Energy Transitions". Editors: Barichella, Arnault; Yada, Jurei. Publisher: Palgrave Macmillan Ltd.. Pp. 1-13. ISBN: 978-3-031-04196-9. December 2024.
- J.P. Chaves, S. Huclin, A. Ramos, *"El rol de las tecnologías de almacenamiento para la integración de las energías renovables y provisión de servicios al sistema eléctrico. Claves del caso español en 2030"*. Chapter in the book "La estrategia para la transición energética". Editors: Atance Muñiz, Ignacio. Publisher: Cajamar Caja Rural. Pp. 63-80. ISBN: 979-13-990157-2-0. May 2025.
- J.P. Chaves, M. Troncia, J.J. Fernández García, *"Comunidades energéticas: situación actual y perspectivas en Europa y España"*. Chapter in the book "Informe España 2024". Editors: Blanco Martín, Agustín; Mora Rosado, Sebastián; López Ruiz, José Antonio. Publisher: Servicio de Publicaciones de la Universidad Pontificia Comillas. Pp. 83-146. ISBN: 978-84-7399-150-6. November 2024.
- R. Cossent, *"Potencial de utilización de hidrógeno en España"*. Chapter in the book "La estrategia para la transición energética". Editors: Atance Muñiz, Ignacio. Publisher: Cajamar Caja Rural. Pp. 81-94. ISBN: 979-13-990157-2-0. May 2025.
- T. Gerres, *"La descarbonización de la industria no intensiva en energía"*. Chapter in the book "La estrategia para la transición energética". Editors: Atance Muñiz, Ignacio. Publisher: Cajamar Caja Rural. Pp. 211-230. ISBN: 979-13-990157-2-0. May 2025.
- P. Linares, *"La introducción a la transición energética y sus consecuencias"*. Chapter in the book "La estrategia para la transición energética". Editors: Atance Muñiz, Ignacio. Publisher: Cajamar Caja Rural. Pp. 13-22. ISBN: 979-13-990157-2-0. May 2025.
- P. Mastropietro, *"Posibles diseños de mercado eléctrico a futuro y consecuencias para los consumidores"*. Chapter in the book "La estrategia para la transición energética". Editors: Atance Muñiz, Ignacio. Publisher: Cajamar Caja Rural. Pp. 155-169. ISBN: 979-13-990157-2-0. May 2025.
- M. Nour, M. Troncia, J.P. Chaves, *"Energy management in energy communities"*. Chapter in the book "Towards future smart power systems with high penetration of renewables". Editors: Tostado Véliz, Marcos; Jordehi, Ahmad Rezaee; Mansouri, Seyed Amir; Ramos Galán, Andrés; Jurado Melguizo, Francisco. Publisher: Academic Press. Pp. 321-340. ISBN: 9780443298714. February 2025.

- N. Morell, J.P. Chaves, T. Gómez, T. Schittekatte, "*Forward-looking dynamic network tariffs: an efficient solution for price-responsive customers*". Chapter in the book "Incentives and digitalization for flexibility in the green transition". Editors: Meeus, Leonardo; et al., . Publisher: Danish Utility Regulator. Pp. 56-62. ISBN: 978-87-975187-0-0. September 2024.
- M. Pérez-Bravo, "*La descarbonización del transporte pesado*". Chapter in the book "La estrategia para la transición energética". Editors: Atance Muñiz, Ignacio. Publisher: Cajamar Caja Rural. Pp. 231-253. ISBN: 979-13-990157-2-0. May 2025.
- M. Pérez-Bravo, T. Gómez, "*Autoconsumo y comunidades energéticas*". Chapter in the book "La estrategia para la transición energética". Editors: Atance Muñiz, Ignacio. Publisher: Cajamar Caja Rural. Pp. 171-191. ISBN: 979-13-990157-2-0. May 2025.

3.3.3 Publications in journals

- J. Abenojar, S. López de Armentia, J.C. del Real-Romero, M.A. Martínez, "*Magnetic cork as adsorbent to remove hexavalent chromium from aqueous solution*", Applied Water Science, vol. 14, nº. 12, pp. 267-1-267-17. ISSN: 2190-5487. e-ISSN: 2190-5495. November 2024/December 2024.
- G. Akullo, E. Aracil, S. Mwaura, C. McMillan, "*Beyond teaching: the extended role of informal entrepreneurship education and training in challenging contexts*", International Journal of Entrepreneurial Behavior & Research, vol. 31, nº. 8, pp. 2049-2071. ISSN: 1355-2554. e-ISSN: 1758-6534. October 2024/August 2025.
- D. Alfaya, I. Biswas, T.L. Gómez, S. Mukhopadhyay, "*Torelli theorem for moduli stacks of vector bundles and principal G-bundles*", Journal of Geometry and Physics, vol. 207, pp. 105350-1-105350-15. ISSN: 0393-0440. e-ISSN: 1879-1662. October 2024/January 2025.
- D. Alfaya, I. Biswas, P. Kumar, A. Singh, "*A criterion for holomorphic Lie algebroid connections*", Journal of Algebra, vol. 681, pp. 343-366. ISSN: 0021-8693. e-ISSN: 1090-266X. June 2025/November 2025.
- D. Alfaya, L.A. Calvo, A. Martínez de Guinea García, J. Rodrigo, A. Srinivasan, "*Markoff m-Triples with k-Fibonacci Components*", Mediterranean Journal of Mathematics, vol. 22, nº. 3, pp. 76-1-76-19. ISSN: 1660-5446. e-ISSN: 1660-5454. April 2025/May 2025.
- D. Alfaya, L.A. Calvo, A. Martínez de Guinea García, J. Rodrigo, A. Srinivasan, "*A classification of Markoff-Fibonacci m-triples*", Fibonacci Quarterly, vol. 63, nº. 3, pp. 517-541. ISSN: 0015-0517. July 2025/December 2025.

- G. Álvarez-Fernández, D. Roch Dupré, G. Gomez-Bengoechea, "*Synthetic Labor Market Index: construction and application to the Spanish case*", International Journal of Manpower, vol. 46, nº. 8, pp. 1563-1586. ISSN: 0143-7720. e-ISSN: 1758-6577. August 2025/September 2025.
- P. Antonetti, C. Valor, I. Baghi, H.V. González-Gómez, "*Consumer emotional ambivalence: a state-of-the-art review*", Journal of Marketing Management, vol. on-line, ISSN: 0267-257X. e-ISSN: 1472-1376. July 2025.
- P. Antonetti, C. Valor, B. Božic, "*Mitigating Moral Emotions After Crises: A Reconceptualization of Organizational Responses*", Journal of Business Ethics, vol. on-line, ISSN: 0167-4544. e-ISSN: 1573-0697. July 2025.
- P. Antonetti, C. Valor, D. Manika, L. Wei, "*Traditional methods, consumers' stereotyping of farmers and the compensatory effects of ethical food cues*", European Journal of Marketing, vol. 59, nº. 7, pp. 1891-1912. ISSN: 0309-0566. e-ISSN: 1758-7123. August 2025/September 2025.
- E. Aracil, J. Jung, A. Melguizo, "*Leveraging fintech mobile money to expand banks' financial services in developing countries*", Finance Research Letters, vol. 72, pp. 106280-1-106280-11. ISSN: 1544-6123. e-ISSN: 1544-6131. October 2024/February 2025.
- S. Balietti, C. Celebi, D. Tercero-Lucas, "*From crypto to NFTs: Identifying the new wave of digital investors*", International Review of Financial Analysis, vol. 104, nº. Part A, pp. 104172-1-104172-20. ISSN: 1057-5219. e-ISSN: 1873-8079. April 2025/August 2025.
- L. Barcos Redín, M.F. Morales Contreras, M.F. Suárez-Barraza, V.M. Rodríguez Chacón, "*TQM, Lean, Six Sigma, and Kaizen in higher education management: a bibliometric analysis*", The TQM Journal, vol. on-line, ISSN: 1754-2731. e-ISSN: 1754-274X. May 2025.
- R. Barrella, S. Mora Rosado, J.C. Romero, "*The 2022 energy and inflationary crises: Data, experiences and opinions of Spanish energy vulnerable households*", Energy Research & Social Science, vol. 121, pp. 103961-1-103961-17. ISSN: 2214-6296. e-ISSN: 2214-6326. February 2025/March 2025.
- R. Barrella, P. Palma, J.P. Gouveia, J.C. Romero, E.M. Arenas, J.I. Linares, "*Toward an enhanced policy and action framework to address energy poverty in the Iberian Peninsula: An exploratory analysis*", Heliyon, vol. 11, nº. 10, pp. e43414-1-e43414-24. e-ISSN: 2405-8440. May 2025/May 2025.
- R. Barrella, J.C. Romero, "*Bridging the Energy Poverty Gap: Evaluating the Impact of Shallow Renovations and Micro-Efficiency in Spain*", Sustainability, vol. 17, nº. 12, pp. 5585-1-5585-25. e-ISSN: 2071-1050. June 2025/June 2025.

- F. Barrera-Jimenez, J.L. Arroyo-Barrigüete, E.C. Garrido-Merchán, G. Grinda-Luna, *"Invulnerability bias in perceptions of artificial intelligence's future impact on employment"*, Scientific Reports, vol. 15, pp. 28698-1-28698-12. e-ISSN: 2045-2322. August 2025/December 2025.
- C. Batlle, P. Heller, C. Knittel, T. Schittekatte, *"US federal resource allocations are inconsistent with concentrations of energy poverty"*, Science Advances, vol. 10, n°. 41, pp. eadp8183-1-eadp8183-10. e-ISSN: 2375-2548. October 2024/October 2024.
- C. Baumann, J.C. Romero, R. Barrella, *"Energy Poverty and Vulnerability Trends in Southern and Western Europe during Crisis Years"*, Sustainability, vol. 17, n°. 12, pp. 5264-1-5264-16. e-ISSN: 2071-1050. June 2025/June 2025.
- F.J. Bellido-López, M.A. Sanz-Bobi, A. Muñoz, D. González-Calvo, T. Álvarez Tejedor, *"A novel method for evaluation of the maintenance impact in the health of industrial components"*, Results in Engineering, vol. 27, pp. 105809-1-105809-26. e-ISSN: 2590-1230. June 2025/September 2025.
- S. Bindu, L. Sigrist, J.P. Chaves, *"Frequency stability services to compensate for low inertia in renewable-dominated power systems"*, Utilities Policy, vol. 95, pp. 101938-1-101938-14. ISSN: 0957-1787. e-ISSN: 1878-4356. April 2025/August 2025.
- M. Blanco-Castillo, A. Fernández Rodríguez, S. Su, A. Fernández-Cardador, A.P. Cucala, *"Efficient automatic operation of a metro line: eco-driving design with optimized use of regenerative energy and rolling stock consideration"*, Engineering Optimization, vol. 57, n°. 8, pp. 2044-2076. ISSN: 0305-215X. e-ISSN: 1029-0273. September 2024/August 2025.
- R. Calderón, F. Herrera, *"And Plato met ChatGPT: an ethical reflection on the use of chatbots in scientific research writing, with a particular focus on the social sciences"*, Humanities and Social Sciences Communications, vol. 12, pp. 713-1-713-13. e-ISSN: 2662-9992. May 2025/December 2025.
- A. Camacho, C. Valor, J. Portela, J.L. Arroyo-Barrigüete, *"Examining Crash Factors in Free-Floating Carsharing"*, Journal of Road Safety, vol. 36, n°. 2, pp. 10-22. ISSN: 2652-4260. e-ISSN: 2652-4252. May 2025.
- J. Camacho-Mateu, A. Lampo, M. Castro, José A. Cuesta, *"Microbial populations hardly ever grow logistically and never sublinearly"*, Physical Review E, vol. 111, n°. 4, pp. 044404-1-044404-8. ISSN: 2470-0045. e-ISSN: 2470-0053. April 2025/April 2025.

- P. Casas, T. Christou, A. García-Rodríguez, N.J. Lazarou, P. Lecca, P. Monfort, S. Salotti, *"The impact of innovation policy on the regional economies of Europe"*, Cambridge Journal of Regions, Economy and Society, vol. on-line, ISSN: 1752-1378. e-ISSN: 1752-1386. August 2025.
- M. Casero, M.A. Sanz-Bobi, F.J. Bellido-López, A. Muñoz, D. González-Calvo, T. Álvarez Tejedor, *"Efficiency monitoring of a cooling water pump based on machine learning techniques"*, International Journal of Prognostics and Health Management, vol. 16, nº. 1, pp. 1-6. e-ISSN: 2153-2648. January 2025/December 2024.
- M. Castro, J. Bassaganya-Riera, M. Fribourg, *"Editorial: Mechanistic and statistical modeling approaches to study alloimmune T-cell responses"*, Frontiers in Immunology, vol. 16, pp. 1591083-1-1591083-2. e-ISSN: 1664-3224. April 2025/December 2025.
- C.J. Cela-Conde, S. Lumbreras, S. Pusil, B. Chino, J.M. Caamaño, L. Gismera, F. Maestú, L. Rojas-Marcos, *"Teaching-induced changes in neural networks: Toward a model of the creative universe"*, NeuroImage: Reports, vol. 5, nº. 3, pp. 100280-1-100280-12. e-ISSN: 2666-9560. August 2025/September 2025.
- Ch.Y. Chen, B.H. Huang, Y.H. Tang, C. González-Ruano, F. Aliev Kazanski, D.Ch. Ling, J.Y. Hong, *"Stochastic Nature of Voltage-Controlled Charge Dynamics in AlOx Magnetic Tunnel Junctions"*, Nano Letters, vol. 25, nº. 31, pp. 11776-11781. ISSN: 1530-6984. e-ISSN: 1530-6992. July 2025/August 2025.
- T. Christou, P. Lecca, S. Salotti, *"Regional rebound effects of energy efficiency improvements in a spatial general equilibrium framework"*, Energy Economics, vol. 148, pp. 108645-1-108645-16. ISSN: 0140-9883. e-ISSN: 1873-6181. June 2025/August 2025.
- V. Cieslak, C. Valor, *"Moving beyond conventional resistance and resistors: an integrative review of employee resistance to digital transformation"*, Cogent Business & Management, vol. 12, nº. 1, pp. 2442550-1-2442550-31. e-ISSN: 2331-1975. December 2024/December 2025.
- N. Collado, P. Linares, *"El impacto del mecanismo de ajuste de carbono en frontera: evidencia disponible y retos futuros"*, Cuadernos de Energía, nº. 79, pp. 49-55. ISSN: 1698-3009. March 2025.
- O.D. Cortázar, A. Megia-Macías, B. Hontanilla, H. Cortázar-Gallicchio, *"Demonstration of the High Efficiency of an Air Plasma Jet Combining Electric Field and RONS in the Treatment of Chronic Wounds"*, IEEE Transactions on Radiation and Plasma Medical Sciences, vol. 9, nº. 5, pp. 680-688. ISSN: 2469-7311. e-ISSN: 2469-7303. October 2024/May 2025.

- T. Corzo, K. Martín-Bujack, J. Portela, A. Rodríguez-Gallego, *"Exchange rate regime changes and market efficiency: An event study"*, Journal of International Financial Markets, Institutions and Money, vol. 100, pp. 102132-1-102132-25. ISSN: 1042-4431. e-ISSN: 1873-0612. February 2025/April 2025.
- T. Corzo, K. Martín-Bujack, J. Portela, A. Rodríguez-Gallego, *"Floating exchange rate efficiency: Grouping patterns and pandemic impacts"*, International Economics, vol. 182, pp. 100591-1-100591-15. ISSN: 2110-7017. e-ISSN: 2542-6869. March 2025/August 2025.
- R. Coto Martín, N. Pérez Mallada, M.J. Martínez Beltrán, L. Cuéllar Marín, P.J. Borrás Luján, O. Otín Arroyo, M.A. Sáenz-Nuño, J.M. Arribas-Marín, *"Differences in Strength, Muscle Work, and Hamstring/Quadriceps Ratio in Professional and Junior Elite Basketball Players According to Sex"*, Journal of Functional Morphology and Kinesiology, vol. 10, nº. 2, pp. 204-1-204-13. e-ISSN: 2411-5142. June 2025/June 2025.
- R. Coto Martín, N. Pérez Mallada, M.J. Martínez Beltrán, I. Ríos Arroyo, L. Cuéllar Marín, *"Influence of Knee Angle on Hamstring/Quadriceps Strength Ratio in Male Soccer Players"*, Applied Sciences, vol. 15, nº. 6, pp. 3040-1-3040-10. e-ISSN: 2076-3417. March 2025/March 2025.
- F. Crucitti, P. Lecca, P. Monfort, S. Salotti, *"Short and longer-term effects of European regional policy"*, Economic Analysis and Policy, vol. 86, pp. 1748-1765. ISSN: 0313-5926. e-ISSN: 2204-2296. May 2025/June 2025.
- L. Delgado San Martín, I. de Castro Asensio, A. Esteban Temprano, M.A. Sáenz-Nuño, T.E. Fernández-Vicente, L. Peña Rubio, A. Sáez-Serrano, C. Sánchez-Blaya, *"New challenges in metrology for health: Looking for reliable diagnosis in electrocardiography and blood pressure measurement"*, Measurement: Sensors, vol. 38, nº. Supplement, pp. 101515-1-101515-5. e-ISSN: 2665-9174. January 2025/May 2025.
- P. Di Casola, M.M. Habib, D. Tercero-Lucas, *"Global and local drivers of Bitcoin trading vis-à-vis fiat currencies"*, Journal of International Money and Finance, vol. 158, pp. 103405-1-103405-29. ISSN: 0261-5606. e-ISSN: 1873-0639. August 2025/September 2025.
- L.W. Dietz, P. Sánchez, A. Bellogín, *"Understanding the influence of data characteristics on the performance of point-of-interest recommendation algorithms"*, Information Technology & Tourism, vol. 27, nº. 1, pp. 75-124. ISSN: 1098-3058. e-ISSN: 1943-4294. January 2025/March 2025.

- M. Domínguez, A. Fernández-Cardador, A. Fernández Rodríguez, A.P. Cucala, R.R. Pecharromán, P. Urosa Sánchez, I. Vadillo Cortázar, "*Review on the use of energy storage systems in railway applications*", Renewable & Sustainable Energy Reviews, vol. 207, pp. 114904-1-114904-21. ISSN: 1364-0321. e-ISSN: 1879-0690. September 2024/January 2025.
- S. Dorado, J.R. Jiménez-Octavio, P. Riaza, O.A. Peters, A. Arias, "*Structural response of mandibular first molars in the presence of proximal contacts: finite element analysis with antagonist teeth and alternative loading applications*", Clinical Oral Investigations, vol. 29, nº. 4, pp. 214-1-214-12. ISSN: 1432-6981. e-ISSN: 1436-3771. March 2025/April 2025.
- M.A.E. Elabbas, L. Olmos, I.J. Pérez-Arriaga, "*InfraFair: Infrastructure cost allocation*", SoftwareX, vol. 29, pp. 102069-1-102069-9. e-ISSN: 2352-7110. January 2025/February 2025.
- A. Esteban Temprano, I. de Castro Asensio, L. Delgado San Martín, M.A. Sáenz-Nuño, T.E. Fernández-Vicente, L. Peña Rubio, A. Sáez-Serrano, C. Sánchez-Blaya, "*Emerging innovations in health metrology for diagnostic imaging*", Measurement: Sensors, vol. 38, nº. Supplement, pp. 101649-1-101649-5. e-ISSN: 2665-9174. December 2024/May 2025.
- A. Esteban Temprano, L. Delgado San Martín, I. de Castro Asensio, T.E. Fernández-Vicente, L. Peña Rubio, A. Sáez-Serrano, A.I. Martín Megias, M.A. Sáenz-Nuño, "*Nuevos retos en metrología de la salud*", e-medida - Revista Española de Metrología, vol. 14, nº. 25, pp. online. e-ISSN: 2341-1821. December 2024.
- J.J. Fernández García, M. Troncia, J.P. Chaves, "*Empowering Energy Markets: Unraveling the Dynamics of Aggregators Relationships in Demand Response Services*", Current Sustainable/Renewable Energy Reports, vol. 12, nº. 1, pp. 7. e-ISSN: 2196-3010. March 2025/December 2025.
- L.J. Fernández, E. Centeno, S. Wogrin, "*Interactions between electricity and hydrogen markets: A bi-level equilibrium approach*", International Journal of Electrical Power & Energy Systems, vol. 170, pp. 110902-1-110902-12. ISSN: 0142-0615. e-ISSN: 1879-3517. July 2025/September 2025.
- A. Fernández Rodríguez, M. Domínguez, A.P. Cucala, A. Fernández-Cardador, "*Transport Capacity Maximization in Rail Mass Transit Stations Under Uncertainty*", IEEE Access, vol. 13, pp. 126227-126244. e-ISSN: 2169-3536. July 2025/December 2025.
- M. Fernández-Ruz, I. Jiménez-Serra, M. Castro, M. Ruiz-Bermejo, J. Aguirre, "*Strong parameter hierarchy in the interstellar phosphorus chemical network*", Frontiers in Astronomy and Space Sciences, vol. 12, pp. 1570525-1-1570525-16. e-ISSN: 2296-987X. July 2025/December 2025.

- D. Fernández-Sánchez, E.C. Garrido-Merchán, D. Hernández-Lobato, "*Alpha entropy search for new information-based Bayesian optimization*", Knowledge-Based Systems, vol. 322, pp. 113612-1-113612-24. ISSN: 0950-7051. e-ISSN: 1872-7409. May 2025/July 2025.
- I. Figuerola-Ferretti Garrigues, E. Schwartz, I. Segarra, "*Drought, water, and the valuation of hydropower assets*", Journal of Banking and Finance, vol. 179, pp. 107520-1-107520-14. ISSN: 0378-4266. e-ISSN: 1872-6372. August 2025/October 2025.
- T. Freire-Barceló, F. Martín, A. Sánchez, "*Demand response cost analysis and its effect on system planning*", International Journal of Electrical Power & Energy Systems, vol. 165, pp. 110483-1-110483-11. ISSN: 0142-0615. e-ISSN: 1879-3517. January 2025/April 2025.
- M. Galici, M. Troncia, M. Nour, J.P. Chaves, F. Pilo, "*Comparative techno-economic analysis of market models for peer-to-peer energy trading on a distributed platform*", Applied Energy, vol. 380, pp. 125005-1-125005-14. ISSN: 0306-2619. e-ISSN: 1872-9118. December 2024/February 2025.
- Z. Gao, M. Gazzani, D.A. Tejada, A. S. Siqueira, N. Wang, M. Gibescu, G. Morales-España, "*Fully flexible temporal resolution for energy system optimization*", Applied Energy, vol. 396, pp. 126267-1-126267-15. ISSN: 0306-2619. e-ISSN: 1872-9118. June 2025/October 2025.
- A. García-Cerezo, D. Bonilla, L. Baringo, J. García-González, "*A Stochastic Adaptive Robust Optimization Approach to Build Day-Ahead Bidding Curves for an EV Aggregator*", IEEE Transactions on Industry Applications, vol. on-line, ISSN: 0093-9994. e-ISSN: 1939-9367. July 2025.
- E.C. Garrido-Merchán, "*Machine Consciousness as Pseudoscience: The Myth of Conscious Machines*", Journal of Consciousness Exploration & Research, vol. 16, nº. 2, pp. 200-213. e-ISSN: 2153-8212. June 2025.
- E.C. Garrido-Merchán, M. Molina, G. Martínez, "*Multifidelity Bayesian optimization for hyperparameter tuning of deep reinforcement learning algorithms*", Computing and Artificial Intelligence, vol. 3, nº. 2, pp. 2923-1-2923-13. e-ISSN: 3029-2786. May 2025/December 2025.
- E.C. Garrido-Merchán, S. Mora-Figueroa, M. Coronado-Vaca, "*Multi-Objective Bayesian Optimization of Deep Reinforcement Learning for Environmental, Social, and Governance (ESG) Financial Portfolio Management*", Intelligent Systems in Accounting, Finance and Management, vol. 32, nº. 2, pp. e70008-1-e70008-15. ISSN: 1550-1949. e-ISSN: 2160-0074. June 2025/June 2025.

- R. Gesteira-Miñarro, I. Gutiérrez, R. Palacios, G. López, "*pwnobd: Offensive Cybersecurity Toolkit for Vulnerability Analysis and Penetration Testing of OBD-II Devices*", IEEE Access, vol. 13, pp. 126925-126934. e-ISSN: 2169-3536. July 2025/December 2025.
- R. Gesteira-Miñarro, G. López, R. Palacios, "*Clonable key fobs: Analyzing and breaking RKE protocols*", International Journal of Information Security, vol. 24, nº. 3, pp. 150-1-150-15. ISSN: 1615-5262. e-ISSN: 1615-5270. May 2025/June 2025.
- R. Gesteira-Miñarro, G. López, R. Palacios, "*Revisiting Wireless Cyberattacks on Vehicles*", Sensors, vol. 25, nº. 8, pp. 2605-1-2605-15. e-ISSN: 1424-8220. April 2025/April 2025.
- J.L. Gómez, E. Marcoulaki, A. Cantizano, M. Konstantinidou, R. Caro, M. Castro, "*Simulated fire observables as indicators for optimizing wireless sensor networks in wildfire risk monitoring*", Ecological Indicators, vol. 175, pp. 113509-1-113509-15. ISSN: 1470-160X. e-ISSN: 1872-7034. May 2025/June 2025.
- S. Gómez Lorenzo, M.M. Cledera-Castro, K. Hueso-Kortekaas, J.C. Romero, "*Social Life Cycle Assessment of Innovative Products from Solar Evaporation Iberian Saltworks: A Descriptive Approach to the Implementation of Halotolerant Crops and Microorganisms*", World, vol. 6, nº. 2, pp. 38-1-38-21. e-ISSN: 2673-4060. March 2025/June 2025.
- J.D. Gómez, F. Labora Gómez, J.M. Latorre, A. Ramos, "*Efficient hydropower modeling for medium-term hydrothermal planning using data-driven approaches*", Renewable Energy, vol. 245, pp. 122730-1-122730-14. ISSN: 0960-1481. e-ISSN: 1879-0682. March 2025/June 2025.
- S. Gómez, L. Olmos, A. Ramos, M. Rivier, "*A bi-level framework to analyse the alternative use of FTRs as a long-term risk hedging instrument. Application to a European case study*", Applied Energy, vol. 380, pp. 125094-1-125094-23. ISSN: 0306-2619. e-ISSN: 1872-9118. December 2024/February 2025.
- P. Gómez-Sánchez de Rojas, J. Victoria Rodríguez, C. Morales-Polo, M.M. Cledera-Castro, "*Environmental and techno-economic analysis of a biomethane energy community in southern Spain*", Sustainable Energy Technologies and Assessments, vol. 82, pp. 104496-1-104496-13. ISSN: 2213-1388. e-ISSN: 2213-1396. August 2025/October 2025.
- E. González García, P. Varas, P. González-Naranjo, E. Ulzurrun, G. Marcos-Ayuso, C. Pérez, J.A. Páez, D. Ríos Insua, S. Rodríguez-Santana, N.E. Campillo, "*AI-Driven De Novo Design and Development of Nontoxic DYRK1A Inhibitors*", Journal of Medicinal Chemistry, vol. 68, nº. 10, pp. 10346-10364. ISSN: 0022-2623. e-ISSN: 1520-4804. May 2025/May 2025.

- J. Guasch Albareda, M. Ramadan Younis, P. Rodilla, J.P. Chaves, "*Analysing the electric vehicle charging behaviour in Spain: Patterns and insights*", *Electric Power Systems Research*, vol. 247, pp. 111853-1-111853-9. ISSN: 0378-7796. e-ISSN: 1873-2046. May 2025/October 2025.
- L. Güitta-López, L. Güitta-López, J. Boal, A.J. López López, "*Sim-to-real transfer via a Style-Identified Cycle Consistent Generative Adversarial Network: Zero-shot deployment on robotic manipulators through visual domain adaptation*", *Engineering Applications of Artificial Intelligence*, vol. 159, n°. Part A, pp. 111510-1-111510-15. ISSN: 0952-1976. e-ISSN: 1873-6769. July 2025/November 2025.
- L. Güitta-López, V. Suriani, J. Boal, A.J. López López, D. Nardi, "*Boosting Deep Reinforcement Learning with Semantic Knowledge for Robotic Manipulators*", *Robotics*, vol. 14, n°. 7, pp. 86-1-86-18. e-ISSN: 2218-6581. June 2025/July 2025.
- L. Herding, L. Carvalho, R. Cossent, M. Rivier, "*A security-aware dynamic hosting capacity approach to enhance the integration of renewable generation in distribution networks*", *International Journal of Electrical Power & Energy Systems*, vol. 161, pp. 110210-1-110210-13. ISSN: 0142-0615. e-ISSN: 1879-3517. September 2024/October 2024.
- L. Herding, M. Pérez-Bravo, R. Barrella, R. Cossent, M. Rivier, "*Large-scale estimation of electricity distribution grid reinforcement requirements for the energy transition – A 2030 Spanish case study*", *Energy Reports*, vol. 12, pp. 5432-5444. e-ISSN: 2352-4847. November 2024/December 2024.
- L.A. Herrero, F.A. Campos, J. Villar, "*A joint Cournot equilibrium model for the hydrogen and electricity markets*", *International Journal of Hydrogen Energy*, vol. 90, pp. 1084-1099. ISSN: 0360-3199. e-ISSN: 1879-3487. October 2024/November 2024.
- L.A. Herrero, F.A. Campos, J. Villar, "*The impact of contracts on hydrogen and electricity markets under a joint Cournot equilibrium*", *International Journal of Hydrogen Energy*, vol. 169, pp. 151174-1-151174-14. ISSN: 0360-3199. e-ISSN: 1879-3487. August 2025/September 2025.
- K. Hueso-Kortekaas, N. Delgado-Mellado, J. Calzada-Funes, C. Sanchez-Mata, C. Castañeda, M.M. Cledera-Castro, "*Microplastics in Inland Saline Lakes of the Central Ebro Basin, NE Spain*", *Water*, vol. 17, n°. 7, pp. 989-1-989-15. e-ISSN: 2073-4441. March 2025/April 2025.
- I. Ilieva, R. Matthews, P. Tobin, C. Valor, V.K. Moreno, L. Ruiz, "*Adaptable customer engagement strategy for utilising energy flexibility*", *International Journal of Sustainable Energy Planning and Management*, vol. 44, pp. 30-46. ISSN: 2246-2929. June 2025.

- N. Jankovic, J. Roldán-Pérez, M. Prodanovic, J.A. Suul, S. D'Arco, L. Rouco, "*Network-reconfiguration-aware Power Oscillation Damping Controller for Converter- interfaced Generator Based Power Plants*", *Journal of Modern Power Systems and Clean Energy*, vol. 13, nº. 4, pp. 1420-1431. ISSN: 2196-5625. e-ISSN: 2196-5420. March 2025/July 2025.
- J. Jarauta Gastelu, R. Gesteira-Miñarro, J. Matanza, R. Palacios, G. López, "*MitM Attack to Electric Vehicle AC Chargers*", *IEEE Internet of Things Journal*, vol. 12, nº. 19, pp. 39689-39700. e-ISSN: 2327-4662. July 2025/October 2025.
- A.R. Jordehi, S.A. Mansouri, M. Tostado-Véliz, M. Safaraliev, S.M. Hakimi, M. Nasir, "*A tri-level stochastic model for operational planning of microgrids with hydrogen refuelling station-integrated energy hubs*", *International Journal of Hydrogen Energy*, vol. 96, pp. 1131-1145. ISSN: 0360-3199. e-ISSN: 1879-3487. November 2024/December 2024.
- A.R. Jordehi, M. Tostado-Véliz, S.A. Mansouri, A. Ahmarinejad, A. Ahmadi, M. Safaraliev, R. Sirjani, R. Verayiah, "*A two-stage stochastic framework for hydrogen pricing in green hydrogen stations including high penetration of hydrogen storage systems*", *Journal of Energy Storage*, vol. 100, nº. Part A, pp. 113567-1-113567-12. e-ISSN: 2352-152X. September 2024/October 2024.
- T. Klatzer, S. Wogrin, D.A. Tejada, G. Morales-España, "*Tight MILP formulation for pipeline gas flow with linepack*", *International Journal of Electrical Power & Energy Systems*, vol. 169, pp. 110734-1-110734-12. ISSN: 0142-0615. e-ISSN: 1879-3517. May 2025/August 2025.
- R. Komuda, Ll. Oviedo, S. Lumbreras, "*Artificial Intelligence (AI) and Christian Anthropology: where the concerns lie*", *ET-Studies*, vol. 15, nº. 1, pp. 3-27. ISSN: 2032-5215. e-ISSN: 2033-4273. December 2024.
- A. Larrañaga, C. Valor, P. Antonetti, "*The Risk of Tradition-Washing: Why Communicating Traditionality Increases Green Perceptions*", *Environmental Communication*, vol. 19, nº. 4, pp. 833-853. ISSN: 1752-4032. e-ISSN: 1752-4040. February 2025/May 2025.
- L. Lefranc, J.I. Linares, A. Santos-Montes, E.M. Arenas, C. M. Sastre, B.Y. Moratilla, "*Biohydrogen with negative CO₂ emissions from municipal solid waste for decarbonising the public bus fleet. Application to the municipality of Madrid*", *Journal of Environmental Management*, vol. 371, pp. 123258-1-123258-13. ISSN: 0301-4797. e-ISSN: 1095-8630. November 2024/December 2024.

- A. López-Aguilera, C. Morales-Polo, J. Victoria Rodríguez, M.M. Cledera-Castro, *"Assessment of Biomethane Production Potential in Spain: A Regional Analysis of Agricultural Residues, Municipal Waste, and Wastewater Sludge for 2030 and 2050"*, Sustainability, vol. 17, nº. 10, pp. 4742-1-4742-15. e-ISSN: 2071-1050. May 2025/May 2025.
- C. López, M.F. Morales Contreras, I.M. Langella, J. Alonso-Monge, *"Modeling supply chain disruptions due to geopolitical Reasons: A systematic literature review"*, Transportation Research Part E: Logistics and Transportation Review, vol. 202, pp. 104290-1-104290-30. ISSN: 1366-5545. e-ISSN: 1878-5794. July 2025/October 2025.
- I. Losa, R. Cossent, *"Scalability and replicability analysis in smart grid demonstration projects: lessons learned and future needs"*, Energies, vol. 17, nº. 21, pp. 5312-1-5312-35. e-ISSN: 1996-1073. October 2024/November 2024.
- S. Lumbreras, P. Ciller, *"Interpretable Optimization: Why and How We Should Explain Optimization Models"*, Applied Sciences, vol. 15, nº. 10, pp. 5732-1-5732-28. e-ISSN: 2076-3417. May 2025/May 2025.
- S. Lumbreras, E.C. Garrido-Merchán, *"Insights from Saint Teresa and Saint Augustine on Artificial Intelligence: discussing human interiority"*, Scientia et Fides, vol. 12, nº. 2, pp. 265-295. ISSN: 2300-7648. e-ISSN: 2353-5636. October 2024.
- S. Malacek, J. Portela, Y. Werner, S. Wogrin, *"Generating building-level heat demand time series by combining occupancy simulations and thermal modeling"*, Smart Energy, vol. 18, pp. 100181-1-100181-15. e-ISSN: 2666-9552. May 2025/May 2025.
- S.A. Mansouri, E. Nematbakhsh, A. Ramos, M. Tostado-Véliz, J.A. Aguado, j Aghaei, *"A robust ADMM-enabled optimization framework for decentralized coordination of microgrids"*, IEEE Transactions on Industrial Informatics, vol. 21, nº. 2, pp. 1479-1488. ISSN: 1551-3203. e-ISSN: 1941-0050. November 2024/February 2025.
- S.A. Mansouri, A. Ramos, J.P. Chaves, J. García-González, J.A. Aguado, *"A DSO-Driven Privacy-Preserving Mechanism for Managing Power Exchanges in Australian Networks"*, IEEE Transactions on Industrial Informatics, vol. 21, nº. 11, pp. 8673-8683. ISSN: 1551-3203. e-ISSN: 1941-0050. July 2025/November 2025.
- F.J. Martín-Campo, M.T. Ortuño Sánchez, B. Ruiz-Gonzalez, *"Medical staff planning for field hospital deployments: the START hospital"*, Journal of Humanitarian Logistics and Supply Chain Management, vol. 15, nº. 1, pp. 4-17. ISSN: 2042-6747. e-ISSN: 2042-6755. November 2024/January 2025.

- C. Martín-Sanz-Garrido, M. Revuelta-Aramburu, C. Morales-Polo, A. Santos-Montes, "*Digestate from Spanish wholesale food markets: valorization as biofertilizer and analysis of environmental impacts compared to synthetic fertilizers*", Environmental Sciences Europe, vol. 37, pp. 134-1-134-15. ISSN: 2190-4707. e-ISSN: 2190-4715. August 2025/December 2025.
- C. Martín-Sanz-Garrido, M. Revuelta-Aramburu, A. Santos-Montes, C. Morales-Polo, "*A Review on Anaerobic Digestate as a Biofertilizer: Characteristics, Production, and Environmental Impacts from a Life Cycle Assessment Perspective*", Applied Sciences, vol. 15, nº. 15, pp. 8635-1-8635-32. e-ISSN: 2076-3417. August 2025/August 2025.
- R. Marti-nez-Cruz, A.J. López López, J. Portela, "*ChatGPT vs state-of-the-art models: a benchmarking study in keyphrase generation task*", Applied Intelligence, vol. 55, nº. 1, pp. 50-1-50-25. ISSN: 0924-669X. e-ISSN: 1573-7497. November 2024/January 2025.
- R. Marti-nez-Cruz, D. Mahata, A.J. López López, J. Portela, "*Enhancing keyphrase extraction from long scientific documents using graph embeddings*", Applied Intelligence, vol. 55, nº. 10, pp. 711-1-711-18. ISSN: 0924-669X. e-ISSN: 1573-7497. May 2025/July 2025.
- M. Martínez, C. Mateo, T. Gómez, B. Alonso Santos, P. Frías, "*A hybrid particle swarm optimization approach for explicit flexibility procurement in distribution network planning*", International Journal of Electrical Power & Energy Systems, vol. 161, pp. 110215-1-110215-14. ISSN: 0142-0615. e-ISSN: 1879-3517. September 2024/October 2024.
- P. Mascherbauer, M. Martínez, C. Mateo, S. Yu, L. Kranzl, "*Analyzing the impact of heating electrification and prosumaging on the future distribution grid costs*", Applied Energy, vol. 387, pp. 125563-1-125563-15. ISSN: 0306-2619. e-ISSN: 1872-9118. March 2025/June 2025.
- M. Massano, C. Mateo, E. Macii, E. Patti, L. Bottaccioli, "*A scalable and flexible solution to evaluate the effects of the integration of photovoltaic distributed generation systems within the electrical grid*", Sustainable Energy, Grids and Networks, vol. 43, pp. 101732-1-101732-19. e-ISSN: 2352-4677. May 2025/September 2025.
- P. Mastropietro, P. Rodilla, "*Support mechanisms for low-carbon hydrogen: The risks of segmenting a commodity market*", Energy Policy, vol. 202, pp. 114605-1-114605-6. ISSN: 0301-4215. e-ISSN: 1873-6777. March 2025/July 2025.

- P. Mastropietro, P. Rodilla, "*A taxonomy of support mechanisms for the low-carbon hydrogen supply chain*", International Journal of Hydrogen Energy, vol. 105, pp. 169-178. ISSN: 0360-3199. e-ISSN: 1879-3487. January 2025/March 2025.
- J. Mazurek, P. Linares, L.A. Calvo, "*Dealing with non-reciprocal matrices in the additive and fuzzy preference relations theoretical frameworks*", International Journal of Approximate Reasoning, vol. 187, pp. 109540-1-109540-12. ISSN: 0888-613X. e-ISSN: 1873-4731. August 2025/December 2025.
- L. Mendieta-Echevarría, M.A. Sáenz-Nuño, E. M. Rubio, "*Programación en Matlab de los algoritmos para el cálculo de parámetros de rugosidad de perfiles y superficies conforme a la Normativa ISO: comparativa con otros paquetes de software*", e-medida - Revista Española de Metrología, vol. 15, nº. 26, pp. online. e-ISSN: 2341-1821. June 2025.
- J. Merladet, S. Lumbreras, A. Ramos, "*The resilient power of CSR: Sustained risk reduction despite widespread ESG adoption*", Finance Research Letters, vol. 79, pp. 107240-1-107240-9. ISSN: 1544-6123. e-ISSN: 1544-6131. March 2025/June 2025.
- M. Nour, J.P. Chaves, M. Troncia, A. Sánchez, A. Ali, "*Optimal planning and operation of energy community DERs considering local energy trading and uncertainties*", Results in Engineering, vol. 26, pp. 104881-1-104881-18. e-ISSN: 2590-1230. April 2025/June 2025.
- L. Montero, G. Morales-España, A. Bello, J. Reneses, "*Tight and compact MILP formulation for a high-resolution of start-up costs in the medium-term unit commitment*", Sustainable Energy, Grids and Networks, vol. 44, pp. 101935-1-101935-12. e-ISSN: 2352-4677. August 2025/December 2025.
- M.F. Morales Contreras, C. Bellón, L. Barcos Redín, "*Promoting insider action research: a practitioner-scholar perspective*", International Journal of Qualitative Methods, vol. 23, pp. 1-18. e-ISSN: 1609-4069. October 2024/December 2024.
- V.K. Moreno, C. Valor, J.P. Chaves, "*An incentive-based framework for small-load flexibility providers*", Renewable & Sustainable Energy Reviews, vol. 213, pp. 115479-1-115479-15. ISSN: 1364-0321. e-ISSN: 1879-0690. February 2025/May 2025.
- R. Nagpal, U. Usua, R. Palacios, A. Gupta, "*FairRAG: A Privacy-Preserving Framework for Fair Financial Decision-Making*", Applied Sciences, vol. 15, nº. 15, pp. 8282-1-8282-18. e-ISSN: 2076-3417. July 2025/August 2025.

- H. Nemati, P. Sánchez, A. Baringo, A. Ortega, *"Single-level flexible robust optimal bidding of Renewable-Only Virtual Power Plant in energy and secondary reserve markets"*, Energy, vol. 328, pp. 136421-1-136421-18. ISSN: 0360-5442. e-ISSN: 1873-6785. May 2025/August 2025.
- H. Nemati, P. Sánchez, A. Ortega, L. Sigrist, E. Lobato, L. Rouco, *"Flexible robust optimal bidding of renewable virtual power plants in sequential markets under asymmetric uncertainties"*, Sustainable Energy, Grids and Networks, vol. 43, pp. 101801-1-101801-22. e-ISSN: 2352-4677. July 2025/September 2025.
- H. Nemati, P. Sánchez, L. Sigrist, L. Rouco, A. Ortega, *"Flexible robust optimization for Renewable-only VPP bidding on electricity markets with economic risk analysis"*, International Journal of Electrical Power & Energy Systems, vol. 167, pp. 110594-1-110594-17. ISSN: 0142-0615. e-ISSN: 1879-3517. March 2025/June 2025.
- O. Oladimeji, A. Ortega, L. Sigrist, B. Marinescu, V. Thomas, *"Adaptive High-Performance Optimization Tool for Real-time Operation of Renewable-based Virtual Power Plants"*, IEEE Access, vol. 13, pp. 11479-11493. e-ISSN: 2169-3536. January 2025/December 2025.
- P.M. Ortiz-Grisales, L. Gutiérrez-León, E. Duque-Grisales, C.D. Zuluaga-Ríos, *"Dynamic Modeling Under Temperature Variations for Sustainable Air Quality Solutions: PM2.5 and Negative Ion Interactions"*, Sustainability, vol. 17, nº. 1, pp. 70-1-70-18. e-ISSN: 2071-1050. December 2024/January 2025.
- P.M. Ortiz-Grisales, L. Gutiérrez-León, C.D. Zuluaga-Ríos, *"Influence of temperature variability on the efficacy of negative ions in removing particulate matter and pollutants: an experimental database"*, Data, vol. 9, nº. 11, pp. 131-1-131-7. e-ISSN: 2306-5729. November 2024/November 2024.
- J.R. Paredes-Miguel, M. Cano-Lara, A.A. Garcia-Granada, A. Espinal, M.J. Villaseñor-Aguilar, L. Martinez-Jimenez, H. Rostro-González, *"Exploring the Role of Artificial Intelligence in Precision Photonics: A Case Study on Deep Neural Network-Based fs Laser Pulsed Parameter Estimation for MoOx Formation"*, Advanced Photonics Research, vol. 6, nº. 6, pp. 2400113-1-2400113-13. ISSN: 2699-9293. e-ISSN: 2699-9293. April 2025/June 2025.
- A. Pérez-Sánchez, R. Palacios, G. López, *"COMISET: Dataset for the analysis of malicious events in Windows systems"*, Data in Brief, vol. 61, pp. 111723-1-111723-9. e-ISSN: 2352-3409. May 2025/August 2025.
- J. Pizarroso, D. Alfaya, J. Portela, A. Muñoz, *"Metric tools for sensitivity analysis with applications to neural networks"*, Applied Soft Computing, vol. 180, pp. 113300-1-113300-19. ISSN: 1568-4946. e-ISSN: 1872-9681. May 2025/August 2025.

- B.K. Pothineni, J. Barner, G. Grundmeier, D. Contreras, M. Castro, A. Keller, *"Rapid assembly of highly ordered DNA origami lattices at mica surfaces"*, Discover Nano, vol. 20, nº. 1, pp. 77-1-77-10. e-ISSN: 2731-9229. May 2025/December 2025.
- C. Puente, I. Sánchez Pérez, E. Kolomiyets-Ludwig, C. Palacios-Castrillo, P.S.P. Wang, R. Palacios, *"Analysis of Job Offers to Measure Gender Barriers through Natural Language Processing and Soft Computing Techniques"*, International Journal of Pattern Recognition and Artificial Intelligence, vol. 39, nº. 5, pp. 2551005-1-2551005-24. ISSN: 0218-0014. e-ISSN: 1793-6381. April 2025.
- M. Rajabdorri, E. Lobato, L. Sigrist, j Aghaei, *"Data-driven continuous-time framework for frequency-constrained unit commitment"*, International Journal of Electrical Power & Energy Systems, vol. 162, pp. 110327-1-110327-11. ISSN: 0142-0615. e-ISSN: 1879-3517. October 2024/November 2024.
- M. Rajabdorri, M. Troffaes, B. Kazemtabrizi, M. Sarvarizadeh, L. Sigrist, E. Lobato, *"Data-driven estimation of the amount of under frequency load shedding in small power systems"*, Engineering Applications of Artificial Intelligence, vol. 139, nº. Part B, pp. 109617-1-109617-11. ISSN: 0952-1976. e-ISSN: 1873-6769. November 2024/January 2025.
- G.L. Rajora, M.A. Sanz-Bobi, C. Mateo, L. Bertling Tjemberg, *"An Open-Source Tool-Box for Asset Management based on the asset condition for the Power System"*, IEEE Access, vol. 13, pp. 49174-49186. e-ISSN: 2169-3536. March 2025/December 2025.
- S. Rashid, E. Bollis, L. Pellicer, D. Rabbani, R. Palacios, A. Gupta, A. Gupta, *"Evaluating Prompt Injection Attacks with LSTM-Based Generative Adversarial Networks: A Lightweight Alternative to Large Language Models"*, Machine Learning and Knowledge Extraction, vol. 7, nº. 3, pp. 77-1-77-24. e-ISSN: 2504-4990. August 2025/September 2025.
- M. Reneses, *"Subjetividad farmacéutica en tiempos de crisis en Madrid: Entre la supervivencia, la cronificación y el "Debo ser yo" "*, Salud Colectiva, vol. 21, pp. e5563-1-5563-14. ISSN: 1669-2381. e-ISSN: 1851-8265. March 2025/December 2025.
- M. Reneses, M.L. Parder, M. Riberas-Gutiérrez, N. Bueno-Guerra, *"Cyberbullying and cyberhate as an overlapping phenomenon among adolescents in Estonia and Spain: Cross-cultural differences and common risk factors"*, Children and Youth Services Review, vol. 172, pp. 108285-1-108285-9. ISSN: 0190-7409. e-ISSN: 1873-7765. April 2025/May 2025.

- M. Reneses, M. Riberas-Gutiérrez, N. Bueno-Guerra, "*“He flattered me”*. A comprehensive look into online grooming risk factors: Merging voices of victims, offenders and experts through in-depth interviews", *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, vol. 18, nº. 4, pp. 3-1-3-24. ISSN: 1802-7962. September 2024.
- M. Reneses, M. Riberas-Gutiérrez, N. Bueno-Guerra, "*¿Quién comparte fake news? Consumo y distribución de información entre adolescentes y su relación con el discurso de odio*", *Revista de Educación*, vol. 1, nº. 406, pp. 265-291. ISSN: 0034-8082. e-ISSN: 1988-592X. September 2024.
- M. Reneses, M. Riberas-Gutiérrez, N. Bueno-Guerra, "*“It’s just a joke”: gender, sexuality and trivialisation in adolescent online violence such as cyberhate, cyberbullying, and online grooming*", *Humanities and Social Sciences Communications*, vol. 12, pp. 740-1-740-14. e-ISSN: 2662-9992. May 2025/December 2025.
- F. Retorta, J. Mello, C. Gouveia Aguiar, B. Silva, J. Villar, M. Troncia, J.P. Chaves, "*Local flexibility markets based on grid segmentation*", *Utilities Policy*, vol. 96, pp. 102029-1-102029-18. ISSN: 0957-1787. e-ISSN: 1878-4356. August 2025/October 2025.
- J. Rico, M. Hermanns, "*Thermal interaction of slender geothermal boreholes with strong groundwater flows*", *International Journal of Heat and Mass Transfer*, vol. 253, pp. 127418-1-127418-24. ISSN: 0017-9310. e-ISSN: 1879-2189. July 2025/December 2025.
- M.A. Rios-Ocampo, J.C. Romero, E. Centeno, S. Mora Rosado, "*A just energy transition is not just a transition: Framing energy justice for a quantitative assessment*", *Energy Research & Social Science*, vol. 119, pp. 103900-1-103900-17. ISSN: 2214-6296. e-ISSN: 2214-6326. December 2024/January 2025.
- M. Robin, J. Renedo, J.C. González-Torres, A. García-Cerrada, L. Rouco, A. Benchaib, P. García-González, "*Addressing intra-area oscillations and frequency stability after DC segmentation of a large AC power system*", *International Journal of Electrical Power & Energy Systems*, vol. 165, pp. 110467-1-110467-11. ISSN: 0142-0615. e-ISSN: 1879-3517. January 2025/April 2025.
- F. Rodríguez-Cuenca, E.F. Sánchez-Úbeda, J. Portela, A. Muñoz, V. Guizien, A. Veiga, A. Mateo, "*Television usage recommendations for energy efficiency: A Probabilistic methodology based on the Wasserstein distance*", *Energy*, vol. 322, pp. 135410-1-135410-13. ISSN: 0360-5442. e-ISSN: 1873-6785. March 2025/May 2025.

- E. Rodríguez-Fernández, S.N. Santalla, M. Castro, R. Cuerno, *"Anomalous dynamic scaling of Ising interfaces"*, Journal of Statistical Mechanics: Theory and Experiment, vol. 2025, nº. 1, pp. 013215-1-013215-23. e-ISSN: 1742-5468. January 2025/January 2025.
- A.F. Rodríguez Matas, C. Ruiz, P. Linares, M. Pérez-Bravo, *"How energy strategies are shaped by the correlation of uncertainties"*, Applied Energy, vol. 382, pp. 125257-1-125257-11. ISSN: 0306-2619. e-ISSN: 1872-9118. January 2025/March 2025.
- N. Rodríguez Pérez, J. Matanza, L. Sigrist, J.L. Rueda Torres, G. López, *"MaDIoT 3.0: Assessment of Attacks to Distributed Energy Resources and Demand in a Power System"*, IEEE Open Access Journal of Power and Energy, vol. 12, pp. 552-563. e-ISSN: 2687-7910. August 2025/December 2025.
- J.R. Zaldivar, G. Loroño, J.R. Jiménez-Octavio, S. Dorado, A. Arias, *"Computational fluid dynamics analysis of conventional irrigation and the combination with adjuvant suction cannulas in human molars with isthmus communication"*, Odontology, vol. 113, pp. 996-1002. ISSN: 1618-1247. e-ISSN: 1618-1255. November 2024/July 2025.
- I. Rodríguez-Muñoz-de-Baena, M. Coronado-Vaca, E. Vaquero Lafuente, *"Fine-tuning transformer models for M&A target prediction in the U.S. ENERGY sector"*, Cogent Business & Management, vol. 12, nº. 1, pp. 2487219-1-2487219-29. e-ISSN: 2331-1975. April 2025/December 2025.
- M.A. Rojo-Yepes, C.D. Zuluaga-Ríos, S.D. Saldarriaga-Zuluaga, J.M. López-Lezama, N. Muñoz-Galeano, *"A novel neuro-probabilistic framework for energy demand forecasting in Electric Vehicle integration"*, World Electric Vehicle Journal, vol. 15, nº. 11, pp. 493-1-493-18. e-ISSN: 2032-6653. October 2024/November 2024.
- M. Romeo Monterde, E. F. Álvarez, M. Valarezo, *"Non-Firm Grid Connections: A Review of Access Types, Mechanisms, and Regulatory Frameworks"*, Current Sustainable/Renewable Energy Reports, vol. 12, nº. 1, pp. 23-1-23-12. e-ISSN: 2196-3010. August 2025/December 2025.
- J. Romero-Luis, J.L. Rubio-Tamayo, A. Sánchez-Acedo, D.L. Wuebben, V. Codesido-Linares, *"Virtual, Augmented, and Extended Reality Applied to Science Communication: A Systematic Literature Review"*, IEEE Transactions on Visualization and Computer Graphics, vol. 31, nº. 10, pp. 8359-8371. ISSN: 1077-2626. e-ISSN: 1941-0506. May 2025/October 2025.
- J.C. Romero, P. Linares, A.F. Rodríguez Matas, M. Pérez-Bravo, *"Illustrating the conflicts between energy poverty and decarbonisation in the energy transition. A case example in Spain"*, Energy, vol. 314, pp. 134204-1-134204-11. ISSN: 0360-5442. e-ISSN: 1873-6785. December 2024/January 2025.

- S. Rosado, L. Camporro, L. Gullón, S. Oñate, L.F. Mazadiego, J. Llamas, B.Y. Moratilla, S. Lumberras, *"Assessing the business potential, price volatility and supply chain challenges of silicon metal in the European Union"*, Detritus, vol. 29, pp. 145-149. ISSN: 2611-4127. e-ISSN: 2611-4135. December 2024/December 2024.
- H. Rostro-González, G. Reyes-Pozo, J.M. Puigoriol-Forcada, F.J. López-Valdés, S.S. Sundarram, A.A. Garcia-Granada, *"Additive manufacturing Gyroid structures used as crash energy management"*, Computation, vol. 12, nº. 12, pp. 248-1-248-21. e-ISSN: 2079-3197. December 2024/December 2024.
- L. Rouco, L. Sigrist, A. García-Cerrada, *"Generación conectada a la red a través de convertidores electrónicos de potencia con emulación del comportamiento de los generadores síncronos: el control grid-forming y el problema de la sincronización de los convertidores a la red"*, Cuadernos de Energía, nº. 79, pp. 119-128. ISSN: 1698-3009. March 2025.
- J.L. Rubio-Tamayo, M. Gertrudix, D.L. Wuebben, *"Immersive Scientific Communication: A Multidimensional Theoretical Model for Approaching Extended Reality as a Medium"*, Presence: Virtual and Augmented Reality, vol. 34, pp. 135-157. ISSN: 1054-7460. e-ISSN: 1531-3263. March 2025.
- M.A. Sáenz-Nuño, C. Puente-Rueda, E. M. Rubio, *"The Characterization of Surface Texture in Laser Bamboo Engraving: A Metrological Approach"*, Coatings, vol. 15, nº. 6, pp. 624-1-624-35. e-ISSN: 2079-6412. May 2025/June 2025.
- J.L. Sancha Gonzalo, *"Reducir la factura de la luz con autoconsumo y almacenamiento"*, Cuadernos de Energía, nº. 79, pp. 71-92. ISSN: 1698-3009. March 2025.
- E. Sánchez, R. Calderón, F. Herrera, *"Artificial Intelligence Adoption in SMEs: Survey Based on TOE–DOI Framework, Primary Methodology and Challenges"*, Applied Sciences, vol. 15, nº. 12, pp. 6465-1-6465-43. e-ISSN: 2076-3417. June 2025/June 2025.
- J. Sánchez Del Río Sáez, V. Aragonés, T. Sánchez Villaluenga, L. Dávila-Gómez, S. Paramio, A. Vázquez-López, Y. Ballesteros, V. Martínez, J.L. Jiménez, A. Yusuf, X. Li, X. Ao, J. Xiu, D.Y. Wang, *"Wi-Fi/LoRa communication systems for fire and seismic-risk mitigation and health monitoring"*, Frontiers in Detector Science and Technology, vol. 3, pp. 1484647-1-1484647-17. e-ISSN: 2813-8031. February 2025/December 2025.

- J. Sánchez Del Río Sáez, A. Vázquez-López, A. López Laguna, M. Andolfi, R. Cascón Porres, F. Santos Olalla, S. Paramio, Y. Ballesteros, C. Cruz, V. Martínez, J.L. Jiménez, X. Ao, D.Y. Wang, "*A low frequency seismic triboelectric energy nano-generator used in slow and higher ground motion*", Results in Engineering, vol. 27, pp. 105845-1-105845-19. e-ISSN: 2590-1230. June 2025/September 2025.
- P. Sánchez, A. Bellogín, "*Smart imputation, better recommendations: improving traditional Point-of-Interest recommendation through data augmentation*", ACM Transactions on Intelligent Systems and Technology, vol. 16, nº. 4, pp. 95-1-95-35. ISSN: 2157-6904. e-ISSN: 2157-6912. June 2025/August 2025.
- D. Sánchez Sánchez, D. Alfaya, J. Pizarroso, "*Motives meet SymPy: studying -ring expressions in Python*", Electronic Research Archive, vol. 33, nº. 4, pp. 2118-2147. e-ISSN: 2688-1594. April 2025/December 2025.
- A. Santos-Montes, Y. González-Arechavala, C. M. Sastre, L. Lefranc, J.I. Linares, "*Life cycle assessment of clinker and cement production in Spain. Environmental assessment of decarbonisation measures*", Cleaner Environmental Systems, vol. 18, pp. 100290-1-100290-14. e-ISSN: 2666-7894. June 2025/September 2025.
- M. Sarvarizadeh, M. Rajabdorri, E. Lobato, L. Sigrist, B. Kazemtabrizi, M. Troffaes, "*Under frequency load shedding aware unit commitment in island power systems*", International Journal of Electrical Power & Energy Systems, vol. 170, pp. 110884-1-110884-15. ISSN: 0142-0615. e-ISSN: 1879-3517. July 2025/September 2025.
- S. Sochor, J.R. Jiménez-Octavio, C.J. Carpintero-Rubio, M. Sochor, J.M. Asensio-Gil, C. Rodríguez-Morcillo, F.J. López-Valdés, "*Human Cervical Intervertebral Disc Pressure Response During Non-Injurious Quasistatic Motion: A Feasibility Study*", Applied Sciences, vol. 15, nº. 11, pp. 6167-1-6167-17. e-ISSN: 2076-3417. May 2025/June 2025.
- P. Sofokleous, E. Paz, F.J. Herraiz-Martínez, "*Design and manufacturing of dielectric resonators via 3D printing of composite polymer/ceramic filaments*", Polymers, vol. 16, nº. 18, pp. 2589-1-2589-20. e-ISSN: 2073-4360. September 2024/September 2024.
- S. Sorbet Santiago, J. Cifuentes, "*Deep learning-based gesture recognition for surgical applications: A data augmentation approach*", Expert Systems, vol. 41, nº. 12, pp. e13706-1-e13706-21. ISSN: 0266-4720. e-ISSN: 1468-0394. September 2024/December 2024.

- Joan B. Soriano, A. Peláez, S. Lumbreras, E. Fernández, J. Ancochea, "*Modest versus significant excess mortality due to COVID-19 deaths in Europe*", *Lancet Regional Health - Europe*, vol. 45, pp. 101060-1-101060-2. e-ISSN: 2666-7762. September 2024/October 2024.
- D. Stampatori, N. Rossetto, "*From hesitation to participation: examining behavioural barriers to engage customers in flexibility markets*", *Current Sustainable/Renewable Energy Reports*, vol. 11, n^o. 4, pp. 127-135. e-ISSN: 2196-3010. September 2024/December 2024.
- A. Street, J.M. Arroyo, N. Alguacil, L.A. Barroso, "*Robustness: The Missing Ingredient in Generation Scheduling*", *IEEE Power and Energy Magazine*, vol. 23, n^o. 3, pp. 31-43. ISSN: 1540-7977. e-ISSN: 1558-4216. April 2025/June 2025.
- J. Suárez-Porras, F. Fernández-Bernal, L. Rouco, A. Tomás-Martín, "*Synchronous Compensators Considering Reactive Power for PLL Stability Improvement and Short-Circuit Ratio Evaluation*", *IEEE Transactions on Energy Conversion*, vol. on-line, ISSN: 0885-8969. e-ISSN: 1558-0059. June 2025.
- C. Tais, J. Fontana, L. Molisani, R. O'Brien, Y. Ballesteros, R. Caro, J.C. del Real-Romero, "*Flaw classification in bonded joints using multivariate statistical analysis and artificial intelligence*", *International Journal of Adhesion and Adhesives*, vol. 140, pp. 104032-1-104032-11. ISSN: 0143-7496. e-ISSN: 1879-0127. April 2025/June 2025.
- W. Talbot, J. Nubert, T. Tuna, C. Cadena, F. Dümbgen, J. Tordesillas Torres, "*Continuous-Time State Estimation Methods in Robotics: A Survey*", *IEEE Transactions on Robotics*, vol. 41, pp. 4975-4999. ISSN: 1552-3098. e-ISSN: 1941-0468. July 2025/December 2025.
- D.A. Tejada, J. Kiviluoma, G. Morales-España, "*Debunking the speed-fidelity trade-off: Speeding-up large-scale energy models while keeping fidelity*", *International Journal of Electrical Power & Energy Systems*, vol. 168, pp. 110674-1-110674-12. ISSN: 0142-0615. e-ISSN: 1879-3517. April 2025/July 2025.
- A. Tomás-Martín, C.D. Zuluaga-Ríos, J. Suárez-Porras, B. Kazemtabrizi, J. García-Aguilar, L. Sigríst, A. García-Cerrada, "*A vector-based flexible-complexity tool for simulation and small-signal analysis of hybrid AC/DC power systems*", *Sustainable Energy, Grids and Networks*, vol. 43, pp. 101817-1-101817-12. e-ISSN: 2352-4677. July 2025/September 2025.

- M. Torres-Pérez, J. Domínguez, L. Arribas, J. Amador, P. Ciller, A. González-García, *"A geospatial clustering algorithm and its integration into a techno-economic rural electrification planning model"*, Engineering Applications of Artificial Intelligence, vol. 137, n°. Part B, pp. 109249-1-109249-22. ISSN: 0952-1976. e-ISSN: 1873-6769. September 2024/November 2024.
- M. Tostado-Véliz, S.A. Mansouri, A.R. Jordehi, S.A. Habeeb, F. Jurado, *"A risk-aware P2P platform involving distributed generators, energy communities and storage assets"*, Journal of Energy Storage, vol. 100, n°. Part A, pp. 113606-1-113606-15. e-ISSN: 2352-152X. September 2024/October 2024.
- P. Tuero, J.B. Tjernshaugen, C. Sánchez, C. González-Ruano, Y. Lu, J. Linder, F. Aliev Kazanski, *"Large Tunable Thermoelectric Effects in Superconducting Spin Valves with Commercially Available Materials"*, PRX Energy, vol. 4, n°. 3, pp. 033003-1-033003-10. ISSN: 2768-5608. July 2025/September 2025.
- C. Valor, J. Martín-Magdalena, L. Lazcano, C. Bada, *"Rhetorical use of displayed emotions in resource mobilization: A proposal of a pedagogy"*, International Journal of Management Education, vol. 23, n°. 2, pp. 101165-1-101165-17. ISSN: 1472-8117. e-ISSN: 2352-3565. March 2025/July 2025.
- C. Valor, V.K. Moreno, L. Ruiz, *"Schemes for Flexibility Provision Among Residential Consumers: Value Propositions for Automated Flexibility"*, Current Sustainable/Renewable Energy Reports, vol. 12, n°. 1, pp. 3. e-ISSN: 2196-3010. February 2025/December 2025.
- C. Valor, R. Redondo, I. Carrero, *"Workplace greenery and employee green behavior: a moderated-mediation model"*, Management Research Review, vol. 48, n°. 5, pp. 726-745. ISSN: 2040-8269. e-ISSN: 2040-8277. March 2025/March 2025.
- C. Valor, R. Redondo, I. Carrero, *"Explaining the influence of biophilic design on employee well-being"*, Scientific Reports, vol. 14, pp. 32090-1-32090-9. e-ISSN: 2045-2322. December 2024/December 2024.
- C. Valor, L. Ronda, C. Abril, *"Moral Dramas as a Sustainable Communication Genre: An Analysis of its (Dys)Functionalities"*, Journal of Macromarketing, vol. 45, n°. 3, pp. 107-431. ISSN: 0276-1467. e-ISSN: 1552-6534. June 2025/September 2025.
- N.C. Verdugo Rojas, D. Roch Dupré, E. Aracil, *"Cultivating Spirituality in Organizations: The Role of Spiritual Discernment"*, Journal of Management Spirituality & Religion, vol. 22, n°. 3, pp. 373-389. ISSN: 1476-6086. e-ISSN: 1942-258X. December 2024/May 2025.

- J. Villacampa-Porta, M. Coronado-Vaca, E.C. Garrido-Merchán, *"Impact of EU non-financial reporting regulation on Spanish companies' environmental disclosure: a cutting-edge natural language processing approach"*, Environmental Sciences Europe, vol. 37, pp. 29-1-29-33. ISSN: 2190-4707. e-ISSN: 2190-4715. February 2025/December 2025.
- G. Wang, R. Chalard, J. Cifuentes, M.T. Pham, *"Learning an inverse thermodynamic model for Pneumatic Artificial Muscles control"*, Mechatronics, vol. 110, pp. 103359-1-103359-6. ISSN: 0957-4158. e-ISSN: 1873-4006. June 2025/October 2025.
- D.L. Wuebben, D.L. Calcagno, M. Henry, *"Planning for energy justice? A discourse analysis of energy planning and climate policy in South America"*, Applied Energy, vol. 393, pp. 126041-1-126041-10. ISSN: 0306-2619. e-ISSN: 1872-9118. May 2025/September 2025.
- D.L. Wuebben, E. Wang, E. Gómez Domingo, J. Romero-Luis, *"Diverging paths, converging goals: Framing crisis to kairos in Bill Gates's and Greta Thunberg's climate discourse"*, Energy Research & Social Science, vol. 118, pp. 103747-1-103747-12. ISSN: 2214-6296. e-ISSN: 2214-6326. September 2024/December 2024.
- J. Xu, A. Vázquez-López, J. Sánchez Del Río Sáez, J. de la Vega, I. Collado, S. G. Prolongo, R. Giannetti, J. Wu, D.Y. Wang, *"Single-Walled Carbon Nanohorns Functionalization of PVA/PDMS for Flexible Triboelectric Nanogenerators: IoT Remote Gait Sensor"*, Polymer Composites, vol. 46, nº. 15, pp. 14310-14320. ISSN: 0272-8397. e-ISSN: 1548-0569. May 2025/October 2025.
- L. Yagüe, J.I. Linares, E.M. Arenas, J.C. Romero, *"Biohydrogen production through biomethane steam reforming with CCUS for decarbonizing Spain's tile industry"*, Results in Engineering, vol. 24, pp. 103361-1-103361-18. e-ISSN: 2590-1230. November 2024/December 2024.
- S. Yamujala, M. J. Koivisto, M. Korpas, M. McPherson, N. Helistö, D. Lew, D.A. Tejada, G. Morales-España, D. Flynn, B. Frew, T. Heggarty, J. Kiviluoma, H. Holttinen, *"Synergies and trade-offs between storage, transmission, and sector coupling in high renewable energy systems"*, Energy, vol. 334, pp. 137701-1-137701-19. ISSN: 0360-5442. e-ISSN: 1873-6785. July 2025/October 2025.
- S. Yeh, S. Paltsev, J. Reilly, D. Daniels, P. Linares, *"Rethinking resilience of low-carbon transportation using a multi-system dynamics approach"*, Joule, vol. 9, nº. 7, pp. 101999. ISSN: 2542-4785. e-ISSN: 2542-4351. June 2025/July 2025.

- M. Zedan, M. Nour, G. Shabib, L. Nasrat, A.A. Ali, "*Review of peer-to-peer energy trading: Advances and challenges*", e-Prime - Advances in Electrical Engineering, Electronics and Energy, vol. 10, pp. 100778-1-100778-22. e-ISSN: 2772-6711. September 2024/December 2024.
- H. Zen, R. Wagh, M. Wanderley, G. Bicalho, R. Park, M. Sun, R. Palacios, L. Carvalho, G. Rinaldo, A. Gupta, "*Ensemble-Based Biometric Verification: Defending Against Multi-Strategy Deepfake Image Generation*", Computers, vol. 14, nº. 6, pp. 225-1-225-27. e-ISSN: 2073-431X. June 2025/June 2025.
- C.D. Zuluaga-Ríos, "*A modified and extended genetic algorithm for optimal distributed generation grid-integration solutions in direct current power grids*", e-Prime - Advances in Electrical Engineering, Electronics and Energy, vol. 10, pp. 100857-1-100857-6. e-ISSN: 2772-6711. November 2024/December 2024.
- C.D. Zuluaga-Ríos, C. Guarnizo-Lemus, "*Data-driven approaches for generating probabilistic short-term renewable energy scenarios*", Computers and Electrical Engineering, vol. 120, nº. Part C, pp. 109817-1-109817-18. ISSN: 0045-7906. e-ISSN: 1879-0755. November 2024/December 2024.

3.3.4 Conference presentations

- R. Trevisan, E. Ghiani, M. Galici, F. Pilo, "*Uncertain Decision Making: A Cooperative Agent Model For Flexible Renewable Energy Communities*", Communication in 59th International Universities Power Engineering Conference - UPEC 2024. Cardiff (United Kingdom). 02-06 September 2024. ISBN: 979-8-3503-7974-7. e-ISBN: 979-8-3503-7973-0.
- S. Sasanpour, M. Wetzel, K.K. Cao, A. Ramos, "*Decomposition of stochastic energy system optimization models – time-splitting in Benders Decomposition vs. PIPS-IPM++*", Communication in International Conference on Operations Research - OR 2024. Munich (Germany). 03-06 September 2024.
- P. Sofokleous, F.J. Herraiz-Martínez, E. Paz, E. Márquez-Segura, P. Padilla, M. Pérez-Escribano, "*A 3D-printed prototype of a miniaturized top-metalized rectangular Dielectric Resonator Antenna*", Communication in XXXIX Simposio Nacional de la Unión Científica Internacional de Radio - URSI 2024. Cuenca (Spain). 04-06 September 2024. e-ISBN: 978-84-09-62953-4.
- L. Bagherzadeh, S.A. Mansouri, I. Kamwa, A.R. Jordehi, "*A decentralized business model for integrating energy hubs into flexibility markets within renewable-based smart grids*", Communication in 7th International Conference on Smart Energy Systems and Technologies - SEST 2024. Turin (Italy). 10-12 September 2024. ISBN: 979-8-3503-8650-9. e-ISBN: 979-8-3503-8649-3.

- A. García-Cerezo, L. Baringo, D. Bonilla, J. García-González, *"Building bidding curves for an EV aggregator via stochastic adaptive robust optimization"*, Communication in 7th International Conference on Smart Energy Systems and Technologies - SEST 2024. Turin (Italy). 10-12 September 2024. ISBN: 979-8-3503-8650-9. e-ISBN: 979-8-3503-8649-3.

- J.M. Asensio-Gil, E. Jokubaityte, M. Valdano, N. Oleaga Ortega, L. Llobet-Cusí, F.J. López-Valdés, C.M. Vives-Torres, J. Alvarez-Fernandez, *"Parametric study on the influence of impact energy and inflation pressure on the effectiveness of a cervical airbag"*, Communication in International Research Council on Biomechanics of Injury - IRCOBI Europe 2024. Stockholm (Sweden). 11-13 September 2024. ISSN: 2235-3151.

- F.J. López-Valdés, J.R. Jiménez-Octavio, C.M. Vives-Torres, J. Alvarez-Fernandez, J.M. Asensio-Gil, M. Valdano, C. Rodríguez-Morcillo, M. Östling, M. Lebarbé, M. Masuda, P. Beillas, A. Eggers, P. Petit, P. Lemmen, O. Richard, *"The impact response of four male PMHS to frontal impacts in reclined positions"*, Communication in International Research Council on Biomechanics of Injury - IRCOBI Europe 2024. Stockholm (Sweden). 11-13 September 2024. ISSN: 2235-3151.

- B. Pipkorn, M. Valdano, M. Östling, L. Eriksson, M. Videby, F.J. López-Valdés, *"Sled tests for development of HIII CAE dummy certification method"*, Communication in International Research Council on Biomechanics of Injury - IRCOBI Europe 2024. Stockholm (Sweden). 11-13 September 2024. ISSN: 2235-3151.

- M. Valdano, M. Östling, L. Eriksson, F.J. López-Valdés, B. Pipkorn, *"Preparing for virtual testing for crashworthiness: proposing a method for certifying ATD models for frontal crash assessments"*, Communication in International Research Council on Biomechanics of Injury - IRCOBI Europe 2024. Stockholm (Sweden). 11-13 September 2024. ISSN: 2235-3151.

- M.A. Sáenz-Nuño, O. Martín Carrasquilla, M.R. Salas Labayen, M.V. Montes Gan, N. López Salas, R. Arroyo Sanz, E. M. Rubio, *"Estrategia para la información y difusión del patrimonio geominero español mediante técnicas de realidad virtual portable en dispositivos móviles"*, Communication in XX / XXIV Congreso Internacional sobre Patrimonio Geológico y Minero / Sesión Científica de la SEDPGYM. Madrid (Spain). 15-18 September 2024.

- C. Tais, J. Fontana, L. Molisani, R. O'Brien, Y. Ballesteros, J.C. del Real-Romero, *"Damage clasification in composite materials using neural networks"*, Communication in IEEE Biennial Congress of Argentina - ARGENCON 2024. San Nicolás de los Arroyos (Argentina). 18-20 September 2024. ISBN: 979-8-3503-6594-8. e-ISBN: 979-8-3503-6593-1.

- Y. González-Arechavala, *"Aprendiendo a servir desde la Ingeniería con Propósito: una experiencia de seis años con estudiantes de ingeniería"*, Communication in XII/VI Congreso Nacional e Internacional de Aprendizaje-Servicio Universitario - APSU 2024. Palma de Mallorca (Spain). 25-27 September 2024.
- E.M. Arenas, M. Muñoz, A. Cantizano, J.I. Linares, M.J. Montes, A.J. Rovira, *"Preliminary design of S-CO₂ turbomachinery and its influence on the performance of an integrated solar combined cycle"*, Communication in 30th International Conference on Concentrating Solar Power and Chemical Energy Systems - SolarPACES 2024. Rome (Italy). 08-11 October 2024.
- S. Hashemi, M. Panteli, M. Baù, E. Ciapessoni, D. Cirio, A. Pitto, G. Bakhos, N. Barla, A. Bouchaib, B. Ismail, P.M. Namara, C. MacIver, A. García-Cerrada, S. Rezaeian-Marjani, L. Sigrist, *"Tools for Reliability and Resilience-oriented planning and operation of hybrid AC/DC power systems"*, Communication in IEEE PES International Conference on Innovative Smart Grid Technologies Europe - ISGT Europe 2024. Dubrovnik (Croatia). 14-17 October 2024. ISBN: 979-8-3503-9043-8. e-ISBN: 979-8-3503-9042-1.
- H. Nemati, P. Sánchez, L. Sigrist, A. Ortega, *"Impact of uncertain data in robust optimal bidding of RVPP in energy and reserve markets"*, Communication in IEEE PES International Conference on Innovative Smart Grid Technologies Europe - ISGT Europe 2024. Dubrovnik (Croatia). 14-17 October 2024. ISBN: 979-8-3503-9043-8. e-ISBN: 979-8-3503-9042-1.
- J.L. Gómez, E. Marcoulaki, M. Konstantinidou, A. Cantizano, R. Caro, M. Castro, *"Risk mitigation of wildfire-driven natech events with optimally localized wireless sensor networks in the wildland-industrial interface"*, Poster in Meeting of the Spanish Section of the Combustion Institute - SEIC24. Madrid (Spain). 17-18 October 2024.
- S. Bindu, J.P. Chaves, L. Olmos, T. Gómez, *"The need for system balance restoration after congestion management: an examination of Iberian congestion management markets"*, Communication in 14th Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion - MEDPOWER 2024. Athens (Greece). 03-06 November 2024. e-ISSN: 2732-4494.
- T. Ferrucci, M. Troncia, J.L. Alcañiz Pérez, J.P. Chaves, D. Lagos, S. Pantelis, J. Eichman, D. Poli, D. Fioriti, *"Integrating energy communities into the electricity market: overcoming barriers and enhancing flexibility in Spain, Italy, and Greece"*, Communication in 14th Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion - MEDPOWER 2024. Athens (Greece). 03-06 November 2024. e-ISSN: 2732-4494.

- T. Freire-Barceló, F. Martín, M. Rivier, "*Exploring a 2030 nearly 100% renewable Spanish electricity system from a capacity-mix adequacy perspective*", Communication in 14th Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion - MEDPOWER 2024. Athens (Greece). 03-06 November 2024. e-ISSN: 2732-4494.
- J. Gutiérrez, J.P. Chaves, A. Ramos, "*Biomass top-cycle CHP with hightemperature heat pump coupling: economic insights for industrial decarbonization*", Communication in 14th Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion - MEDPOWER 2024. Athens (Greece). 03-06 November 2024. e-ISSN: 2732-4494.
- E.C. Ormeño-Mejía, M. Troncia, J.P. Chaves, M. Valarezo, M. Galici, "*Integrating third-party flexibility resources into distribution networks: a quantitative assessment on the interactions of network tariffs and local markets*", Communication in 14th Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion - MEDPOWER 2024. Athens (Greece). 03-06 November 2024. e-ISSN: 2732-4494.
- L. Rouco, L. Sigrist, A. Benítez Domínguez, F.M. Echavarren, I. Egido, E. Lobato, "*Understanding generator droop voltage control*", Communication in 14th Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion - MEDPOWER 2024. Athens (Greece). 03-06 November 2024. e-ISSN: 2732-4494.
- M. Rodríguez, J. Ruiz-Tova, Y. Ortega Latorre, P. Huerta Cebrián, J.R. Jiménez-Octavio, "*Innovación y tradición para la enseñanza de anatomía*", Communication in VI Congreso Internacional de Innovación Docente e Investigación en Educación Superior - CIDICO. Seville (Spain). 05-09 November 2024.
- J. Bagajo, C. Schwarke, V. Klemm, I. Georgiev, J.P. Sleiman, J. Tordesillas Torres, "*DiffSim2Real: Deploying Quadrupedal Locomotion Policies Purely Trained in Differentiable Simulation*", Communication in 2024 Conference on Robot Learning Workshop - CoRL Workshop. Munich (Germany). 09 November 2024.
- J.M. Asensio-Gil, J.R. Jiménez-Octavio, A. Carnicero, C. Rodríguez-Morcillo, "*E-scooter rider average positioning investigation for biomechanical research*", Communication in 68th AAAM Annual Scientific Conference - AAAM 2024. Seoul (South Korea). 11-14 November 2024.
- F.J. López-Valdés, "*Head and spinal kinematics of young and elderly volunteers in low-speed frontal tests*", Communication in 68th AAAM Annual Scientific Conference - AAAM 2024. Seoul (South Korea). 11-14 November 2024.

- C.M. Vives-Torres, M. Valdano, J.R. Jiménez-Octavio, F. Forriol Campos, F.J. López-Valdés, "*The effect of seatbelt pre-tensioners and load limiters in the occurrence of MAIS 2+ and MAIS 3+ abdominal injuries in real-world frontal crashes*", Communication in 68th AAAM Annual Scientific Conference - AAAM 2024. Seoul (South Korea). 11-14 November 2024.
- S. Herreros, D. Alfaya, J. Pizarroso, J. Portela, J. Rodrigo, "*Isomorphisms between moduli spaces of parabolic vector bundles*", Poster in Reunión Red Temática de Geometría y Física - RTGF 2024. Madrid (Spain). 26-29 November 2024.
- C. Baumann, R. Barrella, J.C. Romero, "*Unveiling energy poverty in Southern Europe: indicators, vulnerability factors, and policy implications*", Communication in 8th AIEE Energy Symposium «Current and Future Challenges to Energy Security». Padua (Italy). 28-30 November 2024. ISBN: 978-88-942781-8-7.
- F.J. López-Valdés, M. Valdano, S. Ferris, I. Tomasi, D. Scaldaferro, "*Assessing the tensile and flexion behavior of the neck of the PIPER pediatric human body model*", Communication in 22nd Protection of Children in Cars Conference - POCC 2024. Munich (Germany). 09-11 December 2024.
- D. Alfaya, E. Alonso, S. Cano Casanova, M. Oliva Calero, J. Rodrigo, E. Santaolalla Pascual, B. Urosa Sanz, M. Villanueva Pesqueira, "*Maths Team Contest (MTC): Collaborative problem-solving in mathematics education*", Communication in 2024 Teaching Europe Conference. Marburg (Germany) Online. 12-13 December 2024.
- A.O. Olasoji, D.T.O. Oyedokun, M. Rajabdorri, J.E. Sierra-Aguilar, "*Investigating inclusion of linear sensitivity factors in analytical frequency constrained unit commitment formulation*", Paper in 33rd Southern African Universities Power Engineering Conference - SAUPEC 2025. Pretoria (South Africa). 29-30 January 2025. ISBN: 979-8-3315-3517-9. e-ISBN: 979-8-3315-3516-2.
- M. Castro, "*The statistical physics of virus-endosome dynamics*", Communication in 3ª Reunión de la Sociedad Española de Sistemas Complejos - CS3. Madrid (Spain). 19-21 February 2025.
- S. Lumbreras, "*Complex network techniques for transmission expansion and vulnerability assessment*", Poster in 3ª Reunión de la Sociedad Española de Sistemas Complejos - CS3. Madrid (Spain). 19-21 February 2025.
- M. Hermanns, J. Rico, "*Thermal interaction of geothermal boreholes with groundwater flows at peclet numbers of order unity*", Communication in 10th Thermal and Fluids Engineering Conference - TFEC 2025. Washington (United States of America). 09-12 March 2025. e-ISBN: 978-1-56700-549-3.

- J.C. González-Torres, G. Bakhos, F. Perez, A. Benchaib, L. Sigrist, R. Dimitrovski, *"Enhancing AC Line Emulation controls for improved inter-area oscillation damping and application to Multi-Terminal DC Grids"*, Communication in 22nd IET International Conference on AC and DC Power Transmission - ACDC 2025. Birmingham (United Kingdom). 17-19 March 2025. e-ISBN: 978-1-83724-263-4.
- S. Rezaeian-Marjani, L. Sigrist, A. García-Cerrada, S. Galvani, *"A conditional value at risk-based optimal power flow in hybrid AC/DC power systems"*, Poster in 22nd IET International Conference on AC and DC Power Transmission - ACDC 2025. Birmingham (United Kingdom). 17-19 March 2025. e-ISBN: 978-1-83724-263-4.
- A. Peláez, S. Lumbreras, J. Ancochea, E. Fernández, Joan B. Soriano, *"Post-Pandemic Changes in Respiratory Mortality in Spain"*, Poster in 2025 REG Summit. London (United Kingdom). 20-22 March 2025.
- P. Sánchez, J. Sanz-Cruzado, A. Bellogín, *"Improving Novelty and Diversity of Nearest-Neighbors Recommendation by Exploiting Dissimilarities"*, Paper in 47th European Conference on Information Retrieval - ECIR 2025. Lucca (Italy). 06-10 April 2025. ISBN: 978-3-031-88716-1. e-ISBN: 978-3-031-88717-8.
- L. Rouco, A. Benítez Domínguez, F. Gegúndez Nogueroles, I. Egido, E. Lobato, *"Grid Connection of Renewable Energy Sources, Harvesting Grids, and Voltage Control"*, Poster in IEEE PES Energy & Policy Forum. Washington (United States of America). 14-17 April 2025.
- P. Mastropietro, P. Rodilla, C. Batlle, *"Long-term Regulatory Instruments for Electricity Storage and Their Impact on the Smart Operation of Energy Storage Technologies"*, Communication in Joint Workshop EERA ES-e3s-CSP-DfE. Madrid (Spain). 13-14 May 2025.
- S. Lumbreras, *"Emergent phenomena in computation: from entrophy to artificial consciousness?"*, Paper in 5th International Conference on Philosophy of Mind - ICPM. Porto (Portugal). 15-21 May 2025.
- K. Kondo, C.T. Tewari, A. Tagliabue, J. Tordesillas Torres, P.C. Lusk, J.P. How, *"PRIMER: Perception-Aware Robust Learning-based Multiagent Trajectory Planner"*, Communication in IEEE International Conference on Robotics and Automation - ICRA 2025. Atlanta (United States of America). 19-23 May 2025. ISBN: 979-8-3315-4140-8. e-ISBN: 979-8-3315-4139-2.
- L. Delgado San Martín, M.A. Sáenz-Nuño, A. Esteban Temprano, I. de Castro Asensio, T.E. Fernández-Vicente, S. Ruiz González, A.I. Martín Megias, *"Emerging innovations in metrology for medical device technologies: advancing healthcare precision"*, Poster in 150th BIPM Anniversary of the signing of the Metre Convention. Sèvres (France). 20-22 May 2025.

- A. Esteban Temprano, L. Delgado San Martín, S. Ruiz González, M.A. Sáenz-Nuño, T.E. Fernández-Vicente, A.I. Martín Megías, *"The use of artificial intelligence in diagnostic imaging"*, Poster in 150th BIPM Anniversary of the signing of the Metre Convention. Sèvres (France). 20-22 May 2025.
- S. Moltó, J.A. Fernandez-Torres, M.A. Sáenz-Nuño, E. Bernabéu Martínez, *"Transcendence of generalized lorentz-lorenz relation in refractometry: statistical incidences"*, Poster in 150th BIPM Anniversary of the signing of the Metre Convention. Sèvres (France). 20-22 May 2025.
- M.A. Sáenz-Nuño, E. Bernabéu Martínez, J.A. Fernandez-Torres, J. Maldonado, *"Impact of electric charge compensation on wind energy production: a statistical quantile regression analysis"*, Poster in 150th BIPM Anniversary of the signing of the Metre Convention. Sèvres (France). 20-22 May 2025.
- C. Valor, E. Aracil, L. Fernández-Méndez, C. Bellón, *"Resonance Trajectories of Frames among Organizations: The Catalan Independent Movement"*, Communication in 13th International Conference of the Iberoamerican Academy of Management - IAoMAD 2025. Madrid (Spain). 22-24 May 2025.
- T. Domínguez Larre, L.A. Herrero, F.A. Campos, *"Batteries Ageing Impact on Economic Medium-Term Dispatch Models of Electricity Generation"*, Poster in 21st International Conference on the European Energy Market - EEM25. Lisbon (Portugal). 27-29 May 2025. ISBN: 979-8-3315-1279-8. e-ISBN: 979-8-3315-1278-1.
- J. Mahou, R. Castañón, F.A. Campos, A. Oliveira, J. Villar, *"Assesing the Role of Fuel Cell Vehicles in the Iberia Energy Transition"*, Poster in 21st International Conference on the European Energy Market - EEM25. Lisbon (Portugal). 27-29 May 2025. ISBN: 979-8-3315-1279-8. e-ISBN: 979-8-3315-1278-1.
- H. Nematí, P. Sánchez, L. Sigríst, L. Rouco, A. Ortega, *"Sizing of Battery Storage Systems to Mimic the Operation of RES-based VPPs in Electricity Markets"*, Communication in 21st International Conference on the European Energy Market - EEM25. Lisbon (Portugal). 27-29 May 2025. ISBN: 979-8-3315-1279-8. e-ISBN: 979-8-3315-1278-1.
- A. Rodrigues de Oliveira, S. Doménech, J. Villar, T.F. Bessa, J.P. Tomé Saraiva, R. Gonçalves de Morais, B. Dávila-Isidoro, F.A. Campos, *"Analysis of the New Portuguese and Spanish NECPs using CEVESA market model"*, Paper in 21st International Conference on the European Energy Market - EEM25. Lisbon (Portugal). 27-29 May 2025. ISBN: 979-8-3315-1279-8. e-ISBN: 979-8-3315-1278-1.

- M. Hermanns, J. Rico, S.E. Ibáñez, Y. Goitia, *"Thermal performance assessment of closed-loop geothermal heat exchangers with vertical, inclined, and curved boreholes"*, Communication in 1st Geothermal Research and Innovation Network Conference - Geo-RIN. Huesca (Spain). 02-06 June 2025.
- M. Pérez-Bravo, J.C. Romero, A.F. Rodríguez Matas, P. Linares, *"A big-data approach to assess transport poverty: a case study of Madrid"*, Communication in XX Congreso de la Asociación Española para la Economía Energética. Bilbao (Spain). 02-04 June 2025.
- A.F. Rodríguez Matas, T.B. Wild, P. Linares, J.R. Lamontagne, D. Domínguez-Barbero, *"Designing robust energy transition policy portfolios under deep uncertainty"*, Communication in XX Congreso de la Asociación Española para la Economía Energética. Bilbao (Spain). 02-04 June 2025.
- F. Bagheri-Gisour Marandyn, N. Rodríguez Pérez, M. Castro, L. Sigrist, G. López, *"Estimación Probabilística del Riesgo en Redes Eléctricas ante Ataques MaDloT: Un Enfoque Multicapa"*, Poster in X Jornadas Nacionales de Investigación en Ciberseguridad - JNIC 2025. Zaragoza (Spain). 04-06 June 2025. ISBN: 978-84-10169-61-6.
- A. Baños Ramos, M. Reneses, M. Castro, E. Awad, G. López, *"Análisis y validación de un videojuego como herramienta de investigación para el ciberacoso"*, Poster in X Jornadas Nacionales de Investigación en Ciberseguridad - JNIC 2025. Zaragoza (Spain). 04-06 June 2025. ISBN: 978-84-10169-61-6.
- M. León Toledo, A. Megia-Macías, S. López de Armentia, J.C. del Real-Romero, *"Efecto del tratamiento con plasma frío en las propiedades de adhesión de materiales poliméricos"*, Communication in 24as Jornadas Técnicas de Soldadura y Tecnologías de Unión. Seville (Spain). 04-06 June 2025.
- A.M. López Gómez, A.A. Rodríguez Rodríguez, O. Tejerina Rodríguez, J. Inza Aldaz, G. López, *"Verificación de edad en línea basada en extensión de navegador y pruebas de conocimiento cero"*, Communication in X Jornadas Nacionales de Investigación en Ciberseguridad - JNIC 2025. Zaragoza (Spain). 04-06 June 2025. ISBN: 978-84-10169-61-6.
- B. Ruiz-Gonzalez, J. Tatay Nieto, S. Lumbreras, *"Artificial Intelligence and Spirituality: Opportunities and Ethical Challenges"*, Communication in The Jesuit University in the 21st Century: A Project of Hope for the World - HOPE 25. Seville (Spain). 04-06 June 2025.

- M. Seguí-Gómez, F.J. López-Valdés, J. Tatay Nieto, J.R. Jiménez-Octavio, *"Sustainable mobility and what it means for health -- a cause for the Jesuit University network"*, Communication in The Jesuit University in the 21st Century: A Project of Hope for the World - HOPE 25. Seville (Spain). 04-06 June 2025.
- L. Yagüe, J.I. Linares, E.M. Arenas, J.C. Romero, *"Decarbonising grey hydrogen production in Spain by means of bio-hydrogen with CCS (HyBECCS)"*, Communication in 14th/5th National and International Conference in Engineering Thermodynamics - 14CNIT. Zaragoza (Spain). 04-06 June 2025.
- A. Polo-Molina, D. Alfaya, J. Portela, *"A Mathematical Certification for Positivity Conditions in Neural Networks with Applications to Partial Monotonicity and Ethical AI"*, Communication in XLI Congreso Nacional de Estadística e Investigación Operativa - SEIO 2025. Lerida (Spain). 10-13 June 2025.
- A.F. Rodríguez Matas, T.B. Wild, P. Linares, J.R. Lamontagne, D. Domínguez-Barbero, *"Navigating uncertainty in the energy transition: Evaluating policy levers for robust decarbonization strategies"*, Communication in 43rd International Energy Workshop - IEW 2025. Nara (Japan). 10-13 June 2025.
- M.A. Sáenz-Nuño, M. Rodríguez-Fernández, H. Pizarro Llorente, M.E. Ramos Fernández, M. Ramos Vera, E.M. Pérez Avellán, *"Microcredencial como instrumento docente de humanidades digitales: el caso del Colegio Imperial de los Jesuitas (Madrid). Uso de Realidad Virtual"*, Communication in VIII Congreso Internacional sobre Innovación, Aprendizaje y Cooperación - CINAIC 2025. Madrid (Spain). 11-13 June 2025. ISBN: 978-84-10169-60-9.
- P. Linares, A. Bernárdez Álvarez, *"Techno-economic analysis of solar heat for industry use"*, Communication in 46th IAEE International Conference. Paris (France). 15-18 June 2025.
- V.K. Moreno, C. Valor, J.P. Chaves, *"An Incentive-Based Framework for Small-Load Flexibility Providers: Insights from a Pre-Test of a Discrete Choice Experiment"*, Communication in 46th IAEE International Conference. Paris (France). 15-18 June 2025.
- D. Sonowal, P. Rodilla, A. Bello, *"Trade-Offs in Electrolyser Representation for Medium-Term Electricity Sector Modelling"*, Communication in 46th IAEE International Conference. Paris (France). 15-18 June 2025.

- M.A. Sáenz-Nuño, M.V. Montes Gan, O. Martín Carrasquilla, M.R. Salas Labayen, N. Pérez Mallada, *"Gamification for Standardization: Interactive Educational Tools for Enhancing Learning Outcomes"*, Communication in 29th Annual Standardisation Conference - EURAS 2025. Madrid (Spain). 18-20 June 2025.
- E. F. Álvarez, P. Sánchez, A. Ramos, *"Optimized Self-Scheduling of a Hydrogen-Based Virtual Power Plant in the Day-Ahead Electricity Market"*, Paper in 34th European Conference on Operational Research - EURO 2025. Leeds (United Kingdom). 22-25 June 2025.
- J. Gutiérrez, A. Ramos, J.P. Chaves, *"Tackling uncertainty in electrolyser deployment: the role of degradation on expansion planning problems"*, Communication in 34th European Conference on Operational Research - EURO 2025. Leeds (United Kingdom). 22-25 June 2025.
- B. Ruiz-Gonzalez, S. Lumbreras, J. García-González, *"Enhancing optimization interpretability through problem simplification"*, Communication in 34th European Conference on Operational Research - EURO 2025. Leeds (United Kingdom). 22-25 June 2025.
- S. Serna, T. Gerres, R. Cossent, *"The Role of Low-Carbon Hydrogen in Optimising Hydrogen Production Costs and Electrolysis Plant Design"*, Communication in 34th European Conference on Operational Research - EURO 2025. Leeds (United Kingdom). 22-25 June 2025.
- A. Tomás-Martín, C.D. Zuluaga-Ríos, J. Suárez-Porras, B. Kazemtabrizi, J. García-Aguilar, L. Sigrist, A. García-Cerrada, *"A Vector-Based Flexible-Complexity Tool for Simulation and Small-Signal Analysis of Hybrid AC/DC Power Systems"*, Communication in 12th Bulk Power System Dynamics and Control Symposium - IREP 2025. Sorrento (Italy). 22-27 June 2025.
- M. Castro, J. Faro, *"B cell receptors and free antibodies have different antigen-binding kinetics"*, Paper in XVIII International Congress of the Spanish Biophysical Society - SBE 2025. Madrid (Spain). 24-27 June 2025.
- L. Rouco, *"Contribution of synchronous compensators to the stability of inverter-based generation"*, Paper in 23rd International Conference on Renewable Energies and Power Quality - ICREPQ '25. Santa Cruz de Tenerife (Spain). 25-27 June 2025.
- M. Martínez, J. Deboever, M. Rylander, A. O'Connell, *"Grid-wide hosting capacity analysis for distributed residential EV adoption"*, Communication in 16th IEEE PowerTech Conference - PowerTech 2025. Kiel (Germany). 29 June - 29 June 2025. ISBN: 979-8-3315-4398-3. e-ISBN: 979-8-3315-4397-6.

- A. Ortega, F. Fernández-Bernal, *"Evaluation of Self-Assessment Tests in Engineering Modules – A Powerful Tool for All"*, Communication in 17th International Conference on Education and New Learning Technologies - EDULEARN25. Palma de Mallorca (Spain). 30 June - 30 June 2025. ISBN: 978-84-09-74218-9.
- A. Ortega, F. Fernández-Bernal, *"Reintroducing Oral Exams in Engineering Education: Challenging Students' Communication Habits"*, Communication in 17th International Conference on Education and New Learning Technologies - EDULEARN25. Palma de Mallorca (Spain). 30 June - 30 June 2025. ISBN: 978-84-09-74218-9.
- A. González-Cervera, Y. González-Arechavala, O. Martín Carrasquilla, *"Orientación, vocaciones y mundo digital: resultados de intervenciones formativas con docentes"*, Communication in IV Congreso Internacional de Orientación Universitaria - CIOU 2025. Madrid (Spain). 02-04 July 2025.
- J. Suárez-Porras, F. Fernández-Bernal, L. Rouco, A. Tomás-Martín, A. García-Cerrada, E.J. Bueno, *"Estabilidad de DFigs con compensadores síncronos: desarrollo de una plataforma experimental"*, Poster in XXXII Seminario Anual de Automática, Electrónica industrial e Instrumentación - SAAEI 2025. Aranjuez (Spain). 02-04 July 2025.
- A. Tomás-Martín, C.D. Zuluaga-Ríos, J. Suárez-Porras, B. Kazemtabrizi, J. García-Aguilar, L. Sigrist, A. García-Cerrada, *"A Vector-Based Flexible-Complexity Tool for Simulation and Small-Signal Analysis of Hybrid AC/DC Power Systems"*, Communication in XXXII Seminario Anual de Automática, Electrónica industrial e Instrumentación - SAAEI 2025. Aranjuez (Spain). 02-04 July 2025.
- P. Sofokleous, E. Paz, F.J. Herraiz-Martínez, *"3D-Printed Porous Dielectric Resonator as a Self-Sensing Scaffold"*, Communication in IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting - IEEE AP-S/URSI 2025. Ottawa (Canada). 12-18 July 2025.
- A. Baños Ramos, M. Reneses, M. Castro, E. Awad, G. López, *"Playing to do research: Can we use a video game to research about cyberbullying?"*, Poster in 11th International Conference on Computational Social Science - IC2S2 2025. Norrköping (Sweden). 21-24 July 2025.
- L. Rouco, P. Sánchez, *"Contribution of hydrogen pipelines to the flexibility of electric power systems"*, Paper in IEEE Power & Energy Society General Meeting - IEEE PES GM 2025. Austin (United States of America). 27-31 July 2025.

- D. Rognini, P. Lecca, J. Díaz Lanchas, *"EU-Andorra Association Agreement: a CGE impact analysis"*, Communication in 64th European Congress of the Regional Science Association - ERSA 2025. Athens (Greece). 26-29 August 2025.

3.3.5 IIT working papers

This section includes both technical reports prepared for companies and institutions in the framework of research projects that are usually confidential documents, as well as working papers that have been registered.

- R. Barrella, J.C. Romero, *"Bridging the Energy Poverty Gap: Evaluating the Impact of Shallow Renovations and Micro-Efficiency in Spain"*. May 2025. Ref: IIT-25-131WP.
- C. Batlle, *"Que el apagón nos ilumine"*. May 2025. Ref: IIT-25-128WP.
- C. Batlle, M.A. Barruso, P. Rodilla, A. Canoyra, *"The (Hopefully) Enlightening Blackout in Spain: Questions and Lessons for the Future"*. August 2025. Ref: IIT-25-249WP.
- C. Batlle, P. Mastropietro, P. Rodilla, D.M. Navarrete Cruz, A. Bello, *"Balancing socio-political acceptance and economic efficiency of electricity price signals for residential end users: lessons learnt from the pioneering Spanish experience"*. September 2024. Ref: IIT-24-286WP.
- C. Baumann, J.C. Romero, R. Barrella, *"Navigating Energy Poverty in Southern and Western Europe: A Comparative Study of Vulnerability Trends in Crisis Years"*. April 2025. Ref: IIT-25-097WP.
- E. Centeno, F.A. Campos, J. Maguregui, L.J. Fernández, S. Wogrin, *"Minimum-cost-based capacity planning: does annualized capital expenditure always yield full cost recovery with marginal pricing? Proofs of the statements"*. May 2025. Ref: IIT-25-134WP.
- P. Claeys, B. Böckemeier, B. Owusu, J. Equiza Goñi, A. Stoian, *"Home bias in banks' sovereign debt holdings and fiscal sustainability"*. July 2025. Ref: IIT-25-225WP.
- F. de Cuadra, P. Dueñas, E. Sánchez-Jacob, S. Díaz-Pastor, O. Rico, R. Palacios, I.J. Pérez-Arriaga, C. Domínguez, D. Mazzoni, N. Narayan, *"Models and tools for Integrated Clean Cooking Planning. Case example of Rwanda"*. May 2025. Ref: IIT-24-371WP.

- J. García-González, *"Unit-commitment model developed for educational purposes"*. November 2024. Ref: IIT-24-320WP.
- G. Gavilanes Domínguez, L.A. Herrero, F.A. Campos, J. Villar, *"A Joint Supply Function Equilibrium Model for the Hydrogen and Electricity Markets"*. February 2025. Ref: IIT-25-034WP.
- L. Herding, L. Carvalho, R. Cossent, M. Rivier, *"Renewable capacity investment planning under distribution grid hosting capacity uncertainty via Conditional Value-at-Risk"*. February 2025. Ref: IIT-25-030WP.
- L.A. Herrero, F.A. Campos, J. Villar, *"Assessing Green Hydrogen Support Mechanisms in Coupled Electricity and Hydrogen Markets"*. August 2025. Ref: IIT-25-258WP.
- G. Marulanda, *"Cross-Border Capacity Remuneration Mechanisms and De-Rating Factors: Determining the Value of Foreign Resources in Regional Markets"*. March 2025. Ref: IIT-25-049WP.
- E.C. Ormeño-Mejía, M. Troncia, M. Valarezo, M. Galici, R. Cossent, J.P. Chaves, *"Distribution system operator services: A comparative assessment of multi-product co-optimisation for congestion management and voltage control using a local flexibility market"*. July 2025. Ref: IIT-25-242WP.
- M. Pérez-Bravo, S. Serna, R. Cossent, P. Linares, *"Economies of scale matter: how refueling infrastructure policy affects the viability of alternative fuel trucks"*. March 2025. Ref: IIT-25-071WP.
- M. Pérez-Bravo, S. Yeh, A.F. Rodríguez Matas, P. Linares, *"Assessing and improving resilience of future transport systems under climate stress: A case study for Spain"*. February 2025. Ref: IIT-25-026WP.
- A. Polo-Molina, J. Portela, L.A. Herrero, R. Cicero González, *"Modeling Membrane Degradation in PEM Electrolyzers with Physics-Informed Neural Networks"*. July 2025. Ref: IIT-25-220WP.
- R. Rodríguez-Vilches, F. Martín, A. Sánchez, *"From Consumers to Participants: A Framework for the design of engaging apps to foster participation in the Electricity System"*. July 2025. Ref: IIT-25-218WP.
- M.A. Ruiz, T. Gómez, J.P. Chaves, *"Trigger rules optimization for adaptable electricity distribution planning: untapping the value of flexibility"*. May 2025. Ref: IIT-25-130WP.

- J. Suárez-Porras, F. Fernández-Bernal, L. Rouco, A. Tomás-Martín, *"Synchronous Compensators considering reactive power for PLL stability improvement and Short-Circuit Ratio evaluation"*. September 2024. Ref: IIT-24-273WP.
- A. Tomás-Martín, B. Kazemtabrizi, A. García-Cerrada, L. Sigrist, E.J. Bueno, *"Fully decentralised multi-agent hierarchical control of a hybrid AC-DC microgrid based on event-triggered consensus"*. July 2025. Ref: IIT-25-236WP.
- M. Valarezo, J.P. Chaves, T. Gómez, *"Multi-objective distribution network reconfiguration: application to a real large-scale distribution system"*. November 2024. Ref: IIT-24-343WP.

3.3.6 Other publications

- R. Barrella, *"Afrontar el invierno en un edificio de baja eficiencia energética: "Es muy viejo y nos cuesta más calentar la casa" "*. Electronic press in Radiotelevisión Española (RTVE). Madrid (Spain). November 2024.
- R. Barrella, J.C. Romero, *"Más de 10 millones de españoles no pudieron mantener sus hogares con una temperatura "adecuada" el pasado invierno"*. Electronic press in La Vanguardia Ediciones, S.L.U. Barcelona (Spain). October 2024.
- R. Barrella, J.C. Romero, *"Uno de cada diez hogares no puede pagar la factura del gas o la luz"*. Electronic press in Radio Popular S.A. - COPE. Madrid (Spain). October 2024.
- R. Barrella, J.C. Romero, *"10 millones de españoles no pueden calentar sus hogares"*. Electronic press in Audiovisual Española 2000 S.A. Madrid (Spain). October 2024.
- R. Barrella, J.C. Romero, *"Diez millones de personas en España no pueden mantener sus hogares calientes durante el invierno"*. Electronic press in Editorial La Capital. Ferrol (Spain). October 2024.
- R. Barrella, J.C. Romero, *"El 20,7% de las familias pasaron frío en invierno en su casa en 2023"*. Electronic press in Conecta5 Telecinco, S.A.U. Madrid (Spain). October 2024.
- M.M. Cledera-Castro, *"Comillas Cast Fest: Podcast y conocimiento"*. Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.
- M.M. Cledera-Castro, *"Microplásticos y tratamientos contra el cáncer: Comillas investiga para cuidar la salud"*. Electronic press in Universidad Pontificia Comillas. Madrid (Spain). July 2025.

- M.M. Cledera-Castro, "*Microplásticos en la sal: el aderezo involuntario en nuestra cocina*". Electronic press in The Conversation Media Group Ltd. Madrid (Spain). July 2025.
- M.M. Cledera-Castro, "*Confirman la presencia de microplásticos en el proceso de extracción de sal en las salinas de la Península Ibérica*". Electronic press in Europa Press Noticias S.A. Madrid (Spain). July 2025.
- A.M. Coll-Franck, "*La nueva generación de jóvenes que marca el camino*". Electronic press in Periódico El Mundo. Madrid (Spain). October 2024.
- A.M. Coll-Franck, "*Hacia una cobertura financiera más precisa frente al riesgo climático*". Electronic press in Unidad Editorial Información Económica S.L. Madrid (Spain). June 2025.
- R. Cossent, I. Figuerola-Ferretti Garrigues, F.J. Sanz, S. Serna, "*Informe anual Cátedra de Estudios sobre el Hidrógeno 2023-2024.. Hidrógeno renovable: quo vadis?*". Technical report in Universidad Pontificia Comillas. February 2025.
- P. García-González, "*Comillas Onexed: cuando el tiempo suma*". Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.
- X. García-Muros, E. Alonso-Elpelde, J.C. Romero, M. Pérez-Bravo, M. García, J. Galindo, A. Sanz Fernández, C. Quílez, N. Collado, C. Ponce de León, D. Quiroga, A. Alguacil, "*Vulnerabilidad y pobreza en el transporte en España*". Technical report in Basque Centre for Climate Change; Ecoserveis; et al.; Fundación Ecológica y Desarrollo; Universidad Pontificia Comillas; Universidad Rey Juan Carlos. October 2024.
- E.C. Garrido-Merchán, "*Doble aceleración: inteligencia artificial y humanismo, en sincronía o en colapso*". Electronic press in Diario Responsable S.L. Madrid (Spain). June 2025.
- H. Gerard, A. Anapyanova, A. Pizzamiglio, D. Verez, D. Moneta, J. Mason,, J.P. Chaves, K. Laffont-Eloire, L. Guitart, M. Troncia, S. Gallego, "*Bridge Regulation Working Group - Annual Report 2023*". Technical report in Comisión Europea. October 2024.
- A. González-García, K. Dietrich, P. Ciller, ####FALTA NOMBRE####, R. Palacios, "*Plan Nacional de electrificación de última milla en Paraguay*". Technical report in Inter-American Development Bank (IADB). June 2025.

- K. Kessels, G. Willeghems, J. Vanschoenwinkel, R. D'Hulst, A. Delnooz, H. Gerard, J.P. Chaves, N. Mirzaei Alavijeh, G. Taljan, A. Fuchs, S. Gallego, S. Lengkeek, N. Kerkhof-Damen, "*Active System Management by DSOs*". Technical report in Chalmers tekniska högskola; Energienetze Steiermark GmbH; Forschungsstelle Energienetze; Iberdrola; Rijksdienst voor Ondernemend Nederland; Universidad Pontificia Comillas; Vlaamse Instelling Voor Technologisch Onderzoek N.V. January 2025.
- L. Lefranc, "*Claves de la descarbonización de la industria del acero*". Electronic press in Banco Bilbao Vizcaya Argentaria, S.A. Bilbao (Spain). October 2024.
- P. Linares, T. Gómez, L. Rouco, C. Batlle, J. García-González, "*Siete investigadores de Comillas están entre los más influyentes del mundo según la Universidad de Stanford*". Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.
- P. Linares, M. Pérez-Bravo, "*Cómo son los viajes de media y larga distancia en España y qué hacer para reducir sus emisiones*". Electronic press in Centro de Políticas Económicas EsadeEcPol. Barcelona (Spain). January 2025.
- F.J. López-Valdés, J.R. Jiménez-Octavio, "*La salud es lo primero (también en la investigación): Mobios Lab*". Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.
- S. Lumbreras, "*La respuesta de la teología a los desastres naturales*". Electronic press in Mediaset España Comunicación S.A. Madrid (Spain). December 2024.
- S. Lumbreras, "*Discapacidad y teología*". Electronic press in Diario ABC, S.L. Madrid (Spain) Online. June 2025.
- M. Martínez, F. Martín, A. Ramos, C. Mateo, T. Gómez, J.P. Chaves, "*Cuantificación de los beneficios técnico-económicos del despliegue del almacenamiento distribuido y la respuesta de la demanda*". Technical report in Samso EDS S.L, UNEF, AEPIBAL, PIMEC, OCTOPUS. August 2025.
- A. Megia-Macías, "*La salud es lo primero (también en la investigación): Medical Plasmas*". Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.
- K. Neuhoff, M. Sato, F. Ballesteros, C. Böhringer, S. Borghesi, A. Cosbey, K. Das, R. Ismer, A. Johnston, P. Linares, et al., "*Industrial decarbonisation in a fragmented world: an effective carbon price with a 'climate contribution'*". Technical report in Deutsches Institut für Wirtschaftsforschung; European University Institute; Universidad Pontificia Comillas; University of Oxford. January 2025.

- D. Roch Dupré, P. Calvo-Báscones, E. Aracil, *"Economía y longevidad: ¿estamos preparados para la transición demográfica?"*. Electronic press in The Conversation Media Group Ltd. Madrid (Spain). September 2024.
- D. Roch Dupré, P. Calvo-Báscones, E. Aracil, *"Economía y longevidad: ¿está España preparada para la transición demográfica y los desafíos del envejecimiento?"*. Electronic press in La Vanguardia Ediciones, S.L.U. Barcelona (Spain). November 2024.
- S. Rodríguez-Santana, *"Comillas, la IA y el cáncer"*. Electronic press in Universidad Pontificia Comillas. Madrid (Spain). July 2025.
- C. Rodríguez-Morcillo, *"La salud es lo primero (también en la investigación): Sperantia App"*. Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.
- C. Rodríguez-Morcillo, *"El gen investigador de Comillas"*. Electronic press in Universidad Pontificia Comillas. Madrid (Spain). July 2025.
- J.C. Romero, *"Sobrevivir a base de mantas: dos de cada 10 hogares en España no puede mantener la temperatura adecuada en invierno"*. Electronic press in El Periódico de Catalunya, S.L.U. Barcelona (Spain). October 2024.
- J.C. Romero, R. Barrella, *" Los datos de la pobreza energética mejoran aunque diez millones de personas no pueden calentar sus casas"*. Electronic press in Radiotelevisión Española (RTVE). Madrid (Spain). October 2024.
- J.C. Romero, R. Barrella, *"El 18% de hogares de Castilla-La Mancha no pudieron mantenerse calientes en el invierno de 2023"*. Electronic press in Diverxa Multimedia, S.L. Toledo (Spain). October 2024.
- J.C. Romero, R. Barrella, *"La pobreza energética apunta a un descenso tras un 2023 en máximos y con los bonos sociales como "salvavidas" "*. Electronic press in El Diario de Prensa Digital SL. Madrid (Spain). October 2024.
- J.C. Romero, R. Barrella, *"Los bonos sociales reducen un 44% la pobreza energética de las familias con menos ingresos"*. Electronic press in Ediciones Prensa Libre S.L. Madrid (Spain). October 2024.
- J.C. Romero, R. Barrella, *"La mayor pobreza energética oculta severa se registra en la región"*. Electronic press in Grupo Zeta. Caceres (Spain). October 2024.
- J.C. Romero, R. Barrella, *"Uno de cada 10 españoles no pagó a tiempo las facturas de energía en 2023"*. Electronic press in Ediciones El Pais, S.L. Madrid (Spain). October 2024.

- J.C. Romero, R. Barrella, E. Centeno, *"Informe de Indicadores de pobreza energética en España 2023"*. Technical report in Fundación Naturgy, Endesa, EDP. October 2024.
- L. Rouco, *"Device and method for monitoring overvoltage protection capacitors in generator circuit breakers"*. Patent in Iberdrola Generacion Nuclear, S.A. Bilbao (Spain). February 2025.
- M.A. Sáenz-Nuño, M.M. Cledera-Castro, A. Megia-Macías, L. Mochón, *"Sensibilización en la Educación Superior: En el siglo XXI, ¿Jesús habría nacido en un campo de refugiados?"*. Electronic press in International Association of Jesuit Universities (IAJU). Madrid (Spain). May 2025.
- J.L. Sancha Gonzalo, *"El apagón aboca a una profunda actualización de las normas con las que opera el sistema eléctrico"*. Electronic press in Ediciones El Pais, S.L. Madrid (Spain). May 2025.
- A. Tzoumpas, A. Pinnarelli, A. Mink, A. Aguayo Mendoza, C. Montalvo, C. Valor, C.E. Borges, D. Ördög, F.J. Sainz de Salces, F. Garms, J.I. Höffken, M. Brenner-Fliesser, M. Kuivalainen, M. Prek, P. Ktenidis, V.K. Moreno, V. Krušvar, *"Consumer and citizen engagement. Annual activity report 2023"*. Technical report in Comisión Europea. November 2024.
- M. Ventosa, *"Ignacio Sánchez Galán, doctor honoris causa"*. Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.
- M. Ventosa, *"La salud es lo primero (también en la investigación)"*. Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.
- M. Ventosa, E. Aracil, *"Nuevo equipo de gobierno"*. Electronic press in Universidad Pontificia Comillas. Madrid (Spain). September 2024.

4. Teaching

The experience that the IIT holds in various technological fields is a valuable input for the different Bachelor's and Master's degrees offered by the ICAI School of Engineering

This section presents the Bachelor and Master Theses that have been supervised by IIT staff during the last academic year, and the list of Master courses where IIT Researchers have participated as lecturers.

4.1 Supervised undergraduate theses at IIT

4.1.1 Bachelor's Degree in Engineering for Industrial Technologies

- *A practical approach to testing 18650 Li-Ion cells and developing state-of-charge and thermal models*
Aguilera Irala, Daniel. Supervised by Pablo Ayala Santamaría.
- *A thermodynamic approach to hydrogen storage cost optimization*
Montero Díaz, Alejandro. Supervised by Francisco Alberto Campos Fernández, José Villar Collado, Luis Alberto Herrero Rozas.
- *Ajuste, configuración y pruebas del sistema de protección de la Subestación Eléctrica Bombarda 30/132KV*
Jiménez Hernández, Álvaro. Supervised by Luis Rouco Rodríguez.
- *Análisis comparativo de diferentes herramientas de modelado de consumos térmicos en los hogares españoles*
Pérez-Canal Iglesias, María. Supervised by María Morán Camacho, Roberto Barrella.
- *Análisis comparativo de materiales de impresión 3D y hueso humano*
Ayllón Sarti, Lucía. Supervised by Eva Paz Jiménez.

- *Análisis del efecto de la porosidad en el comportamiento mecánico de las geometrías lattice Schwarz D.*
Aristegui Abaitua, Jaime Simón. Supervised by Eva Paz Jiménez.
- *Análisis del sector energético mexicano: posibilidad de inversión y desarrollo de fuentes de energía renovables*
García D'Augusta, Pablo. Supervised by Andrés Ramos Galán.
- *Análisis del uso de los sistemas de seguridad pasiva por usuarios vulnerables*
Pais-Quina García-Altozano, Inés. Supervised by Jesús Jiménez Octavio.
- *Análisis dimensional y estudio del comportamiento mecánico de estructuras porosas elásticas fabricadas mediante impresión 3D por estereolitografía*
Escuín Buendía, Isabel. Supervised by Eva Paz Jiménez.
- *Análisis técnico-económico de la aplicación de la impresión 3d en el diseño de alimentos. caracterización de la materia prima*
García Vidigal, Lara. Supervised by Susana Ortiz Marcos.
- *Análisis tecno-económico de la producción de metanol verde*
Badías López, Teresa. Supervised by Léonard Lefranc, Santiago Serna Zuluaga.
- *Analysis of different averaging techniques to describe the kinematics of human occupants in frontal decelerations*
Seguí Corbatón, Alicia. Supervised by Francisco José López Valdés.
- *Aplicación de Zenoh a la automatización industrial*
Guinea Sotillo, José Manuel. Supervised by José Antonio Rodríguez Mondéjar.
- *Asistente Virtual para una empresa de decoración*
Artero Mompó, Javier María. Supervised by Fernando de Cuadra García.
- *Business Case: Análisis de la viabilidad económica de un parque eólico.*
García-Larrache Segura, Jaime. Supervised by Mercedes Fernández García.
- *Caracterización experimental de la función de pérdidas en una batería de iones de litio*
Rodríguez Criado, Javier. Supervised by Javier García González, Jorge Suárez Porras.
- *Comparación de la traslación y rotación en tres dimensiones de la cabeza en ensayos de impacto simulando choques frontales de tráfico entre dummies y Post Mortem Human Subjects(PMHS)*
Vázquez Gutiérrez, Juan. Supervised by Francisco José López Valdés.

- *Configuración y pruebas de las protecciones eléctricas de la subestación Híjar 3: 132/30 kV*
Rubio de Pablos, Sergio. Supervised by Luis Rouco Rodríguez.
- *Control regenerativo de una MSIP de un vehículo eléctrico*
Huertas Romero, Nicolás. Supervised by Lukas Sigrist.
- *Controles Grid-Forming en convertidores HVDC*
Herrero Extremera, Guillermo. Supervised by Andrés Tomás Martín, Lukas Sigrist.
- *Creación de una ontología de elementos y preguntas en la realización de casos de estudio en la política energética*
González Moreno, Ana. Supervised by Sara Lumbreras Sancho.
- *Creación y aplicación del BIKE (Bicycle Integration Key Elements) Index: Evaluando la Integración de la Bicicleta en las Ciudades Europeas.*
Quintero Gómez, Alejandro. Supervised by Pablo Calvo Báscones.
- *Decarbonization of public transport fleets in urban areas*
Colmenar Cascón, Rodrigo. Supervised by Pablo Frías Marín.
- *Desarrollo de un modelo de apoyo al diagnóstico por inteligencia artificial sobre imágenes clínicas*
Corpas González, María Dolores. Supervised by Jesús Jiménez Octavio.
- *Desarrollo de un modelo de flujo de cargas óptimo en AC*
Delgado Romera, Adriana. Supervised by Javier García González.
- *Desarrollo y aplicación de técnicas para la interpretabilidad de la programación estocástica*
Alvarez Calvo, Modesto. Supervised by Sara Lumbreras Sancho.
- *Descarbonización en el sector industrial español. Caso de aplicación a la industria de la cerámica.*
Sáenz de Miera Navarrete, Lucas. Supervised by Pedro Linares Llamas.
- *Determinación del comportamiento mecánico estático y a fatiga de las geometrías Gyroid*
Poblaciones Bardisa, Ricardo. Supervised by Eva Paz Jiménez.
- *Diseño de agentes artificiales autónomos en entornos de simulación mediante aprendizaje por refuerzo.*
González López, Manuel. Supervised by Álvaro Jesús López López.

- *Diseño de un sistema para el ensayo de impactos en usuarios de patinete eléctrico*
Alonso Argenti, Mario. Supervised by Alberto Carnicero López, Juan Manuel Asensio Gil.
- *Diseño e Implantación del Sistema de Control de un Cuadricóptero Autónomo*
Maestroarena Navamuel, Álvaro. Supervised by Juan Luis Zamora Macho.
- *Diseño Integral de Hardware para un Cuadricóptero Autónomo: Sensores, Actuadores y Comunicaciones.*
Lucena Vicente, Clara. Supervised by Juan Luis Zamora Macho.
- *Efecto del tratamiento de plasma atmosférico frío en resinas fotocurables biocompatibles empleadas para impresión 3D*
Cortina Deniz, Gabriela. Supervised by Sara López de Armentia Hernández.
- *Ensayo de eficiencia de un colector solar térmico de bajo coste*
Carlos Lardies, Íñigo de. Supervised by Luis Manuel Mochón Castro, Pablo Ayala Santamaría.
- *Estudio de las propiedades mecánicas in vitro de scaffolds para regeneración ósea fabricados por estereolitografía*
Casado Guzmán, Álvaro. Supervised by Sara López de Armentia Hernández.
- *Estudio del movimiento 3D de la cabeza y del cuello en manipulaciones de la cabeza en el rango fisiológico del movimiento*
Zubiaga Gardeazabal, Pablo. Supervised by Francisco José López Valdés.
- *Evaluación de alternativas de Inteligencia Artificial generativa orientada al Dibujo Técnico*
Díez Sanz, Carlos. Supervised by José Porras Galán.
- *Evaluación tecno-económica de estrategias de recarga inteligente de vehículos eléctricos residenciales en la planificación de redes de distribución eléctrica a largo plazo.*
Marcano Robledo, María. Supervised by Miguel Martínez Velázquez, Tomás Gómez San Román.
- *Gemelo digital de una máquina para conformar, llenar y precintar embalajes*
Moreno-Ortiz García, Antonio. Supervised by José Antonio Rodríguez Mondéjar.
- *Gestión de colas en electrolineras*
Colomina Muñoz, Rocío. Supervised by Andrés Ramos Galán.

- *Laboratorio de protecciones eléctricas basado en gemelo digital de Siemens*
Fernández Rodríguez, Pablo. Supervised by Luis Rouco Rodríguez.
- *Offshore wind power production*
Estrada Zorzano, Nicolás. Supervised by Fernando de Cuadra García.
- *Optimización del proceso de molturación de la aceituna dentro de la producción de AOVEde una almazara respondiendo a una necesidad del mercado*
Cánovas Parra, Ignacio. Supervised by Susana Ortiz Marcos.
- *Plan de Negocio para la start-up AI Consortivm SA*
Irusta Gómez-Cornejo, María Dolores. Supervised by Mercedes Fernández García.
- *Predicting tunnel smoke behavior using machine learning techniques*
Amo Peletier, Luis. Supervised by Pablo Ayala Santamaría.
- *Procesamiento de datos y análisis biomecánico para el estudio de la efectividad de un airbag cervical para usuarios vulnerables de la carretera*
Sánchez Martínez, Pablo. Supervised by Francisco José López Valdés, Juan Manuel Asensio Gil.
- *Robust tuning of turbine-governor models*
Loureiro Orejas, Ignacio. Supervised by Lukas Sigrist.
- *Simulación numérica de incendios en túneles inclinados*
Arias Llorente, Juan. Supervised by Pablo Ayala Santamaría.
- *Strategic Bidding in Local Energy Markets: A Focus on Agent Behaviour*
Polvorosa del Campo, Ramón. Supervised by Matteo Troncia.
- *Temporal Variability of Sensitivity Coefficients in Emerging Local Electricity Markets*
Cantalapiedra Pérez, Claudia. Supervised by José Pablo Chaves Ávila, Matteo Troncia.

4.1.2 Bachelor's Degree in Engineering in Telecommunications Technologies

- *Análisis de los métodos de clasificación en ML*
Álvarez Castro, Lucía. Supervised by Francisco Martín Martínez.
- *Análisis de soluciones quasi-óptimas con Machine Learning*
Martín Colino, Alberto. Supervised by Sara Lumbreras Sancho.

- *Anomaly detection in railway infrastructure based on 3D point cloud data using neural networks*
Hernández Fernández, Lucía. Supervised by Miguel Ángel Sanz Bobi.
- *Aplicación de técnicas de Machine Learning para el diagnóstico del comportamiento de bombas de agua de circulación de una central de generación eléctrica*
Rodríguez Aguilar, Inés. Supervised by Miguel Ángel Sanz Bobi.
- *Aplicación para comunicación inalámbrica con sensor de electromiografía*
Díaz Hidalgo, Juan Diego. Supervised by José Daniel Muñoz Frías.
- *Aprendizaje por refuerzo e IA generativa para la gestión de la demanda energética*
González Tabernero, Álvaro. Supervised by Francisco Martín Martínez, Jaime Boal Martín-Larrauri.
- *Banco de pruebas para sistema de inhibición de ataques a dispositivos inteligentes por ultrasonidos*
Landa Cereceda, Jaime. Supervised by Eduardo Alonso Rivas, Javier Matanza Domingo.
- *Diseño e implementación de un servidor que permita estudiar la experiencia de usuario en aplicaciones y webs.*
Sánchez-Beato Gil, Miguel. Supervised by Francisco Martín Martínez.
- *Implementación y evaluación de algoritmos de sincronismo de símbolo en un receptor digital*
Cives Espejo, Juan Orlando. Supervised by Javier Matanza Domingo.
- *Programming an online dashboard to generate scenarios in the OpenMASTER energy model*
Martín García-Marcos, Vicente. Supervised by Manuel Pérez Bravo, Pedro Linares Llamas.

4.1.3 Bachelor's Degree in Mathematical Engineering and Artificial Intelligence

- *Desarrollo e implementación de un modelo LLM especializado en el ámbito biomédico mediante técnicas de RAG*
Martínez Fuentes, Andrés. Supervised by David Contreras Bárcena.
- *Leveraging Natural Language Processing Techniques for Music Metadata Enhancement*
Rey Sánchez, Emma. Supervised by Jaime Pizarroso Gonzalo.

- *A computational analysis of isomorphism classes of moduli spaces of parabolic vector bundles*
Herreros Pérez, Sergio. Supervised by Jaime Pizarroso Gonzalo.
- *Análisis y detección de patrones en la estrategia y técnica del fútbol mediante técnicas de Computer Vision*
Gómez Azor, Jorge. Supervised by David Contreras Bárcena.
- *Applications of tensor algebra to Neural Networks sensitivity analysis*
Montes Lorenzo, Miguel. Supervised by Jaime Pizarroso Gonzalo.
- *Artificial intelligence for universal energy access*
Mazuecos Reíllo, Carlos. Supervised by Andrés González García, Mario Castro Ponce, Pablo Dueñas Martínez.
- *AudioMind: Modelos Inteligentes para Procesamiento y Transformación de Sonido mediante IA Generativ*
Freire Arias, Mario. Supervised by David Contreras Bárcena.
- *Automatic detection of AI generated Audios*
García Martínez-Echevarría, Victoria. Supervised by Gregorio López López, Rafael Palacios Hielscher.
- *Desarrollo de estrategias de imputación de datos en la recomendación de puntos de interés*
Mora Abós, Antonio. Supervised by Pablo Sánchez Pérez.
- *Desarrollo de un Sistema de Verificación Visual con un Modelo de Deep Learning Entrenado con Muestras Sintéticas*
Rojo Llorens, Javier. Supervised by Ignacio de Rodrigo Tobías.
- *Desarrollo de una librería en Python de sistemas de recomendación*
Royo-Villanova Seguí, Catalina. Supervised by Pablo Sánchez Pérez.
- *Desarrollo y Entrenamiento de un Robot Bípedo con Técnicas de Aprendizaje por Refuerzo*
Gómez Martínez, Pablo. Supervised by Álvaro Jesús López López, Lucía Güitta López.
- *Estudio Comparativo y Desarrollo de Algoritmos de Imitation Learning: Análisis y Aplicación*
Lorenzo Díaz-Meco, Antonio. Supervised by Álvaro Jesús López López, Lucía Güitta López.

- *Estudio Comparativo y Desarrollo de Algoritmos de Reward Learning y Goal Conditioned Learning: Análisis y Aplicación.*
Lozano Mendoza, Adolfo. Supervised by Álvaro Jesús López López, Lucía Güitta López.
- *Filling the gaps for optimal electrification of space conditioning in buildings*
López-Lanchares Echezarreta, Adrián. Supervised by Pablo Dueñas Martínez.
- *Hierarchical Models for Time Series Forecasting*
Campos Alonso, Enrique Andrés. Supervised by Simón Rodríguez Santana.
- *Impacto de la Información Meteorológica en la recomendación de puntos de interés*
Prado Fernández-Vega, Lucía. Supervised by Pablo Sánchez Pérez.
- *InsurAI: Sistema Inteligente para Análisis y Optimización en el Sector Asegurador*
Leyenda Lodares, Natalia. Supervised by David Contreras Bárcena.
- *Interpreting Neural Networks: Developing a Methodology for Banking Case Studies Using Explainable AI*
Prieto Domínguez, Javier. Supervised by Jaime Pizarroso Gonzalo.
- *Modelado de un entorno virtual para el entrenamiento de algoritmos de aprendizaje por refuerzo profundo con activos industriales*
Paz Rodríguez, Jaime. Supervised by Lucía Güitta López.
- *Sistema automático de definición de coberturas en una póliza de seguros*
Jaque Oficialdegui, María. Supervised by David Contreras Bárcena.
- *Smart nutrition and cooking. Applications to specific dietary restrictions.*
Ardura Carnicero, Elena. Supervised by Pablo Dueñas Martínez.
- *The generalized Markoff equation*
Martínez de Guinea García, Alejandro. Supervised by Jaime Pizarroso Gonzalo.
- *Transforming Fashion: AI for Style Recommendation*
Ocón Madrid, Lara. Supervised by Simón Rodríguez Santana.
- *Uncertainty-Aware Classification for Anthropological Data*
Bayón Jiménez-Ugarte, Ignacio. Supervised by Simón Rodríguez Santana.
- *Uso de la profundidad para la segmentación semántica en aplicaciones de realidad extendida*
Pedrós Tobaruela, Sofía. Supervised by David Contreras Bárcena.

- *Visual topological SLAM using deep learning techniques*
Rodríguez Villegas, Manuel. Supervised by Jaime Boal Martín-Larrauri.

4.2 Postgraduate teaching

4.2.1 Graduate courses

On the University website, as well as in the corresponding information brochures, you can find detailed information on the different master programs available. The master courses given by IIT staff in which they participate as lecturers are listed hereafter.

4.2.1.1 Official Master's Degree in the Electric Power Industry (MEPI)

Director: Luis Olmos Camacho

This master can also be taken in the context of the Erasmus Mundus *Master in Economics and Management of Network Industries* (EMIN). More information at <https://www.comillas.edu/en/postgraduate/official-masters-degree-in-the-electric-power-industry>

- *Decision support models in the electric power industry*
Antonio Bello Morales, Javier García González, Sara Lumbreras Sancho, Carlos Mateo Domingo, Andrés Ramos Galán
- *Economy of the electric power industry*
José Pablo Chaves Ávila
- *Electric power systems*
Francisco Miguel Echavarren Cerezo, Mohammad Rajabdorri
- *Environmental and renewable energy policy*
Pedro Linares Llamas
- *Business Ethics and CSR*
José Carlos Romero Mora
- *Fundamentals on electrical engineering and optimization techniques*
Francisco Alberto Campos Fernández
- *Law and Legislation of the power industry*
José Pablo Chaves Ávila

- *Master's thesis*

José Pablo Chaves Ávila, Paolo Mastropietro, Luis Olmos Camacho

- *Network business: transmission, distribution and smart grids*

José Pablo Chaves Ávila, Rafael Cossent Arín, Luis Olmos Camacho, Michel Rivier Abbad, Miguel Ángel Sánchez Fornié

- *Regulation of the electric power industry*

Carlos Batlle López, Pablo Rodilla Rodríguez

- *Wholesale and retail electricity markets*

Carlos Batlle López, Pablo Rodilla Rodríguez

4.2.1.2 Master in Railway Systems

Director: Antonio Fernández Cardador

More information at

<https://www.comillas.edu/en/postgraduate/official-masters-degree-in-railway-systems>

- *Control, surveillance and digitization*

José Antonio Rodríguez Mondéjar

- *Traffic operation design*

Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez

- *Electrification*

Luis Rouco Rodríguez

- *ERTMS and RAMS regulations*

Adrián Fernández Rodríguez

- *Trabajo Fin de Máster*

Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez

4.2.1.3 Master's Degree in Smart Industry (MIC)

Director: Bernardo Villazán

More information at

<https://www.comillas.edu/en/masters/master-degree-in-smart-industry>

- *IIoT-Cloud Communications*

Gregorio López López, Néstor Rodríguez Pérez

- *Machine learning*
Néstor Rodríguez Pérez

- *Master Thesis*
Álvaro Jesús López López

4.2.1.4 Master's Degree in Big Data Technologies and Advanced Analytics (MBD)

Director: Carlos Morrás Ruiz-Falcó

More information at

<https://www.comillas.edu/en/postgraduate/master-universitario-en-big-data/>

- *Introducción al Análisis Estadístico con Lenguajes de Programación para Machine Learning*

Jaime Pizarroso Gonzalo, Alejandro Polo Molina, José Portela González

- *Machine Learning I*

Jaime Pizarroso Gonzalo, Alejandro Polo Molina, José Portela González

- *Machine Learning II*

Eugenio Francisco Sánchez Úbeda, Miguel Ángel Sanz Bobi

- *Master Thesis*

Jaime Pizarroso Gonzalo, José Portela González, Mohammad Rajabdorri, Eugenio Francisco Sánchez Úbeda, Miguel Ángel Sanz Bobi

4.2.1.5 Master's Degree in Smart Grids (MSG)

Director: Miguel Ángel Sánchez Fornié

More information at

<https://www.comillas.edu/en/masters/master-degree-in-smart-grids>

- *Business Ethics and CSR*

José Carlos Romero Mora

- *Leadership and Change Management*

José Carlos Romero Mora

- *Master Thesis*

Andrés Tomás Martín

- *Operation and Planning of Future Distribution Networks*

José Pablo Chaves Ávila, Carlos Mateo Domingo, Matteo Troncia

- *Operation and Planning of Future Distribution Networks*
José Pablo Chaves Ávila, Carlos Mateo Domingo, Matteo Troncia
- *Operation and Planning of Future Distribution Networks Laboratory*
Matteo Troncia
- *Regulation and New Business Models*
Carlos Batlle López, Pablo Rodilla Rodríguez
- *Regulation and New Business Models*
Carlos Batlle López, Pablo Rodilla Rodríguez

4.2.2 Graduate theses supervised at IIT

4.2.2.1 Official Master's Degree in Industrial Engineering (MII)

- *Aplicación de técnicas de Machine Learning para la optimización del ciclo de vida de rodillos en la etapa de Hot Rolling Mill*
Duarte Carrillo, Jaime. Supervised by Bernardo Villazán Gil.
- *AI-based framework for EV aggregators bidding in service markets*
Gómez-Aparici Vega, Rafael. Supervised by José Pablo Chaves Ávila, Matteo Troncia.
- *Ajuste fino de un LLM orientado al manejo eficiente de información privada*
Amores Parra, Sofía. Supervised by Álvaro Jesús López López.
- *Algoritmo de AGC para una zona de regulación con solo generación renovable*
Frutos de la Torre, Natalia de. Supervised by Ana Baringo Morales, Ignacio Egido Cortés.
- *Análisis de la accesibilidad al transporte*
García Gaspar, Alejandro. Supervised by Manuel Pérez Bravo, Pedro Linares Llamas.
- *Análisis de la participación de los combustibles alternativos en el sector del transporte*
Montero Bravo, Sara. Supervised by Manuel Pérez Bravo, Pedro Linares Llamas.
- *Analysis of investment strategies in renewable and storage power plants through a multi-stage simulation market model*
Sarceda Martínez, Luis. Supervised by Tomás Gómez San Román.

- *Analysis of the Decarbonization Potential of Heat Pumps in the Spanish Energy System and Their Impact on the Most Vulnerable Families*
Sicilia Guelbenzu, Dácil. Supervised by José Carlos Romero Mora, Miguel Ángel Ríos Ocampo.
- *Characterisation of energy poverty in Europe through the implementation of a monitoring tool*
Egaña Marín, Álvaro de. Supervised by José Carlos Romero Mora, Roberto Barrella.
- *Comportamiento térmico de tanques de almacenamiento de hidrógeno y metanol*
Gorris Galán, Luis. Supervised by Luis Manuel Mochón Castro.
- *Creación de un conjunto de datos de preguntas y respuestas para el ajuste fino de LLMs sobre documentación privada*
Ripoll Domínguez, Mario. Supervised by Álvaro Jesús López López.
- *Creación de un sistema RDS en un IPC*
Sáez Jaén, Juan. Supervised by José Antonio Rodríguez Mondéjar.
- *Desarrollo de una herramienta para la optimización de la logística de una compañía metalúrgica*
Blanco Mourenza, María. Supervised by Álvaro Jesús López López.
- *Detection of Hotspot Anomalies in LV Networks via Data Analysis*
Prieto Rodríguez de Vera, Carlos. Supervised by Miguel Ángel Sanz Bobi.
- *Development of a visual odometry module for an autonomous wheelchair*
Pandelet Durán, Ernesto. Supervised by Jaime Boal Martín-Larrauri.
- *Diseño y dimensionamiento de la ampliación de una bodega para la elaboración de 5.500 litros anuales de vino en Jerez de la Frontera (Cádiz)*
Benjumeda Hektoen, Joaquín Antonio. Supervised by Susana Ortiz Marcos.
- *Enrutamiento urbano de vehículos compartidos con conductor*
Mansilla Barrionuevo, Pablo. Supervised by Mario Castro Ponce, Pedro Sánchez Martín.
- *Estudio de la conexión de la logística inversa con los principios lean en el contexto de la industria 4.0*
Alfayate Celis, Javier. Supervised by Susana Ortiz Marcos.
- *Estudio de la respuesta estructural de un implante monofásico dental y su influencia en los tejidos óseos.*
Martínez-Bidón Rufo, Lucía. Supervised by Jesús Jiménez Octavio.

- *Evaluating the Transition of the Petrochemical Industry in Spain to Climate Neutrality by 2050*
Gil Capelastegui, Jorge. Supervised by José Carlos Romero Mora, Léonard Lefranc.
- *Generación de redes sintéticas mediante inteligencia artificial*
García-Pérez Merino, Juan Manuel. Supervised by Carlos Mateo Domingo.
- *Impact of the Electrification of the Economy on i-DE's Low-Voltage Network*
Gracia de Dios, Juan de. Supervised by Néstor Rodríguez Pérez.
- *Influencia de la simplificación de modelos computacionales dentales en la predicción del riesgo de fractura*
Escribano Blanco, Ignacio. Supervised by Jesús Jiménez Octavio.
- *Integración software de sensores en un patinete eléctrico para implementación de ADAS*
Savall Climent, Laura. Supervised by Carlos Rodríguez-Morcillo García, Juan Manuel Asensio Gil.
- *Mejoras metodológicas para la construcción de indicadores compuestos*
Álvarez Fernández, Gustavo. Supervised by David Roch Dupré.
- *Modelado de la instalación y operación de puntos de recarga rápida públicos*
Domingo Górriz, Ignacio. Supervised by Carlos Mateo Domingo, Miguel Martínez Velázquez.
- *Modelado y análisis del Generador Eólico Tipo 4*
San Mamés Chamorro, Diego. Supervised by Jorge Suárez Porras.
- *Modelado y evaluación del rol de nuevos modos y modelos de negocio en el sector transporte*
Santos Calvo, María del Mar. Supervised by Manuel Pérez Bravo, Pedro Linares Llamas.
- *Modelo de negocio dirigido a la subsistencia de una congregación de religiosas del Convento de Santa Isabel.*
Alonso Pérez, Paula. Supervised by Susana Ortiz Marcos.
- *Modelos de series temporales basados en aprendizaje profundo para la predicción de la generación eléctrica en parques eólicos.*
Coduras Gracia, Claudia María. Supervised by Antonio Muñoz San Roque.
- *Optimal tuning of UFLS schemes based on frequency stability margin*
Vadillo Díaz de Aguilar, Mónica. Supervised by Lukas Sigrist.

- *Optimización del coste de producción de hidrogeno renovable*
Arcos Presedo, María Cruz. Supervised by Rafael Cossent Arín.
- *Optimización del modelo de explotación de electrolineras de alta potencia*
Pérez Triay, Álvaro José. Supervised by Miguel Martínez Velázquez.
- *Paving the way for a comprehensive environmental economic accounting of Mar Menor (Spain)*
Portillo Avellaneda, Alejandro. Supervised by José Carlos Romero Mora.
- *Perfeccionamiento de un sistema inalámbrico implantable de electromiografía.*
Rivier Julien, Bosco Antonio. Supervised by José Daniel Muñoz Frías, Romano Giannetti.
- *Propiedades mecánicas de composites de carbono y lino fabricados mediante compresión*
Lancha Cisneros, José María. Supervised by Alberto Carnicero López.
- *Remuneration Schemes Driving Future Grids: Flexibility Incentives in Regulatory Frameworks*
Santos Piñas, Guillermo. Supervised by José Pablo Chaves Ávila, Matteo Troncia.
- *Resolución de un modelado conjunto de los mercados Eléctrico y del Hidrógeno con Funciones de Suministro Lineales*
Gavilanes Domínguez, Gerardo Ángel. Supervised by Francisco Alberto Campos Fernández, José Villar Collado, Luis Alberto Herrero Rozas.
- *Sensor design for characterization of metallic nanoparticles*
Martín Martín, Álvaro. Supervised by Francisco Javier Herraiz Martínez, Javier Matanza Domingo, Romano Giannetti.
- *Simulation of future electric truck electricity needs*
Busto Celaya, Juan. Supervised by José Pablo Chaves Ávila, Manuel Pérez Bravo.
- *Solar and Wind Power Generation Modeling for the Spanish Electrical System*
Celaya Oyón, Fernando Javier. Supervised by Andrés Ramos Galán.
- *Time to leave "PIB" behind. Looking forward in the measurement of welfare in Spain*
Martínez González, Juan María. Supervised by José Carlos Romero Mora.

- *Towards an operational understanding of transport poverty in Spain: applying accessibility indicators based on mobility big-data*
Macarulla Trell, Jorge. Supervised by José Carlos Romero Mora, Manuel Pérez Bravo.
- *Utilización de la herramienta Lean para optimización de procesos de una agencia de viajes usando la Inteligencia Artificial*
Villanueva Nieto, Elena. Supervised by Susana Ortiz Marcos.
- *Variables que Impactan en el Mercado de Emisiones de Carbono de la UE: Predicciones con Modelos Estadísticos y de Machine Learning*
Vicente-Tutor Vázquez, Ignacio de. Supervised by José Carlos Romero Mora.
- *Virtual Data Concentrator: Testing, validation, and documentation of containerization/virtualization architecture for tele management Data Concentrator application in distributed environments*
Valdivielso Suárez, Emilio Juan. Supervised by Javier Matanza Domingo.

4.2.2.2 Official Master's Degree in Telecommunications Engineering (MIT)

- *Análisis musical a partir de las señales de audio*
Olucha Royo, Carles. Supervised by Javier Matanza Domingo, Miguel Ángel Sanz Bobi.
- *Caracterización del funcionamiento de dispositivos de criptografía cuántica en una red desplegada*
Ruiz-Tagle Valcarce, Pablo. Supervised by Mario Castro Ponce.
- *Comparación de Comportamientos de Bombas de Agua de Circulación Usando Herramientas de Machine Learning*
Sánchez Rosillo, Mencía. Supervised by Miguel Ángel Sanz Bobi.
- *Desarrollo de una herramienta para la ocultación y spoofing de señales GPS*
Herrerías Redondo, Arturo Amando. Supervised by Javier Matanza Domingo.
- *Diseño y evaluación del uso de dispositivos EEG para la detección de movimientos corporales*
Saavedra Villafruela, Inés. Supervised by Antonio Muñoz San Roque.
- *FactGuard: Un Escudo Inteligente Contra la Desinformación*
Cuenca Núñez, Sergio. Supervised by Miguel Ángel Sanz Bobi.
- *MitM Attacks to Electric Vehicle Charging Points*
Jarauta Gastelu, Javier. Supervised by Gregorio López López.

- *Reversing DJI Enhanced Wi-Fi Protocol*
Zhou, Feng. Supervised by Javier Matanza Domingo.

4.2.2.3 Official Master's Degree in the Electric Power Industry (MEPI)

- *A Crowded Regulatory Space: Exploring the Overlap between Resource Adequacy and Flexibility*
González Moreno, Aída. Supervised by José Pablo Chaves Ávila, Paolo Mastropietro.
- *Assessing power system reliability under temperature-dependent variables: A case study of the Brazilian Power System*
Gonçalves Costa, Matheus. Supervised by Pablo Rodilla Rodríguez.
- *Critical analysis of Brazil's long-term auctions*
Gomes de Oliveira, Juliana. Supervised by Pablo Rodilla Rodríguez.
- *Exploiting Flexibility in Water Treatment Plants for Power System Operation: Integrating Energy Storage and Load Modulation*
Ventura Sandoval, Jorge Alfonso. Supervised by José Pablo Chaves Ávila, Matteo Troncia.
- *How the allocation of technical constraint costs affects market efficiency: evidence from Spain*
Avello Gorostidi, Pedro. Supervised by José Pablo Chaves Ávila.

4.2.2.4 Master's Degree in Smart Industry (MIC)

- *Ajuste fino de un LLM orientado al manejo eficiente de información privada*
Amores Parra, Sofía. Supervised by Álvaro Jesús López López.
- *Aplicación de técnicas de machine learning para la optimización del ciclo de vida de rodillos en la etapa de laminación en caliente*
Duarte Carrillo, Jaime. Supervised by Bernardo Villazán Gil.
- *Creación de un conjunto de datos de preguntas y respuestas para el ajuste fino de LLMs sobre documentación privada*
Ripoll Domínguez, Mario. Supervised by Álvaro Jesús López López.
- *Desarrollo de una herramienta para la optimización de la logística de una compañía metalúrgica*
Blanco Mourenza, María. Supervised by Álvaro Jesús López López.
- *Estudio de tecnologías de digital manufacturing para el diseño, impresión 3D y ensayo de geometrías Lattice para aplicaciones biomédicas*
Aja Alberó, Jaime. Supervised by Eva Paz Jiménez.

- *Modelos de series temporales basados en aprendizaje profundo para la predicción de la generación eléctrica en parques eólicos*
Coduras Gracia, Claudia María. Supervised by Antonio Muñoz San Roque.
- *Sensor design for characterization of metallic nanoparticles*
Martín Martín, Álvaro. Supervised by Francisco Javier Herraiz Martínez, Romano Giannetti.

4.2.2.5 Master's Degree in Smart Grids (MSG)

- *Detection of Hotspot Anomalies in LV Networks via Data Analysis*
Prieto Rodríguez de Vera, Carlos. Supervised by Miguel Ángel Sanz Bobi.
- *Impact of the Electrification of the Economy on i-DE's Low-Voltage Network*
Gracia de Dios, Juan de. Supervised by Néstor Rodríguez Pérez.
- *MV grid discovery via Phasor Measurements Units (PMUs)*
Pérez López, Maximiliano. Supervised by Andrés Tomás Martín.
- *Remuneration Schemes Driving Future Grids: Flexibility Incentives in Regulatory Frameworks*
Santos Piñas, Guillermo. Supervised by José Pablo Chaves Ávila, Matteo Troncia.
- *Virtual Data Concentrator: Testing, validation, and documentation of containerization/virtualization architecture for tele management Data Concentrator application in distributed environments*
Valdivielso Suárez, Emilio Juan. Supervised by Javier Matanza Domingo.

5. Doctorate

5.1 ICAI Engineers' Association

The IIT maintains a close relationship with the ICAI Engineers' Association in several aspects. On the one hand, the Association partially funds one of the IIT doctoral theses. During this academic year, the thesis developed by Juan Manuel Asensio Gil has benefited from such financial support. On the other hand, the IIT collaborates with the Association sending some of its research for publication to its official journal *Anales de Mecánica y Electricidad*.

5.2 Training complements

Training complements typically correspond to Master courses that complement the training of the student in those aspects relevant for the doctoral thesis and that have not been tackled in the academic or professional career.

- *Research Methods I: Introduction, Information Sources and Quantitative Research Methods*
Carmen Valor Martínez
- *Métodos de Investigación II: Epistemología de la Ciencia, Métodos de Investigación Cualitativa y Redacción de Textos Científicos*
Carmen Valor Martínez
- *Optimization Techniques*
Francisco Alberto Campos Fernández
- *Preliminary research project*
Aurelio García Cerrada
- *Publishing Research Results*
Aurelio García Cerrada

5.3 Training activities

Training activities have to be carried out by all students. These activities provide the students with basic information about various research techniques.

- *Doctorado e Investigación Científica en Comillas (20h): El proceso de investigación*
Carmen Valor Martínez
- *Doctorado e Investigación Científica en Comillas (20h): La investigación en una universidad de la Compañía de Jesús*
Pedro Linares Llamas
- *Doctorado ICAI: Advanced Excel for applied research*
Javier García González
- *Doctorado ICAI: Advanced optimization modelling for applied research*
Pedro de Otaola Arca, Andrés Ramos Galán
- *Doctorado ICAI: Current research topics*
Roberto Barrella, Pablo Dueñas Martínez, Jaime Pizarroso Gonzalo, Néstor Rodríguez Pérez, Simón Rodríguez Santana, Pablo Sánchez Pérez, Matteo Troncia
- *Doctorado ICAI: Data analysis (10h)*
Sara Lumbreras Sancho
- *Doctorado ICAI: Forecasting techniques (10h)*
José Portela González
- *Doctorado ICAI: Introduction to Biomechanics*
Francisco José López Valdés
- *Doctorado ICAI: Reinforcement learning*
Álvaro Jesús López López
- *Programa oficial de doctorado CETIS 99/2011: Explainable Artificial Intelligence: Use of Neural Networks in Social Sciences for Explanatory Models*
José Portela González

5.4 Doctoral theses

The following doctoral theses defended in this academic year or currently in development are or have been conducted and led by researchers at the IIT.

Usually, these theses are developed in conjunction or in close relationship with some of the research projects mentioned above.

5.4.1 Comillas submitted theses

- Title: *The impact of demand-side flexibility on generation investment planning and operation of the future electric system*
 Author: Teresa Freire Barceló
 Supervisors: Álvaro Sánchez Miralles and Francisco Martín Martínez
 Date: Septiembre 17 , 2024

- Title: *Medium-term technical and economic analysis of storage impacts on power systems under different scenarios with a high renewable share*
 Author: Sébastien Huclin
 Supervisors: José Pablo Chaves Ávila, Mikel González-Eguino and Andrés Ramos Galán
 Date: Septiembre 27 , 2024

- Title: *Evaluating local energy trading for massive integration of distributed energy resources*
 Author: Morsy Abdelkader Morsy Mohammed Nour
 Supervisors: José Pablo Chaves Ávila and Álvaro Sánchez Miralles
 Date: Octubre 04 , 2024

- Title: *TSO-DSO coordination: a multidimensional study on coordination schemes, modelling and regulation in the european context*
 Author: Leandro Lind
 Supervisors: Rafael Cossent Arín and Pablo Frías Marín
 Date: Octubre 31 , 2024

- Title: *Improving medium-term models to deal with the low-carbon reality of modern power systems*
 Author: Luis Manuel Montero Guirao
 Supervisors: Antonio Bello Morales and Javier Reneses Guillén
 Date: Noviembre 07 , 2024

- Title: *Contributions to the analysis and forecasting of oil prices*
 Author: Pedro Moreno Alonso
 Supervisor: Antonio Muñoz San Roque
 Date: Noviembre 08 , 2024

- Title: *Machine Learning techniques to enhance the capacitive sensing of microwave resonant structures*
 Author: Miguel Monteagudo Honrubia
 Supervisors: Javier Matanza Domingo and Francisco Javier Herraiz Martínez
 Date: Noviembre 15 , 2024

- Title: *Efficiently transferring deep reinforcement learning experience to industrial assets*
Author: Lucía Güitta López
Supervisors: Álvaro Jesús López López and Jaime Boal Martín-Larrauri
Date: Diciembre 18 , 2024

- Title: *Impact of vehicle restraint systems on injury outcomes a combined approach using real-world crash data and computational modelling*
Author: Manuel Valdano
Supervisors: Francisco José López Valdés and Bengt Pipkorn
Date: Diciembre 19 , 2024

- Title: *Improving Modelling for Optimal Expansion Planning of Power Transmission Systems*
Author: Erik Francisco Álvarez Quispe
Supervisors: Andrés Ramos Galán and Luis Olmos Camacho
Date: Enero 21 , 2025

- Title: *DC Segmentation Of Electrical Grids To Improve Power System Stability*
Author: Mathieu Guillaume Robin
Supervisors: Francisco Javier Renedo Anglada, Aurelio García Cerrada and Juan Carlos González Torres
Date: Enero 24 , 2025

- Title: *New Methods for Modeling Renewable Energy Uncertainty and Cross-Border Policy Mechanisms in Electricity Markets*
Author: Geovanny Alberto Marulanda García
Supervisors: Antonio Bello Morales and Javier Reneses Guillén
Date: Marzo 13 , 2025

- Title: *Modelado Probabilístico y Análisis de la Demanda en Sistemas de Bicicletas Compartidas: Caso de Estudio BiciMad*
Author: Carlos Miguel Vallez Fernández
Supervisors: Mario Castro Ponce and David Contreras Bárcena
Date: Marzo 31 , 2025

- Title: *Navigating employee resistance to digital technologies: understanding and addressing its emotional bases*
Author: Veronika Cieslak
Supervisor: Carmen Valor Martínez
Date: Abril 11 , 2025

- Title: *Assessment of Electricity Grid Requirements for the Energy Transition*
Author: Leslie Herding
Supervisors: Michel Rivier Abbad and Rafael Cossent Arín
Date: Junio 13 , 2025

- Title: *Selecting Mechanisms to Acquire DSO Flexibility Services in the Energy Transition*
 Author: Fernando David Martín Utrilla
 Supervisors: Rafael Cossent Arín and José Pablo Chaves Ávila
 Date: Junio 27 , 2025
- Title: *The degradation of sustainable business models: customer misbehavior and shared mobility*
 Author: Andrés Camacho Donézar
 Supervisors: Carmen Valor Martínez and José Portela González
 Date: Junio 30 , 2025
- Title: *Modeling and Experimental Research of Cryogenic Magnetic Refrigeration for the 4–20 K Range*
 Author: Carlos José Hernando López de Toledo
 Supervisors: Juan Carlos del Real Romero, Javier Munilla López and Luis García Tabarés
 Date: Julio 17 , 2025

5.4.3 Comillas ongoing theses

- Title: *Actitudes hacia la tecnología y el pensamiento computacional en la educación stem del profesorado de primaria, secundaria y en formación*
 Author: Ana María González Cervera
 Supervisors: Olga Martín Carrasquilla and Yolanda González Arechavala
- Title: *3d-printed self-sensing scaffolds for monitoring bone regeneration*
 Author: Paraskevas Sofokleous
 Supervisors: Eva Paz Jiménez and Francisco Javier Herraiz Martínez
- Title: *Abdominal injuries in occupants seated in reclined configurations in autonomous vehicles*
 Author: Carmen María Vives Torres
 Supervisor: Francisco José López Valdés
- Title: *Natural gas tariff design: a comprehensive framework for analyzing economic efficiency.*
 Author: Celia Mosácula Atienza
 Supervisors: Javier Reneses Guillén and José Pablo Cháves Avila
- Title: *Accounting for wrongdoing. the financial consequences of bank misconduct*
 Author: José Miguel Fernández de Bilbao Ortega
 Supervisor: Isabel Catalina Figuerola-Ferreti Garrigues

- Title: *ESG investing, corporate performance and idiosyncratic risk*
Author: Paraskevas Paraskevas
Supervisors: Isabel Catalina Figuerola-Ferretti Garrigues and Sara Lumbreras Sancho

- Title: *A bilevel model for long-term studies of grid access tariffs considering behind-the-meter decentralized generation*
Author: Salvador Doménech Martínez
Supervisors: Francisco Alberto Campos Fernández and José Villar Collado

- Title: *Modeling and optimizing isolated microgrids by reinforcement learning techniques*
Author: Claudia Domínguez Barbero
Supervisors: Javier García González and Miguel Ángel Sanz Bobi

- Title: *Medium-term hydrothermal scheduling considering short-term uncertainty*
Author: Jesús David Gómez Pérez
Supervisors: Andrés Ramos Galán and Jesús María Latorre Canteli

- Title: *Analysis of the impact of ftrs on generation and transmission expansion planning and its coordination*
Author: Stefania Gómez Sánchez
Supervisor: Luis Olmos Camacho

- Title: *Evaluating the interaction between dso and third-party flexibility resources in the operation and planning of distribution grids*
Author: Orlando Mauricio Valarezo Rivera
Supervisors: Tomás Gómez San Román and José Pablo Cháves Avila

- Title: *Improving the representation of the transport sector within energy models*
Author: Manuel Pérez Bravo
Supervisors: Pedro Linares Llamas and Pablo Frías Marín

- Title: *Multi-agent control strategies for the islanded and grid-connected operation of microgrids with 100% electronic generation*
Author: Andrés Tomás Martín
Supervisors: Aurelio García Cerrada and Lukas Sigrist

- Title: *Robust control of electric power systems with important share of electronic generation*
Author: Javier García Aguilar
Supervisors: Juan Luis Zamora Macho and Aurelio García Cerrada

- Title: *Development of smart environment for asset management based on machine learning models in power grids*
Author: Gopal Lal Rajora
Supervisors: Miguel Ángel Sanz Bobi and Lina Bertling Tjernberg

- Title: *Detección de ciberataques mediante algoritmos de aprendizaje y clasificación en la matriz de mitre att&ck*
 Author: Antonio Pérez Sánchez
 Supervisors: Rafael Palacios Hielscher and Gregorio López López

- Title: *Optimal operation and configuration of rvpp under uncertainty of non-dispatchable res in the energy and ancillary markets*
 Author: Hadi Nematì
 Supervisors: Álvaro Ortega Manjavacas and Pedro Sánchez Martín

- Title: *Real-time operation of res-based virtual power plants*
 Author: Oluwaseun Enoch Oladimeji
 Supervisors: Lukas Sigrist and Álvaro Ortega Manjavacas

- Title: *Rigid body simulation with implicit shape descriptions*
 Author: Pedro López-Adeva Fernández-Layos
 Supervisor: Luis Francisco Sánchez Merchante

- Title: *Study of the performance of multi-stage holomorphic embedding method (MSHELM)*
 Author: Álvaro Benítez Domínguez
 Supervisors: Luis Rouco Rodríguez and Francisco Miguel Echavarren Cerezo

- Title: *Future-proof design of capacity mechanisms during the energy transition: firm supply calculation, demand participation and cost allocation*
 Author: Paulo Brito Pereira
 Supervisors: Pablo Rodilla Rodríguez and Paolo Mastropietro

- Title: *Alternate models for european short-term electricity markets*
 Author: Shilpa Bindu
 Supervisors: José Pablo Cháves Avila and Luis Olmos Camacho

- Title: *Data depth and predictive models in the oil market: an adaptive approach.*
 Author: Carlos Casarrubio Feijoo
 Supervisor: Isabel Catalina Figuerola-Ferreti Garrigues

- Title: *Climate-related credit risk: rethinking the credit risk framework*
 Author: María Helena Redondo García
 Supervisor: Elisa María Aracil Fernández

- Title: *An integrated financial and regulatory framework for electrification*
 Author: Santos-José Díaz Pastor
 Supervisor: José Ignacio Pérez Arriaga

- Title: *Un modelo ético para la inteligencia artificial: el caso de la toma de decisiones automatizadas (ADM)*
Author: Sonia Liliana Acosta Arias
Supervisors: Sara Lumbreras Sancho and Gonzalo Génova

- Title: *Development of operational wildfire models and applications at the wildland industrial-urban interface*
Author: Juan Luis Gómez González
Supervisors: Mario Castro Ponce and Alexis Cantizano González

- Title: *Techno-economic analysis of green hydrogen supply chain in Spain*
Author: Santiago Serna Zuluaga
Supervisors: Rafael Cossent Arín and Timo Gerres

- Title: *A comprehensive energy poverty analysis in just energy transitions: from conceptualization to decision-making*
Author: Miguel Angel Rios Ocampo
Supervisors: José Carlos Romero Mora and Efraim Centeno Hernández

- Title: *A long-term joint equilibrium model for the wholesale electricity and hydrogen markets*
Author: Luis Alberto Herrero Rozas
Supervisors: Francisco Alberto Campos Fernández and José Villar Collado

- Title: *How to improve the coordinated use of models for energy planning towards to a zero-carbon system*
Author: Dilayne Santos Oliveira
Supervisors: Sara Lumbreras Sancho and Andrés Ramos Galán

- Title: *Enhancing keyphrase extraction from long documents*
Author: Roberto Martínez Cruz
Supervisors: Álvaro Jesús López López and José Portela González

- Title: *Bi-level programming applied to the hydrogen economy in energy markets*
Author: Luis Jesús Fernández Palomino
Supervisor: Efraim Centeno Hernández

- Title: *African power pools and regional trade: adoption of international best practices in the African context*
Author: Mohamed Abbas Eltahir Elabbas
Supervisors: Luis Olmos Camacho and José Ignacio Pérez Arriaga

- Title: *Bio-hydrogen with ccus (golden hydrogen) as decarbonisation tool in hard-to-abate industrial sectors*
Author: Luis Yagüe Muñoz
Supervisors: José Ignacio Linares Hurtado and Eva María Arenas Pinilla

- Title: *The role of demand-response independent aggregator in the power system. how does it change the balance between the actors?*
 Author: Jesús José Fernández García
 Supervisors: Matteo Troncia and José Pablo Cháves Avila

- Title: *The impact of csr on firm risk and valuation*
 Author: Jorge Abdon Merladet Artiach
 Supervisors: Sara Lumbreras Sancho and Andrés Ramos Galán

- Title: *Cultivating spirituality in organizations. the role of spiritual discernment*
 Author: Norma Carolina Verdugo Rojas
 Supervisors: David Roch Dupré and Elisa María Aracil Fernández

- Title: *Integrating flexibility from electric vehicles and other distributed energy resources in distribution network planning*
 Author: Miguel Martínez Velázquez
 Supervisors: Pablo Frías Marín and Carlos Mateo Domingo

- Title: *Research plan proposal - year 1 frequency behavior in electric power systems in the power electronics age.*
 Author: Carlo de Paolis Robles
 Supervisors: Ignacio Egido Cortés and Aurelio García Cerrada

- Title: *Increasing the penetration of inverter-based resources to weak grids with synchronous compensators*
 Author: Jorge Suárez Porras
 Supervisors: Fidel Fernández Bernal and Luis Rouco Rodríguez

- Title: *Distribution system operator remuneration for fostering flexibility procurement. valuing flexibility solutions in planning distribution networks*
 Author: Miguel Ángel Ruiz Hernández
 Supervisors: José Pablo Cháves Avila and Tomás Gómez San Román

- Title: *Generating synthetic datasets: towards bridging the gap between deep learning and applications with limited data*
 Author: Ignacio de Rodrigo Tobías
 Supervisors: Álvaro Jesús López López and Jaime Boal Martín-Larrauri

- Title: *Assessing the impact of electrolyzer operational characteristics on integration in the electricity markets.*
 Author: Juan Francisco Gutiérrez Guerra
 Supervisors: José Pablo Cháves Avila and Andrés Ramos Galán

- Title: *From stand-alone to combined mechanisms for acquiring distribution system operator services*
 Author: Eliana Carolina Ormeño Mejía
 Supervisors: José Pablo Cháves Avila and Matteo Troncia

- Title: *A multi-faceted approach to water management and hydropower generation under climate change and power markets regulation*
Author: Ignacio Segarra Tamarit
Supervisors: Isabel Catalina Figuerola-Ferretti Garrigues and Eduardo Schwartz

- Title: *Understanding injury mechanisms in e-scooter riders*
Author: Juan Manuel Asensio Gil
Supervisors: Jesús Jiménez Octavio and Alberto Carnicero López

- Title: *Analysis of cybersecurity systems in the automotive sector*
Author: Roberto Gesteira Miñarro
Supervisors: Gregorio López López and Rafael Palacios Hielscher

- Title: *Empowering small-load flexibility-service-providers in the energy transition: an incentive-based framework tested through discrete-choice modelling and market simulations*
Author: Valeria Karina Moreno Soria
Supervisors: Carmen Valor Martínez and José Pablo Cháves Avila

- Title: *Guiding the decarbonisation of the energy- and emission-intensive eu industries*
Author: Léonard Lefranc
Supervisors: Timo Gerres and Pedro Linares Llamas

- Title: *Sim-to-real hybrid reinforcement learning and optimal control strategies for autonomous mobile robot coordination*
Author: Diego Cubillo Llanes
Supervisors: Jaime Boal Martín-Larrauri and Juan Luis Zamora Macho

- Title: *Prognosis methods of industrial systems based on generative adversarial networks*
Author: María del Carmen Rubiales Mena
Supervisors: Antonio Muñoz San Roque and Miguel Ángel Sanz Bobi

- Title: *Análisis de factores de éxito y fracaso académicouniversitario en ingeniería: un enfoque centrado en la autorregulación y los patrones de aprendizaje*
Author: Luis Alarcón Massó
Supervisors: Isabel Muñoz San Roque and Jesús Jiménez Octavio

- Title: *Maximizing performance in the continuous intraday market: a reinforcement learning approach to strategy optimization*
Author: Francisco Rodríguez Cuenca
Supervisor: Eugenio Francisco Sánchez Úbeda

- Title: *Anaerobic co-digestion of different residues enhanced with Fe-C nanoparticles*
Author: Javier Victoria Rodríguez
Supervisors: M^a del Mar Cledera Castro and Carlos Morales Polo
- Title: *Operational technology system architectures for new green molecule energy companies in the era of industry 4.0*
Author: Juan Manuel Tomé Lara
Supervisor: José Antonio Rodríguez Mondéjar
- Title: *Maintenance optimisation through digital twins: integration of PHM and maintenance management*
Author: Francisco Javier Bellido López
Supervisors: Antonio Muñoz San Roque and Miguel Ángel Sanz Bobi
- Title: *Tools to optimize the participation of aggregators in electricity markets*
Author: Diana María Navarrete Cruz
Supervisors: Antonio Bello Morales and Pablo Rodilla Rodríguez
- Title: *Weather to power: multivariate medium-term probabilistic forecasting*
Author: Anne Maren Coll Franck
Supervisor: Eugenio Francisco Sánchez Úbeda
- Title: *Designing an integrated planning tool for global clean cooking initiatives: addressing gaps and enhancing capabilities*
Author: Olga Rico Díez
Supervisors: Fernando de Cuadra García and Pablo Dueñas Martínez
- Title: *Advancing neural network comprehension with geometric and topological approaches*
Author: Alejandro Polo Molina
Supervisors: José Portela González and David Alfaya Sánchez
- Title: *Electric vehicles and hvac systems as demand-side flexibility providers*
Author: Jordi Guasch Albareda
Supervisors: Pablo Rodilla Rodríguez and José Pablo Cháves Avila
- Title: *Prosumers in electricity markets: approaches, tools and viability assessment*
Author: Rubén Rodríguez Vilches
Supervisors: Álvaro Sánchez Miralles and Francisco Martín Martínez
- Title: *Breakthrough in off-grid energy systems: crossing the chasm towards sustainable energy access in africa*
Author: Hagos Meresa Weldu
Supervisors: Pablo Dueñas Martínez and Andrés González García

- Title: *A just renovation of buildings: analysing the feasibility of energy retrofitting in vulnerable households*
Author: María Morán Camacho
Supervisors: Eva María Arenas Pinilla and Roberto Barrella

- Title: *Human cervical spine intradiscal pressure response in dynamic compressive impact configurations: a cadaveric study to understand spine injury causation*
Author: Sara Sochor
Supervisors: Francisco José López Valdés and Jesús Jiménez Octavio

- Title: *Digestate as a sustainable fertiliser alternative: assessing and modelling the environmental impacts*
Author: Carmen Martín-Sanz Garrido
Supervisors: Carlos Morales Polo and Marta Revuelta Aramburu

- Title: *Optimal bidding of batteries in energy and ancillary services markets*
Author: Mohammad Zain Ul Abideen
Supervisors: Pedro Sánchez Martín, Abdulrahman Samir Ali Alassi and Andrés Ramos Galán

- Title: *Wide-area oscillations of low frequency with IBRS*
Author: Alejandra Cedenilla Bote
Supervisors: Luis Rouco Rodríguez and Lukas Sigrist

- Title: *Electricity end-user participation in demand response: behavioral insights and market implications*
Author: Daniele Stampatori
Supervisors: José Pablo Cháves Avila and Sanchayan Banerjee

- Title: *Experimental and computational investigation of whiplash and pitch-related injury risk in low- and high-speed automotive crashes*
Author: William Ricardo Valdez
Supervisors: Francisco José López Valdés and Jesús Jiménez Octavio

- Title: *Reliability and resilience of island power systems*
Author: Miad Sarvarizadeh Kouhpaye
Supervisors: Enrique Lobato Miguélez and Mohammad Rajabdorri

- Title: *Optimization based approaches for nuclear flexibility in high-renewable systems: formulation enhancements and system-level insights*
Author: Francisco Labora Gómez
Supervisor: Andrés Ramos Galán

- Title: *The impact of longevity on banks' profitability*
Author: Francisco Ignacio Quintana Fernández
Supervisors: Elisa María Aracil Fernández and David Roch Dupré

- Title: *Decarbonizing transport through demand management: assessing the impact of economic instruments*
 Author: Natalia Collado Van-Baumberghen
 Supervisor: Pedro Linares Llamas and Jose María Labeaga Azcona

- Title: *Contribution of energy storage systems to the stability of low-inertia power systems*
 Author: Mahmoud Khalifa Abdelhamid Khalifa
 Supervisors: Álvaro Ortega Manjavacas and Lukas Sigrist

- Title: *Impact of ibrs on electromechanical phenomena in power systems*
 Author: Chinmayi Mukund Wagh
 Supervisors: Luis Rouco Rodríguez and Xavier Jean Marie Leon Guillaud

- Title: *Technical challenges of automatic voltage control in modern power systems*
 Author: Fernando Gegúndez Nogueroles
 Supervisor: Luis Rouco Rodríguez

- Title: *Regulatory strategies for retail power market design*
 Author: Bruno Goulart de Freitas Machado
 Supervisor: José Pablo Chaves Ávila and Carlos Batlle López

- Title: *Short-term expansion planning of grid-enhancing technologies for congestion management in power systems*
 Author: María del Socorro Gómez Pérez
 Supervisors: Sara Lumbreras Sancho and Andrés Ramos Galán

- Title: *Methodologies for selecting feeders in underfrequency load shedding schemes*
 Author: Oswaldo Arenas Crespo
 Supervisor: Lukas Sigrist and Mohammad Rajabdorri

- Title: *Gaming for prevention and research: exploring serious games for researching and raising awareness in cybersecurity and cybercrime*
 Author: Andrea Baños Ramos
 Supervisors: Gregorio López López and Mario Castro Ponce

- Title: *Agents' behavior characterization in an electricity market considering confidentiality periods and bids' complex conditions*
 Author: Eloy Jesús del Gran Poder Insunza Díaz
 Supervisors: José Portela González and Antonio Muñoz San Roque

- Title: *Impact of active aerodynamics in vehicle stability and emergency breaking scenarios*
 Author: Ignacio Victoria Rodríguez
 Supervisors: Alberto Carnicero López and José Rubén Pérez Domínguez

- Title: *Development of assessment methods for long-term consequences of road traffic injuries*
Author: Simona Róka
Supervisor: Francisco José López Valdés
- Title: *Electrification solutions for heating/cooling through a thermal district network*
Author: Navid Nasrollahei
Supervisors: Pablo Dueñas Martínez and Carlos Mateo Domingo
- Title: *Bridging interpretability and optimization: simplification methods and automated quasi-optimal alternatives*
Author: Berta Ruiz González
Supervisors: Sara Lumbreras Sancho and Javier García González
- Title: *The phoebe buffay paradox: analysing sustainable consumer stereotyping processes in popular sitcoms*
Author: Sophie Sandrine Josépha Raynaud
Supervisors: Carmen Valor Martínez, Maria Carolina Zanette and Paolo Antonetti

6. Other activities

6.1 International exchanges

It is an IIT policy to encourage and finance, to the extent possible, that its members expand their education and research experience abroad. Some members of IIT have spent some time at foreign universities and agencies, as visiting scientists or engineers, working on specific projects and expand its expertise in research problems. During this academic year, the stays are:

- Paulo Brito Pereira, in Engineering, Systems and Services, Energie and Industrie, Technische Universiteit Delft (TU Delft), Delft (Netherlands). September-November 2024.
- Pablo Calvo Báscones, in Finance Department, Boston College, Boston (United States of America). July 2025.
- Efraim Centeno Hernáez, in Energy and Materials Transition Unit, Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (TNO), Amsterdam (Netherlands). August-December 2024.
- Pablo Frías Marín, in Energy Technologies Area. Grid Integration Group, Lawrence Berkeley National Laboratory (LBNL), Berkeley (United States of America). July-August 2025.
- Javier García González, in Institute for Data, Systems, and Society (IDSS), Laboratory for Information and Decision Systems (LIDS), Massachusetts Institute of Technology - MIT, Boston (United States of America). June-July 2025.
- Roberto Gesteira Miñarro, in Computer Security and Industrial Cryptography - COSIC, Katholieke Universiteit Leuven, Leuven (Belgium). February-May 2025.
- Jesús David Gómez Pérez, in Institute of Electricity Economics and Energy Innovation (IEE), Technische Universität Graz (TU Graz), Graz (Austria). September-December 2024.

- Stefanía Gómez Sánchez, in Institute of Electricity Economics and Energy Innovation (IEE), Technische Universität Graz (TU Graz), Graz (Austria). September-December 2024.
- Pedro Linares Llamas, in Center for Energy and Environmental Policy Research (CEEPR), Massachusetts Institute of Technology - MIT, Boston (United States of America). June-August 2025.
- Gregorio López López, in Computer Science & Artificial Intelligence Laboratory - CSAIL, Massachusetts Institute of Technology (MIT), Cambridge (United States of America). July 2025.
- Valeria Karina Moreno, in Oxford Institute for Energy Studies, University of Oxford, Oxford (United Kingdom). May-July 2025.
- Rafael Palacios Hielscher, in CAMS - Cybersecurity at MIT Sloan, Massachusetts Institute of Technology (MIT), Cambridge (United States of America). August 2024-July 2025.
- Manuel Pérez Bravo, in Department of Space, Earth and Environment, Chalmers tekniska högskola (CTH), Gothenburg (Sweden). September-November 2024.

6.2 Visiting students

- Mathias Baudouin, École nationale supérieure d'Arts et Métiers, Paris (France). July-September 2025.
- Onur Talu, Massachusetts Institute of Technology, Cambridge (USA). June 2025.

6.3 Courses offered and coordinated to external companies and institutions

The courses offered to companies and consultancy activities are frequently related to research projects. There have been as follows:

- Luis Olmos Camacho, Luis Rouco Rodríguez, Rafael Palacios Hielscher, *"Coordination of the course committee of the EES-UETP network during the year 2024"*. Electric Energy Systems - University Enterprise Training Partnership Association (EES-UETP). USA. Madrid, Madrid.

- Pedro Linares Llamas, Pablo Rodilla Rodríguez, Tomás Gómez San Román, José Pablo Chaves Ávila, José Carlos Romero Mora, Carmen Valor Martínez, Rafael Cossent Arín, *"Course on the ecological transition for CEPSA Technical Direction"*. CEPSA Comercial Petróleo S.A.U. USA. Online.
- Andrés Ramos Galán, Javier García González, *"Course on optimization applied to the operation of electrical systems"*. XM S.A. E.S.P. USA. Online.
- Simón Rodríguez Santana, Jaime Pizarroso Gonzalo, Andrés Occhipinti Liberman, *"Generative AI course for CASVI schools"*. Colegios CASVI. USA. Villaviciosa de Odón, Madrid.
- Antonio Bello Morales, Pablo Rodilla Rodríguez, Paulo Brito Pereira, *"Training for the Technological Migration of ACUARIO (Phase 1)"*. Endesa S.A. USA. Madrid, Madrid.
- Carlos Mateo Domingo, Álvaro Ortega Manjavacas, Pablo Frías Marín, *"Preparation of an advanced digital training course on public low-voltage distribution systems"*. Ormazabal Electric, S.L.U. USA. Online.
- Carlos Mateo Domingo, Pablo Frías Marín, Álvaro Ortega Manjavacas, *"Training course on public low voltage networks"*. Ormazabal Electric, S.L.U. USA. Bilbao, Biscay.
- Juan Carlos del Real Romero, Yolanda Ballesteros Iglesias, Eva Paz Jiménez, Sara López de Armentia Hernández, *"Course of adhesive joints for the European Adhesive Specialist (EAS)"*. Asociación Española de Soldadura y Tecnologías de Unión (CESOL). USA. Madrid, Madrid.
- Juan Carlos del Real Romero, Yolanda Ballesteros Iglesias, Eva Paz Jiménez, Sara López de Armentia Hernández, *"Practical training for the European Adhesive Specialist (EAS)"*. Asociación Española de Soldadura y Tecnologías de Unión (CESOL). USA. Madrid, Madrid.
- Jaime Boal Martín-Larrauri, Jaime Pizarroso Gonzalo, *"Introduction to image processing for object recognition"*. Enel Green Power España, S.A. USA. Madrid, Madrid.
- Pablo Rodilla Rodríguez, Carlos Batlle López, Miguel Angel Barruso Recuero, *"FSR Annual Training on the Regulation of Energy Utilities"*. European University Institute (EUI), Florence School of Regulation. USA. Online.
- Luis Olmos Camacho, Luis Rouco Rodríguez, Rafael Palacios Hielscher, Álvaro Ortega Manjavacas, *"Coordination of the course committee of the EES-UETP network during the year 2024"*. Electric Energy Systems - University Enterprise Training Partnership Association (EES-UETP). USA. Madrid, Madrid.

- Matteo Troncia, José Pablo Chaves Ávila, *"ISGAN Virtual Learning"*. International Smart Grid Action Network (ISGAN). USA. Online.
- Juan Carlos del Real Romero, Yolanda Ballesteros Iglesias, Sara López de Armentia Hernández, Eva Paz Jiménez, *"Training Course for the European Adhesive Specialist (EAS)"*. Asociación Española de Soldadura y Tecnologías de Unión (CESOL). USA. Madrid, Madrid.
- Javier García González, Andrés Ramos Galán, Pablo Dueñas Martínez, *"Modeling the path to net-zero energy"*. Massachusetts Institute of Technology (MIT). USA. Cambridge, MA (United States of America).
- Francisco José López Valdés, *"9th International Advanced Course on Injury Biomechanics"*. Registro participantes. USA. Madrid, Madrid.
- José Pablo Chaves Ávila, Javier Matanza Domingo, Miguel Ángel Sánchez Fornié, Rafael Cossent Arín, Lukas Sigríst, Ignacio Egido Cortés, Álvaro Ortega Manjavacas, Néstor Rodríguez Pérez, Francisco Miguel Echavarren Cerezo, *"Smart Grids Academy support"*. Asociación de Industrias de Conocimiento y Tecnología de Euskadi (GAIA). USA. San Sebastian, Guipuzcoa.

6.4 Seminars

Dissemination seminars are organized throughout the year at IIT facilities to present final or preliminary results of the ongoing research lines, as well as to discuss hot topics of general interest. The speakers of these seminars are either IIT member or guest speakers coming from other institutions. The seminars that have taken place in this course are the following ones.

- David Alfaya Sánchez, *"Classifying isomorphisms between moduli of bundles"*. Mathematics Department Seminar IISER. Indian Institute of Science Education and Research Bhopal.
- David Alfaya Sánchez, *"Computer assisted classification of isomorphisms between moduli spaces of parabolic vector bundles"*. Geometry and machine learning 2 Conference - GML 2025. Sorbonne Université; Université d'Artois; y Penn State University.
- David Alfaya Sánchez, *"Computer assisted exploration of the geometry of moduli spaces"*. Workshop on "AI in Mathematical Research". University of Augsburg.
- David Alfaya Sánchez, *"The mathematics of neural networks"*. Mathematics Career Talk. Indian Institute of Science Education and Research Bhopal.

- David Alfaya Sánchez, Mario Castro Ponce, *"Designing activities with AI support"*. Plan de formación IA para PDI. IA para la enseñanza y evaluación. Universidad Pontificia Comillas.
- Elisa María Aracil Fernández, *"Monitoring socioeconomic readiness for the demographic transition: Introducing the Senior Economy Tracker"*. Seminars of the Economic Research Portal at the Banco de España. Banco de España.
- Elisa María Aracil Fernández, *"Multinational enterprises as agents of global transformation. A review and framework for scaling up solutions to Grand Challenges"*. Global Strategy Journal Idea & Paper Development Workshop. Norwegian University of Science and Technology - NTNU.
- Elisa María Aracil Fernández, David Roch Dupré, Pablo Calvo Báscones, *"Understanding demographic transformation to inspire a new economic and social paradigm: the Senior Economy Tracker"*. II Encuentro de Longevidad. Cátedra Iberdrola de Ética Económica y Empresarial. Universidad Pontificia Comillas.
- Eva María Arenas Pinilla, *"Flexible generation in nuclear power plants through hydrogen production"*. 50ª Reunión Anual de la Sociedad Nuclear Española. Sociedad Nuclear Española (SNE).
- Eva María Arenas Pinilla, María del Mar Cledera Castro, Carlos Morales Polo, *"Bioenergy in action: how to obtain biomethane from waste"*. Semana de la Ciencia y la Innovación 2024. Fundación para el conocimiento madri+d. Comunidad de Madrid.
- Andrea Baños Ramos, *"Playing to do research: Can we use a video game to research about cyberbullying?"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Roberto Barrella, *"Energy for all. A Service-Learning project"*. Putting Energy Poverty Research into Practice. Fuel Poverty Research Network (FPRN); y University of Salford.
- Roberto Barrella, *"The behind-the-scenes story of 2022 energy and inflationary crises: data, experiences and opinions of spanish vulnerable households"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Roberto Barrella, *"Unveiling energy poverty in Southern and Western Europe: indicators, vulnerability factors, and policy implications"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Manuel Blanco Castillo, *"Efficient automatic operation of a metro line: eco-driving design with optimized use of regenerative energy and rolling stock consideration"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Robin Blömer, *"Challenges in the hydrogen market uptake, the European Hydrogen Bank auctions and the role of support schemes in kick-starting hydrogen in the EU"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Mario Castro Ponce, *"Mathematical modeling of intrahost dynamics"*. Update Work Package 4 Project EPICVIR. EPICVIR consortium.
- Mario Castro Ponce, *"The statistical physics of virus-endosome dynamics"*. Spanish Network on Physical Virology - BioFiViNet VII. CNB-CSIC; Universidad Autónoma de Madrid; Universidad de Barcelona; y ICMAB-CSIC.
- Efraim Centeno Hernáez, *"Results of the Report of energy poverty indicators in Spain 2024"*. Comisión de Transición Ecológica. Senado de España.
- José Pablo Chaves Ávila, *"Challenges of technological planning in the face of the realities of an evolving electricity market"*. IV Simposio CIER Redes y Ciudades Inteligentes. Comisión de Integración Energética Regional (CIER).
- José Pablo Chaves Ávila, *"Distributed Energy Resources in Spain : challenges, innovations and evolving regulations"*. Global Smartgrids Seminar. Korea Power Exchange.
- José Pablo Chaves Ávila, *"Distributed Energy Resources: Challenges, Value, Innovations, and Evolving Regulations"*. Spring Working Papers Days 2025. Sustainable Economy Research Group (S.E.R.G.). Université Paris-Saclay.
- José Pablo Chaves Ávila, *"European Experience in Regulatory Sandboxes"*. Regional Workshop on Regulatory Innovation and First Advisory Committee Meeting Project: Technical Assistance for Regulatory Innovation in the Countries of Central America and the Dominican Republic. International Telecommunication Union (ITU).
- José Pablo Chaves Ávila, *"International experiences of regulatory sandboxes"*. VII Congreso Internacional de Regulación 2024. Autoridad Regulatoria de los Servicios Públicos - ARESEP.
- José Pablo Chaves Ávila, *"Flexibility Requirements in the European Power System. Session 4: Technical Solutions for Flexibility Provision"*. IREDonline Conference. Integration of Renewable & Distributed Energy Resources (IRED).

- José Pablo Chaves Ávila, *"Hierarchical Multi-Tier Energy Market Architecture: The Emergence of Distribution Local Markets"*. 2025 IEEE PES General Meeting. IEEE - Institute of Electrical and Electronics Engineers.
- José Pablo Chaves Ávila, *"Local flexibility market design and TSO/DSO coordination: R&D projects"*. CEER Specialised Training on Regulation of DSOs, Digitalisation and Flexibility Market. Council of European Energy Regulators (CEER).
- José Pablo Chaves Ávila, *"Network tariff designs and interactions with local flexibility markets"*. EPRI European Workshop Week 2025. Electric Power Research Institute (EPRI).
- José Pablo Chaves Ávila, *"Modern Regulation of Public Services. Just energy transition and decarbonisation of the economy, environment and SDGs"*. VII Congreso Internacional de Regulación 2024. Autoridad Regulatoria de los Servicios Públicos - ARESEP.
- María del Mar Cledera Castro, José Carlos Romero Mora, *"Inside-Out Sustainability: Peripatetic teaching"*. Jornadas de buenas prácticas en docencia. Comillas 2024-25. Universidad Pontificia Comillas.
- Natalia Collado Van-Baumberghen, *"Empirical evidence on economic signals for congestion management"*. Experiencias en la mejora de la congestión en ciudades. Cátedra Kapsch para una movilidad sostenible e inteligente. Universidad Pontificia Comillas.
- Natalia Collado Van-Baumberghen, *"Scope, coverage and effectiveness of the Spanish Bono Social Eléctrico in combating energy poverty"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- David Contreras Bárcena, *"Clash of the Titans: Humans versus ChatGPT"*. Semana de la Ciencia y la Innovación 2024. Fundación para el conocimiento madri+d. Comunidad de Madrid.
- David Contreras Bárcena, Juan Luis Zamora Macho, *"AI-supported contents and presentations"*. Plan de formación IA para PDI. IA para la enseñanza y evaluación. Universidad Pontificia Comillas.
- Rafael Cossent Arín, *"Current state and future of sustainable transportation technologies: implications for logistics decarbonization"*. 8ª Jornada Logística Sostenible. Asociación Española de Codificación Comercial - AECOC.
- Rafael Cossent Arín, *"H2V price"*. Congreso Nacional de Hidrógeno Verde. Federación Onubense de Empresarios - FOE.

- Rafael Cossent Arín, *"Transposition of RED III and compliance schemes applied in Europe for the incorporation of new gaseous fuels"*. Asamblea General. Gasnam-Neutral Transport.
- Rafael Cossent Arín, Isabel Catalina Figuerola-Ferretti Garrigues, *"Public presentation of the 2023-2024 Annual Report of the Chair of Hydrogen Studies"*. Cátedra de Estudios sobre el Hidrógeno. Universidad Pontificia Comillas.
- Asunción Paloma Cucala García, Adrián Fernández Rodríguez, *"The experience in the application of AI technologies to the IIT's railway sector"*. Jornada Técnica «Aplicación de las Tecnologías de la IA al Ferrocarril». Foro ICAITREN; Asociación de Ingenieros del ICAI; Universidad Pontificia Comillas.
- Santos José Díaz Pastor, *"An integrated financial approach to electrification for SDG7.1"*. Introductory Workshop on Power Sector Regulation in Africa. Open Africa Power 2025 Program. Enel Foundation, SEforALL & African School of Regulation.
- Santos José Díaz Pastor, *"Integrated Development Frameworks Webinar"*. Mini-Grids Partnership Steering Committee. Sustainable Energy for All.
- Santos José Díaz Pastor, *"Regulatory support to accelerate electrification. On-and-off-grid distribution"*. Power Sector Regulation in Africa Course. African School of Regulation.
- Santos José Díaz Pastor, *"Results of the regulatory and financial proposal for Zambia's electrification as a case study"*. Expert Policy Dialogue on Sustainable and Scalable Mini-Grid Business Models. African School of Regulation (AFR).
- Santos José Díaz Pastor, *"The Future of Mini Grids: Mini Grids at the Forefront of the Sustainable Energy Revolution"*. 8th Mini Grid Action Learning Event. World Bank's Energy Sector Management Assistance Program (ESMAP) and the Africa Mini Grid Developers Association (AMDA).
- Santos José Díaz Pastor, Michel Rivier Abbad, José Ignacio Pérez Arriaga, *"Online Training on the Planning of Tenders and Projects within the Integrated Rural Electrification Framework in Madagascar"*. Ministry of Energy and Hydrocarbons (MEH).
- Pablo Dueñas Martínez, *"The power of demand response"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Mohamed Abbas Elabbas, *"A bilevel approach for efficient allocation of transmission losses in regional electricity markets with single-node dispatch: Application to the West African Power Pool CLSG network"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Adrián Fernández Rodríguez, *"Interoperability and technology: keys to global decarbonization"*. Presentación del estudio de cocreación 'Retos, fortalezas y necesidades futuras del sector ferroviario español'. Mafex.
- Pablo Frías Marín, *"Lessons Learned from the Blackout in the Iberian Peninsula"*. Energy Technologies Area (ETA) Seminar. Lawrence Berkeley National Laboratory (LBNL).
- Eduardo César Garrido Merchán, *"Artificial Intelligence for Language Mediation in Moderate and Severe Autism: A Survey of Methods and Applications"*. CIUTI Conference 2025 – Language Mediation in Flux: Assessing the Impact of Generative AI. Universidad Pontificia Comillas.
- Eduardo César Garrido Merchán, *"Ethical Dimensions of AI in T&I"*. CIUTI Conference 2025 – Language Mediation in Flux: Assessing the Impact of Generative AI. Universidad Pontificia Comillas.
- Fernando Gegúndez Nogueroles, *"Dynamic reactive limits of synchronous generators in the new Spanish voltage control"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Roberto Gesteira Miñarro, *"pwnobd: Offensive cybersecurity toolkit for vulnerability analysis and penetration testing of OBD-II devices"*. Black Hat Europe 2024. Informa PLC.
- Tomás Gómez San Román, *"Network access: capacity and flexibility"*. XXVIII Congreso de ASEME. Asociación de Empresas Eléctricas -ASEME.
- Tomás Gómez San Román, *"Policy and regulatory aspects for the implementation of flexibility in energy systems"*. Curso «Flexibilidad en sistemas eléctricos descarbonizados». Universidad Internacional Menéndez Pelayo - UIMP.
- Tomás Gómez San Román, *"DSO challenges and network tariffs under more active consumers, energy communities, and DER flexibility"*. CEER Specialised Training on Network Tariffs for Transmission and Distribution. Council of European Energy Regulators (CEER).

- Tomás Gómez San Román, *"The future of the Spanish decarbonised energy system"*. Curso «Flexibilidad en sistemas eléctricos descarbonizados». Universidad Internacional Menéndez Pelayo - UIMP.
- Tomás Gómez San Román, *"Promoting rational investment decisions"*. ERSE High Level Seminar on «Ensuring "investability" without jeopardising incentive regulation». Entidade Reguladora dos Serviços Energéticos (ERSE).
- Tomás Gómez San Román, *"Tariffication in the EU : Working group"*. CEER Specialised Training on Network Tariffs for Transmission and Distribution. Council of European Energy Regulators (CEER).
- Yolanda González Arechavala, *"Artificial Intelligence for educators: history, innovation and practice"*. Semana de la Ciencia y la Innovación 2024. Fundación para el conocimiento madri+d. Comunidad de Madrid.
- Yolanda González Arechavala, *"Journey into the world of Artificial Intelligence: practical workshop for young people"*. Semana de la Ciencia y la Innovación 2024. Fundación para el conocimiento madri+d. Comunidad de Madrid.
- Yolanda González Arechavala, *"3rd STEM Training Day for Early Childhood and Elementary School Teachers in Computational Thinking"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas.
- Yolanda González Arechavala, Sara Lumbreras Sancho, *"Seminar on STEM studies at IES Lope de Vega in Madrid"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas.
- Yolanda González Arechavala, Ana María Megía Macías, Eva María Arenas Pinilla, Anne Maren Coll Franck, Sara López de Armentia Hernández, *"Seminar on STEM studies at IES Africa in Madrid"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas.
- Juan Francisco Gutiérrez Guerra, *"Tackling uncertainty in electrolyzer deployment: the role of stack degradation on long-term expansion plans"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Sergio Herreros Pérez, *"Isomorphisms between moduli spaces of parabolic vector bundles"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Francisco Labora Gómez, *"An Efficient and Tight Model for Nuclear Power Plant Constraints in Flexible Operation"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Francisco Labora Gómez, *"Enhancing Power System Flexibility: The Role of Pumped Storage in Providing Operating Reserves. Panel 1. Operational and strategic decision-making of energy storage systems based on optimization methods or smart operation rules"*. Joint Workshop EERA ES-e3s-CSP-DfE «Smart Operation Of Energy Storage Technologies In Future Energy Markets». Universidad Politécnica de Madrid (UPM); European Energy Research Alliance (EERA); y CIEMAT.

- Patrizio Lecca, *"Demographic Change and Household Energy Efficiency. Preliminary draft"*. States & Markets Seminar. Universidad Pontificia Comillas.

- Léonard Lefranc, *"Decarbonising industry in an heterogeneous geopolitical context: can existing modelling schools address it?"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Léonard Lefranc, *"How can our caña of beer become net-zero?"*. Energy Seminars 2024-2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Pedro Linares Llamas, *"The value of Ocean Carbon Dioxide Removal"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Sara López de Armentia Hernández, *"Biomaterials for tissue regeneration"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Álvaro Jesús López López, *"Impact of new IA technologies on the railway system"*. Jornada Técnica «Aplicación de las Tecnologías de la IA al Ferrocarril». Foro ICAITREN; Asociación de Ingenieros del ICAI; Universidad Pontificia Comillas.

- Sara Lumbreras Sancho, *"Dialogue «Human rights and ethics in artificial intelligence»"*. Jornada 2024 de la Comisión General Justicia y Paz. Justicia y Paz.

- Sara Lumbreras Sancho, *"Emerging phenomena in computing: from entropy to artificial consciousness?"*. Ciclo Ciencia y Filosofía. Seminario «Naturaleza y emergencia: cómo la novedad se abre camino en el cosmos. 4º curso». Fundación Xavier Zubiri.

- Sara Lumbreras Sancho, *"The Revolution of Artificial Intelligence in Respiratory Diseases"*. Ciclo de Conferencias Be neumo, be you. Hospital Universitario de La Princesa.
- Sara Lumbreras Sancho, *"Faith and Humanity in the Age of AI: potentials and perplexities of AI in spirituality"*. Diócesis de Málaga.
- Sara Lumbreras Sancho, *"Rethinking the human: ethical and anthropological reflections from artificial intelligence"*. Taller teológico. Talleres 2024-2025. Centro de Ciencia y Fe.
- Sara Lumbreras Sancho, *"Innovative technologies. So much power!"*. Ciclo de Conferencias El Universo y nosotros. Acción Social Católica - ASC.
- Sara Lumbreras Sancho, *"Responses to transhumanism. Body, authenticity and meaning"*. Ciclo 2024-2025 de Ateneos de Ciencia y Religión «Transhumanismo: ¿utopía o distopía?». Universidad Católica de Salta.
- Sara Lumbreras Sancho, *"Challenges and possibilities of AI in social action. Ethical criteria"*. Escuelas en Verano 2025. Caritas Española Formación.
- Sara Lumbreras Sancho, *"Ethical and anthropological aspects of artificial intelligence"*. Seminario Diálogo Ciencia y Tecnología (II edición). Universidad de Murcia.
- Sara Lumbreras Sancho, *"Final discussion"*. Ciclo Ciencia y Filosofía. Seminario «Naturaleza y emergencia: cómo la novedad se abre camino en el cosmos. 4º curso». Fundación Xavier Zubiri.
- Sara Lumbreras Sancho, *"Ethics in AI"*. ILUNION S.L..
- Sara Lumbreras Sancho, *"Faith and humanity in the age of Artificial Intelligence (AI): potentials and perplexities of AI on spirituality"*. Seminario Diocesano de Huelva. Apertura del Curso Académico 2024/2025. Diócesis de Huelva.
- Sara Lumbreras Sancho, *"AI solving complex problems"*. 4ª Ed. Programa de formación de IA en las Ciencias Sociales y Jurídicas. Universidad Complutense de Madrid - UCM.
- Sara Lumbreras Sancho, *"AI: applications and research, sharing day"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Sara Lumbreras Sancho, *"Imago dei and AI: theological insights for chatbot ethics"*. OCTAI workshop 2: Initial theological proposals. University of Oxford.

- Sara Lumbreras Sancho, *"Artificial intelligence and Christian humanism"*. Jornadas de Teología «Teología e Inteligencia Artificial». Universidad de Deusto.
- Sara Lumbreras Sancho, *"Introduction to quantum computing"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Sara Lumbreras Sancho, *"Human identity in the light of artificial intelligence"*. Jornadas de Teología «Teología e Inteligencia Artificial». Universidad de Deusto.
- Sara Lumbreras Sancho, *"Human identity at the sight of technology and AI"*. Jornada de Formació per al Clergat sobre Intelligència Artificial. Bisbat de Mallorca.
- Sara Lumbreras Sancho, *"The ethical challenges of artificial intelligence for political life"*. Encuentros Trasatlánticos. Academia de Lideres Católicos (ALC).
- Sara Lumbreras Sancho, *"The role of infrastructure. Session 2: Electrification opportunities & hydrogen's role"*. Electrification: a feasible pathway to a climate neutral European Union. European Climate and Energy Modelling Forum (ECEMF).
- Sara Lumbreras Sancho, *"Are we losing skills? Professors and students discuss the impact of generative AI"*. Jornada de Buenas Prácticas en Docencia 24/25. Universidad Pontificia Comillas.
- Sara Lumbreras Sancho, David Contreras Bárcena, *"Artificial intelligence. The future of engineering"*. Instituto de la Ingeniería de España.
- Sara Lumbreras Sancho, Álvaro Jesús López López, *"IA support in bibliographic studies and drafting"*. Plan de formación IA para PDI. IA en la investigación académica. Universidad Pontificia Comillas.
- Alejandro Martínez de Guinea García, *"The generalized Markoff equation"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Miguel Martínez Velázquez, *"Distribution grid investments for the energy transition in the residential sector"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Miguel Martínez Velázquez, *"Harnessing the value of battery energy storage systems for cost-effective and reliable power distribution systems"*. 29th ES-OnSeminar. International Energy Agency - IEA.

- Paolo Mastropietro, *"Towards the introduction of a capacity mechanism in Spain: regulatory analysis and current status of the approval process"*. 5º Webinar «The energy transition: towards a decarbonized energy». IEEE PES ESPAÑA.
- Paolo Mastropietro, *"Long-term Regulatory Instruments for Electricity Storage and Their Impact on the Smart Operation of Energy Storage Technologies. Panel 2. Societal, environmental, economic, cultural and regulatory aspects"*. Joint Workshop EERA ES-e3s-CSP-DfE «Smart Operation Of Energy Storage Technologies In Future Energy Markets». Universidad Politécnica de Madrid (UPM); European Energy Research Alliance (EERA); y CIEMAT.
- Paolo Mastropietro, Andrés Ramos Galán, Sara Lumbreras Sancho, Luis Olmos Camacho, María del Socorro Gómez Pérez, *"Beyond the Grid: Transmission Planning Challenges in Latin America and the Caribbean"*. Webinar. Banco Interamericano de Desarrollo (BID).
- Carlos Mateo Domingo, *"Digitalisation of electricity distribution networks: indicators and investments"*. XXVIII Congreso de ASEME. Asociación de Empresas Eléctricas -ASEME.
- Emanuel Gastón Mompó Pavesi, *"AI-generated feedback on evaluation activities"*. Plan de formación IA para PDI. IA para la enseñanza y evaluación. Universidad Pontificia Comillas.
- Antonio Muñoz San Roque, *"Welcome"*. Jornada Técnica «Aplicación de las Tecnologías de la IA al Ferrocarril». Foro ICAITREN; Asociación de Ingenieros del ICAI; Universidad Pontificia Comillas.
- Andrés Occhipinti Liberman, *"Epistemic planning and action model learning"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Rafael Palacios Hielscher, *"Building and developing your data analytics and monitoring programs"*. AI & Compliance Summit 2024. Boston University.
- José Ignacio Pérez Arriaga, *"Current challenges in the regulation of the power sector in Africa"*. Introductory Workshop on Power Sector Regulation in Africa. Open Africa Power 2025 Program. Enel Foundation, SEforALL & African School of Regulation.
- José Ignacio Pérez Arriaga, *"Integrated Development Frameworks Webinar"*. Sustainable Energy for All.

- José Ignacio Pérez Arriaga, *"The Integrated Framework for Electrification (IFE): Fundamentals and implementation"*. Introductory Workshop on Power Sector Regulation in Africa. Open Africa Power 2025 Program. Enel Foundation, SEforALL & African School of Regulation.
- Manuel Pérez Bravo, *"The International Transport Energy Modeling (iTEM) Open Data & Harmonized Transport Database"*. Seventh International Transport Energy Modeling (iTEM) Workshop. United Nations Economic Commission for Europe, International Transport Energy Modeling.
- Manuel Pérez Bravo, *"Assessing and improving resilience of future transport systems under climate stress: A case study for Spain"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Jaime Pizarroso Gonzalo, *"XAI Techniques in forecasting: why all papers might be wrong"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Alejandro Polo Molina, *"MonoKAN: Certified Monotonic Kolmogorov-Arnold Network"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- José Portela González, *"The electricity generation emissions (EGE) tracker for monitoring the green transition in the power sector"*. International Workshop «The ecological transition challenge: Energy poverty, well-being and sustainability». Universidad Pontificia Comillas; Universidad de Nebrija.
- Andrés Ramos Galán, *"The future of mini-hydro and its value contribution"*. Jornada Técnica «Optimización, gestionabilidad y nuevas oportunidades de la Minihidráulica». Asociación de Empresas de Energías Renovables (APPA).
- Javier Rico Cabrera, *"Application of matched asymptotic expansion techniques to the analysis of geothermal heat exchangers"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Michel Rivier Abbad, *"Market design"*. Jornada Iberoamericana sobre Mercados Eléctricos. Comité Nacional de España de CIGRE; Comité Nacional Português do CIGRE.
- Antonio Francisco Rodríguez Matas, *"Designing robust energy transition policy portfolios under deep uncertainty"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Néstor Rodríguez Pérez, *"Madiot & Industroyer Attacks: Impact on an European Power System"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Simón Rodríguez Santana, *"Useful tools for research with data analysis"*. Plan de formación IA para PDI. IA en la investigación académica. Universidad Pontificia Comillas.
- Simón Rodríguez Santana, *"Probabilistic Machine Learning in applied problems"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Carlos Rodríguez-Morcillo García, *"Closure of the Seminar"*. Jornada «Innovación y Ciencia para un Futuro Sostenible: Impacto Social Positivo». Oficina de Transferencia de Conocimiento (OTC). Universidad Pontificia Comillas.
- José Carlos Romero Mora, *"The horizon of Integral Ecology in the Catholic University"*. Jornada interuniversitaria. Caminos de esperanza en el cuidado de la casa común. Unidad de Ecología Integral. Universidad Pontificia Comillas.
- José Carlos Romero Mora, *"Energy transition and challenges for Spain"*. VI Edición del Programa de Liderazgo Humanista. Fundación Pablo VI; y Fundación Conexus.
- José Carlos Romero Mora, *"A dual perspective on energy poverty in Spain: traditional and gap indicators for 2023"*. International Workshop «The ecological transition challenge: Energy poverty, well-being and sustainability». Universidad Pontificia Comillas; Universidad de Nebrija.
- José Carlos Romero Mora, *"Beyond Incidence: A Cartography of Energy Poverty in Spain. Session: The social approach and the role of energy users"*. Jornadas Internacionales «Construyendo el camino hacia una Transición Energética Justa (y efectiva)». Consejo Superior de Investigaciones Científicas (CSIC).
- José Carlos Romero Mora, *"LivingLab Forum Roadmap"*. Foro LivingLab contra la Pobreza Energética. Cátedra de Energía y Pobreza. Universidad Pontificia Comillas..
- José Carlos Romero Mora, *"Senioverty proyect. Assessing the social implications of senior energy poverty. The Spanish case"*. Foro 360. Fundación "la Caixa".
- Luis Rouco Rodríguez, *"The evolution of the stability problem over the last 40 years: a personal journey"*. IEEE PES Spain Power and Energy Chapter. Power Engineering Society (PES) del Institute of Electrical and Electronics Engineers Inc. - IEEE.

- Berta Ruiz Gonzalez, *"Enhancing optimization interpretability through problem simplification"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- María Ana Sáenz Nuño, *"Virtual reality or recreated reality? The Library of the Imperial College of Madrid"*. Semana de la Ciencia y la Innovación 2024. Fundación para el conocimiento madri+d. Comunidad de Madrid.

- María Ana Sáenz Nuño, *"Houdini Escape Room"*. Semana de la Ciencia y la Innovación 2024. Fundación para el conocimiento madri+d. Comunidad de Madrid.

- María Ana Sáenz Nuño, *"Innovation and Tradition: Digital Humanities at the Imperial College Library"*. II Workshop CLARIAH-CM. Humanidades digitales y ciencia abierta en la era de la inteligencia artificial. Nodo CLARIAH-CM; y Universidad Carlos III de Madrid.

- María Ana Sáenz Nuño, *"From the archives to the Metaverse: advances in Digital Recreation to revive and share the Imperial Jesuit College"*. Seminario "MARCO Digital". Universidad de Alcalá.

- María Ana Sáenz Nuño, *"Historical environments. Methodological strategies, free digital tools and implementation process in the case of the Library and Chapel of the Imperial College of Madrid (17th century)"*. Seminario teórico práctico de Curaduría de la carrera de posgrado: Maestría y Especialización en Curaduría de Arte Contemporáneo. Universidad del Salvador.

- María Ana Sáenz Nuño, *"Escape Room. International system of units"*. Second Interactive Conference on Education about Standardization. DIN e. V..

- María Ana Sáenz Nuño, *"Working group: Metrology Training and Dissemination - CEM Prospective Study"*. Centro Español de Metrología- CEM; y Ministerio de Industria y Turismo.

- María Ana Sáenz Nuño, *"Working group: AI, IoT, Digital Twins, TD, Blockchain - CEM Prospective Study"*. Centro Español de Metrología- CEM; y Ministerio de Industria y Turismo.

- María Ana Sáenz Nuño, *"Interactive games on standardization"*. Academic Standard Day (ASD) Madrid. Universidad Politécnica de Madrid (UPM); y Asociación Española de Normalización (UNE).

- María Ana Sáenz Nuño, *"New teaching formats, the micro-credential. A teaching focused on learning and cultural diffusion. Proposal of Gamification"*. Seminario MARCO. Presentación del Proyecto «Madrid, Real y Cortesano». Universidad Autónoma de Madrid; Universidad Rey Juan Carlos; Universidad Complutense de Madrid; Universidad de Alcalá ; yUniversidad Pontificia Comillas.

- María Ana Sáenz Nuño, *"Review of Laboratory for Health of the Spanish National Metrology Institute (CEM)"*. Course 217 - Future Needs for Metrology: Climate Science, Quantum Technologies and the Digital Transformation. International School of Physics "Enrico Fermi".

- Luis Francisco Sánchez Merchante, *"Leveraging ARCUS Resources to Understand the Relationship Between Long Bone Cortical Thickness and Medical Diagnosis"*. Webinar. METACHOP Research Affinity Group.

- Daniel Sánchez Sánchez, *"Motives meet SymPy: studying π -ring expressions in Python"*. 20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Joel Schölzel, *"Local energy markets: the future of managing decentralized urban energy systems?"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Santiago Serna Zuluaga, *"The Role of Low-Carbon Hydrogen in Integrated Hydrogen Production Systems: achieving a cost-Effective operation"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Santiago Serna Zuluaga, Manuel Pérez Bravo, *"Understanding the alternative fuels: molecules, pathways and regulation"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Daniele Stampatori, *"Shaping end-user behaviour for demand response using the COM-B model"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Jesús Tordesillas Torres, *"Trajectory Optimization"*. ETH Robotics Summer School 2025. ETH Zürich.

- Jesús Tordesillas Torres, *"Trajectory Planning and Constraint Guarantees with Neural Networks"*. University of Pennsylvania.

- Jesús Tordesillas Torres, "*Trajectory Planning and Constraint Guarantees with Neural Networks*". Robotics: Science and Systems (RSS) 2025 Workshop «Leveraging Implicit Methods for Aerial Autonomy». School of Engineering and Applied Science. University of Pennsylvania.
- Jesús Tordesillas Torres, "*How does a robot fly, walk, or parkour?*". Cátedra de Aplicaciones de IA al Mantenimiento basado en datos. Endesa S.A..
- Jesús Tordesillas Torres, Jesús Tordesillas Torres, "*Trajectory planning and constraint guarantees with neural networks*". Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Matteo Troncia, "*Integrated and coordinated short-term markets for system services: implementation challenges and impact assessment*". Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.
- Orlando Mauricio Valarezo Rivera, "*Workshop C: Market-based SGAM updates or solito negotium? An interactive and collaborative workshop discussion*". The 13th DACH+ Energy Informatics Conference. Scuola universitaria professionale della Svizzera italiana - SUPSI.
- Carmen Valor Martínez, "*Connecting with God in Nature*". 34º Semana Parroquial de Cristo de la Paz. Parroquia Cristo de la Paz.
- Carmen Valor Martínez, "*Economic, consumption and welfare models*". VI Edición del Programa de Liderazgo Humanista. Fundación Pablo VI; y Fundación Conexus.
- Carmen Valor Martínez, "*Stop Answering. Start Asking. The Art of Drafting Questions that Matter.*". Doctoral Colloquium TBS-TSM PhD Day – Marketing track. Toulouse School of Management (TSM); y Toulouse Business School (TBS).
- Carmen Valor Martínez, "*Where and when doctoral communities*". 2025 EFMD Doctoral programmes Conference. EFMD.
- Daniel Lewis Wuebben, "*Making Meaning of Energy: Interpretivist Methods for Understanding Energy Activism, Energy Planning, and Energy in Contemporary Fiction*". Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

6.5 Organization of congresses, seminars and workshops

- Sara Lumbreras Sancho, Sara Lumbreras Sancho, *"Thinking about AI. Protocol/Algorithm to generate changes in jurisprudence. An application of Dialogic Logic: manual protocol or algorithm for AI."*. Cátedra Hana y Francisco José Ayala de Ciencia, Tecnología y Religión. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.
- José Carlos Romero Mora, José Carlos Romero Mora, *"LivingLab Forum against Energy Poverty"*. Cátedra de Energía y Pobreza. Universidad Pontificia Comillas.. Madrid (Spain). April 2025-January 2030.
- Efraim Centeno Hernáez, Efraim Centeno Hernáez, *"LivingLab Forum against Energy Poverty"*. Cátedra de Energía y Pobreza. Universidad Pontificia Comillas.. Madrid (Spain). April 2025-January 2030.
- Roberto Barrella, Roberto Barrella, *"LivingLab Forum against Energy Poverty"*. Cátedra de Energía y Pobreza. Universidad Pontificia Comillas.. Madrid (Spain). April 2025-January 2030.
- Miguel Angel Rios Ocampo, Miguel Angel Rios Ocampo, *"LivingLab Forum against Energy Poverty"*. Cátedra de Energía y Pobreza. Universidad Pontificia Comillas.. Madrid (Spain). April 2025-January 2030.
- Aitana Alguacil, Aitana Alguacil, *"LivingLab Forum against Energy Poverty"*. Cátedra de Energía y Pobreza. Universidad Pontificia Comillas.. Madrid (Spain). April 2025-January 2030.
- Yolanda González Arechavala, Yolanda González Arechavala, *"Welcome Session to the International Women in STEM Project"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.
- Yolanda González Arechavala, Yolanda González Arechavala, *"Visit of the International Women in STEM Project to the Hydrogen Plant of Empresa Municipal de Transportes de Madrid (EMT Madrid)"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.

- Yolanda González Arechavala, Yolanda González Arechavala, *"Visit of the International Women in STEM Project to the Institute for Research in Technology (IIT) and the laboratories of the ICAI School of Engineering of the Comillas Pontifical University"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.
- Yolanda González Arechavala, Yolanda González Arechavala, *"Visit of the International Women in STEM Project to the Iberdrola Training and Innovation Campus"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas. San Agustín del Guadalix (Spain). April 2025-January 2030.
- Yolanda González Arechavala, Yolanda González Arechavala, *"Seminar on STEM studies at IES Africa in Madrid"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.
- Yolanda González Arechavala, Yolanda González Arechavala, *"Seminar on STEM studies at IES Lope de Vega in Madrid"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.
- Rafael Cossent Arín, Rafael Cossent Arín, *"International Congress on Climate Finance and the Hydrogen Economy"*. Cátedra de Estudios sobre el Hidrógeno. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.
- Isabel Catalina Figuerola-Ferretti Garrigues, Isabel Catalina Figuerola-Ferretti Garrigues, *"International Congress on Climate Finance and the Hydrogen Economy"*. Cátedra de Estudios sobre el Hidrógeno. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.
- Sara Lumbreras Sancho, Sara Lumbreras Sancho, *"Summer lecture series "Technology and transcendence or AI's freak side""*. Cátedra Hana y Francisco José Ayala de Ciencia, Tecnología y Religión. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.
- Sara Lumbreras Sancho, Sara Lumbreras Sancho, *"20th Workshop on Industrial Systems and Energy Technologies - JOSITE'2025"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.

- Yolanda González Arechavala, Yolanda González Arechavala, *"3rd STEM Training Day for Early Childhood and Elementary School Teachers in Computational Thinking"*. Cátedra para la Promoción de la mujer en Vocaciones STEM en la Formación Profesional para la Movilidad Sostenible. Universidad Pontificia Comillas. Madrid (Spain). April 2025-January 2030.

6.6 Organization and management of other academic activities

- Francisco Alberto Campos Fernández, *"Chairman in 21st International Conference on the European Energy Market - EEM25. Session SSE E3"*. Instituto Superior de Engenharia de Lisboa (ISEL). Lisbon (Portugal). May 2025.
- Mario Castro Ponce, *"Permanent member of Congress of Statistical Physics - FISES"*. RSEF / GEFENOL. April 2014- Today.
- José Pablo Chaves Ávila; Tomás Gómez San Román y Pedro Linares Llamas, *"Member of the Scientific Committee of 21st International Conference on the European Energy Market - EEM25"*. Instituto Superior de Engenharia de Lisboa (ISEL). Lisbon (Portugal). May 2025.
- María del Mar Cledera Castro, *"Round table: The horizon of Integral Ecology in the Catholic University"*. Unidad de Ecología Integral. Universidad Pontificia Comillas. Madrid (Spain). April 2025.
- María del Mar Cledera Castro, *"Chairman in Round table: Biomethane, key vector in energy transition in «Jornada «El papel del biometano en el desarrollo rural»»"*. Institut Cerdá; y Fundación Repsol. Valencia (Spain). June 2025.
- Asunción Paloma Cucala García, *"Chairman in Round table: The contribution of the research to the future of rail, technology, defence and industrial sectors in «40th IIT Anniversary. Global and National Energy Decarbonization Challenges»"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas. Madrid (Spain). November 2024.
- Pablo Dueñas Martínez, *"Member of the Scientific Committee of XX Congreso de la Asociación Española para la Economía Energética"*. Asociación Española para la Economía Energética (AEEE); Universidad del País Vasco/ Euskal Herriko Unibertsitatea (UPV/EHU); y Basque Centre for Climate Change (BC3). Bilbao (Spain). June 2025.
- Aurelio García Cerrada, *"Permanent member of Annual Seminar on Automation, Industrial Electronics and Instrumentation - SAAEI"*. September 1999- Today.

- Javier García González, *"Permanent member of Power Systems Computation Conference - PSCC"*. January 2001- Today.
- Tomás Gómez San Román, *"Chairman in Round table: Market design in «Jornada Iberoamericana sobre Mercados Eléctricos»"*. Comité Nacional de España de CIGRE; Comité Nacional Português do CIGRE. Madrid (Spain). March 2025.
- Jesús Jiménez Octavio y Juan Carlos del Real Romero, *"Member of the Scientific Committee of 1st International Conference on Bio-Joining"*. Universidade do Porto. Porto (Portugal). December 2024.
- Jesús Jiménez Octavio, *"Chairman in Round table: «Atravesando el túnel de la movilidad en España: Descarbonización, costes y data en un contexto de sobrerregulación y tensiones geopolíticas»"*. Universidad Pontificia Comillas. Madrid (Spain). May 2025.
- Sara Lumbreras Sancho; Pedro Linares Llamas; José Pablo Chaves Ávila y José Ignacio Pérez Arriaga, *"Chairman in Round table: The contribution of research in the energy transition. Private agents in «40th IIT Anniversary. Global and National Energy Decarbonization Challenges»"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas. Madrid (Spain). November 2024.
- Luis Olmos Camacho y Luis Rouco Rodríguez, *"Permanent member of Power Systems Computation Conference - PSCC"*. June 2017- Today.
- Luis Olmos Camacho, *"Chairman in Steering Committee of 21st International Conference on the European Energy Market - EEM25"*. Instituto Superior de Engenharia de Lisboa (ISEL). Lisbon (Portugal). May 2025.
- José Ignacio Pérez Arriaga, *"Chairman in Round table: Global energy decarbonization challenges in «40th IIT Anniversary. Global and National Energy Decarbonization Challenges»"*. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas. Madrid (Spain). November 2024.
- Manuel Pérez Bravo, *"Member of the Scientific Committee of Organising Committee of XX Congreso de la Asociación Española para la Economía Energética"*. Asociación Española para la Economía Energética (AEEE); Universidad del País Vasco/ Euskal Herriko Unibertsitatea (UPV/EHU); y Basque Centre for Climate Change (BC3). Bilbao (Spain). June 2025.
- Andrés Ramos Galán, *"Member of the Scientific Committee of International Conference on Renewable Energy Research and Applications (ICRERA)"*. International Journal of Renewable Energy Research - IJER. September 2012- Today.

- Juan Carlos del Real Romero, *"Permanent member of Congress of Adhesion and Adhesives"*. Grupo Español de Adhesión y Adhesivos (GEAA). Zaragoza (Spain). January 2000- Today.
- Juan Carlos del Real Romero, *"Permanent member of International Conference on Structural Adhesive Bonding"*. Porto (Portugal). January 2011- Today.
- Juan Carlos del Real Romero, *"Permanent member of International Conference on Advanced Joining Processes - AJP"*. January 2019- Today.
- Juan Carlos del Real Romero, *"Member of the Scientific Committee of 1st International Conference on Bio-joining - BI2024"*. Universidade do Porto. Porto (Portugal). December 2024.
- Juan Carlos del Real Romero, *"Member of the Scientific Committee of 24as Jornadas Técnicas de Soldadura y Tecnologías de Unión"*. Asociación Española de Soldadura y Tecnologías de Unión (CESOL). Seville (Spain). June 2025.
- Antonio Francisco Rodríguez Matas, *"Member of the Scientific Committee of XX Conference Spanish Association for Energy Economics (AEEE)"*. Asociación Española para la Economía Energética (AEEE); Universidad del País Vasco/ Euskal Herriko Unibertsitatea (UPV/EHU); y Basque Centre for Climate Change (BC3). Bilbao (Spain). June 2025.
- María Ana Sáenz Nuño, *"Chairman in Round table: Educational innovation - Integrating standardization in the university in «Academic Standard Day (ASD) Madrid»"*. Universidad Politécnica de Madrid (UPM); y Asociación Española de Normalización (UNE). Madrid (Spain). April 2025.
- Pedro Sánchez Martín, *"Chairman in European Conference on Operational Research - EURO 2025. Session: Hydrogen Production Planning and Operation"*. Operational Research Society; y University of Leeds. Leeds (United Kingdom). June 2025.

7. Data about IIT

The relevant numbers of the academic year 2024 - 2025 are shown below, as well as the historical evolution of the turnover of the Institute and of its staff, separated into academic staff and research assistants:

8.193 M€ Turnover

112 Professors and researchers

66 Pre and post-doctoral researchers

138 Research projects

52 Consultancy projects

9 Services and analysis projects

2 Books

11 Chapters in books

169 Papers published in JCR journals

22 Papers published in other journals

35 Papers presented at conferences

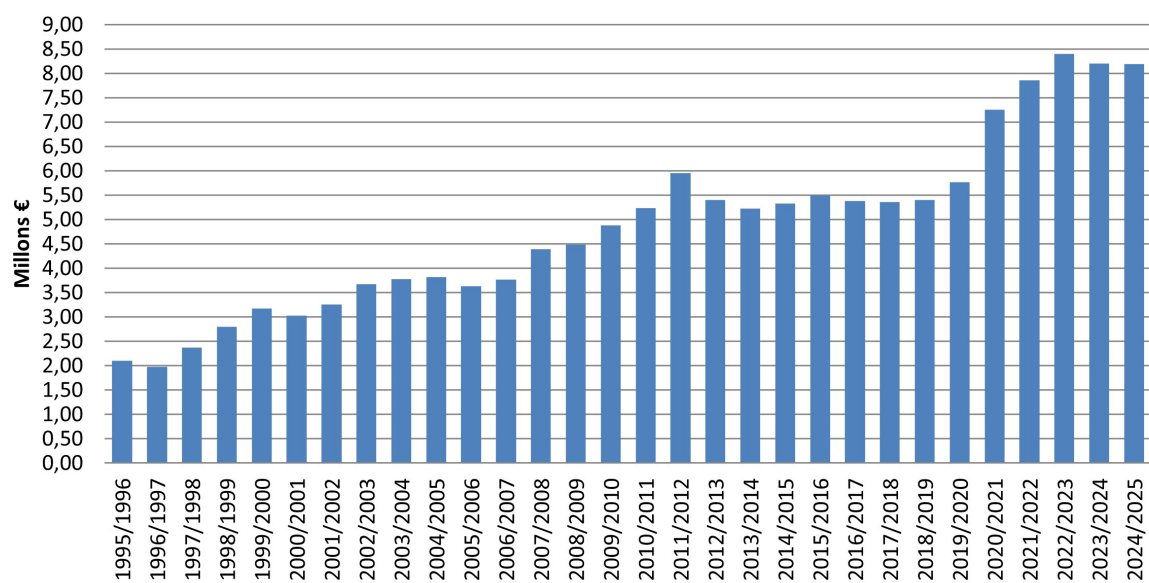
9 Technical reports and 22 Working papers

18 Submitted theses

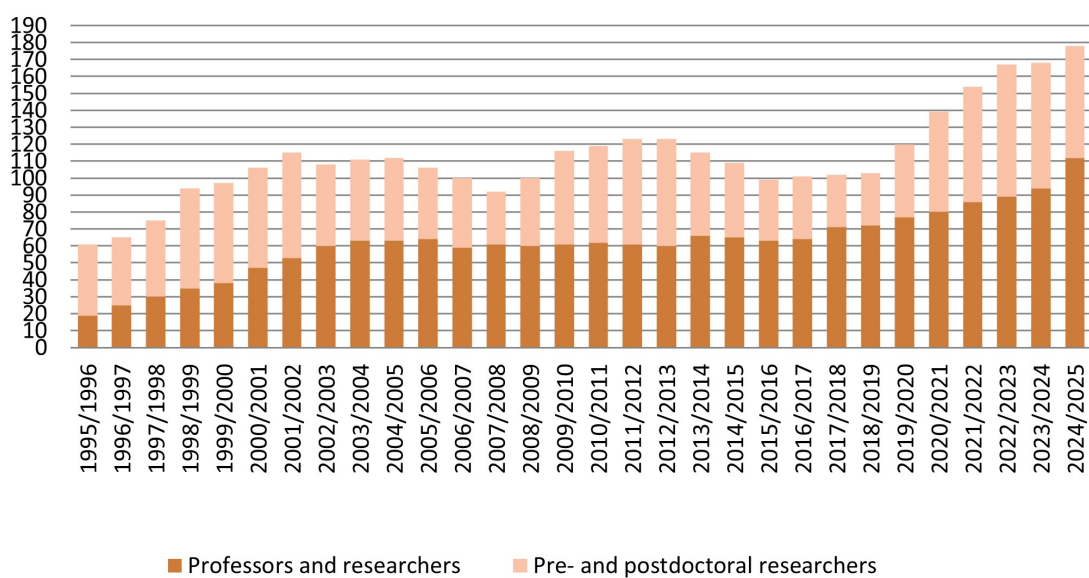
88 Ongoing theses

17 Courses offered to external entities

Turnover



Staff



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