ANNUAL ACADEMIC REPORT

Academic Year

2021-2022

COMILLAS ICAI

IIT
INSTITUTO DE INVESTIGACIÓN TECNOLÓGICA

Index

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, and the continuing success of our collaboration with the industrial sector for more than thirty years.

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, 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 an deeper technology change, especially in the energy, transport and telecommunication sectors. 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.

Andrés Ramos Galán

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 2021 - 2022, from September 1, 2021 to August 31, 2022.

2. Organizational structure

2.1 Management

The management of the IIT during the course 2021 - 2022 has been carried out by the following Professors and Researchers:

- **Chaves Ávila, José Pablo**. Deputy Director for Research Development
- **Cucala García, Asunción Paloma**. Deputy Director for Economic Affairs
- **García González, Javier**. Deputy Director for Economic Affairs until June 2022
- **Lumbreras Sancho, Sara**. Deputy Director for Research Results
- **Ramos Galán, Andrés**. Director

2.2 Council

The members of the Council of IIT during the course 2021 - 2022 were the following ones:

- **Brito Pereira, Paulo**. Research Assistant Representative
- **Chaves Ávila, José Pablo**. Deputy Director for Research Development
- **Cossent Arín, Rafael**. Reseacher Representative
- **Cucala García, Asunción Paloma**. Deputy Director for Economic Affairs
- **García González, Javier**. Deputy Director for Economic Affairs until June 2022
- **Gómez San Román, Tomás**. Reseacher Representative
- **Güitta López, Lucía**. Research Assistant Representative
- **López López, Álvaro Jesús**. Reseacher Representative
- **Lumbreras Sancho, Sara**. Deputy Director for Research Results
- **Ramos Galán, Andrés**. Director
- **Rivier Abbad, Michel**. Reseacher Representative
- **Rodilla Rodríguez, Pablo**. Reseacher Representative
- **Sigrist, Lukas**. Secretary General

2.3 Area coordinators

The coordinators of the eight research areas that group the different activities carried out in the IIT during the course 2021 - 2022 are the following ones:

- **Aracil Fernández, Elisa María**. SMS Coordinator
- **Cantizano González, Alexis**. PCI Coordinator
- **Fernández Rodríguez, Adrián**. ASF Coordinator
- **Latorre Canteli, Jesús María**. SADSE Coordinator
- **Mateo Domingo, Carlos**. REDES Coordinator
- **Olmos Camacho, Luis**. RYE Coordinator
- **Paz Jiménez, Eva**. BIO Coordinator
- **Portela González, José**. ASI 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:

- **Aracil Fernández, Elisa María**. Assistant 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.

- **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, 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. Modelling of electricity markets.

- **Bello Morales, Antonio**. Research Assistant 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**. Assistant 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: Energy efficiency and flexibility · Internet of Things (IoT) · Deep learning · Computer vision · Autonomous mobile robots · Topological modeling of the environment · Industry 4.0

- **Campos Fernández, Francisco Alberto**. Research Associate Professor
  Ph.D. in Industrial Engineering (Comillas)
  Mathematics Science degree (UCM)
  Areas of interest: Mathematical techniques of operations research. Stochastic optimization. Planning and operation of energy systems. Nash equilibrium. General equilibrium. Optimization under uncertainty. Hydrogen, Gas and Electricity Markets. Cryptology.

- **Castro Ponce, Mario**. Professor
  Ph.D. in Physics Science (UCM)
  Physics Science degree (UCM)
  Areas of interest: Statistical Mechanics, Nonlinear Physics, Theoretical Immunology, Bayesian Statistics and Epidemiology, Forest fires.

- **Centeno Hernáez, 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.

- **Chaves Ávila, José Pablo**. 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), 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 gas sectors.

- **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.

- **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**. Senior Associate 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

- **Díaz Aguiluz, Elena María**. Assistant Professor
  Degree in Industrial Engineering (Universidad del Istmo, Guatemala)
  Master's in Economics and Finance (University of Navarra)
  PhD in Economics and Business (University of Navarra)

- **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**. Research Associate Professor
  Ph.D. in Industrial Engineering (Comillas)
  Electrical Engineer (Comillas)
  Areas of interest: Modeling, analysis and simulation of power systems.

- **Egido Cortés, Ignacio**. 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 Assistant 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**. Senior Associate 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 aplied to the electric power systems (FACTS devices, active filters, HVDC, etc.). Electric power systems stability and control.

- **Gerres, Timo**. Research Assistant Professor
  B.Sc. in Business Administration and Engineering (Universität Paderborn) (DE)
  M.Sc. in Systems Engineering, Policy Analysis & Management (Technische Universiteit Delft) (NL)
  Areas of interest: Energy economics, industrial decarbonisation, hydrogen, renewable energy resources, energy sector regulation, environmental policy instruments

- **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.

- **Herraiz Martínez, Francisco Javier**. Assistant 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.

- **Latorre Canteli, Jesús María**. Research Assistant Professor
  Ph.D. in Industrial Engineering (Comillas)
  Electronics Engineer (Comillas)
  Areas of interest: Operations research and modeling. Stochastic programming. Data analysis. Parallel and distributed computing.

- **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**. Senior Associate Professor
  Ph.D. in Industrial Engineering (Comillas)
  Electrical Engineer (Comillas)
  Areas of interest: Analysis, planning, operation and economics in electric power systems.

- **López López, Álvaro Jesús**. Research Assistant 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: Industry 4.0, Machine Learning, IoT, Railway Power Systems, Railway System Simulation, Dynamic System Control.

- **López López, Gregorio**. Assistant 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 Valdés, Francisco José**. Assistant 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**. 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. ---Tecniques:--- 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**. Research Assistant 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 Assistant 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: Power sector regulation; Security of supply; Capacity remuneration mechanisms; regional markets; tariff design and subsidies

- **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.

- **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.

- **Nobrega Barroso, Luiz Augusto**. Research Affiliate
  Ph.D. in Power Engineering and Operations Research (Federal University of Rio de Janeiro - UFRJ, Brazil)
  Mathematics Science degree (Universidade Federal do Rio de Janeiro - UFRJ, Brasil)
  Areas of interest: Power system economics. Stochastic optimization. Game theory. Energy policy.

- **Olmos Camacho, Luis**. 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.

- **Pérez Arriaga, José Ignacio**. Lecturer
  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.

- **Portela González, José**. Assistant 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

- **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**. Assistant 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**. 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 Gallego, Alejandro**. Assistant Professor
  PhD CETIS (ICADE). Universidad Pontificia Comillas
  Industrial Engineer (ICAI). Universidad Pontificia Comillas
  Executive MBA. IE Business School
  Master's degree in Stock Markets & Financial Derivatives. UNED
  Master's degree in Business Intelligence & Big Data. EOI
  Areas of interest: Finance

- **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-Morcillo García, Carlos**. Research Assistant Professor
  Ph.D. in Industrial Engineering (Comillas)
  Electronics Engineer (Comillas), M.Sc. in Communication Technologies and Systmes (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**. Assistant 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 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: Monitoring and analysis of industrial processes. Modelling and simulation of industrial components performance. Expert systems. Neural networks. Fuzzy logic. Genetic algorithms. Failure detection techniques. Reliability. Predictive maintenance. Image and voice processing.

- **Sigrist, Lukas**. Research Associate Professor
  Ph.D. in Industrial Engineering (Comillas)
  Electrical and Electronics Engineer (École Plytechnique Fédérale de Lausanne - EPFL, Switzerland)
  Areas of interest: Modeling, analysis and control of electric power systems. Energy Systems Models.

- **Valor Martínez, Carmen**. Senior Associate 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.

- **Ventosa Rodríguez, Mariano**. Professor
  Ph.D. in Industrial Engineering (Comillas)
  Electronics Engineer (Comillas)
  Areas of interest: Operations, planning and economy of electric energy systems. Application of operations research in electric energy markets.

2.6 Associated academic staff

The following professors have collaborated with IIT as Associate Researchers:

- **Alfaya Sánchez, David**. Assistant 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.

- **Arenas Pinilla, Eva María**. Assistant 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.

- **Cantizano González, Alexis**. 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

- **Cledera Castro, Mª del Mar**. Assistant Professor
  Industrial Engineer. Universidad Politécnica de Madrid.
  Ph.D. in Industrial Engineering. Universidad Pontificia Comillas.
  Areas of interest: Energy and Environment. Materials.

- **Fernández Bernal, Fidel**. Senior Associate Professor
  Ph.D. in Industrial Engineering (Comillas)
  Electrical Engineer (Comillas)
  Areas of interest: Electric Machines and Electric Drives, Electrical Generation, Renewable Generation, Wind Generation.

- **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.

- **Jiménez Octavio, Jesús**. Associate Professor
  Ph.D. in Industrial Engineering (Comillas)
  Mechanical Engineer (Comillas)
  Areas of interest: Computational mechanics

- **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.

- **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.

- **Morales Contreras, Manuel Francisco**. Assistant 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 embbedded systems for automatic control applications.

- **Paz Jiménez, Eva**. Assistant 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.

- **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

- **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 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

- **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.

- **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.

2.7 Research assistants

The Research Assistants (PhD students and post-docs) that developed their activity at the IIT during the academic course 2021 - 2022 were the following ones:

- **Agrawal, Prachi**. Ph.D. in Mathematics. National Institute of Technology Hamirpur, Himachal Pradesh, India.
  Masters's (M.Sc.) degree in Mathematics . Indian Institute of Technology Delhi (India).
  Bachelor's degree (B.Sc. (H)) in Mathematics. University of Delhi, India.
- **Akullo, Grace**. Bachelors in Entrepreneurship and Small Business Management (Makerere University)
  Masters degree in Management and Promotion of Local Development (University of Valencia)
  Masters in Intercultural Communication and Public Service Translation and Interpretation (University of Alcalá de Henares)
- **Álvarez Quispe, Erik Francisco**. Bachelor's Degree in Mechanical and Electrical Engineering. National University of Engineering (Peru).
  Master's Degree in Electrical Engineering. State University of Campinas (Brazil).
- **Ávila Martínez, Régulo Enrique**. Bachelor Degree in Electrical Engineering. University of Oriente (UDO), Venezuela.
  Master degree in Renewable Energies in Electrical Systems. Carlos III University of Madrid (UC3M), Spain.
- **Baringo Morales, Ana**. 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)
- **Benítez Domínguez, Álvaro**. Master in Aerospace Engineering. Universidad Carlos III de Madrid.
  Máster de Energías Renovables y Medio Ambiente. Universidad Politécnica de Madrid.
- **Bindu, Shilpa**. Bachelor's degree in Electrical and Electronics Engineering from National Institute of Technology (NIT) - Calicut, India.
  EIT- Innoenergy double Master's degree in Energy for Smart Cities at KTH Royal Institute of Technology Stockholm and Universidad Politécnica de Catalunya (UPC) Barcelona.
- **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).
- **Cieslak, Veronika**. Bachelor of Science in Business Administration. Salem International University.
  Bachelor of Arts in International Relations & Diplomacy. Schiller International University.
  Master of Science degree in Human Resource Management. Florida International University.
  Master of European Studies. University of Bonn.

- **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.
- **Díaz Cortes, María**. Degree in Biotechnology. Universidad CEU San Pablo.
  Master in Digital Marketing Management.IED Madrid.
  Master's Degree in Cosmetics and Dermopharmacy. CESIF.
  Master of Education. Universidad Camilo José Cela.
- **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.
- **Domínguez Barbero, David**. Bachelor's Degree in Computer Engineering, Universidad de Castilla – La Mancha.
  Master's Degree in Artificial Intelligence Research, Menendez Pelayo International University.
- **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.
- **Freire Barceló, Teresa**. Degree in Industrial Engineering. Universidad Pontificia Comillas
  Máster in Industrial Engineering. Universidad Pontificia Comillas
- **García Aguilar, Javier**. Master's Degree in Industrial Engineering. Universidad P. Comillas
- **García Sánchez, Miguel**. Bachelor's degree in Design and Business,VIA University College. Denmark.
  Master's degree in Leadership and Organisation. Malmö University. Sweden.
- **Gómez González, Juan Luis**. Bachelor's degree in Physics. University of Seville.
  Master´s degree in Physics of Complex Systems. University of the Balearic Islands.
- **Gómez Pérez, Jesús David**. Electrical engineer and M.Sc. in electrical engineering. Universidad Tecnológica de Pereira (Colombia)
- **Gómez Sánchez, Stefanía**. Degree in Industrial Engineering. (Escuela Colombiana de Ingeniería Julio Garavito, Colombia)
  Master's Degree in Optimization. (Universidad Autónoma Metropolitana, México)
- **Goswami, Rohit Raj**. Bachelor of Engineering (B.E.) in civil engineering. Ragiv Gandhi Prodougiki Vishvavidayalya (India)
  Master of Science (M.Sc.) in Transport system and engineering. Sapienza Universita di Roma.(Italy)
- **Güitta López, Lucía**. Degree in Electromechanical Engineer (Comillas)
  Master's Degree in Industrial Engineering (Comillas)
  Master in Smart Industry (Comillas)

- **Herding, Leslie**. Bachelor of Engineering. Technische Hochschule Köln (Germany).
  Master in Research in Energy Efficiency and Sustainability in Industry, Transport, Construction and Town Planning. UPV/EHU (Bilbao).
- **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)
- **Huclin, Sébastien**. Master's degree in Physics (University of Paris-Sud)
- **Lind, Leandro**. B.Sc. in Economics. Federal University of Santa Catarina (Brasil)
  Master in the Electric Power Industry. University Pontificia Comillas (Spain)
  Master in Digital Economics and Network Industries. University Paris-Sud 11 (France)
- **López de Armentia Hernández, Sara**. Bachelor Degree in Industrial Technology Engineering. Universidad Politécnica de Madrid.
  Master Degree in Materials Science and Engineering. Universidad Carlos III de Madrid.
- **Loras Gimeno, Diego**. B.Sc. in Economics. University of Valencia.
  M.Sc. in Economics and Finance. Barcelona Graduate School of Economics.
  M.A. in Ethics and Democracy. University of Valencia.
- **Manjón Rodríguez, María José**. Grade in Law. University of Granada.
  Executive MBA. Instituto de Empresa.
  Master in International Business ESCP-EAP School of Management (Paris and Bangkok)
  Master in Sustainability and Corporate Responsibility (UNED.)
- **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)
- **Mohammed Nour, Morsy Abdelkader Morsy**.
  Bachelor's degree in Electrical Engineering. Aswan University, Aswan, Egypt.
  Master's degree in Electrical Engineering. Budapest university of Technology and Economics, Budapest, Hungary.
- **Monteagudo Honrubia, Miguel**. Bachelor Degree in Biomedical Engineering (Universitat Politècnica de València)
  MSc in Biomedical Engineering (University of Twente)
- **Montero Guirao, Luis Manuel**. Bachellor's degree in Chemical Engineering from the Universidad de Granada.
  Master's degree in Chemical Engineering from the Universidad de Salamanca.

- **Morell Dameto, Nicolás Mariano**. Bachelor's Degree in Industrial Engineering, Universidad Politécnica de Madrid.
  Master's Degree in Industrial Engineering, Universidad Politécnica de Madrid.
  Master in Electricity Markets, Illinois Intitute of Technology, USA.
- **Navarrete Cruz, Diana María**. Master degree in Data Mining and Business Intelligence (Complutense University of Madrid)
  Industrial Engineering (Universidad del Valle. Colombia)
- **Nemati, Hadi**. B.Sc. degree in Electrical Engineering (Shiraz University)
  M.Sc. degrees in Electrical Engineering (Isfahan University of Technology)
- **Oladimeji, Oluwaseun Enoch**. BSc. Electrical and Electronics Engineering (University of Ibadan)
  MSc. Energy Systems (Skolkovo Institute of Science and Technology)
- **Otaola Arca, Pedro de**. Bachelor's degree in Electromechanical Engineering (major in Electronics)(Comillas)
  Master's degree in Industrial Engineering (Comillas)
- **Paolis Robles, Carlo de**. Bachelor's Degree in Electromechanical Engineering. Comillas Pontifical University.
  Master's Degree in Industrial Engineering. Comillas Pontifical University.
- **Pérez Bravo, Manuel**. Graduado en Ingeniería de Tecnologías Industriales. Universidad de Sevilla
  Máster Universitario en Ingeniería Industrial. Universidad de Sevilla
- **Pérez Sánchez, Jaime**. Degree in Telecommunication Technologies and Services Engineering, by the Universidad Politécnica de Madrid (2013-2018)
  Master's Degree in Telecommunications Engineering, by the Universidad Politécnica de Madrid (2018-2020)
- **Rajabdorri, Mohammad**. Bachelor's degree of Electrical Power Engineering. Shiraz University, Iran.
  Master's in Electrical Power Systems. Shiraz University of Technology, Iran.
- **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.
- **Rico Díez, Olga**. Telecommunication Technologies and Systems Engineering degree. Universidad Politécnica de Madrid.
  Master's degree in Biomedical Engineering. Universidad Politécnica de Madrid.
- **Ríos Ocampo, Miguel Angel**. 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)
- **Rodríguez Pérez, Néstor**. Universitary 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)
- **Rodríguez Vilches, Rubén**. Bachelor's Degree in Mechanical Engineering. Universitat Politècnica de València. Master's Degree in Energy Engineering. Universitat Politècnica de Catalunya.
- **Ruiz Hernández, Miguel Ángel**. Bachelor´s degree in Industrial Engineering. University Carlos III of Madrid.
  MsC in Industrial Engineering. University of Puerto Rico.
- **Sánchez Contreras, Gonzalo**. Degree in Electromechanical Engineering. Comillas Pontifical University.
  Master's Degree in Industrial Engineering. Comillas Pontifical University.
- **Santos Oliveira, Dilayne**. Petroleum Engineer. Federal University of Campina Grande (UFCG/Brazil).
  Master's degree in Energy Engineering. Polytechnic University of Madrid (UPM).
  Master's degree in Oil Reservoirs Simulation and Management. Federal University of Pernambuco (UFPE/ Brazil).
- **Segarra Tamarit, Ignacio**. BSc in Mathematics
  MSc in Banking and Quantitative Finance
- **Serna Zuluaga, Santiago**. Bachellor's degree in Chemichal Engineering. Rey Juan Carlos University.
  Master's degree in Chemichal Engineering. Autonomous University of Madrid and the Rey Juan Carlos University.
- **Sidelkivska, Valerya**. Bachelor's Degree in Psychology and Communications. Saint Louis University, Madrid. Master's Degree in Brain and Cognition. University of Pompeu Fabra, Barcelona.
  Master's Degree in Pharmacological Research, specialization in Neuropsychopharamcology. Autonomous University of Madrid.
- **Sofokleous, Paraskevas**. Bachelor´s degree in Physics (Aristotle University of Thessaloniki, Greece)
  Master´s degree in Nanoscale Engineering (University of Lyon, France)
- **Suárez Porras, Jorge**. Degree in Engineering in Industrial Technologies. Universidad Pontificia Comillas.
  Master's degree in Energy Engineering. Aalborg University (AAU), Denmark.

- **Tomás Martín, Andrés**. University Degree in Communications Electronic Engineering. Complutense University of Madrid.
  Master's Degree in Energy. Complutense University of Madrid.
- **Troncia, Matteo**. Ph.D. in Industrial Engineering (University of Cagliari), M.Sc. in Electrical Engineering (University of Cagliari), B.Sc. in Electrical Engineering (University of Cagliari)
- **Urosa Sánchez, Pablo**. Bachelor degree in Electromechanical Engineering.
  Masters degree in Industrial Engineering.
- **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)
- **Valdano, Manuel**. Mechanical Engineering. Universidad Nacional de Rio Cuarto (Argentina).
- **Verdugo Rojas, Norma Carolina**. Degree in Comercial Engineering. Universidad Técnica Federico Santa María, Valparaiso, Chile.
  Master's degree in Business Administration. Universidad Técnica Federico Santa María, Chile.
- **Villegas Galaviz, Carolina**. M. A. in Organizational Governance and Culture. University of Navarra.
  B. A. in Philosophy & B. A. in Communications, Journalism. University of Navarra.

2.8 Services staff

2.8.1 Systems administrator staff

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

- **Lázaro Martín, Marco Antonio**. Technical Engineer in Management Computing
- **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)
- **Ghorbal, Bad**. B.A. Geology & Earth Sciences - Université Pierre et Marie Curie. France.
  M.S. Earth Sciences. Université Pierre et Marie Curie. France.
  PhD. Geosciences - Geology & Solid Earth Sciences. Vrije University.The Netherlands.

- **Ruiz González-Mateo, Cristina**. Law and Legal Advisor Companies degree (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**. Criminology degree (UEM), Criminology diploma (UCM)

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: Jesús María Latorre Canteli
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/adi

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/geac

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: Elisa María Aracil Fernández
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

- **Predictive models in healthcare**
  Medsavana S.L. June 2018 - December 2021. (Sara Lumbreras Sancho)

  The widespread adoption of the electronic medical record (Electronic Health Records, EHR) opens the way to evidence-based medicine, based on the history of large numbers of real patients rather than limited clinical trials. This can be used to create custom risk profiles or predictive models to anticipate the effect of specific treatment lines. Although a substantial amount of work has been done in this field in recent years, there are still unresolved limitations. One of the main ones is the use of unstructured text data, which contains most of the relevant information. This text is considerably difficult to use, given the complexity of medical terminology. The second limitation is the large number of variables that can be explained or used in the models.

Savana is an EHR manager that provides innovative solutions for the extraction of knowledge of these data and support for the decision-making in research, clinic and management. It owns the SAVANA MANAGER, SAVANA CONSULTA, SAVANA RESEARCH and SAVANA PREDICT platforms, as well as the EHREAD and ENTROPIA technology, which are computer tools capable of reading and interpreting the information contained in the electronic clinical records. In addition, it is able to associate each medical term with the concepts related to it, linking them to the standard medical oncology SnoMed. Savana has access to one of the largest EHR databases internationally, with several hundred million stories.
This proposal describes the future collaboration between the Technological Research Institute and Savana, which has the fundamental objective of accelerating the development of predictive models as well as the dissemination of research results.

- **Modeling and assessment of electrical networks´ requirements for the energy transition in Spain**
  Iberdrola España S.A.U. January 2019 - December 2021. (Michel Rivier Abbad, Tomás Gómez San Román, Rafael Cossent Arín, José Pablo Chaves Ávila, Leslie Herding, Andrés Ramos Galán, Sara Lumbreras Sancho)

  The main objective of the research is to analyze the impact on electricity networks of the connection of new renewable plants on the 2030 horizon under different possible scenarios, and to develop proposals to facilitate the decarbonisation objectives to be achieved in the most efficient possible way.

- **Analysis of the expansion and operation of the Spanish electricity system for a 2030-2050 time horizon**
  Iberdrola España S.A.U. January 2019 - December 2021. (Michel Rivier Abbad, Tomás Gómez San Román, Álvaro Sánchez Miralles, Francisco Martín Martínez, José Pablo Chaves Ávila, Teresa Freire Barceló, Timo Gerres, Andrés Ramos Galán, Sébastien Huclin)

  The main objective of this line of research is to model and analyze possible scenarios of investment and operation of energy resources for the Spanish electricity system in the 2030-2050 horizon. More specifically, the objective is to evaluate the potential and role that each generation, storage and consumption technology can play in the future mix of the electricity system, identifying the factors and scenarios that are most critical for each one of them.

- **New interoperable CBTC system for the future urban transport**
  CAF SIGNALLING, SL. January 2020 - December 2021. (Asunción Paloma Cucala García, Antonio Fernández Cardador, Adrián Fernández Rodríguez, Gonzalo Sánchez Contreras, Manuel Blanco Castillo)

  In this project, new models are developed for the calculation of transport capacity in railways urban networks equipped with CBTC or ERTMS signalling system. These models obtain the maximum capacity in complex nodes of the network: terminal stations, intermediate turn-back stations, yards and switches. In addition, an optimization model is developed for the design of the signaling

system to fulfill a target headway between trains.
This project is in the framework of the CIEN program (2018) of CDTI.

- **Advanced generator of stochastic scenarios**
  Iberdrola Generación España, S.A.U. April 2020 - March 2023. (Andrés Ramos Galán, Jesús María Latorre Canteli, Jesús David Gómez Pérez)

  In this project a series of stochastic scenarios is obtained, adapted to the Iberian electric system, linked stochastically. Those scenarios allow the generation optimization in the medium term in an uncertain framework, especially by the variability of natural hydro inflows.
  Besides, we model the Portuguese electric system, new hybrid hydro power plants, and new energy storage systems.

- **Optimal design of ATO driving parameters for Metro de Barcelona to Line 1 for new trains**
  Bombardier European Investments S.L.U. April 2020 - December 2021. (Antonio Fernández Cardador, Asunción Paloma Cucala García, Adrián Fernández Rodríguez, Gonzalo Sánchez Contreras)

  The objective of this project is the design and implementation of ATO speed commands in Line 3 of Metro de Barcelona to minimise the energy consumption of new trains in this line. These ATO speed commands are selected and sent to the train by the traffic regulation system in real-time. For each inter-station a set of 4 speed commands are designed, the flat out command and 3 commands parameterized basically by a coast point and a regulation speed.

- **Optimal design of ATO driving parameters for Metro de Barcelona to Line 1 for new trains**
  Bombardier European Investments S.L.U. April 2020 - December 2021. (Antonio Fernández Cardador, Asunción Paloma Cucala García, Adrián Fernández Rodríguez, Gonzalo Sánchez Contreras)

  The objective of this project is the design and implementation of ATO speed commands in Line 1 of Metro de Barcelona to minimise the energy consumption of new trains in this line. These ATO speed commands are selected and sent to the train by the traffic regulation system in real-time. For each inter-station a set of 4 speed commands are designed, the flat out command and 3 commands parameterized basically by a coast point and a regulation speed.

- **Hydraulic design of integral turbine-pump devices**
  JOGOSA Obras y Servicios. June 2020 - November 2021. (Eva María Arenas Pinilla, Alexis Cantizano González, Reza Valizadeh)

  The project is part of the SHIFT! project ("Save water, Save energy, Save costs, Sustainable irrigation with integral turbine pump") and is financed by the European Eurostars programme. JOGOSA Obras y Servicios is a partner of the consortium created for the development of this project, the rest of the members of the consortium being the Dutch company aQysta Holding BV and TU Delft

University.
The objective is to develop several versions of the Integral Pump-Turbine (BTI), adapted to the initial specifications. A BTI is a set of pump and turbine, compact, which takes energy from a channel of water to pump a part of it, and thus be able to irrigate or provide drinking water.
It is, therefore, an equipment that does not need external energy, such as electricity or fossil fuels (or others). This allows it to be independent of the electricity grid, and reduce operating costs, with a minimum impact on greenhouse gas emissions.

- **Traceable mechanical and electrical power measurement for efficiency determination of wind turbines**
  Dinnteco Spain S.L. September 2020 - September 2023. (María Ana Sáenz Nuño)

  New technologies for wind turbines are currently assessed in the field, are time-consuming to perform and highly affected by wind conditions. Shortening the time to market for these tests is one way to reduce costs and increase performance for this form of renewable energy. Indoor test benches can rapidly record a wide range of data but require accurate torque and rotational speed measurements which currently lack traceability to national standards and are difficult to make for torque measurements above 1.1 NMm.
  The project assess current methods and develop traceable methodology for torque measurements up to 5 MNm and rotational speeds up to 20 and 1600 revolutions per minute which covers the operational speeds on low-speed and high-speed shafts respectively. Standardised guidelines for traceably determining turbine efficiency on test benches developed along with new efficiency measurement methods for the electrical components of wind turbine nacelles. Project outputs give a better prediction of the energy output of proposed wind parks, provide greater certainty in investments opportunities and help accelerate the transition towards cleaner energy sources.

- **DATA-COVID: Development of a triage and psychological care app to overcome COVID-19**
  Universidad Pontificia Comillas. September 2020 - August 2022. (Carlos Rodríguez-Morcillo García, Lucía Halty Barrutieta, Álvaro Taboada López, Virginia Cagigal de Gregorio, Rocío Rodríguez Rey, María Jesús Martínez Beltrán)

  After the medical crisis produced in the Spanish health system due to the COVID-19 pandemic, a collapse of mental health problems is looming as a result of the psychological impact that the pandemic has generated in Spanish society. Sources from the General Council of Psychology, the MIT Technology Review magazine, or the director of the WHO Mental Health Area herself, warn of the possible collapse of the mental health and primary care system. It is estimated that 10 million Spaniards are at risk of presenting psychological problems derived from COVID-19. The psychological affectation will be deep and prolonged in time. In previous investigations of SARS suffered in 2003, post-traumatic symptoms were observed in affected people after 3 years of the disease (Brooks et al., 2020). Taking into account the harshness with which this

crisis has occurred, we have to be prepared to attend to many people affected directly (health workers, sick people, relatives of the deceased, people who have lost their jobs) and indirectly (confined people, reorganization of the social system…).

Given these data, it is necessary to prepare and offer the population resources, as personalized as possible, to meet two objectives. In the first place, offer psychological help to all those who may need it and, secondly, protect the health system, which has been so depleted.

In order to meet both objectives, it is necessary to provide mental health and primary care professionals with technological tools that allow serving a significant number of people. The application developed in this project will allow professionals to carry out psychological triage in real time. In this way, many people can be cared for and those with the greatest psychological risk referred to the healthcare service, avoiding the collapse of the system. The flow of derivations generated by the application would be as follows. The person who needs it accesses the application, fills in a series of screening questions and through decision trees and underlying algorithms, the person can be classified as “risk” or “no risk”. If it is classified as "risk", it is referred to a healthcare service of the corresponding health center; but if it is classified as “no risk”, the application is capable of offering a series of guidelines that help the person to better cope with the situation for which they have requested the use of the tool; in this way, the application supports and serves a significant volume of people who are not at risk. From the previous experience with iCygnus, this volume of people who could be served through the application would be 75%, while the remaining 25% would be referred to "risk". With these data we can say that the collapse of the health system would be avoided.

- **New 100% renewable, flexible and robust energy system for the integration of new generation, grid and demand-side technologies- Network Planning and reconfiguration**

  i-DE Redes Eléctricas Inteligentes, S.A.U. October 2020 - December 2023. (José Pablo Chaves Ávila, Fernando Emilio Postigo Marcos, Tomás Gómez San Román, Orlando Mauricio Valarezo Rivera, Carlos Mateo Domingo, Miguel Ángel Ruiz Hernández, Miguel Martínez Velázquez)

  The main objective of the FLEXENER project is to research new technologies and simulation models in the field of renewable generation, storage systems and flexible demand management and distribution grid operation. The aim is to achieve a 100% renewable and decarbonised energy mix, effectively integrated into the electricity system of the future in a flexible, efficient and safe manner.
  This project supports the FLEXENER project by focusing on the challenges of distribution networks. The specific objective is to develop a series of tasks identified within the FLEXENER project:
  - Distribution grid flexibility solutions.
  - Analysis of requirements and simulations of future scenarios and their impact on the grid in the Iberian Peninsula.
  - Technological research into new markets, flexibility services and system

regulation to achieve a 100% renewable energy mix with safe, efficient and clean energy.

- **New 100% renewable, flexible and robust energy system for the integration of new generation, grid and demand-side technologies-Technical studies of networks**
  I-DE Redes Eléctricas Inteligentes, S.A. October 2020 - December 2023. (Luis Rouco Rodríguez, Lukas Sigrist)

  This project is part of the FLEXENER project. The main objective of the FLEXENER project is to investigate new technologies and simulation models in the field of renewable generation, storage systems and flexible demand management and operation of the distribution network. A 100% renewable and decarbonised energy mix is sought, effectively integrated into the electrical system of the future in a flexible, efficient and safe way. In this context, this project has been in charge of the assessment of the contribution to the distribution grid to the system stability.

- **New 100% renewable, flexible and robust energy system for the integration of new generation, grid and demand-side technologies- Technical studies of networks**
  Iberdrola Generación España, S.A.U. October 2020 - December 2023. (Luis Rouco Rodríguez, Francisco Miguel Echavarren Cerezo, Enrique Lobato Miguélez, Carlo de Paolis Robles)

  This project is part of the FLEXENER project. The main objective of the FLEXENER project is to investigate new technologies and simulation models in the field of renewable generation, storage systems and flexible demand management and operation of the distribution network. A 100% renewable and decarbonised energy mix is sought, effectively integrated into the electrical system of the future in a flexible, efficient and safe way. In this context, this project has been in charge of the assessment of the contribution to the stability of the Spanish mainlad system of the solutions developed in activities A2, A3 and A4.

- **FLEXENER: New 100% renewable, flexible and robust energy system for the integration of new technologies in generation, networks and demand - Scenarios**
  Iberdrola Generación España, S.A.U. October 2020 - December 2023. (Michel Rivier Abbad, Tomás Gómez San Román, Álvaro Sánchez Miralles, Francisco Martín Martínez, Andrés Ramos Galán, José Pablo Chaves Ávila, Stefanía Gómez Sánchez, Leslie Herding, Teresa Freire Barceló)

  This project is part of the FLEXENER project. It corresponds to one of the activities of said project. The main objective of the FLEXENER project is to investigate new technologies and simulation models in the field of renewable generation, storage systems and flexible demand management and operation of the distribution network. A 100% renewable and decarbonised energy mix is ??sought, effectively integrated into the electrical system of the future in a flexible, efficient and safe way.

In this context, this project or activity has been in charge of building future scenarios for 2030 that, based on the resources and technological equipment available at that time, determine an optimal mix of renewable generation technologies, storage systems and energy management. the demand that allows covering the demand for electricity with sufficient guarantees of supply reliability.
These scenarios have served to feed other activities of the FLEXENER Project that analyze aspects of the detailed electrotechnical behavior of the electrical networks in these conditions to investigate the technical feasibility of the system and explore possible solutions to the technical problems they present.

- **FLEXENER: New 100% renewable, flexible and robust energy system for the integration of new technologies in generation, networks and demand - Market design**
  Iberdrola Generación España, S.A.U. October 2020 - December 2023. (Michel Rivier Abbad, José Pablo Chaves Ávila, Pablo Rodilla Rodríguez, Carlos Batlle López, Paolo Mastropietro, Paulo Brito Pereira, Shilpa Bindu, Matteo Troncia)
  This project is part of the FLEXENER project. It corresponds to one of the activities of said project. The main objective of the FLEXENER project is to investigate new technologies and simulation models in the field of renewable generation, storage systems and flexible demand management and operation of the distribution network. A 100% renewable and decarbonised energy mix is ??sought, effectively integrated into the electrical system of the future in a flexible, efficient and safe way.
  In this context, this project or activity has been in charge of designing configuration options for the electricity market that are adapted to the existence of a 100% renewable electricity system. The general configuration of the market has been analyzed (types of markets involved, their sequence, role of agents, type of agents), focusing in particular on capacity markets and balancing markets. The different options have been analyzed, identifying the advantages and disadvantages for a 100% renewable electricity system.

- **Voltage control system of the transmission grid with renewable generation**
  Iberdrola Generación España, S.A.U. October 2020 - December 2021. (Luis Rouco Rodríguez, Enrique Lobato Miguélez, Ignacio Egido Cortés, Álvaro Benítez Domínguez)
  This project will develop a voltage control system of the transmission grid with renewable generation.

- **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 2020 - November 2022. (Francisco Alberto Campos Fernández, Salvador Doménech Martínez)
  CEVESA is a dynamic model with hourly chronology for planning the expansion of electricity generation in the Spanish and Portuguese electricity systems that considers both the investments made by customers in distributed

energy resources from generation and storage (DER) and by generators in conventional plants of thermal generation, renewable and centralized storage (CR). It also represents the Spanish transport sector by including investment decisions in electric vehicles (PEV) and internal combustion motor vehicles (ICEV), taking into account the deployment of infrastructure, fuel and the social and environmental costs of both transport technologies. In turn, CEVESA models investments and hourly operation of hydrogen (H2) production plants in Spain to cover a daily demand for H2 that allows representing a penetration scenario of vehicles powered by H2 (H2EV) or a satisfied H2 demand by renewable generation for other industrial uses. It is also a multizonal model that considers marketsplitting to represent interzonal flows.

- **Design of protection settings and damping of low-frequency oscillations in power systems with high penetration of non-synchronous generation**
  Gas y Electricidad Generación S.A. December 2020 - December 2021. (Lukas Sigrist, Antonio Muñoz San Roque, Luis Rouco Rodríguez, José Portela González, Miguel Ángel Sanz Bobi, Miguel Ángel Durán Olivencia, Carlo de Paolis Robles)

  Scenarios of high penetration of RES involve a high penetration of non-synchronous, inverter-based generation. On the one hand, inverter response during faults es different from the response of synchronous generation. On the other hand, high penetration of RES affects the dispatch of conventional synchronous generators that are in charge today of damping low-frequency oscillations. RES generator could also contribute to the damping of low-frequency oscillations. The objective of this project is two-fold: design of protection settings by using machine learning techniques and tuning of PSS to damp low-frequency oscillations in a inverter-dominated power system.

- **Modeling the meteorological behavior for medium-term forecasting using machine learning techniques**
  Endesa Medios y Sistemas S.L. January 2021 - December 2021. (Eugenio Francisco Sánchez Úbeda)

  The aim of this project is to model the behavior of the main meteorological variables, (such as wind, solar radiation or air temperature), in order to improve the medium-term forecasts for the medium-term operation and planning tools of the Iberian electricity market (MIBEL).

- **New integrated model for strategic bidding and operation planning in the secondary reserve market**
  Endesa Medios y Sistemas S.L. January 2021 - December 2021. (Javier García González, Francisco Alberto Campos Fernández, Antonio Muñoz San Roque, Pedro de Otaola Arca)

  The objective of this project is to expand the SIROCO model to integrate it with the developments carried out recently in the tools EXCOM and EXLA to 1) facilitate digitization process, cloud computing and connection with Big-Data, and 2) take advantage of detailed modeling of hydro subsystems. This new integrated model will make it possible to submit quarter-hour offers to the

secondary reserve market, and to obtain the bi-monthly planning for this market.

- **Modeling and forecasting of the demand for natural gas and electricity in Spain, Portugal and France**
  Endesa Medios y Sistemas S.L. January 2021 - December 2021. (Eugenio Francisco Sánchez Úbeda, Víctor Arias Blanco)

  The objective of this project is modeling and forecasting of the demand for natural gas and electricity in Spain, Portugal and France. A probabilistic approach is used to fulfill this objective.

- **Assistance and maintenance of Middle Office models**
  Enel Iberoamérica S.R.L. January 2021 - December 2021. (Antonio Bello Morales, Javier Reneses Guillén, Alberto Orgaz Gil, Geovanny Alberto Marulanda García, Luis Manuel Montero Guirao, Cristina Casillas Clot)

  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-VEIMAO, AURIGA, and VALORE-CLOUD.

- **Development of advanced forecasting models for residual demand curves and group necesities in real time**
  Endesa Medios y Sistemas S.L. January 2021 - September 2021. (José Portela González, Antonio Muñoz San Roque, Alberto González Sánchez)

  The objective of the proposed collaboration is to improve the tools for forecasting residual demand curves in the electricity market.

- **Flexible and efficient integration of CO2 generation technologies**
  Siemens Gamesa Renewable Energy Innovation & Technology S.L. January 2021 - December 2023. (Luis Rouco Rodríguez, Aurelio García Cerrada, Juan Luis Zamora Macho, Javier García Aguilar, Lukas Sigrist)

  This project will develop "fundamental models" for the design and analysis of wind-based generation technologies. Fundamental models are those derived from more detailed models that capture the most relevant dynamics of systems to be studied so that they can be included in the study of broader systems. These fundamental models will have various degrees of detail according to the purpose they will be intended for.

- **New functionalities, automation and maintenance DESI and DESIEXT Models 2021**
  Endesa Medios y Sistemas S.L. January 2021 - December 2021. (Enrique Lobato Miguélez)

  New functionalities, automation and maintenance DESI and DESIEXT models 2021

- **Prediction of the behavior of critical components in reactors of electric power generation plants**
  Innomerics S.L. January 2021 - July 2022. (José Portela González)

  The objective of the project is the application of Machine Learning techniques and visualization for the analysis of the state of health of critical components of the reactors of electric power generation plants. The models have been applied to records of historical inspections that have been carried out throughout the useful life of the components in order to identify the factors that affect degradation over time.

  This collaboration is part of the projectSMARTinspect: Sistema autónomo e inteligente para mantenimiento predictivo", which has received a grant from the Ministry of Economic Affairs and Digital Transformation of the Government of Spain.

- **Improvements in Monte Carlo executions and in the resolution processes of the P48 and the extrapeninsular systems**
  Enel Iberoamérica S.R.L. March 2021 - October 2021. (Antonio Bello Morales, Javier Reneses Guillén, Alberto Orgaz Gil, Geovanny Alberto Marulanda García)

  This project focuses on a redesign of the methodology currently used in Monte Carlo simulations, as well as in improving the representation of generation units in the extrapeninsular systems.

- **Improving Monte Carlo simulations in OMEGA**
  Endesa Medios y Sistemas S.L. April 2021 - October 2021. (Antonio Bello Morales, Javier Reneses Guillén, Cristina Casillas Clot, Luis Manuel Montero Guirao, Diana María Navarrete Cruz)

  This project focuses on improving the methodology used in Monte Carlo simulations.

- **Simulation of the global gas market in the medium term**
  Enel Global Trading S.P.A. April 2021 - October 2021. (Antonio Bello Morales, Javier Reneses Guillén, Pablo Rodilla Rodríguez, Paulo Brito Pereira)

  The aim of this collaboration between IIT and Enel is to develop different improvements in SIMGAS to enable a more realistic representation of the global natural gas market in the medium term.

- **Support to deployment of DRE solutions within the Rockefeller Foundation Call for Action and the Integrated Distribution Framework**
  Massachusetts Institute of Technology (MIT), Rockefeller Foundation. May 2021 - January 2023. (Fernando de Cuadra García, Carlos Mateo Domingo, Paolo Mastropietro, Santos José Díaz Pastor, José Ignacio Pérez Arriaga, Andrés González García, Pablo Dueñas Martínez, Varios General Contratado)

  This project is a collaboration between the MITei research team (in which the Comillas-IIT is a relevant partner) and the Rockefeller Foundation (RF) regarding

the ongoing collaboration around the Global Commission to End Energy Poverty (GCEEP), and the development of a globally applicable Integrated Distribution Framework (IDF)
The main areas of action of the project are:
- Advancing IDF implementation aligned with the Call Action Plan for massive deployment of
Distributed Renewable Electrification (DRE) solutions
- Index measuring the progress towards a fully electrified and decarbonized economy for all
Some of the tasks included in the IIT contributions to the project are:
- Definition and implementation of computer models to analyse optimal electrification along time, in specific areas (several demand clusters related to the same feeder). Solutions include grid and off-grid options, uncertainty and multiple scenarios.
- Analysis of the effects and promotion schemes for demand growth: C&I customers, electric cooking or electric vehicles
- Definition of dynamic scenarios for demand, regulation and business models.
- Analysis of business models, policies, tariffs and subsidies.

- **AgroMaster: Automatic and autonomous support system for small primary farms based on IoT (internet of things) and edge computing with fully distributed autonomous data and power network**
Universidad Ramón Llull, Universidad de Deusto. May 2021 - April 2022. (Carlos Rodríguez-Morcillo García, Javier Matanza Domingo, José Daniel Muñoz Frías, Francisco Javier Herraiz Martínez, Romano Giannetti, Gregorio López López)

In this project, we want to build a small prototype that allows demonstrating that it is possible to improve the economic performance of various agricultural activities. To do this, it will focus on improving the efficiency of energy, water, and time spent. A solution especially suitable for areas of extensive irrigation, livestock and greenhouse crops, where communications have little or no coverage. That it covers from beginning to end the needs suffered by large areas of land, in poor areas from the economic point of view. A cheap solution, without fixed maintenance costs (such as a telephone communication may suppose), which makes it accessible to the small farmer or producer, on a personal basis. A solution that can serve multiple points scattered throughout a large area of ??land, avoiding the movement of people.

The project, for the agricultural scenario, offers water and energy savings, by being able to irrigate in a controlled way thanks to the use of sensors, with the necessary water, in the lowest hours of energy cost, including obtaining energy in a renewable (solar or wind). Not forgetting that accurate and adequate irrigation affects the quantity and quality of production. In other scenarios, such as farms or greenhouses, the implementation of this system results in cost savings.

To demonstrate the feasibility of improving economic performance, it is necessary to build a prototype consisting of three parts:

1) The minimum elements to control, provided by INEA will be 1 solenoid valve, 1 irrigation motor, and 1 door. They provide knowledge about the operation of crops and farms, the management and supervision of the installed prototype, and the analysis of the collected data.

2) The control and sensor electronics (temperature, humidity, pressure), which will be designed and built by ICAI, using low-cost components. It will be in charge of the assembly and tests in the laboratory and in the field.

3) The totally autonomous electrical supply (solar panels and batteries) of the previous parts, which will be designed and built by the URL-IQS electrotechnical laboratory. They will be in charge of the assembly and laboratory tests.

- **Simulation of distributed energy resources**
  Zola Electric. May 2021 - March 2022. (Carlos Mateo Domingo, Francisco Javier Renedo Anglada, Fernando Emilio Postigo Marcos)

  The objective of the project is to simulate the steady state of a microgrid with AC/DC power conversion units (PCUs), loads and delta-wye three-phase transformers. The model is based on a full three-phase model of a distribution network. The equations in the PCUs relate the frequency of and the voltage in their terminals to the power injected into the grid. The algorithm searches for the solution iteratively looking for a solution of the power flow that is coherent with the equations of the PCUs.

- **Optimal design of ATO driving parameters in the branches of Valles Line of FGC**
  Siemens Rail Automation S.A.U. May 2021 - December 2021. (Antonio Fernández Cardador, Asunción Paloma Cucala García, Adrián Fernández Rodríguez, Manuel Blanco Castillo)

  The objective of this project is the design and implementation of efficient ATO speed commands in FGC railway line in Tarrasa and Sabadell branches. These ATO speed commands are selected and sent to the train by the traffic regulation system in real-time. The new ATO speed commands must comply with technical, operational and comfort restrictions and will minimise the energy consumption.

- **Development of a module to monitor functional training exercises with computer vision and deep learning**
  Brooklyn Fitboxing International S.L. May 2021 - October 2021. (Jaime Boal Martín-Larrauri, Eugenio Francisco Sánchez Úbeda)

  Using images captured with an RGB-D camera, the aim of the project is to detect the functional exercise (sit-ups, push-ups...) being performed by a person and to count the number of correct repetitions automatically. To identify the exercises, deep learning models are trained and quantized in order to deploy

them on an electronic board equipped with an artificial intelligence acceleration module.

- **Training, innovation and development in Metrology**
  Universidad Nacional Educación a Distancia (UNED), FREMAP. May 2021 - July 2023. (María Ana Sáenz Nuño, Mª Rosa Salas Labayen, Mª Victoria Montes Gan, Olga Martín Carrasquilla)

  Projects typically small in duration or budget on metrology, including training, design, innovation for companies, etc.
  Consultancy on gamification and serious games for training applications in Higher Education and Business.

- **Improvement of the modeling of wind generation in a European context and from a probabilistic perspective**
  Enel Iberoamérica S.R.L. June 2021 - December 2021. (Antonio Bello Morales, Javier Reneses Guillén, Luis Manuel Montero Guirao, Geovanny Alberto Marulanda García)

  This project focuses on improving the decision-making process with the model through a better modeling of wind generation in a European context and from a probabilistic perspective.

- **Phase 1 of GAMS code reengineering**
  Endesa Medios y Sistemas S.L. June 2021 - October 2021. (Antonio Bello Morales, Javier Reneses Guillén, Alberto Orgaz Gil, Geovanny Alberto Marulanda García, Luis Manuel Montero Guirao)

  This project focuses on improving the resolution of SENP systems by means of structural changes in the optimization process.

- **Improvements in the temporal representation used in ACUARIO**
  Enel Iberoamérica S.R.L. June 2021 - December 2021. (Antonio Bello Morales, Javier Reneses Guillén, Pablo Rodilla Rodríguez, Paulo Brito Pereira, Jenny Alexandra Cifuentes Quintero)

  The objective of this project is to undertake a reengineering of ACUARIO to improve the temporal representation used in the model by making the current load blocks more flexible.

- **Analysis of impact factors in mechanical life cycle tests**
  Inesco Ingenieros S.L. June 2021 - September 2021. (José Portela González, Sonja Wogrin)

  The objective of the project is the analysis of data from different mechanical tests to determine the factors that significantly affect the useful life.

- **CODEX: Modeling of new trends. Green hydrogen**
  Endesa Medios y Sistemas S.L. June 2021 - September 2021. (Francisco Alberto Campos Fernández, Salvador Doménech Martínez)

The main objective of this project is the integration in CODEX of a model that allows to represent green hydrogen, without considering its storage or its use in reconditioned thermal power plants to generate electricity.

- **Improvements in the modeling of the Salime reservoir, in the technical constraints market module and in the module for the feasibility of cleared schedules**

  Endesa Medios y Sistemas S.L. August 2021 - September 2021. (Javier García González, Pedro de Otaola Arca)

  This project is part of the development of the decision support tools EXCOM and EXLA. The objective of this project is to improve the modeling of the Salime reservoir (shared power plant), as well as the technical constraints market, and the feasibility modules.

- **Experimental proof-of.concept of electromagnetic selfsensing scaffolds**

  Universidad Pontificia Comillas. September 2021 - August 2023. (Francisco Javier Herraiz Martínez, Javier Matanza Domingo, Yolanda Ballesteros Iglesias, Juan Carlos del Real Romero, Romano Giannetti, José Daniel Muñoz Frías)

  The main objective of the project is the development of a novel scaffolds technology. These scaffolds are resonant in the GHz band. Thus, they can be interrogated by an electromagnetic signal and used as sensors. Their response signal will be used to control the regeneration of the bone. Moreover, it could be useful for infections detectecion. In order to obtain such an ambitious goal, different novel technologies will be used. In partircular, additive manufacturing techniques and nanomaterials are proposed. Finally, a demonstrator of the whole system will be develop to evaluate the viability of the proposed technology.

- **Representation of new trends. Green hydrogen**

  Endesa Medios y Sistemas S.L. September 2021 - December 2021. (Efraim Centeno Hernáez)

  CODEX is a model for long-term MIBEL analysis that allows the representation either hourly either by states of the time horizon, the representation of generation resources by technologies or groups, the modeling of competition and the secondary reserve, as well as the treatment of uncertainty by characterizing the stochastic variables mentioned above. In this task, the generation of hydrogen with electricity was introduced in the model in a basic version.

- **Discerning leadership. Impact measurement methodology and implementation techniques**

  Universidad Pontificia Comillas. September 2021 - July 2022. (David Roch Dupré)

  This project seeks two main objectives:

  • Systematize the discernment leadership model and define the methodologies that allow its implementation.

  • Develop an impact measurement methodology that allows evaluating the

micro-changes that take place in individuals who use this leadership model. The measurement methodology must combine qualitative and quantitative information, from which composite/synthetic indicators are constructed applying different quantitative techniques (normalization, weighting, aggregation, robustness analysis, among others).
Measuring and monitoring the results of applying this leadership model will be essential to ensure the scalability of the model and its sustainability over time.

- **Integration of cybersecurity and biomechanics in vehicles and traffic**
  Centro de Experimentación y Seguridad Vial Mapfre S.A. September 2021 - April 2022. (Jesús Jiménez Octavio, Gregorio López López, Rafael Palacios Hielscher, Francisco José López Valdés, Alberto Carnicero López, Jaime Fúster de la Fuente, Manuel Valdano)

  The global aim of this collaboration, in which this proposal is framed, is: firstly, the determination of the risk and the impact that a telematic or local attack via software may have on the vehicles insured in MAPFRE and; secondly, to explore the possibilities of application and management of Toyota virtual human models (THUMS) in the reconstruction of traffic accidents.

- **Development of a model for detecting structural changes in bidding strategies based on analyzing residual demand curves**
  Endesa Medios y Sistemas S.L. September 2021 - December 2021. (José Portela González, Antonio Muñoz San Roque, Alberto González Sánchez)

  The objective of the proposed collaboration is the development of a model for detecting changes in the bidding strategies of agents based on residual demand curves using models for the automatic detection of structural changes in time series.

- **Voltage control system of the transmission grid with renewable generation: control of power park modules**
  Iberdrola Renovables Energía, S.A.U. September 2021 - December 2021. (Luis Rouco Rodríguez, Enrique Lobato Miguélez, Ignacio Egido Cortés, Álvaro Benítez Domínguez)

  This project develop a voltage control system of the transmission grid with renewable generation. Precisely, the control of power park modules is addressed.

- **Tests of a 400V/4kW/2950 rpm induction motor**
  Innomerics S.L. November 2021 - January 2022. (Luis Rouco Rodríguez, Fidel Fernández Bernal)

  The work is aimed at testing a 50 Hz / 400 V / 4 kW / 2950 rpm induction motor for Cofrentes NP, including the torque-speed curve.

- **Impact of the electric vehicle in the electricity markets in 2030**
  Repsol S.A. November 2021 - February 2022. (Andrés Ramos Galán, Pablo Frías Marín, José Pablo Chaves Ávila, Pedro Linares Llamas, Juan José Valentín Vírseda)

Analysis of the impact on the electricity markets of the mainland Spanish system of the high penetration of electric vehicles in a 2030 scenario.

- **Economic evaluation of LAES in Tenerife**
  Highview Power Spain S.L. December 2021 - March 2022. (Lukas Sigrist, Enrique Lobato Miguélez, Luis Rouco Rodríguez)

  The project assesses the economic benefits of a LAES. A detailed LAES model needs to be developed for this purpose. Benefits will be derived from the reduction in fuel consumption and on the substitution of synchronous must-run units.

- **CODEX: Improvements in the representation of the storage and spillages. Tool input data loading**
  Endesa Medios y Sistemas S.L. January 2022 - March 2022. (Francisco Alberto Campos Fernández, Luis Alberto Herrero Rozas)

  This task includes three subtasks for the improvement of the CODEX model that cover different aspects relating to the representation of storage, treatment of renewable spillages and the input data load from old versions of CODEX.

- **CODEX: Review of wind profiles**
  Endesa Medios y Sistemas S.L. January 2022 - February 2022. (Francisco Alberto Campos Fernández, Luis Alberto Herrero Rozas)

  The main objective of this project is to improve the representation of technologies such as renewable, nuclear, mini-hydraulic or cogeneration, in the CODEX hourly operating modes, to adequately represent both its profile as its use, and therefore the expected hourly prices.

- **New functionalities, automation and maintenance DESI and DESIEXT Models 2022**
  Endesa Medios y Sistemas S.L. January 2022 - December 2022. (Enrique Lobato Miguélez)

  New functionalities, automation and maintenance DESI and DESIEXT models 2022

- **Measuring the Silver Economy Tracker**
  Fundación Mapfre. January 2022 - June 2022. (Elisa María Aracil Fernández, Elena María Díaz Aguiluz, David Roch Dupré)

  This project seeks to quantify the Silver Economy Tracker, a tool proposed in previous works to measure the longevity economy. This study provides the existing indicators for Spain, France and Portugal, which could satisfy the information needs in each of the dimensions, and their subsequent treatment to determine the degree of intra-country and inter-country progress towards the longevity economy.

- **Assistance and maintenance of Middle Office models**
  Endesa Medios y Sistemas S.L. January 2022 - December 2022. (Antonio Bello Morales, Geovanny Alberto Marulanda García, Luis Manuel Montero Guirao, Varios General Contratado)

  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-VEIMAO, AURIGA, and VALORE-CLOUD.

- **Development of a human like multibody model of a pedestrian**
  Siemens Industry Software NV. January 2022 - December 2022. (Francisco José López Valdés)

  1. Comillas carry out research work in which the behaviour of Madymo pedestrian models are reviewed and analysed against experimental data in order to demonstrate their level of validation. Following the review an improvement plan is made and the models are modified such that the correlation to human response improves. This work is reported to the project manager.
  2. The models' behaviour is validated against existing certification requirements

- **Model for the construction of supply curves for Endesa´s hydroelectric resources**
  Endesa Medios y Sistemas S.L. January 2022 - April 2022. (Javier García González, Pedro de Otaola Arca)

  The objective of this project is the construction of optimal supply curves for hydroelectric resources, taking into account a very detailed representation of the hydraulic basins managed by Enel-Endesa. These offers are built taking into account the bimonthly hourly schedulling obtained through the EXCOM model and are consistent with the medium-term operation of the reservoirs obtained with the tool EXLA.

- **Model identification and validation of and Intelligent Inertial Position System based on Machine Learning Techniques**
  Airbus Defence and Space S.A.U. February 2022 - April 2022. (José Portela González, Antonio Muñoz San Roque, Eugenio Francisco Sánchez Úbeda)

  The objective of this project is to identify machine learning models to improve the accuracy of an inertial position system and validate the methodology with a large dataset of flights.

- **Tuning of the POD of a PV plant**
  Jema Energy S.A. February 2022 - March 2022. (Luis Rouco Rodríguez, Lukas Sigrist)

  This work is aimed at tuning the POD (Power Oscillation Damper) of a PV plant. In addition, the fulfillment of Technical Supersion Standard will be checked.

- **Improvements in Monte Carlo executions**
  Endesa Medios y Sistemas S.L. March 2022 - October 2022. (Antonio Bello Morales, Geovanny Alberto Marulanda García, Luis Manuel Montero Guirao)
  This project focuses on a redesign of the methodology currently used in Monte Carlo simulations.

- **Improving Monte Carlo simulations in OMEGA**
  Endesa Medios y Sistemas S.L. March 2022 - October 2022. (Antonio Bello Morales, Pablo Rodilla Rodríguez, Diana María Navarrete Cruz)
  This project focuses on improving the methodology used in Monte Carlo simulations.

- **Improvements in the optionality of combined cycle power plants**
  Endesa Medios y Sistemas S.L. March 2022 - October 2022. (Antonio Bello Morales, Jenny Alexandra Cifuentes Quintero, Geovanny Alberto Marulanda García, Varios General Contratado)
  The objective of the project is to improve the quality of the representation of the optionality of the combined cycle power plants.

- **Improvements in the execution of VALORE: Unification with SEIE and hourly executions**
  Endesa Medios y Sistemas S.L. March 2022 - December 2022. (Antonio Bello Morales, Geovanny Alberto Marulanda García, Luis Manuel Montero Guirao)
  The objective of this project is to improve the quality of forecasts by establishing a unified scheme for the different executions of the LPM and by implementing a chronological hourly execution mode taking into account temporal couplings.

- **Adaptation of VALORE to new regulatory changes**
  Endesa Medios y Sistemas S.L. April 2022 - June 2022. (Antonio Bello Morales, Luis Manuel Montero Guirao, Varios General Contratado)
  The final objective of the project is to carry out different developments to adapt VALORE to the new regulatory framework that has been proposed to be implemented in MIBEL in the near future.

- **Simulation of the global gas market in the medium term**
  Enel Global Services Srl. April 2022 - November 2022. (Antonio Bello Morales, Pablo Rodilla Rodríguez, Paulo Brito Pereira, Varios General Contratado)
  The aim of this collaboration between IIT and Enel is to develop different improvements in SIMGAS to enable a more realistic representation of the global natural gas market in the medium term.

- **Adaptation of the treatment of outputs considering equiprobable scenarios**
  Endesa Medios y Sistemas S.L. April 2022 - October 2022. (Antonio Bello Morales, Geovanny Alberto Marulanda García, Luis Manuel Montero Guirao)

The final objective of the project is to carry out different developments in order to improve the quality of the probabilistic forecasts that are made with VALORE in the Market Analysis Unit.

- **Migration of the GENsol solar scenario generator to the cloud environment**
  Endesa Medios y Sistemas S.L. April 2022 - December 2022. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

  The primary aim of this project is the migration of the GENsol tool to the cloud environment. Taking as input the information published by the System Operator, this tool uses machine-learning techniques in order to generate solar production scenarios.

- **Development of a model for detecting structural changes in bidding strategies based on analyzing residual demand curves**
  Endesa Medios y Sistemas S.L. April 2022 - December 2022. (José Portela González, Antonio Muñoz San Roque, Alberto González Sánchez)

  The objective of the proposed collaboration is the development of a deterministic prediction model for residual demand curves in the secondary regulation market. The model will take into account the effect of existing regulatory regions as well as the adaptation to new regulatory changes.

- **Model for the construction of supply curves for Endesa´s hydroelectric resources**
  Endesa Medios y Sistemas S.L. May 2022 - July 2022. (Javier García González, Pedro de Otaola Arca)

  The objective of this project is to improve the model to build the optimal supply curves for hydroelectric resources, taking into account a very detailed representation of the hydraulic basins managed by Enel-Endesa.

- **Energy storage system modeling**
  Endesa Medios y Sistemas S.L. May 2022 - November 2022. (Antonio Bello Morales, Geovanny Alberto Marulanda García, Genérico Proyectista Ief)

  The final objective of the project is to carry out different developments in order to improve the quality of the forecasts by including daily storage systems in the simulations executed with VALORE in the Market Analysis Unit.

- **CODEX: Development of outputs to support the evaluation of PPAs**
  Endesa Medios y Sistemas S.L. May 2022 - June 2022. (Francisco Alberto Campos Fernández, Luis Alberto Herrero Rozas)

  The general objective of this task is to provide the CODEX model with the necessary outputs to support the analysis of the valuation of PPAs. As a fundamental parameter is the risk, so these outputs will be the result of the processing of Montecarlo simulations. In addition to creating a case preparation tool and new modes of execution.

- **CODEX: Output management of the CODEX optimization model**
  Endesa Medios y Sistemas S.L. May 2022 - June 2022. (Francisco Alberto Campos Fernández, Luis Alberto Herrero Rozas)

  The main objective of this project is to generate new outputs of the Codex model for a better analysis of its results. Among these outputs are: the marginal technology in each hour, the reservoir levels of the hydro technologies, the net hydro production of mixed pumping and the number of cycles and load level for storage technologies (pumping and batteries)

- **Improvements in the representation of renewable generation assets**
  Endesa Medios y Sistemas S.L. May 2022 - December 2022. (Antonio Bello Morales, Pablo Rodilla Rodríguez, Diana María Navarrete Cruz)

  The final objective of the project is to carry out different developments in order to improve the quality of the representation of the renewable assets in Endesa's portfolio.

- **Adaptation to the big data environment of the automatic monitoring and analysis tool for bidding behaviour in the Iberian electricity market**
  Endesa Medios y Sistemas S.L. May 2022 - July 2022. (Eugenio Francisco Sánchez Úbeda)

  The primary aim of this project is the adaptation of the DECA tool to the big data environment. Taking as input the information published by the Market and System Operators, this tool uses machine-learning techniques in order to analyze the bidding behavior of firms and their pricing of the different generation technologies.

- **Development of an application for the GUI of a tool to optimize the filling of containers and trucks**
  Pladur Gypsum S.A. May 2022 - July 2022. (Álvaro Jesús López López, Fernando de Cuadra García)

  In this project, we have developed a backend to manage all product libraries which communicates via an API REST with a front end application developed with React.

- **Wind profiles review**
  Endesa Medios y Sistemas S.L. May 2022 - July 2022. (Efraim Centeno Hernáez, Luis Jesús Fernández Palomino)

  The final objective of the project is to carry out different developments in order to improve the quality of the long-term forecasts made with CODEX in the changing environment of MIBEL and the European integrated electricity market.

  Specifically, the general objective of this task is to improve the representation of the dispatch of basic technologies such as renewables, nuclear, mini-hydraulic or cogeneration, in the CÓDEX hourly operating modes, to adequately represent both their profile and their use, and finally the expected hourly prices.

- **Output management of CODEX optimization model**
  Endesa Medios y Sistemas S.L. May 2022 - June 2022. (Efraim Centeno Hernáez, Luis Jesús Fernández Palomino)

  The final objective of the project is to carry out different developments in order to improve the quality of the long-term forecasts made with CODEX in the changing environment of MIBEL and the European integrated electricity market.

  Specifically, the general objective of this task is to improve the representation of the dispatch of basic technologies such as renewables, nuclear, mini-hydraulic or cogeneration, in the CÓDEX hourly operating modes, to adequately represent both their profile and their use, and finally the expected hourly prices.

- **Output development for PPAs assessment**
  Endesa Medios y Sistemas S.L. May 2022 - June 2022. (Efraim Centeno Hernáez, Luis Jesús Fernández Palomino)

  The final objective of the project is to carry out different developments in order to improve the quality of the long-term forecasts made with CODEX in the changing environment of MIBEL and the European integrated electricity market.

  The general objective of this task is to provide the model with the necessary outputs to support the analysis of the different teams related to the negotiation and valuation of PPAs. As a fundamental parameter for the evaluation and analysis of the PPAs is the risk, so these outputs will be the result of the processing of Montecarlo simulations. In addition to creating a case preparation tool and new modes of execution.

- **Improvement of storage representation**
  Endesa Medios y Sistemas S.L. May 2022 - June 2022. (Efraim Centeno Hernáez, Luis Jesús Fernández Palomino)

  The final objective of the project is to carry out different developments in order to improve the quality of the long-term forecasts made with CODEX in the changing environment of MIBEL and the European integrated electricity market.

  The increasing weight that non-manageable technologies (solar and wind) have in the generation mix is making the modeling of the different storage technologies increasingly decisive in the planning and operation of the system.

  Codex already has a model of batteries as a storage technology but, given the relevance that, as has been mentioned, storage is intended to deepen the representation of storage of different types.

- **Improvements in the statistical modeling of the demand for natural gas and electricity in Spain, Portugal and France**
  Endesa Medios y Sistemas S.L. June 2022 - September 2022. (Eugenio Francisco Sánchez Úbeda, Anne Maren Coll Franck)

  The objective of this project is to improve the statistical models of the demand for electricity and natural gas in Spain, Portugal and France.

- **Adaptation of the Montecarlo executions to the use of hydraulic production paths: Phase I**
  Endesa Medios y Sistemas S.L. June 2022 - December 2022. (Antonio Bello Morales, Varios General Contratado)

  The final objective of the project is to carry out different developments in order to improve the quality of the forecasts by adapting VALORE to a new consideration of hydraulic management and its associated uncertainty in the model.

- **Extension of dry rail dispersion factors Kdry calculation for the on-board ERTMS system configuration**
  Patentes Talgo S.L.U. June 2022 - October 2022. (Adrián Fernández Rodríguez)

  In this project a new software tool is developed for the calculation of the dry rail dispersion factors (Kdry) to be configured in the on-board ERTMS systems. The tool uses Montecarlo method to obtain the variability in the braking curve as a function of the uncertainty in the application of the different train braking systems.

3.2.1.2 Public funding

- **Control and protection systems for island operation of distribution feeders**
  Ministerio de Ciencia e Innovación (MCIN), Agencia Estatal de Investigación (AEI), 10.13039/501100011033, FEDER. September 2018 - December 2021. (Luis Rouco Rodríguez, Pablo García González, José Daniel Muñoz Frías, Francisco Miguel Echavarren Cerezo, Francisco Javier Renedo Anglada, María Candelaria Utrilla Bustamante, Lukas Sigrist, Luis Ismael de la Barba Suárez, Aurelio García Cerrada, Régulo Enrique Ávila Martínez)

  This project is aimed at developing control and protection systems for island opertion of distribution feeders to improve the quality and continuity of electricity supply taking advantage of distributed energy resources.

Grant RTC-2017-6296-3 funded by:

- **Modelling, technologies, control and operation for AC-DC hybrid electric grids with low-to-nil synchronous generation and strong penetration of renewable generation (RTI2018-098865-B-C31)**
  MCIN/ AEI/10.13039/501100011033/ "FEDER Una manera de hacer Europa". January 2019 - June 2022. (Aurelio García Cerrada, Luis Rouco Rodríguez, Francisco Miguel Echavarren Cerezo, Francisco Javier Renedo Anglada, Pablo García González, Ignacio Egido Cortés, Régulo Enrique Ávila Martínez)

  The future sustainability of the Worlds Energy System (WES) rests on a massive and distributed penetration of renewable energy sources and their substantial increase in the generation mix. This phenomenon is already taking place at an ever-increasing pace (that is bound to speed up in the future) thanks to facilitating technologies such as power electronics. Therefore, conventional synchronous technology will gradually move from its dominant position towards a situation in which coordination with other and newer technologies will be mandatory. In fact, a situation in which the whole electricity demand of certain regions is supplied by electronic converters from renewable energy sources, at least temporarily, is possible or is already occurring. In this new situation there exists the urgent need to rethink current paradigms regarding the control and operation of conventional electric energy systems in order to address future scenarios (lower system inertia, faster dynamics, controller interactions, etc.). The main objective of this project is to provide the in-depth analysis of the control, operation and technology requirements for the newly created breed of electricity networks of low-to-nil conventional generation with increasing numbers of smart components (generators and loads, for example). This type of systems must include (a) alternating current (AC) sub-grids because of the large number of existing AC loads and the necessity of maintaining the compatibility with the conventional grid and (b) direct current (DC) sub-grids where most of the renewable-based generation can be more naturally integrated (see solar energy, for example), energy storage (batteries) can also be easily interfaced and some domestic and industrial loads can be connected (computers and electrical drives, for example). Currently, the operation of hybrid (DC/AC) electric grids is possible thanks to the use of electronic Voltage Source Converters (VSCs, abbreviated). This project will address the following specific topics:
  (1) Modelling, analysis, control, and quality of electrical grids with low-to-nil conventional generation in order to improve their flexibility thanks to the use of power electronics while similar levels of voltage control, quality and reliability of supply to those already achieved with conventional systems can be reached.
  (2) The detailed study of selected electronic power converters and related technologies as key tools for electrical grids like those under study. The project will focus on solid-state (electronic or intelligent) transformers, energy storage, distributed VSCs and virtual synchronous machines.
  (3) Experimental demonstration and validation of the main theoretical contributions developed in points (1) and (2).

Grant RTI2018-098865-B-C31 funded by MCIN/AEI/ 10.13039/501100011033 and by “ERDF A way of making Europe”

- **Large scale campaigns to demonstrate how TSO-DSO shall act in a coordinated manner to procure grid services in the most reliable and efficient way**

  European Commission. January 2019 - June 2022. (José Pablo Chaves Ávila, Rafael Cossent Arín, Tomás Gómez San Román, Leandro Lind, Timo Gerres, Luis Olmos Camacho, Miguel Ángel Sánchez Fornié, Shilpa Bindu, Álvaro Sánchez Miralles, Nicolás Mariano Morell Dameto, Javier Matanza Domingo, Gregorio López López, Enrique Lobato Miguélez, Orlando Mauricio Valarezo Rivera, Matteo Troncia)

  The CoordiNet project aims at demonstrating how DSOs and TSOs shall act in a coordinated manner to procure and activate grid services in the most reliable and efficient way through the implementation of three “TSO-DSO-Consumer” demonstrations at large scale, in cooperation with market participants (and consumers). The consortium defines and adapts, demonstrates and promotes future standardized products for grid services and related market platforms to contribute to the seamless pan-European electricity market.
  The project covers not only typical market situations but also advanced and futuristic scenarios, such as P2P markets, to paint the most flexible and advanced vision of how a cooperative service platform may look in the future European energy system.
  In a nutshell the innovation introduced by CoordiNet can be captured in the following points:
  - Creation of the appropriate conditions of cooperation among all the actors including the customers removing barriers;
  - Complete analysis and definition of flexibility in the grid at every voltage level encompassing TSO and DSO domain and including consumer participation;
  - Definition of new mechanisms more suitable for real time operations;
  - Implementation of large-scale field-tests able to comprehend all the voltage level and to trigger the participation of all the actors including the small players;
  - Definition of the requirements for a standard unified European platform to be exploited beyond the limit of the project.

  Three large-scale demonstration projects are foreseen, implemented by both DSOs and TSOs for the networks covered within the respective demonstration areas in Spain, Sweden and Greece.

Each demonstration assesses the application of selected coordination schemes and prototype market platforms and test a complete set of products for grid services. Demonstration areas are selected based on existing and future needs for additional / adapted grid services for the network operator and the availability of flexibility from energy consumers, storage and or small-scale (RES) generation connected to the network. The demonstration regions provide versatility in terms of geographical location, market maturity and their load / generation profile. Finally, the results of these demonstrators are extrapolated to other European countries to pave the way towards a pan-European platform.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824414

- **Programa Microrredes Inteligentes Comunidad de Madrid**
  Comunidad de Madrid, Fondo Social Europeo, Fondo Europeo de Desarrollo Regional. January 2019 - April 2023. (Aurelio García Cerrada, David Domínguez Barbero, Ramón Rodríguez Pecharromán, Carlos Rodríguez-Morcillo García, Pablo Frías Marín, Jaime Boal Martín-Larrauri, Javier Matanza Domingo, Álvaro Sánchez Miralles, Lukas Sigrist, Francisco Javier Renedo Anglada, Pablo García González, Asunción Paloma Cucala García, Antonio Fernández Cardador, Luis Rouco Rodríguez, Andrés Tomás Martín, Javier García González)

  PROMINT will investigate several aspects of the deployment of smart micro-grids in urban environments: generation, energy recovery, electric vehicles, peer-to-peer communications and machine learning applied to data collection and analysis. Specific objectives are:
  1. Design, simulation, communication architecture evaluation in distributed energy systems working as micro-grids.
  2. Study of hybrid AC-DC urban micro-grids.
  3. Energy recovery and recycling from urban railway systems in urban micro-grids.
  4. Generation management of micro-grids.
  5. Machine learning applied to micro-grids, electric vehicles and energy management.

Program of R&D activities among Research Groups of "Comunidad de Madrid" in Technology 2018, funding by Comunidad de Madrid and co-funding by

European Social Fund and European Regional Development Fund, 2014-2020.

- **Transport and policies for the transition to a low-carbon economy in Spain**
  Ministerio de Ciencia e Innovación (MCI), Agencia Estatal de Investigación (AEI), Fondo Europeo de Desarrollo Regional (FEDER). January 2019 - September 2022. (Pedro Linares Llamas)

  The transport sector has become one of the fundamental sectors in fighting against climate change. The great importance of emissions in this sector (responsible for 14% of global greenhouse gas emissions as well as significant emissions of local pollutants) makes it paramount to accelerate the energy transition process. This requires transforming existing mobility policies, among other things, by facilitating the transition from combustion to electric vehicles.
  This transformation process must begin both at a local level with new strategies for environmental sustainability and urban mobility as well as at the state and regional level to penalize the use of polluting vehicles, subsidize the acquisition of clean vehicles and implement tax reforms incorporating environmental criteria. These new policies must be approached from different perspectives. Reforms are required to keep pace with the long and short-term transition in the private vehicle market. It is equally important to establish compensatory mechanisms to avoid the distribution of a disproportionately large share of the costs of these policies to certain population groups.
  Within this context, this project aims to study the policies required to deal with this transition in Spain in the short-term, both by reforming fuel and vehicle registration taxes as well as promoting energy efficient vehicles. This project is therefore structured in three lines of work that are interrelated but also relatively independent. The first of them, based on the analysis of the current situation of private residential transport in Spain, will analyze the environmental, tax and distributive impacts on Spanish households of the tax reform on fuel and vehicle registration; it will study the impact of modifying tax rates and consider different recycling alternatives of additional income/revenue that could/might compensate the possible regressive effects of the reforms. The second line of work aims to develop a homogeneous database on mobility in Spain that could expand the current energy-environmental models to include the transport sector at a level of detail that would allow us to identify the most efficient policies in the area within the context of a broad energy transition. Last but not least, the third line of work will analyze the capacity of various public policies to promote energy-efficient cars in the Spanish market.
  The results of the above-mentioned lines of work may contribute to an informed design and evaluation of foreseeable reforms in public transport policies in Spain, to be undertaken in the coming years, in line with the objectives and proposals put forward by the EU.

Project RTI2018-093692-B-I00 funded by Ministerio de Ciencia e Innovación (MCI), Agencia Estatal de Investigación (AEI) and Fondo Europeo de Desarrollo Regional (FEDER)

- **Open energy transition analyses for a low-carbon economy**
  European Commission. May 2019 - April 2023. (Luis Olmos Camacho, Sara Lumbreras Sancho, Andrés Ramos Galán, Michel Rivier Abbad, Erik Francisco Álvarez Quispe)

  The primary objective of Open ENTRANCE is to contribute to an improved and robust understanding of the transition to a low carbon energy system in Europe by developing, demonstrating and using an Open platform. The platform will be populated with a suite of open 1) integrated modelling tools and a common database including all necessary data for conducting among other scenario building exercises and macro-economic analyses of pathways to a low-carbon energy system at regional, national and pan-European level.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 835896

- **IELECTRIX - Indian and European Local Energy CommuniTies for Renewable Integration and the Energy Transition**
  European Commission. May 2019 - October 2022. (Rafael Cossent Arín, Pablo Frías Marín, Carlos Mateo Domingo, Fernando Emilio Postigo Marcos, Nicolás Mariano Morell Dameto, Mauricio Correa Ramírez, Luca De Rosa, Francisco Javier Renedo Anglada, Lukas Sigrist, Leandro Lind, Leslie Herding, Néstor Rodríguez Pérez)

  An increasing role is foreseen in Europe for local energy communities (LECs) to speed up the grid integration of RES. Today, the enabling role of DSOs in support of LECs is hampered by a lack of flexibility when planning cost-efficient LEC connections to their network at MV level, and by a lack of digitalization of the LV networks to make LEC's smart prosumers benefit economically when serving the DSO flexibility needs. Four European DSOs (E.ON, ENEDIS, E.DIS, Güssing Stadtwerke) and an Indian DSO (TATA) have joined with IT-based, innovative product and solution providers, and technology and research centers, to demonstrate the combined roles of innovative functionalities serving the MV and LV networks, when implemented in 5 different regulatory regimes (Austria, France, Hungary, Germany, India- state of Delhi-).

  The joint work of DSOS aims at accelerating scaling up and replication tested by HEDNO (Greece) and E.ON (Sweden). Dissemination towards players of the energy value chain recommends business models, possible regulatory adjustments and deployment roadmaps of the most promising use cases, in support of the implementation of the Clean Energy Package.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824392

- **Island system operation with high degree of renewable energy resources (RTI2018-100965-A-I00)**
  MCIN/ AEI/10.13039/501100011033/ "FEDER Una manera de hacer Europa". September 2019 - September 2022. (Lukas Sigrist, Enrique Lobato Miguélez, Mohammad Rajabdorri, Luis Rouco Rodríguez, Francisco Miguel Echavarren Cerezo)

  This projects jointly addresses the operation planing and frequency stability. Both problems are intimately related in island power systems and operation planing taking into account frequency stability and its associated dynamics can lead to stabler and more efficient operation. Real island systems will be used to validate the methods developed.

Grant RTI2018-100965-A-I00 funded by MCIN/AEI/ 10.13039/501100011033 and by “ERDF A way of making Europe”.

- **Thematic Network of Energy Modeling for a Sustainable Energy Transition**
  Ministerio de Ciencia, Innovación y Universidades. January 2020 - December 2021. (Pedro Linares Llamas)

  The fight against climate change involves undertaking an energy transition, at global and at national level, to a new energy system with low greenhouse gas emissions. The political and technological decisions adopted by our country in the next decades will build the future energy system and they will have impacts on the economy, the environment and the society. To inform the strategic decision-making process, a wide range of appropriate tools adapted to the actual energy situation of our country is required. There are several tools available, but few of them have been applied on regular basis to energy planning so far. These tools need to be able to assess the economic, environmental and social repercussions of the energy transition. The models developed by the groups of these network show their multidisciplinary character, from multiregional input-output models, dynamics, or with environmental and social extensions and with social accounting matrices, models of computable general equilibrium, of productivity and efficiency frontier analysis and Data Envelopment Analysis, demand forecasting, simulation models, to models of energy optimization. The goal of the network is to contact these national research groups that, from different perspectives and methodological approaches, are working on energy modelling to develop synergies and complementarities, to align priorities adapted to and able to respond to the needs and threats pose by the energy transition, to set up a group of reference at national and international level in energy modelling able to support agents in their process of decision-making, promote the improving the skills on energy modelling, participate on R&D projects together and convey the network research and results to society.

- **EUniversal - Market enabling interface to unlock flexibility solutions for cost-effective management of smarter distribution grids**
  European Commission. February 2020 - July 2023. (Rafael Cossent Arín, Tomás Gómez San Román, José Pablo Chaves Ávila, Mauricio Correa Ramírez, Nicolás Mariano Morell Dameto, Leslie Herding, Orlando Mauricio Valarezo Rivera, David Ulrich Ziegler, Matteo Troncia, Luca De Rosa, Néstor Rodríguez Pérez)

  The present context shows the potential of electricity grids to lead the energy system transition as long as new solutions deal with the challenges related to flexibility solutions, grid observability and controllability, market mechanisms and interoperability in a holistic way. The new solutions need to cover the technological aspects by linking smart and integrated services and tools for distribution grid with market mechanisms. This architecture will guarantee a significant impact on the environment and society.
  The project consortium accepted this challenge and will develop "EUniversal Project" which will enable the transformation of the electricity grid by resolving existing limitations in the energy system through the introduction of a Universal Market Enabling Interface (UMEI). Through this concept, grids will become capable of accommodating all future scenarios through the active use of grid services, acting as an extensive toolbox of flexibility solutions and innovate market mechanisms.
  The primary goal of EUniversal is to enable the transformation of the energy system into a new multi-energy and multi-consumer concept guaranteeing a sustainable, secure and stable manner of electricity supply by bringing forward an universal, adaptable and modular approach through a Universal Market Enabling Interface (UMEI) to interlink active system management with electricity markets and the provision of flexibility services, taking also into consideration the activation needs and the coordination requirements with both commercial parties and TSOs. To do so, EUniversal will define, develop and validate a set of market-oriented flexibility management services from DER in a real environment, under a large RES integration and high electrification scenario.
  In order to demonstrate the services generated in the development phase of the project, 3 different DEMO sites (located in Portugal (PT), Germany (DE) and Poland (PL)) will be run to validate the project solutions.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 864334

- **Distribution network design of U.S. districts in the URBANopt platform**
  National Renewable Energy Laboratory (NREL), U.S. Department of Energy. February 2020 - December 2022. (Carlos Mateo Domingo, Tomás Gómez San Román, Luca De Rosa)

  The objetive of the URBANopt Grid-Interactive Efficient Building (GEB) Modeling Toolkit, is to model efficient, connected and smart building with a portfolio of interoperable technologies that can adjust demand up or down and shift, store, or dispatch electric load in response to grid and building needs. In this project the U.S. Reference Network Model (RNM-US) is integrated into the URBANopt platform in order to design the distribution network of districts, to be able to analyze the interaction between the buildings and the distribution network, taking into account distributed energy resources.

- **Advanced Tools Towards cost-efficient decarbonisation of future reliable Energy SysTems**
  European Commission. March 2020 - February 2023. (Miguel Ángel Sanz Bobi, Carlos Mateo Domingo, Pablo Calvo Báscones, Gopal Lal Rajora, Rafael Palacios Hielscher, Rafael Cossent Arín, Eugenio Francisco Sánchez Úbeda, José Portela González, David Domínguez Barbero)

  The objective of the ATTEST project is to develop and operationalize a modular open source toolbox comprising a suite of innovative tools to support TSOs / DSOs operating, maintaining and planning the energy systems of 2030 and beyond in an optimised and coordinated manner, considering technical, economic and environmental aspects. The consortium, from six EU countries, that has been assembled to deliver ATTEST consists of five highly experienced research organisations in the energy systems area, two utilities that manage and operate the transmission system and the distribution system in Croatia, and two industry partners that specialise in the development of advanced ICT solutions and SCADA systems. The development of this broad spectrum of energy-related ICT tools and the utilization of next generation algorithms, demonstrated in a real world environment has not been attempted before. The outputs from the ATTEST project will enable accelerated dissemination, by a wide range of research institutions, within and outside of the project consortium, of the tools that will help TSOs and DSOs to better manage their networks. The demonstration of the results of the project will be valuable for the scientific community and EU energy industry and attest to the relevance of the solutions developed. The ATTEST's ambition is to enable a wide range of users to utilize and test the tools developed in the project, thereby contributing to spread knowledge and experience in the energy systems community in the EU and on a global scale. This will contribute significantly to addressing not only the specific challenges of the call and the Horizon 2020 Energy Work Program, but also those of the EU's Energy Union strategy and the 2020 Climate & Energy package.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 864298

- **RC4ALL: Responsible consumption for all**
  Ministerio de Ciencia e Innovación (MCI), Agencia Estatal de Investigación (AEI). May 2020 - April 2023. (Eugenio Francisco Sánchez Úbeda, Antonio Muñoz San Roque, José Portela González, Ignacio Navas Pascual, Francisco Rodríguez Cuenca)

  The main objective of the RC4ALL project (Responsible Consumption for All) is to develop a system that, based on the specific information on consumption per device of a relatively small number of representative customers and complementing it with information from external sources, is capable of generating personalized recommendations that improve the efficiency of consumption for the entire customer base of the company. Machine Learning and Big Data techniques will be used.

Project Retos- Colaboración RTC2019-007380-3 funded by Ministerio de Ciencia e Innovación (MCI) and Agencia Estatal de Investigación (AEI)

- **Biophysics of immune response: receptors, cells and populations**
  Ministerio de Ciencia e Innovación (MCIN), Agencia Estatal de Investigación (AEI), 10.13039/501100011033. June 2020 - May 2023. (Mario Castro Ponce, Angela Jiménez Casas, Alberto Carnicero López, Miguel García Sánchez)

  The immune response involves multiple stages operating at different spatial and temporal scales. In recent years there has been increasing recognition of the role of physical processes in the effectiveness of the response, starting with the region of physical contact between cells (the so-called immunological synapse). In general, it is not possible to speak of the immune response at a scale but an interaction between scales. On the other hand, although the exact molecular structure of the T cell receptor was discovered in August 2019, this knowledge does not fully determine the immune response as it is a dynamic process out of equilibrium, which requires the use of the traditional tools of statistical physics.

The central objective of the project is to quantify through modeling, simulation, and data analysis the role of the biophysical aspects of the immune response operating at different scales, always focusing on the explanation of experimental data, discrimination between alternative theories and the generation of new hypotheses. To achieve this objective, a study is proposed separating these scales and choosing the methodology that best adapts to their characteristics (large/small concentrations, fluctuations, spatial properties versus well-mixed, etc...) and the available experimental data.

At the molecular level, we will model the cooperation of T-cell receptors (TCR) to determine the dominant mechanism in the amplification of sensitivity by TCR nanoclusters. Combining stochastic models, image analysis and Bayesian inference, we will quantify the dynamics and function of these nanoclusters. This approach will extend to cytokine-activated competition processes.

At the cellular level, we propose the quantitative study of cell deformation at the synapse. In the first phase, we will use an experimental model of a collaborating group (hydrothermal carbon) to validate simulation models based on finite elements and generate effective models of this deformation. In the second phase, we will model the cell membrane using the phase-field method. Finally, we will extend classical models of statistical physics (Smoluchowski model) to study the intracellular dynamics of organelles in viral infections.

At the population level, we will introduce compartmental models that allow us to contrast hypotheses on the maturation dynamics of T lymphocytes in the thymus, with special emphasis on symmetry/asymmetry in the selection of double negative cells, and we will use the models to extract the most parsimonious mechanism from the analysis of experimental data. Following the compartmental models, we will study the role of latency in the severity of HIV infection. The model will be contrasted with experimental data where the role of drugs reversing latency will be analyzed. At all levels, exhaustive use of statistical inference methods will be made, for which the transversal problem of the models' identifiability and new measures of sensitivity and synergy of the models' parameters will be analyzed.

The research team is multidisciplinary (Physics, Mathematics, and Mechanical engineering) and will have a work team made up of biologists, mathematicians and physicists and experimental collaborators who will provide us with empirical data to validate the models.

Grant PID2019-106339GB-I00 funded by
MCIN/AEI/10.13039/501100011033/ and FSE invierte en tu futuro

- **Development of movement behavior models of complex chronic patients**
  Ministerio de Ciencia e Innovación (MCI), Agencia Estatal de Investigación (AEI). June 2020 - May 2023. (Eugenio Francisco Sánchez Úbeda, Rafael Palacios Hielscher, Antonio Muñoz San Roque, José Portela González, Carlos Rodríguez-Morcillo García)

  The aim of this project, coordinated with Virgen del Rocío University Hospital (HUVR), is to investigate how the deterioration of mobility may reflect changes in the patient's clinical condition, and its degeneration in the domain of integrated care of complex chronic patient.

  To fulfill this objective, an IoT infrastructure and information system is developed. Based on the collected data on patients mobility, machine learning techniques are applied to create patterns capable of modeling and characterizing movement in the patients in order to explain aspects of the clinical evolution of patients.

  Project Retos- Investigación PID2019-110747RB-C22/ AEI/10.13039/501100011033 funded by Ministerio de Ciencia e Innovación (MCI) and Agencia Estatal de Investigación (AEI)

- **Powering system flexibility in the future through RES (POSYTYF)**
  European Commission. July 2020 - July 2023. (Lukas Sigrist, Luis Rouco Rodríguez, Enrique Lobato Miguélez, Álvaro Ortega Manjavacas, Oluwaseun Enoch Oladimeji, Hadi Nemati, Pedro Sánchez Martín)

  The main objective in the POSYTYF project is to group several RES into a systemic object called Virtual Power Plant (VPP). VPP is a way to aggregate RES sources to form a portfolio of dispatchable/non-dispatchable RES able to optimally internally redispatch resources in case of meteorological and system variations in order to provide sufficient flexibility, reliable power output and grid services.

The POSYTYF project will provide TSOs, DSOs and generators with knowledge, models and tools for synthesis of VPP controls both for local (production) and grid (ancillary services) objectives. New analysis (stability assessement) and control (centralized vs decentralized concepts) methods will be particularly proposed. Solutions will be immediately implementable in the actual grid and regulatory situation. Realistic (large-scale grids and concrete RES technologies) cases will be treated and full validations – both in simulation and hardware in the loop along with the codes for regulator's implementation will be made available. Proposals for some main problems like stability will be formulated for next generation grids of massive RES penetration and low inertia systems.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 883985

- **Stability analysis of large power systems with 100% of non-synchronous generators**

  Ministerio de Ciencia e Innovación (MCI). September 2020 - August 2024. (Aurelio García Cerrada, Régulo Enrique Ávila Martínez, Luis Rouco Rodríguez, Francisco Javier Renedo Anglada)

  The future sustainability of the Worlds Energy System (WES) rests on a massive and distributed penetration of renewable energy sources and their substantial increase in the generation mix. This phenomenon is already taking place at an ever-increasing pace (that is bound to speed up in the future) thanks to facilitating technologies such as power electronics. Therefore, conventional synchronous technology will gradually move from its dominant position towards a situation in which coordination with other and newer technologies will be mandatory. In fact, a situation in which the whole electricity demand of certain regions is supplied by electronic converters from renewable energy sources, at least temporarily, is possible or is already occurring. In this new situation there exists the urgent need to rethink current paradigms regarding the control and operation of conventional electric energy systems in order to address future scenarios (lower system inertia, faster dynamics, controller interactions, etc.). The main objective of this project is to provide the in-depth analysis of the control, operation and technology requirements for the newly created breed of electricity networks of low-to-nil conventional generation with increasing numbers of smart components (generators and loads, for example). This type of systems must include (a) alternating current (AC) sub-grids because of the large number of existing AC loads and the necessity of maintaining the

compatibility with the conventional grid and (b) direct current (DC) sub-grids where most of the renewable-based generation can be more naturally integrated (see solar energy, for example), energy storage (batteries) can also be easily interfaced and some domestic and industrial loads can be connected (computers and electrical drives, for example). Currently, the operation of hybrid (DC/AC) electric grids is possible thanks to the use of electronic Voltage Source Converters (VSCs, abbreviated). This project will address the following specific topics:
"Modelling, analysis, control, and quality of electrical grids with low-to-nil conventional generation in order to improve their flexibility thanks to the use of power electronics while similar levels of voltage control, quality and reliability of supply to those already achieved with conventional systems can be reached."

This project is supported by the Spanish Government through the 2019 edition of its pre-doctoral contract programme with reference number PRE2019-088084

- **MODESC – Platform of innovative models for speeding the energy transition towards a decarbonized economy**
  Ministerio de Ciencia e Innovación (MCIN), Agencia Estatal de Investigación (AEI). September 2020 - December 2023. (Tomás Gómez San Román, Michel Rivier Abbad, José Pablo Chaves Ávila, Andrés Ramos Galán, Pedro Linares Llamas, Leslie Herding, Teresa Freire Barceló)

  The aim of the project is the development of a global platform that integrates innovative energy simulation and impact assessment models that allow speeding the decarbonization of the electricity system including the electrification of the energy demand. Several scenarios in the horizon 2030-2050 are considered.

Grant RTC2019-007315-3 funded by MCIN/AEI

- **Real consumer engagement through a new user-centric ecosystem development for end-users´assets in a multi-market scenario**
  European Commission. October 2020 - October 2023. (Álvaro Sánchez Miralles, Francisco Martín Martínez, Miguel Ángel Sanz Bobi, Carmen Valor Martínez, Álvaro Erdozain Vila, Alessandra Porfido, José Carlos Romero Mora, Roberto Barrella, Efraim Centeno Hernáez, Miguel Martín Lopo, Alejandro Rodríguez Gallego, Bad Ghorbal, Javier Matanza Domingo, Rubén Rodríguez Vilches, Olga Rico Díez)

This project not only enables the effective participation of the consumers/prosumers in the energy market, but also drives a profound change turning traditional company's value chain into value generation chain, based on a revolutionary Service Dominant Logic paradigm. The main objective of the REDREAM project is to effectively move the consumer (as a residential, industrial and tertiary consumer) participation to the centre of the energy market through an open and co-creative ecosystem where all stakeholders will actively interact. This ambitious challenge will require the collection of demand response tools and services (energy and non-energy) capable of enabling the capacity for the consumers of participating in the energy market through an improvement of predictability of consumption patterns and consumer behaviour.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957837

- **Empowering and educating young people for the internet by playing**
  European Commission. October 2020 - October 2023. (Gregorio López López, Nereida Bueno Guerra, Mario Castro Ponce, Álvaro Jesús López López, Javier Matanza Domingo, Sara Lumbreras Sancho, Yolanda González Arechavala, Carlos Rodríguez-Morcillo García, Rafael Palacios Hielscher, David Contreras Bárcena, Francisco Javier Herraiz Martínez, Jaime Pérez Sánchez, María Reneses Botija, María Riberas Gutiérrez, Luis Francisco Sánchez Merchante, Aarón Gómez Dorado)

  The RAYUELA project is a 3-years project beginning in October 2020 with a budget of 5M EUR. The consortium involves 17 partners from 9 countries and is co-ordinated by Universidad Pontificia Comillas. The project brings together experts from different areas of knowledge from all over Europe to develop an interactive story-like game that, on the one side, will allow minors to learn good practices on the use of the Internet and associated technology by playing, and, on the other side, will allow modelling, in a friendly and non-invasive manner, online habits and potential risk profiles related to cybersecurity and cybercriminality, providing Law Enforcement Agencies with scientifically sound foundations to define appropriate policies.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 882828

- **OneNet- One network for Europe**

  European Commission. October 2020 - September 2023. (José Pablo Chaves Ávila, Tomás Gómez San Román, Rafael Cossent Arín, Luis Olmos Camacho, Javier Matanza Domingo, Gregorio López López, Leandro Lind, Orlando Mauricio Valarezo Rivera, Matteo Troncia)

  OneNet addresses the growing needs of TSOs and DSOs to have real-time insight into the operation of
  their networks to work in a closely coordinated way, while unlocking and enabling new flexibility markets in a fair and open way. Goal is to enable a cost-effective, seamless and secure bidirectional power flow to and from network customers as active players while supporting grid operators in their system responsibilities.
  The challenges that OneNet addresses are:
  • The need to unlock markets of flexibility at every level to address all the possible needs of network operators
  • The need to effectively support both TSOs and DSOs system-level operation through providing flexibility for 'frequency balancing' and 'non-frequency' ancillary services among others
  • The need for TSOs and DSOs to secure power supplies in the context of ever-increasing RES penetration, decreasing network outages,
  • The need for TSOs and DSOs to gain near real-time insight into the operation of the networks and to can optimise them in near real-time, and
  • The need for improved efficiency of grid reinforcements and stabilization of future costs of grid connection.
  Comillas is leader of WP10– From OneNet demonstrators to EU wide implementation of coordinated
  market schemes and interoperable platforms for standardized system products.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957739

- **integRatEd Solutions for POsitive eNergy and reSilient CitiEs**
  European Commission. October 2020 - September 2025. (Gregorio López López, Javier Matanza Domingo, Rafael Cossent Arín, José Pablo Chaves Ávila, Tomás Gómez San Román, Carlos Rodríguez-Morcillo García, Néstor Rodríguez Pérez)

  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

- **Graphene-enhanced 3D printed biodegradable scaffolds for bone regeneration (EIN2020-112443)**
  MCIN/AEI /10.13039/501100011033, Unión Europea NextGenerationEU/ PRTR. November 2020 - October 2022. (Eva Paz Jiménez)

Grant for proposal preparation fot the Horizon Europe Call: ERC Grants (Pillar 1) - Starting Grants (StG).

Grant EIN2020-112443 funded by MCIN/AEI/ 10.13039/501100011033 and by the European Union NextGenerationEU/PRTR.

- **INTMOD: from the mathematical model to the human decision: positioning Spain as a leader in interpretable models**
  Agencia Estatal de Investigación (AEI). November 2020 - October 2022. (Sara Lumbreras Sancho)
  Granted awarded in the 2020 call for “Europe Research” Revitalization Actions for the preparation and presentation of the proposal addressed to the Horizon Europe call: ERC Aids (Pillar 1) - Starting Grants (StG).

Action EIN2020-112480 funded by Agencia Estatal de Investigación (AEI)

- **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?

- **Assessment of the storage needs for the Spanish electric system in a horizon 2020-2050 with large share of renewables**
  Instituto para la Diversificación y Ahorro de la Energía (IDAE). January 2021 - June 2022. (Andrés Ramos Galán, Pedro Linares Llamas, José Pablo Chaves Ávila, Javier García González, Sonja Wogrin, Juan José Valentín Vírseda)

  This project assesses, from a technical and economic point of view, the daily, weekly and seasonal storage needs for the Spanish electricity system in the 2020-2050 horizon, considering the different storage technologies, as well as keys such as the flexibility of demand or hydroelectric availability.

- **European Climate and Energy Modellling Forum**
  European Commission. May 2021 - December 2024. (Sara Lumbreras Sancho, Andrés Ramos Galán, Luis Olmos Camacho, Carlos Mateo Domingo, Dilayne Santos Oliveira)

  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

- **BIO-FlexGen- Highly-efficient and flexible integration of biomass and renewable hydrogen for low-cost combined heat and power generation to the energy system**
  European Comission. September 2021 - August 2024. (José Pablo Chaves Ávila, Timo Gerres, Paolo Mastropietro, Pablo Rodilla Rodríguez, Paulo Brito Pereira, Javier Matanza Domingo, Gregorio López López, Jesús María Latorre Canteli, Luca De Rosa, Rafael Cossent Arín, Elisa María Aracil Fernández, David Roch Dupré, Shilpa Bindu)

  BIO-FlexGen aims to significantly increase the efficiency, flexibility and cost effectiveness of renewable energy-based combined heat and power plants (CHP), enabling them to play a key role in integrating fluctuating renewable energy into the energy system, and therefore making a significant contribution to the decarbonisation of the energy system.

  Comillas will contribute to:
  1) the socio and techno-economic evaluation of the of CHP technology under different scenarios and contexts.
  2) analyse the barriers (market, regulatory, business models, etc.) for CHP deployment
  3) contribute to the integration of digitalization strategy.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037085

- **Sector coupling and flexibility services in smart grid initiative appraisal**
  Università di Cagliari. September 2021 - January 2022. (José Pablo Chaves Ávila, Matteo Troncia)

The objective of the project is to develop and implement approaches for the appraisal of the impacts determined by smart grid initiatives that involve sector coupling and flexibility services.
One of the proposed objectives is to formulate an evaluation approach for sector-coupling consistent with smart grid initiatives. Due to its characteristics, this evaluation approach will be an integral part of the Multicriteria Cost-Benefit Analysis (MC-CBA) appraisal procedure, which will be extended to include the appraisal of sector coupling initiatives. The research activity includes the methodological formulation of the MC-CBA appraisal tool for multi-sector initiatives and its application to a case study.
The second objective of the proposed collaboration activity concern the study of flexibility service and the methodologies for estimating the related impacts. Flexibility services will be studied in light of defining approaches to evaluate them from the point of view of system needs and potential service providers. Flexibility services will be grouped into homogeneous categories, and a definition of flexibility products with technology-neutral characteristics will be provided. This activity is preliminary to the identification of the metrics useful for assessing the impact of flexibility services and identifying methods for estimating these impacts in the planning phases of the electricity system. These performance indicators have to characterise from a technical or economic point of view the effectiveness of flexibility services exploited in different smart grid initiatives under appraisal.

- **Assisting in Power Africa work. GIS tool for demand forecasting to be used in electrification planning problems**
  OCDE - Organisation de Cooperation et de Development Economiques. September 2021 - September 2022. (Fernando de Cuadra García, Rafael Palacios Hielscher, Carlos Mateo Domingo)

  Research for the development of a Geographic Information System (GIS) tool that can be applied for demand forecasting in Ghana, Senegal, and Uganda to support electrification planning purposes, in terms of defining least-cost pathways to universal electricity access in the aforementioned countries. Model/tool tested by data gathering and running cases in realistic contexts for the countries under study. Capacity building in the use and maintenance of the tool, through cases and seminars/courses.

- **Financial Literacy and Inequalities**
  CaixaBank. February 2022 - November 2022. (Elisa María Aracil Fernández, Elena María Díaz Aguiluz)

  This project analyzes the role of financial education as an element that enhances the positive impacts of financial inclusion in the United Nations' 2030 Agenda, and especially in SDG 10, 'Reduction of inequalities'. The results can serve as a basis to delve into the positive effects that banking promotes on economic and social well-being in the context of developed countries. In particular, the results seek to determine the contribution of financial education in the financial inclusion-reduction of inequality tandem, reinforcing the effect of financial inclusion on the mitigation of inequality. This is significant since

advanced countries have high rates of financial inclusion and, at the same time, growing income inequality.

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

  Sustainable Energy for All (SE4All). March 2022 - June 2022. (Fernando de Cuadra García, Andrés González García, Pablo Dueñas Martínez)

  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 in the initial phase of the Plan, including: State of the Art (methods, tools and data), design of a methodology, local data analysis (existing and required) and recommendations.

  The deliverable results of this project are the following:

  a) Review of literature, plans, data, tools. International level.

  b) Review of clean cooking efforts in Rwanda.

  c) Proposal of methodology and approach for clean cooking planning in Rwanda.

  d) Assessment/audit of data available for the proposed methodology.

  e) Phase II proposal. Includes data-collection requirements and recommendations.

  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.

- **Synthetic Distribution System of Continental United States**

  NREL. August 2022 - January 2023. (Carlos Mateo Domingo, Tomás Gómez San Román)

  The Reference Network Model USA (RNM-US) is licensed to NREL and support is provided to build a synthetic model of the distribution system of the entire Continental United States. The scale is immense with about 9,800 million km2, where the full distribution system is planned in detail from substations to low voltage consumers. 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.

3.2.2 Consultancy and technological support

3.2.2.1 Private funding

- **Study of the electrical interconnection between Bolivia and Brasil**
  Banco Interamericano Desarrollo (BID), Empresa Nacional de Electricidad (ENDE) - Bolivia, Centrales Eléctricas Brasileñas (ELETROBRAS). June 2019 - September 2022. (Luis Olmos Camacho, Andrés Ramos Galán, Michel Rivier Abbad, Jesús María Latorre Canteli, Francisco Miguel Echavarren Cerezo, Francisco Javier Renedo Anglada, Stefanía Gómez Sánchez)

  Technical and economical assessment of the elecrical interconnection between Bolivia and Brasil.

- **Technological consulting for the development of disruptive models using artificial intelligence techniques**
  Insurance Manager S.L. July 2020 - December 2021. (David Contreras Bárcena, Álvaro Jesús López López)

  This project develops the consulting and coordination of the tasks to be carried out for the subsequent development of an intelligent risk management system for the IMEUREKA company within the framework of the awarded NEOTEC project.

  The definition of artificial intelligence techniques, methods, and algorithms proposed by the IIT will be developed by the IMEUREKA IT team.

- **Application of machine learning techniques for the study of customer and employee experience**
  Lukkap Consultants S.L. October 2020 - September 2021. (José Portela González, Antonio Muñoz San Roque)

  The objective of the proposed collaboration is the application of machine learning models to extract useful knowledge from customer experience or employee experience data.
  Different modeling strategies and different models that can be used to automatically extract the desired useful information will be identified.

- **Root cause analysis of failures of high voltage equipment for REN – Portugal**
  Intertek Iberica Spain S.L.U. October 2020 - February 2022. (Luis Rouco Rodríguez)

  This work consists of collaborating with Intertek in the root cause analysis of failures of high voltage equipment for REN - Portugal.

- **Supply of the AGC-IIT and commissioning in the Acciona SCADA system**
  Nexus energía S.A. November 2020 - September 2021. (Ignacio Egido Cortés, Luis Rouco Rodríguez)

  Nexus will participate in the secondary regulation in the Spanish power system. In order to do that, Nexus needs to include an AGC regulator in its SCADA system. This project consists in the supply to Nexus of the AGC-IIT, and the

assistance to both Nexus and the SCADA provider in its integration in the system.

- **Simulation-based study to evaluate the effects of E-mobility smart charging strategies in India**
  Fraunhofer Institute for Energy Economics and Energy System Technology. January 2021 - December 2021. (Pablo Frías Marín, Tomás Gómez San Román, Manuel Pérez Bravo, Morsy Abdelkader Morsy Mohammed Nour, Miguel Martínez Velázquez)

  This project will conduct a detailed study based on critical global review on EV charging infrastructure, smart charging strategies, and simulation studies on selected Distribution networks in India with the main thrust on the following focus points:
  -A detailed and comprehensive global review on different smart charging strategies for EVs;
  -Structured framework for desired data collection from selected DISCOM and other relevant
  sources along with data filtering and quality check;
  -Performing concrete simulations on smart charging strategies for EVs while considering
  different scenarios/use cases with the grid data provided by the DISCOM;
  -Preparation of comprehensive and concrete guidelines for smart EV charging in India;
  -Conducting a detailed literature review on charging infrastructure and consumer response;
  -Providing a framework for short term pool of experts for ad hoc support.

- **Support for the development of the CERES commercial integrated planning model**
  Pharoes Advisory S.L. January 2021 - January 2022. (Sara Lumbreras Sancho, Andrés Ramos Galán)

  PHAROES requests COMILLAS a collaboration through the provision of support services mathematical / computational for the development of the CERES model.

- **Assistance and maintenance of tools CODEX, SIROCO and DESI**
  Endesa Medios y Sistemas S.L. January 2021 - December 2021. (Efraim Centeno Hernáez, Francisco Alberto Campos Fernández, Salvador Doménech Martínez, Enrique Lobato Miguélez)

  Assistance and maintenance of tools developed by IIT for Endesa

- **Roadmap for the national strategy for the production and use of hydrogen in Colombia**
  Banco Interamericano de Desarrollo (BID). April 2021 - September 2021. (Pablo Rodilla Rodríguez, Pedro Linares Llamas, José Pablo Chaves Ávila, Timo Gerres, Sonja Wogrin, Juan José Valentín Vírseda, Paolo Mastropietro, Carlos Batlle López)

The objective of the project is to develop the roadmap for the implementation of hydrogen in Colombia. Among other tasks, it is necessary to evaluate the competitiveness of hydrogen in Colombia, calculate the internal demand and evaluate the regulatory enablers.

- **Assessment of energy losses incentives**
  Endesa, S.A. May 2021 - October 2021. (Tomás Gómez San Román, Rafael Cossent Arín, Nicolás Mariano Morell Dameto, Mauricio Correa Ramírez)
  The aim of this project is to analyze the energy losses incentive proposed in Spain in Circular 6/2019. Some improvements are proposed in the conceptual formulation and in how to apply the incentive taking into account zonal differences between distribution companies.

- **Migration of the Theoretical Thermal Expenditure calculation model to a web-based software tool**
  Fundación Ecológica y Desarrollo. May 2021 - December 2021. (Eva María Arenas Pinilla, Efraim Centeno Hernáez, José Ignacio Linares Hurtado, José Carlos Romero Mora, Roberto Barrella)
  In the study "Characterization of the energy situation and behavior in the sample of households of the program «Not a single household without energy»", a computer application (DIAGNOSTIC) implemented using a local high-level language was used to determine the so-called Theoretical Thermal Expenditure, which represents the sum of the expenditure required to meet the thermal demand for heating and for the preparation of domestic hot water (DHW). This project migrates this DIAGNOSTIC application to a web platform, so that it can be used remotely, in particular by vulnerable households, volunteers and energy audit technicians. Specifically, it is integrated into the Enersoc application of the NGO ECODES and the freely accessible website of the "Not a single household without energy" project.

- **Design of an interactive application for the analysis of impact factors in mechanical life cycle tests based on machine learning techniques**
  Inesco Ingenieros S.L. June 2021 - September 2021. (José Portela González)
  The objective of the project is the design of an interactive tool based on Shiny software that allows the analysis of data from different mechanical tests to determine the factors that significantly affect the useful life. The tool allows statistical studies and modeling with machine learning techniques.

- **Colombia sustainable integrated electrification planning. Grid and off-grid strategies assessment**
  Massachusetts Institute of Technology (MIT), Rockefeller Foundation. July 2021 - September 2022. (Fernando de Cuadra García, Andrés González García, Rafael Palacios Hielscher, Carlos Mateo Domingo, Clara Pérez-Andújar Carretié, Santos José Díaz Pastor, José Ignacio Pérez Arriaga, Varios General Contratado)
  This project is a collaboration between the MITei research team (in which the Comillas-IIT is a relevant partner) and the Rockefeller Foundation (RF) regarding

the ongoing collaboration around the Global Commission to End Energy Poverty (GCEEP), and the development of a globally applicable Integrated Distribution Framework (IDF).
The project aims to extend the electrification planning effort to the whole national territory of Colombia, providing the grounds for the Government to launch an integrated (comprising grid, mini?grids and individual standalone systems) electrification effort that will lead to the achievement of the Universal Access goal by 2030, including the communities in most isolated areas of the country. This planning strategy will also aim at assessing the main components of an integrated (grid and off?grid) sustainable framework for power supply which will allow the attraction of the necessary investments, the governance of the business?model stakeholders ecosystem, and the regulatory and energy policy provisions which will allow for the long?term supply and its future sustainable evolution.

- **Supply of the AGC-IIT and commissioning in the Acciona SCADA system**
  Acciona Generación Renovable S.A. July 2021 - July 2022. (Ignacio Egido Cortés, Luis Rouco Rodríguez)

  Acciona participates in the secondary regulation in the Spanish power system. Acciona is using one license of AGC-IIT in his regulation zone. As Acciona is forming a second regulating zone which will include his wind generation, a second license of AGC-IIT is provided in this project to be used in Acciona's second regulating zone.

- **Simulation of overvoltages in a 2 MVA generator**
  Repsol Generación Eléctrica, S.A.U. September 2021 - September 2021. (Luis Rouco Rodríguez)

  This work is aimed at simulating the overvoltages that may arise in a 2 MVA generator that it is connected to the grid through a transformer and a vacuum circuit breaker. The opening of the vacuum breaker with chopping current is simulated.

- **W2008-64 bits version of the AGC-IIT software intlalled in Cepsa control system**
  Núcleo de Comunicaciones y Control, S.L.U. September 2021 - September 2021. (Luis Rouco Rodríguez, Ignacio Egido Cortés)

  This work is aimed at supplying W2008-64 bits version of the AGC-IIT software intlalled in Cepsa control system.

- **4D Certification of development of an Solid Surface inyection process**
  OCA Instituto de Certificación S.L.U. September 2021 - November 2021. (Pedro Sánchez Martín)

  Perform of a 4D certification to identify the new achievements of a process line for Solid Surface Injection to manufacture types of domestic equipment, mainly for kitchens and bathrooms.

- **Model of hybrid power plants**
  Iberdrola Renovables Energía, S.A.U. September 2021 - December 2021. (Luis Rouco Rodríguez)

  The aim of this work is the development of agregated models of solar photovoltaic inverters.

- **Migration of the model for calculating the Theoretical Electricity Expenditure to a web-based software tool**
  ECODES - Fundación Ecológica y Desarrollo. September 2021 - November 2021. (Eva María Arenas Pinilla, Roberto Barrella)

  In the study "Development of a model for calculating the theoretical electricity cost for Spanish households", a model was obtained that makes it possible to calculate the theoretical cost that a Spanish household should have in order to cover its electricity needs, based on the most representative parameters of the household. In this project, this model is migrated to a web platform, so that it can be used remotely, particularly by vulnerable households, volunteers, and energy audit technicians. Specifically, it is integrated into the Enersoc application of the NGO ECODES and the freely accessible web page of the "Ni un hogar sin energía" project.

- **Complementary analysis of the feasibility of the 2nd circuit of the SIEPAC line and the complementary network upgrades**
  IADB - Inter-American Development Bank. September 2021 - June 2022. (Luis Olmos Camacho, Jesús María Latorre Canteli)

  Technical and economic assessment of the reinforcement of the interconnection between a set of neighboring countries in Central America.

- **Simulation and implementation of the BBE voltage control**
  Bahía Bizkaia Electricidad S.L. October 2021 - January 2022. (Ignacio Egido Cortés, Álvaro Benítez Domínguez)

  REE has published a new version of the operational procedure that regulates the voltage control ancillary service (P.O. 7.4) in Spain. This new version modifies both the implementation and calculations in the control, and the assessment of the unit response compliance with the service requirements. This research project addresses the design and adjustment of the voltage control in BBE, and the supervision of the implementation in the SCADA system.

- **Support to the implementation of the more lights for the Amazon program**
  Inter-American Development Bank (IADB). October 2021 - January 2023. (Rafael Palacios Hielscher, Andrés González García, José Ignacio Pérez Arriaga, Santos José Díaz Pastor)

  The specific objective of this consultancy is to develop an optimal georeferenced Plan to facilitate universal access to the electricity service, within the framework of the More Lights for the Amazon, to the beneficiaries (consumer units) who must be identified and characterized in remote and isolated areas of the legal Amazon in the States of Amazonas, Acre, Pará and Roraima.

The products of this consultancy complement the information and analysis carried out by Ministry of Energy and Mines (MME) for the conception, design, and implementation of the More Lights for the Amazon Program. As a result of the consultancy, a georeferenced electrification plan is expected to be prepared, based on GIS information, to facilitate the provision of electricity to remote and isolated communities in the States subject to the consultancy, considering the various options for supplying the electrical service with individual photovoltaic systems or PV mini-grids.

- **Study on Green Industrial Policy in Europe - mapping policy options for a European Green Industrial Policy in line with the Paris Agreement**
  The Greens/EFA in the European Parliament. November 2021 - December 2021. (Pedro Linares Llamas, Timo Gerres)

  Given the life cycle of assets within the emission-intensive heavy industries, the EU has just one investment cycle to shift production processes to achieve domestic climate neutrality by 2050.
  A new Green Industrial Policy has to set a clear direction for industry, investors, workers, and regions particularly affected by the industrial transition by tackling the major challenges ahead.
  This study will provide the basis for a political debate on the formulation of a new deal for the industry by mapping the main challenges for heavy to decarbonise, policy options and their translation into EU law and policy pathways for industrial sectors (steel, cement and chemicals).

- **Advice and support in the preparation of the Fair Transition Technical Offer - Mudéjar 400 kV**
  CI ETF I RENATO PTX HOLDCO, SLU. November 2021 - December 2021. (Lukas Sigrist)

  The objective is to provide consultancy on the evaluation criteria and support on the preparation of the technical documents.

- **ACG-IIT maintenance services**
  Acciona Generación Renovable S.A. January 2022 - December 2022. (Ignacio Egido 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

- **Assistance and maintenance of tools CODEX, SIROCO and DESI**
  Endesa Medios y Sistemas S.L. January 2022 - December 2022. (Francisco Alberto Campos Fernández, Efraim Centeno Hernáez, Luis Alberto Herrero Rozas, Enrique Lobato Miguélez, Javier García González)

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

- **Development of steady-state and dynamic models of multi-terminal HVDC-VSV links**
  Power-Tech Engineers, Inc. January 2022 - April 2022. (Luis Rouco Rodríguez)
  This project is aimed at providing consulting servicies to PTEI for the development of Development of steady-state and dynamic models of multi-terminal HVDC-VSV links .

- **Development of the universal access to electricity strategy in Bolivia, based on a geo-referenced electricity access plan**
  Inter-American Development Bank (IADB). January 2022 - January 2023. (Rafael Palacios Hielscher, Andrés González García, José Ignacio Pérez Arriaga, Santos José Díaz Pastor, Carlos Mateo Domingo, Fernando de Cuadra García, Varios General Contratado)
  In this project we are developing the "National Integrated Rural Electrification Plan for Bolivia in 2030" (PINERB 2030), through the optimization of least-cost power supply with grid extension, microgrids, and standalone systems, by using the Reference Electrification Model REM©MIT&IIT-Comillas.

  The technological design analyzes several electrification modes for each individual customer. The analysis includes (1) connection to the existing grid, (2) connection to an independent and isolated mini or microgrid, and (3) small individual standalone systems (DC solar kits and AC systems), considering in detail the techno-economic characteristics of each one of these modes. The decision about the most convenient (least-cost) electrification technology for each customer inside the study area (where there might be a mix of the three electrification modes) requires the analysis of the following topics:
  * For connection to existing network: Topology and design of the existing network, electrical characteristics and cost of network components (cables, transformers), cost and reliability of the energy, tariffs and operational costs, LV and MV regulations.
  * For independent systems: Assets for generation in AC or DC, microgrid regulations and electrical compatibility with existing grid, catalog of components, target reliability of the system, microgrid and stand alone systems' regulations, availability of energy resources (solar, hydraulic, wind, biomass...), cost and legal limitations in the use of diesel fuel for electricity generation.
  * Characteristics of the demand: Types of clients, and electrification modes (demand profile, minimum reliability requirements, quality of service).
  * Geographic characteristics: Topography, Elevation maps, and maps of forbidden areas or areas with a higher implementation or maintenance costs (ex. hills, jungle, or water features).

- **Computation of grid access capacity**
  Iberenova Promociones S.A.U. February 2022 - December 2022. (Luis Rouco Rodríguez, Enrique Lobato Miguélez)
  The aim of this project is to update a compute tool for computing the grid acces capacity according to the WSCR criteria incorporating the planning of the transmission grid 2021-2025.

- **Simulation of the disturbance of Tenerife system on 15 July 2020**
  EDISTRIBUCIÓN Redes Digitales, S.L. March 2022 - July 2022. (Luis Rouco Rodríguez, Lukas Sigrist)

  This work is aimed at simulating the disturbance of Tenerife system on 15 July 2020.

- **Report on the disturbance at Cofrentes NPP on 12 March 2022**
  Iberdrola Generación Nuclear, S.A.U. March 2022 - July 2022. (Luis Rouco Rodríguez)

  The aim of the work is to conduct a study and to deliver a report on the disturbance at Cofrentes NPP on 12 March 2022 as a result of the failure of the generator circuit breaker.

- **Application of the ENTSO-e cost-benefit analysis method to Los Guájares pumped-hydro storage**
  Villar Mir Energía. May 2022 - June 2022. (Andrés Ramos Galán, Luis Olmos Camacho)

  Report on the application of the ENTSO-e cost-benefit analysis method to Los Guájares pumped-hydro storage.

- **Metro Manila Metro Line 4 Transport Capacity Analysis**
  IDOM. May 2022 - March 2023. (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.

- **Application of the ENTSO-e cost-benefit analysis method to Aguayo II pumped-hydro storage**
  Repsol Generación Eléctrica, S.A.U. June 2022 - June 2022. (Andrés Ramos Galán, Luis Olmos Camacho, Lukas Sigrist)

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

- **Study of transient recovery voltage of Trillo NPP generator circuit breaker**
  Centrales Nucleares Almaraz Trillo AIE. June 2022 - December 2022. (Luis Rouco Rodríguez)

  The aim of the study is to determine the impact of generator shunt capacitors on the transient recovery voltage of Trill NPP genearator circuit breaker.

- **Development of a model for calculating the theoretical energy expenditure on cooling for Spanish households**
  ECODES - Fundación Ecológica y Desarrollo. July 2022 - November 2022. (Roberto Barrella, José Ignacio Linares Hurtado, Eva María Arenas Pinilla, José Carlos Romero Mora)

The general objective of the project is to develop a model to obtain the thermal expenditure necessary for cooling, i.e. to maintain good comfort in summer in a Spanish home, as a complement to the existing model, which calculates the thermal expenditure for heating and DHW, developed in previous years. In addition, an analysis will be made of the total energy expenditure, including cooling, in Spanish households according to the most representative parameters of these (climate zone, surface area of the dwelling heated in summer, age of the building, etc.).

3.2.2.2 Public funding

- **A method for the settlement of the complementary service of supplying electricity to trains in the ADIF and ADIF high-speed railway systems**
  Administrador de Infraestructuras Ferroviarias (ADIF). June 2020 - November 2022. (Tomás Gómez San Román, José Antonio Rodríguez Mondéjar, Asunción Paloma Cucala García, Antonio Fernández Cardador, Ramón Rodríguez Pecharromán, Álvaro Jesús López López, Adrián Fernández Rodríguez, Carlos Mateo Domingo, Rafael Cossent Arín, Yolanda González Arechavala, Pablo Urosa Sánchez, Manuel Blanco Castillo)

  The aim of the project is to set the regulatory conditions and operational procedures for the settlement of electricity supply to trains belonging to different mobility operators under a context of liberalization of train operators, implementation of on-board energy measurement equipment, and providing energy efficiency signals to the train operators. In addition, the project proposes a remuneration regime for ADIF that acknowledges the efficient incurred costs, providing financial sustainability and economic efficiency signals together with keeping quality of service standards for ADIF as an energy supplier and an infrastructure operator.

- **Improving energy system modelling tools and capacity**
  European Commission. October 2020 - June 2022. (Sara Lumbreras Sancho, Andrés Ramos Galán, Pedro Linares Llamas, Manuel Pérez Bravo, Antonio Francisco Rodríguez Matas, José Carlos Romero Mora, Rodrigo Camarillo Ramos, Dilayne Santos Oliveira)

  The project improve the description of the Spanish energy system in model TIMES-SINERGIA, from the technologies consiered or a higher time resolution to the detailed modeling of the power sector, such as the inclusion of transmission constraints.

- **Protecting children in crashes through the investigation of the material and structural properties of developing tissue (EIN2020-112448)**
  MCIN/AEI /10.13039/501100011033 y por la Unión Europea NextGenerationEU/ PRTR. November 2020 - October 2022. (Francisco José López Valdés)

  PROCHILD is a proposal submitted to the EUROPA INVESTIGACION 2020 of the PROGRAMA ESTATAL DE I+D+I ORIENTADA A LOS RETOS SOCIALES. The goal of the proposal is to obtain funding to establish a collaborative

network with several Spanish and international institutions to prepare a successful proposal to the European Research Council Consolidator Grants (ERC CoG) call for projects of the program HORIZON EUROPE.

The ERC CoG proposal will address the global problem of infant injuries due to motor vehicle (MV) crashes. Unintentional injuries, and particularly motor vehicle injuries, are the leading cause of death, serious injury and acquired disability for children and youth between 1 and 14 years of age. In addition, for every fatality, around 18 children are hospitalized and over 400 hundred receive medical treatment. The ultimate goal of the ERC CoG proposal is to eliminate fatal, severe and severely incapacitating injuries caused by road traffic to children and adolescents worldwide. To that end, the specific objective of the proposal is to investigate on the most appropriate constitutive models of developing human musculoskeletal tissue so that detailed finite element models of children are biofidelic and can predict tissue failure. Then, the project will also seek how to implement these models into testing standards and regulations that can be easily adopted by low- and middle- income countries. Indeed, the cost of testing equipment and large testing facilities is a barrier for these countries to implement effective programs to assess the safety of vehicles and vehicle components. But thinking only in the so-called passive safety of children would be to look at one piece of the picture, especially with the advent of more automated cars. This international projection of the results to be obtained within the ERC CoG project is why we consider a need to meet with international experts working on the field of automated vehicles to identify how these features can also help not only in well-established high-income countries, but also in others that are struggling to have a safe and sustainable transport system and cannot afford the toll on young human lives that suboptimal vehicles may impose in their populations. To this end, the current proposal will dedicate funds to establish meetings with those responsible of international testing and regulatory programs such as EuroNCAP and the United Nations.

As for the scientific contribution of the proposal, the approach of the ERC CoG project to the prevention of pediatric injury is novel because it presents a comprehensive research methodology to analyze changes of tissue mechanical properties with age by linking age to microstructural tissue changes and it is the first robust attempt of developing probabilistic tissue injury criteria based on strain predictions of human FE models. In addition, the proposal will advance existing knowledge on pediatric injuries by approaching them from a multidimensional perspective including not only risk to life but also aspects of disability and treatment costs.

Thus, PROCHILD also seeks to establish close collaborations with relevant national research groups such as the School of Medicine of the Universidad San Pablo CEU and the IQS at Universidad Ramon Llull, both well known for their expertise in biomechanical and post-mortem studies and in material testing and characterization.

Grant EIN2020-112448 funded by MCIN/AEI/ 10.13039/501100011033 and by the European Union NextGenerationEU/PRTR.

- **Assessment on Electricity Access for Host Communities and Forcibly Displaced People in the Sahel**
  World Bank, Trama TecnoAmbiental (TTA). December 2020 - February 2022. (Rafael Palacios Hielscher, Andrés González García, José Ignacio Pérez Arriaga, Santos José Díaz Pastor)

  The overall objective of this activity is to conduct an assessment of electricity access to better understand demand and supply and identify market barriers, key market players and support required to promote the growth of basic electricity services for conflict-affected zones (borders), host communities and Forcibly Displaced Populations (FDPs) in the Sahel (Burkina Faso, Mali, Mauritania, Niger, Tchad).

  This assessment also seeks to fill the data gap and identify options for fast delivery mechanisms and preparing investment operations on electricity access in host communities and FDPs in the Sahel while taking into account that displaced populations typically have a temporary variable given the duration of the displacement at a specific location is inconsistent. The activity will propose a roadmap and investment plan to provide and/or improve access to affordable, reliable, and sustainable energy to host communities, refugees and conflict-affected zones and borders in the five Sahel countries.

  This assignment will inform the design of electrification projects that provide access to electricity services to households, community and productive users in the targeted areas. The consultant will be provided with existing studies, including off grid assessments that the ECOWAS Center for Renewable Energy and Energy Efficiency (ECREEE), with support from the World Bank, conducted as part of the Regional Off Grid Electrification Project (ROGEP).

- **Assessment on electricity access for host communities and forcibly displaced people in the Lake Chad Basin**
  World Bank, Trama TecnoAmbiental (TTA). March 2021 - June 2022. (Rafael Palacios Hielscher, Andrés González García, José Ignacio Pérez Arriaga, Santos José Díaz Pastor)

  The overall objective of this activity is to conduct an assessment of electricity access to better understand demand and supply and identify market barriers, key market players, and support required to promote the growth of basic electricity services for conflict-affected zones (borders), host communities, and

Forcibly Displaced Populations (FDPs) in the Chad Lake Basin (Nigeria, Niger, Cameroon, and Chad).

This assessment also seeks to fill the data gap and identify options for fast delivery mechanisms and preparing investment operations on electricity access in host communities and FDPs in the Sahel while taking into account that displaced populations typically have a temporary variable given the duration of the displacement at a specific location is inconsistent. The activity will propose a roadmap and investment plan to provide and/or improve access to affordable, reliable, and sustainable energy to host communities, refugees and conflict-affected zones and borders in the four Lake Chad Basin countries.

This assignment will inform the design of electrification projects that provide access to electricity services to households, community and productive users in the targeted areas. The consultant will be provided with existing studies, including off grid assessments that the ECOWAS Center for Renewable Energy and Energy Efficiency (ECREEE), with support from the World Bank, conducted as part of the Regional Off Grid Electrification Project (ROGEP).

- **Least cost electrification study and mini-grid portfolio readiness assessment for Pakistan**

  World Bank. June 2021 - February 2023. (Rafael Palacios Hielscher, Andrés González García, José Ignacio Pérez Arriaga, Santos José Díaz Pastor)

  The Government of Pakistan adopted sustainable development goals (SDGs) in February 2016. As a part of SDGs, the government has targeted universal energy access by 2030. This project aims to analyze both grid extension and off-grid systems as a potential solution for providing energy access to unelectrified population, allowing to electrify 32 million households.
  The World Bank (WB) is supporting Pakistan's energy sector through "Pakistan Sustainable Energy Program" which includes this project to assist the Government in identifying solutions to achieve universal energy access in Pakistan.
  The organizations involved in this project will use the Reference Electrification Model (REM) and the Village Data Analytics (VIDA) for the LCES and mini-grid portfolio assessment respectively. The chosen model and analytical tool have been successfully used for similar activities worldwide.
  The Least-Cost Electrification Study (LCES) shall include:
  (i) Geospatial analysis (grid and off-grid) - The detailed geospatial analysis will consider, based on good practice and international experience, possible least-cost options for electrification, provide a sound strategic basis to implement systematically staged grid extensions and the deployment of off-grid technologies (mini-grids and standalone systems) powered by cost-effective renewable energy solutions where appropriate.
  (ii) Recommendations for implementation – Recommendations on policies, actions and investments needed to achieve the goal of universal electricity access by 2030, including proposed intermediate targets, corresponding investment financing frameworks, an action plan to address the enabling policy

and institutional framework, and capacity strengthening initiatives for key sector institutions and agencies involved.
The Mini-Grid Portfolio Assessment shall support mini-grid pipeline development to assist the World Bank in conducting its due diligence on a potential mini-grid investment operation and provide useful evidence and data to sector agencies and stakeholders.

- **Studies on the design options for the electricity market in Mexico**
  Agence Française de Développement (AFD). July 2021 - December 2021. (Pablo Rodilla Rodríguez, Carlos Batlle López, Paolo Mastropietro, Paulo Brito Pereira)

  The objective of this project is to carry out a diagnosis of the electricity market design in Mexico and propose improvements to enhance its efficiency. The proposed design should focus on minimizing the costs of integrating renewable energies.

- **EU-INDIA Smart Grid Platform Handbook**
  FSR Global. September 2021 - January 2022. (Tomás Gómez San Román, Rafael Cossent Arín, José Pablo Chaves Ávila, Orlando Mauricio Valarezo Rivera, Néstor Rodríguez Pérez, Matteo Troncia)

  The aim is to write a handbook on smart grid experiences in Europe that can be transferred to the Indian context. A special focus of the report is on cost-benefit and scalability and applicability methodologies.

- **Analysis of the island power system of Tenerife**
  Fundación General Universidad de La Laguna. October 2021 - December 2021. (Lukas Sigrist)

  The objective of this project is to study the steady state and transient operation of the island power system of Tenerife for two time horizons and two generation dispatch scenarios.

- **Synthesis of past IRENA grid assessment studies**
  International Renewable Energy Agency (IRENA). October 2021 - April 2022. (Lukas Sigrist, Rafael Cossent Arín, Ignacio Egido Cortés, Pablo Rodilla Rodríguez, Luis Rouco Rodríguez)

  This project summarises the lessons learnt and the usefulness and application of the grid assessment studies for the integration of variable renewable energy (VRE) sources carried out by IRENA for the Small Island Developing States (SIDS). The study aims at providing recommendations for the integration of VREs, as well as analysing innovative solutions to facilitate the integration of VREs into power systems.

- **Licensing and application of a reference network model by a colombian distribution system operator**
  Empresas públicas de Medellín E.S.P. October 2021 - December 2023. (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.

- **Regulatory and tariff proposals for public electric vehicle charging stations in Peru**
  World Bank. April 2022 - May 2022. (Tomás Gómez San Román, Manuel Pérez Bravo)
  The study analyzes the different charging options of electric vehicles (from semi-fast to ultra-fast charging), homes, offices, public charging stations, and fleet charging. Regulatory measures and tariff designs are proposed, considering Peru's current technical, economic, and regulatory situation for the deployment of charging infrastructure. Implementation options are also analyzed, with public and private participation, including economic evaluation models.

- **Consulting services for the tariff reform in Slovenia**
  AGENCIJA ZA ENERGIJO. May 2022 - December 2022. (Tomás Gómez San Román, José Pablo Chaves Ávila, Nicolás Mariano Morell Dameto)
  Consulting services for the study on the Slovenian tariff reform project (preparation of expert opinions, participation in explanatory meetings, participation in public consultation, etc.)

- **Assessment of the emissions reduction potential in the Spanish industrial sectors**
  Ministerio de Industria, Comercio y Turismo. July 2022 - September 2022. (Pedro Linares Llamas, Timo Gerres, Santiago Serna Zuluaga)
  This project assesses the availability in the short and medium term of the different industrial decarbonization technologies according to their readiness; determines the CO2 emissions reduction potential for each sector, related to the European benchmark; and estimates the cost of emissions reduction per ton of CO2, for each sector.

3.2.3 Services and analysis projects

3.2.3.1 Private funding

- **Technical support for the tools DECA, HADES and MODEM**
  Endesa Medios y Sistemas S.L. January 2021 - December 2021. (Eugenio Francisco Sánchez Úbeda, José Portela González)
  The objective of this project is to provide ENDESA with technical support and maintenance of the tools DECA, HADES and MODEM developed by IIT.

- **Energy storage in Spain: current status and future perspectives**
  Our New Energy. September 2021 - December 2021. (José Pablo Chaves Ávila)
  The objective of this collaboration is to produce a report explaining the current regulations and those expected to be developed in Spain in the next decade that may affect the economic viability of storage.

- **Technical support for the tools DECA, HADES and MODEM**
  Endesa Medios y Sistemas S.L. January 2022 - December 2022. (Eugenio Francisco Sánchez Úbeda, José Portela 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.

- **Support to the Costa Rican ministry of Energy and Environment to develop the National Strategy of Green Hydrogen**
  NTT DATA Europe & Latam Inc. January 2022 - December 2022. (José Pablo Chaves Ávila, Timo Gerres)
  Support to the MINAE of Costa Rica in the development of a National Green Hydrogen Strategy. IIT contributes in the definition of the methodology, analysis of international hydrogen experiences and markets, identification of existing gaps and finally in the elaboration of the Strategy and Action Plan.

- **Carbon Contracts for Differences (CCfDs) in a European context**
  The Greens/EFA Group in the European Parliament. April 2022 - May 2022. (Timo Gerres)
  Study about the design elements of Carbon Contracts for Differences (CCfDs) to support the industrial transition in an European and national context.

3.2.3.2 Public funding

- **EDucation for DIgitalisation of Energy. Sector Skills Alliances for implementing a new strategic approach ("Blueprint") to sectoral cooperation on skills**
  Education, Audiovisual and Culture Executive Agency. January 2020 - December 2023. (Fernando de Cuadra García, Carlos Mateo Domingo, Miguel Ángel Sánchez Fornié, Álvaro Jesús López López, Juan Carlos del Real Romero, Pablo García González, María Belén Sánchez Alfayate)
  The EDDIE project aims at creating a Sector Skills Alliance (SSA) by bringing together all the relevant stakeholders in the energy value chain such as industry, education and training providers, European organisations, recruiters, social partners and public authorities. The main objective of this SSA is to develop a long-driven Blueprint for the digitalisation of the European energy sector to enable the matching between the current and future demand of skills necessary for the digitalisation of the energy sector and the supply of improved Vocational Education and Training (VET) systems and beyond.

- **Community of Madrid - Indicators on social vulnerability**
  Comunidad de Madrid. May 2021 - September 2021. (Elisa María Aracil Fernández, David Roch Dupré)

  The project identifies the most appropriate data and indicators, their sources and availability and their hierarchical levels of aggregation that serve as the basis for the distribution to local entities of extraordinary social financing for COVID and other extraordinary funds whose destination is to face economic needs and social aspects of the population.

- **Implementation and monitoring of the recovery and resilience plan for the green transition**
  DG REFORM. December 2021 - February 2023. (Pablo Rodilla Rodríguez, Pedro Linares Llamas, Carlos Batlle López, Rafael Cossent Arín, Paolo Mastropietro, Diana María Navarrete Cruz)

  In the context of the RRP implementation, Spain requested support in particular for the regulatory framework for energy storage and renewable energy. While Spain's plans are ambitious with regard to renewable energy, aiming for climate neutrality by 2050, their current regulation fails to provide the necessary framework to support large-scale RES, storage and hydrogen deployment. Overall, there is a need to provide clear (price) signals to the market players, and in particular to renewables, energy storage and renewable hydrogen.

3.3 Publications

3.3.1 Chapters in books

- T. Gómez, R. Cossent, *"Las redes eléctricas, facilitadoras de la transición energética".* Chapter in the book "Descarbonización de la demanda: desarrollo de las redes eléctricas". Publisher: Wolters Kluwer. Pp. 26. August 2022.

- S. Lumbreras, *"¿Es posible confiar en la inteligencia artificial?".* Chapter in the book "Huella digital: ¿servidumbre o servicio?". Editors: Amor Pan, José Ramón; Villegas Galaviz, Carolina. Publisher: Tirant lo Blanch. Pp. 113-130. ISBN: 978-8419071262. March 2022.

- S. Lumbreras, *"El ideal de un hombre que esquiva al tiempo: tecnología y vejez".* Chapter in the book "Bioética para una sociedad envejecida". Editors: Amo Usanos, Rafael. Publisher: Universidad Pontificia Comillas. Pp. 179-193. ISBN: 978-84-8468-917-1. April 2022.

- S. Lumbreras, *"Towards a new understanding of embodiment: alternative models to the western mind-body relationship".* Chapter in the book "Issues in Science and Theology: Creative Pluralism?". Editors: Fuller, Michael; et al., . Publisher: Springer. Pp. 209-218. ISBN: Print ISBN 978-3-031-06276-6. June 2022.

- I.J. Pérez-Arriaga, D. Nagpal, G. Jacquot, R.J. Stoner, *"Harnessing the power of integration to achieve universal electricity access: the case for the integrated distribution framework".* Chapter in the book "Handbook on electricity markets". Editors: Glachant, Jean-Michel; et al., . Publisher: Edward Elgar Publishing. Pp. 540-567. ISBN: 978-1-78897-994-8. November 2021.

3.3.2 Publications in journals

- J. Abenojar, S. López de Armentia, M.A. Martínez, J.C. del Real-Romero, *"Development of a green epoxy adhesive for cork by adding lignin: thermal and bonding properties",* Wood Science and Technology, vol. 56, nº. 3, pp. 721-742. ISSN: 0043-7719. March 2022/May 2022.

- D. Alfaya, *"Automorphism group of the moduli space of parabolic vector bundles with fixed degree",* Bulletin des Sciences Mathématiques, vol. 175, pp. 103112-1-103112-26. ISSN: 0007-4497. January 2022/March 2022.

- D. Alfaya, *"Simplification of lambda-ring expressions in the Grothendieck ring of Chow motives",* Applicable Algebra in Engineering, Communication and Computing, vol. 33, nº. 6, pp. 599-628. ISSN: 0938-1279. June 2022/December 2022.

- D. Alfaya, T.L. Gómez, *"Automorphism group of the moduli space of parabolic bundles over a curve",* Advances in Mathematics, vol. 393, pp. 108070-1-108070-127. ISSN: 0001-8708. November 2021/December 2021.

- E. Alonso, G. Scandurra, C. Ciofi, C. Rodríguez-Morcillo, R. Giannetti, *"A novel approach for the design of fast-settling amplifiers for biosignal detection",* Electronics, vol. 10, nº. 21, pp. 2631-1-2631-14. ISSN: 2079-9292. October 2021.

- D. Álvarez-Coedo, P. Ayala, A. Cantizano, W. Wegrzynski, *"A coupled hybrid numerical study of tunnel longitudinal ventilation under fire conditions",* Case Studies in Thermal Engineering, vol. 36, pp. 102202-1-102202-10. ISSN: 2214-157X. June 2022.

- I. Álvarez-Monteserín, M.A. Sanz-Bobi, *"An online fade capacity estimation of lithium-ion battery using a new health indicator based only on a short period of the charging voltage profile",* IEEE Access, vol. 10, pp. 1138-11146. ISSN: 2169-3536. January 2022/January 2022.

- E. F. Álvarez, L. Olmos, A. Ramos, K. Antoniadou-Plytaria, D. Steen, L.A. Tuan, *"Values and impacts of incorporating local flexibility services in transmission expansion planning",* Electric Power Systems Research, vol. 212, pp. 108480-1-108480-9. ISSN: 0378-7796. July 2022/November 2022.

- R. Ávila-Martínez, J. Renedo, L. Rouco, A. García-Cerrada, L. Sigrist, T. Qoria, X. Guillaud, *"Fast voltage boosters to improve transient stability of power systems with 100% of grid-forming VSC-based generation",* IEEE Transactions on Energy Conversion, vol. 37, nº. 4, pp. 2777-2789. ISSN: 0885-8969. August 2022/December 2022.

- R. Barrella, J.C. Romero, J.I. Linares, E.M. Arenas, M. Asín, E. Centeno, *"The dark side of energy poverty: who is underconsuming in Spain and why?",* Energy Research & Social Science, vol. 86, pp. 102428-1-102428-24. ISSN: 2214-6296. December 2021/April 2022.

- M. Blanco-Castillo, A. Fernández Rodríguez, A. Fernández-Cardador, A.P. Cucala, *"Eco-driving in railway lines considering the uncertainty associated with climatological conditions",* Sustainability, vol. 14, nº. 14, pp. 8645-1-8645-26. ISSN: 2071-1050. July 2022.

- D. Blanco Gómez, E. M. Rubio, R.M. Lorente-Pedreille, M.A. Sáenz-Nuño, *"Sustainable processes in aluminium, magnesium, and titanium alloys applied to the transport sector: a review",* Metals, vol. 12, nº. 1, pp. 9-1-9-21. ISSN: 2075-4701. December 2021.

- D. Blanco Gómez, E. M. Rubio, R.M. Lorente-Pedreille, M.A. Sáenz-Nuño, *"Lightweight structural materials in open access: latest trends",* Materials, vol. 14, nº. 21, pp. 6577-1-6577-28. ISSN: 1996-1944. November 2021.

- D. Blanco Gómez, E. M. Rubio, M.A. Sáenz-Nuño, R.M. Lorente-Pedreille, *"Comparison of sustainable cooling systems used in the drilling repair of Mg-Al and Mg-Ti multi-material parts in the aeronautical industry",* Tribology International, vol. 175, pp. 107804-1-107804-32. ISSN: 0301-679X. July 2022/November 2022.

- P. Brito-Pereira, P. Mastropietro, P. Rodilla, L.A. Barroso, C. Batlle, *"Adjusting the aim of capacity mechanisms: future-proof reliability metrics and firm supply calculations",* Energy Policy, vol. 164, pp. 112891-1-112891-13. ISSN: 0301-4215. March 2022/May 2022.

- P. Brito-Pereira, P. Rodilla, P. Mastropietro, C. Batlle, *"Self-fulfilling or self-destroying prophecy? The relevance of de-rating factors in modern capacity mechanisms",* Applied Energy, vol. 314, pp. 118939-1-118939-13. ISSN: 0306-2619. March 2022/May 2022.

- A. Cantizano, R. Caro, M. Fernández, P. Ayala, *"Human factors in the model of urban fire spread in Madrid (Spain) focused on the poor population",* Sustainability, vol. 14, nº. 8, pp. 4486-1-4486-13. ISSN: 2071-1050. April 2022.

- S. Caron, L. Herding, Y. Binyamin, M. Baidossi, Y. Vinetsky, A. Morales, C. Hildebrandt, R. Reoyo-Prats, O. Faugeroux, A. Agüero, S. Rodríguez, F. Sutter, M. Röger, F. Manzano-Agugliaro, *"Laboratory intercomparison of solar absorptance and thermal emittance measurements at room temperature",* Solar Energy Materials and Solar Cells, vol. 238, pp. 111579-1-111579-15. ISSN: 0927-0248. January 2022/May 2022.

- M. Castro, R. J. de Boer, *"The limitations, dangers, and benefits of simple methods for testing identifiability",* Plos Computational Biology, vol. 17, nº. 10, pp. e1009425-1-e1009425-2. ISSN: 1553-7358. October 2021.

- I. Cazcarro, D. García-Gusano, D. Iribarren, P. Linares, J.C. Romero, P. Arocena, I. Arto, S. Banacloche, Y. Lechón, L.J. Miguel, J. Zafrilla, L.A. López, R. Langarita, M.A. Cadarso, *"Energy-socio-economic-environmental modelling for the EU energy and post-COVID-19 transitions",* Science of The Total Environment, vol. 805, pp. 150329-1-150329-8. ISSN: 0048-9697. September 2021/January 2022.

- H.R. Chamorro, A.J. Guel-Cortez, E. Kim, F. Gonzalez-Longatt, A. Ortega, W. Martínez, *"Information length quantification and forecasting of power systems kinetic energy",* IEEE Transactions on Power Systems, vol. 37, nº. 6, pp. 4473-4484. ISSN: 0885-8950. January 2022/November 2022.

- P. Ciller, S. Lumbreras, A. González-García, *"Network cost estimation for mini-grids in large-scale rural electrification planning",* Energies, vol. 14, nº. 21, pp. 7382-1-7382-21. ISSN: 1996-1073. November 2021.

- O.D. Cortázar, A. Megia-Macías, S. Moreno Fernández, A. Brun Torres, E. Gómez-Casado, *"Vulnerability of SARS-CoV-2 and PR8 H1N1 virus to cold atmospheric plasma activated media",* Scientific Reports, vol. 12, pp. 263-1-263-12. ISSN: 2045-2322. January 2022.

- T. Corzo Santamaría, K. Martín-Bujack, J. Portela, R. Sáenz-Díez, *"Early market efficiency testing among hydrogen players",* International Review of Economics & Finance, vol. 82, pp. 723-742. ISSN: 1059-0560. August 2022/November 2022.

- K. Doenges, L. Sigrist, I. Egido, E. Lobato, L. Rouco, *"Wind farms in AGC: modelling, simulation and validation",* IET Renewable Power Generation, vol. 16, nº. 1, pp. 139-147. ISSN: 1752-1416. September 2021/January 2022.

- J.C. Fernández-Pérez, F.M. Echavarren, L. Rouco, *"Linear power flow algorithm with losses for multi-terminal VSC AC/DC power systems",* IEEE Transactions on Power Systems, vol. 37, nº. 3, pp. 1739-1749. ISSN: 0885-8950. September 2021/May 2022.

- T. Freire-Barceló, F. Martín, A. Sánchez, *"A literature review of explicit demand flexibility providing energy services",* Electric Power Systems Research, vol. 209, pp. 107953-1-107953-17. ISSN: 0378-7796. April 2022/August 2022.

- T. Freire-Barceló, F. Martín, A. Sánchez, M. Rivier, T. Gómez, S. Huclin, J.P. Chaves, A. Ramos, *"Storage and demand response contribution to firm capacity: analysis of the Spanish electricity system",* Energy Reports, vol. 8, pp. 10546-10560. ISSN: 2352-4847. August 2022/November 2022.

- A. Gallén, M. Castro, A. Hernández-Machado, *"Red blood cells in low Reynolds number flow: a vorticity-based characterization of shapes in two dimensions",* Soft Matter, vol. 17, nº. 42, pp. 9587-9594. ISSN: 1744-683X. September 2021/November 2021.

- M. García-Sánchez, I. Jiménez-Serra, F. Puente-Sánchez, J. Aguirre, *"The emergence of interstellar molecular complexity explained by interacting networks",* Proceedings of the National Academy of Sciences of the United States of America, vol. 119, nº. 30, pp. e2119734119-1-e2119734119-10. ISSN: 0027-8424. July 2022/July 2022.

- R. Gaugl, T. Klatzer, U. Bachhiesl, S. Wogrin, S. Jodl, *"GIS-based optimization – achieving Austria's 2030 wind energy target",* Elektrotechnik und Informationstechnik, vol. 138, nº. 8, pp. 590-596. ISSN: 0932-383X. September 2021/December 2021.

- F. Gomollón, J. P. Gisbert, I. Guerra, R. Plaza, R. Pajares Villarroya, L. Moreno Almazán, M.C. López Martín, M. Domínguez Antonaya, M.I. Vera Mendoza, J. Aparicio, V. Martínez, I. Tagarro, A. Fernández-Nistal, S. Lumbreras, C. Maté, *"Clinical characteristics and prognostic factors for Crohn's disease relapses using natural language processing and machine learning – a pilot study",* European Journal of Gastroenterology & Hepatology, vol. 34, nº. 4, pp. 389-397. ISSN: 0954-691X. December 2021/April 2022.

- A. González-García, P. Ciller, S.J. Lee, R. Palacios, F. de Cuadra, I.J. Pérez-Arriaga, *"A rising role for decentralized solar minigrids in integrated rural electrification planning? Large-scale, least-cost customer-wise design of grid and off-grid supply systems in Uganda",* Energies, vol. 15, nº. 13, pp. 4517-1-4517-31. ISSN: 1996-1073. June 2022.

- T. González Grandón, F. de Cuadra, I.J. Pérez-Arriaga, *"A market-driven management model for renewable-powered undergrid mini-grids",* Energies, vol. 14, nº. 23, pp. 7881-1-7881-29. ISSN: 1996-1073. November 2021.

- I.C. González-Romero, S. Wogrin, T. Gómez, *"Transmission and storage expansion planning under imperfect market competition: social planner versus merchant investor",* Energy Economics, vol. 103, pp. 105591-1-105591-15. ISSN: 0140-9883. September 2021/November 2021.

- L. Gruber, U. Bachhiesl, S. Wogrin, *"The current state of research on energy communities",* Elektrotechnik und Informationstechnik, vol. 138, nº. 8, pp. 515-524. ISSN: 0932-383X. October 2021/December 2021.

- L. Herding, R. Cossent, M. Rivier, J.P. Chaves, T. Gómez, *"Assessment of electricity network investment for the integration of high RES shares : a Spanish-like case study",* Sustainable Energy, Grids and Networks, vol. 28, pp. 100561-1-100561-14. ISSN: 2352-4677. November 2021/December 2021.

- H. Holttinen, A. Groom, E. Kennedy, D. Woodfin, L.A. Barroso, A.G. Orths, K. Ogimoto, C. Wang, R. Moreno, K. Parks, T. Ackermann, *"Variable renewable energy integration: status around the world",* IEEE Power and Energy Magazine, vol. 19, nº. 6, pp. 86-96. ISSN: 1540-7977. October 2021/November 2021.

- F. Holz, T. Scherwath, P. Crespo del Granado, C. Skar, L. Olmos, Q. Ploussard, A. Ramos, A. Herbst, *"A 2050 perspective on the role for carbon capture and storage in the European power system and industry sector",* Energy Economics, vol. 104, pp. 105631-1-105631-18. ISSN: 0140-9883. October 2021/December 2021.

- S. Huclin, J.P. Chaves, A. Ramos, M. Rivier, T. Freire-Barceló, F. Martín, T. Gómez, A. Sánchez, *"Exploring the roles of storage technologies in the Spanish electricity system with high share of renewable energy",* Energy Reports, vol. 8, pp. 4041-4057. ISSN: 2352-4847. March 2022/November 2022.

- K. Hueso-Kortekaas, J.C. Romero, R. González-Felipe, *"Evaluación del impacto energético-ambiental del tomate cultivado de tomate en invernadero: Un estudio de caso en Almería (España)",* Anales, vol. on-line, pp. 1-23. ISSN: 0003-2506. September 2021.

- K. Hueso-Kortekaas, J.C. Romero, R. González-Felipe, *"Energy-environmental impact assessment of greenhouse Grown tomato: a case study in Almeria (Spain)",* World, vol. 2, nº. 3, pp. 425-441. ISSN: 2673-4060. September 2021/September 2021.

- D. Huppmann, M.J. Gidden, Z. Nicholls, J. Hörsch, R. Lamboll, P.N. Kishimoto, T. Burandt, O. Fricko, E. Byers, J. Kikstra, M. Brinkerink, M. Budzinski, F. Maczek, S. Zwickl-Bernhard, L. Welder, *"pyam: Analysis and visualisation of integrated assessment and macro-energy scenarios",* Open Research Europe, vol. 1, pp. 74-1-74-30. ISSN: 2732-5121. September 2021.

- S. Izadkhast, R. Cossent, P. Frías, P. García-González, A. Rodriguez, *"Performance evaluation of a BESS unit for black start and seamless islanding operation",* Energies, vol. 15, nº. 5, pp. 1736-1-1736-21. ISSN: 1996-1073. February 2022.

- Jose L. Izquierdo, Joan B. Soriano, Y. González, S. Lumbreras, J. Ancochea, C. Echeverry, J.M. RG-Moro, *"Use of N-Acetylcysteine at high doses as oral treatment for patients hospitalized with COVID-19",* Science Progress, vol. 105, nº. 1, pp. 1-11. ISSN: 0036-8504. January 2022/January 2022.

- O. Juste-Lorente, M. Maza, M. Piccand, F.J. López-Valdés, *"The influence of headform/helmet friction on head impact biomechanics in oblique impacts at different tangential velocities",* Applied Sciences, vol. 11, nº. 23, pp. 11318-1-11318-21. ISSN: 2076-3417. November 2021/December 2021.

- O. Juste-Lorente, M. Maza, A. Piqueras, A.I. Lorente, F.J. López-Valdés, *"Effects of including a penetration test in motorcyclist helmet standards: influence on helmet stiffness and impact performance",* Applied Sciences, vol. 12, nº. 5, pp. 2455-1-2455-12. ISSN: 2076-3417. February 2022.

- Z. Khan, A. Conchado, P. Linares, et al., *"Emerging themes and future directions of multi-sector nexus research and implementation",* Frontiers in Environmental Science, vol. 10, pp. 918085-1-918085-11. ISSN: 2296-665X. August 2022.

- A.R. Andrew Lauer, M.A. Durán-Olivencia, A. Fernández-Martínez, A.E.S. Van Driessche, *"Multistep nucleation compatible with a single energy barrier: catching the non-classical culprit",* Faraday Discussions, vol. 235, pp. 95-108. ISSN: 1359-6640. January 2022/July 2022.

- E. Lee, J. Seo, J. Muñoz-Garcia, M. Castro, R. Cuerno, J.-S. Kim, *"Nanopatterning of rotating highly oriented pyrolytic graphite (0001) surfaces by ion beam irradiation: experiments and modeling",* Physical Review B, vol. 105, nº. 8, pp. 085413-1-085413-17. ISSN: 2469-9950. February 2022/February 2022.

- E. Lobato, L. Sigrist, A. Ortega, A. González, J.M. Fernández de Bobadilla Navarrete, *"Battery energy storage integration in wind farms: economic viability in the Spanish market",* Sustainable Energy, Grids and Networks, vol. 32, pp. 100854-1-100854-9. ISSN: 2352-4677. July 2022/December 2022.

- S. López de Armentia, S. Fernández-Villamarín, Y. Ballesteros, J.C. del Real-Romero, N. Dunne, E. Paz, *"3D printing of a graphene-modified photopolymer using stereolithography for biomedical applications: a study of the polymerization reaction",* International Journal of Bioprinting, vol. 8, nº. 1, pp. 503-182-503-197. ISSN: 2424-7723. January 2022/March 2022.

- F.J. López-Valdés, S. Duprey, J.L. Forman, M.Y. Svensson, *"Editorial: Understanding age and sex-related differences in the biomechanics of road traffic associated injuries through population diversity analyses",* Frontiers in Bioengineering and Biotechnology, vol. 10, pp. 869356-1-869356-3. ISSN: 2296-4185. May 2022.

- S. Lumbreras, *"The synergies between understanding belief formation and artificial intelligence",* Frontiers in Psychology, vol. 13, pp. 868903-1-868903-4. ISSN: 1664-1078. April 2022.

- S. Lumbreras, *"Lessons from the quest for artificial consciousness: the emergence criterion, insight-oriented AI, and Imago Dei",* Zygon, vol. 57, nº. 4, pp. 963-983. ISSN: 0591-2385. August 2022/December 2022.

- S. Lumbreras, *"Dualism in our technoscience: the influence of technological advances and transhumanism in the current anthropological views in society, and the scientific evidence behind them",* Philosophy, Theology and the Sciences, vol. 8, nº. 2, pp. 169-183. ISSN: 2195-9773. May 2022/May 2022.

- S. Lumbreras, J.D. Gómez, E. F. Álvarez, S. Huclin, *"The human factor in transmission network expansion planning: the grid that a sustainable energy system needs",* Sustainability, vol. 14, nº. 11, pp. 6746-1-6746-22. ISSN: 2071-1050. May 2022.

- S. Lumbreras, Ll. Oviedo, H.F. Angel, *"The missing piece in sustainability indices: accounting for the human factor",* Sustainability, vol. 13, nº. 21, pp. 11796-1-11796-11. ISSN: 2071-1050. October 2021/November 2021.

- J. Maldonado, M.A. Sáenz-Nuño, P. Weidinger, *"Protección y eficiencia de aerogeneradores de energía dotados con compensadores de carga eléctrica",* Energética XXI: revista de generación de energía, nº. 214, pp. 56-58. ISSN: 1577-7855. March 2022.

- M.J. Manjón, A. Merino, I. Cairns, *"Business as not usual: a systematic literature review of social entrepreneurship, social innovation, and energy poverty to accelerate the just energy transition",* Energy Research & Social Science, vol. 90, pp. 102624-1-102624-14. ISSN: 2214-6296. April 2022/August 2022.

- P. Mastropietro, *"El impacto de la COVID-19 en los objetivos y las políticas de descarbonización: un análisis preliminar sobre España*",* Papeles de Energía, nº. 15, pp. 25-64. ISSN: 2530-0148. December 2021/December 2021.

- P. Mastropietro, *"Energy poverty in pandemic times: fine-tuning emergency measures for better future responses to extreme events in Spain",* Energy Research & Social Science, vol. 84, pp. 102364-1-102364-8. ISSN: 2214-6296. November 2021/February 2022.

- A. Megia-Macías, E. Barrios-Díaz, O.D. Cortázar, *"Time resolved plasma diagnostics for pulsed 2.45 GHz hydrogen discharges",* Review of Scientific Instruments, vol. 92, nº. 11, pp. 113301-1-113301-19. ISSN: 0034-6748. November 2021/November 2021.

- R. Mendaza-DeCal, Y. Ballesteros, S. Peso-Fernández, E. Paz, J.C. del Real-Romero, J. Rodríguez-Quirós, *"Biomechanical test of a new endoprosthesis for cylindrical medullary canals in dogs",* Frontiers in Veterinary Science, vol. 9, pp. 887676-1-887676-13. ISSN: 2297-1769. June 2022.

- G. Mestre, E.F. Sánchez-Úbeda, A. Muñoz, E. Alonso, *"The arithmetic of stepwise offer curves",* Energy, vol. 239, nº. Part E, pp. 122444-1-122444-11. ISSN: 0360-5442. October 2021/January 2022.

- F. Milano, M. Liu, M.A.A. Murad, G.M. Jónsdóttir, G. Tzounas, M. Adeen, A. Ortega, I. Dassios, *"Power system modelling as stochastic functional hybrid differential-algebraic equations",* IET Smart Grid, vol. 5, nº. 5, pp. 309-331. ISSN: 2515-2947. May 2022.

- M. Nour, J.P. Chaves, A. Sánchez, *"Review of blockchain potential applications in the electricity sector and challenges for large scale adoption",* IEEE Access, vol. 10, pp. 47384-47418. ISSN: 2169-3536. April 2022.

- M. Nour, G. Magdy, J.P. Chaves, A. Sánchez, E. Petlenkov, *"Automatic generation control of a future multi-source power system considering high renewables penetration and electric vehicles: Egyptian power system in 2035",* IEEE Access, vol. 10, pp. 51662-51681. ISSN: 2169-3536. May 2022.

- L. Montero, A. Bello, J. Reneses, *"A review on the unit commitment problem: approaches, techniques, and resolution methods",* Energies, vol. 15, nº. 4, pp. 1296-1-1296-40. ISSN: 1996-1073. February 2022.

- E. Mora, J. Cifuentes, G. Marulanda, *"Short-term forecasting of wind energy: a comparison of deep learning frameworks",* Energies, vol. 14, nº. 23, pp. 7943-1-7493-26. ISSN: 1996-1073. November 2021.

- M.F. Morales Contreras, M. Leporati, L. Fratocchi, *"The impact of COVID-19 on supply decision-makers: the case of personal protective equipment in Spanish hospitals",* BMC Health Services Research, vol. 21, pp. 1170-1-1170-15. ISSN: 1472-6963. October 2021.

- D.P. Morán-Río, J. Roldán-Pérez, M. Prodanovic, A. García-Cerrada, *"Influence of the phase-locked loop on the design of microgrids formed by diesel generators and grid-forming converters",* IEEE Transactions on Power Electronics, vol. 37, nº. 5, pp. 5122-5137. ISSN: 0885-8993. November 2021/May 2022.

- F. Nazaré, L.A. Barroso, B. Bezerra, *"A probabilistic and value-based planning approach to assess the competitiveness between gas-fired and renewables in hydro-dominated systems: a Brazilian case study",* Energies, vol. 14, nº. 21, pp. 7281-1-7281-21. ISSN: 1996-1073. November 2021.

- O. Oladimeji, A. Ortega, L. Sigrist, L. Rouco, P. Sánchez, E. Lobato, *"Optimal participation of heterogeneous, RES-based virtual power plants in energy markets",* Energies, vol. 15, nº. 9, pp. 3207-1-3207-18. ISSN: 1996-1073. April 2022.

- A. Orgaz, A. Bello, J. Reneses, *"Modeling storage systems in electricity markets with high shares of renewable generation: a daily clustering approach",* International Journal of Electrical Power & Energy Systems, vol. 137, pp. 107706-1-107706-11. ISSN: 0142-0615. November 2021/May 2022.

- A. Orgaz, A. Bello, J. Reneses, *"Temporal aggregation for large-scale multi-area power system models",* IET Generation Transmission & Distribution, vol. 16, nº. 6, pp. 1108-1121. ISSN: 1751-8687. December 2021/March 2022.

- H. Ospina-Mateus, L. Quintana Jiménez, F.J. López-Valdés, *"The rider behavior questionnaire to explore associations of motorcycle taxi crashes in Cartagena (Colombia)",* Traffic Injury Prevention, vol. 22, nº. Supl 1, pp. S99-S103. ISSN: 1538-9588. September 2021/October 2021.

- R. Palacios, A. Fariña Fernández-Portillo, E.F. Sánchez-Úbeda, P. García-de-Zúñiga, *"HTB: a very effective method to protect web servers against BREACH attack to HTTPS",* IEEE Access, vol. 10, pp. 40381-40390. ISSN: 2169-3536. April 2022.

- H. Parris, A.H. Sorman, C. Valor, A. Tuerk, A. Anger-Kraavi, *"Cultures of transformation: an integrated framework for transformative action",* Environmental Science & Policy, vol. 132, pp. 24-34. ISSN: 1462-9011. February 2022/June 2022.

- A. Pérez-Sánchez, R. Palacios, *"Evaluation of local security event management system vs. standard antivirus software",* Applied Sciences, vol. 12, nº. 3, pp. 1076-1-1076-18. ISSN: 2076-3417. January 2022.

- J. Pérez, P. Arroba, J.M. Moya, *"Data augmentation through multivariate scenario forecasting in data centers using generative adversarial networks",* Applied Intelligence, vol. on-line, ISSN: 0924-669X. April 2022.

- A. Piqueras, B. Pipkorn, J. Iraeus, M. Maza, F.J. López-Valdés, *"Assessment of in situ chest deflection of post mortem human subjects (PMHS) and personalized human body models (HBM) in nearside oblique impacts",* Traffic Injury Prevention, vol. 23, nº. 4, pp. 181-186. ISSN: 1538-9588. February 2022/March 2022.

- J. Pizarroso, J. Portela, A. Muñoz, *"NeuralSens: sensitivity analysis of neural networks",* Journal of Statistical Software, vol. 102, nº. 7, pp. 1-36. ISSN: 1548-7660. April 2022.

- F. Postigo Marcos, C. Mateo, T. Gómez, *"Improving distribution network resilience through automation, Distributed Energy Resources, and undergrounding",* International Journal of Electrical Power & Energy Systems, vol. 141, pp. 108116-1-108116-13. ISSN: 0142-0615. March 2022/October 2022.

- C. Pretel, P. Linares, *"How much should we spend to fight against climate change? The value of backstop technologies in a simplified model",* Energies, vol. 14, nº. 22, pp. 7781-1-7781-11. ISSN: 1996-1073. November 2021.

- C. Puente, M.E. Fabra, C. Mason, C. Puente-Rueda, M.A. Sáenz-Nuño, R. Viñuales, *"Role of the universities as drivers of social innovation",* Sustainability, vol. 13, nº. 24, pp. 13727-1-13727-14. ISSN: 2071-1050. December 2021.

- G.L. Rajora, M.A. Sanz-Bobi, C. Mateo, *"Application of machine learning methods for asset management on power distribution networks",* Emerging Science Journal, vol. 6, nº. 4, pp. 905-920. ISSN: 2610-9182. May 2022.

- A. Ramos, E. F. Álvarez, S. Lumbreras, *"OpenTEPES: Open-source transmission and generation expansion planning",* SoftwareX, vol. 18, pp. 101070-1-101070-14. ISSN: 2352-7110. May 2022/June 2022.

- E. Bovolenta, E. M. García-Cuesta, L. Horndler, J. Ponomarenko, W.W. Schamel, M. Mellado, M. Castro, D. Abia, H.M. Van Santen, *"A set point in the selection of the alphabetaTCR T cell repertoire imposed by pre-TCR signaling strength",* Proceedings of the National Academy of Sciences of the United States of America, vol. 119, nº. 22, pp. e2201907119-1-e2201907119-9. ISSN: 0027-8424. May 2022/May 2022.

- E. Rodríguez-Fernández, S.N. Santalla, M. Castro, R. Cuerno, *"Anomalous ballistic scaling in the tensionless or inviscid Kardar-Parisi-Zhang equation",* Physical Review E, vol. 106, nº. 2, pp. 024802-1-024802-9. ISSN: 1539-3755. August 2022/August 2022.

- J.C. Romero, P. Linares, *"Multiple criteria decision-making as an operational conceptualization of energy sustainability",* Sustainability, vol. 13, nº. 21, pp. 11629-1-11629-14. ISSN: 2071-1050. October 2021/November 2021.

- Y. Ruwaida, J.P. Chaves, N. Etherden, I. Gómez-Arriola, G. Gürses-Tran, K. Kessels, C. Madina, A. Sanjab, M. Santos-Mugica, D.N. Trakas, M. Troncia, *"TSO-DSO-Customer coordination for purchasing flexibility system services: challenges and lessons learned from a demonstration in Sweden",* IEEE Transactions on Power Systems, vol. on-line, ISSN: 0885-8950. July 2022.

- E.F. Sánchez-Úbeda, J. Portela, A. Muñoz, E. Chueca, M. Carvalho, *"Impact of COVID-19 on electricity demand of Latin America and the Caribbean countries",* Sustainable Energy, Grids and Networks, vol. 30, pp. 100610-1-100610-21. ISSN: 2352-4677. January 2022/June 2022.

- P. Santurino, L. Sigrist, A. Ortega, J. Renedo, E. Lobato, *"Optimal coordinated design of under-frequency load shedding and energy storage systems",* Electric Power Systems Research, vol. 211, pp. 108423-1-108423-8. ISSN: 0378-7796. July 2022/October 2022.

- M. Sanz, J.I. Moreno, G. López, J. Matanza, J.J. Berrocal, *"Web-based toolkit for performance simulation and analysis of power line communication networks",* Energies, vol. 14, nº. 20, pp. 6475-1-6475-25. ISSN: 1996-1073. October 2021/October 2021.

- R. Serrano, M. R. Carvalho, J.C. Araneda, O. Alamos, L.A. Barroso, D. Bayma, R.S. Ferreira, R. Moreno, *"Fighting against wildfires in power systems: lessons and resilient practices from the Chilean and Brazilian experiences",* IEEE Power and Energy Magazine, vol. 20, nº. 1, pp. 38-51. ISSN: 1540-7977. January 2022/January 2022.

- S. Solera-Cotanilla, M. Vega-Barbas, J. Pérez, G. López, J. Matanza, M. Álvarez-Campana, *"Security and privacy analysis of youth-oriented connected devices",* Sensors, vol. 22, nº. 11, pp. 3967-1-3967-25. ISSN: 1424-8220. May 2022.

- F. Úbeda, F.J. Forcadell, E. Aracil, A. Méndez, *"How sustainable banking fosters the SDG 10 in weak institutional environments",* Journal of Business Research, vol. 146, pp. 277-287. ISSN: 0148-2963. April 2022/July 2022.

- C. Valor, P. Antonetti, B. Crisafulli, *"Emotions and consumers' adoption of innovations: an integrative review and research agenda",* Technological Forecasting and Social Change, vol. 179, pp. 121609-1-121609-16. ISSN: 0040-1625. March 2022/June 2022.

- C. Valor, P. Antonetti, G. Zasuwa, *"Corporate social irresponsibility and consumer punishment: a systematic review and research agenda",* Journal of Business Research, vol. 144, pp. 1218-1233. ISSN: 0148-2963. February 2022/May 2022.

- C. Valor, L. Lind, R. Cossent, C. Escudero, *"Understanding the limits to forming policy-driven markets in the electricity sector",* Environmental Innovation and Societal Transitions, vol. 40, pp. 645-662. ISSN: 2210-4224. November 2021/September 2021.

- C. Valor, L. Ronda, C. Abril, *"Understanding the expansion of circular markets: building relational legitimacy to overcome the stigma of second-hand clothing",* Sustainable Production and Consumption, vol. 30, pp. 77-88. ISSN: 2352-5509. December 2021/March 2022.

- A. Werlang, G. Cunha, J. Serra, B. Barbosa, L.A. Barroso, *"Reliability metrics for generation planning and the role of regulation in the energy transition: case studies of Brazil and Mexico",* Energies, vol. 14, nº. 21, pp. 7428-1-7428-29. ISSN: 1996-1073. November 2021.

3.3.3 Conference presentations

- M. Valdano, J.R. Jiménez-Octavio, C.M. Vives-Torres, F.J. López-Valdés, B. Pipkorn, *"Assessment of madymo active human body model kinematics and dynamics by means of human volunteer response at low-speed frontal impacts"*, Communication in International Research Council on Biomechanics of Injury - IRCOBI Europe 2021. Zurich (Switzerland) Online. 08-10 September 2021.

- P. Gallegos, P. Chittur, F. Postigo Marcos, C. Mateo, J. Fleury, *"Quantitative assessment of the role of flexibility measures in the integration of renewables using the upgraded metis platform"*, Communication in 26th International Conference and Exhibition on Electricity Distribution - CIRED 2021. Geneva (Switzerland) Online. 20-23 September 2021.

- L. Lind, C. Valor, R. Cossent, V. Labajo, C. Escudero, *"New business models at distribution grids: a stakeholder consultation"*, Communication in 26th International Conference and Exhibition on Electricity Distribution - CIRED 2021. Geneva (Switzerland) Online. 20-23 September 2021.

- L. Rouco, *"Interacción de controles de aerogeneradores basados en generadores de inducción doblemente alimentados"*, Communication in 2021 Jornadas Técnicas del Comité Nacional de Cigre. Madrid (Spain). 16-17 November 2021.

- M. Rajabdorri, E. Lobato, L. Sigrist, *"Viability of including frequency metrics in short-term scheduling of island power systems"*, Communication in International Conference on Control System, Power and Electrical Engineering - ICCSPEE 2021. Istanbul (Turkey). 05 December 2021.

- M. Robin, J. Renedo, J.C. González-Torres, A. García-Cerrada, A. Benchaib, P. García-González, *"DC segmentation: a promising solution to improve angle stability of stressed power systems"*, Communication in 17th IET International Conference on AC and DC Power Transmission - ACDC 2021. Stevenage (United Kingdom) Online. 07-08 December 2021.

- E. Aracil, D. Roch Dupré, E.J. González González, *"Tracking the silver economy. A multidimensional approach to aging societies"*, Communication in IV Congreso Iberoamericano de Jóvenes Investigadores en Economía y Empresa - Congreso AJICEDE. Madrid (Spain). 16-17 December 2021.

- J.L. Gómez, M. Castro, A. Cantizano, *"Fire risk assessment in WUI – WII implementing bayesian networks to infer fire spread probabilities"*, Communication in International Conference on Planning, Challenges of Disaster Management and Resilience - ICPCDMR. Athens (Greece). 11-13 February 2022.

- Ll. Oviedo, S. Lumbreras, *"How can theology contribute to our sustainability goals?"*, Communication in 19th European Conference on Science and Theology - ECST XIX. Ålesund (Norway). 04-08 May 2022.

- R.R. Goswami, R. Sañudo, S. Ricci, *"Simplified analysis of railway track degradation by mobile applications"*, Communication in 7th International Conference on Road and Rail Infrastructure - CETRA 2022. Pula (Croatia). 11-13 May 2022.

- M. García-Sánchez, M. Castro, *"Brownian dynamics simulations of the B-cell activation"*, Poster in XXIII Congreso de Física Estadística - FisEs 2022. Zaragoza (Spain). 12-14 May 2022.

- L.A. Herrero, L.J. Fernández, F.A. Campos, E. Centeno, *"Integration of green hydrogen generation in the MIBEL, a long-term analysis"*, Communication in 29th Young Energy Economists and Engineers Seminar - YEEES Ghent 2022. Ghent (Belgium). 12-13 May 2022.

- M. Pérez-Bravo, P. Linares, P. Frías, J.C. Romero, A.F. Rodríguez Matas, *"Improving the representation of transport demands in TIMES models: a case of study for the Spanish 2030 transport decarbonization goals"*, Communication in 29th Young Energy Economists and Engineers Seminar - YEEES Ghent 2022. Ghent (Belgium). 12-13 May 2022.

- A.F. Rodríguez Matas, P. Linares, J.C. Romero, M. Pérez-Bravo, *"A novel application of a robust and flexible decision-making methodology to a dynamic model of strategic energy planning"*, Communication in 29th Young Energy Economists and Engineers Seminar - YEEES Ghent 2022. Ghent (Belgium). 12-13 May 2022.

- C.M. Vallez Fernández, M. Castro, D. Contreras, *"El principio de máxima entropía y la distribución de viajes en servicios de bicicletas compartidas"*, Poster in XXIII Congreso de Física Estadística - FisEs 2022. Zaragoza (Spain). 12-14 May 2022.

- P. Linares, *"Eficiencia como herramienta para la seguridad energética y la descarbonización: ¿medidas "rápidas y efectivas"?"*, Paper in XVII Congreso de la Asociación Española para la Economía Energética. Alcalá de Henares (Spain). 25-27 May 2022.

- M. Pérez-Bravo, P. Linares, P. Frías, J.C. Romero, A.F. Rodríguez Matas, *"Assessing the transport policies needed to reach the 1.5ºC target: decarbonizing road transport in Spain"*, Communication in XVII Congreso de la Asociación Española para la Economía Energética. Alcalá de Henares (Spain). 25-27 May 2022.

- A.F. Rodríguez Matas, P. Linares, J.C. Romero, M. Pérez-Bravo, *"Robustness and flexibility in strategic energy planning: a case of study on the Spanish carbon budget for the 1.5ºC target"*, Communication in XVII Congreso de la Asociación Española para la Economía Energética. Alcalá de Henares (Spain). 25-27 May 2022.

- A. Sáez-Serrano, C. Sánchez-Blaya, M. Sáenz, T.E. Fernández-Vicente, *"Aseguramiento de la calidad de las mediciones en el ámbito sanitario"*, Poster in XIII Congreso Nacional de la Sociedad Española de Electromedicina e Ingeniería Clínica - SEEIC 2022. Madrid (Spain). 08-10 June 2022.

- E. Carbó-Laso, P. Sanz-Ruiz, J. Vaquero-Martín, I. López-Torres, M.C. Solans-López, J.C. del Real-Romero, F. Arán-Ais, Y. Ballesteros, E. Paz, *"Rifampicin-loaded polymethylmethacrylate: is it possible to preserve mechanical properties and setting time?"*, Communication in 23rd EFORT Annual Congress - EFORT 2022. Lisbon (Portugal). 22-24 June 2022.

- E. F. Álvarez, L. Olmos, A. Ramos, K. Antoniadou-Plytaria, D. Steen, L.A. Tuan, *"Values and impacts of incorporating local flexibility services in transmission expansion planning"*, Communication in 22nd Power Systems Computation Conference - PSCC 2022. Porto (Portugal). 27 June - 01 July 2022.

- R. Gesteira Miñarro, J. Blázquez Sánchez, G. López, R. Palacios, M.A. Blázquez Puras, R. García Fernández, E. Zapico Alonso, J.M. Cancer Abóitiz, *"Metodología y herramientas para análisis y evaluación de seguridad frente a ataques de radiofrecuencia en vehículos"*, Communication in VII Jornadas Nacionales de Investigación en Ciberseguridad - JNIC 2022. Bilbao (Spain). 27-29 June 2022.

- P. Santurino, L. Sigrist, A. Ortega, J. Renedo, E. Lobato, *"Optimal coordinated design of under-frequency load shedding and energy storage systems"*, Communication in 22nd Power Systems Computation Conference - PSCC 2022. Porto (Portugal). 27 June - 01 July 2022.

- S. Solera-Cotanilla, J. Fúster de la Fuente, J. Pérez, R. Palacios, M. Vega-Barbas, M. Álvarez-Campana, G. López, *"Análisis de problemas de seguridad y privacidad en wearables usados por menores"*, Communication in VII Jornadas Nacionales de Investigación en Ciberseguridad - JNIC 2022. Bilbao (Spain). 27-29 June 2022.

- C. Valero, J. Pérez, S. Solera-Cotanilla, M. Vega-Barbas, G. Suárez, G. López, M. Álvarez-Campana, *"Evaluando la seguridad y privacidad de los asistentes personales inteligentes: ¡Ojo con el juguete!"*, Communication in VII Jornadas Nacionales de Investigación en Ciberseguridad - JNIC 2022. Bilbao (Spain). 27-29 June 2022.

- R. Perera, S. Sandercock, A. Carnicero, *"Structural condition identification using roaming damage method"*, Communication in 10th European Workshop on Structural Health Monitoring - EWSHM 2022. Palermo (Italy). 04-07 July 2022.

- V. Cagigal, R. Rodriguez-Rey, L. Halty, C. Rodríguez-Morcillo, M.J. Martínez Beltrán, H. Garrido-Hernansaiz, *"Sperantia. App: un recurso para acercar la salud mental a la población general"*, Communication in 7th International Psychology Congress - IFCU 2022. Porto (Portugal). 07-09 July 2022.

- F.J. López-Valdés, *"Potential injury mechanisms associated to recline occupant positions in automated cars"*, Paper in 9th World Congress of Biomechanics - WCB 2022. Taipéi (Taiwan). 10-14 July 2022.

- M. Castro, *"The turning point and end of an expanding epidemic cannot be precisely forecast"*, Paper in XXXVIII Reunión Bienal de la Real Sociedad Española de Física. Murcia (Spain). 11-15 July 2022.

- J. Archilla Martín-Sanz, C. Gavilán, L. Rouco, A. Ortega, *"Response of a nuclear power plant in case of a large power system disturbance"*, Poster in IEEE Power & Energy Society General Meeting - IEEE PES GM 2022. Denver (United States of America). 17-21 July 2022.

- O. Oladimeji, A. Ortega, L. Sigrist, P. Sánchez, E. Lobato, L. Rouco, *"Modeling demand flexibility of RES-based virtual power plants"*, Communication in IEEE Power & Energy Society General Meeting - IEEE PES GM 2022. Denver (United States of America). 17-21 July 2022.

- J. Pérez, E. Awad, M. Castro, G. López, N. Bueno-Guerra, M. Reneses Botija, M. Riberas Gutiérrez, A. Gómez-Dorado, *"A computational framework for understanding risk factors in cybercrime"*, Communication in 8th International Conference on Computational Social Science - IC2S2 2022. Chicago (United States of America). 19-22 July 2022.

- J. Pérez, V. Balmaseda, A.L. Urbistondo, E. Awad, M. Castro, G. López, *"A child's play: an agent-based simulator to protect minors online"*, Poster in 8th International Conference on Computational Social Science - IC2S2 2022. Chicago (United States of America). 19-22 July 2022.

- R. Rodriguez-Rey, L. Halty, C. Rodríguez-Morcillo, V. Cagigal, M.J. Martínez Beltrán, H. Garrido-Hernansaiz, *"Sperantia.App: an online application to take care of mental health during the COVID-19 pandemic"*, Communication in 36th Annual Conference of the European Health Psychology Society - EHPS 2022. Bratislava (Slovakia). 23-27 August 2022.

3.3.4 IIT technical documents

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, *"Resumen de la propuesta de ECODES-COMILLAS para la Licitación IDAE sobre Monitorización de la Pobreza energética".* July 2022. Ref: IIT-22-132WP.

- R. Barrella, P. Palma, J.P. Gouveia, J.I. Linares, J.C. Romero, E.M. Arenas, *"An integrated framework to address energy poverty in the Iberian Peninsula".* March 2022. Ref: IIT-22-043WP.

- R. Barrella, J.C. Romero, *"Contribution to the chapter on experts' perspective of the EPAH full revision of energy poverty indicators".* June 2022. Ref: IIT-22-094WP.

- E. Centeno, F.A. Campos, J. Maguregui, S. Wogrin, *"Minimum-cost-based electricity generation capacity planning: does annualized investment cost always yield full cost recovery with marginal pricing?".* December 2021. Ref: IIT-21-213WP.

- D. Dokupilová, P. Palma, A. Stojilovska, J.P. Gouveia, E.G. Paschalidou, R. Barrella, M. Feenstra, A. Horta, C. Sánchez-Guevara, J. Kádár, M. Tesanovic, N.S. Thomaidis, *"The urban/rural divide: exploring energy poverty determinants for eight countries in Europe and the Middle East".* December 2021. Ref: IIT-21-214WP.

- T. Gerres, S. Serna, R. Cossent, *"National hydrogen strategies in a global context: common design elements across country specific visions".* May 2022. Ref: IIT-22-083WP.

- L. Herding, R. Cossent, M. Rivier, J.P. Chaves, T. Gómez, *"Assessment of electricity network investment for the integration of high RES shares: a comparative case study".* April 2022. Ref: IIT-22-060WP.

- L.A. Herrero, L.J. Fernández, F.A. Campos, E. Centeno, *"Integration of green hydrogen generation in the MIBEL, a long-term analysis".* April 2022. Ref: IIT-22-066WP.

- G. Marulanda, A. Bello, J. Reneses, *"Profits in horizontal mergers: an asymmetric equilibrium approach to solve the Merger Paradox".* November 2021. Ref: IIT-21-186WP.

- P. Otaola-Arca, J. García-González, *"Introduction of regulatory criteria in the self-UC model".* July 2022. Ref: IIT-22-122WP.

- I.J. Pérez-Arriaga, S. Díaz-Pastor, P. Mastropietro, C. de Abajo, *"The electricity access index methodology and preliminary findings".* May 2022. Ref: IIT-22-100WP.

- I.J. Pérez-Arriaga, P. Mastropietro, *"Electricity distribution concessions in Odisha".* March 2022. Ref: IIT-22-033WP.

- M. Rajabdorri, E. Lobato, L. Sigrist, *"Robust frequency constrained UC using data driven logistic regression for island power systems".* February 2022. Ref: IIT-22-023WP.

- J. Renedo, L. Rouco, A. García-Cerrada, L. Sigrist, *"Coordinated control in multi-terminal VSC-HVDC systems to improve transient stability: Impact on electromechanical-oscillation damping".* June 2022. Ref: IIT-22-105WP.

- N. Rodríguez Pérez, J. Matanza, G. López, *"Scalability and replicability analysis of information and communication technologies in smart grid implementations".* July 2022. Ref: IIT-22-123WP.

- J.C. Romero, R. Barrella, E. Centeno, *"Understanding the impact of COVID-19 lockdown on energy poverty in Spain".* March 2022. Ref: IIT-22-032WP.

- J.M. Schwidtal, J.P. Chaves, A. Lorenzoni, *"Driving balancing responsibility: why imbalance pricing methodologies and balancing area sizing matter for renewables".* September 2021. Ref: IIT-21-142WP.

- A Tomás-Martín, A. García-Cerrada, L. Sigrist, S.J. Yagüe, J. Suárez-Porras, *"State relevance for model order reduction applied to a microgrid".* November 2021. Ref: IIT-21-204WP.

- M. Troncia, J.P. Chaves, C. Damas Silva, H. Gerard, G. Willeghems, *"Appraising recommendations and challenges of real-world implementations of market-based TSO-DSO coordination: the theoretical market framework".* March 2022. Ref: IIT-22-031WP.

3.3.5 Other publications

- E. Aracil, *"Vivir en el metaverso y en la economía de la escasez".* Electronic press in Ediciones El Pais, S.L. Madrid (Spain). November 2021.

- E. Aracil, *"Respuesta a «De una sociedad que envejece a una economía de la longevidad»".* Electronic press in CENIE - Centro Internacional sobre el Envejecimiento. Salamanca (Spain). February 2022.

- E. Aracil, *"Tiempo, el valor más preciado para un investigador".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain). July 2022.

- E.M. Arenas, *"1X11 - Recursos para la transición energética".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain) Online. July 2022.

- E.M. Arenas, R. Barrella, A. Cosín López-Medel, J.I. Linares, J.C. Romero, C. Foronda Díez, L. Díez Alzueta, *"Investigación aplicada para el desarrollo de una herramienta web de cálculo del gasto eléctrico teórico para hogares españoles".* Technical report in ECODES - Fundación Ecológica y Desarrollo. November 2021.

- E.M. Arenas, R. Barrella, J.I. Linares, J.C. Romero, *"Migración de DIAGNÓSTICO (modelo de cálculo del Gasto Térmico Teórico) a un entorno web".* Technical report in Fundación Ecológica y Desarrollo. November 2021.

- R. Barrella, *"2021 energy price crisis impacts on energy poverty in Spain".* Electronic press in ENGAGER COST Action. Brussels (Belgium). December 2021.

- R. Barrella, *"Se doblan los hogares en situación de pobreza energética en España".* Electronic press in Grupo COPE. Madrid (Spain). July 2022.

- R. Barrella, E.M. Arenas, J.C. Romero, *"¿Qué efecto tiene en el consumo de gas bajar un grado el termostato de la calefacción?".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). April 2022.

- R. Barrella, R. Castaño-Rosa, M. Dereniowska, A. Dobbins, J.P. Gouveia, R. Guyet, K. Grossmann, A. Horta, M.J. Manjón, F. Martín-Consuegra, L. Papamikrouli, A. Stojilovska, L. Zivcic, *"A toolkit for a just transition with the people".* Technical report in European Cooperation in Science and Technology. November 2021.

- R. Barrella, J.C. Romero, E. Centeno, *"El confinamiento agravó la pobreza energética pero el escudo social evitó un mal mayor".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). February 2022.

- E. Beckstedde, L. Meeus, A. Ramos, K. Kessels, J. Vanschoenwinkel, M. Kaffash, E. Heylen, M. Troncia, J.P. Chaves, R. Cossent, et al., *"Evaluation of market mechanisms: challenges and opportunities".* Technical report in Comisión Europea. July 2022.

- M. Bichler, S. Bindu, H.U. Buhl, J.P. Chaves, H. Gerard, A. Monti, K. Neuhoff, J.C. Richstein, M. Troncia, M. Weibelzahl, et al., *"Electricity market design 2030-2050: shaping future electricity markets for a climate-neutral Europe".* Technical report in European Commission. January 2022.

- M. Castro, *"1X10 - Predecir en tiempos inciertos".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain) Online. July 2022.

- J.P. Chaves, P. Bhagwat, R. Cossent, S. Kundu, S. Ravi Kumar, T. Gómez, R. Kumar Pillai, B. Karnam, J. Moreno Barrio, N. Rodríguez Pérez, M. Troncia, M. Valarezo, *"Smart grid replication: handbook for India".* Technical report in FSR Global. March 2022.

- J.P. Chaves, R. Cossent, T. Gómez, G. López, J. Matanza, C. Mateo, N. Rodríguez Pérez, M.A. Sánchez Fornié, *"La digitalización de las redes eléctricas de distribución en España".* Technical report in Fundación Naturgy. September 2021.

- J.P. Chaves, T. Gómez, N. Morell, *"La electricidad en España: formación del precio, composición de la factura y comparativa con otros países".* Technical report in Fundación Naturgy. December 2021.

- J.P. Chaves, L. Olmos, L. Lind, A. Ivanova, J. Farré, M. Pardo, D. Davi, F.D. Martín Utrilla, C. Ojeda, O. Barreiro, A. Gil Martínez, J.J. Peiró, C. Madina, M. Santos-Mugica, N. Ruiz, M. Barbero, G. Leclercq, A. Debray, V. Benjumeda, *"Final Spanish demo report results and analysis of the full-scale demonstration".* Technical report in Comisión Europea. June 2022.

- D. Contreras, S. Lumbreras, *"1X08 - Humanizando la inteligencia artificial".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain) Online. June 2022.

- R. Cossent, *"Spain bets on green hydrogen in clean energy push".* Electronic press in EURACTIV Media Network BV. Schiphol (Netherlands). June 2022.

- R. Cossent, *"España apuesta a lo grande por la revolución sostenible del hidrógeno verde".* Electronic press in Diario ABC, S.L. Madrid (Spain). June 2022.

- S. Díaz-Pastor, *"Nuevos actores para el suministro eléctrico del futuro y el acceso universal a la energía en la base de la pirámide".* Electronic press in Diario Responsable S.L. Madrid (Spain). October 2021.

- K. Drivakou, T. Bachoumis, A. Tzoumpas, C. Augusto, S. Giovanett, F. Dominguez, M. Troncia, L. Lind, F. Oliveira, S. Gandhi, J.M. Cruz, C. Damas Silva, *"Business use cases for the OneNet".* Technical report in European Commission. September 2021.

- A. García-Cerrada, A. Ortega, L. Rouco, L. Sigrist, *"A review of methods for the estimation of inertia and its distribution".* Technical report in I-DE Redes Eléctricas Inteligentes, S.A. October 2021.

- T. Gerres, P. Linares, *"Carbon Contracts for Differences (CCfDs) in a European context".* Technical report in The Greens/EFA Group in the European Parliament. June 2022.

- Y. González-Arechavala, *"¿Por qué sigue habiendo pocas mujeres en profesiones técnicas y científicas?".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). February 2022.

- A. González-Garrido, I. Gómez-Arriola, K. Kessels, J. Vanschoenwinkel, D. Davi, E. Faure, Y. Ruwaida, N. Etherden, L. Lind, M. Valarezo, *"Economic assessment of proposed coordination schemes and products for system services".* Technical report in Comisión Europea. August 2022.

- P. González, D. Davi, E. Faure, F.J. Leiva, E. Morgades, S. Gallego, F.D. Martín Utrilla, F. García Martínez, M. Gaudó, J.P. Chaves, M. Correa, T. Gómez, *"Flexibilidad en redes de distribución eléctrica: guía explicativa para la tramitación de proyectos de demostración regulatorios".* Technical report in Endesa RED, S.A. September 2021.

- M. Hesselman, S. Tirado Herrero, M. Smith, M. Cornelis, I. Antepara, A. Bajomi, R. Barrella, U. Cao, S. Chatterjee, T. Cuerdo, A. Dobbins, G. Frigo, S. Fuller, M. Feenstra, J.P. Gouveia, R. Guyet, V. Kizilcec, B. Lennon, I. González Pijuán, S. Robic, *"Moving forward on the right to energy in the EU. Engagement toolkit".* Technical report in European Cooperation in Science and Technology. November 2021.

- J.R. Jiménez-Octavio, P. Frías, *"1X01 ¿Por qué Casting the Future?".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain) Online. April 2022.

- D. Kim, B. Reidenbach, B. Motherway, V. Rozite, P. Fraser, K. Sadamori, J.P. Chaves, et al., *"Unlocking the potential of Distributed Energy Resources: power system opportunities and best practices".* Technical report in International Energy Agency. May 2022.

- P. Linares, *"¿Es el CO2 culpable del alto precio de la electricidad?".* Electronic press in La voz de Galicia, S.L. Corunna (Spain). October 2021.

- P. Linares, *"Camino a la COP26: ¿Qué medidas son las más urgentes para reducir las emisiones de CO2?".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). October 2021.

- P. Linares, *"¿Qué podemos o debemos esperar de la COP26?".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). October 2021.

- P. Linares, *"COP26: Avances y cuentas pendientes de una cumbre poco comprometida".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). November 2021.

- P. Linares, *"Cómo poner precio al CO2 de las importaciones en Europa: una perspectiva desde España".* Electronic press in Centro de Políticas Económicas EsadeEcPol. Barcelona (Spain). December 2021.

- P. Linares, *"¿Deben el gas y la nuclear considerarse actividades sostenibles?".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). February 2022.

- P. Linares, *"¿Qué políticas funcionarán mejor para aumentar la eficiencia y moderar la demanda energética?".* Electronic press in Centro de Políticas Económicas EsadeEcPol. Barcelona (Spain). May 2022.

- P. Linares, *"El impacto del ajuste en frontera al carbono sobre la competitividad industrial".* Electronic press in Centro de Políticas Económicas EsadeEcPol. Barcelona (Spain). June 2022.

- P. Linares, T. Gómez, M. Rivier, *"1X03 - El reto de la descarbonización energética".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain) Online. May 2022.

- L. Lind, J.P. Chaves, A. Barlier, J.M. Cruz, M. Louro, R. Prata, C. Damas Silva, B. Alonso Santos, F.D. Martín Utrilla, A. Lucas, J. Villar, G. Glória, J. Saragoça, S. Muñoz Delgado, M.A. Sánchez Bodas, C. Vidal Silvestre, R. Pestana, R. Losseau, S. Falcó, *"Specifications and guidelines for Western demos".* Technical report in European Commission. September 2021.

- L. Lind, J.P. Chaves, A. Ivanova, J. Farré, V. Aragonés, M. Pardo, D. Davi, F.D. Martín Utrilla, A. Gil Martínez, J.J. Peiró, C. Madina, M. Santos-Mugica, I. Gómez-Arriola, V. Benjumeda, M. Marroquin, *"Evaluation of preliminary conclusion from demo run".* Technical report in Comisión Europea. February 2022.

- L. Lind, M. Valarezo, M. Troncia, J.P. Chaves, *"Scalability and replicability analysis of the market platform and standardized products".* Technical report in Comisión Europea. June 2022.

- S. Liverani, K. Glennung, S. Vogel, O. Cerny, M. Baron, J.P. Chaves, L. Lind, R. Cossent, R. Samuelsson, A. Sanjab, K. Kessels, D. Davi, M. Uslar, *"Common position paper with related projects in the same call".* Technical report in Comisión Europea. June 2022.

- S. Liverani, S. Vogel, M. Cremona, O. Cerny, K. Kessels, C. Madina, J.P. Chaves, R. Samuelsson, Y. Ruwaida, M. Pardo, A. Ivanova, M. Voumvoulakis, *"Proceedings of final conference in Brussels".* Technical report in Comisión Europea. June 2022.

- A.J. López López, *"Comillas ICAI, pionera en investigación en Inteligencia Artificial".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain). July 2022.

- F.J. López-Valdés, *"1X04 ¿Movilidad segura a cualquier precio?".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain) Online. May 2022.

- S. Lumbreras, *"Exploración espacial".* Electronic press in Grupo EIG Multimedia, S.L. Madrid (Spain). September 2021.

- S. Lumbreras, *"Energía lunar para sobrevivir".* Electronic press in Grupo EIG Multimedia, S.L. Madrid (Spain). September 2021.

- S. Lumbreras, *"Es altamente improbable que estemos solos en el universo".* Electronic press in El Periódico de Catalunya, S.L.U. Barcelona (Spain). October 2021.

- S. Lumbreras, *"Es hora de exigir explicaciones a la inteligencia artificial".* Electronic press in Prensa Científica S. A. Barcelona (Spain). November 2021.

- S. Lumbreras, *"Does Artificial Intelligence change our understanding of the imago dei?".* Electronic press in University of Saint Andrews. Saint Andrews (United Kingdom). January 2022.

- S. Lumbreras, *"La inteligencia artificial puede despertar gran cantidad de conocimiento dormido".* Electronic press in Fundación Pablo VI. Madrid (Spain). June 2022.

- M.J. Manjón, *"Un departamento social en las empresas eléctricas para luchar contra la pobreza energética".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). December 2021.

- A. Muñoz, *"1X02 Ingenieros para el mundo".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain) Online. May 2022.

- K. Neuhoff, O. Chiappinelli, T. Gerres, R. Ismer, T. Köveker, P. Linares, J.C. Richstein, *"Addressing export concerns in the CBAM file".* Technical report in Deutsches Institut für Wirtschaftsforschung; Universidad Pontificia Comillas; Friedrich-Alexander-Universität Erlangen-Nürnberg. March 2022.

- I.J. Pérez-Arriaga, S. Díaz-Pastor, *"Impulsando la electrificación del Africa subsahariana".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain). July 2022.

- F. Postigo Marcos, *"Microrredes, útiles para cada ocasión".* Electronic press in Ediciones El Pais, S.L. Madrid (Spain). May 2022.

- D. Robinson, T. Gómez, M. Tennican, M. Pérez-Bravo, *"Propuesta regulatoria y tarifaria para las estaciones de recarga pública de vehículo eléctrico en Perú".* Technical report in World Bank. July 2022.

- D. Roch Dupré, J. Portela, *"Transición verde, mix energético y escasez de suministro".* Electronic press in Universidad Pontificia Comillas; Deloite. Madrid (Spain). November 2021.

- P. Rodilla, P. Linares, J.P. Chaves, T. Gerres, S. Wogrin, J.J. Valentín Vírseda, P. Mastropietro, C. Batlle, et al., *"Hoja de ruta del hidrógeno en Colombia".* Technical report in Banco Interamericano de Desarrollo (BID). September 2021.

- J.C. Romero, *"Pandemia y pobreza energética".* Electronic press in Fundación Pía San Agustín. Madrid (Spain). February 2022.

- J.C. Romero, *"Pobreza Energética y COVID-19".* Electronic press in Diario Responsable S.L. Madrid (Spain). March 2022.

- J.C. Romero, *"La polémica de la 'operación termostato' de Italia: "27 º C para trabajar es mucho calor, roza lo insalubre"".* Electronic press in Conectas Telecinco, S.A.U. Madrid (Spain). April 2022.

- J.C. Romero, *"El desperdicio de alimentos".* Electronic press in Centre d'Estudis Cristianisme i Justícia. Barcelona (Spain). June 2022.

- J.C. Romero, *"Cómo reducir el 7% de consumo de gas exigido por Bruselas: bajar un grado la calefacción o apagarla de noche".* Electronic press in Newtral Media Audiovisual S. L. U. Madrid (Spain). July 2022.

- J.C. Romero, P. Linares, *"Evaluación de las implicaciones distributivas del Fondo Nacional para la Sostenibilidad del Sistema Eléctrico".* Electronic press in Centro de Políticas Económicas EsadeEcPol. Barcelona (Spain). September 2021.

- R. Samuelsson, M. Danielzon Larsson, K. Kessels, J. Vanschoenwinkel, A. Sanjab, A. Delnooz, N. Neyestani, L. Lind, M. Troncia, J.P. Chaves, R. Cossent, D.N. Trakas, D. Papadaskalopoulos, G. Gürses-Tran, M. Santos-Mugica, C. Madina, I. Gómez-Arriola, U. St, *"Roadmap towards a new market design including the implementation of standardised products for system services".* Technical report in Comisión Europea. June 2022.

- J.L. Sancha, *"Factura de la luz: sin cambios significativos a corto plazo".* Electronic press in La voz de Galicia, S.L. Corunna (Spain). January 2022.

- J.L. Sancha, *"Claves. Así bajará la luz tras el acuerdo con la Comisión Europea".* Electronic press in Ediciones El Pais, S.L. Madrid (Spain). April 2022.

- J.L. Sancha, *"La guerra en Ucrania y su impacto en las facturas de la luz y el gas".* Electronic press in Grupo de Comunicación Loyola S.L. Bilbao (Spain). May 2022.

- J.L. Sancha, *"Bruselas da luz verde al plan de España y Portugal para rebajar la factura eléctrica".* Electronic press in Ediciones El Pais, S.L. Madrid (Spain). May 2022.

- J.L. Sancha, *"El tope al gas contuvo la escalada de la luz en alrededor de un 20% en España y un 18% en Portugal en su primer mes de vigencia".* Electronic press in Ediciones El Pais, S.L. Madrid (Spain). July 2022.

- M. Troncia, M. Valarezo, R. Cossent, L. Lind, L. Olmos, J.P. Chaves, *"OneNet priorities for KPIs, Scalability and Replicability in view of harmonised EU electricity markets".* Technical report in European Commission. December 2021.

- M. Troncia, D. Ziegler, T. Gómez, J.P. Chaves, E. Beckstedde, L. Meeus, J. Villar, A. Rodrigues de Oliveira, B. Czarnecki, R. Magulski, T. Knop, C. Augusto, C. Marin, G. Faria, *"Challenges and opportunities for electricity grids and markets".* Technical report in Comisión Europea. September 2021.

- M. Valarezo, R. Cossent, E. Beckstedde, L. Meeus, *"Methodology and scenarios for the EUniversal scalability and replicability analysis".* Technical report in Comisión Europea. January 2022.

- C. Valor, *"¿Usar ropa de segunda mano es "de pobres"?".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). November 2021.

- C. Valor, *"Profecías autocumplidas: pánico y desabastecimiento".* Electronic press in The Conversation Media Group Ltd. Madrid (Spain). March 2022.

- C. Valor, *"El orgullo de comprar ropa de segunda mano".* Electronic press in Universidad Pontificia Comillas. Madrid (Spain). April 2022.

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

- *¿Cómo incentivar la producción de Hidrógeno Verde en España?*
  Carsi Ramón-Borja, Miguel. Supervised by Rafael Cossent Arín.

- *Actualización de un modelo de cálculo de gasto eléctrico de los hogares españoles a la nueva estructura de tarifa y análisis de escenarios*
  Blázquez Cabezas, Marta. Supervised by Roberto Barrella .

- *Adaptación de un algoritmo de AGC para la integración de parques eólicos en regulación*
  Benito Velad, Sofía. Supervised by Ignacio Egido Cortés.

- *AMORTIGUAMIENTO DE OSCILACIONES ELECTROMECÁNICAS CON COMPENSADORES SÍNCRONO*
  Soutelo Rivera, Carlos. Supervised by Luis Rouco Rodríguez.

- *Análisis de deguridad de un sistema eléctrico con alta penetración renovable*
  López de Hierro Puértolas, Pablo. Supervised by Ignacio Egido Cortés, Lukas Sigrist .

- *ANÁLISIS DE ESCENARIOS FUTUROS DE DEMANDA DE HIDRÓGENO EN ESPAÑA: ROL DEL HIDRÓGENO EN LA DESCARBONIZACIÓN DEL TRANSPORTE Y EL SECTOR INDUSTRIAL*
  Pérez Arévalo, Daniel. Supervised by Rafael Cossent Arín.

- *Análisis de las decisiones de particulares en la compra de vehículos eléctricos*
  Fernández Aguirre, Jorge. Supervised by Manuel Pérez Bravo.

- *Análisis y simulación de control proporcional (estatismo) de tensión de generadores*
  Aja Albero, Jaime. Supervised by Luis Rouco Rodríguez.

- *Aplicación para la predicción y la optimización de las posiciones de las competiciones de Fórmula 1 mediante algoritmos de machine learning.*
  Urquidi Castro, Ana. Supervised by Miguel Ángel Sanz Bobi.

- *Aprovechamiento de residuos biomásicos para generar hidrógeno y energía*
  Bravo Martín, Rafael. Supervised by Julio Montes Ponce de León.

- *Aprovechamiento de residuos para generar Hidrógeno y energía*
  Maseda Aparicio, Ricardo. Supervised by Julio Montes Ponce de León.

- *Aprovechamiento de residuos para generar Hidrógeno y energía*
  Colomina Teulón, Pablo. Supervised by Julio Montes Ponce de León.

- *Aprovechamiento de residuos para generar hidrógeno y energía*
  Guerrero Landabaso, Karla. Supervised by Julio Montes Ponce de León.

- *Aprovechamiento de residuos para generar hidrógeno y energía*
  Ruiz-Badanelli Medina, Ignacio. Supervised by Julio Montes Ponce de León.

- *Assessing the impact of market intervention measures to manage the EU energy market crisis*
  Elechiguerra Batlle, Javier. Supervised by Pablo Rodilla Rodríguez.

- *Caracterización de las infraestructuras de recarga del vehículo eléctrico en España, actuales y en desarrollo. Estudio y diseño de una instalación de autoconsumo y viabilidad de la utilización en la recarga inteligente del vehículo eléctrico.*
  Pérez Triay, Álvaro José. Supervised by Manuel Pérez Bravo, Miguel Martínez Velázquez.

- *Control mediante microprocesador de un convertidor CC-CC reductor*
  Almunia Escobar, José Luis. Supervised by Aurelio García Cerrada.

- *Desarrollo de una metodología para identificar parámetros de control para la moto eléctrica del ISC*
  Castelló Díez, Alejandro. Supervised by Luis Ismael de la Barba Suárez.

- *Design and simulation of a doubly-fed induction generator (DFIG)*
  Císcar Múgica, Juan Carlos. Supervised by Aurelio García Cerrada.

- *Diseño de un sistema de frenado regenerativo por supercondensadores para un coche de fórmula SAE*
  Rodríguez Juliani, Javier Herminio. Supervised by Aurelio García Cerrada, Luis Ismael de la Barba Suárez.

- *Diseño e implementación de la electrónica en un coche de competición Formula Student*
  Pino Osborne, Fernando del. Supervised by Francisco María Martín Martínez.

- *Diseño y fabricación de un acumulador para motocicletas eléctricas de competición*
  Vacas Omatos, Enrique. Supervised by Luis Ismael de la Barba Suárez.

- *Diseño y prueba de un convertidor elevador y su control para posterior fabricación de un convertidor de potencia CC-CC (elevador+reductor).*
  Martín de San Pablo del Castillo, Javier. Supervised by Aurelio García Cerrada.

- *Diseño y prueba de un convertidor reductor y su control para posterior fabricación de un convertidor de potencia CC-CC (elevador-reductor).*
  Martínez-Cattáneo Amich, Fernando María. Supervised by Aurelio García Cerrada.

- *Estudio de los beneficios de la implantación del Carsharing en un entorno urbano.*
  Gómez Corbatón, Arturo. Supervised by Manuel Pérez Bravo.

- *Estudio de una microrred inteligente en la ciudad de Salamanca y diseño de una planta de gasificación por plasma*
  Gómez-Pablos Fernández del Campo, Carmen. Supervised by Julio Montes Ponce de León.

- *Gasificación por plasma de residuos orgánicos para generar hidrógeno*
  Montijano del Diego, Francisco. Supervised by Julio Montes Ponce de León.

- *Integración del sistema eléctrico francés en el modelo CEVESA para el cálculo de la operación y expansión del MIBEL*
  Bassy Navarro, Álvaro. Supervised by Francisco Alberto Campos Fernández, José Villar Collado.

- *Methodology for assessing social vulnerability to poverty based on bibliometrics and AHP*
  García Pita, Miguel. Supervised by David Roch Dupré.

- *Modelo de Inteligencia Artificial para el procesamiento automático de pólizas de seguros mediante técnicas de NLP*
  García Bolívar, Pablo. Supervised by Miguel Ángel Durán Olivencia.

- *Optimal energy management of a microgrid to produce green Hydrogen*
  Mansilla Barrionuevo, Pablo. Supervised by Andrés Ramos Galán.

- *Pinza para robot colaborativo*
  Quintana Criado, Alberto. Supervised by José Antonio Rodríguez Mondéjar.

- *Provision of flexibility using second life of electric vehicles batteries*
  Knop Salto, Roberto. Supervised by Carlos Mateo Domingo.

- *Simulador multi-tren de una línea de metro para ensayos de regulación automática del tráfico*
  Cidoncha González, Álvaro. Supervised by Adrián Fernández Rodríguez, Antonio Fernández Cardador.

- *Sistema de Gamificación del consumo energético*
  Burillo Palomino, Mercedes. Supervised by Álvaro Sánchez Miralles.

- *Spacecraft power distributor*
  Pérez del Río, Emilio. Supervised by Aurelio García Cerrada.

- *Synthetic KPI to measure the Spanish recovery from COVID-19*
  Álvarez Fernández, Gustavo. Supervised by David Roch Dupré.

- *System protection of island power systems under large shares of RES*
  Vadillo Díaz de Aguilar, Mónica. Supervised by Lukas Sigrist .

- *Wind Turbine BreakerBOT*
  Morenilla Pérez, Ángel. Supervised by Miguel Ángel Sanz Bobi.

4.1.2 Bachelor's Degree in Engineering in Telecommunications Technologies

- *Análisis de la evolución de los perfiles diarios de consumo eléctrico en España*
  Casero Martín, Marta. Supervised by Eugenio Francisco Sánchez Úbeda.

- *Aplicación de técnicas de aprendizaje automático para evaluar y predecir la actividad geomagnética solar en las comunicaciones*
  López Soto, Ignacio. Supervised by Miguel Ángel Sanz Bobi.

- *Ataque a protocolos de comunicación a corta distancia por radiofrecuencia*
  Blázquez Sánchez, Juan. Supervised by Gregorio Ignacio López López.

- *Clasificador automático de modulaciones aplicado a sistemas de guerra electrónica*
  Reglero García, Jaime. Supervised by Javier Matanza Domingo.

- *Control de VCS mediante señales no audibles*
  Valero Martí, Javier. Supervised by Gregorio Ignacio López López, Javier Matanza Domingo.

- *Desarrollo software y simulación radar pasivo*
  González Gómez, Raúl. Supervised by Javier Matanza Domingo.

- *Development of visualization and interpretation tools for convolutional neural networks*
  Llorente González, Óscar. Supervised by Eugenio Francisco Sánchez Úbeda.

- *Feature Engineering para mejorar la clasificación automática de espectros de un biosensor dieléctrico para la detección de gluten*
  Martínez de Aspe Martín, Diego. Supervised by Francisco Javier Herraiz Martínez.

- *Mejora de una mesa interactiva para el análisis de movilidad y modelado de escenarios urbanos*
  Egea Hernández, David. Supervised by Ignacio de Rodrigo Tobías.

- *Text Games Synthetic Data Generation based on Behavior Profiles*
  Balmaseda del Campo, Vicente. Supervised by Gregorio Ignacio López López, Jaime Pérez Sánchez.

- *Viability of PRIME Hybrid (PLC+RF) technology in low-voltage Smart Grid networks across different topologies*
  Oriol Guerra, Nicolás. Supervised by Javier Matanza Domingo.

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 http://www.icai.upcomillas.es/en/master/mepi-en

- *Fundamentals on electrical engineering and optimization techniques*
  Javier García González

- *Law and Legislation of the power industry*
  Tomás Gómez San Román

- *Leadership and Change Management*
  José Carlos Romero Mora

4.2.1.2 Master in Railway Systems

Director: Antonio Fernández Cardador
More information at http://www.icai.upcomillas.es/en/master/msf-en

- *Traffic operation design*
  Asunción Paloma Cucala García, Antonio Fernández Cardador

- *Electrification*
  Luis Rouco Rodríguez

- *ERTMS and RAMS regulations*
  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

- *Master Thesis*
  Álvaro Jesús López López

- *Smart Systems Applied to Industry*
  Álvaro Sánchez Miralles

4.2.1.4 Master's Degree in Big Data Technologies and Advanced Analytics (MBD)

More information at
https://www.comillas.edu/en/masters/master-degree-in-big-data-technologies-and-advanced-analytics

- *Machine Learning II*
  Miguel Ángel Sanz Bobi

- *Master Thesis*
  José Portela González

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

- *Operation and Planning of Future Distribution Networks*
  José Pablo Chaves Ávila, Rafael Cossent Arín, Francisco Miguel Echavarren Cerezo, Carlos Mateo Domingo, Álvaro Ortega Manjavacas, Lukas Sigrist

- *Operation and Planning of Future Distribution Networks*
  Francisco Alberto Campos Fernández, José Pablo Chaves Ávila, Rafael Cossent Arín, Francisco Miguel Echavarren Cerezo, Carlos Mateo Domingo, Álvaro Ortega Manjavacas, Lukas Sigrist

- *Operation and Planning of Future Distribution Networks Laboratory*
  Álvaro Ortega Manjavacas, Lukas Sigrist

- *Regulation and New Business Models*
  Carlos Batlle López, Paolo Mastropietro, Pablo Rodilla Rodríguez

- *Regulation and New Business Models*
  Carlos Batlle López, Paolo Mastropietro, Pablo Rodilla Rodríguez

- *Telecommunications for Smart Grids*
  Javier Matanza Domingo

4.2.2 Graduate theses supervised at IIT

4.2.2.1 Official Master's Degree in Industrial Engineering (MII)

- *A Decision-Making Tool for Investment, Procurement and Operation of Aggregators in Electricity Markets*
  Sanz de la Escalera, Alicia. Supervised by Jose Pablo Chaves Ávila.

- *AI assistant for grid installation works*
  Moreno Barrio, Jorge. Supervised by Miguel Ángel Sanz Bobi.

- *An analysis of traumatic brain injuries (TBI) using real-world crash data and FEM simulations*
  Vives Torres, Carmen María. Supervised by Francisco José López Valdés.

- *ANÁLISIS DE DATOS DE UNA LÍNEA DE PRODUCCIÓN DEL SECTOR AUTOMOCIÓN*
  María Prieto, Blanca de. Supervised by Álvaro Jesús López López, José Portela González.

- *Blockchain application to Electric Vehicle management*
  Rodríguez García, Ricardo. Supervised by Jose Pablo Chaves Ávila, Morsy Abdelkader Morsy Mohammed Nour .

- *Broadband PLC Deployment in the Low Voltage Grid*
  Berzal Hernández, Julio. Supervised by Javier Matanza Domingo.

- *Caracterización de cinemática y dinámica de ocupantes de patinetes eléctricos en accidentes de tráfico*
  Guzmán Terrón, Diego. Supervised by Francisco José López Valdés, Manuel Valdano .

- *Desarrollo de la interfaz de un Bot de trading de criptomonedas e implementación en Telegram con uso de Base de Datos*
  Sánchez Sierra, Ángel. Supervised by Álvaro Jesús López López.

- *Desarrollo de un modelo de cálculo del consumo eléctrico por iluminación en un hogar español*
  Fernández Pedraz, Mario. Supervised by Roberto Barrella .

- *Desarrollo de un modelo teórico para la determinación del gasto eléctrico en un hogar español*
  Cosín López-Medel, Álvaro. Supervised by Roberto Barrella .

- *Desarrollo y ejecución de trayectorias artificiales de robots industriales integrando algoritmos de RL*
  Giménez Suárez, Pablo Santiago. Supervised by Álvaro Jesús López López, Ignacio de Rodrigo Tobías.

- *Desarrollo y evaluación de estrategias automáticas de trading aplicadas a mercados energéticos globales*
  Márquez Larrea, Alejo Javier. Supervised by Antonio Bello Morales.

- *Diseño de una cooperación público-privada para realizar proyectos de gran escala relacionados con la descarbonización de la industria intensiva de energía*
  Gemperle Sánchez del Corral, Álvaro Nicolás. Supervised by Jose Pablo Chaves Ávila.

- *Diseño e implementación de una metodología de cálculo de Ingreso Mínimo en España como umbral para la obtención de indicadores de pobreza energética.*
  Mariño Galindo, Lucía. Supervised by José Carlos Romero Mora, Roberto Barrella .

- *Diseño, optimización y caracterización de un mecanismo de agarre para un robot industrial*
  Belart Siguero, Jorge. Supervised by Álvaro Jesús López López, Ignacio de Rodrigo Tobías.

- *Dynamic Hosting Capacity evaluation within DERMS*
  Menéndez-Pidal Hernández-Ros, Juan. Supervised by Lukas Sigrist .

- *Ergodicidad en la valoración de activos de capital*
  Herranz Ramos, Juan Carlos. Supervised by Sara Lumbreras Sancho.

- *Estudio de la influencia de la eficiencia energética de los diferentes electrodomésticos de un hogar español en su gasto eléctrico*
  Borque Angulo, Gonzalo. Supervised by Roberto Barrella .

- *Estudio por simulación de los nuevos patrones de lesión en choque frontal asociados a la posición reclinada en vehículo autónomo*
  Tagliavia Ramírez, Íñigo Andrés. Supervised by Francisco José López Valdés.

- *Formulación del despacho económico como un control predictivo (MPC) para un sistema insular con alta penetración renovable*
  Cuartero García, Arturo. Supervised by Lukas Sigrist .

- *Implementation of Balancing Platform in Spain using Electric Vehicles and managed through a digital platform developed with Blockchain technology*
  García-Mina Peñaranda, Julio Canuto. Supervised by Jose Pablo Chaves Ávila.

- *Implementing an appropriate time resolution to demand sectors in MASTER (Strategic Energy Planning Model)*
  Huelin Torroba, Ignacio Javier. Supervised by Antonio Francisco Rodríguez Matas, José Carlos Romero Mora.

- *Model for the provision, documentation and inventory of telecommunication networks and services in electricity utilities.*
  Gómez Delgado, Irene. Supervised by Néstor Rodríguez Pérez.

- *Modelado de la recuperación de costes a largo plazo de la rentabilidad de la generación eléctrica*
  Maguregui Ortiz, Javier. Supervised by Efraim Centeno Hernáez.

- *MODELO DE EXPANSIÓN DE LOS SECTORES ELÉCTRICO Y TRANSPORTE: ANÁLISIS DEL ROL DEL VEHÍCULO DE HIDRÓGENO EN LA TRANSICIÓN ENERGÉTICA DE IBERIA*
  Mahou Luque, Javier. Supervised by Francisco Alberto Campos Fernández, José Villar Collado.

- *New Generation of Smart Metering Deployment Planning, with PRIME v1.4*
  Guisasola Montes, Fernando. Supervised by Javier Matanza Domingo.

- *Onesait Utilities Metering for EDP*
  Benavente Martínez, Eduardo. Supervised by Néstor Rodríguez Pérez.

- *Optimización de un algoritmo de inversión para criptomonedas mediante modelos predictivos con machine learning*
  Geûens Álvarez, Carlos. Supervised by Álvaro Jesús López López.

- *Planning the evolution of the Digital Network in the Distribution grid*
  Donoso Martín, Irene. Supervised by Gregorio Ignacio López López.

- *PRIME Hybrid Use Cases and Monitoring Tools*
  Rodríguez Gómez, Álvaro. Supervised by Javier Matanza Domingo.

- *Quantitative evaluation of distribution network charges in a context of Digitalization, Decarbonization and Decentralization*
  Linares Calero, Sara. Supervised by Jose Pablo Chaves Ávila, Nicolás Morell Dameto.

- *Sistema de control y adquisición de datos para bancos de ensayo multieje*
  Rivero Ríos, José Esteban. Supervised by Aurelio García Cerrada.

- *Sistema de visión artificial basado en un dataset sintético para una aplicación de pick and place*
  Ortiz de Zúñiga Mingot, Ignacio. Supervised by Álvaro Jesús López López, Ignacio de Rodrigo Tobías.

- *Treatment of low voltage advanced supervision (SABT) information for network incidents*
  Mirat Fernández-Cuervo, Rafael. Supervised by Miguel Ángel Sanz Bobi.

- *What will be the role of hydrogen in the Spanish energy demand? A modelling approach for the 2050 horizon.*
  Serrahima de Bedoya, Álvaro. Supervised by José Carlos Romero Mora, Timo Gerres .

- *COMPARATIVA DE LA SOSTENIBILIDAD MEDIOAMBIENTAL Y ECONÓMICA DE LOS MIXES ENERGÉTICOS DE DISTINTOS PAÍSES CON PLANES DE DESARROLLO EN ENERGÍA FOTOVOLTAICA Y EÓLICA BAJO LA PERSPECTIVA DEL ANÁLISIS DEL CICLO DE VIDA*
  Urdániz Viejo, Javier. Supervised by Carlos Martín Sastre, Yolanda González Arechavala.

4.2.2.2 Official Master's Degree in Telecommunications Engineering (MIT)

- *Honeypots para dispositivos IoT*
  Fariña Fernández-Portillo, Andrea. Supervised by Gregorio Ignacio López López.

- *Pruebas de intrusión en automóviles mediante ataques de radio frecuencia. Análisis de vulnerabilidades*
  Gesteira Miñarro, Roberto. Supervised by Gregorio Ignacio López López.

4.2.2.3 Master in Railway Systems

- *Ajuste de protecciones de subestaciones eléctricas de Metro de Madrid*
  Arribas Cabrero, Sergio. Supervised by Luis Rouco Rodríguez.

4.2.2.4 Master's Degree in Smart Industry (MIC)

- *ANÁLISIS DE DATOS DE UNA LÍNEA DE PRODUCCIÓN DEL SECTORAUTOMOCIÓN*
  María Prieto, Blanca de. Supervised by Álvaro Jesús López López, José Portela González.

- *Aplicación de técnicas de aprendizaje automático al diagnóstico de la combustión de una turbina de gas*
  Rubiales Mena, María del Carmen. Supervised by Miguel Ángel Sanz Bobi.

- *Desarrollo de la interfaz de un Bot de trading de criptomonedas e implementación en Telegram con uso de Base de Datos*
  Sánchez Sierra, Ángel. Supervised by Álvaro Jesús López López.

- *Desarrollo y ejecución de trayectorias artificiales de robots industriales integrando algoritmos de RL.*
  Giménez Suárez, Pablo Santiago. Supervised by Álvaro Jesús López López, Ignacio de Rodrigo Tobías.

- *Generación de datasets de imágenes sintéticas, análisis de resultados con CNNs y estudio de aplicación en escenarios industriales.*
  Ortiz de Zúñiga Mingot, Ignacio. Supervised by Álvaro Jesús López López, Ignacio de Rodrigo Tobías.

4.2.2.5 Master's Degree in Smart Grids (MSG)

- *AI assistant for grid installation works*
  Moreno Barrio, Jorge. Supervised by Miguel Ángel Sanz Bobi.

- *Broadband PLC Deployment in the Low Voltage Grid*
  Berzal Hernández, Julio. Supervised by Javier Matanza Domingo.

- *Dynamic Hosting Capacity evaluation within DERMS*
  Menéndez-Pidal Hernández-Ros, Juan. Supervised by Lukas Sigrist .

- *Model for the provision, documentation and inventory of telecommunication networks and services in electricity utilities*
  Gómez Delgado, Irene. Supervised by Néstor Rodríguez Pérez.

- *New Generation of Smart Metering Deployment Planning, with PRIME v1.4*
  Guisasola Montes, Fernando. Supervised by Javier Matanza Domingo.

- *Onesait Utilities Metering for EDP*
  Benavente Martínez, Eduardo. Supervised by Néstor Rodríguez Pérez.

- *Planning the Evolution of the Digital Network in the Distribution Grid*
  Donoso Martín, Irene. Supervised by Gregorio Ignacio López López.

- *PRIME Hybrid Use Cases and Monitoring Tools*
  Rodríguez Gómez, Álvaro. Supervised by Javier Matanza Domingo.

4.2.2.6 Master in Mobility and Safety Engineering (MMS)

- *Analysis of e-scooter impacts*
  Guzmán Terrón, Diego. Supervised by Francisco José López Valdés, Manuel Valdano .

- *Development of a multibody 50th percentile model for EuroNCAP?s Pedestrian Test Protocol*
  Asensio Gil, Juan Manuel. Supervised by Francisco José López Valdés.

- *Estudio por simulación de los nuevos patrones de lesión en choque frontal asociados a la posición reclinada en vehículo autónomo*
  Tagliavia Ramírez, Íñigo Andrés. Supervised by Francisco José López Valdés.

- *Moderate and serious KTH injuries in obese occupants: a quantification of the risk matching obese occupants with non-obese occupants and ATDs*
  Vives Torres, Carmen María. Supervised by Francisco José López Valdés.

- *Variación de las propiedades de huesos largos en función de la edad: caracterización composicional y mecánica.*
  Vázquez Sanz, Claudia. Supervised by Francisco José López Valdés.

4.2.2.7 Master in Environment and Energy Transition

- *Life Cycle Assessment of Ceramic Tiles: Improving Environmental Performance of a Factory located in Castellón de la Plana*
  Servín Lee, Luis Diego. Supervised by Ana María Santos Montes, Yolanda González Arechavala.

4.3 Other academic activities

4.3.1 Supervised Master Theses in other Universities

- *Fernández Palomino, L.J. «Integración de la generación de hidrógeno verde en el MIBEL, análisis a largo plazo»*. Universidad de Santiago de Compostela; Universidad de A Coruña; Universidad de Vigo; Universidad Carlos III de Madrid; y Universidad Politécnica de Madrid;, Madrid (Spain).
  Supervisor: Francisco Alberto Campos Fernández, Efraim Centeno Hernáez, Luis Alberto Herrero Rozas

- *García-Duarte Sáenz, L. «Hourly prediction of air temperature in Spain with deep learning-based strategies»*. Universidad Carlos III de Madrid, Madrid (Spain).
  Supervisor: Geovanny Alberto Marulanda García

- *Mora, E. «Analysis of deep learning strategies for wind energy forecasting applications»*. Universidad Carlos III de Madrid, Madrid (Spain).
  Supervisor: Jenny Alexandra Cifuentes Quintero, Geovanny Alberto Marulanda García

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 Javier García Aguilar 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

- *Optimization Techniques*
  Andrés Ramos Galán

- *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 ICAI: Advanced Excel for research (10h)*
  Javier García González, Jesús María Latorre Canteli

- *Doctorado ICAI: Advanced GAMS for applied research (10h)*
  Pedro de Otaola Arca, Andrés Ramos Galán

- *Doctorado ICAI: Advanced Matlab for applied research (10h)*
  Eugenio Francisco Sánchez Úbeda

- *Doctorado ICAI: Advanced VBA-Excel for applied research (10h)*
  Salvador Doménech Martínez, Jesús María Latorre Canteli

- *Doctorado ICAI: Data analysis (10h)*
  Eugenio Francisco Sánchez Úbeda

- *Doctorado ICAI: Data Management (10h)*
  Jesús María Latorre Canteli, Eugenio Francisco Sánchez Úbeda

- *Doctorado ICAI: Forecasting techniques (10h)*
  José Portela González

- *Doctorado ICAI: Introduction to Python (10 h)*
  Andrés Ramos Galán

- *Doctorado ICAI: Reinforcement learning*
  Álvaro Jesús López López

- *Programa oficial de doctorado CETIS 99/2011: Doctorate and Scientific Research at Comillas (8h)*
  Carmen Valor Martínez

- *Seminar on Bibliographic Management (15h): Bibliographic data bases (6h)*
  José Pablo Chaves Ávila

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: *Probabilistic forecasting of functional time series: application to scenario-generation of residual demand curves in electricity markets*
  Author: Guillermo Mestre Marcos
  Supervisors: Antonio Muñoz San Roque and Estrella Alonso Pérez
  Date: October 07, 2021

- Title: *Leveraging unstructured data sources in asset pricing*
  Author: Alejandro Rodríguez Gallego
  Supervisors: Isabel Catalina Figuerola-Ferretti Garrigues and Sara Lumbreras Sancho
  Date: November 22, 2021

- Title: *Understanding the implications of industrial decarbonisation: a multidisciplinary approach towards the transition of the basic materials industry and its impact on our energy systems*
  Author: Timo Gerres
  Supervisors: José Pablo Chaves Ávila and Tomás Gómez San Román
  Date: January 12, 2022

- Title: *Factor investing, ESG metrics and market timing rules*
  Author: Ramón Bermejo Climent
  Supervisor: Isabel Catalina Figuerola-Ferretti Garrigues
  Date: February 24, 2022

- Title: *Addressing energy poverty in an integrated way. An interdisciplinary characterisation of Spanish vulnerable households and proposal for implementing feasible technical and policy solutions*
  Author: Roberto Barrella
  Supervisors: José Ignacio Linares Hurtado and José Carlos Romero Mora
  Date: July 05, 2022

5.4.2 Submitted theses in other universities

- Title: *El comportamiento, los conflictos de tráfico y los factores asociados con la accidentalidad de los motociclistas en las intersecciones de las vías de Cartagena*
  Author: Holman Ospina Mateus
  Supervisors: Leonardo Augusto Quintana Jiménez and Francisco José López Valdés
  Pontificia Universidad Javeriana. Bogotá (Colombia).
  Date: December 09, 2021

- Title: *Religión, consumo sostenible y cambio climático: la influencia de la religiosidad en la huella de carbono personal*
  Author: Anabel Rocío Orellano
  Supervisors: Emilio Chuvieco Salinero and Carmen Valor Martínez
  Universidad de Alcalá. Alcalá de Henares (Spain).
  Date: July 12, 2022

5.4.3 Comillas ongoing theses

- Title: *Development of a wireless Brain Computer Interface system.*
  Author: Eduardo Alonso Rivas
  Supervisors: Carlos Rodríguez-Morcillo García and Romano Giannetti

- 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: *Contribuciones al análisis y la previsión de los precios del petróleo*
  Author: Pedro Moreno Alonso
  Supervisor: Antonio Muñoz San Roque

- Title: *Market aproach to esg?*
  Author: Paraskevas Paraskevas
  Supervisors: Isabel Catalina Figuerola-Ferretti Garrigues and Sara Lumbreras Sancho

- Title: *Multi-area electricity market modeling using Intelligent data Techiniques and an Advanced Temporal Framework*
  Author: Alberto Orgaz Gil
  Supervisors: Javier Reneses Guillén and Antonio Bello Morales

- Title: *DSO-TSO Coordination in the European context*
  Author: Leandro Lind
  Supervisors: Rafael Cossent Arín and Pablo Frías Marín

- Title: *Multi-region probabilistic electric load forecasting using coherent temperature scenarios*
  Author: Santiago Moreno Carbonell
  Supervisors: Eugenio Francisco Sánchez Ubeda and Antonio Muñoz San Roque

- Title: *Analysis of policy strategies for renewable energy integration in multi-area electricity markets*
  Author: Geovanny Alberto Marulanda García
  Supervisors: Antonio Bello Morales and Javier Reneses Guillén

- Title: *Modelling and Optimizing the behavior of distributed agents in decentralized power systems by Reinforcement Learming techniques*
  Author: David Domínguez Barbero
  Supervisors: Javier García González and Miguel Angel Sanz Bobi

- Title: *Medium-term technical and economical analysis impacts of storage on power systems under different scenarios with high renewables share*
  Author: Sébastien Huclin
  Supervisors: Andrés Ramos Galán and José Pablo Cháves Avila

- Title: *Research status report: The intentionality in impact funds: how to measure it and effects on impact perfomance*
  Author: Olga de Bergé Pineo
  Supervisors: José Luis Fernández Fernández and Elisa María Aracil Fernández

- Title: *THE FACTORS FOR SUSTAINABLE BRAND EXTENSION SUCCESS*
  Author: María Luisa Hernández Olalla
  Supervisors: Carmen Valor Martínez and Carmen Abril Barrie

- Title: *Highly sensitive Metamaterial-Inspired Microwave Sensors for Liquid Dielectric Characterization*
  Author: Mahdieh GholamiMayani
  Supervisors: Romano Giannetti and Javier Matanza Domingo

- Title: *Optimal Power Grid Design for a Low Carbon Emisson Future*
  Author: Erik Francisco Alvarez Quispe
  Supervisors: Andrés Ramos Galán and Luis Olmos Camacho

- Title: *Assessment of electricity network requierements for the energy transition*
  Author: Leslie Lara Herding
  Supervisors: Michel Rivier Abbad and Rafael Cossent Arín

- Title: *Novel approaches for condition monitoring and dimensioning of high-voltage insulators*
  Author: Héctor de Santos Yubero
  Supervisor: Miguel Ángel Sanz Bobi

- Title: *Flexible Charging of Electric Vehicles Using Distributed Technologies Such as Blockchain*
  Author: Morsy Abdelkader Morsy Mohammed Nour
  Supervisors: Alvaro Sánchez Miralles and José Pablo Cháves Avila

- Title: *Stability analysis of large power Systems with 100% of non-synchronous generation*
  Author: Régulo Enrique Avila Martinez
  Supervisor: Luis Rouco Rodríguez

- Title: *Medium-term hydrothermal scheduling considering short-term uncertainty*
  Author: Jesús David Gómez Pérez
  Supervisors: Andrés Ramos Galán and Jesús María Latorre Canteli

- Title: *Exploring the design of local Market-based Machanisms to provide DSO flexibility services.*
  Author: Fernando David Martín Utrilla
  Supervisors: Rafael Cossent Arín and José Pablo Cháves Avila

- Title: *Dealing with Uncertainty in Energy Planning: Robust Optimization for Energy Models.*
  Author: Antonio Francisco Rodríguez Matas
  Supervisors: Pedro Linares Llamas and José Carlos Romero Mora

- Title: *Mejoras en el control secundario de microrredes con sistemas de batería.*
  Author: Diana Patricia Morán Río
  Supervisors: Aurelio García Cerrada and Javier Roldán Pérez

- Title: *A bilevel model for the long-term evolution of tariffs in the power sector considering behind-the-meter distributed generation*
  Author: Salvador Doménech Martínez
  Supervisors: Francisco Alberto Campos Fernández and José Villar Collado

- Title: *Island system operation with high degree of rewable energy resources*
  Author: Mohammad Rajabdorri
  Supervisors: Enrique Lobato Miguélez and Lukas Sigrist

- Title: *Influence of Education on East African Women`s Entrepreneurial Innovation Practices*
  Author: Grace Akullo
  Supervisors: Elisa María Aracil Fernández and Samuel Mbugua Mwaura

- Title: *Access Based Services Customer misbehaviour and value co-creation in carshaning explained through the lens of academic theories in social sciences. Evidence from the data*
  Author: Andres Camacho Donézar
  Supervisors: Carmen Valor Martínez and José Portela González

- Title: *Are you sustainable product? Consumer´s and practitioner´s categorization of sustainable products*
  Author: María Aranzazu Larrañaga Muguerza
  Supervisors: Carmen Valor Martínez and Antonetti Paolo

- Title: *Dideño de tarifas eléctricas en un entorno de descarbonización, descentralización y digitalización de los sistemas eléctricos*
  Author: Nicolás Mariano Morell Dameto
  Supervisors: Tomás Gómez San Román and José Pablo Cháves Avila

- Title: *Interaction between DSO and third-party flexibility resources in the operation of distribution grids*
  Author: Orlando Mauricio Valarezo Rivera
  Supervisors: Tomás Gómez San Román and José Pablo Cháves Avila

- Title: *Risk assessment and modeling of human behavior through games and AI*
  Author: Jaime Pérez Sánchez
  Supervisors: Gregorio Ignacio López López and Mario Castro Ponce

- 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: *The impact of explicit demand flexibility for generation investment planning and operationof the future electric system*
  Author: Teresa Freire Barceló
  Supervisors: Alvaro Sánchez Miralles and Francisco María Martín Martínez

- Title: *Improving medium-term models to deal with the low-carbon reality of modern power systems.*
  Author: Luis Manuel Montero Guirao
  Supervisors: Javier Reneses Guillén and Antonio Bello Morales

- Title: *Detección de Ciberataques mediante algoritmos de aprendizaje y clasificación en la matriz de MITRE ATT&CK*
  Author: Antonio Pérez Sánchez
  Supervisor: Rafael Palacios Hielscher

- Title: *Cryogenic Supply System with Magnetic Refrigeration Stage*
  Author: Carlos José Hernando López de Toledo
  Supervisors: Juan Carlos del Real Romero and Javier Munilla López

- Title: *Improving the representation of the transport sector within energy models*
  Author: Manuel Pérez Bravo
  Supervisors: Pedro Linares Llamas and Pablo Frías Marín

- Title: *Coordination between Generation and Transission expasion planning in a liberalized electricoty context, and the use os fte of FTRs as a coordination tool*
  Author: Stefania Gómez Sánchez
  Supervisor: Luis Olmos Camacho

- Title: *DC segmentation of power system*
  Author: Mathieu Guillaume Robin
  Supervisors: Francisco Javier Renedo Anglada and Aurelio García Cerrada

- Title: *Desarrollo y aplicación real de un indicador de degradación de un sistema BESS operando en regulación*
  Author: Jose Ignacio Alvarez-Monteserin Garcia
  Supervisor: Miguel Ángel Sanz Bobi

- Title: *Explainable Machine Learning applied to predictive Maintenance*
  Author: Jaime Pizarroso Gonzalo
  Supervisors: José Portela González and Antonio Muñoz San Roque

- Title: *Multi-agent secondary control of microgrids*
  Author: Andrés Tomás Martín
  Supervisors: Aurelio García Cerrada and Lukas Sigrist

- Title: *The impact of bike-sharing systems in urban mobility : the BiciMad case*
  Author: Carlos Miguel Vallez Fernández
  Supervisors: Mario Castro Ponce and David Contreras Bárcena

- Title: *Injury risk assessment through the combination of metdmodels and baseline human body models*
  Author: Manuel Valdano
  Supervisors: Francisco José López Valdés and Bengt Pipkorn

- Title: *Development of smart environment for assetmanagement based on Machine Learning Models inpower grids*
  Author: GopaL Lal Rajora
  Supervisor: Miguel Ángel Sanz Bobi

- Title: *Optimal Operation and Configuration of VPP under Uncertainty of Non-Dispatchable RES in the Energy and Ancillary Markets*
  Author: Hadi Nemati
  Supervisors: Álvaro Ortega Manjavacas and Pedro Sánchez Martín

- Title: *Long-term Active Distribution Network Planning with High Shares of Variable Renewable Energy*
  Author: David Ulrich Ziegler
  Supervisors: Tomás Gómez San Román and Carlos Mateo Domingo

- Title: *Real Time operation of RES-based Virtual Power Plants*
  Author: Oluwaseun Enoch Oladimeji
  Supervisors: Lukas Sigrist and Álvaro Ortega Manjavacas

- Title: *Deep Learning for Geometry Processing*
  Author: Pedro López-Adeva Fernández-Layos
  Supervisor: Luis Francisco Sánchez Merchante

- 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: *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: *Contibuciones al uso óptimo de los protocolos de comunicación en entornos específicos de ámbito industrial y ferroviario*
  Author: Juan Manuel Cerezo Sánchez
  Supervisor: José Antonio Rodríguez Mondéjar

- Title: *Contributions to automatic detection of inconsistencies on Description texts of protocol Behaviour*
  Author: Sonia León del Rosario
  Supervisors: José Antonio Rodríguez Mondejar and Cristina Puente Águeda

- Title: *Planning and assessment of the impact of distribution networks interconnection in urban districts with high deployment of flexible distributed energy resources.*
  Author: Luca de Rosa
  Supervisors: Tomás Gómez San Román and Carlos Mateo Domingo

- Title: *Regulation of Flexibility in Electricity Distribution Networks*
  Author: Mauricio Correa Ramirez
  Supervisors: Tomás Gómez San Román and Rafael Cossent Arín

6. Other activities

6.1 EES-UETP

The Electric Energy Systems - University Enterprise Training Partnership (EES-UETP) is a consortium of 3 companies and 22 universities and research centers in 15 European countries. They started operations in July 1992 under the program COMETT (COMmunity program for Education and Training in Technology). Since its origin, the IIT has participated very actively in the management and maintenance of this Association.

The main objective of the EES-UETP is to increase the competitiveness of the electric power industry sector through technology training. In this sense, the main activities of the EES-UETP are the organization of advanced courses in electric power systems and exchanges of students and researchers.

More information at http://www.ees-uetp.com.

6.1.1 EES-UETP partners

Currently, the partners of the ESS-UETP are as detailed below, classified by country:

- **Austria**
  - Graz University of Technology
- **Belgium**
  - Katholieke Universiteit Leuven (KU Leuven)
- **Croatia**
  - Energy Institute Hrvoje Požar
  - University of Osijek
- **Denmark**
  - Danmarks Tekniske Universitet
- **Finland**
  - Graduate School in Electrical Energy Engineering (GSEEE)
- **France**
  - École Supérieure d´Electricité (SUPELEC)

- Gestionnaire du Réseau de Transport d'Electricité (RTE)
- **Germany**
  - Technische Universität Dortmund
- **Greece**
  - National Technical University of Athens
- **Italy**
  - Universitá degli Studi di Bologna
  - Universitá degli Studi di Cagliari
  - Universitá degli Studi di Genova
- **Latvia**
  - Riga Technical University
- **Portugal**
  - Institute for Systems and Computer Engineering of Porto (INESC Porto)
- **Spain**
  - Catalonia Institute for Research in Technology (IREC)
  - Iberdrola, S.A.
  - Universidad de Sevilla
  - Universidad Politécnica Valencia
  - Universidad Pontificia Comillas
- **Sweden**
  - KTH Royal Institute of Technology
- **Switzerland**
  - École Polytechnique Fédérale de Lausanne (EPFL)
  - ETH Zürich
- **United Kingdom**
  - University of Manchester
  - University of Strathclyde

Besides being an active member of the network, the Comillas Pontifical University covers the following positions in the EES-UETP:
- Chairman of the Executive Board: Mr. Luis Rouco Rodríguez
- Coordinating Secretary: Mr. Luis Olmos Camacho

6.1.2 Teached courses

- *HVDC grids and Offshore Wind*
  Danmarks Tekniske Universitet, Denmark
  Katholieke Universiteit Leuven, Belgium
  CITCEA-UPC, Universidad Pontificia de Catalunya, Spain

6.2 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:

- Elisa María Aracil Fernández, in Management Department, Sapienza Università di Roma, Rome (Italy). May 2022.

- Roberto Barrella, in Center for Environmental and Sustainability Research (CENSE), Universidade NOVA de Lisboa, Lisbon (Portugal). January-April 2022.

- Pablo Calvo Báscones, in Research Centre for Automatic Control (CRAN), Université de Lorraine, Nancy (France). October 2021-January 2022.

- Efraim Centeno Hernáez, in Institut für Elektrizitätswirtschaft und Energieinnovation, Universität Graz, Graz (Austria). May 2022.

- Pedro Linares Llamas, in CEEPR, Massachussetts Institute of Technology - MIT, Boston (United States of America). July 2022.

- Sara López de Armentia Hernández, in School of Mechanical and Manufacturing Engineering, DCU - Dublin City University, Dublin (Ireland). January-February 2022.

- Sara López de Armentia Hernández, in School of Chemical Engineering, University of Birmingham, Birmingham (United Kingdom). May-July 2022.

- Nicolás Mariano Morell Dameto, in MIT Energy Initiative, Massachusetts Institute of Technology (MIT), Boston (United States of America). March-September 2022.

- Pedro de Otaola Arca, in Department of Electrical Engineering. Center for Electric Power and Energy., Technical University of Denmark (DTU), Roskilde (Denmark). February-April 2022.

- Jaime Pérez Sánchez, in Department of Economics, University of Exeter, Exeter (United Kingdom). January-April 2022.

- Mohammad Rajabdorri, in Department of Engineering, University of Durham, Durham (United Kingdom). June-September 2022.

- Antonio Francisco Rodríguez Matas, in Operations Research, Universidad Carlos III de Madrid (UC3M), Madrid (Spain). May-July 2022.

6.3 Visiting professors

- Sauro José Yagüe Yagüe, from IQS School of Engineering, Universitat Ramon Llull, Barcelona (Spain). July 2015-August 2022.

6.4 Visiting students

- Marco Branzi, from Department of Technique and Management of Industrial Systems (DTG), Padua University, Padova/Vicenza (Italy). March-July 2022.

- César Leandro Dorado Romero, from Facultad de Ingeniería Electrónica y Telecomunicaciones, Universidad del Cauca, Popayán (Colombia). May-June 2022.

- Marco Galici, from Department of Electrical and Electronic Engineering, University of Cagliari, Caligary (Italy). June-July 2022.

- Madeleine Hill, from Engineering, University of Applied Sciences Upper Austria, Wels (Austria). January-July 2022.

- Muhammad Minhaj Khan, from Nuclear Engineering, Kyung Hee University, Seoul (South Korea). October 2021-July 2022.

- Samuele Manente, from Department of technique and management of industrial systems, University of Padua, Padua (Italy). March-July 2022.

- Jan Marc Schwidtal, from Department: Industrial Engineering, University of Padua, Padua (Italy). October 2020.

- Sophia Tushak, from Mechanical and Aerospace Engineering, University of Virginia, Charlottesville (USA). February-May 2022.

6.5 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:

- José Pablo Chaves Ávila, Matteo Troncia, *"ISGAN Academy".* International Smart Grid Action Network (ISGAN). USA. Online.

- Luis Olmos Camacho, Luis Rouco Rodríguez, Rafael Palacios Hielscher, *"Coordination of the course committee of the EES-UETP network during the year 2021".* Electric Energy Systems - University Enterprise Training Partnership Association (EES-UETP). USA. Madrid.

- Efraim Centeno Hernáez, Luis Alberto Herrero Rozas, *"Support and training for CODEX tool".* Endesa Medios y Sistemas S.L. USA. Online.

- Luis Rouco Rodríguez, Lukas Sigrist, *"Course on small-signal stability of power systems".* Siemens, S.A. USA. Madrid.

- Juan Carlos del Real Romero, *"Training European Adhesive Bonder (QC / Durability)".* Sika S.A.U. USA. Alcobendas, Madrid.

- Francisco Alberto Campos Fernández, Salvador Doménech Martínez, *"CODEX: Modeling of new trends".* Endesa Medios y Sistemas S.L. USA. Online.

- Francisco José López Valdés, *"Child restraint system expert course".* Inscripciones asistentes. USA. Madrid.

- Pablo Rodilla Rodríguez, *"FSR e-learning course on regulation of energy utilities".* European University Institute (EUI), Florence School of Regulation. USA. Online.

- Luis Olmos Camacho, Luis Rouco Rodríguez, Rafael Palacios Hielscher, *"Coordination of the course committee of the EES-UETP network during the year 2022".* Electric Energy Systems - University Enterprise Training Partnership Association (EES-UETP). USA. Madrid.

- Andrés Ramos Galán, Javier García González, *"Computational modeling tools for promoting low-carbon electricity".* Massachusetts Institute of Technology (MIT). USA. Online.

- Luis Rouco Rodríguez, *"Course on power system stabilizers".* Engie Cartagena S.L. USA. Online.

- Alexis Cantizano González, *"Course on numerical simulation of fires".* Dirección General de la Policía. División de Formación y Perfeccionamiento. USA. Madrid.

- Juan Carlos del Real Romero, Yolanda Ballesteros Iglesias, Eva Paz Jiménez, Sara López de Armentia Hernández, *"ractical course of adhesive joints for the European Adhesive Engineer (EAE)".* Asociación Española de Soldadura y Tecnologías de Unión (CESOL). USA. Madrid.

- Luis Rouco Rodríguez, Lukas Sigrist, *"Course on power syetm protection fundamentals".* Red Eléctrica de España, S.A. USA. Tres Cantos, Madrid.

6.6 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.

- Erik Francisco Álvarez Quispe, *"openENTRANCE case study 3: Need for flexibility storage".* EMP-E 2021 - Re-Energising Sustainable Transitions in Europe. Energy Modelling Platform for Europe- EMPE.

- Elisa María Aracil Fernández, *"AMR Idea Development Workshop".* Academy of Management.

- Elisa María Aracil Fernández, *"Silver economy".* III Jornadas «Mayores y postpandemia: derechos, riesgos y oportunidades». Observatorio de Conciliación, Corresponsabilidad y Diversidad. Universidad Pontificia Comillas.

- Elisa María Aracil Fernández, *"An analytical framework for the silver economy in Europe".* Conferencia sobre el futuro de Europa (COFE). Universidad Pontificia Comillas.

- Elisa María Aracil Fernández, David Roch Dupré, *"We will live 100 years: rethinking the economics of longevity in Europe".* Conferencia sobre el futuro de Europa (COFE). Universidad Pontificia Comillas.

- Eva María Arenas Pinilla, *"The role of golden hydrogen in the decarbonization of the residential sector".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- Roberto Barrella, *"A decade of research on energy poverty indicators. Where should we go?".* Jornada «Pobreza energética: Diez años de visibilización y acción». ACA - Asociación de Ciencias Ambientales.

- Roberto Barrella, *"Session 2. "How far is the thermal bonus going to alleviate Energy Poverty?"".* VII Sesión del Seminario Interdisciplinar. Situación actual y perspectivas de evolución de la pobreza energética en España.. Cátedra de Energía y Pobreza. Universidad Pontificia Comillas.

- Roberto Barrella, *"What can engineers do to address energy poverty?".* Universidad Carlos III de Madrid.

- Roberto Barrella, Eva María Arenas Pinilla, José Carlos Romero Mora, *"Modeling and analysis of the electricity consumption of vulnerable households in Spain".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- Álvaro Benítez Domínguez, *"Developments in the Multi-Stage Holomorphic Embedded Load Flow Method (MSHELM)".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Mario Castro Ponce, *"What the pandemic took away: How has the pandemic affected environmental and health law?".* Semana de la Ciencia y la Innovación 2021. Fundación para el conocimiento madri+d. Comunidad de Madrid.

- José Pablo Chaves Ávila, *"CoordiNet lessons learnt".* The CoordiNet final event. E.DSO.

- José Pablo Chaves Ávila, *"Driving balancing responsibility: why imbalance pricing alternatives and balancing area sizing matter for renewables".* Webinar «Imbalance settlement processes: Economic incentives for balancing responsible parties in Europe». International Association for Energy Economics (IAEE).

- José Pablo Chaves Ávila, *"Flexibility in the network".* Ciclo «La distribución del futuro». UFD.

- María del Mar Cledera Castro, Carlos Morales Polo, *"Waste-to-energy valuation of sewage sludge waste".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- María del Mar Cledera Castro, Carlos Morales Polo, Ana María Santos Montes, Yolanda González Arechavala, *"Carbon footprint reduction measures in the automotive industry".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- Rafael Cossent Arín, *"Regulatory and policy issues".* EUniversal Workshop 2022. European project Euniversal.

- Rafael Cossent Arín, Pedro Linares Llamas, *"Public presentation of the Report of the Observatory on Energy and Sustainability in Spain. Report based on indicators. 2021 edition".* Cátedra BP de Energía y Sostenibilidad. Universidad Pontificia Comillas.

- Rafael Cossent Arín, Sara Lumbreras Sancho, *"Review of Flagships proposed for the Spanish case".* Accelerating Climate Action. Key transformative investment opportunities under the Green transition Analysis of the Spanish case. Agora Energiewend; y Universidad Pontificia Comillas.

- Pablo Frías Marín, *"Electromobility in Spain: current status and future trends".* 7th Annual Electric Vehicle Road Transport. Edinburgh Napier University.

- Pablo Frías Marín, *"Europe's perspective of smart EV charging. Session 4: Smart charging infraestructure".* E-Mobility Workshop. I.I.T. Bombay.

- Pablo Frías Marín, *"Challenges of the new mobility: eConcessionaires, recharging infrastructures and road safety".* Congreso & Expo 2022 Faconauto. Faconauto.

- Miguel García Sánchez, *"XI Workshop for doctoral students in business ethics, RSE and Sustainability".* Cátedra Iberdrola de Ética Económica y Empresarial. Universidad Pontificia Comillas.

- Miguel García Sánchez, Mario Castro Ponce, *"Brownian dynamics simulations of the B-cell activation".* Third Workshop on Nonlinear Dynamics in Biological Systems. Universidad Rey Juan Carlos.

- Juan Luis Gómez González, *"Probabilistic modelling of wildfires based on cellular automata and bayesian networks".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Tomás Gómez San Román, *"Decarbonisation of demand: development of electricity grids to face the challenges of decarbonisation of demand".* Universidad Pontificia Comillas.

- Tomás Gómez San Román, *"The digitization of electricity distribution networks in Spain".* Webinar «Digitalización de las redes eléctricas de distribución». Fundación Naturgy.

- Tomás Gómez San Román, *"The activity of electrical energy storage. Regulatory strategy".* Foro Energía y Regulación. FIDE - Fundación para la Investigación sobre el Derecho y la Empresa.

- Tomás Gómez San Román, *"Presentation of «The digitization of of electricity distribution networks in Spain» report.".* Webinar «Digitalización de las redes eléctricas de distribución». Fundación Naturgy.

- Tomás Gómez San Román, *"Rethinking the price formation model of electricity in the Iberian market".* 9º Fórum Energia. Água & Ambiente.

- Yolanda González Arechavala, *"Discovering Artificial Intelligence".* Semana de la Ciencia y la Innovación 2021. Fundación para el conocimiento madri+d. Comunidad de Madrid.

- Yolanda González Arechavala, *"3D design and creativity with 3D pencil".* 1ª Jornada de Educación STEM. Universidad Pontificia Comillas.

- Yolanda González Arechavala, *"Training for safe employment".* Jornada «Apuesta por la empleabilidad de la mujer». EMT - Empresa Municipal de Transportes.

- Yolanda González Arechavala, *"STEM education, inspiration for new generations".* I Semana Interdisciplinar del Espacio y IV Congreso de Ingeniería Espacial. Instituto de la Ingeniería de España (IIE).

- Yolanda González Arechavala, *"Women in STEM careers: inspiration and leadership".* iFriday. Sacyr.

- Yolanda González Arechavala, *"Women and Leadership at the service of society. Transform the world from Innovation and Science".* Women Insights. Foro de Mujer y Liderazgo. Colegio Mayor Universitario Alcor.

- Yolanda González Arechavala, *"Presentation of the Conference and Awards Ceremony".* 1ª Jornada de Educación STEM. Universidad Pontificia Comillas.

- Tiago Guimarães Leite Ferreira, *"Behavioral aspects of the energy consumer".* Seminário Internacional «O Futuro do Consumidor de Energia Elétrica». Agência Nacional de Energia Elétrica - ANEEL.

- Lucía Güitta López, *"The University as a first employer".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- Luis Alberto Herrero Rozas, Luis Jesús Fernández Palomino, *"Integration of green hydrogen generation in the MIBEL: a long-term analysis".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Pedro Linares Llamas, *"Climate change talks: Glasgow COP26 conclusions".* Webinar. Fundación Naturgy; y Capítulo Español del Club de Roma.

- Pedro Linares Llamas, *"Discussion on Renewable power generation and green hydrogen, and Clean industries Flagships".* Accelerating Climate Action. Key transformative investment opportunities under the Green transition Analysis of the Spanish case. Agora Energiewend; y Universidad Pontificia Comillas.

- Pedro Linares Llamas, *"What exactly are we talking about when we talk about energy transition?".* Diálogo sobre el Futuro de la Energía. Ayuntamiento de Cáceres; Fundación Iberdrola España; Junta de Extremadura; Universidad de Extremadura; Oficina Nacional de Prospectiva y Estrategia; Comisión Europea; y Parlamento Europeo.

- Pedro Linares Llamas, *"Is it technologically feasible to decarbonize the global economy?".* Curso de verano «Green Deal: ¿punto de inflexión frente a la crisis climática?». Basque Centre for Climate Change.

- Pedro Linares Llamas, Eva María Arenas Pinilla, Álvaro Jesús López López, Pablo Frías Marín, Yolanda González Arechavala, *"Roadmap to a Green Europe".* XII Noche Europea de los Investigadores de Madrid. Fundación madri+d; Universidad Pontificia Comillas.

- Álvaro Jesús López López, *"Artificial intelligence".* #Eventos CIC. Cátedra de Industria Avanzada. Universidad Pontificia Comillas.

- Álvaro Jesús López López, Mariano Ventosa Rodríguez, *"University and Company".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- Gregorio López López, *"Cybersecurity in the Digcomp context of the legal professions".* Ciberseguridad y los retos DIGCOMP en el ámbito jurídico. Universidad Pontificia Comillas.

- Sara Lumbreras Sancho, *"Ethical algorithms and problematic algorithms".* I Congreso Internacional de Inteligencia Artificial y Libertad de Expresión en las Ciencias Sociales. Universidad Complutense de Madrid.

- Sara Lumbreras Sancho, *"Anthropological analysis of the new languages".* XXXII Semana de Teología Pastoral. El desafío de la revolución digital a la iglesia.. Instituto Superior de Pastoral. Universidad Pontificia de Salamanca.

- Sara Lumbreras Sancho, *"Believing and artificial intelligence".* Credition 2021. Heinrich Heine University.

- Sara Lumbreras Sancho, *"Technical and anthropological challenges of the metaverse".* Jornada «Salvar la fraternidad ante la llegada del Metaverso». Cátedra Francisco José Ayala de Ciencia, Tecnología y Religión. Universidad Pontificia Comillas.

- Sara Lumbreras Sancho, *"Evil in an interdisciplinary perspective, between science, philosophy, theology and literature".* III Jornadas de investigación SOFIC. Universidad Francisco de Vitoria.

- Sara Lumbreras Sancho, *"The role of engineering in the technology-economy-impact vector".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- Sara Lumbreras Sancho, *"Ethical challenges of a future world shaped by emerging technologies".* JRC Science Summit 2022. Joint Research Centre (JRC). European Commission.

- Sara Lumbreras Sancho, *"Humanity, technology ethics and the future. Session 1: Welcome to the future".* Transvision Future Summit 2021. Designing the future. Madrid Innovation.

- Sara Lumbreras Sancho, *"Technology to connect".* TEDx VíaComplutense -ReconeXión, el primer paso para el reencuentro. TED.

- Sara Lumbreras Sancho, *"Transhumanism: its histories".* Humanity+.

- Sara Lumbreras Sancho, *"Transhumanism and artificial intelligence: science and technology applied to human improvement".* Seminario Doctoral sobre Transhumanismo.. Universidad de Costa Rica.

- Sara Lumbreras Sancho, *"Vaccines and technologies against COVID: bioethical aspects".* Semana de la Ciencia y la Innovación 2021. Fundación para el conocimiento madri+d. Comunidad de Madrid.

- Sara Lumbreras Sancho, *"Are we walking towards a posthuman future?".* IV Programa de Liderazgo Iberoamericano en España. Fundación Pablo VI.

- Hadi Nemati, *"Optimal operation and configuration of VPP under uncertainty of non-dispatchable RES in the energy and ancillary markets".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Oluwaseun Enoch Oladimeji, *"Real-time operation of RES-based virtual power plants".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- José Ignacio Pérez Arriaga, *"An index to evaluate progress towards universal electricity access".* Global Commission to End Energy Poverty.

- José Ignacio Pérez Arriaga, *"An index to evaluate progress towards universal electricity access. Session 10: Infrastructure and Grids for Africa".* Advanced Training Course - ATC 2021. RES4Africa; Enel Foundation; y European Investment Bank.

- José Ignacio Pérez Arriaga, *"Any future for markets? Any market perfectly fit for disruptions?".* Electricity markets Webinar Series.Webinar 2. Innovation & disruption in the electricity sector: What future for markets?. International Association for Energy Economics (IAEE); y Florence School of Regulation.

- José Ignacio Pérez Arriaga, *"Access gaps: last mile".* VI Semana de la Energía. Olade; y Banco Interamericano de Desarrollo (BID).

- José Ignacio Pérez Arriaga, *"Business models, advancing electricity and modern fuels, economic impact, and resilience for energy access".* Global Commission to End Energy Poverty; y Natural Resources Defense Council.

- José Ignacio Pérez Arriaga, *"Challenges and new business models to achieve universal access to energy".* Tertulia Fulbright. Asociación J.W. Fulbright.

- José Ignacio Pérez Arriaga, *"Local development in rural communities".* Unión Iberoamericana de Municipalistas.

- José Ignacio Pérez Arriaga, *"Enabling policies and regulations for scaling-up decentralised renewable energy solutions for access".* 5th International Off-grid Renewable Energy Conference and Exhibition - IOREC. International Renewable Energy Agency - IRENA.

- José Ignacio Pérez Arriaga, *"Evaluating progress towards universal electricity access".* 5th Ministerial Meeting of the Energy and Climate Partnership of the Americas (ECPA). Americas Business Dialogue (ABD).

- José Ignacio Pérez Arriaga, *"Impact Assessment of RES4Africa Panel 2: Looking forward: setting priorities for the coming years".* RES4Africa Annual Conference «Setting Priorities for Africa's Sustainable Energy Transition». RES4Africa Foundation.

- José Ignacio Pérez Arriaga, *"Increasing investments in African grid networks".* Private Sector Participation in African Grids. RES4Africa Foundation.

- José Ignacio Pérez Arriaga, *"Purposeful engineering, but … what purpose?".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- José Ignacio Pérez Arriaga, *"Le rôle de la Guinée dans l'accélération du commerce regional.".* 5th Africa Energy Market Place (AEMP). African Development Bank.

- José Ignacio Pérez Arriaga, *"Mise en œuvre complète de dégroupage du secteur pour le renforcer".* 5th Africa Energy Market Place (AEMP). African Development Bank.

- José Ignacio Pérez Arriaga, *"Organization of cross-border trade. Case studies: SAPP & WAPP".* Training Course on Benefits & measures for international power exchanges. Florence School of Regulation; y Mediterranean Transmission System Operators.

- José Ignacio Pérez Arriaga, *"Power systems of the future".* Managing New Power Markets and Regulation in Africa course. University of Cape Town.

- José Ignacio Pérez Arriaga, *"Presentation of the current activities of the GCEEP".* COP 26. UK Government; y United Nations Climate Change.

- José Ignacio Pérez Arriaga, *"Reducing energy poverty".* 14th Annual Energy Africa Conference «Unlocking Africa's Energy Investments' Potential». Global Commerce Forum.

- José Ignacio Pérez Arriaga, *"Regulation for electricity access in emerging market & developing economies".* "Introduction to the electricity sector: Engineering, economics, & regulation" course. Princeton University.

- José Ignacio Pérez Arriaga, *"Topics in electricity policy in developing countries".* HARVARD-ENEL Foundation Worshop on Analysis and Management of Energy and Environmental Policy. Harvard University.

- José Ignacio Pérez Arriaga, *"Transparency and regulations: scaling mini-grids and mega-projects".* SEforALL Forum 2022 Agenda «Driving Bold Action for a People-Centred Energy Transition». Sustainable Energy for All.

- José Ignacio Pérez Arriaga, *"What does it take to move from single buyer model to wholesale electricity market in developing countries?".* ESMAP.

- José Ignacio Pérez Arriaga, Andrés González García, *"If you want to transform the world, become an engineer.".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- Manuel Pérez Bravo, *"Assessing the transport policies needed to reach the 1.5ºC target: decarbonizing road transport in Spain".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Manuel Pérez Bravo, *"The role of transport models in the energy transition: assessing policies and trends".* International Autumn School «Climate Policy and Energy System Transformation: New Opportunities and Challenges of the Consideration of Co-Benefits». TU Bergakademie Freiberg; Forschungszentrum Jülich.

- José Portela González, Antonio Muñoz San Roque, *"NeuralSens".* Grupo de Investigación en Innovación Docente y Analytics - GIIDA. Universidad Pontificia Comillas.

- Andrés Ramos Galán, *"Mathematical models for transmission expansion planning".* Webinar «Spain's Power Network towards a Zero Emissions future: The Role of the Grid and Innovative Technologies». currENT; y Olivo Energy.

- Andrés Ramos Galán, *"Decomposition methods in integer programming: Benders decomposition".* Ciclos de Conferencias del IMI-DSC. Instituto de Matemática Interdisciplinar; y Universidad Complutense de Madrid.

- Juan Carlos del Real Romero, *"Internships at ICAI: analysis and trends".* VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro». Colegio de Ingenieros del ICAI.

- David Roch Dupré, *"BSENIOR "Ageism, from 45, what?"".* Barcelona Woman Acceleration Week - BWAW 2022. Consorci de la Zona Franca de Barcelona; y Fundación INCYDE.

- David Roch Dupré, *"Ageism in the field of European societies".* Conferencia sobre el futuro de Europa (COFE). Universidad Pontificia Comillas.

- David Roch Dupré, *"The Silver Economy Tracker: a composite indicator to measure the Silver Economy".* Seminario Académico 2012 sobre economía y longevidad. Fundación MAPFRE; y Universidad de Deusto.

- David Roch Dupré, Carmen Valor Martínez, Elisa María Aracil Fernández, Elena María Díaz Aguiluz, *"The demographic challenge and the Silver Economy".* Semana de la Ciencia y la Innovación 2021. Fundación para el conocimiento madri+d. Comunidad de Madrid.

- Antonio Francisco Rodríguez Matas, *"Dealing with uncertainty in energy planning: robust optimization for energy models".* International Autumn School «Climate Policy and Energy System Transformation: New Opportunities and Challenges of the Consideration of Co-Benefits». TU Bergakademie Freiberg; Forschungszentrum Jülich.

- Antonio Francisco Rodríguez Matas, *"Robustness and flexibility in strategic energy planning: a case of study on the Spanish carbon budget for the 1.5ºC target".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Antonio Francisco Rodríguez Matas, Pedro Linares Llamas, *"Robust programming in energy".* Hacia una transición energética justa. Líneas de trabajo recientes de la Red MENTES. MENTES - Red Temática de Modelización Energética para una Transición Energética Sostenible.

- Néstor Rodríguez Pérez, *"Scalability evaluation of a modbus TCP control and monitoring system for distributed energy resources".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Rubén Rodríguez Vilches, Olga Rico Díez, *"ReDREAM change your energy".* 11ª Conferencia del Programa Marco de Investigación e Innovación de la Unión Europea en España. CDTI; Ministerio de Ciencia e Innovación; y Comisión Europea.

- José Carlos Romero Mora, *"Higher education and research for socio-ecological transformation".* SC URL 2021 VI Semana Científica. Universidad Rafael Landívar.

- José Luis Sancha Gonzalo, *"What is happening with the electricity bill?".* SEJU; Asociación de Ingenieros de ICAI.

- José Luis Sancha Gonzalo, *"What is happening with the electricity bill?".* Advanced manufacturing Madrid21.. CMR.

- José Luis Sancha Gonzalo, *"What is happening with the electricity bill?".* Logistics & automation.The future of intralogistics technology. Slimstock.

- Dilayne Santos Oliveira, *"Increasing time resolution and improving the modelling of the power sector in TIMES-SINERGIA model".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Matteo Troncia, *"Coordinet Project. Session 1: Flexibility market mechanisms across Europe".* Enlit Europe 2021. European Commission.

- Matteo Troncia, *"Services, products, and market design for a harmonised European electricity market".* OneNet Grid Forum (GRIFOn). One Network for Europe - ONENET.

- Manuel Valdano, *"Evaluation of AIS3+ car occupant injuries using deterministic and probabilistic methods in frontal crashes".* 17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022. Instituto de Investigación Tecnológica. Universidad Pontificia Comillas.

- Carmen Valor Martínez, *"Reconnect with nature".* TEDx VíaComplutense -ReconeXión, el primer paso para el reencuentro. TED.

- Carmen Valor Martínez, *"To be or not to be, to appear or not to appear ... Sustainable".* Semana de la Ciencia y la Innovación 2021. Fundación para el conocimiento madri+d. Comunidad de Madrid.

6.7 Organization of congresses, seminars and workshops

- Jenny Alexandra Cifuentes Quintero, *"New Bridges between Mathematics and Data Science".* Red Estratégica en Matemáticas (REM). Valladolid (Spain). November 2021.

- Matteo Troncia, *"Powering system flexibility in the future through renewable energy sources: the role of virtual power plants (POSYTYF H2020 project)".* International Smart Grid Action Network (ISGAN). Online. November 2021.

- José Carlos Romero Mora, Roberto Barrella, Efraim Centeno Hernáez, *"VII Sesión del Seminario Interdisciplinar. Situación actual y perspectivas de evolución de la pobreza energética en España.".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain). November 2021.

- María José Manjón Rodríguez, *"Innovación social en pobreza energética. El papel de las empresas en la lucha contra la pobreza energética".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain). December 2021.

- Matteo Troncia, *"Optimizing the value of storage in power systems and electricity markets (Smart4RES H2020 project)".* International Smart Grid Action Network (ISGAN). Online. December 2021.

- Miguel García Sánchez, *"IV Congreso Iberoamericano de Jóvenes Investigadores en Economía y Empresa - Congreso AJICEDE".* Universidad Pontificia Comillas. Madrid (Spain). December 2021.

- Rafael Cossent Arín, *"Nuevos modelos de negocio en torno al hidrógeno: análisis desde diferentes segmentos de la cadena de suministro".* Cátedra de Estudios sobre el Hidrógeno. Universidad Pontificia Comillas. Madrid (Spain). January 2022.

- Roberto Barrella, Efraim Centeno Hernáez, José Carlos Romero Mora, *"Indicadores de pobreza energética en España 2020. Más allá de los índices oficiales".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Online. January 2022.

- Matteo Troncia, *"Contribution of the Osmose project to the enhancement of the IEC61850 standard: Improvement of the engineering process and storage data modeling".* International Smart Grid Action Network (ISGAN). Online. January 2022.

- Alberto Carnicero López, *"Future Urban Mobility Challenge".* Universidad Pontificia Comillas. Madrid (Spain). February 2022.

- Eva María Arenas Pinilla, *"El amoníaco como vector energético para transporte y almacenamiento de hidrógeno".* Cátedra Rafael Mariño de Nuevas Tecnologías Energéticas. Universidad Pontificia Comillas. Madrid (Spain). February 2022.

- Santos José Díaz Pastor, José Ignacio Pérez Arriaga, *"International Conference on Concessions in the Power Sector".* African School of Regulation (ASR); MIT Energy Initiative; World Bank; y Rockefeller Foundation. Online. February-March 2022.

- Rafael Cossent Arín, *"Europe´s energy crisis, geopolitical risk and the role of clean hydrogen under the green transition".* Cátedra de Estudios sobre el Hidrógeno. Universidad Pontificia Comillas. Madrid (Spain). March 2022.

- Eva María Arenas Pinilla, *"Evolución del reactor nuclear avanzado HTGR hasta llegar al MIGHTR, desarrollado por Boston Atomics".* Cátedra Rafael Mariño de Nuevas Tecnologías Energéticas. Universidad Pontificia Comillas. Madrid (Spain). March 2022.

- Álvaro Jesús López López, *"Logística y cadena de suministro post COVID".* Cátedra de Industria Conectada. Universidad Pontificia Comillas. Madrid (Spain). March 2022.

- Elena María Díaz Aguiluz, Elisa María Aracil Fernández, David Roch Dupré, *"Conferencia sobre el futuro de Europa (COFE). Mesa redonda: Viviremos 100 años: repensando la economía de la longevidad en Europa".* Universidad Pontificia Comillas. Madrid (Spain). March 2022.

- Rafael Cossent Arín, *"Oportunidades del hidrógeno verde ante la transición energética y barreras para el desarrollo de proyectos de hidrógeno renovable en España".* Cátedra de Estudios sobre el Hidrógeno. Universidad Pontificia Comillas. Madrid (Spain). April 2022.

- Elisa María Aracil Fernández, *"Banking on ESG. Microfinanzas en España".* Universidad Pontificia Comillas. Madrid (Spain). April 2022.

- Elisa María Aracil Fernández, *"Climate change and climate finance: the key role of the banking sector in emerging markets".* Universidad Pontificia Comillas. Madrid (Spain). May 2022.

- Miguel García Sánchez, *"Fostering the value of Technology, Telco and Media Companies".* Quint; y Universidad Pontificia Comillas. Madrid (Spain). May 2022.

- Efraim Centeno Hernáez, José Carlos Romero Mora, Roberto Barrella, *"VIII Sesión del Seminario Interdisciplinar. ¿Cómo contribuyen las comunidades energéticas a luchar contra la pobreza energética?".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain). May 2022.

- Sara Lumbreras Sancho, *"17th Workshop on Industrial Systems and Energy Technologies - JOSITE'2022".* Instituto de Investigación Tecnológica. Universidad Pontificia Comillas. Madrid (Spain). June 2022.

- Elisa María Aracil Fernández, *"Workshop «Recent contributions in climate finance»".* Cátedra de Estudios Sobre el Hidrógeno; y Cátedra de Caixabank Economía Sostenible. Madrid (Spain). June 2022.

- Yolanda González Arechavala, *"Jornada de Orientadores: la orientación hacia los estudios STEM".* Cátedra para la promoción de la mujer en vocaciones STEM en la Formación Profesional para la movilidad sostenible. Universidad Pontificia Comillas. Madrid (Spain). July 2022.

- Miguel García Sánchez, *"12th International EIASM Public Sector Conference".* European Institute for Advanced Studies in Management (EIASM) ; y Universidad Pontificia Comillas. Madrid (Spain). August 2022.

6.8 Organization and management of other academic activities

- Elisa María Aracil Fernández, *"Chairman in Round table: ESG challenges in the 4th industrial revolution".* Cátedra de Industria Conectada. Universidad Pontificia Comillas. Madrid (Spain). June 2022.

- Elisa María Aracil Fernández, *"Chairman in Round table: Analysis of current challenges in «Foro anual «La Aceleración de la Transición Ecológica como Respuesta a los Retos Actuales»»".* Grupo Español para el Crecimiento Verde (GECV). Madrid (Spain). June 2022.

- Mario Castro Ponce, *"Permanent member of Congress of Statistical Physics - FISES".* RSEF / GEFENOL. April 2014- Today.

- Efraim Centeno Hernáez, *"Chairman in Session 2. "How far is the thermal bonus going to alleviate Energy Poverty?" in «VII Sesión del Seminario Interdisciplinar. Situación actual y perspectivas de evolución de la pobreza energética en España.»".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain). November 2021.

- Efraim Centeno Hernáez, *"Chairman in Discussion and conclusions in «VIII Sesión del Seminario Interdisciplinar. ¿Cómo contribuyen las comunidades energéticas a luchar contra la pobreza energética?»".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain) Online. May 2022.

- Jenny Alexandra Cifuentes Quintero, *"Member of the Scientific Committee of 5th Colombian Conference on Automatic Control".* Institute of Electrical and Electronics Engineers Inc. - IEEE; et al.. Ibagué (Colombia). October 2021.

- Elena María Díaz Aguiluz, *"Chairman in Round table: We will live 100 years: rethinking the economics of longevity in Europe in «Conferencia sobre el futuro de Europa (COFE)».".* Universidad Pontificia Comillas. Madrid (Spain). March 2022.

- Pablo Dueñas Martínez, *"Member of the Scientific Committee of XVII Conference Spanish Association for Energy Economics (AEEE).".* Asociación Española para la Economía Energética (AEEE). Alcalá de Henares (Spain). May 2022.

- Pablo Frías Marín, *"Chairman in Round table on European environment in «¿Cómo llegar a 5 millones de vehículos eléctricos en 2030? Retos y oportunidades II.».".* Asociación/Colegio Nacional de Ingenieros de ICAI; Fundación Caminos; y Observatorio del Vehículo Eléctrico y Movilidad Sostenible (OVEMS). Madrid (Spain). October 2021.

- Aurelio García Cerrada, *"Permanent member of Annual Seminar on Automation, Industrial Electronics and Instrumentation - SAAEI".* September 1999- Today.

- Aurelio García Cerrada, *"Editor of IET Power Electronics".* Institute for Engineering and Technology (IET). Stevenage (United Kingdom). October 2007- Today.

- Aurelio García Cerrada, *"Member of the Scientific Committee of 29th Annual Seminar on Automation, Industrial Electronics and Instrumentation - SAAEI 2022".* Universitat de LLeida (UdL). Lerida (Spain). July 2022.

- Javier García González, *"Permanent member of Power Systems Computation Conference - PSCC".* January 2001- Today.

- Tomás Gómez San Román, *"Editor of Sustainable Energy, Grids and Networks".* Elsevier Science BV.. Amsterdam (Netherlands). June 2014- Today.

- Tomás Gómez San Román, *"Editor of Journal of Modern Power Systems and Clean Energy".* Nanjing NARI Electric Power Information Co., Ltd. ; e Institute of Electrical and Electronics Engineers Inc. - IEEE. Piscataway (United States of America). March 2020- Today.

- Tomás Gómez San Román, *"Chairman in Round table 1: Is it appropriate to rethink the electricity market in the face of the energy transition? in «El futuro del sector eléctrico tras los episodios de altos precios en el mercado eléctrico y las consecuentes medidas adoptadas por el".* Universidad Pontificia Comillas; y Enerclub. Online. September 2021.

- Tomás Gómez San Román, *"Chairman in Round table: Storage and new business models: hybridization and self-consumption in «Almacenamiento de energía y transición ecológica: temas claves».".* Club Español de la Energía. Madrid (Spain). May 2022.

- Tomás Gómez San Román, *"Chairman in 22nd Power Systems Computation Conference - PSCC 2022. S10: Power systems as part of multi-energy systems".* Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência - INESTEC. Porto (Portugal). June-July 2022.

- Yolanda González Arechavala, *"Chairman in Round table: Situation of STEM studies in Spain and employability. Professional opportunities and labor market needs. Reality in specific companies. How to include the STEM world in the classrooms of our center and in the orientation, breaking".* Cátedra para la promoción de la mujer en vocaciones STEM en la Formación Profesional para la movilidad sostenible. Universidad Pontificia Comillas. Madrid (Spain). July 2022.

- Pedro Linares Llamas, *"Editor of Papeles de Energía".* FUNCAS. Madrid (Spain). June 2015- Today.

- Pedro Linares Llamas, *"Chairman in 9th Atlantic Workshop on Energy and Environmental Economics".* Economics for Energy; CEPE (ETH Zurich); y CURE (Ruhr-Universität Bochum). La Toja Island (Spain). June 2022.

- Francisco José López Valdés, *"Editor of Journal of Healthcare Engineering".* Hindawi Ltd.. London (United Kingdom). January 2016- Today.

- Francisco José López Valdés, *"Editor of Frontiers in Bioengineering and Biotechnology. Biomechanics".* Frontiers Editorial. Lausanne (Switzerland). November 2014- Today.

- Francisco José López Valdés, *"Editor of Injury Epidemiology".* Springer. London (United Kingdom). January 2022- Today.

- Francisco José López Valdés, *"Organization/Direction of the course «2nd Edition Advanced technical course in child retention systems»".* Universidad Pontificia Comillas. Madrid (Spain). October 2021.

- Sara Lumbreras Sancho, *"Editor of Micro espacios de investigación. Revista científica e interdisciplinar".* Asociación UBUNTU. Madrid (Spain). January 2016- Today.

- María José Manjón Rodríguez, *"Chairman in Session 1. What are energy communities and what possibilities do they offer in the fight against energy poverty in «VIII Sesión del Seminario Interdisciplinar. ¿Cómo contribuyen las comunidades energéticas a luchar contra la pobreza energética".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain) Online. May 2022.

- Luiz Augusto Nobrega Barroso, *"Editor of IEEE Power & Energy Magazine".* IEEE Power & Energy Society (IEEE PES). Piscataway (United States of America). January 2017- Today.

- Luiz Augusto Nobrega Barroso, *"Editor of IEEE Open Access Journal of Power and Energy".* IEEE Power & Energy Society (IEEE PES). Piscataway (United States of America). January 2020- Today.

- Luis Olmos Camacho y Luis Rouco Rodríguez, *"Permanent member of Power Systems Computation Conference - PSCC".* June 2017- Today.

- Luis Olmos Camacho y Luis Rouco Rodríguez, *"Member of the Scientific Committee of Technical Program Committee «XXII Power Systems Computation Conference- PSCC 2022».".* Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência (INESC TEC). Porto (Portugal). June-July 2022.

- José Ignacio Pérez Arriaga, *"Editor of European Review of Energy Markets".* European Energy Institute. June 2015- Today.

- José Ignacio Pérez Arriaga, *"Chairman in The urgency of the global energy transition (s) in a post COVID-19 world order".* Real Academia de Ingeniería de España. Madrid (Spain). February 2022.

- Andrés Ramos Galán, *"Editor of Computational Management Science".* Springer. Heidelberg (Germany). October 2011- Today.

- Andrés Ramos Galán, *"Member of the Scientific Committee of International Conference on Renewable Energy Research and Applications (ICRERA)".* International Journal of Renewable Energy Research - IJRER. September 2012- Today.

- Andrés Ramos Galán, *"Chairman in Round table 1. University and Company in «VIII Congreso Nacional de Igenieros del ICAI «Somos historia que construye futuro»»".* Colegio de Ingenieros del ICAI. Madrid (Spain). November 2021.

- 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.

- Eva Paz Jiménez y Juan Carlos del Real Romero, *"Editor of Materials. Special Issue "Mechanical Properties of Biocomposites"".* MDPI AG. Basel (Switzerland). October 2021.

- José Carlos Romero Mora, *"Chairman in Session 1. "Where are we? Two years of the National Strategy against Energy Poverty " in «VII Sesión del Seminario Interdisciplinar. Situación actual y perspectivas de evolución de la pobreza energética en España.»".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain). November 2021.

- José Carlos Romero Mora, *"Chairman in Debate. "The next steps in the fight against Energy Poverty." in «VII Sesión del Seminario Interdisciplinar. Situación actual y perspectivas de evolución de la pobreza energética en España.»".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain). November 2021.

- José Carlos Romero Mora, *"Chairman in Session 2. Experiences of energy communities oriented to the fight against vulnerability in «VIII Sesión del Seminario Interdisciplinar. ¿Cómo contribuyen las comunidades energéticas a luchar contra la pobreza energética?»".* Cátedra de Energía y Pobreza. Universidad Pontificia Comillas. Madrid (Spain) Online. May 2022.

- Luis Rouco Rodríguez, *"Editor of Electric Power Systems Research".* Elsevier Science Ltd.. Lausanne (Switzerland). January 2000- Today.

- Luis Rouco Rodríguez, *"Editor of IET Generation, Transmission and Distribution".* The Institution of Engineering and Technology (IET). Hertford (United Kingdom). April 2016- Today.

- Luis Rouco Rodríguez, *"Editor of IEEE Transactions on Power Systems".* Institute of Electrical and Electronics Engineers Inc. - IEEE. Piscataway (United States of America). January 2017- Today.

- Lukas Sigrist, *"Editor of IET Generation,Transmission and Distribution".* Institute for Engineering and Technology (IET). Quebec (Canada). August 2017- Today.

- Carmen Valor Martínez, *"Editor of International Journal of Consumer Studies".* Wiley-Blackwell. Hoboken (United States of America). May 2020- Today.

7. Data about IIT

The relevant numbers of the academic year 2021 - 2022 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:

7.845 M€ Turnover

86 Professors and researchers

68 Research assistants

115 Research projects

50 Consultancy projects

8 Services and analysis projects

5 Chapters in books

93 Papers published in JCR journals

10 Papers published in other journals

34 Papers presented at conferences

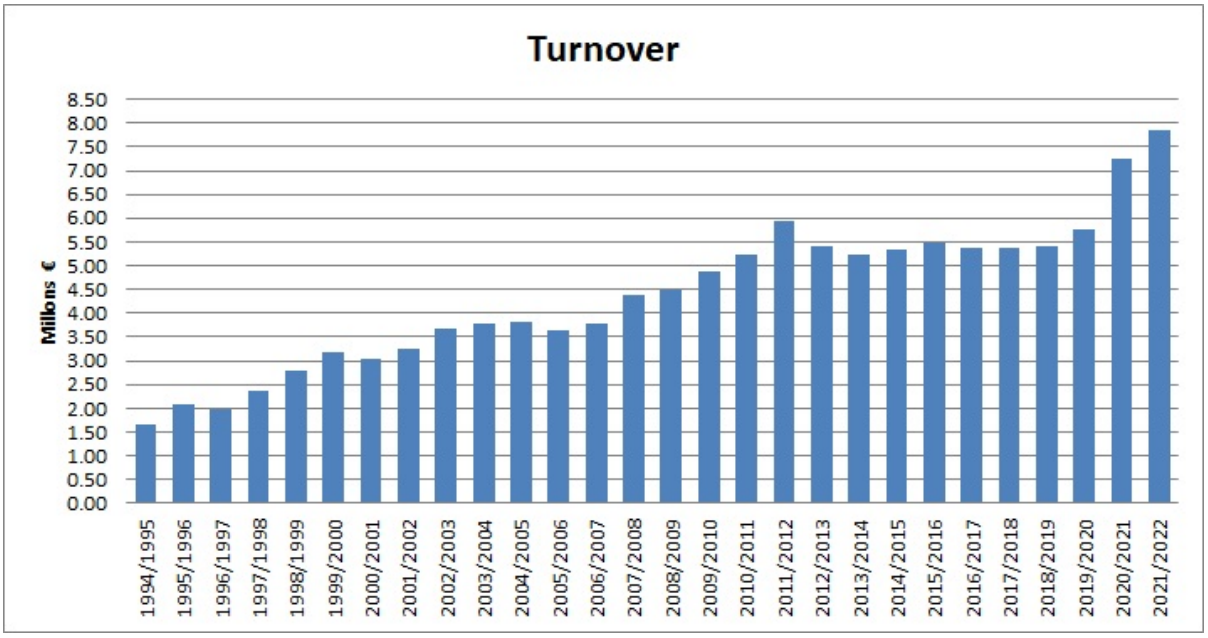
28 Technical reports and 19 Working papers

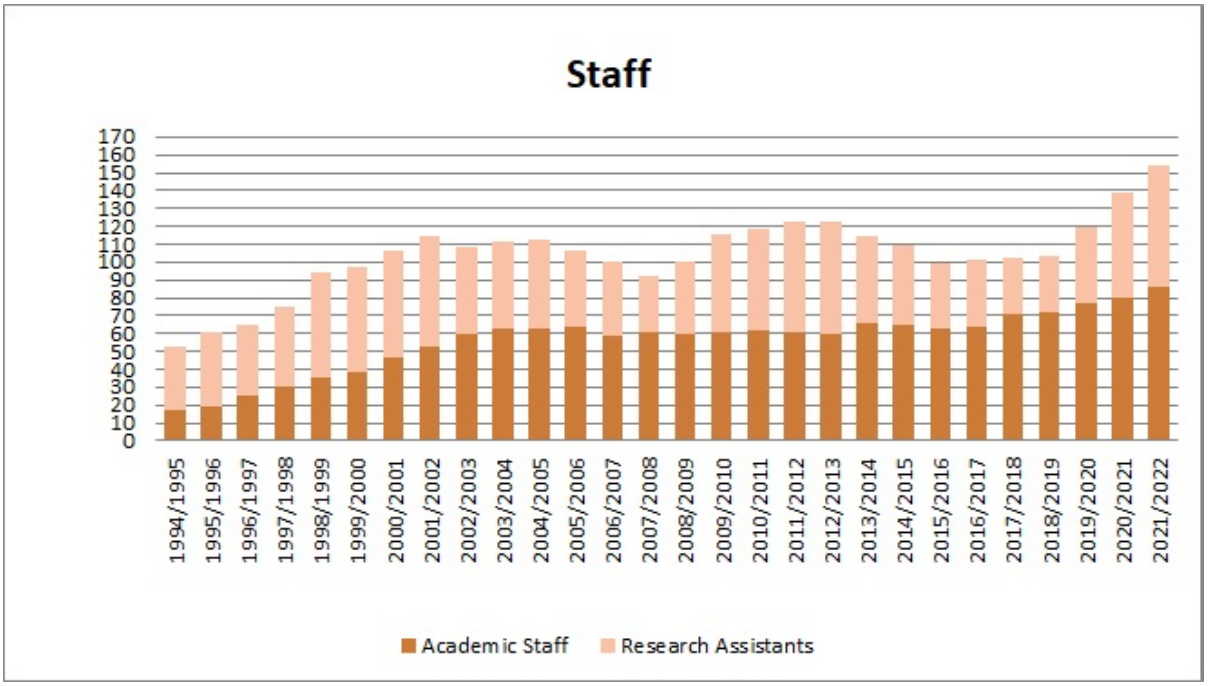
7 Submitted theses

55 Ongoing theses

14 Courses offered to external entities

Data about IIT





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