



Centre for Innovation in Distributed Systems



## ADVISORY BOARD MEMBER

Professor Ignacio J. Pérez-Arriaga



*Professor and Director, BP Chair on Sustainable Development, Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, Madrid, Spain*

Ignacio J. Pérez-Arriaga was born in Madrid in 1948. He received the Electrical Engineer degree from Comillas University, Madrid, Spain, and the M.S. and Ph.D. degrees in electrical engineering from the Massachusetts Institute of Technology (MIT), Cambridge, USA. He is Director of the BP Chair on Sustainable Development and Full Professor of electrical engineering at Comillas University, where he was Founder and Director of the Instituto de Investigación Tecnológica (IIT, Institute for Technological Research) for 11 years, and has been Vice-Rector for Research. For five years he served as Commissioner at the Spanish Electricity Regulatory Commission. He is life member of the Spanish Royal Academy of Engineering and Fellow of the Institute of Electrical and Electronic Engineers (IEEE). He is member of the European Energy Institute, a high-level think tank providing academic input into both European Community and national decision making on energy. He is Director of the Training Program for European Energy Regulators at the Florence School of Regulation within the European University in Florence. He has been principal researcher in more than 40 projects and he has published more than 100 papers in national and international journals and conference proceedings. He has supervised 20 doctoral theses. He has worked and lectured extensively on power system dynamic analysis, monitoring and diagnosis of power system devices and systems, intelligent computer design of industrial systems, planning and operation of electric generation and networks, and regulatory, economic and environmental aspects of the energy sector. In this latter topic he has been a consultant for governments, international institutions, industrial associations, and utilities in more than 30 countries. His current research interests are centred on energy regulation, the design of regional electricity markets and energy sustainability. See:

<http://www.iit.upcomillas.es/people/ignacio>

<http://web.mit.edu/ceepr/www/people/index.html>

<http://www.iit.upcomillas.es/ignacio/index.php.en>

<http://www.eeinstitute.org/participating-professors/i.-perez-arriaga>

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**Dr. Ignacio Pérez Arriaga**  
*Curriculum Vitae*

**Personal Information**

Name Ignacio J. Pérez-Arriaga  
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Address Comillas University  
Alberto Aguilera, 23 – Madrid 28015, Spain  
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Fax 00 34 91 542 31 76  
E-mail ignacio.perez@iit.upcomillas.es  
Nationality Spanish  
Date of Birth 23/06/1948

**University degrees**

- Ph. D. in Industrial Engineering, Universidad Politécnica de Madrid, June 1982.
- Ph. D. in Electrical Engineering, Massachusetts Institute of Technology (MIT), USA, June 1981.
- Master of Science in Electrical Engineering, Massachusetts Institute of Technology (MIT), USA, June, 1978.
- Electrical Engineer, Instituto Católico de Artes e Industrias (I.C.A.I.), Universidad Pontificia Comillas, Madrid, June 1970.

**Present Positions**

- APR. 2000 – PRESENT Full professor of Electrical Engineering, Universidad Pontificia Comillas, Madrid.
- MARCH. 2004 – PRESENT. Member of the European Energy Institute, [www.ee-institute.org/](http://www.ee-institute.org/) a think tank of academics with the purpose of advising the European Commission on energy matters.
- OCT. 2003 – PRESENT. Elected member of the Spanish Royal Academy of Engineering.
- DEC. 2002 – PRESENT. Director of the BP Chair on Sustainable Development, Universidad Pontificia Comillas.
- MARCH. 2001 – PRESENT. Director of Training Courses for Energy Regulators of the Council of European Energy Regulators (CEER), at the European University in Florence (Italy).
- OCT. 2001 – PRESENT: Director and lecturer of the Master Program (500 hours) on “Technical and Economic Management of the Electric Power Sector”, Comillas University.

**Previous Occupations**

- APR. 1995 – APR. 2000. Commissioner at the Comisión Nacional del Sistema Eléctrico (Spanish National Electric Regulatory Commission).
- SEP. 1994 - APR. 1995. Vice-Rector for Research and Doctoral Programs of the Universidad Pontificia Comillas, Madrid.
- FEB. 1984 - SEP. 1994. Full professor of Electrical Engineering. Founder and Director of the INSTITUTO DE INVESTIGACION TECNOLÓGICA (IIT) of the Universidad Pontificia Comillas, Madrid.
- SEPT. 1981 - FEB. 1984: Director of Research Programs in the Energy Division of

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the INSTITUTO TECNOLÓGICO DE POSTGRADUADOS (ITP), Madrid.

- MAY - AUGUST 1981: Electric Power Systems Engineering Laboratory, MIT, consultant for the research program RP1764-8 of the USA Electric Power Research Institute on advanced concepts in power systems analysis.
- 1975-1981. Graduate student, Electric Power Systems Engineering Laboratory, MIT. Occasional collaborations with ITP in the identification of research programs for the Spanish electricity industry.
- 1970 - 1975. Lecturer in the Electrical Engineering School (courses in Physics and Electromagnetic Theory), ICAI, Comillas University.
- 1970 - 1972. Undergraduate Officer of the Engineering School, ICAI, Comillas University.

#### Languages

- Spanish (mother tongue)
- English (ability to read, write and speak: excellent)
- French (ability to read, write and speak: good)

#### Teaching Activity

- FEB. 2006 – PRESENT: Graduate course on “Advanced topics in electricity regulation”, Comillas University doctoral program (40 hours).
- OCT. 2001 – Present: Director and lecturer of the Master Program (500 hours) on “Technical and Economic Management of the Electric Power Sector”, Comillas University. Graduate course on “Electricity regulation” (60 hours).
- Director and lecturer of 3 training courses (two weeks) and one e-learning course (5 months) for the staff of European energy regulatory authorities (Council of European Energy Regulators, CEER), since 2001 until present time.
- Director of the e-learning courses (3 editions, 5 month duration) for staff of Administrations and regulatory institutions in Latin America on “Electricity regulation”, in cooperation with the World Bank, the Spanish Ministry of Industry and CEDDET. Since 2004 until present time.
- Director of two courses for the Energy Regulators Regional Association (ERRA), (one week course in Budapest, 2003, and a three month e-learning course).
- SEP. 1994 - APR. 1995. Vice-Rector for Research and Doctoral Programs of the Universidad Pontificia Comillas, Madrid.
- FEB. 1984 - SEP. 1994. Full professor of Electrical Engineering. Founder and Director of the INSTITUTO DE INVESTIGACION TECNOLÓGICA (IIT) (Institute for Technological Research) of the Universidad Pontificia Comillas, Madrid.
- Tenured full professor in the School of Engineering (ICAI) of the Comillas University (since October 1981). Director of numerous engineering theses and twenty doctoral theses (three in progress). Graduate courses in "Optimal planning,

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operation and control of electric energy systems", "Electric energy markets", "Regulation of the electric power sector", "Regulation of electricity transmission" and "Wholesale and retail electricity markets".

- Tenured assistant professor in the School of Engineering of the Madrid Polytechnic University (October 1986 to May 1990. Presently with a permanent leave of absence). Graduate course on "Reliability of Electric Power Systems".
- Research affiliate of the Massachusetts Institute of Technology (since November 1985).
- JULY 1988 - JULY 1989. Visiting professor in the Massachusetts Institute of Technology, Laboratory for Electromagnetic and Electronic Systems. Graduate course on "Planning, operation and control of electric power systems".
- 1970 - 1975. Lecturer in the Electrical Engineering School (courses in Physics and Electromagnetic Theory), ICAI, Comillas University.

### **Research and Consulting**

Principal researcher on more than 50 research projects (see details below) and consultant for firms and institutions in more than 30 countries on the following topics:

- Electricity economics and regulation. Energy and sustainability.
- Transmission regulation: investment, access and pricing.
- Modelling, analysis and optimization of the operation and planning of large generation, transmission and distribution electric energy systems.
- Modelling, stability analysis and control of large dynamic systems. Techniques for model order reduction. Applications to large electric networks.
- Reliability engineering of generation, transmission and distribution systems.
- Computer-aided optimal design of electric machinery.
- Development of expert systems for incipient fault diagnosis of complex industrial systems. Applications to thermal power plants. Optimization of maintenance strategies.

### **Energy Modelling Activity**

Many of the projects that are listed below had the final objective of producing a computer model for industrial use. The applications range from analysis of stability of large interconnected networks to reliability evaluation of large integrated power systems, expert systems for various applications, production cost models for electric power systems or expansion models of transmission networks or electric generation. Some representative examples are:

- "PERLA" and "CHOPIN", for long-term expansion planning of electric transmission networks. They were developed and have been used by the Spanish National Grid Company (Red Eléctrica de España).
- "MODEX", a production cost model for a large hydro-thermal generation system (developed for ENDESA).
- "JUANAC", a model to compute nodal prices (short-term marginal costs) in the nodes of a generation / transmission system (the model has been used by IBERDROLA, Red Eléctrica de España, and firms and institutions of more than 10 countries, including the dispatch of generation of the Argentinean system).
- "MEPAM", a model for the allocation of costs of a transmission network among its users in an electricity market (IBERDROLA, Rumanian Regulatory

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Commission, DG TREN of the European Commission, Council of European Energy Regulators).

- “SEQA”, an expert system for predictive analysis of water chemistry in power plants.
- “SMAS3”, a model for oscillatory stability analysis of large interconnected power systems (IBERDROLA, Red Eléctrica de España, Electricité de France, CAMMESA in Argentina).
- “MARGEN”, a model for the analysis of marginal prices and production costs in competitive electricity markets (ENDESA).

### **Projects:**

1. "Development of a production cost model of electric generation" for ENDESA (1981-1985).
2. "Data base and methodology development for generating plant reliability analysis" for HIDROELECTRICA ESPAÑOLA, S.A. (1982-1985).
3. "Perturbations in distribution electric networks" for UNION ELECTRICA FENOSA (1982-1984).
4. "Insulation and protection system coordination" for UNION ELECTRICA FENOSA (1982-1984).
5. "Reactive power planning" for UNION ELECTRICA FENOSA (1982-1984).
6. "Specification of the computer requirements for the Energy Control Center and technical support at an electric utility" for ENDESA (1983).
7. "Computer-aided optimization of air-core reactors" for ARTECHE HERMANOS, S.A. and IBERDUERO (1984).
8. "A data base for global management of a distribution system" for UNION ELECTRICA FENOSA (1984).
9. "Reliability and economic assessment of the penetration of thermo-solar power plants in an electric system" (National Center for Energy Studies, 1984).
10. "A reliability data base for operation and maintenance of electric power plants" for ENDESA (1985-1987).
11. "Determination of the average supply cost of electricity" for the Department of Industry and Energy (1984-1985).
12. "Comprehensive reliability plan for the retrofit of a coal power plant to a fluidized bed combustion technology" for ENDESA (1985).
13. "Expert system for diagnostic and maintenance control of industrial equipment", internally funded by the UNIVERSIDAD PONTIFICIA COMILLAS (1986) and CAICYT (1987-1988).
14. "Capacity expansion planning of generating equipment" for ENDESA (1986-1987).
15. "Comparative reliability analysis of alternative substation configurations", internally funded by the UNIVERSIDAD PONTIFICIA COMILLAS, 1985-87.
16. "Conceptual design of satellites using knowledge-based engineering techniques" for the EUROPEAN SPACE AGENCY (1986-1987).
17. "State-of-the-art in long term expansion planning of electrical transmission networks" for RED ELECTRICA DE ESPAÑA (1987).
18. "Expert system for monitoring and diagnosis of the steam-water chemistry in a generating power plant" for UNION ELECTRICA FENOSA (1987-1988).
19. "Explanatory and predictive models of electricity demand" for the GOVERNMENT DELEGATION IN RED ELECTRICA DE ESPAÑA (1987).
20. "Cargo accommodation in the HERMES vehicle using knowledge engineering techniques for EUROPEAN SPACE AGENCY (1989-1990).
21. "Cost evaluation of transmission services" for RED ELECTRICA DE ESPAÑA (1988-1989).
22. "Static optimization model for network capacity expansion" for RED ELECTRICA DE ESPAÑA (1988-1990).
23. "Studies on a regional transmission network in Central America" for ENDESA (1988).
24. "Automatic diagnostic system for monitoring and diagnosis of large power transformers" for Unión Eléctrica Fenosa (1991-93).
25. "Selective Modal Analysis of Oscillatory Instability" for Iberdrola (1988-92).
26. "An expert system consultant for on-line security assessment of electric power

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- systems" for Iberdrola (1991-93).
27. "Regulatory and economic study of transmission issues in a system of generation, transmission and distribution of electrical energy" for Iberdrola (1991-92).
  28. "A regulatory approach for quality of service in electric power supply" for Iberdrola (1992).
  29. "Technical and regulatory analysis of alternative schemes of third party access to transmission networks" for Iberdrola (May 92-Feb. 93).
  30. "Coordinated operation of the electric power systems of the European Community in the context of the Single Market", (Comisión Interministerial de Ciencia y Tecnología, CICYT, Julio 1992 - July 1993).
  31. "Quantitative analysis of alternative regulatory schemes for third party access in electric power systems" (Iberdrola, Mayo 1993 - Mayo 1994).
  32. "A generation expansion and production cost model for the strategic evaluation of alternative regulation schemes of the electric power industry" (ENDESA, January - December 1994).
  33. "Specification of an advanced annual production cost model for the Spanish electric power system" (ENDESA, March 1994 - January 1995).
  34. "Regulatory developments on the proposal of the new Spanish Law for the Electric Power Industry" (Iberdrola, October 1994 - December 1994).
  35. "An analysis of competitive bidding for incorporation of generation and load management projects in electric power systems", (Iberdrola, October 1994 - October 1995).
  36. "A proposal for regulatory development of third party access in the context of the new Spanish Law for the Electric Power Industry" (Iberdrola, December 1994 - June 1995).
  37. "Analysis of competitive regulatory models for electricity generation and evaluation of alternative schemes", (ENDESA, January 1995 - December 1995).
  38. "Evaluation of the proposals for reform of the regulatory framework of the electric power sector", consultancy for the Energy Regulatory Commission of Honduras, (May 2000 – October 2000), sponsored by the World Bank.
  39. "Benchmark of electricity transmission tariffs in the EU countries", for the TREN General Direction of the European Commission, (September 2000 – January 2001).
  40. "Studies for the implementation of the Internal Electricity Market of the European Union", external consultant for the working groups of the Council of European Energy Regulators (CEER) for regulatory development of cross-border trade (September 2000 – October 2005).
  41. "External expert advisor for the Italian Energy Regulatory Authority", (June 2000 to June 2004).
  42. "Assistance in the development of secondary regulation of electricity and heat markets for Romania", European project PHARE, for the Rumanian Energy Regulatory Commission, (June 2000 – September 2001).
  43. "Member of the Economic Council of the French Electricity Regulatory Commission, CRE", (January 2001 – December 2002).
  44. President of the Advisory Council to the Central American governments on the implementation of the Central American Regional Electricity Market, 2001 to present.
  45. "Consultancy for the Italian Market Operator (GME)", (November 2001 – May 2002).
  46. "Analysis of the costs of cross-border trade of electricity", for the Direction General TREN of the European Commission, (January 2002-December 2002).
  47. "Consultancy for the Hungarian Energy Regulatory Office, HEO", (May 2004 – September 2002).
  48. "Short consultancy for the Dutch Ministry of Economic Affairs", September 2002.
  49. "Private expert report for the Competition Authority on the events that occurred in the Spanish daily market during 19, 20 and 21 November, 2001", for ENDESA, December 2002.
  50. "Extension of the study on analysis of the costs of cross-border trade of electricity", for the Direction General TREN of the European Commission, (January 2003-October 2003).

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51. "Market design and transmission regulation for the Central American Regional Electricity Market", expert consultant for project PREEICA, SNC-Lavalin, (January 2001 – December 2003).
52. "Trends and fundamentals of models of liberalization of electricity markets". (ENDESA. April 2002- September 2003)
53. "Regional Electricity Market for South East Europe, SEETEC", expert consultant for SNC Lavalin, (May 2002 – May 2004).
54. "Long-term guarantee of supply in the Dutch electricity market: the role of reliability options", for the Dutch Energy Regulatory Commission, DTe, (September 2003 – January 2004).
55. "Conceptual design of electricity tariffs for Costa Rica", for the Costa Rican Electricity Institute, ICE, April 2003- November 2003). This study was sponsored by the World Bank.
56. "Long term generation adequacy for the Dutch electricity market", for the Amsterdam Power Exchange, (July 2003 – November 2003).
57. "Impact of environmental policies on the European electricity markets", (BBVA Bank, April 2003- March 2005).
58. Extension of the project on "Trends and fundamentals of models of liberalization of electricity markets". (ENDESA. April 2004- December 2004).
59. "Technical assistance for the reform of the regulatory framework of the electricity sub-sector", consultancy for the Ministry of Economics in Honduras, (March 2004 – June 2004), sponsored by the World Bank.
60. "Regulatory reform of transmission regulation in the Peruvian electricity system", for the OSINERG Regulatory Agency in Peru, (November 2005 – May 2006).
61. "Sustainable Energy Specific Support Action, SESSA", for the European Commission, DG Research, (May 2004 – October 2005).
62. "Development of a capacity payment mechanism for the Russian electricity market", jointly with Mercados Energéticos for the Russian Energy Regulatory Authority, (October 2004 – May 2005).
63. "Member of the Supervisory Board for the Central and Eastern European Energy Market (C3EM) project, for the Regional Centre for Energy Policy Research (REKK) at the Corvinus University of Budapest, (May 2005- present).
- 64.
65. "Inter-TSO compensation mechanism for cross-border trading in the EU Internal Electricity Market", Florence School of Regulation for GRTN (Italy), February 2005 – June 2005.
66. "Analysis of the proposal of a White Paper for the regulatory reform of the wholesale electricity market in Peru", for the OSINERG Regulatory Agency in Peru, (September 2005 – April 2006).
67. "Study of the Spanish regulatory deficiencies that perturb the correct development of the supply activity", for the Association of independent suppliers ACIE, (November 2005 – January 2006).
68. "Enhancement of sustainable electricity supply through improvements of the regulatory framework", European Research Project, Energy Intelligent Europe 2003-06 Project EIE 2003-015, (January 2005 – June 2007).
69. "Virtual Balkan Power Centre for Advance of Renewable Energy Sources in Western Balkans", for the European Commission, 6<sup>th</sup> Framework Program, (January 2005 – December 2006).
70. "Coordinated action to consolidate RTD activities for large scale integration of Distributed Energy Resources into the European electricity market", for the EU Commission, 6<sup>th</sup> Framework Program, (November 2005 – April 2008).
71. "Evaluation of regulatory schemes of transmission services and system operation in the context of the Internal Electricity Market", for the Spanish Transmission System Operator (Red Eléctrica de España), (May 2004 – May 2006).
72. "Study on the obstacles to trade and the compatibility of market rules", SEETEC Balkans, Southern Europe Electrical System Technical Support Project, (January 2006 – present), external expert.
- 73.
74. "Regulatory mechanisms for efficient siting of electricity generators in the Spanish transmission network", (June 2006 – June 2007), Spanish Energy

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Regulatory Commission, CNE.

75. "Training Course on the regulatory reform of electricity tariffication in Costa Rica", San José, Costa Rica, September 2006.

**Supervision  
of doctoral  
theses**

**DIRECTION OF DOCTORAL THESES**

1. Analysis of subsynchronous resonance (Angel Sáiz Chicharro).
2. Dynamic stability of large electric power systems by selective modal analysis (José Luis Sancha Gonzalo)
3. Adaptive control of dynamic stability in electric power systems (Francisco Luis Pagola y de las Heras)
4. Availability analysis of power plants using event trees (Francisco. Nieto Fuentes)
5. Optimal planning of reactive compensation in transmission networks with simultaneous consideration of economic and security criteria (Tomás Gómez San Román)
6. Mid term production cost model for electric generation (Andrés Ramos Galán)
7. The generalized problem of computer-aided design optimization: Application of knowledge engineering techniques (Fernando de Cuadra García)
8. Oscillatory stability of multiarea power systems (Luis Rouco Rodríguez)
9. Static models for long-term electricity transmission network planning (Gerardo Latorre Bayona)
10. A methodology for the selection of availability improvements in medium voltage distribution networks (Luis Puertas Medina)
11. Probabilistic production cost model: A contribution to marginal pricing (Michel Rivier Abbad)
12. Optimal operation of medium voltage electricity distribution systems (Gilberto Carrillo Caicedo)
13. A methodology for cost allocation of transmission network costs in a competitive regulatory framework (Francisco Javier Rubio Odériz)

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14. Marginal pricing in the remuneration of electric generation services (Claudia Meseguer Velasco)
15. Dedicated models for incipient failure detection (Rafael Palacios Hielscher)
16. Switching planning models in electric networks: Application of knowledge engineering models (Juan José Alba Ríos)
17. Algorithms for bid matching in competitive energy markets (Carlos Vázquez Martínez).
18. A regulatory framework for the transmission network in regional electricity markets (Luis Olmos Camacho)

**Scientific  
Publications**

1. "*Ampliación de Física*", (textbook) Publicaciones Realigraf, Madrid, 1973, re-edited until 2002 (second author: F. García Ochoa).
2. "Sistemas de Unidades en Electromagnetismo". *Anales de Mecánica y Electricidad*, 47, 5, 1970.
3. "Los Métodos Activos en la Formación de los Técnicos", presented at the VI Congreso de F.E.A.N.I, Barcelona, September 1973 (co-authors: J.L. Sancha, F. García-Ochoa). Published in *Anales de Mecánica y Electricidad*, 61, 4, 1974, and in "*Enseñanza Técnica y Formación Permanente*", (book), Editorial Ayuso, Madrid, 1975.
4. "Final Report on Research Toward Improved Flywheel Suspension and Energy Conversion Systems", Charles Stark Draper Laboratory, Report no. 1108, Nov. 1977, (co-author).
5. "Computer-Aided Design of High Speed Synchronous Machines". S.M. Thesis, Electric Engineering Department, MIT, June 1978.
6. "Computer-Aided Design of High Speed Synchronous Machines". Proceedings of the 1978 IEEE PES Summer Meeting, Los Angeles, California, USA Publication A-78-581-1 (co-author: J.G. Kassakian).
7. "A Stationary Thermal Model for Smooth Air-Gap Rotating Electric Machines, in "Electric Machines and Electromechanics", Vol.3, no.4, Sept-Dec. 1979 (co-author: J.G. Kassakian).
8. "Selective Modal Analysis for Electric Power Systems", Report no.67, EPSEL, MIT, SIAM Conf. "Electric Power Systems: The Mathematical Challenge", Seattle, March, 1980.
9. "Selective Modal Analysis", Proceedings of the IEEE International Conference on Circuits and Systems, New York, October, 1980 (co-authors: F.C. Schweppe y G.C. Verghese).
10. "Selective Modal Analysis with Applications to Electric Power Systems", Ph.D. thesis, Electric Engineering Department. Massachusetts Institute of Technology, USA. June 1981.
11. "Determination of Relevant State Variables for Selective Modal Analysis", Proceedings of the Joint Automatic Control Conference, publication Ta-4F, Charlottesville, Virginia, June 1981 (co-authors: G.C. Verghese y F.C. Schweppe).
12. "Rational Approximation Via Selective Modal Analysis", presented in the Workshop on Rational Approximation, Applied Mathematics Department, Katholieke Universiteit Leuven, Belgica, August 31-September 1, 1981 (co-authors: G.C. Verghese y F.C. Schweppe).

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### *Curriculum Vitae*

13. "Measuring State Variable Participation for Selective Modal Analysis", IFAC Symposium on Digital Control, New Delhi, India, January 1982 (co-authors: G.C. Verghese y F.C. Schweppe).
14. "Selective Modal Analysis with Application to Electric Power Systems, Part I: Heuristic Introduction", IEEE Transactions on Power Apparatus and Systems, Vol. PAS-101, no.9, September 1982, pp. 3117-3125 (co-authors: G.C. Verghese y F.C. Schweppe).
15. "Selective Modal Analysis with Applications to Electric Power Systems, Part II: The Dynamic Stability Problem" IEEE Transactions on Power Apparatus and Systems, Vol. PAS-101, no.9, September 1982, pp. 3126-3134 (co-authors: G.C. Verghese and F.C. Schweppe).
16. "Evaluation of Dynamic Stability in Power Systems" (co-authors: G.C. Verghese and F.C. Schweppe), IEEE Large Scale Systems Symposium, Virginia Beach, October 1982.
17. "Selective Modal Analysis in Power Systems" (co-authors: G.C. Verghese, F.C. Schweppe and K.W. Tsai). EPRI Report EL-2830, EPRI Project RP-1764-8. January 1983.
18. "Rational Approximation Via Selective Modal Analysis", Circuits Systems Signal Process, Vol. I, no.3-4, 1982, pp.433-445 (co-authors: G.C. Verghese and F.C. Schweppe).
19. "Selective Modal Analysis in Power Systems", American Control Conference, San Francisco, USA, June 1983 (co-authors: G.C. Verghese, F.L. Pagola, Schweppe).
20. "Aplicación de la Metodología del Árbol de Fallos al Análisis Cualitativo de la Fiabilidad de Sistemas con Sucesos Básicos Dependientes", IX Reunión Anual de la Sociedad Nuclear Española, Sevilla, December 1983 (co-authors: A.J. Fernandez, J. Guerra).
21. "Comparative Reliability Evaluation of Alternative Substation Bus Schemes", 11th Annual Reliability Conference for the Electric Power Industry, Las Vegas, USA, April 1984 (co-author: J.F. Dominguez).
22. "Availability States of a Cycling Power Plant and Curtailed Energy Evaluation" 11th Annual Reliability Conference for the Electric Power Industry, Las Vegas, USA, April 1984 (co-authors: A.J. Fernández, J. Guerra, M.A. Sánchez Fornié).
23. "A Decentralized Method for Oscillatory Stability Evaluation of Multimachine Systems", 8th Power Systems Computation Conference, Helsinki, Finland, August 1984 (co-author: J.L. Sancha).
24. "Design of Power Systems Stabilizers Using Eigenvalue Sensitives and SMA Techniques", 8th Power Systems Computation Conference, Helsinki, Finland, August 1984 (co-author: F.L. Pagola).
25. "Optimization of Spare Management Strategies for Unique Components of Generating Power Plants", 12th Inter-RAM Conference, Baltimore, USA, April 1985 (co-authors: A. Lozano, C. Illán, A. Ramos).
26. "Evaluation of the Impact of Solar Thermal Generation on the Reliability and Economics of an Electrical Utility System", MELECOM'85, Madrid, Spain, October 1985 (co-authors: A. Conejo, A. Ramos, A. Santamaría).
27. "Assessment of the Availability Impact of Limiting Conditions for Operation in Nuclear Power Plants", 13th Inter-RAM Conference, Syracuse, USA, June 1986 (co-authors: A. Ramos, M.J. Rodeño, M.A. Sánchez Fornié).
28. "Selective Modal Analysis of Power Systems Oscillatory Instability", IEEE Transactions on Power Systems, vol. PWRS-3, no. 2, May 1988, pp. 429-438 (co-author: J.L. Sancha).
29. "A Computer Program for Global Availability Modeling of Generating Power Plants" (co-authors: F. Nieto, M.A. Sánchez Fornié), 14th International RAM Conference, Toronto, Canada, June 1987.
30. "Selective Modal Analysis of Subsynchronous Resonance" 9th PSCC Conference, Lisbon, September 1987 (co-author: A. Saíz Chicharro).
31. "A Computerized Tool for Building Expert Systems for the Diagnostic of Industrial Equipment", 1st. Iberian Conference of Artificial Intelligence (IBERAMIA), Barcelona, January 1988 (co-authors: Juan José Alba, Jesús Pedraza).

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### *Curriculum Vitae*

32. "Developments in Selective Modal Analysis of Small-Signal Stability in Electric Power Systems", *Automática*, vol. 26, no. 2, pp. 215-231, 1990.
33. "A Data Base Operation and Maintenance to Support Powerful RAM Analysis", 15th Inter-RAM Conference, Portland (Oregon), U.S.A., June 1988 (co-authors: Miguel Angel Sanz Bobi, Alvaro Domenech Pujol, Andrés Ramos Galán et al.).
34. "The Role of Participation Factors in Reduced Order Eigenanalysis of Large Power Systems", 1988 IEEE International Symposium of Circuits and Systems (ISCAS), Helsinki, Finland, June 1988.
35. "On sensitivities, Residues and Participations. Applications to Oscillatory Stability Analysis and Control", *IEEE Transactions on Power Systems*, vol. PWRS-4, no. 1, February 1989, pp. 278-285 (co-authors: F. Luis Pagola, George C. Verghese).
36. "A nonlinear programming approach for static optimal generation expansion planning" *IEEE Transactions on Power Systems*, Aug. 1989, Vol. 4 no.3. (co-authors: A. Ramos, J. Bogas).
37. "Analysis and control of small signal stability in electric power systems by selective modal analysis", *IEEE special publication on "Eigenanalysis and frequency domain methods for system dynamic performance"* Oct. 1989. (co-authors: F.L. Pagola and L. Rouco). Presented as invited article at IEEE PES 1989 Summer Meeting (Los Angeles, EE.UU) y 1990 Winter Meeting (Atlanta, EE.UU.).
38. "SEQA, an expert system for control and diagnosis of water chemistry in a fossil fueled power plant: EPRI Seminar on Expert Systems Applications for the Electric Power Industry", Orlando, Florida, USA, Jun. 1989. (co-authors: M.A. Sanz Bobi, J.L. Serrano, M.E. Ortíz, J.J. Alba).
39. "An SMA based algorithm for an efficient computation of the interarea oscillatory modes in power systems", *IASTED Conference on High Technology of the Electric Power Industry*, Valencia, Spain, July 1989. (co-author: L. Rouco).
40. "Control and diagnosis of water chemistry in the water-steam cycle and water makeup in a fossil fueled power plant" 2nd. Symposium on Expert Systems Applications to Power Systems, Seattle, Washington, USA, July 1989. (co-authors: M.A. Sanz Bobi, J.L. Serrano, M.E. Ortíz, J.J. Alba).
41. "JUANAC: A model for computation of spot prices in interconnected power systems", 10th PSCC Conference, Graz. Austria, Aug. 1989. (co-authors: M. Rivier, G. Luengo).
42. "A security constrained decomposition approach to optimal reactive power planning", *IEEE Transactions on Power Systems*, vol. 6, no. 2, August 1991, pp. 1069-1076.
43. "Selective modal analysis of large singular systems", *SIAM Conference on Control in the 90's*, San Francisco, USA, May 1989. (co-authors: G.C. Verghese, L. Rouco, F.L. Pagola).
44. "SEQA: Sistema de control de la química del ciclo agua-vapor de una central térmica", *AEPIA 89*, Madrid, Spain, Nov.1989. (co-authors: M.A. Sanz Bobi, J.L. Serrano, M.E. Ortíz, J.J. Alba).
45. "Un modelo de planificación estático de la red de transporte a largo plazo", *Jornadas Hispano-Lusas de Ingeniería Eléctrica*, Vigo, Spain, July 1990. (co-authors: A. Ramos, G. Latorre, J. Román, J.F. Alonso, A. Saíz).
46. "Evaluación de los modos inter-area en grandes sistemas eléctricos de potencia mediante el análisis modal selectivo", *Jornadas Hispano-Lusas de Ingeniería Eléctrica*, Vigo, España, Julio 1990. (co-author: L. Rouco).
47. "Application of Knowledge Engineering to Computer-Aided Design Optimization of Variable Reluctance Motors", *International Conference on Electrical Machines*, Cambridge, EE.UU., August 1990, (co-authors: F. Cuadra, J. Lang)
48. "A Conceptual Model for Pricing Analysis of Transmission Services", Report IIT-91-006, Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, Oct. 1990.
49. "Cost Allocation of Transmission Services", Report IIT-91-007, Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, Oct. 1990 (co-

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author: M. Rivier).

50. "A Probabilistic Production Cost Model with Optimization of the Loading Order", Third International Conference on Probabilistic Methods Applied to Electric Power Systems, Julio 91, London, United Kingdom (co-authors A. Ramos, J. Román).
51. "Probabilistic Bulk Production Cost Model by a Continuation MonteCarlo Simulation Method", Third International Conference on Probabilistic Methods Applied to Electric Power Systems, Julio 91, London, United Kingdom (co-author M. Rivier).
52. "PERLA: Un modelo de Planificación Estática a Largo Plazo de la Red de Transporte. Opciones de Modelado y Análisis de Idoneidad" (co-authors: G. Latorre Bayona, A. Ramos, J.F. Alonso, A. Sáiz), Jornadas Hispano-Lusas de Ingeniería Eléctrica, Coimbra, Portugal, Julio 1991.
53. "Multi-Area Analysis of Small Signal Stability in Large Electric Power Systems by SMA", (co-author L. Rouco), IEEE PES 1992 Summer Meeting, San Diego, USA, July 1992 (to appear in IEEE Transactions on Power Delivery).
54. "A Conceptual Framework for Implementation of Competitive Electricity Markets in International Power Systems", 15th Annual International Conference on Energy Economics, Tours, France, May 1992 (invited paper).
55. "Structured Multi-Attribute Optimization: Concepts and Applications", (co-authors F. Cuadra, A. Conejo), Third Stockholm Optimization Days, Royal Institute of Technology, Stockholm, Sweden, June 1992.
56. "Pricing of Transmission Services", Working paper IIT-92-030, Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, June 1992.
57. "Application of the Dantzig-Wolfe decomposition to the decentralized coordination of the optimal dispatch of multiple interconnected electric power systems (in Spanish)", (co-authors A. Conejo, M. Rivier), XX Annual Spanish Meeting of Statistics and Operations Research. Sept. 1992.
58. "MODEX: A medium term production cost model", (co-authors: C. Illán, A. Ramos, N. Jiménez Redondo, A. Díaz Casado, P. del Casar), article IIT-93-043, Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, April 1993.
59. "Taxonomy and comprehensive evaluation of third party access power transactions (in Spanish)", (co-authors J.F. Puerta, J. Arceluz), Proceedings of the 3rd Spanish-Portuguese Power Meeting, Barcelona, July 1993.
60. "New methods and models in planning and operation of electric power systems in competitive regulatory frameworks (in Spanish)", Plenary invited paper, Proceedings of the 3rd Spanish-Portuguese Power Meeting, Barcelona, July 1993.
61. "Results of quantitative application of marginal transmission pricing to the Spanish high voltage network (in Spanish)", (co-authors F.J. Rubio, J. Marín, J.F. Puerta, J. Arceluz), Proceedings of the 3rd Spanish-Portuguese Power Meeting, Barcelona, July 1993.
62. "Reliability analysis of substation configurations with explicit representation of the complete high voltage network (in Spanish)", (co-authors F.J. Rubio, D. Laloux), Proceedings of the 3rd Spanish-Portuguese Power Meeting, Barcelona, July 1993.
63. "SMA3: A computer package for analysis of small signal stability in large electric power systems", (co-author L. Rouco), Proceedings of the 11 Power Systems Computation Conference (PSCC), Avignon, August 1993.
64. "Computation and Decomposition of Spot Prices for Transmission Pricing", (co-author M. Rivier), Proceedings of the 11th Power Systems Computation Conference (PSCC), Avignon, August 1993.
65. "CHOPIN, a heuristic model for long term expansion planning of transmission networks", (co-author: G. Latorre), presented to the IEEE 1994 PES Winter Meeting (published in IEEE Transactions on Power Delivery). Xxx
66. "SMA3: A state-of-the-art computer package for analysis of small signal stability in large electric power systems", (co-authors L. Rouco, R. Criado, J. Soto, J. Corera), presented at the Colloquium on Power Systems Dynamic Performance, organized by CIGRE Study Committee 38, Brazil, September

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67. "Marginal economic principles in electric power systems", Report IIT-93-004, Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, September 1993 (in Spanish).
  68. "An improved version of the model JUANAC: Applications to network adequacy and economic studies in large interconnected power systems", (co-authors: M. Rivier, P. Sánchez, A. Ramos, T. Gómez), Conference on Probabilistic Methods Applications in Power Systems, PMAPS-94, Sept. 1994, Río de Janeiro.
  69. "Direct computation of derivatives in production cost models based on probabilistic simulation", (co-authors: A. Ramos, L. Muñoz), Conference on Probabilistic Methods Applications in Power Systems, PMAPS-94, Sept. 1994, Río de Janeiro.
  70. "Marginal pricing of transmission services: An analysis of cost recovery", (co-authors: F.J. Rubio et al.), IEEE PES Summer Meeting, San Francisco, USA, July 1994 (published in the IEEE Transactions on Power Systems). xxx
  71. "International Power System Transmission Open Access Experience" (co-authors H. Rudnick, W.O. Stadlin), invited review paper for the Panel on International Experiences on Transmission Open Access, IEEE PES Summer Meeting, San Francisco, USA, July 1994, to be published in IEEE Transactions on Power Systems.
  72. "Control and diagnosis of water chemistry in the water-steam cycle and water makeup in a fossil fueled power plant", Electrical Power and Energy Systems, vol. 16, number 4, 1994 (co-authors: M.A. Sanz Bobi, J.L. Serrano, M.E. Ortíz, J.J. Alba, A. Domenech, et al.).
  73. "International Experience in Transmission Open Access", in the Panel on International Experiences on Transmission Open Access, IEEE PES Summer Meeting, San Francisco, USA, July 1994, published in IEEE Power Engineering Review, (co-recorders: H. Rudnick, M.H., Schrameyer).
  74. "A Conceptual Framework for Implementation of Competitive Electricity Markets in International Power Systems", chapter 10 of the book "From regulation to competition: New frontiers in electricity markets", Michael Einhorn (editor), Kluwer Academic Publishers, 1994.
  75. "A critical appraisal of the restructuring process of the Colombian electric power sector", (invited paper), ISA Technical Journal (Colombia, in Spanish), March 1995.
  76. "The unified electricity market of the Central American region", Latin America Power Markets Conference, Mexico D.F., Mexico, February 1995 (co-authors: J.C. Enamorado, T. Gómez, A. Vela, I. Larrazábal).
  77. "Optimal reconfiguration of distribution networks for a diversity of regulatory frameworks", Paper SPT PS 25-06-0316, Stockholm Power Tech, (IEEE sponsored) International Symposium on Electric Power Engineering, Stockholm, June 1995 (Co-author: Gilberto Carrillo Caicedo).
  78. "A model for strategic studies of generation expansion and operation (in Spanish)", (co-authors: C. Meseguer, G. de Cuadra, A. Ramos, E. García -Viñas, F. Pérez-Thoden), Proceedings of the 4th Spanish-Portuguese Power Meeting, Porto, July 1995.
  79. "Marginal pricing of transmission services: Comparative evaluation of methods for cost assignment (in Spanish)", (co-authors: F.J. Rubio, J. Marín, J.F. Puerta, J. Arceluz), Proceedings of the 4th Spanish-Portuguese Power Meeting, Porto, July 1995.
  80. "Incentive regulation for demand side management: Application to the Spanish power industry (in Spanish)", (co-authors: C. Meseguer, L. Muñoz Moro), Proceedings of the 4th Spanish-Portuguese Power Meeting, Porto, July 1995.
  81. "Algoritmo de discretización del plan de mantenimiento de grupos térmicos para modelos de explotación", (co-authors: C. Meseguer, G. de Cuadra, A. Ramos, E. García -Viñas, F. Pérez-Thoden), Proceedings of the 4th Spanish-Portuguese Power Meeting, Porto, July 1995.
  82. "Tarificación marginalista de los servicios de red: Comparación de métodos de asignación del cargo complementario", (co-authors: F.J. Rubio, J. Marín, J.F.

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83. "Explotación óptima de redes de distribución en entornos de competencia", (co-author: Gilberto Carrillo Caicedo), Proceedings of the 4th Spanish-Portuguese Power Meeting, Porto, July 1995.
  84. "La regulación del sector de energía eléctrica: tendencias en un contexto internacional (in Spanish)", *Economía Industrial* No. 302, 1995/II.
  85. "Marginal Pricing of transmission services: An analysis of cost recovery", Chapter 3 of the book "Electricity Transmission Pricing and Technology", Michael Einhorn (editor), Kluwer Academic Publishers, 1996.
  86. "Wholesale marginal prices in competitive generation markets", *IEEE Transactions on Power Systems*, May 1997, Volume 12, number 2. (Co-author: Claudia Meseguer Velasco).
  87. "Regulatory studies within the SIEPAC project: Interconnection agreements for Central America", Presented at CIGRÉ Symposium, Impact de l'ouverture des marchés sur le fonctionnement des systèmes électriques, Tours, June 1997. (Co-authors: Carlos Vázquez, Tomás Gómez, Francisco Javier Rubio Odériz).
  88. "Marginal pricing of transmission services: a comparative analysis of network cost allocation methods", *IEEE Transactions on Power Systems*, vol 15, no. 1, pp 448-454, February 2000. (Co-author: Francisco Javier Rubio Odériz).
  89. "Asignación de los costes de los servicios de transporte para un conjunto de sistemas eléctricos interconectados (in Spanish)". Proceedings of the 5th Spanish-Portuguese Power Meeting, Salamanca, July 1997. (Co-author: Francisco Javier Rubio Odériz)
  90. "Garantía de suministro de largo plazo en mercados competitivos de generación: la remuneración de potencia (in Spanish)". Proceedings of the 5th Spanish-Portuguese Power Meeting, Salamanca, July 1997. (Co-author Claudia Meseguer Velasco).
  91. "La reestructuración del sector eléctrico (in Spanish)". Article published at "Anales de mecánica y electricidad", vol. LXXIV, fascículo IV, July-August 1997.
  92. "Mercados competitivos de generación: formación de precios y garantía de suministro (in Spanish)". *Hacienda Pública Española*, No. 139-4/1996.
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  95. "The Hierarchical Market Approach to the Economic and Secure Operation of the Spanish Power System". *Bulk Power System Dynamics and Control IV- Restructuring*, August 24-28, 1998, Santorini, Greece. Co-authors Canoyra, A.; Illán, C.; Landa, A.; Moreno, J.M.; Sallé, C. and Solé, C.
  96. "Distribution regulation in competitive environments: investment, pricing and access". 15<sup>th</sup> International Conference on Electricity Distribution, CIREN' 99, Niza, 1-4 June, 1999.
  97. "Los mercados eléctricos competitivos y la política energética: mecanismos de compensación (in Spanish)", Sixth Portuguese-Spanish Meeting of Electrical Engineering, July 7-9, 1999, Lisbon. Co-author: Claudia Meseguer Velasco.
  98. "El cálculo de la potencia equivalente a efectos de fiabilidad basado en las teorías probabilistas y sus problemas de aplicación práctica (in Spanish)", Sixth Portuguese-Spanish Meeting of Electrical Engineering, July 7-9, 1999, Lisbon. Co-author: Carlos Batlle.
  99. "Modelo probabilista de explotación generación-red de un sistema eléctrico utilizando técnicas de programación paramétrica (in Spanish)", Sixth Portuguese-Spanish Meeting of Electrical Engineering, July 7-9, 1999, Lisbon. Co-author: Michel Rivier.
  100. "Revisión de modelos de casación de ofertas para mercados eléctricos (in Spanish)", Sixth Portuguese-Spanish Meeting of Electrical Engineering, July 7-9, 1999, Lisbon. Co-authors: Carlos Vázquez & Michel Rivier.
  101. "Estudio teórico de la remuneración marginalista de la red de transporte (in Spanish)", Sixth Portuguese-Spanish Meeting of Electrical Engineering, July 7-

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- 9, 1999, Lisbon. Co-author: Francisco Javier Rubio Odériz.
102. "Reliability in the new market structure", invited lecture for the Plenary Session of the IEEE Power Engineering Society 1999 Summer Meeting. Published in IEEE Power Engineering Review, December 1999, pp. 6-10
  103. "Aula de reflexión sobre la Solidaridad, la Supervivencia y la Cooperación internacional (in Spanish)", VI Congress of ICAI Engineers, October 14, 15 & 16, 1999. Co-author: J.M. Arraiza.
  104. "Benchmark of Electricity Transmission Tariffs in the countries of the Internal Electricity Market of the European Union". Utilities Policy, Vol. 10(1) March 2001 pp. 47-56. Co-authors: F.L. Perán Montero, F.J. Rubio Odériz.
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  106. "If pay-as-bid auctions are not a solution for California, then why not a reliability market", Electricity Journal, Vol. 14, no. 4, pp.41-48, May 2001.
  107. "Production cost minimization versus consumer payment minimization in electricity pools" IEEE Transactions on Power Systems. Vol. 17, No. 1. Pp. 119-127. 2002.
  108. "Asignación de pérdidas de transporte entre los sistemas eléctricos de un mercado regional (in Spanish)", 7ª Jornadas Hispano-Lusas de Ingeniería Eléctrica, Madrid, July 2001.
  109. "Long-term reliability of generation in competitive wholesale markets. A critical review of issues and alternative options". Report IIT-00-098IT.
  110. "Tratando de hacer la luz" Cinco Días. Newspaper, January 15<sup>th</sup>, 2002.
  111. "Estructura y organización del sector eléctrico español (in Spanish)", internal report of the Comisión Nacional de Energía, [www.cne.es](http://www.cne.es), April 2002.
  112. "A market approach to long-term security of supply", IEEE Transactions on Power Systems, Vol. 17, No. 2, pp. 349-357, May 2002.
  113. "Methodology for cross-border tariffication in the internal electricity market (IEM) of the European Union". Power System Computation Conference, Seville, IIT -01-107A, June 2002.
  114. "On the choice of slack bus in mechanisms for transmission network cost allocation that are based on network utilization". Power Systems Computation Conference, Seville, June 2002.
  115. "¿Es la energía nuclear una opción válida para un desarrollo sostenible? Cinco Días Newspaper, June 25<sup>th</sup>, 2002
  116. "Energía eléctrica para 2002 millones de pobres" Cinco Días Newspaper, August 4<sup>th</sup>, 2002.
  117. "Will the California crisis perturb Spain's liberalization process?" IEEE Power Engineering Review. Vol. 22. No. 8. pp 15-16. August 2002. Co-authors: M. Rivier, C. Vázquez.
  118. "Los sistemas de energía eléctrica" Chapter 1 from the book "Análisis y operación de sistemas de energía eléctrica". Editor: Antonio Gómez Expósito. Mc Graw-Hill, 2002.
  119. "Energía y desarrollo sostenible" Opening Lecture for the Academic Year 2002-2003. Universidad Pontificia de Comillas. October 2, 2002.
  120. "Cost components of cross-border exchanges of electricity", report prepared for the DG TREN, European Commission, November 2002, [http://europa.eu.int/comm/energy/electricity/publications/doc/revise\\_ccbt\\_final\\_report\\_v112\\_en.pdf](http://europa.eu.int/comm/energy/electricity/publications/doc/revise_ccbt_final_report_v112_en.pdf). (Co-author: L. Olmos).
  121. "Cost components of cross-border exchanges of electricity: Extension", report prepared for the DG TREN, European Commission, November 2003, [http://europa.eu.int/comm/energy/electricity/publications/doc/cbt\\_comillas\\_final\\_report.pdf](http://europa.eu.int/comm/energy/electricity/publications/doc/cbt_comillas_final_report.pdf). (Co-author: L. Olmos).
  122. "Aclaraciones sobre las tarifas eléctricas" Anales de Mecánica y Electricidad. Vol. LXXX, volume III, pp. 32-41. May-June 2003., (in Spanish) Co-authors: (Jesús Pascual Peco González, Carlos Vázquez Martínez).
  123. A plausible congestion management scheme for the internal electricity market of the European Union. Co-author: Luis Olmos. Internal report, IIT-03-037A, May

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- 2003.
124. "Analysis of the influence of the interconnections capacity in the Spanish electricity wholesale market", 8ª Jornadas Hispano-lusas de Ingeniería Eléctrica, Algarve, Vilamoura (Portugal), July 2003. Co-author: Juan José Sánchez Domínguez.
  125. "Network cost allocation in the internal electricity market of the EU: Two main approaches for inter-TSO payments calculation", 8ª Jornadas Hispano-lusas de Ingeniería Eléctrica, Algarve, Vilamoura (Portugal), Julio 2003. Co-author: Luis Olmos Camacho.
  126. "Pricing of electrical transmission and distribution networks", Book chapter from Kluwer Editorial Press, about "Transport pricing of electricity networks". Editor: Francois Leveque. Kluwer Academic Publishers. ISBN: 1402074557, August 2003. Co-author: Yves Smeers.
  127. "Energy and sustainable development", Chapter of the book "New technologies and the future of mankind", Asociación Interdisciplinar José de Acosta, edited by Universidad Pontificia Comillas, ISBN: 84-8468-091-6, 2003, September 2003.
  128. "Report Spain 2003: An interpretation of the social reality of Spain", Collaborator. Book edited by Fundación Encuentro, 2003, ISBN: 84-89019-16-9, September 2003.
  129. "Interconnection capacity and market power in semi-isolated electricity systems", Revista Anales de Mecánica y Electricidad. Vol. LXXX, number VI, pp. 60-66, November-December 2003. Co-author: Juan José Sánchez Domínguez.
  130. "El déficit de la tarifa eléctrica", El País, Economía, July 2004. (Co-authors: C. Batlle, A. Baillo, C. Vázquez).
  131. "Equidad y eficiencia del plan de asignación de derechos de emisión", Cinco Días, July 2004. (Co-author: C. Batlle).
  132. "A plausible congestion management scheme for the Internal Electricity Market of the European Union", Utilities Policy, 13(2005), pp. 117-134. (Co-author: L. Olmos).
  133. "Compatibility of investment signals in distribution, transmission and generation", chapter of the book "Investments in generation and transmission in liberalized electricity systems" (to be published by Kluwer).
  134. "Energy and Society in Spain: An unsustainable energy model", chapter of the book "Informe España 2005" (in Spanish), edited by Fundación Encuentro, Madrid (ISBN 84-89019-29-0), 2005. Co-authors: Linares, P., E. Menéndez, C. de Miguel, M. Pardo, L.J. Sánchez de Tembleque.
  135. "Observatorio de energía y sostenibilidad en España: 2004", report of the BP Chair of Sustainable Development, February 2005. (Co-author: Ignacio Hierro).
  136. "Energía, sostenibilidad y competitividad en Europa", revista Enerclub, January 2005. (Co-author: P. Linares).
  137. "Electric load management" (in Spanish), report for the Fundación Alternativas, June 2005. (Co-authors: L. J. Sánchez-Tembleque, M. Pardo).
  138. "White Paper for the regulatory reform of electricity generation in Spain", for the Spanish Government, July 2005.
  139. "El Libro Blanco y el mercado eléctrico", Expansión, July 2005.
  140. "El Libro Blanco y la tarifa eléctrica", ABC, July 2005.
  141. "El Libro Blanco de la generación de electricidad", El Mundo, July 2005.
  142. "El Libro Blanco y el teorema de la herencia de la abuela", Cinco Días, November 2005.
  143. "A la espera de la reforma regulatoria", El Economista, Marzo, 2006.
  144. "Redesigning competitive electricity markets: the case of Spain", Chapter in the book "Complex electricity markets", editor: Wladyslaw Mielczarski, The European Power Supply Industry Series, Technical University of Lodz, Poland, 2006, ISBN 83-921636-7-2.
  145. "Locational Signals to new generators", (co-author: Luis Olmos) in ENERGEX 2006, Stavanger, Norway, 2006.
1. Director of the annual seminar on "History of Science and Technology", School

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### Courses and lectures in Conferences

- of Engineering, Comillas University, (1972-75).
2. Organizer and speaker in the Workshop on "New operation and planning methods for the electric energy industry", jointly with the MIT Energy Laboratory, for UNESA, Madrid, June 1980 (1 week).
3. Director and speaker of the course on "Reliability of electric power plants", for Hidroeléctrica Española, S.A., January 1984 (3 days).
4. "Reliability of electric energy systems", for Red Eléctrica de España, S.A. Sept. 1986 (30 hours).
5. Invited lecture on "Expert systems for security control of electric energy systems" in the seminar on "Energy control centers" organized by ACD, Seville, Oct. 1986.
6. Director and speaker of the course "Analysis of electric energy systems" for ENDESA, Nov. 1986 (30 hours).
7. "Reliability of electric power and distribution systems", Industrial University of Santander, Bucaramanga, Colombia, Feb. 1988.
8. Director and speaker in the course "Planning, operation and economy of electric energy systems", Valle University, Cali, Colombia, June 1990 (30 hours).
9. Invited lecture on "Evaluation and control of the economic operation of electric energy systems" in the Seminar on Supervision and Control of Engineering Systems of the Menéndez Pelayo International University, El Ferrol, July 1990.
10. Invited lecture on "Spot prices for the economic valuation of transmission services", in the Energy Economic Training Limited Workshop on "Access and pricing of grid systems", Paris, Nov. 1990.
11. Course on "Economic evaluation of transmission services" (18 hours), Pontificia Universidad Católica de Chile, Santiago, Dec. 1990.
12. Invited lecture on "Electric tariffs with real time discrimination" in the Seminar on Energy Conservation of the Menéndez Pelayo International University, El Ferrol, July 1991.
13. Instructor of the course "Expert systems in electric power systems", Decision Systems International, Monaco, July 1991. Director and instructor of the same course, Madrid, Sept. 1992.
14. "Economic valuation, spot prices and transmission services in electric power systems" (16 hours), Pontificia Universidad Católica de Chile, Dec. 1991.
15. Invited lecture on "Selective modal analysis", Seminar on Applied Mathematics, Carlos III University, Nov. 1992.
16. Invited lecture on "The electric energy market in England and Wales", within the course on Energy Economy of the Spanish Energy Institute, May 1992, Feb. 1993.
17. "Marginal pricing of electricity: Remuneration of generation and transmission services. Recent experiences, difficulties and proposed solutions", invited lecture (4 hours) within the Seminar on "The Marginal Tariff in the Argentinean Electric Power Industry", Buenos Aires, 9-10 September 1993.
18. Lectures on "Decentralized Competitive Planning", "Short Term Operations in

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Deregulated Markets" and "Transmission Network Planning" in the course on "Advanced Planning Methods in Generation, Transmission and Distribution of Electric Energy Systems", within the European COMETT program, El Escorial, Spain, September 1993.

19. Lectures on "Transmission pricing" and "Coordination of independently operated power systems" in the course on "Operation of the Interconnected European Power System: Economic and reliability Issues", within the European COMETT program, Paris, October 1993.
20. "New Strategies in operation and planning of electric power systems in the new competitive markets", invited conference in the XIII National Meeting of Specialized Engineering, Colombian Association of Electrical, Mechanical and Electronic Engineers (ACIEM), Bucaramanga, Colombia, October 1993.
21. "Electric power markets", 20 hours course at the Universidad Industrial de Santander, Bucaramanga, Colombia, October 1993.
22. "The regulation of the electric power industry in Argentina and Chile", in an Energy Economic Training Limited Workshop on "Competition and deregulation in the electricity industry", Paris, December 1993.
23. "Electric Power Markets", 30 hours course for the Association of Generators of the Argentine Power Market, Buenos Aires, Argentina, June 1994.
24. "International Experience in Transmission Open Access", invited paper in the Panel on Transmission Open Access, IEEE Power Engineering Society Summer Meeting, San Francisco, July 1994.
25. "Quantitative and Regulatory Analysis of Competitive Electricity Markets", Instituto de Estudios Superiores de la Empresa (IESE), Barcelona (Spain), September 1994.
26. "Competitive generation markets", Iberdrola, 1st Convention of generation executives, Madrid (Spain), March, 1995.
27. "Argentina, what should have been done differently?" in the "Competitive Restructuring of Electricity Supply Industries" workshop, London (U.K.), April 1995.
28. "Operation in deregulated markets", 1995 Latin American Power Industry Summit, Santiago de Chile (Chile), May 1995.
29. "The Spanish Experience", VI Repsol-Harvard Seminar, S'Agaró (Spain), June 1995.
30. "Planning of the future of electricity sector in Spain" in the Seminar "Southern Europe versus single electricity market". Club Diálogos para la Democracia, Madrid, October 1995
31. "Principles of network pricing, access and investment". Colloquium on Network Pricing, Investment and Access, London, October 1995.
32. "Regulation of the Electric Power Sector in Spain", World Bank Workshop on Legal and Regulatory Reform for the Power Sector in China, Beijing, November 1995
33. "The regulation of the electricity sector: Trends in an international context". Course on Systems Engineering,UPCO-ICAI. Madrid, January 1996

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34. "The regulation of electricity sector: trends in an international context, Specialization Course on Electricity Engineering Markets, Universidad Carlos III, Madrid, February 1996
35. "The LOSEN in the context of the proposal of Directive of Internal Energy Market", Edison European Forum Specialized course of Competitive Electricity Markets, organized by Iberdrola Instituto Tecnológico. Madrid, March 1996.
36. "The regulation of electricity sector: trends in an international context", Seminar "Regulation of the electricity sector in Spain", organized by Instituto Español de la Energía. Madrid, May 1996.
37. Closure speech, "Economic and social outcomes of demand management", Conference on Demand Management in the Power Sector. Organized by Club Español de la Energía. Madrid, May 1996
38. "The role of the regulator", round table on "Technical challenges of the new organization of the Spanish electricity sector", IEEE PES Spanish Chapter, Madrid, June 1996
39. Organizer of the Colloquium "Pricing of Ancillary Services: an International Perspective", Institution of Electrical Engineers, London, June 1996
40. "General overview of remuneration and pricing of electrical services", "Remuneration of pricing service" and "Regulatory schemes of distribution services". Course on Remuneration and Pricing of Electric Engineering Services, organized by Universidad Industrial de Santander, Colombia. Bogotá, September 1996
41. "Electricity Pricing", conference on "The New Electricity Model: competitiveness in an open international market. Organized by Instituto de Fomento Empresarial y Expansión. Madrid, November 1996
42. "Development of the new Spanish Electricity Act: The competitive Generation Market", EDF-EPRI Workshop Technical impacts of Electric Utility Restructuring in the US and Europe. Paris, December 1996
43. "Planning in the electricity sector: the international experience", 7th National Meeting of Investigation Groups in Electrical Engineering, Bilbao, January 1997.
44. "The international experience in the regulation of the electricity sector", Informative meeting CSEN with specialized Economy Press, Segovia, February 1997.
45. Round table on "The internal energy market. Revision of Maastricht Treaty. A new energy policy", VI Forum Energetic, Barcelona, February 1997.
46. "Current trends in the regulation of the electricity sector", Club Español de la Energía, Madrid, March 1997
47. "The remuneration for guarantee of supply in competitive generation markets. Application to Argentinean and Spanish electricity systems". Seminar "Mechanisms of Capacity Payment in Competitive Environments". Comisión de Regulación de Energía y Gas (CREG, Colombia), Bogotá, April 1997
48. "Development of the new Spanish electricity act: the competitive generation market". 2nd APEX (Association of Power Exchanges) Meeting, Melbourne, Australia, April 1997

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49. "Introduction of competitiveness. Radical change versus gradual change". Latin-American Regulators Conference, Santiago de Compostela, May 1997
50. "The new regulatory framework of the electricity sector: the bulk power market". Specialization Course on Economy of Electricity Sector. Universidad Carlos III de Madrid, May 1997
51. "The experience of restructuring in Spain within the European context". Course Electric Utility Planning & Restructuring. Madrid, May 1997
52. "Transmission Access, Pricing & Regulation in Spain". Conference Access and Pricing of Electricity Transmission and Distribution. Koln, June 1997.
53. "The new regulatory framework of the Spanish electricity sector". Keynote speech at the REN price award, Lisbon, June 1997
54. "The experience of restructuring in Spain within the European context", "Distribution and retail" and "Planning in a competitive electricity market". Seminar Towards a competitive electricity market: theoretical and practical issues. University of Lausanne, Switzerland, June 1997.
55. "Pricing of transmission and ancillary services in Spain". IEEE Power Engineering Society, Summer Meeting 1997, Berlin, July 1997
56. "Marginal pricing of transmission services: cost recovery & network expansion", CENTREL Workshop on Transmission Services and Pricing, organized by United States Agency for International Development (USAID), Warsaw, September 1997
57. "Market structure & transmission service pricing. The case of Spain", CENTREL Workshop on Transmission Services and Pricing, organized by United States Agency for International Development (USAID), Warsaw, September 1997
58. "Market structure & transmission service pricing. The case of Argentina", CENTREL Workshop on Transmission Services and Pricing, organized by United States Agency for International Development (USAID), Warsaw, September 1997
59. "Market structure & transmission service pricing. The case of Chile", CENTREL Workshop on Transmission Services and Pricing, organized by United States Agency for International Development (USAID), Warsaw, September 1997
60. "The regulation of the power sector", II Jornadas Hispano Lusas de la Energía. Panel on "The future of energy towards 21<sup>st</sup> Century in Spain and Portugal", Santiago de Compostela, October 1997.
61. "The competitive electricity market under the new Spanish Act. A case in electricity regulation". ITBA - Instituto Tecnológico de Buenos Aires, November 1997.
62. "Reliability of electricity systems in a competitive environment. Relevant aspects and basic options. The Spanish case". 5th Anniversary of CAMMESA & the Argentine Electricity Market, Buenos Aires, November 1997.
63. "Models of Competition. Pool vs. Third Party Access. The Spanish Option". Regulatory Forum, Paris, November 1997.
64. "The New Market in Spain", Pool Reform Conference, National Liberal Club,

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London, November 1997.

65. "The New Market in Spain", Seminar on System of Regulation & Deregulation of the Electricity Sector in the Czech Republic. Prague, December 1997
66. "The competitive electricity market under the new Spanish Act". Seminar Energy Market Functioning: Experience and problems of electricity and gas markets. Warsaw, December 1997.
67. "System operation and network access". Seminar: "The Spanish Electricity Act and the development of its regulations" organized by Club Diálogos para la Democracia. Madrid, January 1998.
68. "The market operation". Conference "The start of the electricity market", organized by Instituto de Fomento Empresarial. Madrid, January 1998.
69. "The competitive Electricity Market under the new Spanish Act", "Market structure and transmission service pricing. The case of Chile & Argentina", "Marginal pricing of transmission services: cost recovery & network expansion". Participation (3 conferences) in the Workshop on Pricing of Transmission and Ancillary Services in Competitive Markets. Organized by The World Bank and USAID. Riga, Latvia, March 1998.
70. "The future of the electric market". Meeting of CNSE with specialized economic press. Salamanca, March 1998.
71. "The Role of the Regulator: the Experience of Spain", "Power Sector Restructuring: the Experience of Spain", "Marginal Pricing of Transmission Services: Cost Recovery & Network Expansion" and "Comparison Between Spain and Portugal". Power Sector Reform Workshop, Jakarta, Indonesia, 4-6 May 1998. Organized by The World Bank.
72. "Spain's Approach to an Open Electricity Market" and "Identification & Treatment of Stranded Investments in Spain". 9<sup>th</sup> IIR Utilities Conference, Vienna, June 8-10, 1998.
73. "Fundamental aspects of electricity regulation" and "Remuneration and tariffs of electricity services". Participation at the Seminar "The regulation of the Colombian power sector", Santafé de Bogotá, 16-17 June 1998. Organized by Ministerio de Minas y Energía, Colombia.
74. "Regulatory and Political Forum: Developing the Regulatory Structure". Participation at the European Electricity Conference, Brussels, 6<sup>th</sup> July 1998. Organized by Business Seminars International, Ltd.
75. "The Spanish approach to an open electricity market", ICAI, School of Engineering, Comillas University, invited lecture, October 5, 1998.
76. "The experience of a transition period: Spain", lecture in the EES-UETP Course on Electricity Markets, Oporto, October 26-30, 1998.
77. "Progress and difficulties in the restructuring of the Spanish electric system", invited lecture, IESE, Barcelona, January 25, 1999.
78. "A proposal for cross-border trading in the European Internal Electricity Market", presentation in the International Energy Agency Regulatory Forum on Pricing and Congestion in Internal Electricity transmission. The Hague, 8-9 February 1999.
79. "Progress and difficulties in the restructuring of the Spanish Electricity Sector",

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presentation in “Meeting on regulation of the electric power sector”, organized by the High Technical School of Industrial & Telecommunication Engineering, Cantabria University, Santander, March 15, 1999.

80. “The restructuring of the Spanish electricity sector: Progress and difficulties in the development of the wholesale market”, presentation in the “Meeting on the new regulation of the National Power Sector”, Cádiz University, April 8, 1999.
81. “The electricity market”, invited lecture in the “Introductory course to the electricity market”, organized by OMEL and Enerclub, Seville, April 29, 1999.
82. “Restructuring and liberalization in Spain and the joint approach of Italy, Portugal and Spain to cross-border-trade in the EU”. Brussels, September 23, 1999.
83. “The distribution activity in the new regulatory environment”. Distributech Europe '99 & Power Delivery Europe '99. Madrid, September 1999.
84. Closure speech at the Conference on International Experiences about the development of electricity markets. International Association of Power Exchanges, Madrid (España). October 21-22, 1999.
85. “Regulating transmission pricing: The experience of Spain”, Workshop on Regulation & Opening up to Competition, Leiden, 26 October 1999.
86. “Pricing of electricity to final consumers in Spain”, European Regulatory Seminar, Roma, October 8<sup>th</sup>, 1999.
87. “Transmission and distribution pricing in Spain”, European Regulatory Seminar, Roma, October 8<sup>th</sup>, 1999.
88. “Developing and regulating and new market in Spain”, EEE Limited Workshop “Regulation: Where have we come from, where are we going?” London, December 1, 1999.
89. “Congestion and loss management in cross border trading”, “Price regulation: The experience of Spain” and “The role of the regulator: The experience of Spain”, Ljubljana Technical University (Eslovenia), January 17, 2000.
90. “Regulación de la transmisión en un ambiente nacional y multipaís”, Workshop on “Problemas, oportunidades y acciones futuras para incorporar reformas de segunda generación en el sector eléctrico del Istmo Centroamericano”, Managua, February 4, 2000.
91. “International transmission pricing: encouraging or hindering trade?”, 3<sup>rd</sup> Euroelectric Workshop, The Electricity Industry adapting to change, Brussels, April 2000.
92. “Acertos y limitaciones en la liberalización del sector eléctrico español”, X Meeting of Power Systems Research Groups, Santander, March 2000.
93. “Planteamiento de los Mercados regionales de América Central y de la Unión Europea: Analogías y diferencias”, Workshop on the development of the Regional Market and cross-border transmission tariffs in Central America, Association of Electricity Regulators of Central America (ACERCA), San Salvador, June 2000.
94. Course (30 hours) “Regulación del Sector Eléctrico” given to Autorità per l'Energia Elettrica e il Gas. Milán, April 2000.
95. Organizer and speaker in Workshop on Electricity transmission system operation

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in liberalising markets & the Florence Regulation Forum. Madrid, June 2000.

96. Metodología de peajes de transmisión propuesta en el diseño general del MER”, Reunión sobre peajes internacionales. Consorcio PREEICA Honduras, July 25, 2000
97. “Models of power exchanges”, Conference on the Electricity Market organized by the Italian Ministry of Industry. Rome, 4 July 2000.
98. “Present charging structure. The need for an EU-wide approach”, The Adam Smith Institute International Conference on EUROPEAN ELECTRICITY TRANSMISSION PRICING. Frankfurt, September 20, 2000.
99. Training course on regulation (15 hours) in the European Project “Phare Assistance in the Development of Secondary Legislation for the Regulation of Electricity & Gas Markets”. Bucarest, September 2000.
100. “El papel de la red de transporte en el Mercado Interior de Electricidad de la Unión Europea”, Seminar “Desarrollo del Mercado Eléctrico y Peajes Internacionales en América Central”, Madrid, October 2000.
101. Course (8 hours) given to CEARE (Centro de Estudios de la Actividad Regulatoria Energética): Seminar: “Sistema de precios y tarifas en la energía”. Buenos Aires, November 2000.
102. “La decisión de expansión a través de mecanismos de mercado, ¿es compatible con el desarrollo eficiente de las redes de transporte?”, CIER (Comisión de Integración Eléctrica Regional), Buenos Aires, November 2000.
103. International Seminar Director on “Open Access in Transmission Networks” and speaker in the Conference “Principles of Transmission Regulation”. Utility Energy Systems University Enterprise Training Partnership. Madrid, December 2000.
104. Training course on regulation (10 hours) in the European Project “Phare Assistance in the Development of Secondary Legislation for the Regulation of Electricity & Gas Markets”. Bucarest, January 2000.
105. “Hacia una nueva organización del sector eléctrico en Europa”, conference in the Curso Superior de Negocio Energético, Club Español de la Energía, February 2001.
106. “El desarrollo de la infraestructura regional: Oportunidades y desafíos en subsector de energía eléctrica”, Meeting of the Grupo Consultivo Regional para Centroamérica, Madrid, March 9, 2001.
107. “Conceptos sobre la regulación de la actividad de transmisión. Experiencias internacionales”, Taller sobre presentación de propuestas para la modificación regulatoria y la tarificación de la transmisión, organized by the Ente Regulador de los Servicios Públicos de Panamá. Panamá, March 2001.
108. “Conceptos sobre regulación de la actividad de transmisión”, Comisión de Tarifas de Energía – Compensaciones y tarifas de transmisión. Reunión de trabajo del sector eléctrico, Organized by Ministerio de Energía y Minas, Lima, March 30, 2001.
109. President of the board of thematic area: “Liberalización del sector eléctrico”, XII Reunión de Grupos de Investigación de Ingeniería Eléctrica, Badajoz, April 4-7, 2001.

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110. "Electricity markets within a European context", 9th Workshop of Marie Curie Fellows, Madrid, April 2001
111. Course (16 hours) given to Organismo Coordinador: "Curso de capacitación sobre regulación del sector eléctrico". Santo Domingo, República Dominicana, May 2001
112. "The process of implementation of the EU Internal Electricity Market", PHARE: Assistance in the Development of Secondary Legislation for the Regulation of Electricity & Gas Markets, Bucarest, June 2001
113. "A market approach to long-term security of generation supply". Invited Conference in the 25<sup>th</sup> Plenary Session, Harvard Electricity Policy Group, Cambridge, Massachusetts, June 2001.
114. Opening Conference "Overview & introduction to deregulation experiences", and invited lecture "Restructuring & liberalization of the Spanish power sector", Deregulation Workshop, Bergen, Norway, June 2001.
115. Chairperson in IEEE Power Engineering Society-Capítulo Español in the conference about "El mercado eléctrico europeo: Próximos pasos", Madrid, June 2001.
116. Chairman of de la session 77<sup>a</sup> Jornadas Hispano-Lusas de Ingeniería Eléctrica. Universidad Carlos III, Madrid, July 2001.
117. Invited Conference "Transport Tariff in Spain", for the French Electricity Regulatory Commission, Paris, October 2001.
118. Chairman of session in the 7<sup>th</sup> World Conference of the APEX "Creating Powerful Market", Amsterdam, October 2001.
119. "Regulation of cross-border trade in the EU: An update". 7<sup>th</sup> Conference of Association of Power Exchanges, Noordwijk, October 2001.
120. Invited Conference in the Instituto de Fomento Empresarial, "Mecanismos para incentivar inversiones en generación y en transporte", Madrid, October 2001.
121. Director, organizer and instructor of the First Training Course for Energy Regulators, (2 weeks) organized by the Council of European Energy Regulators, Palma de Mallorca, March 4 -15, 2002.
122. "La pobreza y el deterioro medioambiental ¿cuánto y cómo debemos preocuparnos?, Conference, Aula de Opinión, Universidad Pontificia Comillas, Madrid, March 2002
123. "Challenges and solutions in the implementation of the EU Internal Electricity Market" Fundación Hidrocarburo, Oviedo, Spain, July 4<sup>th</sup>, 2002.
124. Invited Conference. Iberdrola Forum "Desarrollo y Energía Sostenible", July 15, 2002.
125. "Energy and sustainable development", Conference in the XXIX Meeting of the Asociación Interdisciplinar José de Acosta (ASINJA), September 26, 2002.
126. "Energy and sustainable development", Inaugural lecture of the academic year 2002-03 at Universidad Pontificia Comillas, October 2002.
127. "Congestion management in the EU Internal electricity market". Conference for the French Electricity Regulatory Commission (CRE), Paris, October 2002.

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128. "Restructuring & liberalization of the Spanish power sector. A European perspective". Energy & Development 2002. 7th National Energy Conference. Athens, November 2002.
129. President of a Panel on "Wholesale Markets for Electricity" in the CEPR Workshop: Competition & Coordination in the Electricity Industry. Toulouse, November 2002.
130. "Key regulatory topics in electricity markets liberalization". Curso Superior de Negocio Energético. Club Español de la Energía. Madrid, December 2002.
131. "Sustainability of the Energy model in the Spanish context: Responsibilities and technical answers". Fundación Encuentro. January 2003.
132. Director, organizer and instructor of the course "First ERRA-CEER Training Course for Electricity Regulators of EU Accession Countries" organized by request of the Council of European Energy Regulators, Budapest, Hungary, February 3-7, 2003 (1 week).
133. "Characteristics of the electricity sector & implications for the regulatory activity". Italian Energy Regulatory Commission, Milan, February 2003.
134. "The Iberian electricity market (MIBEL)". 1st Market Facilitation Group Workshop. Sofia, Bulgaria, March, 2003.
135. "Nuclear energy and sustainable development. Pros and cons under the environmental, economic and ethical perspectives". Fundación Encuentro. May 2003.
136. "Incentive-based transmission pricing for the Internal Electricity Market". CIEP Electricity Market Seminar. Meeting the challenges of the Internal Electricity Market. The Hague, June 2003.
137. "Methodology for design of electricity tariffs". Director, organizer and instructor of the course for the Costa Rican Electricity Agency (ICE), Costa Rica, June 23-25, 2003.
138. "Locational prices in transmission networks", CMI Transmission Workshop: "The EU Internal Electricity Market. Current state of debate". Cambridge University, July 18-19, 2003.
139. Director of the on-line Internet course for Latin America "Regulation of the electric power sector", sponsored by the World Bank, the Spanish Ministry for Economics and Finance and the Center for E-learning for the Economic and Technical Development (CEDDET), September 2003.
140. "Solutions to Market Power and Congestion Management? An academic perspective". Conference on Market Power and Congestion Management, organized by the European Association of System Operators (ETSO). Brussels, October 2003.
141. "Training program for European Energy Regulators". Conference at the World Forum on Energy Regulation. Rome, October 2003.
142. "Energy and Sustainable Development", Speech of admisión into the Spanish Royal Academy of Engineering, October 2003.
143. Director and instructor of the 2nd Training Course for Energy Regulators (2 weeks) of the Council of European Energy Regulators, European University,

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Florence, November 2003.

144. "Reliability options for security of generation supply in electricity markets: Considerations for the retail market". Invited conference at the CEPR Workshop on Competition & Coordination in the Electricity Industry. Toulouse, January 2004.
145. "Restructuring the electric power sector: the Spanish case". Conference in the Master Program on Railway Systems, Universidad Pontificia Comillas. Madrid, 16 February 2004.
146. "Electric network planning & regulation", a three day course for the Lithuanian regulatory Agency, as part of a PHARE twinning project of the European Union. Vilnius (Lithuania), March 2004.
147. "The future of the energy sector and its environmental implications for a sustainable development". Panel in the Heliatom Forum. School of Industrial Engineering, Technical University of Madrid, March 2004.
148. Director and instructor of a seminar on "Regional electricity markets: regulatory treatment of interconnections and power exchanges", (3 days), Montevideo, Uruguay, for the Energy Regulatory Agency, URSEA, May 2004.
149. Director and instructor of the 3rd Training Course for Energy Regulators (2 weeks) of the Council of European Energy Regulators, European University, Florence, October 2004.
150. "Electric network planning & regulation", a five day course for the Turkish Regulatory Agency, as part of a PHARE twinning project of the European Union. Ankara (Turkey), September 2005.
151. "Advanced electricity transmission network regulation", Three day training course at the Florence School of Regulation, European University Institute in Florence, November 2005.
152. Director and instructor of the 5th Training Course for Energy Regulators (7 days presential plus 5 months e-learning) of the Council of European Energy Regulators, European University, Florence, February to June 2006.

<There have been so many conferences and invited speeches recently (an average above one per week) that the list has been discontinued after the spring 2004; only major courses are listed>