



## Europass Curriculum Vitae

### Personal information

First name(s) / Surname(s) **Carlos Batlle**

Address(es) 

- Institute for Research in Technology, Comillas Pontifical University. Sta. Cruz de Marcenado 26, 28015 Madrid, Spain
- MIT Energy Initiative, MIT. 77 Massachusetts Av., 02139 Cambridge, MA.

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Nationality Spanish

Date of birth April 11, 1972

Gender Male

### Work experience

Dates Since 2011 onwards (50% dedication)

Occupation or position held **Research Scholar**

Name and address of employer **MIT Energy Initiative (MITEI), Massachusetts Institute of Technology (MIT)**  
77 Massachusetts Ave., Cambridge, 02139 MA, US

Main activities and responsibilities Professor at the course "Engineering, Economics and Regulation of the Electric Power Sector"

- MIT Sloan School of Management, IDSS & Electrical Engineering Dept.

Principal Investigator, Master & Ph.D. thesis supervisor

Type of business or sector Energy Systems & Economics

Dates Since June 2008 onwards

Occupation or position held **Electricity Advisor**

Name and address of employer **Florence School of Regulation, European University Institute**  
Badia Fiesolana - Via dei Roccettini 9, I-50014 San Domenico di Fiesole (FI) - Italy

Main activities and responsibilities Member of the Training Program for European Energy Regulators

- Director of the annual course "FSR Summer School on Regulation of Energy Utilities".
- Instructor in the "Annual Course on Regulation of Energy Utilities". 2005-onwards.

Type of business or sector Energy Systems & Economics

Dates	Since September 1996 onwards
Occupation or position held	<b>Associate Professor</b>
Name and address of employer	<b>Institute for Research in Technology, Comillas Pontifical University</b> Sta. Cruz de Marcenado 26, 28015 Madrid, Spain
Main activities and responsibilities	Project manager, principal researcher and/or participant researcher in research and consultancy projects in the following areas: <ul style="list-style-type: none"> <li>• Electric power systems regulation. <ul style="list-style-type: none"> <li>- Wholesale &amp; retail markets &amp; tariff design.</li> </ul> </li> <li>• Electric power systems and markets modelling. <ul style="list-style-type: none"> <li>- Analysis &amp; optimization of the operation, planning and expansion.</li> </ul> </li> </ul> Professor in Graduate and Postgraduate Programs <ul style="list-style-type: none"> <li>• Electric power systems regulation</li> <li>• Energy Economics</li> <li>• Wholesale and Retail Electricity Markets</li> </ul>
Type of business or sector	Energy Systems & Economics
Dates	November 1995 to May 1996
Occupation or position held	<b>Internship</b>
Name and address of employer	<b>Iberdrola, Madrid, Spain</b>
Main activities and responsibilities	Ancillary services markets design analysis
Type of business or sector	Energy Systems & Economics

## Education and training

Dates	December 2002
Title of qualification awarded	<b>Ph. D. in Industrial Engineering</b>
Principal subjects/occupational skills covered	Dissertation: A strategic production cost model for electricity market risk analysis
Name and type of organisation providing education and training	ICAI School of Engineering, Comillas Pontifical University, Madrid, Spain.
Dates	June 1996
Title of qualification awarded	<b>Electrical Engineer</b>
Principal subjects/occupational skills covered	Final year (1995-96) and dissertation under an Erasmus scholarship <i>Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland.</i>
Name and type of organisation providing education and training	ICAI School of Engineering, Comillas Pontifical University, Madrid, Spain.

## Personal skills and competences

Mother tongue(s)

Other language(s)

Self-assessment

European level (\*)

English

French

**Spanish**

**English and French**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
C1	Proficient user	C2	Proficient user	B2	Independent user	B2	Independent user	A2	Basic user

(\*) Common European Framework of Reference for Languages

## Research and consultancy experience

### Power sector regulation, economics and policy

- 2014-16 MIT Utility of the Future Study. With IIT-Comillas, United States.
- 2016 Construcción de propuestas de política pública y/o regulación que permitan mejorar la eficiencia del Mercado Mayorista de Energía, en el corto y mediano plazo, garantizando la institucionalidad del sector, la promoción de la competencia y el desarrollo sostenible de la actividad de generación. For **Acolgen** (Asociación Colombiana de Generadores de Energía Eléctrica), **Colombia**.
- 2016 Adapting policies and regulation to the changing ownership structure in the electricity generation sector. For **IRENA** (International Renewable Energy Agency).
- 2016 Supporting energy regulation and policy in Mongolia. For the World Bank, **Mongolia**.
- 2015-16 Compatibility of Nuclear and Renewables with Grid Stability, Economics and Deregulation. MIT and University of Tokyo, Central Research Institute for Electric Power, Institute of Energy Economics of Japan and Tokyo Institute of Technology), **Japan**.
- 2015-17 Obligations and penalties in capacity mechanisms to maximize security of supply in a context of a large penetration of intermittent generation. National Science Foundation PIRE, financed by **Ministerio de Economía y Competitividad, Spain**.
- 2015-17 Short-term market mechanisms and pricing rules to enhance incentives for intermittent resources to improve forecasting and generation management tools. National Science Foundation PIRE, financed by **Ministerio de Economía y Competitividad, Spain**.
- 2015 Consulting on the implementation of smart grids with emphasis on distributed generation and power transmission and energy efficiency in buildings. For **Inter-American Development Bank (IADB), Panama**.
- 2015 Empirics of intraday and real-time markets in Europe. For **DIW Berlin, Germany**.
- 2015 Capacity mechanisms experiences for the Vietnamese context. With PSR for the **World Bank, Vietnam**.
- 2014-16 Energy storage perspectives. With MIT for **Ente Nazionale Idrocarburi (ENI), Italia**.
- 2014-16 Post 2020 framework in a liberalised electricity market with large share of Renewable Energy Sources. Market4RES consortium for **European Commission**.
- 2014 Regulatory and technical analysis of the split of the Combined Cycle Gas Turbine "Nueva Generadora del Sur (NGS)". With **Invesyde** for NGS, **Spain**.
- 2014 Promoting long-term intraregional agreements in the Central American regional electric market. For the **Inter-American Development Bank, Central America**.
- 2013 Assessment of consideration of the variable remuneration in the Aggregated Value of the Distribution activity. **Osinergmin, Peru**.

- 2013 Electric power systems integration in the Andinean community. **CENACE, Ecuador.**
- 2013 Impact of Renewable Energy in Electricity Markets in Latin America and the Caribbean: From dispatch to long term integration. **Inter-American Development Bank, Central America.**
- 2013 European electricity market design (EUREEM Project). Assessment of capacity reliability mechanisms alternatives for the German electricity market. With DIW Berlin for **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany.**
- 2013 Reliability Standards for the Electricity Markets. **Department of Energy and Climate Change (DECC), UK.**
- 2013 Expert Group on assessing the impacts of Capacity Remuneration Mechanisms on market integration. For the **Agency for the Cooperation of Energy Regulators (ACER).**
- 2013-14 Comparative analysis of electric market regulatory systems in different Latin American countries. With the MITEI for the **Enel Foundation, Italy.**
- 2013 From distribution networks to smart distribution systems: Rethinking the regulation of European DSOs. THINK project for the **European Commission.**
- 2012-13 Future of Solar Study. Integration of solar generation in wholesale electricity markets. An interdisciplinary **MIT** study, **United States.**
- 2012 Administrative Capacity Markets and interconnections in the context of the Internal Electricity Market. For the **Department of Energy and Climate Change (DECC), UK.**
- 2012 Consultancy for the evaluation of the procedures implemented by the Government of Peru to promote the penetration of water-power generation and Renewable Energy Resources. **Inter-American Development Bank, Peru.**
- 2012 Feasibility analysis of biogas energy plants in Romania. **GED Capital, Romania.**
- 2012 Beyond2020 - Design and impact of a harmonised policy for renewable electricity in Europe. Intelligent Energy for Europe. Executive Agency for Competitiveness and Innovation. **European Commission.**
- 2011 Design and development of a UK Capacity Mechanism. **Department of Energy and Climate Change (DECC), UK.**
- 2011 Design of Auctions for Small Renewable Energy Generation Projects not Subject to Tender in Mexico. With PSR for the Energy Regulatory Commission (CRE) in Mexico under the Energy Sector Management Assistance Program (ESMAP) of the **World Bank, Mexico.**
- 2010-12 Regulatory instruments for the financial viability of an efficient and reliable power system under market-based rules, with a strong presence of renewable intermittent generation in a low carbon economy context. **MITEI-IIT joint project.**
- 2009-12 Transmission system operation with large penetration of Wind and other renewable Electricity sources in Networks by means of innovative Tools and Integrated Energy Solutions (TWENTIES). Seventh Framework Programme, Theme 7, Energy. **European Commission.**
- 2009-12 Regulatory Issues and Business Models for Efficient Integration of EV, Working Package 5 in the Mobile Energy Resources in Grids of Electricity (MERGE) project. Seventh Framework Programme, Theme 7, Energy. **European Commission.**
- 2009-12 Business models to allow a massive and efficient deployment of electric vehicles in the **CENIT** project VERDE, **Spain.**
- 2008-09 Active Distribution networks with full integration of Demand and distributed energy REsourceS (ADDRESS). Grant agreement no. 207643. Seventh Framework Programme, Theme 7, Energy. **European Commission.**
- 2007-09 Economic and regulatory analysis for an active demand management. For Unión Fenosa in the CENIT project "Active Demand Management", **Spain.**
- 2009-10 Supervision and refereeing of the long-term supply auctions led by the distribution companies Edelnor S.A.A. e Hidrandina S.A. during 2009. **Osinergmin, Peru.**
- 2009-10 Advice within the work plan of the ERGEG's "SW Electricity REM" and the "Regional Initiatives Group". **National Energy Commission, Spain.**

- 2009 Electricity tariff design benchmarking for generation, transmission, distribution and retail activities. With ESAN for **Osinergmin, Peru**.
- 2009 Advice on the conceptual design process of the auction for the allocation of financial transmission rights of access to the electrical interconnection between Colombia and Panama. **Interconexión eléctrica Colombia - Panamá S.A. (ICP), Colombia & Panama**.
- 2009 Peer review Regional Initiatives (TREN/C2/397/2009). Everis & Mercados EMI consortium for the DGTREN, **Commission of the European Communities**.
- 2008 Proposals for the improvement of the Spanish electric power system regulatory framework. **Gas Natural, Spain**.
- 2008 Technical assessment on the return rate of compensations derived from the implementation of maintenance flows in hydro installations. **Endesa, Spain**.
- 2008 Electricity auctions design: Criteria and algorithms. **OMIP, Portugal**.
- 2008 Criteria and procedures for default electricity supply auctions. **Osinergmin, Peru**.
- 2008 Technical assessment on the average variation of the regulated electricity tariffs. **Energía de La Loma S.A., Spain**.
- 2008 Revision of the methodology for the design of electricity access tariffs and the development of last-resource tariffs for electricity and gas. **National Energy Commission, Spain**.
- 2008 Information systems of the Regional electricity market. With Indra for **Ente Operador del Mercado Eléctrico Regional de América Central, Central America**.
- 2007 Capacity payments mechanism design for pumped-storage hydroplants in Guatemala. For **Corporación Hidroeléctrica Guatemalteca, Guatemala**.
- 2007 Principles and criteria for the design of a security of supply mechanism for the Iberian electricity system. **National Energy Commission, Spain**.
- 2007 Analysis of the regulation of the cross-border exchanges of electricity in the Andean Community of Nations. **Centro Nacional de Control de la Energía (CENACE), Ecuador**.
- 2006 Diagnosis, design and implementation of surveillance and monitoring of the functioning of the electricity market in the Republic of Guatemala. With Mercados Energéticos Consultores for the **National Energy Regulatory Commission, Guatemala**.
- 2006 Study of opportunities for the evolution of the French balancing mechanism. **La SNET, France**.
- 2006 Electricity markets liberalization: Motivation and basic issues. Twinning project BG03-IB-EY02 (PHARE). Strengthening the Bulgarian Energy Regulator. **Besel, Bulgaria**.
- 2005 Analysis of the regulatory aspects of the Spanish power sector that hinder the correct development of the retailing activity. For **ACIE (Independent Energy Retailers Association), Spain**.
- 2005-06 White Paper for the reform of the regulatory scheme of the power generation in Spain. For the **Ministry of Industry, Tourism and Trade of Spain**.
- 2005 Advisory services to the committee created by the Law 28447, on the "White Paper: Bill to Assure the Efficient Development of Power Generation". For the **Ministry of Energy and Mines of Peru and Osinergmin, Peru**.
- 2004 Consulting services for development of capacity payments mechanisms in Russia. With Mercados EMI for **RAO UESR, Russian Federation**.
- 2002-04 Foundations and trends of liberalization models in electricity markets. Strategic analysis on power market design fundamentals in face of full liberalization. **Endesa, Spain**.
- 2003 Security of supply in the Dutch electricity market: general framework. **Department of Energy Regulation (DTe), The Netherlands**.
- 2003 Long term generation adequacy for the Dutch electricity market. With EEE Limited for the **Amsterdam Power Exchange (APX), The Netherlands**.
- 1997 Computation of the effective load carrying capability for the Spanish generating units. For the **National Electricity Regulatory Commission, Spain**.

1997 General support on electricity market design. Spot markets, energy contracts and stranded cost recovery. With London Economics and Ian Pope Associates for the **National Electricity Regulatory Commission, Spain.**

### **Power markets modeling**

- 2016-17 Mid to long term model for the prospective analysis of electricity markets. For **Gas Natural Fenosa, Spain.**
- 2014-15 Energy Storage Perspectives. MITEI & IIT-Comillas for **ENI, Italy.**
- 2014 Analysis of incentives for investment in generation in the context of massive penetration of renewable energy. For **Iberdrola, Spain.**
- 2012-13 Electric power system operation, planning and management modeling in a context of a large penetration of RES-E. For **Gas Natural Fenosa, Spain.**
- 2010-11 Review and improvement of the strategic bidding optimization model COPLA. For **Gas Natural Fenosa, Spain.**
- 2009 Analysis of energy balance, prices and operating regime on the Iberian Electricity Market. **Unión Fenosa, Spain.**
- 2005-06 A strategic short-term model for the Spanish power market. For **Gas Natural, Spain.**
- 2004 Modeling and evaluation of the risks and strategies for the development of the generation business plan of Unión Fenosa in Spain. For **Unión Fenosa, Spain.**
- 2004 A strategic medium and long-term model for the Spanish power market. For **Gas Natural, Spain.**
- 2003-04 Quantitative risk valuation in power markets. **Endesa, Spain.**
- 2003 Price risk analysis in the Spanish power market. For **Unión Fenosa, Spain.**
- 2002-03 Spanish wholesale power market price modeling. For **EDF Unité Commerciale, Spain.**
- 2002 Risk management in the Spanish electricity market. For **Iberdrola, Spain.**
- 1996-01 Simulation tools for planning, regulation and risk management applications. For **Endesa, Spain.**

### **Environmental policy**

- 2005-06 Forum on Global climate strategies beyond 2012: The route ahead. **Florence School of Regulation.** Madrid, Spain, April 11th to 13th, 2007.
- 2006 2006 Annual forum on energy & sustainability. Towards a global climate change strategy. The EU ETS and beyond. **Cátedra BP de desarrollo sostenible de la Universidad Pontificia Comillas.** November, 2006.

## **Publications**

### **Books and book chapters**

- Batlle, C., Mastropietro, P., Rodilla, P., Pérez-Arriaga, I. J., 2015. "The system adequacy problem: lessons learned from the American continent". In *The Law & Economics of EU Capacity Mechanisms*. Leigh Hancker, Adrien De Hauteclocque, and Małgorzata Sadowska Ed., Oxford University Press, 2015.
- Batlle, C., Ocaña, C., 2013. Electricity regulation: Principles and institutions. In *Regulation of the Power Sector, 2013*, Springer, Pérez-Arriaga, I.J. (Ed.).
- Batlle, C., 2013. Electricity generation and wholesale markets. In *Regulation of the Power Sector, 2013*, Springer, Pérez-Arriaga, I.J. (Ed.).
- Batlle, C., 2013. Electricity retailing. In *Regulation of the Power Sector, 2013*, Springer, Pérez-Arriaga, I.J. (Ed.).
- Rodilla, P., Batlle, C., 2013. Security of generation supply in electricity markets. In *Regulation of the Power Sector, 2013*, Springer, Pérez-Arriaga, I.J. (Ed.).

- Linares, P., Batlle, C., Pérez-Arriaga, I.J., 2013. Environmental Regulation. In Regulation of the Power Sector, 2013, Springer, Pérez-Arriaga, I.J. (Ed.).
- Sánchez, M. A., T. Gómez, P. García, C. Batlle, 2009. "Gestión de la demanda, generación distribuida y redes inteligentes" ("Demand management, distributed generation and smart grids"), in Tratado de Regulación del Sector Eléctrico (Treaty on Electric Power Industry Regulation). Ed. Aranzadi, ISBN: 978-84-8355-902-4, Navarra, 2009.
- Pérez-Arriaga, I.J., C. Batlle, M. Rivier, T. Gómez, 2008. "Expansión de la oferta e infraestructura eléctrica en Iberoamérica: generación, transmisión y distribución" ("Expansion of the electricity supply and infrastructure in Iberian America: generation, transmission and distribution"), in Energía y regulación en Iberoamérica (Energy and regulation in Iberian America). Asociación Iberoamericana de Entidades Reguladoras de la Energía (ARIAE). Civitas Ed. S.L., ISBN: 978-84-470-2965-5, Madrid, April 2008.
- Pérez-Arriaga, I.J., C. Batlle, C. Vázquez, 2006. "Los mercados eléctricos en Europa" ("Electricity markets in Europe"), en "Del monopolio al mercado. La Comisión Nacional de Energía: diez años en perspectiva" ("From the monopoly to the market. The National Energy Commission: ten years perspective"). Civitas Ed. S.L., ISBN: 978-84-470-2540-4, Madrid, December 2006.
- Pérez-Arriaga, I.J., C. Batlle, M. Rivier, P. Rodilla. "Libro Blanco sobre la reforma del marco regulatorio de la generación eléctrica en España". (White Paper for the reform of the regulatory scheme of the power generation in Spain). ISBN 978-84-4785-6, Madrid, July 2005.
- Alba J. J., I. Otero-Novas, C. Meseguer, C. Batlle, "Competitor Behavior and Optimal Dispatch: Modelling Techniques for Decision-Making", in The New Power Markets: Corporate Strategies for Risk and Reward. Robert Jameson, Risk publications Ed., ISBN: 1-899332-59-6, 1999.

### Journal articles

- Rodilla, P., García-González, J., Baíllo, A., Cerisola, S., Batlle, C., 2015. "Regulatory intervention to ensure an efficient medium-term planning in electricity markets". Energy Economics, vol. 51, pp. 365–382, September 2015.
- Mastropietro, P., Rodilla, P., Batlle, C., 2015. "National capacity mechanisms in the European Internal Energy Market: opening the doors to neighbours". Energy Policy, vol. 82, pp. 38-47, July 2015. 2015 Distinguished Scholar Award of the International Confederation of Energy Regulators (ICER).
- Mastropietro, P., Barroso, L.A., Batlle, C., 2015. Power transmission regulation in a liberalised context: proposals based on the analysis of two decades of novel solutions in South American markets. Utilities Policy, vol. 33, pp. 1-9, April 2015.
- Herrero, I., Rodilla, P., Batlle, C., 2015. "Electricity market-clearing prices and investment incentives: The role of pricing rules". Energy Economics, vol. 47, pp. 42–51.
- Veiga, A., Rodilla, P., Herrero, I., Batlle, C., 2015. "Intermittent RES-E, cycling and spot prices: the role of pricing rules". Electric Power Systems Research, vol. 121, pp. 134-144.
- Mastropietro, P., Batlle, C., Barroso, L. A., Rodilla, P., 2014. "Electricity auctions in South America: towards convergence of system adequacy and RES-E support". Renewable and Sustainable Energy Reviews, vol. 40, pp. 375 385, December 2014.
- Ruester, S., Schwenen, S., Batlle, C., Pérez-Arriaga, I.J., 2013. From distribution networks to smart distribution systems: Rethinking the regulation of European electricity DSOs. Utilities Policy, ISSN 0957-1787.
- Vázquez, S., Rodilla, P., Batlle, C., 2014. "Residual demand models for strategic bidding in European power exchanges: revisiting the methodology in the presence of a large penetration of renewables". Electric Power Systems Research, vol. 108, pp. 178-184, 2014.

- Batlle, C., Mastropietro, P., Gómez-Elvira, R., 2014. Towards a better integration of the EU electricity market: physical, financial transmission rights or just contracts for differences? *The Electricity Journal*, Volume 27, Issue 1, January–February 2014, Pages 8–17.
- Rodilla, P., Cerisola, S., Batlle, C., 2013. “Modeling the major overhaul cost of gas-fired plants in the Unit Commitment problem”. *IEEE Transactions on Power Systems*, vol. 29, iss. 3, pp. 1001-1011.
- Batlle, C. & Rodilla, P., 2013. “An enhanced screening curves method for considering thermal cycling operation costs in generation expansion planning”. *IEEE Transactions on Power Systems*, vol. 28, no. 4, pp. 3683-3691, Nov. 2013.
- Pérez-Arriaga, I. J. & Batlle, C., 2012. Impacts of intermittent renewables on electricity generation system operation. *Economics of Energy and Environmental Policy*, vol. 1, No. 2.
- Batlle, C., Pérez-Arriaga, I. J., Zambrano-Barragán, P., 2012. “Regulatory design for RES-E support mechanisms: Learning curves, market structure, and burden-sharing”. MIT CEEPR 2011-011 Working Paper, May 2011. *Energy Policy*, vol. 41, pp. 212-220, February 2012. doi: 10.1016/j.enpol.2011.10.039.
- P. Rodilla & C. Batlle, 2012. Security of electricity supply at the generation level: problem analysis. *Energy Policy*, vol. 40, pp. 177-185. January 2012.
- Batlle, C., 2011. “A Method for Allocating Renewable Energy Source Subsidies among Final Energy Consumers”. *Energy Policy*, vol. 35, iss. 5, pp. 2586-2595, doi: 10.1016/j.enpol.2011.02.027.
- Batlle, C., Barroso, L. A., 2011. “Support schemes for renewable energy sources in South America”. MIT-CEEPR Working Paper 11-001. IAEE Energy Forum. Third Quarter 2011, pp. 27-31. International Association for Energy Economics.
- Rodilla, P., Batlle, C., Salazar, J., Sánchez, J. J., 2011. “Modeling generation expansion in the context of a security of supply mechanism based on long-term auctions. Application to the Colombian case”. *Energy Policy*, Volume 39, Issue 1, January 2011, Pages 176-186.
- Batlle, C., Rodilla, P., 2010. A critical assessment of the different approaches aimed to secure electricity generation supply. *Energy Policy*, vol. 38, iss. 11, pp. 7169-7179, November 2010, doi: 10.1016/j.enpol.2010.07.039.
- Batlle, C., Barroso, L. A., Pérez-Arriaga, I. J., 2010. The changing role of the State in the expansion of electricity supply in Latin America. *Energy Policy*, Vol. 38, Iss. 11, November 2010, Pages 7152-7160, doi: 10.1016/j.enpol.2010.07.037.
- Batlle, C., Rodilla, P., 2009. “Electricity demand response tools: Current status and outstanding issues”. *European Review of Energy Markets*, volume 3, issue 2, June 2009.
- Batlle, C., Solé, C., Rivier, M., 2008. “A new security of supply mechanism for the Iberian Market”. *The Electricity Journal*, vol. 21, iss. 2, March 2008, pp. 63-73 (2008), doi:10.1016/j.tej.2008.02.003.
- Batlle, C., I. J. Pérez-Arriaga, 2007. “Design criteria for implementing a capacity mechanism in deregulated electricity markets”. Special issue on “Capacity mechanisms for long term supply security in liberalised electricity markets”, *Utilities Policy* (2008), doi:10.1016/j.jup.2007.10.004.
- Pérez-Arriaga, I. J., P. Linares, C. Batlle, J. Barquín, 2007. “The Major Elements for a Global Climate Strategy Beyond 2012”. IAEE Energy Forum, International Association for Energy Economics Newsletter, 4th Quarter, 2007.
- Batlle, C., 2007. “Reply to Gence-Creux, C., N. Bonnesoeur, M. Mocco, B. Papillon ‘Balancing Market Maker’ Proposal for France Poses Several Key Questions”. Letters to the editor, *The Electricity Journal*, 20 (10), pp. 3-6, Dec. 2007.



- Batlle, C., C. Vázquez, M. Rivier, I. J. Pérez-Arriaga, 2007. "Enhancing power supply adequacy in Spain: migrating from capacity payments to reliability options". *Energy Policy*, 35 (9), pp. 4545-4554, Sep. 2007.
- Batlle, C., C. Vázquez and J. Barquín, 2007. "The balancing market maker: A tool to enhance liquidity in the French balancing mechanism". *The Electricity Journal*, 20 (6), pp. 76-86, July 2007.
- Barquín, J., C. Batlle, 2005. "Pagando el invernadero: cambio climático y derechos de emisión" ("Paying for the greenhouse: climate change and emission trading"). *Anales de Mecánica y Electricidad*, Volumen LXXXII, Fascículo I, Enero-Febrero 2005.
- Batlle, C., J. Barquín, 2005. "A strategic production cost model for electricity market risk analysis". *IEEE Transactions on Power Systems*, vol. 20, iss. 1, Feb. 2005, pp. 67-74.
- Batlle, C., J. Barquín, 2004. "Fuel prices scenario generation based in a multivariate GARCH model for risk analysis in a wholesale electricity market", *International Journal of Electrical Power and Energy Systems*, vol. 26, iss. 4, pp. 273-280, May 2004. Selected for publication in 7th International conference on Probabilistic Methods Applied to Power Systems (PMAPS), Naples, September 2002.
- Otero-Novas, I., C. Meseguer, C. Batlle, J. J. Alba, 2000. "A simulation model for a competitive generation market", *IEEE Transactions on Power Systems*, vol. 15 (1), pp. 250-257, February 2000.

### Conference proceedings

- Herrero, I., Rodilla, P., Batlle, C., 2016. "The need for intra-day settlements in US electricity markets". 39th IAEE International Conference - IAEE 2016. Bergen, Norway. 19-22 June 2016.
- Usera, I., P. Rodilla, Herrero, I., García-González, J., Batlle, C., 2016. "The role of risk aversion and market completeness in gas and electricity investment coordination issues". CLAIO 2016 - XVIII Latin-Iberoamerican Conference on Operations Research. Santiago de Chile, Chile. October 2-6, 2016.
- Mastropietro, P., P. Rodilla, C. Batlle, 2014. "Reliability option contracts: the effect of the explicit penalty on the merit order of the auction". 14th IAEE European Energy Conference, Sustainable Energy Policy and Strategies for Europe, October 28-31, 2014 in Rome, Italy.
- Herrero, I., P. Rodilla, C. Batlle, 2014. Impact of day-ahead market pricing rules on generation capacity expansion. 37th IAEE International Conference, New York, June, 2014.
- Vázquez, S., P. Rodilla, C. Batlle, 2012. "Analyzing spot prices in a context with high penetration of variable energy resources". 31st USAEE/IAEE North American Conference. Austin, US. November 2012.
- Veiga, A., P. Rodilla, C. Batlle, 2012. "Revisiting GenCo's residual-demand-based methodologies for optimal day-ahead bidding in the context of European PX". 31st USAEE/IAEE North American Conference. Austin, US. November 2012.
- Araújo, C. P., C. Batlle, P. Rodilla, L. A. Barroso, 2009. "National support schemes for renewable energy sources in Latin America. State of the art, lessons learned and design criteria". 10th IAEE European Conference Energy, Policies and Technologies for Sustainable Economies. Vienna, Austria, 7-10 September 2009.
- de Biasi, G., C. Batlle, P. Rodilla, C. I. González, 2009. "A methodology to allocate the cost of national support schemes for renewable among final energy consumers". 10th IAEE European Conference Energy, Policies and Technologies for Sustainable Economies. Vienna, Austria, 7-10 September 2009.
- Rodilla, P., J. Salazar, C. Batlle, 2008. "Análisis estratégico del mercado eléctrico colombiano: Parte I. Modelado del precio de bolsa" ("Strategic analysis of the Colombian electricity market. Part I. Pool price modeling"). XIV Congreso Latino Ibero Americano de Investigación de Operaciones, Septiembre 2008.

- Salazar, J., P. Rodilla, J. J. Sánchez, C. Batlle, 2008. "Análisis estratégico del mercado eléctrico colombiano: Parte II. Modelado de la evolución del mercado" ("Strategic analysis of the Colombian electricity market. Part I. Market evolution modeling"). XIV Congreso Latino Ibero Americano de Investigación de Operaciones, Septiembre 2008.
- Barquín, J., C. Batlle, 2007. "Emission rights allocation criteria in the EU power sector". IEEE Power Engineering Society 2007 General Meeting, Tampa, Florida, 24-28 June 2007.
- Barquín, J., P. Rodilla, C. Batlle, C. Vázquez, M. Rivier, 2007. "Modeling market power: the Spanish White Paper approach". Power Systems Modelling (PSM 2007) Conference, Athens, 5-8 June 2007.
- Rodilla, P., C. Vázquez, C. Batlle, J. Barquín, M. Rivier, I. J. Pérez-Arriaga, 2007. "A robust equilibrium model to compute market power for regulatory purposes". 9th IAEE European Energy Conference, Florence, 2007.
- Batlle, C., C. Vázquez, M. Rivier, I. Pérez-Arriaga, 2006. "A regulatory instrument to enhance security of supply in the Spanish wholesale electricity market". 29th IAEE International Conference, Potsdam, Germany, June 2006.
- Vázquez, M., J. Barquín, C. Batlle, 2006. "Electricity forward and volatility curves computation based on Monte Carlo simulation". PMAPS'06. Stockholm, Sweden, June 11-15, 2006.
- Batlle, C., C. Vázquez, 2000. "A probabilistic model for capacity payments distribution in a deregulated wholesale electricity market". Sixth International Conference on Probabilistic Methods Applied to Electric Power Systems (PMAPS), Madeira, Portugal, Sep. 2000.
- Batlle, C., I. Otero-Novas, J. J. Alba, C. Meseguer, J. Barquín, 2000. "A model based in numerical simulation techniques as a tool for decision-making and risk management in a wholesale electricity market. Part I: General structure and scenario generators". 6th International conference on Probabilistic Methods Applied to Power Systems (PMAPS), Madeira, Sep. 2000.
- Otero-Novas, I., C. Batlle, J. J. Alba, C. Meseguer, J. Barquín, 2000. "A model based in numerical simulation techniques as a tool for decision-making and risk management in a wholesale electricity market. Part II: The market model". 6th International conference on Probabilistic Methods Applied to Power Systems (PMAPS), Madeira, September 2000.
- Batlle, C., I. J. Pérez-Arriaga, 1999. "El cálculo de la potencia equivalente a efectos de fiabilidad basado en las teorías probabilistas y sus problemas de aplicación práctica" ("Computation of the effective load carrying capability for the Spanish generating units"). 6th Portuguese-Spanish Electrical Engineering Conference, Lisbon, Portugal, July 1999.

### **Newspaper articles**

- Batlle, C. and C. Vázquez, 2006. "El mercado energético, como la selección, en el diván" ("The energy market, as the national team, in the divan"). Suplemento Negocios, Diario El País, p. 13, June 18th, 2006.
- Pérez-Arriaga, I. J., C. Batlle, 2004. "Equidad y eficiencia del Plan Nacional de Asignación", ("Equity and efficiency of the National Allocation Plan"). Diario Cinco Días, p. 15. July 15th, 2004.
- Pérez-Arriaga, I. J., C. Batlle, Á. Baíllo, C. Vázquez, 2004. "¿Qué es el déficit de la tarifa eléctrica? Una cuestión de confianza" ("What is the tariff deficit? A question of trust"). Suplemento Negocios, Diario El País, p. 4, Madrid, June 27th, 2004.

### **Working papers**

- Batlle, C., Chaves-Avila, J. P., Rodilla, P., Gómez, T., Mastropietro, P., Pérez-Arriaga, I. J., 2016. "Regulated charges and electricity bills for the future: the end of Ramsey pricing". Working Paper IIT. November, 2016.

- Huntington, S. C., Rodilla, P., Batlle, C., 2016. "Revisiting Support Policies for RES-E Adulthood: Towards Market Compatible Schemes". An MIT Energy Initiative Working Paper, September 2016.
- Usera, I., Rodilla, P., Batlle, C., 2016. "Regulatory framework for energy storage systems". Working Paper IIT. September 2016.
- Burger, S., Chaves-Ávila, J. P., Batlle, C., Pérez-Arriaga, I. J., 2016. The Value of Aggregators in Electricity Systems. An MIT Energy Initiative Working Paper, May 2016.
- Mastropietro, P., Rodilla, P., Batlle, C., 2015. "The unfolding of regional electricity markets: Measures to improve the firmness of cross-border trading". Submitted to Energy Policy. Working Paper IIT.
- Mastropietro, P., Rodilla, P., Batlle, C., 2015. "The need for non-performance penalties in capacity mechanisms: conceptual considerations and empirical evidence". Submitted to Economics of Energy & Environmental Policy. Working Paper IIT-15-088A.
- Rodilla, P., Batlle, C., Veiga, A., Hagerly, M., 2014. "Modeling the role of existing hydro resources in the capacity expansion problem in face of a significant penetration of solar PV. IIT working paper.
- Leung, T., Sánchez, M., Rodilla, P., Batlle, C., 2014. Optimizing Long-Term Service Agreements for gas-fired units in the context of increasing penetration of intermittent generation. Submitted to IEEE ToPS.
- Batlle, C., Rivier, M., 2012. "Redefining the new role and procedures of power network operators for an efficient exploitation of demand side response". Working Paper IIT, submitted to the Energy Journal.
- Batlle, C., Gómez-Elvira, R., 2011. "Forward cross-border transmission capacity allocation: Physical versus Financial Transmission Rights". 11-0xx MIT CEEPR Working Paper, May 2011.
- Rodilla, P. & Batlle, C., 2010. "Optimal incentives in the context of security of generation supply mechanisms". IIT Working Paper IIT-10-029A.
- Rodilla, P. & C. Batlle, 2010. "Redesigning Probabilistic Production Costing models and reliability measures in the presence of market demand elasticity". IIT Working Paper IIT-10-028A, submitted to IEEE Transactions on Power Systems.
- Batlle, C., L. A. Barroso, M. Uribe, 2009. "Long-term energy auctions design criteria and flaws in Latin America. The case of Peru". IIT Working Paper, Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, Madrid.
- Batlle, C. & P. Rodilla, 2009. "Policy and regulatory design on security of electricity generation supply in a market-oriented environment. Problem fundamentals and analysis of regulatory mechanisms". IIT Working Paper IIT-09-057A.
- Batlle, C., M. Rivier, P. Linares, P. Rodilla, 2009. "A framework to coordinate DSOs and the TSO in face of Active Demand Management services". IIT Working Paper IIT-08-062A, December 2008.
- Batlle, C., C. Vázquez, M. Rivier, I. Pérez-Arriaga, 2006. "Market power mitigation proposals for the Spanish wholesale electricity market". IIT Working Paper IIT-06-026A, June 2006.
- Pérez-Arriaga, I. J., C. Batlle, C. Vázquez, M. Rivier, 2006. "Diagnosis of the White Paper for the reform of the regulatory scheme of the power generation in Spain". IIT Working Paper IIT-06-041I, June 2006.
- Vázquez, C., C. Batlle, S. Lumberras e I. J. Pérez Arriaga, 2006. "Electricity retail regulation in a context of vertical integration: the debate on regulated tariffs", IIT Working Paper IIT-06-028A, June 2006.
- Batlle, C., C. Vázquez e I. J. Pérez-Arriaga, 2006) "Regulated tariff design in a liberalized power system: the case of Spain". Working Paper IIT 06 039I, 2006.

## Speaker in workshops and panels

- Vázquez, C., C. Batlle, M. Rivier and I. J. Pérez-Arriaga, 2003. Security of supply in the Dutch electricity market: the role of reliability options, for The Office for Energy Regulation (DTe) of The Netherlands. Presented at the workshop CEPR Competition & Coordination in the Electricity Industry, Toulouse, January 2004.
- “Reviewing market design for a better integration of large shares of RES”. European Power Market Summit: Today’s trends, power for tomorrow. Towards a common vision for European electricity markets? EPEXSPOT, Brussels, **Belgium**. 5–6 October 2016.
- “La seguridad energética del sector eléctrico colombiano en el contexto internacional”. IX Encuentro anual del sector energético colombiano. Bogotá, **Colombia**. August 1<sup>st</sup>, 2016.
- “Capacity market design in Colombia”. IEEE PES LOLEWG. Cambridge, MA, **USA**. 21-22 July 2016.
- “Electricity Supply. The Evolving Role of Different Generation Technologies and its Implications in Europe and North America”. Energy Futures – Europe and North America Workshop. Zurich, **Switzerland**. June 7th 2016.
- New Business Models for the Utility of the Future. Plenary panel. 69th Annual NECPUC Symposium, Falmouth, MA, **USA**. June 5-8, 2016.
- “El paradigma de la energía distribuida: consumidor – productor. ¿Desafío o amenaza para el ingreso tarifario de las distribuidoras?”. Seminario Internacional. Tarifas de distribución y su regulación en la era de la energía inteligente. COCIER, Bogotá, **Colombia**. 16-17 May, 2016.
- “The Cost of Doing Nothing with the Current Design of Electricity Markets”. Energy Demand and Efficiency. King Abdullah Petroleum Studies and Research Center, London, **UK**. March 22nd, 2016.
- “Increasing Power Flexibility” (Chairman). Berlin Energy Transition Dialogue 2016. Berlin, **Germany**, March 22nd, 2016.
- “Key issues to physical and regulatory convergence of markets” (Chairman). Integration and new design of the European electricity markets. Enerclub, Madrid, **Spain**. January 21st, 2016.
- “The difficult interplay between long-term energy policies and electricity markets: lessons learned and current challenges”. 2015 PUA annual conference. Future challenges and lessons from international energy reforms. Jerusalem, **Israel**. Nov. 30, 2015.
- “Electricity Market Design and Capacity Payments: A Transatlantic Perspective”. MIT CEEPR Fall 2015 Workshop. Cambridge, MA, **USA**. Nov 19-20, 2015.
- “Electric power regulation for the future (with a special focus on distribution)”. *Forsyningskonference*, Energi Styrelsen, Copenhagen, **Denmark**. November 11, 2015.
- “The MIT Utility of the Future Study”. Empowering customers and cities. Chicago, IL, **USA**. November 5, 2015.
- “Overcoming the bias against innovation: what the market wants & how to work with regulators to deliver”. Together with Angela O’Connor, Chairman, Massachusetts Department of Public Utilities. 6th Annual EnerNOC Utility Customer Group summit. Boston, MA, **USA**. October 6-8, 2015.
- “Given forms of capacity mechanisms and the EU electricity market”. Capacity mechanisms in Europe: The fundamental issues behind the ongoing sector inquiry. Global Competition Law Centre. City of Brussels, **Belgium**. September 28, 2015.
- “Regional market integration” (Chairman). 6th World Forum on Energy Regulation to be organized. Istanbul, **Turkey**. 25-28 May 2015.

- “Appropriate remuneration for conventional assets in the European system”. Opening comments with Prof. W. Hogan (Harvard). Workshop on EU Electricity Markets for Renewable Integration. DIW Berlin – DG Energy, Berlin, **Germany**. 23 January 2015.
- “Some future trends of the electricity business”. Celsia, Medellín, **Colombia**, November 26th, 2014.
- “Regulation for an efficient integration of distributed energy systems” in the workshop “Smart Frameworks for Smart Grids: The Economy and Regulation for a Sustainable Energy Transition”. Inter-American Development Bank, Miami, **USA**. November 17th, 2014.
- “Demand Response in the EU”. Workshop “Demand Side Response (DSR): Can international experiences be transferred to Russia?” Skolkovo Institute of Science and Technology. Moscow, **Russian Federation**. October 2-3, 2014.
- “Natural gas and power markets: short- and long-term issues”. 1er Foro Académico ANDEG: Futuro del mercado eléctrico colombiano. August 22nd, 2014. Bogotá, **Colombia**.
- “Short-term power market design issues: the complexity of simplicity”. Complexity versus Simplification in Electricity Markets. 2014 IEEE Power & Energy Society General Meeting. National Harbor, MD, **USA**. 29 July, 2014.
- “The disconnect of retail tariffs from wholesale market prices in key european markets”. CEEM Workshop on drifting apart: costs, prices and tariffs in EU electricity markets. *Université Paris-Dauphine*, Paris, **France**. 9 July 2014.
- “The future of the EU Electricity Market. Do we really know where we want to go?” CEPS/EDF Workshop on RES Policy for the 2030 Energy and Climate Framework. “Fixing renewables policy and market design: what’s feasible? What’s acceptable?” Centre for European Policy Studies, Brussels, **Belgium**. June 12, 2014.
- “Capacity Remuneration Mechanisms and the future of the EU Electricity Market”. 3rd European Energy Forum “European Energy Policy to Support Transition”. Conseil Français de l’Énergie, Paris, **France**. April 24, 2014.
- “Renewable energy developments in Spain”. Renewable Energy and Fossil Fuels in 2020 and Beyond - Friends or foes? Università Bocconi, Milan, **Italy**. January 21, 2014.
- “A comparative analysis of existing CRM models. What lessons can be learned?” Future electricity markets with or without capacity mechanisms: What does Europe say? Eurelectric, Brussels, **Belgium**. December 12, 2013.
- “Towards a Better Integration of the EU Electricity Market”. Keynote presentation in Berlin Conference on Electricity Economics (BELEC) - Modeling and Policy in the Energy Transformation – Germany, Europe, and Beyond. Berlin, **Germany**. October 9th, 2013.
- “Energiewende: How about Europe?” Opening Event Berlin Conference on Electricity Economics. Stiftung Mercator – DIW Berlin. Berlin, **Germany**. October 9th, 2013.
- Future design issues of wholesale electricity markets in the presence of large amounts of RES-E. In “Paths towards a New Energy Market Design”. Energy Policy Conference. EnBW & MIT-CEEPR. DIW-Berlin. Berlin, **Germany**. September 6th, 2013
- “A couple of lessons from the US Capacity Markets design for the future of EU internal electricity market. Capacity Remuneration Mechanisms, cross-border trade and demand response” in Workshop on Generation Adequacy and Security of Supply in the Internal Electricity Market. Florence School of Regulation. Florence, **Italy**. 1 February 2013
- Renewable Energy in the Internal Energy Market. Organised by Policy Department A, European Parliament, Brussels, **Belgium**. Thursday, 8 November 2012.
- Technical Workshop on “Capacity Mechanisms”. Huys Clingendael, The Hague, **The Netherlands**. October 29<sup>th</sup>, 2012.
- Designing the future European power market. Axpo Nordic Forum 2012. Helsinki, **Finland**. 17-18th October 2012.
- A Future-proof Energy Market Workshop. Florence, **Italy**. 12 October 2012.

- Foro de Energía: Desarrollo de un marco regulatorio para la sostenibilidad del sector eléctrico. Parlamento de Cataluña. Barcelona, Spain. 13-14 September 2012.
- Energy-only vs. energy-and-capacity markets: what is the best long-term choice for Europe? Elforsk AB. Tändstickspalatset, Västra Trädgårdsgatan 15, Stockholm, **Sweden**. 19 June 2012.
- The state of the Union: Energy Policy. Loyola de Palacio Chair on Energy Policy. Florence School of Regulation. Florence, **Italy**. 10 May 2012.
- Colloque de Printemps de l'Association des Economistes de l'Energie 2012. Les marchés électriques européens à la croisée des chemins. La création de marchés de capacité pour la sécurité long terme. Mercredi 9 mai 2012. Représentation du Parlement Européen en France, Paris, **France**.
- CERAWEEK 2012. The Quest: Energy, Security and the Future of Economic Growth. Houston, TX, **USA**.
  - Strategy session: Evolving Power Market Structures: Lessons from Texas, Alberta and Europe? Carlos Batlle, Research Scholar, MIT Energy Initiative, Doyle Beneby, President & CEO, CPS Energy, Terry Boston, President & CEO, PJM Interconnection, Lawrence Makovich, Vice President & Senior Advisor, IHS CERA (Chair)
- "The need for security of supply mechanisms in the transition to low carbon electricity markets". Workshop on electricity market arrangements in a low carbon economy. European Commission. Directorate-General for Energy. Brussels, **Belgium**. Dec. 12th, 2011.
- "Regulación y resultados de la liberación del mercado eléctrico para los consumidores en España". Seminario "Retos y Desafíos para el Desarrollo Energético de Chile". Ministerio de Energía - Banco Interamericano de Desarrollo. Santiago, **Chile**. September 2nd, 2011.
- "Regulatory Instruments for the Financial Viability of a Power Market with a Strong Presence of Renewable Intermittent Generation". 7th ENEL International Regulation Meeting "Future Electricity Markets: delivering Sustainability, Security of Supply and Competition". Endesa Headquarters, Madrid, **Spain**. 16th June 2011.
- "Renewable energy sources (RES) policy and regulation in Spain". Achieving Decarbonization: Transforming National Energy Systems. Energy, Climate and Innovation. Program of the Fletcher School's Center for International Environment & Resource Policy. Tufts University's Fletcher School. Medford, MA, **USA**. March 10-11, 2011.
- "Incentivos regulatorios para la firmeza y suficiencia del suministro de electricidad". II Encuentro Internacional de Regulación 2009. Osinergmin – CIER. Lima, **Peru**. September 21-22, 2009.
- "Política y Regulación de Energía Renovable en España (*Policy and Regulation for Renewable Energy in Spain*)". Experiencias Internacionales de Política y Regulación para el Desarrollo de Energías Renovables (Policy and Regulatory International Experiences for Development of Renewable Energy). Organized by SENER y ESMAP-World Bank. Mexico D.F., **Mexico**. November 3rd 2009.
- "Ten years of Spanish electricity market liberalization". 1999-2009: Ten years of European energy markets liberalization. Università Bocconi. Milan, **Italy**. October 26th, 2009.
- "Efficiency of reliability options and applicability in different market designs", with I. J. Pérez-Arriaga. International Workshop on "Capacity mechanisms for long term supply security in liberalised electricity markets", Laboratoire d'Analyse économique des Réseaux et des Systèmes Energétiques (LARSEN), University Paris XI, **France**. March 2007.
- "Towards a global climate change strategy: the EU ETS & beyond", with I. J. Pérez-Arriaga. Third meeting of the Climate Change Council. Climate Change Capital. Madrid, **Spain**. November 2006.

## Lecturing and teaching activity

- “Enjeux énergétiques et ouverture des marchés: faut-il protéger ou responsabiliser le consommateur?”, Journée du 27 Avril 2006, SIGEIF (Syndicat Intercommunal pour le Gaz et l'Electricité en Ile de France), Paris, **France**. April 2006.
- “International experiences on demand management”. Energy for the industry in Europe: challenges and opportunities, Foment del Treball Nacional, Barcelona, **Spain**. Oct. 2005.

## Postgraduate education

### *ICAI School of Engineering Doctorate Program*

Professor in the following courses:

- “Electric Power Systems Regulation”, 2008-onwards.
- “Wholesale and retail electricity markets”, 2002-onwards.
- “Models for risk analysis and management in the energy sector”, 2002-2007.

### *MIT*

Professor in:

- “Engineering, Economics and Regulation of the Electric Power Sector”, graduate course ESD.162, 15.032 and 6.695. 2011-onwards.

### *Other postgraduate programs*

- Energy Science and Technology Master Program. Skolkovo Institute of Science and Technology, Moscow. 2014-onwards.
  - Lecturer in the course “Power Markets and Regulation”.
- Master del Negocio Energético. Enerclub. 2010-onwards.
  - Lecturer in the module “Regulación”.
- Programme coordinator and lecturer in “Maestría en Gestión de Energía” (Master in Energy management), ESAN and Universidad Pontificia Comillas, Lima, **Perú**. 2010-onwards.
- Máster Universitario en Tecnología Eléctrica Endesa-ICAI (Master in Electric Technology Endesa-ICAI), Endesa and Universidad Pontificia Comillas. 2008-2010.
  - Lecturer in the module: “Economía del sector eléctrico” (“*Electricity systems economics*”).
- Máster en regulación de la industria eléctrica (Regulation of the electricity industry”), Universidad Pontificia Comillas, Santo Domingo, **Dominican Republic**.
  - 2010-2011. Programme coordinator.
  - Lecturer in the modules: “Regulatory models and institutions in the electricity sector” and “Retail markets”, 2007-onwards.
- Lecturer in the “Máster en gas y electricidad” (Master on gas and electricity) organized by the Instituto Superior de la Energía, Madrid, **Spain**. 2004-07.

## Bachelor education

### *ICAI School of Engineering*

- Professor on Energy Economics. With Pablo Rodilla. 2012 onwards.
- Coordinator of the Final degree dissertation programme, Industrial Organization branch, 2002-2003, 2003-2004.

## Professional training for energy regulatory institutions & energy companies

### **Organization and coordination of tailor-made courses**

- Co-lecturer (together with P. Rodilla) of the course “Economía y regulación de mercados regionales”, for CENACE. Quito, **Ecuador**. February 17-19, 2014.
- Co-lecturer (together with I. J. Pérez-Arriaga) of the course “Regulation of the Power sector” for Saudi Aramco, December 15-19, 2014. Al Khobar, **Saudi Arabia**.
- Co-lecturer (together with J. Barquín) of the course “Curso de análisis y gestión de riesgos en mercados de energía” (“*Risk analysis and management in electricity markets*”), for Petrobras. May 8-10th, 2007, Madrid, **Spain**.
- Co-lecturer (together with Carlos Vázquez) of the course “Factores clave del mercado eléctrico español” (“*Key issues of the Spanish electricity market*”), for Gas Natural. December 12-14th, 2005, Barcelona, **Spain**.

### **Contributions to specific courses**

- La formation sur la Régulation du Secteur Electrique. Sous le Haut Patronage de S.E. Dr. Chakib Khelil, Ministre de l’Energie et des Mines. L’Algerian Petroleum Institute avec la Florence School of Regulation. Algiers, **Algeria**. Nov. 8th-11th 2009 - Jan. 17th-19th 2010.
  - L’Evolution du rôle de l’Etat dans l’expansion de la fourniture d’électricité en Amérique latine.
  - Dix ans de libéralisation du marché de l’électricité en Espagne.
  - Gestion et programmation de la production : du dispatching centralise aux marchés de gros.
  - Questions stratégiques et réglementaires concernant la sécurité de l’approvisionnement en électricité.
- Corso di formazione per funzionari II edizione. Autorità per l’energia elettrica e il gas. Milano, **Italy**. September 28th, 2009.
  - Transition issues to full retail liberalization, default prices.
- Training Course for Senior Regulatory Staff from MEDREG MPC Countries. Programme by Florence School of Regulation. Milan, **Italy**. July 13th-17th 2009.
  - Impact of market design on generation adequacy.
  - Experience with generation adequacy in Latin America.
- International course “Regional Power Market integration in Central America. Hydropower Economics and Financing”, International Centre for Hydropower (ICH), Asociación de Generadores con Energía Renovable (AGER) y Federación de Energías renovables de Centro América y el Caribe (FERCCA). La Antigua, **Guatemala**. 6–11 October 2008.
  - Two-day lectures on “Wholesale electricity market design and analysis”.
- “Sistema energético sostenible, nueva economía y empleos verdes ante la crisis” (*Sustainable Energy System, New Economy and Green Employments in face of the Crisis*). Summer Course organized by Instituto Sindical de Trabajo, Ambiente y Salud (ISTAS) de CCOO. Universidad Complutense, El Escorial, **Spain**. July 31th, 2009.
  - Comparación de marcos regulatorios internacionales (“*International regulatory schemes comparison*”).
- On-line course “Nuevas tendencias en el Sector Eléctrico” (“*New trends in the Electric Power Industry*”), for UNESA, Spain, June-July, 2008. Lecturer in the modules:
  - “Mercados de electricidad. El Mercado Interior de la Electricidad y el Mercado Ibérico” (“*Electricity Markets. The Internal Electricity Market and the Iberian Market*”)
  - “Comercialización de electricidad y diseño de tarifas” (“*Electricity retail business and tariff design*”).



- "FSR advanced training course on electricity markets", Training course for energy regulatory institutions & energy companies (FSR sponsors), Florence, 31 March - 4 April 2008.
  - Invited speaker "Last-resort tariffs".
- International seminar "Modelaje matemático de subastas de energía eléctrica. Sistemas, metodologías y experiencias" ("Mathematical modeling of electricity auctions"). DecisionWare Ltda., Bogotá, Colombia, March, 12-14th, 2008.
  - Modelos fundamentales de análisis de mercados eléctricos (Fundamental analysis models for electricity markets).
  - Mecanismos de garantía de suministro de electricidad (*Security of Supply Mechanisms*).
- Course "Sustainable Energy Markets", EEI Training Program, 2007.
  - Coordinator and lecturer of the module "Electricity & gas markets: Design, regulation, functioning & future perspectives". September 11- 14, 2007.
- "Energy Policy in Spain: the required change", Summer Course, Universidad Complutense, El Escorial, July 2005.
  - Aspectos medioambientales de la energía: el impacto del mercado de derechos de emisión (*"Energy environmental aspects: impact of the emissions trading market"*).
- *On-line* course "Regulación del sector eléctrico" ("Electricity sector regulation"). CEDDET – Universidad Pontificia Comillas collaboration, 2003-07.
  - Lecturer in the module "La regulación de libre mercado: comercialización y mercado minorista" (*"Free market regulation: retail market"*).
- EES-UETP (Electric Energy Systems University Enterprise Training Partnership). Lecturer in the following international courses:
  - "Integration of renewables and CHP, guarantee of supply and ancillary services in electricity markets", Porto, **Portugal**, November 2002. "Modeling risk analysis and management" and "Overview of Approaches to Guarantee of Supply".
  - "Risk management: The perspective in electric utilities", Paris, **France**, January 2001.
  - "Electricity markets: Models and tools for utilities and other players", Porto, **Portugal**, May 2000.
  - "Risk management in energy markets: Optimal use of financial products", Paris, **France**, October 1999