

# PEDRO LINARES

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## Current academic positions

Professor of Industrial Engineering, ICAI School of Engineering, U. Pontificia Comillas

Director, BP Chair on Energy and Sustainability, U. Pontificia Comillas

Director, Economics for Energy

Director, International Doctoral School, U. Pontificia Comillas

Member of the Executive Committee, GlobalE3 program, Institute for International Education

## Research interests

Sustainable Energy Policy, Energy Economics, Decision Theory

## Education

Ph.D. Agricultural Economics, U. Politécnica de Madrid. 1999

M.S. Agricultural Engineering, U. Politécnica de Madrid, 1993

## Languages

Spanish: native; English: fluent; French: good.

## Teaching

Operations Research (undergraduate)

Industrial Economics (undergraduate)

Engineering and Sustainable Development (undergraduate)

Decision Theory and Methods (graduate)

Environmental Regulation of Power Systems (graduate)

## Publications

### Journal articles

"The relevance of the local context for assessing the welfare effect of transport decarbonization policies. A study for 5 Spanish metropolitan areas", with A. Danesin. *Energy Policy*, 118: 41-57, 2018.

"The policy implications of energy poverty indicators", with J.C. Romero, X. López. *Energy Policy*, 115: 98-108, 2018.

"Assessing the EU ETS with a bottom-up, multisector model", with P. Pintos. *Climate Policy*, 18: 413-424, 2018.

"Spatial and temporal synchronization of water and energy systems: towards a single integrated optimization model for long-term resource planning", with Z. Khan, M. Rutten, S. C. Parkinson, N. Johnson, J. García-González. *Applied Energy*, 210: 499-517, 2018.

"Towards a comprehensive policy for electricity from renewable energy: an approach for policy design", with K. Iychettira, R.A. Hakvoort. *Energy Policy*, 106: 169-182, 2017.

"Assessing the potential and costs of reducing energy demand", with P. Pintos, K. Würzburg. *Energy Transitions*, in press.

"Spatial and temporal synchronization of water and energy systems: towards a single integrated optimization model for long-term resource planning", with Z. Khan, M. Rutten, S. C. Parkinson, N. Johnson, J. García-González. *Applied Energy*, in press.

"Assessing the EU ETS with a bottom-up, multisector model", with P. Pintos. *Climate Policy*, in press.

"Towards a comprehensive policy for electricity from renewable energy: designing for social welfare", with K. Iychettira, R.A. Hakvoort, R. de Jeu. *Applied Energy*, 187: 228-242, 2017.

"Integrating water and energy models for policy driven applications. A review of contemporary work and recommendations for future developments", with Z. Khan, J. García-González. *Renewable & Sustainable Energy Reviews*, 67: 1123-1138, 2017.

"An estimation of the economic and environmental benefits of a demand-response electricity program for Spain", with A. Conchado, O. Lago, A. Santamaría. *Sustainable Production and Consumption*, 8: 108-119, 2016.

“How relevant is the lack of reciprocity in pairwise comparisons? An experiment with AHP”, with S. Lumbreras, A. Santamaría, A. Veiga. *Annals of Operations Research*, 245: 227-244, 2016.

“Adaptation to climate-induced regional water constraints in the Spanish energy sector: An integrated assessment”, with Z. Khan, J. García-González. *Energy Policy* 97: 123-135, 2016.

“The role of information for energy efficiency in the residential sector”, with A. Ramos, A. Gago, X. Labandeira. *Energy Economics*, 52: S17-S29, 2015.

“The green impact: how renewable sources are changing EU electricity prices”, with J.P. Chaves, K. Würzburg, T. Gómez. *IEEE Power and Energy Magazine*. 13(4): 29-40, 2015.

“An estimation of fuel demand elasticities for Spain: an aggregated panel approach accounting for diesel share”, with A. Danesin. *Journal of Transport Economics and Policy*, 49 (1): 1-16, 2015.

“Electricity Load Level Detail in Computational General Equilibrium – Part II – Welfare Impacts of a Demand Response Program”, with R. Rodrigues. *Energy Economics*, 47: 52-67, 2015.

“Electricity load level detail in computational general equilibrium – Part I – Data and calibration”, with R. Rodrigues. *Energy Economics*, 46: 258-266, 2014.

“Back to the future? Rethinking auctions for renewable electricity support”, with P. Del Río. *Renewable and Sustainable Energy Reviews*, 35: 42-56, 2014.

“Exergy as a global energy sustainability indicator. A review of the state of the art”, with J.C. Romero. *Renewable and Sustainable Energy Reviews*, 33: 427-442, 2014.

“The effect of carbon prices and anti-leakage policies on selected industrial sectors in Spain - Cement, steel and oil refining”, with A. Santamaría and P. Pintos. *Energy Policy*, 65: 708-717, 2014.

“Renewable generation and electricity prices: Taking stock and new evidence for Germany and Austria”, with K. Würzburg and X. Labandeira. *Energy Economics*, 40: 159-171, 2013.

“The economics of new nuclear power plants in liberalized electricity markets”, with A. Conchado. *Energy Economics*, 40: 119-125, 2013.

“Los efectos económicos del sistema europeo de comercio de emisiones de gases de efecto invernadero”, with P. Pintos. *Cuadernos de Información Económica*, 237: 97-104, 2013.

“Los desafíos económicos del sector energético”, with X. Labandeira. *Revista de Occidente*, 383: 130-133, 2013.

“The costs of electricity interruptions in Spain. Are we sending the right signals?”, with L. Rey. *Energy Policy*, 61: 751-760, 2013

- “A sustainable framework for biofuels in Europe”, with I.J. Pérez-Arriaga. *Energy Policy*, 52: 166-169, 2013.
- “Renewables vs. energy efficiency: the cost of carbon emissions reduction in Spain”, with A. López-Peña and I.J. Pérez-Arriaga. *Energy Policy*, 50: 659-668, 2012.
- “Energías renovables y cambio climático”, with X. Labandeira and K. Würzburg. *Cuadernos Económicos de ICE*, 83: 37-60, 2012.
- “Costes de la reducción de la demanda de energía en España. Estimación del potencial”, with P. Pintos and K. Würzburg. *Revista Economía Industrial*, 384: 37-50, 2012.
- “An Ex-post Analysis of the Effects of Renewables and Cogeneration on Spanish Electricity Prices”, with L. Gelabert and X. Labandeira. *Energy Economics*, 33: S59-S65, 2011.
- “Impacto sobre la producción eléctrica y emisiones de CO<sub>2</sub> de un programa de gestión activa de demanda eléctrica residencial: Un MEGA para España”, with R. Rodrigues and A. Gómez-Plana. *Estudios de Economía Aplicada*, 29: 665-701, 2011.
- “The green effect: Economic and market impacts of renewable energy development in Spain, Germany and Latin America”, with L. Barroso, H. Rudnick and F. Sensfuss. *IEEE Power and Energy Magazine*, 8: 22-35, 2010.
- “Energy efficiency economics and policy”, with X. Labandeira. *Journal of Economic Surveys*, 24: 573-592, 2010.
- “Estimación de los beneficios de la gestión activa de la demanda. Revisión del estado del arte y propuestas”, with A. Conchado. *Cuadernos Económicos del ICE*, 79: 187-212, 2010.
- “Are inconsistent decisions better? An experiment with pairwise comparisons”. *European Journal of Operational Research*, 193: 492-498, 2009.
- “Promoting investment in low-carbon energy technologies”, with I.J. Pérez Arriaga. *European Review of Energy Markets*, 3: 9-21, 2009.
- “Eficiencia energética y medio ambiente”. *Información Comercial Española*, 847: 75-92, 2009.
- “An integrated approach to simulate the impacts of carbon emissions trading schemes”, with X. Labandeira and M. Rodríguez. *The Energy Journal*, Special Issue. *Climate Change Policies after 2012*: 217-237, 2009.
- “La interacción del sistema europeo de comercio de emisiones con otros instrumentos de política”, with X. Labandeira and P. del Río. *Papeles de Economía Española*, 121: 211-224, 2009.

“Coordination of carbon reduction and renewable energy support policies”, with F.J. Santos and M. Ventosa. *Climate Policy*, 8: 377-394, 2008.

“Incorporating oligopoly, CO<sub>2</sub> emissions trading and green certificates into a power generation expansion model”, with F.J. Santos, M. Ventosa and L. Lapiedra. *Automatica*, 44: 1608-1620, 2008.

“Markets vs. regulation: A role for indicative energy planning”, with I.J. Pérez Arriaga. *The Energy Journal*, Special Issue. *The Future of Electricity: Papers in Honor of David Newbery*: 149-164, 2008.

“Scenarios for the evolution of the Spanish electricity sector: Is it on the right path towards sustainability?”, with F.J. Santos and I.J. Pérez Arriaga. *Energy Policy*, 36: 4057-4068, 2008.

“Internalización de externalidades medioambientales en sistemas eléctricos: Una aplicación para España”, with L. Muñoz, A. Ramos and J. Montes. *Revista de Economía Industrial*, 365: 149-162, 2007.

“Impacts of the European Emissions Trading Scheme Directive and permit assignment methods on the Spanish electricity sector”, with F.J. Santos, M. Ventosa and L. Lapiedra. *The Energy Journal*, 27: 79-98, 2006.

“Multiple Criteria Decision Making and Risk Analysis as Risk Management Tools for Power Systems Planning”. *IEEE Transactions on Power Systems*, 17: 895-900, 2002.

“Aggregation of preferences in an environmental economics context: a goal programming approach”, with C. Romero. *OMEGA Int. Journal of Management Science*, 30: 89-95, 2002.

“A multiple criteria decision making approach for electricity planning in Spain: economic versus environmental objectives”, with C. Romero. *Journal of the Operational Research Society*, 51: 736-743, 2000.

“Assessment of the externalities of biomass energy, and a comparison of its full costs with coal”, with R.M. Sáez and J. Leal. *Biomass and Bioenergy*, 14: 469-478, 1998.

#### Book chapters

“Energía y Sostenibilidad”, with J.M. Bellver, A. Conchado, R. Cossent, A. Danesin, I.J. Pérez-Arriaga, J.C. Romero, " in A. Blanco (Ed.), *Informe España 2015*. Fundación Encuentro, 2015.

“Laudato si’ y la ciencia”, with J.C. Romero, in E. Sanz Giménez-Rico (Ed.), *Cuidar de la tierra, cuidar de los pobres*. Sal Terrae, 2015.

“System-level Benefits of Demand Response”, with M. Vallés, P. Frías, A. Conchado, O. Lago, in A. Losi et al (Eds), *Integration of Demand Response into the Electricity Chain: Challenges, Opportunities and Smart Grid Solutions*. Wiley-ISTE, 2015.

“Demanda de electricidad y eficiencia”. In M.A. Agúndez, J. Martínez-Simancas (Eds.), *Energía eléctrica. Manual básico para juristas*. La Ley, 2014.

“El concepto marco de sostenibilidad: variables de un futuro sostenible”. In C. Alonso Bedate (Ed), *¿Es sostenible el mundo en que vivimos?: un enfoque interdisciplinar*, pp. 11-32, Universidad Pontificia Comillas, 2013

“Environmental implications of energy production”, with N. Caldés and Y. Lechón. In Dyer, H., M.J. Trombetta (Eds.), *International handbook of energy security*, pp: 345-385. Edward Elgar, 2013.

“Environmental regulation”, with C. Batlle and I.J. Pérez-Arriaga. In Pérez-Arriaga, I.J. (Ed.), *Regulation of the power sector*, pp: 539-580. Springer, 2013.

“Power system economics”, with M. Ventosa and I.J. Pérez-Arriaga. In Pérez-Arriaga, I.J. (Ed.), *Regulation of the power sector*, pp: 47-124. Springer, 2013.

“The economic impact of demand-response programs on power systems. A survey of the state of the art”, with A. Conchado. In Sorokin, A.; Rebennack, S.; Pardalos, P.M.; Iliadis, N.A.; Pereira, M.V.F. (Eds.). *Handbook of networks in power systems*, pp: 281-302. Springer. 2012.

“The ADDRESS European Project: a large-scale R&D initiative for the development of active demand”, with F. Bouffard, R. Belhomme, A. Diop, M. Sebastian-Viana, C. Yuen, H. Devine-Wright, R. Cerero and G. Valtorta. In Jamasb, T., M.G. Pollitt (Eds). *The Future of Electricity Demand: Customers, Citizens and Loads*, pp: 423-444. Cambridge University Press, 2011.

“Second-best instruments for energy and climate policy”, with X. Labandeira. In Markandya, A., I. Galarraga, M. González (Eds.). *Handbook of Sustainable Use of Energy*, pp: 441-451. Edward Elgar. 2011.

“Análisis prospectivo general”, with P. Frías and T. Gómez. In Becker, F., L.M. Cazorla, J. Martínez-Simancas (Dir.). *Tratado de Energías Renovables*, pp: 243-288. Aranzadi, Cizur Menor. 2010.

“Aspectos éticos en el uso de las distintas energías”. In Llamas Madurga, M.R. (Coord). *Implicaciones éticas en algunos debates científicos*, pp: 121-141. Instituto de España, Madrid. 2010.

“A discussion of “Climate Change Policies, Competitiveness and Leakage”, by Philippe Quirion”. In Cerdá, E., X. Labandeira (Eds). *Climate change policies: Global challenges and future prospects*, pp: 123-128. Edward Elgar, Cheltenham, UK. 2010.

“Instrumentos de regulación ambiental en el sector eléctrico”. In Becker, F., L.M. Cazorla, J. Martínez-Simancas, J.M. Sala (Dir.) Tratado de regulación del sector eléctrico, pp: 479-508. Aranzadi, Cizur Menor. 2009.

“La ingeniería de la decisión como herramienta para la sostenibilidad”, with A. Ramos and P. Sánchez. In Sancha, J.L. (coord). El ingeniero del ICAI y el desarrollo sostenible, pp: 389-395. Universidad Pontificia Comillas, Madrid. 2009.

“The joint impact of carbon emissions trading and tradable green certificates on the evolution of liberalized electricity markets: The Spanish case”, with F.J. Santos. In Gulli, F. (ed). Markets for carbon and power pricing in Europe. Theoretical issues and empirical analyses, pp: 213-233. Edward Elgar, Cheltenham, UK. 2008.

“Strategic decisions for green electricity marketing in Spain: learning from past experiences”, with M. Pérez Plaza. In Wang, H-F. (ed). Web-based green products life cycle management systems: Reverse supply chain utilization, pp: 250-266. IGI Publishing, Hershey, PA. 2008.

“Economía y medio ambiente: Herramientas de valoración ambiental”, with C. Romero. In Becker, F., L.M. Cazorla, J. Martínez-Simancas (Dir.). Tratado de Tributación Medioambiental, pp: 1189-1225. Aranzadi, Cizur Menor. 2008.

“Medio ambiente, energías renovables y garantía de suministro”. In Los asuntos pendientes en la regulación del sector eléctrico, pp: 124-136. Fundación Alternativas, Madrid. 2008.

“An assessment of the consequences of the European Emissions Trading Scheme for the promotion of renewable electricity in Spain”, with F.J. Santos and M. Ventosa. In De Miguel, C., X. Labandeira y B. Manzano (eds). Economic Modelling of Climate Change and Energy Policies, pp: 70-85. Edward Elgar, Cheltenham. 2006.

“Política energética”, with J. Barquín. In Galindo Martín, M.A. & Y. Fernández Jurado (Coords). Política socioeconómica en la Unión Europea, pp: 341-356. Delta Publicaciones, Madrid. 2006.

“El riesgo de las fuentes energéticas”, with J. Barquín, J. Montes and I. Pérez-Arriaga. In IX Forum de la Seguretat: Seguridad y energía, pp: 49-71. Institut d'Estudis de la Seguretat, Barcelona. 2006.

“Un modelo energético insostenible”, with E. Menéndez, C. de Miguel, M. Pardo, J. I. Pérez Arriaga and L.J. Sánchez de Tembleque. In Informe España 2005, pp: 75-142. Fundación Encuentro, Madrid. 2005.

“Programas de cooperación al desarrollo: Aplicación a la electrificación rural apropiada”, with F.J. Santos Pérez. In Fernández, F.R., R. Caballero, C. Romero (eds). La aventura de decidir: una aproximación científica mediante casos reales, pp: 59-71. Universidad de Málaga, Málaga. 2004.

“Externalidades de la energía y su valoración”. In Gago Rodríguez, A., y X. Labandeira Villot (eds.) *Energía, Fiscalidad y Medio Ambiente en España*, pp: 40-65. Instituto de Estudios Fiscales, Madrid. 2002.

#### Books

“Cambio Global España 2020/2050. Energía, Economía y Sociedad”, with J. Nieto. Universidad Complutense y Fundación CONAMA, Madrid. 2011.

“Influencia de las políticas medioambientales en los mercados eléctricos europeos”, with C. Ocaña, I. J. Pérez Arriaga, F.J. Santos. Fundación BBVA, Madrid. 2007.

“ExternE National Implementation. Spain”, with M. Aróstegui, J. Leal, Y. Lechón, R.M. Sáez, M. Varela, A. Alarcón, S. Salat, N. Sumarroca, J. Montes, L. Muñoz, A. Ramos. CIEMAT, Madrid. 1999

#### Other publications

“La valoración de los recursos distribuidos en las políticas energéticas europeas. Ventajas e inconvenientes”, with J.P. Chaves, T. Gómez. *Temas para el debate*, 270: 38-42, 2017.

“El valor de los recursos distribuidos frente a los centralizados”, with J.P. Chaves, T. Gómez. *Revista de Obras Públicas*. 164 (3584): 32-37, 2017.

“El acuerdo de París sobre cambio climático”, with X. Labandeira. *Revista ICADE*, 97: 11-19, 2016.

“Las agendas de cambio climático y de desarrollo humano sostenible en las cumbres de París y Nueva York: una historia de dos ciudades”, with A. González-García, J.C. Romero, A. Conchado. *Revista ICADE*, 97: 57-86, 2016.

“Hacia una conceptualización operativa de la sostenibilidad energética”, with J.C. Romero. *Anales de Mecánica y Electricidad*. vol. XCI: 4-9, 2014.

“Gestión de la demanda eléctrica”, with F. García, D. Trebolle, M. Goudó, J.M. Galán and A. Conchado. *Anales de Mecánica y Electricidad*, XCI: 26-32, 2013.

“La innovación en el sector energético”, with A. Conchado and L. Díaz-Anadón. *Cataluña Económica*. 3 (517): 44-47, 2013.

“Costes de reducción de CO2 en la industria española”, with A. Santamaría. *Economistas*, 127: 72- 81, 2011.



“A new framework for rural electrification programs”, with K. Dietrich and A. López-Peña. IAEE Energy Forum, Summer: 21-25, 2011.

“Análisis de la evolución de la intensidad energética en España”, with X. Labandeira and M. Mendiluce. Economics for Energy, Vigo. 2011.

“Energía y sostenibilidad en España”, with P. Del Río and X. Labandeira. Economistas, 123: 281- 285, 2010.

“Evaluación del potencial de las diversas fuentes de energía renovable y de las tecnologías para su aprovechamiento: oportunidades y retos para el sector de la energía”, with P. Frías and T. Gómez. Nota d'economia, 95-96: 89-101, 2010.

“Políticas para un transporte sostenible”, with I. Pérez Arriaga, A. López Peña and J. Díaz Carazo. Cuadernos de Energía, 25: 14-21, 2009.

“Energía y desarrollo sostenible”, with I.J. Pérez Arriaga. Cuadernos de Economía Social, 3: 1-4, 2008.

“Electrificación rural. Consideración de la organización y estructura social”, with F.J. Santos. Solar News, Cuarto Bimestre: 34-39, 2007.

“The major elements for a global climate strategy beyond 2012”, with I. Pérez-Arriaga, C. Batlle and J. Barquín. IAEE Newsletter, Fall: 21-25, 2007.

“El Protocolo de Kyoto y la Directiva Europea de Comercio de Emisiones: ¿vale la pena el esfuerzo?”. Anales de Mecánica y Electricidad, 82: 10-16, 2005.

“Efectos de la liberalización eléctrica en el parque tecnológico europeo”, with C. Vázquez. Economía Exterior, 26: 195-202, 2003.

“Instrumentos de política ambiental en los mercados eléctricos liberalizados de América Latina y Europa”, with D.R. Gómez, I.D. Aronne, R. Bravo, V.M. Feliciano Jacomino, E. Lerner, F. Oosterhuis, O. Postiglioni, F.C. Rey, R. O’Ryan, H. Rudnick, L.J. Sánchez de Tembleque and F. Thomas. Boletín Energético CNEA, 9: 3-16, 2002.

“Central solar fotovoltaica de la Universidad Pontificia Comillas. Monitorización y difusión en la web”, with J. Riesco and P. Romera. Era Solar, 111: 26-31, 2002.

“Effects of energy markets de/reregulation onto EU’s technology portfolio: conventional and emerging technologies”, with S. Isoard. European Communities, Luxembourg. 2001. (ISBN Report EUR 19829 EN).

“Instrumentos de regulación ambiental en el sector eléctrico”, with R. Santos. Anales de Mecánica y Electricidad, 77: 38-46, 2000.

“Una aplicación de la programación multiobjetivo a la planificación eléctrica”. Energía, Marzo-Abril, 1997.

“Assessment of the externalities of biomass energy for electricity production”, with J. Leal and R.M. Sáez. Informes Técnicos Ciemat 804, 1996.

“Evaluación de los costes externos de los ciclos del carbón y de la energía eólica en España”, with J. Montes and R.M. Sáez. Informes Técnicos Ciemat 768, 1995.

Op-Eds

Blog: <http://pedrolinares.blogspot.com>

“¿Qué hacemos con los precios de la luz?”. El País, 20 de Enero, 2017.

"¿Es un problema real la pobreza energética en España?". El Periódico de la Energía, 21 de Julio, 2015.

"Los problemas del fondo de eficiencia energética". El Periódico de la Energía, 19 de Marzo, 2015.

"¿Es una locura el fondo de eficiencia energética?". El Periódico de la Energía, 11 de Marzo, 2015.

"Nuevos tiempos, nuevas empresas energéticas". Twenergy, 25 de Febrero, 2015.

"Hay que ser realistas". El País, 15 de Diciembre, 2014.

"Tarifas eléctricas planas y eficiencia energética". El Periódico de la Energía, 5 de Diciembre, 2014.

"Los objetivos de eficiencia y su influencia en el sector energético español". Twenergy, 20 de Noviembre, 2014.

"A vueltas sobre el autoconsumo". El Periódico de la Energía, 5 de Octubre, 2014.

"Resolver los problemas de información, clave para la eficiencia energética". Twenergy, 4 de Septiembre, 2014.

"Francia y su transición energética". El Periódico de la Energía, 22 de Agosto, 2014.

"Buscando explicaciones a la demanda de energía". Twenergy, 11 de Marzo, 2014.

“Busquemos acuerdos realistas”, with X. Labandeira. El País, 3 de Diciembre, 2011.

“Renovables y empleo de verdad”. El País, 10 de Junio, 2010.

“La estrategia española en Copenhague”, with G. Sáenz de Miera. El País, 27 de Noviembre, 2009.

“Qué esperar de Copenhague”, with X. Labandeira. Faro de Vigo, 6 de diciembre, 2009.

“El papel de España contra el calentamiento global”, with I.J. Pérez Arriaga. *Expansión*, 11 de Abril, 2007.

“La energía verde y sus beneficios para el medio ambiente: una aclaración necesaria”, with I.J. Pérez Arriaga. *Cinco Días*, 8 de Noviembre, 2003.

## PhD thesis supervised

A. Pueyo. Climate change technology transfer to developing countries: evidence analysis and policy recommendations. Universidad Politécnica de Madrid, 2012.

A. López-Peña. Evaluation and design of sustainable energy policies: An application to the case of Spain. Universidad Pontificia Comillas, 2014.

F.J. Santos Pérez. Metodología de ayuda a la decisión para la electrificación rural apropiada en países en vías de desarrollo. Universidad Pontificia Comillas, 2015.

R. Dias. Hybrid modeling for electricity policy assessments. Universidad Pontificia Comillas, 2017.

A. Danesin. Modelling and assessment of sustainability in transport policies. Universidad Pontificia Comillas, 2017.

A. Conchado. Energy innovation policy in response to global challenges and the quest for sustainable prosperity. Universidad Pontificia Comillas, 2017.

P. Pintos. Análisis del impacto de las políticas climáticas europeas en la competitividad de la industria española. Universidad Pontificia Comillas, 2017

Z. Khan. Integrating water and energy systems for long-term resource management. Universidad Pontificia Comillas, 2017

## Research projects and grants

“The role of natural gas in the Spanish energy sector in 2030”, Enagás S.A.. May 2017 – September 2017

“Study on the feasibility of different electric generation scenarios in the mid term in Spain”, Greenpeace España. December 2016 – July 2017

“Analysis of different technology based scenarios in power systems for the 2040 horizon”. Iberdrola S.A. February 2017 – December 2017.

“An analysis of energy scenarios: Enagas in 2040”. Enagás S.A.. July 2015 – June 2016.

“Adapting policies and regulation to the changing ownership structure in the electricity generation sector”. IRENA. April – December 2015.

“Consequences of climate change on energy demand and supply in Spain”. Ministry of Agriculture, Food and Environment. April – November 2015.

“Analysis of electrification scenarios for the Spanish energy system”. Red Eléctrica de España. April – October 2014.

“Impact on power generation technologies of the availability of water in climate change scenarios”. Fundación Canal de Isabel II. June 2013 – July 2014.

“Social entrepreneurship guide. Inspirations for business creation in the service of society”. Ministry of Labor and Social Security. October – December 2012.

“Future scenarios and sustainability indicators for a self-sufficient and sustainable biocity (BIOCAS)”. Ministry of Industry, Spain. January 2011 - December 2013.

“Design and impact of a harmonised policy for renewable electricity in Europe (Beyond2020)”. European Commission. January 2011 - October 2013.

“Post-2012 scenarios and climate change policies in Spain”. Ministry of Science, Spain. January 2010 - December 2012.

“ENERGOS: Technologies for the intelligent and automated management of future energy distribution grids”. Ministry of Industry, Spain. September 2010 - December 2012.

“REDES: Development of technology solutions for the Spanish power network in 2025”. Ministry of Industry, Spain. July 2009 - December 2012.

“ADDRESS: Active Distribution networks with full integration of Demand and distributed energy RESources”. European Commission. April 2008 - April 2012.

“A model of the GHG emission sectors in Spain”. Ministry of the Environment, Spain. September 2010 - March 2011.

“Effects from carbon pricing and anti-leakage policies in selected industrial sectors in Spain –Cement, Power, Steel, Oil Refining”. Climate Strategies. September 2010 - March 2011.

“Active demand management”. Ministry of Industry, Spain. January 2007 - December 2010.

“Assessment of the impact of wind generation on future electricity prices in Spain”. Acciona Energia. June 2010 - September 2010.

“Quantitative assessment of the impact of wind energy on wholesale electricity prices”. Acciona Energia. April 2010 - July 2010.

“Design and evaluation of climate policies in Spain: Kyoto and beyond”. Ministry of Science and Technology, Spain. October 2006 - September 2009.

“Electricity regulation for isolated rural areas in Guatemala”. Energía Sin Fronteras. January 2008 - June 2009.

“Economic and technology prospective analysis of renewable energies in Spain for 2020”. Iberdrola. April 2009 - June 2009.

“Energy demand, public policies, and adaptation”. Xunta de Galicia. November 2008 - October 2008.

“SOLID-DER: Coordinated action to consolidate RTD activities for large scale integration of DER into the European electricity market”. European Commission. November 2005 - March 2008.

“Economic and distributive effects of alternative allocations of tradable emission allowances for CO2 in Spain”. BBVA Foundation. October 2005 - September 2007.

“Design and implementation of a flexible information system for prospective technology analysis”. European Commission. January 2006 - January 2007.

“Thematic network for multiple criteria decision making (Special Action, National R&D Program)”. Ministry of Science and Technology, Spain. September 2005 - August 2006.

“Techno-economic study on the creation of logistic centers for biomass in the Madrid region”. Gamesa Energía. March 2006 - July 2006.

“Analysis of scenarios for the evolution of CO2 emissions from the Spanish electricity sector for 2010 and 2020”. Adena/WWF. June 2005 - September 2005.

“Technical analysis of the introduction of a high share of renewable energy in the Spanish electricity system”. Greenpeace Spain. May 2004 - May 2005.

“Favouring the Convergence of the Renewable Energy Support after the Directive 01/77/EC - FavoRES (ALTENER 4.1030/C/02-004/2002)”. European Commission. May 2003 - April 2005.

“Influence of environmental policies in European electricity markets”. BBVA Foundation. April 2003 - March 2005.

“Thematic network for multiple criteria decision making (Special Action, National R&D Program)”. Ministry of Science and Technology, Spain. June 2003 - June 2004.

“Discussion group on environmental policy instruments in Latin American and European liberalised electricity markets (GRENELEM) (ICA4-CT-2001-10102)”. European Commission. September 2001 - June 2003.

“An applied integrated environmental impact assessment framework for the European Union (EVG1-CT-2000-00022)”. European Commission. February 2001 - June 2003.

“Specification and prototype design of a tool for the estimation of the electricity needs and optimization of its economic management for a high-speed railway”. Spanish Railway Foundation. February 2001 - December 2001.

“Design and implementation of an integral rural electrification project for isolated villages in Latin America”. National Association of ICAI Engineers. September 2000 - March 2001.

“Assessment of the regulatory model proposed for isolated electricity systems in Spain”. Endesa S.A. June 2000 - July 2000.

“Analysis of the position of the railway operator in the new electricity system regulatory framework. An application to the Madrid-Barcelona high-speed railway”. Railway Infrastructure Manager. September 1999 - June 2000.

“External Costs Discussion Group (JOS3-CT98-0025)”. European Commission. November 1998 - June 2000.

“Priority Setting Initiative: Synergies between European and national energy RTD priorities (JOS3-CT97-0023)”. European Commission. January 1998 - June 2000.

“Impact of the development of photovoltaics on the markets and networks of Iberdrola”. Iberdrola S.A.. October 1999 - March 2000.

“Effects of energy markets de/re-regulation onto EU's technology portfolio: conventional and emerging technologies”. European Commission. February 1999 - February 2000.

“Assessment of the externalities of the nuclear fuel cycle in Spain”. Ministry of Industry and Energy, Spain. January 1999 - January 2000.

“Methodology for demand coverage, in the mid and long-term, in a liberalized environment. Application to the Spanish electricity sector”. Red Eléctrica de España. March 1999 - October 1999.

“Estimation of the SO<sub>2</sub>, NO<sub>x</sub>, particulates and CO<sub>2</sub> emissions resulting from the operation of the Spanish electricity sector in 1998”. National Electricity Regulatory Commission. July 1998 - December 1998.

“Development of a methodology for the selection of sites for GTCC power plants”. Unión Fenosa. April 1998 - October 1998.

“Cost-benefit analysis of the Biomass Promotion Plan”. IDAE, Ministry of Industry and Energy. April 1998 - July 1998.

“Assessment of the environmental externalities of the Spanish electricity sector”. National Electricity Regulatory Commission. January 1997 - December 1997.

“Prefeasability study for the integration of renewable energies for electricity production in Southern Mediterranean countries (INTERSUDMED)”. European Commission. January 1996 - December 1997.

“The National Implementation in the EU of the ExternE Accounting Framework (JOS3-CT95-0010)”. European Commission. January 1996 - October 1997.

“Maintenance and Update of the ExternE Accounting Framework (JOS3-CT95-0002)”. European Commission. January 1996 - October 1997.

“Strategy for the introduction of a biomass power plant in Spain”. European Commission. January 1996 - June 1997.

“The use of biomass to generate electricity at a large scale”. International Energy Agency. September 1996 - February 1997.

“Elaboration of an action plan for the utilisation of renewable energies for electricity production, water supply and socioeconomic development in Southern Mediterranean countries (MEDENERGY)”. European Commission. January 1995 - June 1996.

“Incorporating the externalities of biomass into the overall cost analysis”. European Commission. January 1995 - June 1996.

#### Invited lectures

2018: IESE; Foro de Foros; Freiberg International Spring School; Axpo European Energy Workshop; European Investment Bank; Universidad Internacional Menéndez Pelayo

2017: Universidad de Cantabria; Economics for Energy; European Commission; Escuela de Energía UIMP-Endesa; FEEM-IEFE Joint Seminar Series; BC3 Summer School; Universidad de Castilla-La Mancha; APEEN-AEEE.

2016: AEEE; U. Politécnica de Madrid; Grupo de Crecimiento Verde; FIDE; GENERA; Foro de Ciudades; Universitat de Barcelona; Real Academia de Ingeniería.

2015: Economics for Energy Annual Workshop; ARIAE; Oficina Española para el Cambio Climático; BC3 Summer School; Universitat de Barcelona; EfficiencyFirst; BP Forum on Energy and Sustainability; OMIE.

2014: Fundación para la Eficiencia Energética; Real Academia de Ingeniería; Loyola University Chicago; BP Forum on Energy and Sustainability; Foro del Agua – Fundación Canal; BC3 Summer School; UETP; Universidad de Valladolid.

2013: Harvard Electricity Policy Group; Economics for Energy; Spanish Association of Energy Economics; BC3 Summer School.

2012: ESADE; Fundación Gas Natural; French Association of Energy Economics.

2011: Johns Hopkins University; Escuela de Energía y Cambio Climático FOCUS-Abengoa; Congreso de los Diputados; International Energy Agency; APECYL; Instituto de Estudios Fiscales.

2010: European University Institute; Consejo Económico y Social; Instituto de Estudios Fiscales; Florence School of Regulation; Complutense Institute of International Studies (ICEI).

2009: INDRA; Club Español de la Energía; Florence School of Regulation; Instituto de España.

2008: Universidad Internacional Menéndez Pelayo; Expo Zaragoza 2008; MIT-CEEPR Summer Meeting; Fundación Alternativas.

2007: Universidad de Vigo.

2006: McGill University; Universitat Barcelona; Koldo Michelena Kulturenea.

2005: Fundación Rafael del Pino; Universidad Complutense; IEFE, Università Bocconi; IDAE; Enerforum; Universidad de Vigo.

2004: Universidad Internacional Menéndez Pelayo.

2003: Universidad Politécnica de Cataluña.

#### Professional activities

Editor-in-chief, Papeles de Energía, FUNCAS.

Associate Editor, Energy Transitions, Springer.

#### Professional associations

International Association of Energy Economics, International Society on MCDM.

#### Referee

OMEGA International Journal of Management Science, European Journal of Operations Research, Energy Policy, Energy Journal, Ecological Economics, IEEE Transactions on Power Systems, Energy Economics.