

Ricardo Fernández-Blanco Carramolino

Curriculum Vitae – March 2018

Organization address

Department of Applied Mathematics
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INTERESTS

Battery energy storage, bilevel programming, electricity markets, hydrothermal power systems, operation research, power system operations and economics, mathematical decomposition techniques, water and power interactions.

EDUCATION BACKGROUND

Ph.D., Sciences and Technologies Applied to Industrial Eng. (Electrical Eng.)

University of Castilla-La Mancha, Ciudad Real (Spain)

Sep. 2010 – Oct. 2014

THESIS – *Price-based market clearing in pool-based electricity markets*

SUPERVISORS – José Manuel Arroyo, Natalia Alguacil

GRADE – *Cum laude*

M.Sc., Electric Energy Systems

University of Castilla-La Mancha, Ciudad Real (Spain)

Sep. 2010 – Jul. 2011

THESIS – *Multiperiod energy scheduling based on payment minimization*

SUPERVISORS – José Manuel Arroyo, Natalia Alguacil

GRADE – 9.9 out of 10.0

B.Sc., Industrial Engineering

University of Castilla-La Mancha, Ciudad Real (Spain)

Sep. 2003 – Mar. 2009

THESIS – *Planificación de la generación distribuida para una compañía de distribución en entornos competitivos*

SUPERVISOR – Natalia Alguacil

GRADE – 8.9 out of 10.0

PROFESSIONAL EXPERIENCE

Post-doctoral researcher

Mar. 2018 – Present

University of Málaga, Málaga (Spain)

Scientific / technical project officer

Aug. 2016 – Feb. 2018

Joint Research Centre, European Commission, Petten (The Netherlands)

- Worked in the WATERFLEX project which aims to analyze the water-energy nexus in the power system.
- Worked in the mapping of power system modelling tools at national and European levels.
- Attended to the workshop “*Understanding the water-energy nexus: Integrated water and power system modelling*,” Sep. 28–29, 2016, Ispra (Italy), jointly organized by the JRC and the USA DoE.
- Participated in the course “*Systematic reviews: Diversity, design and debate*” at University College London in Feb. and Mar. 2017.

Post-doctoral researcher

Dec. 2014 – May 2016

University of Washington, Seattle, WA (United States)

- Worked in the project entitled “*Energy Positioning: Control and Economics*,” which is funded by ARPA-e (Advanced Research Projects Agency-ENERGY).
- Attended to the conferences: (i) ARPA-e Energy Innovation Summit, Feb. 9–11, 2015, Washington DC, and (ii) ARPA-e Bi-Annual Stationary Energy Storage Technology Meeting, May 28–29, 2015, Chicago.

FUNDED RESEARCH PROJECTS

Participated in the following funded research projects as co-investigator:

1. Title: “*Analysis of power markets by bilevel programming*”
 (CICYT ENE2009-07836)
 Funded entity: CICYT (National Science Foundation of Spain)
 Period: 2010–2012
 Principal investigator: José Manuel Arroyo
2. Title: “*Design and analysis of alternative market-clearing procedures for electricity markets*” (CICYT ENE2012-30679)
 Funded entity: CICYT (National Science Foundation of Spain)
 Period: 2013–2015
 Principal investigator: José Manuel Arroyo
3. Title: “*Energy Positioning: Control and Economics*”
 (Award No. DE-AR000232)
 Funded entity: ARPA-e (Advance Research Projects Agency-Energy)
 Period: 2013–2015
 Principal investigator: Daniel Kirschen
4. Title: “*Using Distribution-Level Energy Assets to Help Optimize Regional Transmission*”
 Funded entity: Bonneville Power Administration (BPA) and Snohomish PUD
 Period: 2015–2016
 Principal investigator: Daniel Kirschen
5. Title: “*Water Resources Providing Flexibility to the European Power System*”
 (Work Package 4204)
 Funded entity: Institutional - Exploratory Research
 Period: 2016–2017
 Principal investigator: Ignacio Hidalgo González

PUBLICATIONS

A. List of publications in international journals:

1. Y. Dvorkin, **R. Fernández-Blanco**, Y. Wang, B. Xu, D. S. Kirschen, H. Pandžić, J.-P. Watson, and C. A. Silva-Monroy, “*Co-planning of investments in transmission and merchant energy storage*,” IEEE Transactions on Power Systems, vol. 33, no. 1, pp. 245–256, January 2018.
2. B. Xu, Y. Wang, Y. Dvorkin, **R. Fernández-Blanco**, C. A. Silva-Monroy, J. P. Watson, and D. S. Kirschen, “*Scalable planning for energy storage in energy and reserve markets*,” IEEE Transactions on Power Systems, vol. 32, no. 6, pp. 4515–4527, November 2017.
3. **R. Fernández-Blanco**, K. Kavvadias, and I. Hidalgo Gonzalez, “*Quantifying the water-power linkage on hydrothermal power systems: A Greek case study*,” Applied Energy, vol. 203, pp. 240–253, October 2017.
4. Y. Wang, Y. Dvorkin, **R. Fernández-Blanco**, B. Xu, T. Qiu, and D. Kirschen, “*Look-ahead bidding strategy for energy storage*,” IEEE Transactions on Sustainable Energy, vol. 8, no. 3, pp. 1106–1117, July 2017.
5. **R. Fernández-Blanco**, Y. Dvorkin, B. Xu, Y. Wang, and D. Kirschen, “*Optimal energy storage siting and sizing: A WECC case study*,” IEEE Transactions on Sustainable Energy, vol. 8, no. 2, pp. 733–743, April 2017.
6. Y. Dvorkin, **R. Fernández-Blanco**, D. S. Kirschen, H. Pandžić, J. P. Watson, and C. A. Silva-Monroy, “*Ensuring profitability of energy storage*,” IEEE Transactions on Power Systems, vol. 32, no. 1, pp. 611–623, January 2017.
7. **R. Fernández-Blanco**, Y. Dvorkin, and M. A. Ortega-Vazquez, “*Probabilistic security-constrained unit commitment with generation and transmission contingencies*,” IEEE Transactions on Power Systems, vol. 32, no. 1, pp. 228–239, January 2017.

8. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “On the solution of revenue-and network-constrained day-ahead market clearing under marginal pricing – Part II: Case studies,” *IEEE Transactions on Power Systems*, vol. 32, no. 1, pp. 220–227, January 2017.
9. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “On the solution of revenue- and network-constrained day-ahead market clearing under marginal pricing – Part I: An exact bilevel programming approach,” *IEEE Transactions on Power Systems*, vol. 32, no. 1, pp. 208–219, January 2017.
10. **R. Fernández-Blanco**, J. M. Arroyo, N. Alguacil, and X. Guan, “Incorporating price-responsive demand in energy scheduling based on consumer payment minimization,” *IEEE Transactions on Smart Grids*, vol. 7, no. 2, pp. 817–826, March 2016.
11. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “Bilevel programming for price-based electricity auctions: A revenue-constrained case,” *Euro Journal on Computational Optimization*, vol. 3, no. 3, pp. 163–195, September 2015.
12. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “Network-constrained day-ahead auction for consumer payment minimization,” *IEEE Transactions on Power Systems*, vol. 29, no. 2, pp. 526–536, March 2014.
13. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “Consumer payment minimization under uniform pricing: A mixed-integer linear programming approach,” *Applied Energy*, vol. 114, no. 1, pp. 676–686, February 2014.
14. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “A unified bilevel programming framework for price-based market clearing under marginal pricing,” *IEEE Transactions on Power Systems*, vol. 27, no. 1, pp. 517–525, February 2012.

B. List of contributions in international conferences:

a. Conference papers:

1. M. Chuma Cerbantes, **R. Fernández-Blanco**, M. A. Ortega Vazquez, and J. R. Sanches Mantovani, “A nodal pricing approach for reactive power in distribution networks,” *The 2017 IEEE PES Conference on Innovative Smart Grid Technologies Latin America, ISGT 2017*, Quito, Ecuador, September 2017.
2. Y. Wang, Y. Dvorkin, **R. Fernández-Blanco**, B. Xu, and D. Kirschen, “Impact of local transmission congestion on energy storage arbitrage opportunities,” *IEEE PES General Meeting*, Chicago, IL, USA, July 2017.
3. M. Chuma Cerbantes, **R. Fernández-Blanco**, M. A. Ortega Vazquez, and J. R. Sanches Mantovani, “Optimal power flow with voltage-sensitive loads in distribution networks,” *IEEE PES General Meeting*, Boston, MA, USA, July 2016.
4. M. Chuma Cerbantes, **R. Fernández-Blanco**, M. A. Ortega Vazquez, and J. R. Sanches Mantovani, “Optimal short-term operation of a DisCo including voltage-sensitive loads,” *19th Power Systems Computation Conference, PSCC 2016*, Genoa, Italy, June 2016.
5. M. Almassalkhi, Y. Dvorkin, J. Marley, **R. Fernández-Blanco**, I. Hiskens, D. Kirschen, J. Martin, H. Pandžić, T. Qiu, M. Sarker, M. Vrakopoulou, Y. Wang, and M. Xue, “Incorporating storage as a flexible transmission asset in power system operation procedure,” *19th Power Systems Computation Conference, PSCC 2016*, Genoa, Italy, June 2016.
6. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “Revenue- and network-constrained market clearing via bilevel programming,” *18th Power Systems Computation Conference, PSCC 2014*, Wroclaw, Poland, August 2014.
7. **R. Fernández-Blanco**, J. M. Arroyo, N. Alguacil, and P. J. Muñoz, “Price-based market clearing under marginal pricing: A bilevel programming approach,” *17th Power Systems Computation Conference, PSCC 2011*, Stockholm, Sweden, August 2011.

b. Presentations:

1. Y. Dvorkin, **R. Fernández-Blanco**, D. S. Kirschen, H. Pandžić, J. P. Watson, and C. A. Silva-Monroy, “Ensuring profitability of energy storage,” *IEEE PES General Meeting*, Chicago, IL, USA, July 2017.
2. **R. Fernández-Blanco**, Y. Dvorkin, B. Xu, Y. Wang, and D. Kirschen, “Optimal energy storage siting and sizing: A WECC case study,” *IEEE PES General Meeting*, Chicago, IL, USA, July 2017.
3. **R. Fernández-Blanco**, Y. Dvorkin, and M. A. Ortega-Vazquez, “Probabilistic security-constrained unit commitment with generation and transmission contingencies,” *IEEE PES General Meeting*, Chicago, IL, USA, July 2017.

4. D. Kirschen, Y. Dvorkin, **R. Fernández-Blanco**, B. Xu, and Y. Wang, “*Energy storage procurement in vertically-integrated and competitive market environments*,” Panel Session, IEEE PES General Meeting, Chicago, IL, USA, July 2017.
5. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “*Revenue- and network-constrained day-ahead market clearing under marginal pricing*,” 12th IEEE PES Powertech Conference, Manchester, June 18-22, 2017.
6. D. Kirschen, Y. Dvorkin, **R. Fernández-Blanco**, H. Pandžić, J.-P. Watson, and C. A. Silva-Monroy, “*Profitability of merchant investments in battery energy storage*,” Federal Energy Regulatory Commission (FERC) Conference, Washington, DC, USA, June 2016.
7. Y. Wang, D. Kirschen, Y. Dvorkin, and **R. Fernández-Blanco**, “*Risk-constrained look-ahead strategic energy storage bidding*,” Federal Energy Regulatory Commission (FERC) Conference, Washington, DC, USA, June 2016.
8. M. Ortega-Vazquez, Y. Dvorkin, and **R. Fernández-Blanco**, “*Probabilistic security-constrained unit commitment with generation and transmission contingencies*,” Federal Energy Regulatory Commission (FERC) Conference, Washington, DC, USA, June 2015.
9. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “*Network-constrained day-ahead auction for consumer payment minimization*,” IEEE PES General Meeting, Washington, DC, USA, July 2014.
10. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “*A unified bilevel programming framework for price-based market clearing under marginal pricing*,” IEEE PES General Meeting, Vancouver, Canada, July 2013.
11. **R. Fernández-Blanco**, J. M. Arroyo, and N. Alguacil, “*Network-constrained multiperiod auction for a pool-based electricity market under consumer payment minimization*,” 9th International Conference on Computational Management Science, CCMS 2012, London, United Kingdom, April 2012.

C. List of publicly available reports:

1. **R. Fernández-Blanco Carramolino**, K. Kavvadias, I. Hidalgo Gonzalez, B. Bisselink, M. Adamovic, and A. De Roo, “*Models, methods, and challenges for assessing the interactions between the power and water resources*,” European Commission Position Paper on WEF NEXUS & SDGs, 2018.
2. **R. Fernández-Blanco Carramolino**, K. Kavvadias, A. De Roo, B. Bisselink, M. Adamovic, and I. Hidalgo Gonzalez, “*The water-power nexus of the Iberian Peninsula power system: WATERFLEX project*,” Publications Office of the European Union, 2017.
3. **R. Fernández-Blanco Carramolino**, K. Kavvadias, and I. Hidalgo Gonzalez, “*Hydro-related modelling for the WATERFLEX Exploratory Research Project: Version 1*,” Publications Office of the European Union, 2017.
4. **R. Fernández-Blanco Carramolino**, F. Careri, K. Kavvadias, I. Hidalgo Gonzalez, A. Zucker, and E. Peteves, “*Systematic mapping of power system models*,” Publications Office of the European Union, 2017.
5. **R. Fernández-Blanco Carramolino**, K. Kavvadias, and I. Hidalgo Gonzalez, “*Hydro-related modelling for the WATERFLEX Exploratory Research Project: Version 0*,” EUR 28419 EN, doi: 10.2760/386964.
6. **R. Fernández-Blanco Carramolino**, K. Kavvadias, A. De Roo, B. Bisselink, I. Hidalgo Gonzalez, “*The water-energy nexus and the implications for the flexibility of the Greek power system*,” EUR 28411 EN, doi: 10.2760/361084.

D. List of publications submitted to international journals:

1. D. Olsen, Y. Dvorkin, **R. Fernández-Blanco**, and M. Ortega-Vazquez, “*Optimal carbon taxes for emissions targets in the electricity sector*,” submitted to the IEEE Transactions on Power Systems.
2. V. Guerrero, Y. Dvorkin, **R. Fernández-Blanco**, M. Ortega-Vazquez, and J. Contreras, “*Probabilistic security-constrained unit commitment with energy storage*,” submitted to the Applied Energy.
3. R. T. Elliott, **R. Fernández-Blanco**, K. Kozdras, J. Kaplan, B. Lockyear, B. Beberness, and D. S. Kirschen, “*Sharing energy storage between transmission and distribution*,” submitted to the IEEE Transactions on Power Systems.
4. M. Chuma Cerbantes, **R. Fernández-Blanco**, M. A. Ortega Vazquez, and J. R. Sanches Manto-vani, “*Short-term operation of a distribution company: A pseudo-dynamic tabu search-based optimisation*,” submitted to the IET Generation, Transmission & Distribution.

5. M. Chuma Cerbantes, **R. Fernández-Blanco**, M. A. Ortega Vazquez, and J. R. Sanches Mantovani, “Incorporating nodal reactive power prices into the DisCo’s short-term operation,” submitted to the IEEE Transactions on Smart Grid.

VISITING SCHOLAR

University of Washington, Seattle, WA (United States) Department of Electrical Engineering SUPERVISOR – Prof. Miguel Ortega-Vazquez	Jun. 2014 – Jul. 2014
University of Connecticut, Storrs, CT (United States) Department of Electrical and Computing Engineering SUPERVISOR – Prof. Peter B. Luh	Sep. 2013 – Dec. 2013
Xi’an Jiaotong University, Xi’an (China) Systems Engineering Institute and SKLMS Laboratory SUPERVISOR – Prof. Xiaohong Guan	Aug. 2012 – Dec. 2012
Université de Montréal, Montreal (Canada) Département d’informatique et de recherche opérationnelle SUPERVISOR – Prof. Patrice Marcotte	Jul. 2011 – Oct. 2011

COMPUTER SKILLS

Data analysis and graphing software:	Excel, Matlab, Python, basics of SQL
Optimization:	GAMS, Pyomo
Computer-aided design software:	Microstation, Autocad 2D

LANGUAGE SKILLS

Spanish:	Native
English:	Fluent
Dutch:	Basic
Mandarin:	Basic

TRACK RECORD OF MAJOR ACHIEVEMENTS

- Special Award (*Premio Extraordinario Fin de Carrera*) upon *B.Sc.* graduation.
- FPI fellowship (*Beca de Formación Personal Investigador*) from 2010 till 2014.
- FPI Additional Aid for four Short Research Stays abroad.
- Publication of 14 scientific papers in peer-reviewed journals wherein most of them are associated with relevant JCR-indexed journals in the fields of electric power systems and energy.