

Bri-Mathias Hodge

Education:

Doctor of Philosophy in Chemical Engineering 2006-2010

School of Chemical Engineering, Purdue University, West Lafayette, Indiana

Thesis Title: *“A Multi-Paradigm Modeling Approach for Energy Systems Analysis”*

Advisors: Joseph F. Pekny & Gintaras V. Reklaitis

Intern – Sandia National Laboratory, Exploratory Simulation Technologies 2008

Master of Science in Chemical Engineering with Distinction 2004-2005

Process Design Laboratory, Åbo Akademi University, Turku, Finland

Thesis Title: *“A Genetic Algorithm based Metaheuristic for Production Scheduling”*

Advisor: Tapio Westerlund

Bachelor of Science in Chemical Engineering with University and College Honors 2000-2004

Carnegie Mellon University, Pittsburgh, Pennsylvania

Minor in German

Exchange Student, Rheinisch-Westfälische Technische Hochschule – Aachen, Germany 2002-2003

Experience:

Associate Professor 2018 - Present

University of Colorado – Boulder – Department of Electrical, Computer and Energy Engineering

- Fellow of the Renewable and Sustainable Energy Institute (RASEI)
- Lead a group focusing on energy systems simulation and renewable energy integration.

Chief Scientist 2018 - Present

National Renewable Energy Laboratory

- Principal Investigator on DOE, ARPA-E, and industrial projects with a yearly funding level of over \$3.5M in FY18.
- Principal Investigator on projects in the areas of: power system communications, power systems data, solar power forecasting, wind power forecasting visualization, wind and solar resource assessment, grid sensing and measurement, commercial building electricity savings, microgrid design, and ancillary service products from renewable energy.

Manager – Power System Design and Studies Group 2016 - 2018

National Renewable Energy Laboratory

- Management of 25 full-time NREL employees in addition to up to 20 visiting Ph.D. students and interns. Grew the group from 12 FTEs to 25 FTEs in first year.
- Principal Investigator on DOE, ARPA-E, and industrial projects with a yearly funding level of over \$3.5M in FY18.
- Principal Investigator on projects in the areas of: power system communications, power systems data, solar power forecasting, wind power forecasting visualization, wind and solar resource assessment, grid sensing and measurement, commercial building electricity savings, microgrid design, and ancillary service products from renewable energy.

Lecturer and Assistant Professor Adjoint 2016 - 2018

University of Colorado – Boulder – Department of Electrical, Computer and Energy Engineering

- Taught graduate course – Renewable Energy and the Future of the Electricity Grid – every fall semester.
- Ph.D. advisor for two students working on renewable energy integration.

Adjunct and Affiliate Professor 2014 - Present

Colorado School of Mines – Department of Chemical and Biological Engineering

- Taught senior design course, CBEN402 – Chemical Engineering Design (Spring 2014)
- Co-supervising a Ph.D. student on the modeling of cyanobacteria consortia

Fulbright Scholar Summer 2016

VTT – Wind Power Integration Team, Finland

- Funded through a Fulbright-VTT Grant in Science, Technology and Innovation

- Research on the economics of bulk power flexibility options with high renewable energy penetrations

Section Supervisor – System Planning and Reliability

2014 - 2015

National Renewable Energy Laboratory – Transmission and Grid Integration Group

- Management of seven full-time NREL employees in addition to eight visiting students and interns.
- Managed wind, solar, and electricity projects with combined yearly funding level of over \$1.8M in FY15.
- Principal investigator on projects in the areas of: power system flexibility requirements, integrated distribution-transmission systems modeling, the value of wind power forecasting, wind resource assessment, solar resource assessment, reliability impacts of wind power forecasting, solar power forecasting, and the impacts of electric vehicles on bulk power systems.

Senior Engineer

2013 - 2014

National Renewable Energy Laboratory – Transmission and Grid Integration Group

- Managed wind, solar, and electricity projects with combined yearly funding level of over \$1.8M in FY14, including supervision of NREL staff, postdoctoral researchers, subcontractors, visiting graduate students, and student interns.
- Principal investigator on projects in the areas of: cyber-physical-energy systems, distribution level PMUs, mesoscale climate modeling (WIND Toolkit dataset), the value of wind power forecasting, solar power forecasting, and the impacts of distributed wind on transmission level operations.
- Presented at numerous conferences and technical review committees to disseminate key findings to stakeholders.

Research Engineer

2011 - 2013

National Renewable Energy Laboratory – Transmission and Grid Integration Group

- Managed wind, solar, and electricity projects with combined yearly funding level of over \$400k in FY12 and \$2M in FY13, including supervision of NREL staff, postdoctoral researchers, subcontractors, visiting graduate students, and student interns.
- Principal investigator on projects in the areas of: mesoscale climate modeling, wind power forecasting and resource assessment, solar power forecasting, renewable integration costs, the impacts of distributed wind on transmission level operations, the value of wind power forecasting, and sub-hourly solar variability.
- Presented at numerous conferences and technical review committees to disseminate key findings to stakeholders.
- Led statistical analysis of wind and solar forecasting errors for the Western Wind and Solar Integration Study Phase 2.

Post-Doctoral Researcher

2010 - 2011

National Renewable Energy Laboratory – Transmission and Grid Integration Group

- Examined statistical properties of wind and solar power forecast errors, leading to improved operating reserve requirements in Western utilities.
- Performed research on the role of stochastic unit commitment in systems with high wind power penetration.
- Conducted numerical simulations to establish the potential for residential demand response systems to provide flexibility reserve for wind and solar power integration.

Graduate Research Assistant

2006 - 2010

Purdue University – School of Chemical Engineering

- Developed a multi-paradigm modeling approach used to analyze the impact of plug-in hybrid electric vehicles on the United States electricity system infrastructure.
- Studied the interactions between plug-in hybrid electric vehicles and wind power integration through vehicle-to-grid power supply.
- Utilized the modeling approach to study the optimal placement of vehicle charging stations in Indianapolis, IN in collaboration with a local utility.

Graduate Research Assistant

2005

Abo Akademi University – Process Design Laboratory

- Designed and implemented a genetic algorithm based metaheuristic for solving classes of classical scheduling problems.

Book Chapters and Magazine Articles (*Senior Author, † Student/Intern, ‡ Postdoc):

1. Yingchen Zhang, Rui Yang, Jie Zhang, Yang Weng, Bri-Mathias Hodge: “Predictive Analytics for Comprehensive Energy Systems State Estimation”, in: *Big Data Application in Power Systems*, R. Arghandeh, Y. Zhou (Eds.), Elsevier, 2018.
2. Benjamin Kroposki, Brian Johnson, Yingchen Zhang, Vahan Gevorgian, Paul Deholm, Bri-Mathias Hodge, Bryan Hannegan: “Achieving 100% Renewable Grids – Operating Electric Power Systems with Extremely High Levels of Variable Renewable Energy”, *IEEE Power & Energy Magazine*, Vol. 15, Issue 2, March/April 2017.
3. Brady Stoll, Rishabh Jain[†], Carlo Brancucci Martinez-Anido, Eduardo Ibanez, Anthony Florita, Bri-Mathias Hodge*: “Reserve Estimation in Renewable Integration Studies”, in: *Integration of Large Scale Renewable Energy into Bulk Power System: From Planning to Operation*, P. Du, A. Tuohy (Eds.), Springer, 2017
4. Jason Ganley, Jie Zhang[†], Bri-Mathias Hodge*: “Wind Energy”, in: *Alternative Energy Sources and Technologies: Process Design and Operations*, M. Martin (Ed.), Springer, 2016.
5. Mohit Singh, Alicia Allen[‡], Bri-Mathias Hodge*: “Grid Connection and Power Conditioning of Wind Farms”, in: *Handbook of Clean Energy Systems*, R. Boehm, H. Yang, J. Yan (Eds.), Wiley, 2015.
6. Bri-Mathias Hodge, Erik Ela, Paul Denholm: “Integration of Renewable Generation”, in: *Encyclopedia of Sustainability Science and Technology*, R. Meyers (Ed.), Springer, 2012.

Journal Publications (*Senior Author, † Student/Intern, ‡ Postdoc):

1. Niina Helistö Juha Kiviluoma, Hannele Holttinen, Jose Daniel Lara[†], Bri-Mathias Hodge: “Including operational aspects in the planning of power systems with large amounts of variable generation: a review of modelling approaches”, Accepted for **WIRES Energy and Environment**.
2. Mucun Sun, Cong Feng, Erol Chartan, Bri-Mathias Hodge, Jie Zhang: “A Two-Step Short-Term Probabilistic Wind Forecasting Methodology Based on Predictive Distribution Optimization”, Accepted for **Applied Energy**.
3. Kate Doubleday[†], Faeza Hafiz[†], Andrew Parker, Tarek Elgindy, Anthony Florita, Graziano Salvalai, Gregor Henze, Shanti Pless, Bri-Mathias Hodge*: “Integrated Sustainable Urban District Planning and Distribution System Design”, Accepted for **WIRES Energy and Environment**.
4. Andrew Kumler, Ignacio Losada Carreno[†], Michael Craig, Bri-Mathias Hodge, Wesley Cole, Carlo Brancucci: “Inter-annual Variability of Wind and Solar Electricity Generation and Capacity Values in Texas”, Accepted for **Environmental Research Letters**.
5. Michael Craig, Ignacio Losada Carreno[†], Michael Rossol, Bri-Mathias Hodge, Carlo Brancucci: “Effects on Power System Operations of Potential Changes in Wind and Solar Generation Potential under Climate Change”, Accepted for **Environmental Research Letters**.
6. Michael Craig, Stuart Cohen, Jordan Macknick, Caroline Draxl, Omar Guerra[‡], Manajit Sengupta, Sue Ellen Haupt, Bri-Mathias Hodge, Carlo Brancucci: “A Review of the Potential Impacts of Climate Change on Bulk Power System Planning and Operations in the United States”, Accepted for **Renewable & Sustainable Energy Reviews**.
7. Xin Fang, Bri-Mathias Hodge*, Ershun Du[†], Fangxing Li, Chongqing Kang: “Introducing Risk Components in Locational Marginal Pricing Wind Power and Load Uncertainty”, **IEEE Transactions on Power Systems**, In Press.

8. Cong Feng, Mingjian Cui, [Bri-Mathias Hodge](#), Siyuan Lu, Hendrik Hamann, Jie Zhang: “An Unsupervised Clustering-Based Short-Term Solar Forecasting Methodology”, **IEEE Transactions on Sustainable Energy**, In Press.
9. Cong Feng, Mucun Sun, Mingjian Cui, Erol Chartan, [Bri-Mathias Hodge](#), Jie Zhang: “Characterizing Forecastability of Wind Sites in the United States”, **Renewable Energy**, In Press.
10. Mingjian Cui, Venkat Krishnan, [Bri-Mathias Hodge](#), Jie Zhang: “A Copula-Based Conditional Probabilistic Forecast Model for Wind Power Ramps”, **IEEE Transactions on Smart Grid**, In Press.
11. Mingjian Cui, Jie Zhang, Qin Wang, Venkat Krishnan, [Bri-Mathias Hodge*](#): “A Data-Driven Methodology for Probabilistic Wind Power Ramp Forecasting”, **IEEE Transactions on Smart Grid**, In Press.
12. Xinmin Zhang, Yuan Li, Siyuan Lu, Hendrik Hamann, [Bri-Mathias Hodge](#), Brad Lehman: “A Solar Time-based Analog Ensemble Method for Regional Solar Power Forecasting”, **IEEE Transactions on Sustainable Energy**, Vol. 10, Iss. 1, 2019.
13. Ershun Du[†], Ning Zhang, Qin Wang, [Bri-Mathias Hodge](#), Chongqing Kang, Benjamin Kroposki, Qing Xia: “Operation of a High Renewable Penetrated Power System with CSP plants: A Look-ahead Stochastic Unit Commitment Model”, **IEEE Transactions on Power Systems**, Vol. 34, Iss. 1, 2019.
14. Wenqi Zhang[†], William Kleiber, Anthony Florita, [Bri-Mathias Hodge](#), Barry Mather: “Modeling and Simulation of High Frequency Solar Irradiance”, **IEEE Journal of Photovoltaics**, Vol. 9, Iss. 1, 2019.
15. Xin Fang, [Bri-Mathias Hodge*](#), Fangxing Li, Ershun Du[†], Chongqing Kang, Fangxing Li: “Modelling Wind Power Spatial-Temporal Correlation in Multi-Interval Optimal Power Flow: A Sparse Correlation Matrix Approach”, **Applied Energy**, Vol. 230, 2018.
16. Xin Fang, Linqun Bai, Fangxing Li, [Bri-Mathias Hodge](#): “Hybrid Component and Configuration Model for Combined-Cycle Units in the Unit Commitment Problem”, **Journal of Modern Power Systems and Clean Energy**, Vol. 6, Iss. 6, 2018.
17. Xin Fang, [Bri-Mathias Hodge](#), Linqun Bai, Hantao Cui, Fangxing Li: “Mean-Variance Optimization-Based Energy Storage Scheduling Considering Day-Ahead and Real-Time LMP Uncertainties”, **IEEE Transactions on Power Systems**, Vol. 33, Iss. 6, 2018.
18. Ershun Du[†], Ning Zhang, Qin Wang, [Bri-Mathias Hodge](#), Chongqing Kang, Benjamin Kroposki: “The Role of Concentrating Solar Power Towards High Renewable Energy Penetrated Power Systems”, **IEEE Transactions on Power Systems**, Vol. 33, Iss. 6, 2018.
19. Mingjian Cui, Jie Zhang, [Bri-Mathias Hodge](#), Siyuan Lu, Hendrik Hamann: “A Methodology for Quantifying Reliability Benefits from Improved Solar Power Forecasting in Multi-Timescale Power System Operations”, **IEEE Transactions on Smart Grid**, Vol. 9 Iss. 6, 2018.
20. Wenqi Zhang[†], William Kleiber, Anthony Florita, [Bri-Mathias Hodge](#), Barry Mather: “A Stochastic Downscaling Approach for Generating High-Frequency Solar Irradiance Scenarios”, **Solar Energy**, Vol. 176, 2018.
21. Dominik Dominković[†], Greg Stark, [Bri-Mathias Hodge](#), Allan Schröder Pedersen: “Integrated energy planning with a high share of variable renewable energy sources for a Caribbean island”, **Energies**, Vol. 11, Iss. 9, 2018.
22. Xin Fang, Venkat Krishnan, [Bri-Mathias Hodge*](#): “Strategic Offering for Wind Power Producers Considering Energy and Flexible Ramping Products”, **Energies**, Vol. 11, Iss. 5, 2018.

23. Michael Craig, Paulina Jaramillo, Bri-Mathias Hodge, Nathaniel Williams, Edson Severnini: “A Retrospective Analysis of the Market Price Response to Distributed Photovoltaic Generation in California”, **Energy Policy**, Vol. 121, 2018.
24. Steven Davis, Nathan Lewis, Matthew Shaner, Sonia Aggarwal, Doug Arent, Ines Azevedo, Sally Benson, Thomas Bradley, Jack Brouwer, Yet-Ming Chiang, Christopher Clack, Armond Cohen, Stephen Doig, Jae Edmonds, Paul Fennell, Christopher Field, Bryan Hannegan, Bri-Mathias Hodge, Martin Hoffert, Eric Ingersoll, Paulina Jaramillo, Klaus Lackner, Katharine Mach, Michael Mastrandrea, Joan Ogden, Per Peterson, Daniel Sanchez, Daniel Sperling, Joseph Stagner, Jessika Trancik, Chi-Jen Yang, Ken Calderia: “Net-zero emissions energy systems”, **Science**, Vol. 360 Iss. 6396, 2018.
25. Kwabena Pambour, Rostand Sogwi, Bri-Mathias Hodge, Carlo Brancucci: “The value of day-ahead coordination of power and natural gas network operations”, **Energies**, Vol. 11, Iss. 7, 2018.
26. Fei Wang, Kangping Li, Neven Duic, Zengqiang Mi, Bri-Mathias Hodge, Miadreza Shafie-khah, João Catalão: “Association rule mining based quantitative analysis approach of household characteristics impacts on residential electricity consumption patterns”, **Energy Conversion and Management**, Vol. 171, 2018.
27. Richard Bryce[†], Ignacio Losada Carreno[†], Andrew Kumler, Bri-Mathias Hodge, Billy Roberts, Carlo Brancucci Martinez-Anido: “Consequences of Neglecting the Interannual Variability of the Solar Resource: A Case Study of Photovoltaic Power Among the Hawaiian Islands”, **Solar Energy**, Vol. 167, 2018.
28. Ershun Du[†], Ning Zhang, Bri-Mathias Hodge, Chongqing Kang, Benjamin Kroposki, Qing Xia: “Economic justification of concentrating solar power in high renewable energy penetrated power systems”, **Applied Energy**, Vol. 222, 2018.
29. Jianhua Zhang[‡], Adarsh Hasandka[†], Jin Wei, S M Shafiul Alam[‡], Tarek Elgindy, Anthony Florita, Bri-Mathias Hodge*: “Simulating Hybrid Communications for Distributed Smart Grid Applications”, **Energies**, Vol. 11, Iss. 4, 2018.
30. Bri-Mathias Hodge*, Carlo Brancucci Martinez-Andio, Qin Wang, Erol Chartan, Anthony Florita, Juha Kiviluoma: “The Combined Value of Wind and Solar Power Forecasting Improvements and Electricity Storage”, **Applied Energy**, Vol. 214, 2018.
31. Andrew Clifton, Bri-Mathias Hodge*, Caroline Draxl, Jake Badger, Aron Habte: “Wind and Solar Resource Data Sets”, **WIRES Energy and Environment**, Vol. 7, Iss. 2, 2018.
32. Michael Craig, Paulina Jaramillo, Bri-Mathias Hodge: “Carbon Dioxide Emissions Effects of Grid-Scale Electricity Storage in a Decarbonizing Power System”, **Environmental Research Letters**, Vol. 13, No. 1, 2018.
33. Fei Wang, Zhao Zhen, Chun Liu, Zengqian Mi, Bri-Mathias Hodge, Miadreza Shafie-khah, João Catalão: “Image phase shift invariance based cloud motion displacement vector calculation method for ultra-short-term solar PV power forecasting”, **Energy Conversion and Management**, Vol. 157, pp. 123 – 135, 2018.
34. Ivonne Peña[†], Carlo Brancucci Martinez-Anido[†], Bri-Mathias Hodge*: “An Extended IEEE 118-bus Test System with High Renewable Penetration”, **IEEE Transactions on Power Systems**, Vol. 33, Iss. 1, pp. 281 – 289, 2018.
35. Fernando Postigo Marcos, Carlos Mateo Domingo, Tomas Gomez San Roman, Bryan Palmintier, Bri-Mathias Hodge, Venkat Krishnan, Fernando de Cuadra Garcia, and Barry Mather: “A review of power distribution test feeders in the United States and the need for synthetic representative networks”, **Energies**, Vol. 10, Issue 11, 2017.

36. Ricardo Bessa, Corinna Möhrlein, Vanessa Fundel, Malte Siefert, Jethro Browell, Sebastian Haglund El Gaidi, Bri-Mathias Hodge, Umit Cali, George Kariniotakis: “Towards Improved Understanding of the Applicability of Uncertainty Forecasts in the Electric Power Industry”, **Energies**, Vol. 10, Issue 9, 2017.
37. Qifang Chen, Fei Wang, Bri-Mathias Hodge, Zhigang Li, Miadreza Shafie-khah, Joao Catalao: “Dynamic Price Vector Formation Model Based Automatic Demand Response Strategy for PV-assisted EV Charging Stations”, **IEEE Transactions on Smart Grid**, Vol. 8, Issue 6, pp. 1949 - 3061, 2017.
38. Qin Wang[‡], Bri-Mathias Hodge*: “Enhancing Power System Operational Flexibility with Flexible Ramping Products: A Review”, **IEEE Transactions on Industrial Informatics**, Vol. 13, Issue 4, pp. 1652 – 1664, 2017.
39. Hongyu Wu, Ibrahim Krad, Erik Ela, Anthony Florita, Eduardo Ibanez, Jie Zhang[‡], Bri-Mathias Hodge*: “Stochastic Multi-Timescale Power Systems Operation with Variable Wind Generation”, **IEEE Transactions on Power Systems**, Vol. 32, Issue 5, pp. 3325 - 3337, 2017.
40. Mingjian Cui[†], Jie Zhang[‡], Hongyu Wu, Bri-Mathias Hodge*: “Wind-Friendly Flexible Ramping Product Design in Multi-Timescale Power System Operations”, **IEEE Transactions on Sustainable Energy**, Vol. 8, pp. 1064 – 1075, 2017.
41. Mingjian Cui[†], Jie Zhang[‡], Cong Feng, Anthony Florita, Yuanzhang Sun, Bri-Mathias Hodge*: “Characterizing and Analyzing Ramping Events in Wind Power, Solar Power, Load, and Netload”, **Renewable Energy**, Vol. 11, pp. 227 – 244, 2017.
42. Jie Zhang[‡], Mingjian Cui[†], Bri-Mathias Hodge*, Anthony Florita, Jeffrey Friedman: “Ramp Forecasting Performance from Improved Short-Term Wind Power Forecasting Over Multiple Spatial and Temporal Scales”, **Energy**, Vol. 122, pp. 528-541, 2017.
43. Cong Feng, Mingjian Cui, Bri-Mathias Hodge, Jie Zhang: “A Data-Driven Multi-Model Methodology with Deep Feature Selection for Short-Term Wind Forecasting”, **Applied Energy**, Vol. 190, pp. 1245 – 1257, 2017.
44. Bryan Palmintier, Elaine Hale, Timothy Hansen[†], Wesley Jones, David Biagioni, Harry Sorensen, Hongyu Wu, Bri-Mathias Hodge*: “IGMS: An Integrated ISO-to-Appliance Scale Grid Modeling System”, **IEEE Transactions on Smart Grid**, Vol. 8, Iss. 3, pp. 1525 – 1534, 2016.
45. Qin Wang[‡], Hongyu Wu, Anthony Florita, Carlo Brancucci Martinez-Anido, Bri-Mathias Hodge*: “The Value of Improved Wind Power Forecasting: Grid Flexibility Quantification, Ramp Capability Analysis, and Impacts of Electricity Market Operation Timescales”, **Applied Energy**, Vol. 184, pp. 696 – 713, 2016.
46. Jie Zhang[‡], Risabh Jain[†], Bri-Mathias Hodge*: “A Data-Driven Method to Characterize Turbulence-Caused Uncertainty in Wind Power Generation”, **Energy**, Vol. 112, pp. 1139 – 1152, 2016.
47. Qin Wang[‡], Carlo Brancucci Martinez-Anido[‡], Hongyu Wu, Anthony Florita, Bri-Mathias Hodge*: “Quantifying the Economic and Grid Reliability Impacts of Improved Wind Power Forecasting”, **IEEE Transactions on Sustainable Energy**, Vol. 7, Iss. 4, pp. 1525 – 1537, 2016.
48. Carlo Brancucci Martinez-Anido[‡], Gregory Brinkman, Bri-Mathias Hodge*: “The Impact of Wind Power on Electricity Prices”, **Renewable Energy**, Vol. 94, pp. 474 – 487, 2016.
49. Carlo Brancucci Martinez-Anido[‡], Benjamin Botor[†], Anthony Florita, Siyuan Lu, Hendrik F. Hamann, Bri-Mathias Hodge*: “The Value of Day-Ahead Solar Forecasting Improvement”, **Solar Energy**, Vol. 129, pp. 192 – 203, 2016.

50. Emilio Gomez-Lazaro, M. Carmen Bueso, Mathieu Kessler, Sergio Martin-Martinez, Jie Zhang, Bri-Mathias Hodge, Angel Molina-Garcia: “Characterization of Aggregated Large-Scale Wind Power with Weibull Mixtures”, **Energies**, Vol. 9, Iss. 2, 2016.
51. Mingjian Cui[†], Jie Zhang[‡], Anthony Florita, Bri-Mathias Hodge, Deping Ke, Yuanzhang Sun: “An Optimized Swinging Door Algorithm for Identifying Wind Ramping Events”, **IEEE Transactions on Sustainable Energy**, Vol. 7, Iss. 1, pp. 150 – 162, 2016.
52. Jie Zhang[‡], Bri-Mathias Hodge^{*}, Siyuan Lu, Hendrik F. Hamann, Brad Lehman, Joseph Simmons, Edwin Campos, Venkat Banunarayanan: “Baseline and Target for Regional and Point Solar Power Forecasts: Toward Improved Solar Power Forecasting”, **Solar Energy**, Vol 122, pp. 804 – 819, 2015.
53. Jie Zhang[‡], Caroline Draxl, Thomas Hopson, Luca Delle Monache, Emilie Vanvyve, Bri-Mathias Hodge^{*}: “Comparison of Numerical Weather Prediction Based Deterministic and Probabilistic Wind Resource Assessment Methods”, **Applied Energy**, Vol. 156, pp. 528 – 541, 2015.
54. Caroline Draxl, Andrew Clifton, Bri-Mathias Hodge^{*}, James McCaa: “The Wind Integration National Dataset (WIND) Toolkit”, **Applied Energy**, Vol. 151, pp. 355 – 366, 2015.
55. Kirsten Orwig, Mark Ahlstrom, Venkat Banunarayanan, Justin Sharp, James Wilczak, Jeffrey Freedman, Sue Ellen Haupt, Joel Cline, Obadiah Bartholomy, Hendrik Hamann, Bri-Mathias Hodge, Catherine Finley, Dora Nakafuji, Jack Peterson, David Maggio, Melinda Marquis: “Recent Trends in Variable Generation Forecasting and Its Value to the Power System”, **IEEE Transactions on Sustainable Energy**, Vol. 6, Iss. 3, pp. 924 – 933, 2015.
56. Jing Wu, Audun Botterud, Andrew Mills, Zhi Zhou, Bri-Mathias Hodge, Michael Heaney: “Integrating Solar PV in Utility System Operations: Analytical Framework and Arizona Case Study”, **Energy**, Vol. 85, pp. 1 – 9, 2015.
57. Mingjian Cui[†], Deping Ke, Yuanzhang Sun, Di Gan, Jie Zhang[‡], Bri-Mathias Hodge^{*}: “Wind Power Ramp Event Forecasting Using a Stochastic Scenario Generation Method”, **IEEE Transactions on Sustainable Energy**, Vol. 6, Iss. 2, pp. 422 – 433, 2015.
58. Angela Cifor, Paul Denholm, Erik Ela, Bri-Mathias Hodge^{*}, Adam Reed: “The Policy and Institutional Challenges of Grid Integration of Renewable Energy in the Western United States”, **Utilities Policy**, Vol. 33, pp. 34 – 41, 2015.
59. Jie Zhang[‡], Bri-Mathias Hodge^{*}, Anthony Florita: “Joint Probability Distribution and Correlation Analysis of Wind and Solar Power Forecast Errors in the Western Interconnection”, **Journal of Energy Engineering**, Special Issue on Smart Grid and Emerging Technology Integration, Vol 141, Iss. 1, 2015.
60. Jie Zhang[‡], Anthony Florita, Bri-Mathias Hodge^{*}, Siyuan Lu, Hendrik F. Hamann, Venkat Banunarayanan, Anna Brockway: “A Suite of Metrics for Assessing the Performance of Solar Power Forecasting”, **Solar Energy**, Vol. 111, pp. 157 – 175, 2015.
61. Jie Zhang[‡], Souma Chowdhury, Achille Messac, Bri-Mathias Hodge: “A Hybrid Measure-Correlate-Predict Method for Long-Term Wind Condition Assessment”, **Energy Conversion and Management**, Vol. 87, pp. 697 – 710, 2014.
62. Bri-Mathias Hodge^{*}, Erik Ela, Michael Milligan: “Characterizing and Modeling Wind Power Forecast Errors from Operational Systems for Use in Wind Integration Planning Studies”, **Wind Engineering**, Vol 36, Iss. 5, pp. 509 – 524, 2012.
63. Shisheng Huang, Hameed Safiullah, Jingjie Xiao, Bri-Mathias Hodge, Ray Hoffman, Joan Soller, Doug Jones, Dennis Dininger, Wallace Tyner, Andrew Liu, Joseph Pekny: “The Effects of Electric Vehicles in the City of Indianapolis”, **Energy Policy**, Vol. 49, pp. 442 – 455, 2012.

64. Bri-Mathias Hodge, Shisheng Huang, Aviral Shukla, Joseph F. Pekny, Venkat Venkatasubramanian, Gintaras V. Reklaitis: “The Effects of Vehicle-to-Grid Systems on Wind Power Integration”, **Wind Energy**, Vol. 15, Iss. 7, pp. 903 – 914, 2012.
65. Michael Milligan, Erik Ela, Debra Lew, David Corbus, Yih-huei Wan, Bri-Mathias Hodge: “Assessment of Simulated Wind Data Requirements for Wind Integration Studies”, **IEEE Transactions on Sustainable Energy**, Vol. 3, Iss. 4, pp. 620 – 626, 2012.
66. Michael Milligan, Erik Ela, Debra Lew, David Corbus, Yih-huei Wan, Bri-Mathias Hodge, Brendan Kirby: “Operational Analysis and Methods for Wind Integration Studies”, **IEEE Transactions on Sustainable Energy**, Vol. 3, Iss. 4, pp. 612 – 619, 2012
67. Michael Milligan, Erik Ela, Bri-Mathias Hodge, Brendan Kirby, Debra Lew, Charlton Clark, Jennifer DeCesaro, Kevin Lynn: “Integration of Variable Generation, Cost-Causation, and Integration Costs”, **The Electricity Journal**, Vol. 24, Iss. 9, pp. 51 – 63, 2011.
68. Bri-Mathias Hodge, Shisheng Huang, John Siirola, Joseph Pekny, Gintaras Reklaitis: “A Multi-Paradigm Modeling Framework for Energy Systems Modeling, Simulation and Analysis”, **Computers & Chemical Engineering**, Vol. 35, Iss. 9, pp. 1725 – 1737, 2011.
69. Jingjie Xiao, Bri-Mathias Hodge, Joseph Pekny, Gintaras Reklaitis: “Operating Reserve Policies with High Wind Power Penetration”, **Computers & Chemical Engineering**, Vol. 35, Iss. 9, pp. 1876 – 1885, 2011.
70. Bri-Mathias Hodge, Aviral Shukla, Shisheng Huang, Gintaras Reklaitis, Venkat Venkatasubramanian, Joseph Pekny: “Multi-Paradigm Modeling of the Effects of PHEV Adoption on Electric Utility Usage Levels and Emissions”, **Industrial & Engineering Chemistry Research**, Special Issue in Honor of Professor Luis Puigjaner, Vol. 50, Iss. 9, pp. 5191 – 5203, 2011.
71. Shisheng Huang, Bri-Mathias Hodge, Farzad Taheripour, Joseph Pekny, Gintaras Reklaitis, Wallace Tyner: “The Effects of Electricity Pricing on PHEV Competitiveness”, **Energy Policy**, Vol. 39, Iss. 3, pp. 1552 – 1561, 2011.
72. J. Camilo Zapata, Bri-Mathias Hodge, Gintaras Reklaitis: “The Multi-mode Resource Constrained Multi-project Scheduling Problem: Alternative Formulations”, **AIChE Journal**, Vol. 54, Iss. 8, pp. 2101-2119, 2008.
73. Bri-Mathias Hodge, Frank Pettersson, Nirupam Chakraborti: “Re-evaluation of the Optimal Operating Conditions for the Primary End of an Integrated Steel Plant using Multi-objective Genetic Algorithms and Nash Equilibrium”, **Steel Research International**, Vol. 77, Iss. 7, pp. 459 – 461, 2006.

Conference Proceedings (*Senior Author, † Student/Intern, ‡ Postdoc):

1. Kwami Sedzro[‡], Xin Fang, Bri-Mathias Hodge: “Analysis of Wind Ramping Product Formulations in a Ramp-constrained Power Grid”, **Hawaii International Conference on System Sciences**, January 8-11, 2019, Maui, HI, USA.
2. Adarsh Hasandka[†], Jianhua Zhang[‡], Jin Wei, S M Shafiul Alam[‡], Anthony Florita, Bri-Mathias Hodge^{*}: “Simulation-based Parameter Optimization Framework for Large-Scale hybrid Smart Grid Communications System Design”, **2018 IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm)**, October 29 – November 1, Aalborg, Denmark.
3. Mucun Sun, Cong Feng, Jie Zhang, Erol Chartan, Bri-Mathias Hodge: “Probabilistic Short-term Wind Forecasting Based on Pinball Loss Optimization”, **Probabilistic Methods Applied to Power Systems (PMAPS) 2018**, June 24 - 28, 2018, Boise, ID, USA.

4. Iris van Beuzekom[†], Bri-Mathias Hodge^{*}, Han Slootweg: “Projecting solar photovoltaic efficiencies from lab to market”, **5th IEEE International Energy Conference (ENERGYCON 2018)**, *June 3-7, 2018, Limassol, Cyprus.*
5. Bing Huang[†], Venkat Krishnan, Bri-Mathias Hodge^{*}: “Analyzing the Impacts of Variable Renewable Resources on California Net-Load Ramp Events”, **IEEE Power & Energy Society General Meeting**, *August 5-9, 2018, Portland, OR, USA. Best Paper Award.*
6. Xin Fan, Bri-Mathias Hodge, Venkat Krishnan, Fanxing Li: “Potential of Wind Power to Provide Flexible Ramping Products and Operating Reserve”, **IEEE Power & Energy Society General Meeting**, *August 5-9, 2018, Portland, OR, USA. Best Paper Award.*
7. Xin Fan, Bri-Mathias Hodge, Fanxing Li: “Capacity Market Model Considering Flexible Resource Requirements”, **IEEE Power & Energy Society General Meeting**, *August 5-9, 2018, Portland, OR, USA.*
8. Benjamin Kroposki, Emiliano Dall’Anese, Andrey Bernstein, Yingchen Zhang, Bri-Mathias Hodge: “Autonomous Energy Grids”, **Hawaii International Conference on System Sciences**, *January 3-6, 2018, Waikoloa, HI, USA.*
9. Cong Feng, Erol Chartan, Bri-Mathias Hodge, Jie Zhang: “Characterizing Time Series Data Diversity for Wind Forecasting”, **The 4th IEEE/ACM International Conference on Big Data Computing, Applications and Technologies**, *December 5-8, 2017, Austin, TX, USA. Best Student Paper Award.*
10. Hannele Holttinen, Juha Kiviluoma, Damian Flynn, Jody Dillon, Barry Mather, Bri-Mathias Hodge, Til Kristian Vrana, Lennart Söder: “Short-Ter, Kazuhiko Ogimoto, Emmanuel Neau, Nicolaos Cutululis, J. Charles Smith: “Recommendations for Wind and Solar Integration Studies”, Submitted to **The 16th International Workshop on Integration of Wind Power into Power Systems**, *October 25-27, 2017, Berlin, Germany.*
11. Alex Dobbs[†], Tarek Elgindy, Bri-Mathias Hodge, Anthony Florita: “Short-Term Solar Forecasting Performance of Popular Machine Learning Algorithms”, Submitted to **The 7th International Workshop on Integration of Solar Power into Power Systems**, *October 24-25, 2017, Berlin, Germany.*
12. Gyu-Jung Cho[†], Yun-Sik Oh[†], Min-Sung Kim[†], Ji-Soo Kim, Chul-Hwang Kim, Barry Mather, Bri-Mathias Hodge^{*}: “Optimal Operation and Dispatch of Voltage Regulation Devices Considering High Penetrations of Distributed Photovoltaic Generation”, **International Conference on Power Systems Transients**, *June 26-29, 2017, Seoul, South Korea.*
13. Gyu-Jung Cho[†], Yun-Sik Oh[†], Min-Sung Kim[†], Ji-Soo Kim, Chul-Hwang Kim, Barry Mather, Bri-Mathias Hodge^{*}: “Optimal Capacitor Bank Capacity and Placement in Distribution Systems with High Distributed Solar Power Penetration”, **IEEE Power & Energy Society General Meeting**, *July 16-20, 2017, Chicago, IL, USA.*
14. Cong Feng, Mingjian Cui, Meredith Lee, Jie Zhang, Bri-Mathias Hodge, Siyuan Lu, Hendrik Hamann: “Short-term Global Horizontal Irradiance Forecasting Based on Sky Imaging and Pattern Recognition”, **IEEE Power & Energy Society General Meeting**, *July 16-20, 2017, Chicago, IL, USA. Best Paper Award.*
15. Yifu Wu, Jin Wei, Bri-Mathias Hodge: “A Distributed Middleware Architecture for Attack-Resilient Communications in Smart Grids”, **IEEE International Conference on Communications**, *May 21-25, 2017, Paris, France.*

16. Mingjian Cui, Cong Feng, Zhenke Wang, Jie Zhang, Qin Wang, Anthony Florita, Venkat Krishnan, Bri-Mathias Hodge*: “Probabilistic Wind Power Ramp Forecasting Based on a Scenario Generation Method”, **IEEE Power & Energy Society General Meeting**, July 16-20, 2017, Chicago, IL, USA.
17. Robert Cruickshank III, Gregor Henze, Rajagaopalan Balaji, Bri-Mathias Hodge, Anthony Florita: “Empirical Investigations of the Opportunity Limits of Automatic Residential Electric Load Shaping”, **2017 IEEE Ninth Annual Green Technologies Conference**, March 30-31, 2017, Denver, CO, USA.
18. Dexin Wang, Liuqing Yang, Anthony Florita, SM Shafiul Alam[‡], Tarek Elgindy, Bri-Mathias Hodge: “Automatic Regionalization Algorithm for Distributed State Estimation in Power Systems”, **IEEE Global Conference on Signal and Information Processing**, December 7-9, 2016, Washington, DC, USA.
19. Gregor Giebel, Joel Cline, Helmut Frank, Pierre Pinson, Bri-Mathias Hodge, Georges Kariniotakis, Jens Madsen, Corinne Mohrlen: “Wind power forecasting: IE Wind Task 36 & future research issues”, **TORQUE 2016**, October 5-7, 2016, Munich, Germany.
20. Rishabh Jain[†], Yingchen Zhang, Bri-Mathias Hodge*: “Investigating the Impact of Wind Turbines on Distribution System Stability”, **IEEE Innovative Smart Grid Technologies Conference**, September 6-9, 2016, Minneapolis, MN, USA.
21. Qin Wang[‡], Hongyu Wu, Jin Tan, Bri-Mathias Hodge*, Wanning Li, Cheng Luo: “Analyzing the Impacts of Increased Wind Power on Generation Revenue Sufficiency”, **IEEE Power & Energy Society General Meeting**, July 17-21, 2016, Boston, MA, USA. **Best Paper Award**.
22. Bryan Palmintier, Elaine Hale, Bri-Mathias Hodge*, Kyri Baker, Timothy Hansen[†]: “Experiences integrating transmission and distribution simulations for DERs with the Integrated Grid Modeling System (IGMS)”, **19th Power Systems Computation Conference (PSCC 2016)**, June 20-24, 2016, Genoa, Italy.
23. Jun-Hyung Ryu, Bri-Mathias Hodge: “Mathematical Modelling-based Energy System Operation Strategy considering Energy Storage Systems”, **Proceedings of the 26th European Symposium on Computer Aided Process Engineering**, June 12-15, 2016, Portoroz, Slovenia.
24. Soo bin Lee, Jun-Hyung Ryu, Bri-Mathias Hodge, In-Beum Lee: “Development of a Neural Network-based Renewable Energy Forecasting Framework for Process Industries”, **Proceedings of the 26th European Symposium on Computer Aided Process Engineering**, June 12-15, 2016, Portoroz, Slovenia.
25. Eduardo Ibanez, Ibrahim Krad, Bri-Mathias Hodge, Erik Ela: “Impacts of Short-Term Solar Power Forecasts in System Operations”, **IEEE Power & Energy Society Transmission and Distribution Conference**, May 2-5, 2016, Dallas, TX, USA.
26. Mingjian Cui[†], Jie Zhang[‡], Hongyu Wu, Bri-Mathias Hodge, Deping Ke, Yuanzhang Sun: “Wind Power Ramping Product for Increasing Power System Flexibility”, **IEEE Power & Energy Society Transmission and Distribution Conference**, May 2-5, 2016, Dallas, TX, USA.
27. Joshua-Benedict Rosenkranz[†], Carlo Brancucci Martinez-Anido[‡], Bri-Mathias Hodge*: “Analyzing the Impact of Solar Power on Multi-Hourly Thermal Generator Ramping”, **2016 IEEE Eighth Annual Green Technologies Conference**, April 7-8, 2016, Kansas City, MO, USA.
28. WanYin Cheung[†], Jie Zhang[‡], Anthony Florita, Bri-Mathias Hodge*, Siyuan Lu, Hendrik Hamann, Qian Sun, Brad Lehman: “Ensemble Solar Forecasting Statistical Quantification and Sensitivity Analysis”, **5th International Workshop on Integration of Solar Power into Power Systems**, October 19-20, 2015, Brussels, Belgium.
29. Anthony Florita, Jie Zhang[‡], Carlo Brancucci Martinez-Andio, Mingjian Cui[†], Bri-Mathias Hodge*: “Probabilistic Swinging Door Algorithm as Applied to Photovoltaic Power Ramping Event Detection”,

5th International Workshop on Integration of Solar Power into Power Systems, October 19-20, 2015, Brussels, Belgium.

30. Hongyu Wu, Erik Ela, Ibrahim Krad, Anthony Florita, Jie Zhang[‡], Bri-Mathias Hodge*, Eduardo Ibanez, Wenzhong Gao: “An Assessment of the Impact of Stochastic Day-Ahead SCUC on Economic and Reliability Metrics at Multiple Timescales”, **IEEE Power & Energy Society General Meeting, July 26-30, 2015, Denver, CO, USA. Best Paper Award.**
31. Jie Zhang[‡], Bri-Mathias Hodge*, Siyuan Lu, Hendrik Hamann, Brad Lehman, Joseph Simmons, Edwin Campos, Venkat Banunarayanan: “Baseline and Target Values for PV Forecasts: Towards Improved Solar Power Forecasting”, **IEEE Power & Energy Society General Meeting, July 26-30, 2015, Denver, CO, USA.**
32. Mingjian Cui[†], Jie Zhang[‡], Anthony Florita, Bri-Mathias Hodge, Deping Ke, Yuanzhang Sun: “An Optimized Swinging Door Algorithm for Wind Power Ramp Event Detection”, **IEEE Power & Energy Society General Meeting, July 26-30, 2015, Denver, CO, USA.**
33. Siyuan Lu, Youngdeok Hwang, Ildar Khabibrakhmanov, Fernando Marianno, Xiaoyan Shao, Jie Zhang, Bri-Mathias Hodge, Hendrik Hamann: “Machine Learning Based Multi-Physical-Model Blending for Enhanced Renewable Energy Forecast – Improvement via Situation Dependent Error Correction”, **European Control Conference, July 15-17, 2015, Linz, Austria.**
34. Carlo Brancucci Martinez-Anido[‡], Bri-Mathias Hodge*, David Palchak, Jari Miettinen[†]: “The Impact of Distributed Wind on Bulk Power System Operations in ISO-NE”, **13th International Workshop on Large-Scale Integration of Wind Power into Power Systems, November 11-13, 2014, Berlin, Germany.**
35. Carlo Brancucci Martinez-Anido[‡], Anthony Florita, Bri-Mathias Hodge*: “The Impact of Improved Solar Forecasts on Bulk Power System Operations in ISO-NE”, **4th International Workshop on Integration of Solar Power into Power Systems, November 10-11, 2014, Berlin, Germany.**
36. Robert Weissbach, Wen-Li Wang, Bri-Mathias Hodge, Mei-Huei Tang, James Sonnenmeier: “Generation of Simulated Wind Data Using an Intelligent Algorithm”, **46th North American Power Symposium (NAPS), September 7-9, 2014, Pullman, WA, USA.**
37. Jari Miettinen[†], Ville Tikka, Jukka Lassila, Jarmo Partanen, Bri-Mathias Hodge: “Minimizing Wind Power Producer’s Balancing Costs Using Electrochemical Energy Storage”, **11th Nordic Conference on Electricity Distribution System Management and Development (NORDAC), September 8-9, 2014, Stockholm, Sweden.**
38. Jie Zhang[‡], Bri-Mathias Hodge*, Anthony Florita, Jeffrey Freedman: “Ramp Forecasting Performance from Improved Short-Term Wind Power Forecasting”, **ASME 2014 International Design Engineering Technical Conferences, August 17-20, 2014, Buffalo, NY, USA.**
39. Jie Zhang[‡], Bri-Mathias Hodge*: “Forecastability as a Design Criterion in Wind Resource Assessment”, **8th International Conference on Foundations of Computer-Aided Process Design (FOCAPD 2014), July 13-17, 2014, Cle Elum, WA, USA.**
40. Yingchen Zhang, Alicia Allen[‡], Bri-Mathias Hodge*: “Impact of Distribution-Connected Large-Scale Wind Turbines on Transmission System Stability during Large Disturbances”, **Proceedings of the IEEE Power & Energy Society General Meeting, July 27-31, 2014, National Harbor, MD, USA.**
41. Jie Zhang[‡], Souma Chowdhury, Bri-Mathias Hodge*: “Analyzing Effects of Turbulence on Power Generation Using Wind Plant Monitoring Data”, **AIAA Science and Technology Forum and Exposition, January 13-17, 2014, National Harbor, MD, USA.**

42. Caroline Draxl, Bri-Mathias Hodge*, Kirsten Orwig, Wesley Jones, Keith Searight, Dan Getman, Sara Harrold, Jim McCaa, Joel Cline, Charlton Clark: “Advancements in Wind Intergration Study Data Modeling: The Wind Integration National Dataset (WIND) Toolkit”, **12th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *October 22-24, 2013, London, UK*.
43. Jie Zhang[‡], Bri-Mathias Hodge*, Jari Miettinen, Hannele Holttinen, Emilio Gomez-Lazaro, Nicolaos Cutululis, Marisciel Litong-Palima, Poul Sorensen, Anne Line Lovholm, Erik Berge, Jan Dobschinski: “Analysis of Variability and Uncertainty in Wind Power Forecasting: An International Comparison”, **12th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *October 22-24, 2013, London, UK*.
44. Alicia Allen[‡], Yingchen Zhang, Bri-Mathias Hodge*: “Impact of Increasing Distributed Wind Power and Wind Turbine Siting on Rural Distribution Feeder Voltage Profiles”, **12th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *October 22-24, 2013, London, UK*.
45. Nicholas Steckler[‡], Anthony Florita, Jie Zhang[‡], Bri-Mathias Hodge*: “Analysis and Synthesis of Load Forecasting Data for Renewable Integration Studies”, **12th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *October 22-24, 2013, London, UK*.
46. Jie Zhang[‡], Bri-Mathias Hodge*, Anthony Florita, Siyuan Lu, Hendrik F. Hamann, Venkat Banunarayanan: “Metrics for Evaluating the Accuracy of Solar Power Forecasting”, **3rd International Workshop on Integration of Solar Power into Power Systems**, *October 21-22, 2013, London, UK*.
47. Jie Zhang[‡], Souma Chowdhury, Achille Messac, Bri-Mathias Hodge: “Assessing Long-Term Wind Conditions by Combining Different Measure-Correlate-Predict Algorithms”, **International Design Engineering Technical Conferences and Computers and Information in Engineering Conference 2013**, *August 4-7, 2013, Portland, OR, USA*.
48. Jie Zhang[‡], Bri-Mathias Hodge*: “Investigating the Correlation Between Wind and Solar Power Forecast Errors in the Western Interconnection”, **Proceedings of the ASME 2013 7th International Conference on Energy Sustainability & 11th Fuel Cell Science Engineering and Technology Conference**, *July 14-19, 2013, Minneapolis, MN, USA*.
49. Jing Wu, Zhi Zhou, Audun Botterud, Andrew Mills, Bri-Mathias Hodge, Michael Heaney: “Impact of Renewable Energy on Power System Cost and Reliability”, **Proceedings of the 2013 Industrial and Systems Engineering Research Conference**, *May 18-22, 2013, San Juan, Puerto Rico, USA*.
50. Bri-Mathias Hodge*, Debra Lew, Michael Milligan: “Short-Term Load Forecasting Error Distributions and Implications for Renewable Integration Studies”, **2013 IEEE Fifth Annual Green Technologies Conference**, *April 4-5, 2013, Denver, CO, USA*.
51. Anthony Florita, Bri-Mathias Hodge*, Kirsten Orwig: “Identifying Wind and Solar Ramping Events”, **2013 IEEE Fifth Annual Green Technologies Conference**, *April 4-5, 2013, Denver, CO, USA*.
52. Sandra Shedd[†], Bri-Mathias Hodge*, Anthony Florita, Kirsten Orwig: “Statistical Characterization of Solar Photovoltaic Power Variability at Small Timescales”, **The 2nd Annual International Workshop on Integration of Solar Power into Power Systems**, *November 12-13, 2012, Lisbon, Portugal*.
53. Debra Lew, Greg Brinkman, Eduardo Ibanez, Marissa Hummon, Bri-Mathias Hodge, Michael Heaney, Jack King: “Sub-Hourly Impacts of High Solar Penetrations in the Western United States”, **The 2nd Annual International Workshop on Integration of Solar Power into Power Systems**, *November 12-13, 2012, Lisbon, Portugal*.
54. Kirsten Orwig, Bri-Mathias Hodge, Greg Brinkman, Erik Ela, Michael Milligan, Venkat Banunarayanan, Saleh Nasir, Jeff Freedman: “Economic Evaluation of Short-Term Wind Power Forecasts in ERCOT:

Preliminary Results”, **The 11th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *November 13-15, 2012, Lisbon, Portugal.*

55. Debra Lew, Greg Brinkman, Eduardo Ibanez, Bri-Mathias Hodge, Jack King: “Western Wind and Solar Integration Study Phase 2”, **The 11th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *November 13-15, 2012, Lisbon, Portugal.*
56. Bri-Mathias Hodge*, Sandra Shedd, Anthony Florita: “Examining the Variability of Wind Power Output in the Regulation Time Frame”, **The 11th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *November 13-15, 2012, Lisbon, Portugal.*
57. Anthony Florita, Bri-Mathias Hodge*, Michael Milligan: “Wind Power Forecasting Error Frequency Analyses for Operational Power System Studies”, **The 11th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *November 13-15, 2012, Lisbon, Portugal.*
58. Bri-Mathias Hodge*, Hannele Holttinen, Samueli Sillanpää, Emilio Gómez-Lázaro, Richard Scharff, Lennart Söder, Xiaoli Larsén, Gregor Giebel, Damian Flynn, Debra Lew, Michael Milligan, Jan Dobschinski: “Wind Power Forecasting Error Distributions: An International Comparison”, **The 11th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *November 13-15, 2012, Lisbon, Portugal.*
59. Bri-Mathias Hodge*, Kirsten Orwig, Michael Milligan: “Examining Information Entropy Approaches as Wind Power Forecasting Performance Metrics”, **The 12th International Conference on Probabilistic Methods Applied to Power Systems**, *June 10-14, 2012, Istanbul, Turkey.*
60. Michael Milligan, Bri-Mathias Hodge, Brendan Kirby, Charlton Clark: “Integration Costs: Are They Unique to Wind and Solar Energy”, **The American Wind Energy Association Conference, WINDPOWER 2012**, *June 3-6, 2012, Atlanta, GA, USA.*
61. Bri-Mathias Hodge*, Anthony Florita, Kirsten Orwig, Debra Lew, Michael Milligan: “A Comparison of Wind Power and Load Forecasting Error Distributions”, **The World Renewable Energy Forum**, *May 13-17, 2012, Denver, CO, USA.*
62. Bri-Mathias Hodge*, Marissa Hummon, Kirsten Orwig: “Solar Ramping Distributions over Multiple Timescales and Weather Patterns”, **1st International Workshop on Integration of Solar Power into Power Systems**, *October 24, 2011, Aarhus, Denmark.*
63. Kirsten Orwig, Marissa Hummon, Bri-Mathias Hodge, Debra Lew: “Solar Data Inputs for Integration and Transmission Planning Studies”, **1st International Workshop on Integration of Solar Power into Power Systems**, *October 24, 2011, Aarhus, Denmark.*
64. Bri-Mathias Hodge*, Erik Ela, Michael Milligan: “The Distribution of Wind Power Forecast Errors from Operational Systems”, **10th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *October 25-26, 2011, Aarhus, Denmark.*
65. Bri-Mathias Hodge*, Debra Lew, Michael Milligan: “The Impact of High Wind Power Penetration on Hydroelectric Unit Operations”, **10th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *October 25-26, 2011, Aarhus, Denmark.*
66. Michael Milligan, Erik Ela, Bri-Mathias Hodge, Brendan Kirby, Debra Lew, Charlton Clark, Jennifer DeCesaro, Kevin Lynn: “Are Integration Costs and Tariffs Based on Cost-Causation?” **10th International Workshop on Large-Scale Integration of Wind Power into Power Systems**, *October 25-26, 2011, Aarhus, Denmark.*

67. Bri-Mathias Hodge*, Michael Milligan: “Wind Power Forecasting Errors over Multiple Timescales”, **Proceedings of the IEEE Power & Energy Society General Meeting, July 24-29, 2011, Detroit, MI, USA.**
68. Bri-Mathias Hodge, Austin Zeiler, Duncan Brooks, Gary Blau, Joseph Pekny, Gintaras Reklaitis: “Improved Wind Power Forecasting with ARIMA Models”, **Proceedings of the 21st European Symposium on Computer Aided Process Engineering, May 29 – June 1, 2011, Chalkidiki, Greece.**
69. Shisheng Huang, Bri-Mathias Hodge, Jingjie Xiao, Joseph Pekny, Gintaras Reklaitis: “The Effects of Electricity Storage on Large Scale Wind Integration”, **Proceedings of the 21st European Symposium on Computer Aided Process Engineering, May 29 – June 1, 2011, Chalkidiki, Greece.**
70. Jingjie Xiao, Andrew Liu, Bri-Mathias Hodge, Joseph Pekny, Gintaras Reklaitis: “Long-Term Planning of Wind Farm Siting in the Electricity Grid”, **Proceedings of the 21st European Symposium on Computer Aided Process Engineering, May 29 – June 1, 2011, Chalkidiki, Greece.**
71. Bri-Mathias Hodge, Shisheng Huang, Joseph Pekny, Gintaras Reklaitis: “Process Systems Engineering Perspectives on Energy Systems Analysis and Policy”, **Proceedings of the Second International Symposium on Sustainable Chemical Product and Process Engineering, May 9-12, 2010, Hangzhou, China.**
72. Bri-Mathias Hodge, Shisheng Huang, Aviral Shukla, Joseph Pekny, Gintaras Reklaitis: “The Effects of Vehicle-to-Grid Systems on Wind Power Integration in California”, **Proceedings of the 20th European Symposium on Computer Aided Process Engineering, June 6-9, 2010, Ischia, Italy.**
73. Shisheng Huang, Bri-Mathias Hodge, Joseph Pekny, Gintaras Reklaitis: “The Value of Battery Storage and Discharge Logic with Solar Microgeneration”, **Proceedings of the 20th European Symposium on Computer Aided Process Engineering, June 6-9, 2010, Ischia, Italy.**
74. Shisheng Huang, Bri-Mathias Hodge, Joseph F. Pekny, Gintaras V. Reklaitis: “The Impact of PHEV Adoption on Natural Gas Demand in Electricity Generation”, **Proceedings of the 2nd Annual Gas Processing Symposium, January 11-14, 2010, Doha, Qatar.**
75. Bri-Mathias Hodge, Joseph F. Pekny, Gintaras V. Reklaitis: “Technology Pipelines for Learning in Energy System Models”, **Proceedings of the 10th International Symposium on Process Systems Engineering, August 16-20, 2009, Salvador, Brazil.**
76. Bri-Mathias Hodge, Joseph F. Pekny, Gintaras V. Reklaitis: “A Multi-Paradigm Energy Model for Liquid Natural Gas Analysis”, **Proceedings of the 1st Annual Gas Processing Symposium, January 10-12, 2009, Doha, Qatar.**
77. Bri-Mathias Hodge, Selen Aydogan-Cremaschi, Gary E. Blau, Joseph F. Pekny, Gintaras V. Reklaitis: “A Prototype Agent-Based Modeling Approach For Energy System Analysis”, **Proceedings of the 18th European Symposium on Computer Aided Process Engineering, June 1-4, 2008, Lyon, France.**

Other Publications (*Senior Author, † Student/Intern, ‡ Postdoc):

1. Carlo Brancucci, Riccardo Bracho, Greg Brinkman, Bri-Mathias Hodge: “Baja California Sur Renewable Integration Study”, **NREL Technical Report: NREL/TP-5D00-72598, 2018.**
2. Richard Bryce[†], Ignacio Losada Carreno[†], Andrew Kumler, Bri-Mathias Hodge, Billy Roberts, Carlo Brancucci Martinez-Anido: “Annually and monthly resolved solar irradiance and atmospheric temperature data across the Hawaiian archipelago from 1998 – 2015 with interannual summary statistics”, **Data in Brief, Vol. 19, 2018.**

3. Bryan Palmintier, Elaine Hale, Timothy Hansen, Wesley Jones, David Biagioni, Kyri Baker, Hongyu Wu, Julieta Giraldez, Harry Sorensen, Monte Lunacek, Noel Merket, Jennie Jorgenson, Bri-Mathias Hodge*: “Integrated Distribution-Transmission Analysis for Very High Penetration Solar PV”, **NREL Technical Report**: NREL/TP-5D00-65550, 2016.
4. Nick Schlag, Arne Olson, Elaine Hart, Ana Mileva, Ryan Jones, Carlo Brancucci Martinez-Anido[‡], Bri-Mathias Hodge, Greg Brinkman, Anthony Florita, David Biagioni: “Western Interconnection Flexibility Assessment: Final Report”, **Western Electricity Coordinating Council (WECC) Technical Report**, 2015.
5. Caroline Draxl, Bri-Mathias Hodge*, Andrew Clifton, James McCaa: “Overview and Meteorological Validation of the Wind Integration National Dataset Toolkit”, **NREL Technical Report**: NREL/TP-5000-61740, 2015.
6. Bri-Mathias Hodge*, Anthony Florita, Justin Sharp, Michael Margulis, David McCreavy: “The Value of Improved Short-Term Wind Power Forecasting”, **NREL Technical Report**: NREL/TP-5D00-63175, 2015.
7. Jack King, Andrew Clifton, Bri-Mathias Hodge*: “Validation of Power Output for the WIND Toolkit”, **NREL Technical Report**: NREL/TP-5D00-61714, 2014.
8. Carlo Brancucci Martinez-Anido[‡], Bri-Mathias Hodge*: “Impact of Utility-Scale Distributed Wind on Transmission-Level System Operations”, **NREL Technical Report**: NREL/TP-5D00-61824, 2014.
9. Andrew Mills, Audun Botterud, Jing Wu, Zhi Zhou, Bri-Mathias Hodge, Michael Heaney: “Integrating Solar PV into Utility Operations”, **ANL Technical Report**: ANL/DIS-13/18, 2013.
10. Kevin Porter, Sari Fink, Michael Buckley, Jennifer Rogers, Bri-Mathias Hodge*: “A Survey of Variable Generation Integration Charges”, **NREL Technical Report**: TP – 5500-57583, 2013.
11. Debra Lew, Greg Brinkman, Eduardo Ibanez, Bri-Mathias Hodge, Marissa Hummon, Anthony Florita, Michael Heaney, Greg Stark, Jack King, Nikhil Kumar, Steve Lefton, Dwight Agan, Gary Jordan, Sundar Venkataraman: “The Western Wind and Solar Integration Study Phase 2”, **NREL Technical Report**: TP – 5500-55888, 2012.
12. Michael Milligan, Erik Ela, Bri-Mathias Hodge, Brendan Kirby, Debra Lew, Charlton Clark, Jennifer DeCesaro, Kevin Lynn: “Cost-Causation and Integration Cost Analysis for Variable Generation”, **NREL Technical Report**: TP – 5500-51860, 2011.
13. Bri-Mathias Hodge*, Debra Lew, Michael Milligan: “The Impact of High Wind Power Penetration on Hydroelectric Unit Operations in the WWSIS”, **NREL Technical Report**: TP – 5500-52251, 2011.
14. Per Jernström, Bri-Mathias Hodge, K. Tapio Westerlund: “A Comparison Between a MILP-based Decomposition Method and a Genetic Algorithm in Scheduling Applications”, Report of the Process Design Systems Engineering Institute, **Åbo Akademi Technical Report**: 06-190-A, ISBN 952-121-1793-6, 2006.

Patents:

U.S. Provisional Application No. 62/253,847, “Heterogeneous Network Topology Management and Control”, Patent filed November 2018.

Selected Invited Presentations:

“*Designing a Sustainable and Reliable Future: Simulating Next Generation Energy Systems*”, University of California Berkeley, Energy and Resources Group Colloquium, November 2018

“*The WIND Toolkit: A National Dataset for Wind Integration Studies*”, 4th Conference on Stochastic Weather Generators (SWGGEN 2018), October 2018

“*Distribution Integration Research*”, Colorado Public Utilities Commission, Commission’s Review of its Rules Governing ERP, RES and Enabling New Technology Integration – Distribution System Planning, April 2018

“*Renewable Energy Integration: from Resource Data to Power System Impacts*”, Ascend Analytics 2017 Summit on Changing Market Dynamics for Portfolio Management and Planning Decisions, October 2017

“*Solar Power Forecasting and Power System Impacts*”, Yuannan Province Electric Power Research Institute, Southern China Power Grid, May 2017

“*Renewable Energy Integration: from Resource Data to Solar Power Forecasting and Power System Impacts*”, North China Electric Power University, May 2017

“*Next Generation Power System Test Cases*”, Colorado School of Mines, Energy Seminar Series, April 2017

“*The Value of Wind and Solar Power Forecasting Improvements at Multiple Timescales*”, Electric Power Research Institute (EPRI) – Artificial Neural Network Short-Term Load Forecaster Users’ Group Meeting, November 2016

“*Renewable Energy Integration: from Resource Data to Power System Impacts*”, Cranfield University, School of Water, Energy and Environment, July 2016

“*The Modern Grid with High Penetration of Renewables*”, Western Area Power Administration (WAPA) Resource Planning for Power Systems, April 2016

“*The Wind Integration National Dataset (WIND) and Solar Integration National Dataset (SIND) Toolkits*”, Conference on Data Analysis (CoDA) 2016, March 2016

“*Solar and Wind Resources Review*”, Colorado Public Utilities Commission, Commissioners’ Information Meeting – Future Issues for Renewable Energy and Transmission, February 2016

“*Setting the Scene: Forecasting 101*”, USAID Regional Workshop for Asia on Advancing the Use of Wind and Solar Forecasting to Facilitate the Integration of Variable Renewable Energy to the Grid, Bangkok, Thailand, February 2016

“*Data Requirements for Forecasting*”, USAID Regional Workshop for Asia on Advancing the Use of Wind and Solar Forecasting to Facilitate the Integration of Variable Renewable Energy to the Grid, Bangkok, Thailand, February 2016

“*Renewable Energy Integration: from Resource Assessment to Power System Impacts*”, Colorado School of Mines, Department of Mechanical Engineering, February 2016

“*The Value of Forecasting*”, USAID Regional Workshop for Latin America and the Caribbean on Advancing the Use of Wind and Solar Forecasting to Facilitate the Integration of Variable Renewable Energy to the Grid, Mexico City, Mexico, January 2016

“*Forecasting Requirements for System Operations*”, USAID Regional Workshop for Latin America and the Caribbean on Advancing the Use of Wind and Solar Forecasting to Facilitate the Integration of Variable Renewable Energy to the Grid, Mexico City, Mexico, January 2016

“*Renewables Integration Research and Development*”, Western Electricity Coordinating Council (WECC) Dispatch Chief’s Fall Meeting, October 2015

“Regulatory & Policy Role: Renewable Energy Grid Integration International Experience & Lessons for India”, Forum of Indian Regulators, June 2015

“The Value of Very Short-Term Wind Power Forecasting in California in the Context of an Overall Forecasting Value Framework”, Utility Variable Generation Integration Group Forecasting Workshop, February 2014

“The State-of-the-Art in Wind and Solar Power Forecasting”, Eskom and the 21st Century Power Partnership Workshop on Integrating Variable Renewable Energy into Transmission and Distribution Networks, Eskom (South African State Utility), December 2013

“Renewable Energy: Grid Integration Panel”, AMS 2013 Summer Community Meeting, American Meteorological Society, August 2013

“Best Practices in Solar Interconnection and Operations”, ERCOT Photovoltaic/Storage Interconnection Workshop, Electric Reliability Council of Texas, October 2012

“Multi-Paradigm Energy Systems Modeling”, Purdue Energy Systems Workshop, Energy Center, Purdue University, September 2011

“Wind Forecasting Error Distributions and Implications”, Electricity Industry Center, Department of Engineering and Public Policy, Carnegie Mellon University, May 2011

Teaching Experience:

University of Colorado Boulder – Department of Electrical, Computer and Energy Engineering

ECEN 2250 – Introduction to Circuits and Electronics

Fall 2018

- Designed and conducted lectures
- Designed and conducted studio sessions focused on engineering design

ECEN 5009 – Renewable Energy and the Future Power Grid

Fall 2016, 2017

- Designed and conducted lectures
- Supervised and advised design project teams

Colorado School of Mines – Department of Chemical and Biological Engineering

Adjunct Faculty – CHEN 402 – Chemical Engineering Design

Spring 2014

- Designed and conducted lectures
- Supervised and advised design project teams

Purdue University – School of Chemical Engineering

Teaching Assistant - CHE 450 - Design and Analysis of Processing Systems

Spring 2007, 2009

- Designed and supervised computer laboratory sessions
- Formulated design projects
- Designed and conducted lectures

Åbo Akademi, Process Design Laboratory

Lecturer – Basics in Process Design

Fall 2005

- Designed and conducted lectures and recitation sessions
- Created homework sets and solutions

Selected Honors:

- NREL Outstanding Mentor Award *September 2018*
- Best Paper Award (x2), IEEE Power & Energy Society General Meeting *August 2018*
- NREL Outstanding New Partnership Award –Peña Station Next *March 2018*
- Best Paper Award, IEEE Power & Energy Society General Meeting *July 2017*

- NREL President's Award *August 2016*
- Fulbright Fellowship, VTT, Finland *May – August 2016*
- Best Paper Award, IEEE Power & Energy Society General Meeting *July 2016*
- NREL RPP Outstanding Mentor Award *September 2015*
- Best Paper Award, IEEE Power & Energy Society General Meeting *July 2015*
- NREL Outstanding SULI Mentor Award *Spring 2015*
- NREL RPP Outstanding Mentor Award *September 2014*
- NREL Outstanding SULI Mentor Award *Summer 2012*
- Undergraduate Award for Teaching Excellence – Purdue Chemical Engineering *Spring 2009*
- Charlemagne Scholarship - RWTH Aachen, Germany *2002-2003*

Professional Activities:

Journal Reviewer for: *Applied Energy; Applied Soft Computing; Bulletin of the American Meteorological Society (BAMS); Computers & Chemical Engineering; Energy; Energy Conversion & Management; Energy Policy; Energy Research & Social Science; Energy Strategy Reviews; European Journal of Operational Research; Frontiers in Energy Research: Energy Systems and Policy; Frontiers in Energy Research: Process and Energy Systems Engineering; IEEE PES Letters; IEEE Power & Energy Technology Systems Journal; IEEE Transactions on Control Systems Technology; IEEE Transactions on Power Systems; IEEE Transactions on Sustainable Energy; IET Generation, Transmission & Distribution; IET Renewable Power Generation, Industrial & Engineering Chemistry Research; International Journal of Forecasting; International Journal of Power and Energy Systems; International Journal of Sustainable Transportation; Journal of Zhejiang University – Computers & Electronics; Materials and Manufacturing Processes; Mathematical Problems in Engineering; Nature Energy; PLOS One; Renewable Energy; Renewable Energy Focus; Resources; Solar Energy; Utilities Policy; Wind Energy.*

Conference Paper Reviewer for: *The 12th International Conference on Probabilistic Methods Applied to Power Systems (PMAPS) 2012; IEEE GreenTech 2013; IEEE GreenTech 2014, The 13th International Conference on Probabilistic Methods Applied to Power Systems (PMAPS) 2014, 8th International Conference on Foundations of Computer-Aided Process Design (FOCAPD) 2014, 2015 Summer Simulation Multi-Conference, IEEE GreenTech 2016, 55th IEEE Conference on Decision and Control, The 14th International Conference on Probabilistic Methods Applied to Power Systems (PMAPS) 2016, ASME Turbo Expo 2019, 9th International Conference on Foundations of Computer-Aided Process Design (FOCAPD) 2019.*

Book Proposal Reviewer for: *Wiley – Electrical Engineering, Elsevier – Engineering.*

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