BRYAN PALMINTIER

Senior Research Engineer
National Renewable Energy Laboratory
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Education

Massachusetts Institute of Technology, *PhD, Engineering Systems* 2013

Dissertation: ***Incorporating Operational Flexibility into Electric Generation Planning:*** *Impacts and Methods for System Design and Policy Analysis*

Stanford University, *Engineer's Degree, Mechanical Engineering -Design Division* 2004

Thesis: *The Emerald Protocol Suite: Design and Implementation of a Modular, Distributed Architecture for Small Satellite Command, Telemetry, and Power Systems*

Stanford University, *M.S., Aeronautics & Astronautics Engineering* 1999

Georgia Institute of Technology, *B. S., Aerospace Engineering*, with Highest Honor 1996

Research and Engineering Experience

National Renewable Energy Lab (NREL)
Senior Research Engineer 2014-Present
EERE/Sunshot Postdoctoral Fellow 2013-2014

- Smart-DS. PI for ARPA-e GRID DATA program project ($2M) developing large-scale open synthetic distribution system data sets and advanced tools for scenario generation for renewable resource, generation and DER patterns, and more for both distribution and transmission data sets.
- Integrated Grid Modeling System (IGMS). PI for DoE funded and internal R&D grant ($1.2M total). Led team of 10 to develop first-of-a-kind super-computer based integrated transmission-distribution simulation model. Captures ISO-to-appliance scales to assess the value and operational impacts of distributed intelligent resources including smart inverters and demand response.
- Distribution Planning for Uncertain DER Futures using Approximate Dynamic Programming (ADP). Wrote successful internal R&D grant ($500k) to develop advanced, forward looking planning to for distribution systems with high penetrations of distributed energy resources. To start Oct., 2015
- On-the-path to Sunshot. Lead author and PI for "Emerging Issues and Challenges in Integrating Solar with the Distribution System." ($250k) Conducting research and developing extensive report to identify developments, barriers and solutions toward a future with significant increases in distributed solar.
- Duke-Alstom: Advanced Inverter Operational Strategies for High-Pen PV. Co-PI for DoE-Utility co-funded ($850k) project. Leading team of 10 to simulate operational impacts of advanced PV inverters in the Carolinas. Project compares real power only, local reactive power/voltage control, and DMS managed integrated volt-var control. Verification using Power-Hardware-in-the-Loop cosimulation with DMS provided power flow. Also developing novel 3-D visualization approaches for powerflow time series.
- Testbed for Distributed Energy Integration. Co-author for internal R&D grant ($400k). Developed a co-simulation environment that enables actual hardware under test (e.g. PV inverters) with Power-Hardware-in-the-Loop (PHIL) to interact with external feeder-scale simulations in existing modeling tools. Used to link experiments in Golden, CO to Richland, WA and (separately) Newcastle, Australia.
- INTEGRATE Smart Grid communication lead. Led ~15person effort to design, build, and support the communications and information pathways for multi-technology experiments in NREL's Energy Systems Integration Facility (ESIF), including the development of the information layer and assessment bus (iLab) to provide communication diagnostics, simulation coordination, and scientific data collection.
- Efficient, open methods for assessing high penetration solar photovoltaic as (re)active participants in electric distribution systems. Wrote successful fellowship grant ($180k). Developing methods to capture interactions among advanced inverters, existing controls, anticipated technologies (e.g. electric vehicles,

storage), and the bulk power system. Efforts include integrate existing simulation tools, power-hardware-in-the-loop testing, development of screening methodologies, and European collaboration.

MIT Engineering Systems Division, *Graduate Research Assistant* 2009-2012

- Decision making under coupled multi-timescale uncertainty: Co-wrote successful NSF grant ($330k). Research combined stochastic multi-decade electricity generation planning with sophisticated hourly power systems models to assess operational flexibility for renewables and other advanced technologies. I developed novel approaches to power systems models and approximate dynamic programming (ADP).
- Advanced electric power systems models: Developed new power systems operations and expansion approaches to estimate unit commitment constraints many times faster than conventional methods.
- Power system expansion models: Designed & built model used by collaborators to investigate investment trade-offs under carbon and water restrictions. Extended analytic model for renewable policy insights
- ADP Toolbox: Developed a set of modular tools for dynamic and approximate dynamic programming. Incorporated into others' research and an MIT graduate-level class assignment on ADP.

University of Washington, Electrical Engineering, *Visiting Lecturer* 2010-2012

Informal research collaboration: Power & Energy Systems Analysis, and Wind Integration Research labs.

MIT|Portugal Program, *Graduate Research Assistant* 2008-2009

Green Islands Project: Built models of energy balance and power-flow for high renewable scenarios with storage & demand response on São Miguel & Flores Islands. Analyzed correlation of wind vs. demand.

Rocky Mountain Institute, *Research and Consulting Fellow* 2007-2008

- Next Generation Utility (NGU): Conceptual architect and founding programmer for large renewable efficient power system model. Studied optimal mix of wind and solar for variability reduction.
- Smart Garage: Conducted systems design and economic analysis for vehicle-grid (V2G) integration.
- Energy Efficient Datacenters: Worked with design team to identify 50-90% energy savings for IT equipment at a large datacenter being built in the UK for a world-leading managed hosting provider.
- Other projects: Office energy monitoring system. Building energy modeling.

Energy Solutions, Oakland, CA, *Project Manager* 2006-2007

- Coordinated emerging technology (ET) demonstration of ventilation controls efficiency retrofit for PG&E.
- Codes and standards development for lighting, signage, & streetlights, for Pacific Gas & Electric (PG&E).
- Specification and support for California Solar Initiative (CSI) web interface.

Robotics System Lab (RSL), Santa Clara University, *Staff Research Associate* 2001-2007

- Emerald Protocol Suite: Developed plug-and-play architecture used by 5 universities for 7+ satellites.
- Emerald/ONYX/Obsidian Nanosatellite Project: Led/managed multi-disciplinary team of students & staff to meet electrical, mechanical & mission requirements. Mentored over 20 BS and MS students.
- Emerald/ONYX Modular Sub-systems: Developed 6+ plug-and-play embedded microcontroller based subsystems: hardware & software. Designed, assembled, & tested majority of satellite electronic systems.

Stanford University Civil & Env. Engineering, *Energy Research Associate* 2003-2005

- Reviewed and edited manuscript for *Renewable and Efficient Electric Power Systems* with Gil Masters.
- Researched material for future course: "Renewable and Efficient Energy in SE Asia." (in Singapore)
- Analyzed telephone datacenter energy usage for AT&T to establish baseline for VoIP transition.
- Participated in conceptual design of Stanford Green Dorm with a focus on advanced building monitoring.

Crary Lab, McMurdo Station, Antarctica, *Field Researcher (University of Illinois)* 2004-2005

- Antifreeze Adaptations of Antarctic Notothenoid Fish (B-005): Designed & built real-time temperature control system for 150,000-gallon research aquarium. Designed, deployed, and analyzed data from custom ice sensor and off-the-shelf precision instruments for oceanographic environment analysis.

Jasper Ridge Biological Preserve, Stanford University, *Graduate Research Assistant* 2003

Leslie Shao-ming Sun Field Station Energy Monitoring System: Designed, built, programmed, and installed energy monitoring system and WWW kiosk for field station building and its 20kW solar array.

Space Systems Development Lab (SSDL), Stanford, *Graduate Research Assistant* 1997- 2001
- Emerald/Orion Command and Data Handling Team Lead (1999-2001) Managed students and consultants in the design, construction, programming and testing for central control and data unit. Designed and built embedded motherboards for distributed satellite architecture, including associated software libraries.
- OPAL Satellite, 100% mission success on orbit (2000). Solar assembly, machining, post-launch operation.
- Sapphire Satellite, 100% mission success on orbit (2001). Electronics, mechanism design, systems test.

Naval Research Laboratory (NRL), Washington, DC, *Engineering Technician* 1994-1996
Naval Center for Space Technology: Developed computer simulations of hybrid rockets and satellites.

Leadership Experience *(See also Teaching Experience)*

Co-Founder/Past-President, Electricity Student Research Group (ESRG), MIT 2009-2012
Brought together power system researchers scattered across campus. The group has grown to two-dozen active grad students from 5 departments plus many faculty/staff and affiliates.

Staff Project Leader, Emerald Nanosatellite, RSL, Santa Clara University 2001-2005
Coordinated, mentored, and managed a multi-disciplinary team of 20+ BS/MS students and staff in the design and prototyping of a small (20kg) satellite. (See also Research Experience)

Founder, President, & Instructor, (new) Stanford Alpine Club 2002-2007
Spearheaded a group of 5-8 students to re-build the long defunct Stanford Alpine Club, including: extensive risk management, discussions of club goals/structure, etc. Grew membership to 100+, organized meetings, slideshows, 15+ instructional trips, and $50+k of equipment.

Science Co-director, Cosmos Education Science & Sustainability Conference 2002
Worked with the other directors to organize a 1-day science education conference for 400 secondary children and 30 teachers at United Nations Environment Program Headquarters in Nairobi, Kenya.

Assistant Field Coordinator, Cosmos Education 2002
Coordinated and managed two multi-week science education expeditions in Africa: UAS2002 - Under African Skies (Kenya, Tanzania) and Eclipse Watch 2002: (South Africa, Swaziland). Both involved teams of 20 young international scientists traveling from village to village as a traveling science show.

Team Lead, Emerald Command and Data Handling Subsystem, SSDL, Stanford, 1999- 2001
Managed team of 10 fellow students and outside consultants in the design, construction, programming and testing for command and data handling sub-system for the three-satellite Emerald-Orion mission.

Teaching Experience *(See also Guest Lectures under Publications and Presentations)*

Instructor, FEEDER DER Integration Summer School, NREL 2016
Taught module on modeling and simulation of distributed energy resources (DERs) including extensive hands-on simulation component as part of week-long short course.

Instructor, Energy Systems Integration 102–Research Challenges Short Course, NREL 2015
Taught module on integrated transmission and distribution market simulations as part of the international institute for Energy Systems Integration (iiESI) week-long short course.

Instructor, National Grid Workshop on Distributed Generation 2015
Taught third of the material for two full day classes on Distributed Energy/Solar Grid Integration in Syracuse, NY and Boston, MA. 150 students total

Instructor and Co-Coordinator, Renewable Integration Short Course, NREL 2013
Coordinated and taught half of the material for a full day class on Distributed Energy/Solar Grid Integration as part of a week-long short course on Renewable Integration with 60 students.

Mountaineering Course Leader, National Outdoor Leadership School (NOLS) 2002-2013
Lead or co-lead 8 two- to four-week-long wilderness expeditions in Alaska, Washington, British Columbia, & Wyoming. With team of 1-3 instructors lead 10-15 students through uniquely intense situations in remote environments involving physically demanding travel, technical terrain, weather, etc. In addition to wilderness travel and technical climbing skills, we focus on leadership and group dynamics.

Teaching Assistant, *Massachusetts Institute of Technology*
Engineering, Economics, & Regulation of Electric Power Systems (ESD.934/6.974) 2009 & 2010
Recitations, teaching support, & grading for large (75 participants) inter-disciplinary courses.

Adjunct Professor, *Santa Clara University*
Graduate Mechatronics Sequence (Mech 207-9) 2002 & 2006
Introduction to Mechatronics (Mech 143/Elen 123) 2002
Co-taught 4 quarter-long courses each with lecture, lab, and extensive project components.

Instructor and Coordinator, Outdoor Education Program, Stanford University 1997-2007
As an instructor co-taught 20 quarter-long classroom & field courses (for credit) and organized and taught 15 skill specific workshops (half as first offerings). As coordinator, oversaw 20-25 instructors, hiring/admission, university interactions, $100+k of equipment, 200+ classes, and 40+ trips.

Teaching Assistant, *Stanford University*
Spacecraft Design (AA 236a) 1998
Expanded and taught the electronics component (ten lectures). Organized lab & design projects.

Trip Leader and sub-group chair, *Outdoor Recreation at Georgia Tech (ORGT)* 1993-1996
As a trip leader, organized & taught dozens of multi-weekend seminars on backpacking, climbing & caving. As chair, coordinated 10-20 instructors, managed equipment and contributed to long-term visioning.

Honors & Awards

IEEE Senior Member 2015
Employee Team of the Month, National Renewable Energy Lab 2015
EERE/SunShot Postdoctoral Research Fellowship, Department of Energy 2012-2013
Martin Family Sustainability Fellowship, MIT Energy Initiative 2010
Department Fellowship, Stanford Aero/Astro Engineering 1997
President's Scholar (full scholarship), Georgia Tech 1992-1996
1st place team senior design competition, Georgia Tech Aerospace Engineering 1996
Tau Beta Pi 1993
Sigma Gamma Tau 1993
Eagle Scout 1991

Technical Skills

Programming Languages: Python, MATLAB, GAMS/CPLEX, R, C, C++, and 10+ others
Modeling Tools: GridLAB-D, OpenDSS, Opal-RT, Simulink, RNM, etc.
Development Tools: GIT, SVN, Eclipse, etc.
Operating Systems: OSX, Linux, Windows
Productivity Tools: Microsoft Office, LyX, Zotero, OmniGraffle, LaTeX, Visio, etc.
Hardware: Electric (100-600+V AC/DC) and Electronic (3-24V DC) design, assembly & test

Short Courses Attended

NREL Training, Golden, CO
Qualified Electric Worker (2013, 2016), Lock-out/Tag-out (2013, 2015)

Pacific Energy Center, San Francisco, CA
HVAC: Fundamentals of the field (2007), Manual and Automated Demand Response and Critical Peak Pricing Strategies (2006), Retro-commissioning (2006), Building Modeling with eQuest (2004)

Professional Activities

Reviewer for:

National Science Foundation, Electrical, Communications and Cyber Systems (ECCS)
Nature Energy
IEEE Transactions on Power Systems
IEEE Transactions on Sustainable Energy
IEEE Transactions on Smart Grid
IEEE Transactions on Power Delivery
IEEE Power and Energy Technology Systems Journal
Sustainable Energy, Grids and Networks
Journal of the Operations Research Society
Energy Systems (Journal)

Interdisciplinary Research Groups:

Electricity Student Research Group, MIT 2009-2012
Co-founder, 2009. Co-president, 2009-2010. Journal club organizer, 2010-2011
Stochastic Optimization Reading Group, MIT 2010-2011
Wind Energy Interest Group, MIT 2008-2010

Conference Support:

IEEE PES General Meeting, *HPC Panel Session Chair***,** Denver, CO 2015
NREL Advanced Grid Tech. Workshop on Advanced DMS, *Panel lead***,** Golden, CO 2015
MIT Energy Conference, *Audio/Visual Coordinator,* Cambridge, MA 2010
MIT Wind Week, *Webmaster,* Cambridge, MA 2009
MIT Energy Conference, *Responsive Demand Panel Team,* Cambridge, MA 2009
Cosmos Education Science & Sustainability Conference: Science co-director 2002
United Nations Environment Program Headquarters, Nairobi, Kenya

Professional Memberships:

IEEE 1999, 2007-Present
Senior Member 2015-Present
Power & Energy Society 2007-Present
High Performance Computing for Grid Analysis and Operation Working Group
Task Force on Real-Time Simulation of Power & Energy Systems
Industrial Electronics Society 2015-Present
Aerospace and Electronic Systems Society 1999
INFORMS 2011-2013

Volunteer Experiences *(See also Teaching Experience)*

Grid Alternatives, San Francisco, CA, *PV installation and home energy audits* 2006-2007

Cosmos Education, *Assistant Coordinator and Science Teacher* 2002
UAS2002 - Under African Skies Expedition: Kenya, Tanzania
Eclipse Watch Expedition 2002: South Africa, Swaziland

Jasper Ridge Biological Preserve, Stanford University, *Ranger* 2000-2004

Publications and Presentations

Refereed Journal and Magazine Articles

(Submitted) Horowitz, K. A. W., **Palmintier, B.**, Mather, B., & Denholm, P. (In Review). Distribution System Costs Associated with the Deployment of Photovoltaic Systems. *Renewable & Sustainable Energy Reviews.*

(Submitted) Lundstrom, **B., Palmintier**, B., & Rowe, D. (In Review). A Framework for Collaborative Power System and Device Testing using Remote Hardware, Power Hardware-in-the-Loop, and Co-simulation (Working Title). *IET Generation, Transmission, & Distribution Journal*, Special issue on Interfacing Techniques for Simulation Tools in Smart Grid.

Palmintier, B., Hale, E., Hansen, T., Jones, W., Biagioni, D., Sorensen, H., & Hodge, B.-M. (2016). IGMS: An Integrated ISO-to-Appliance Scale Grid Modeling System. *IEEE Transactions on Smart Grid*, (Special Issue on High Performance Computing (HPC) Applications for a More Resilient and Efficient Power Grid). https://doi.org/10.1109/TSG.2016.2604239

Palmintier, B., & Webster, M. D. (2016). Impact of Operational Flexibility on Electricity Generation Planning With Renewable and Carbon Targets. *IEEE Transactions on Sustainable Energy*, *7*(2), 672–684. http://doi.org/10.1109/TSTE.2015.2498640

Hansen, T. M., Kadavil, R., **Palmintier, B.**, Suryanarayanan, S., Maciejewski, A. A., Siegel, H. J., … Hale, E. (2016). Enabling Smart Grid Cosimulation Studies: Rapid Design and Development of the Technologies and Controls. *IEEE Electrification Magazine*, 4(1), 25–32. http://doi.org/10.1109/MELE.2015.2509899

Palmintier, B., Lundstrom, B., Chakraborty, S., Williams, T., Schneider, K., & Chassin, D. (2015). A Power Hardware-in-the-Loop Platform With Remote Distribution Circuit Cosimulation. *IEEE Transactions on Industrial Electronics*, 62(4), 2236–2245.

Palmintier, B., & Webster, M. (2014). Heterogeneous Unit Clustering for Efficient Operational Flexibility Modeling. *IEEE Transactions on Power Systems*, *29*(3), 1089–1098. doi:10.1109/TPWRS.2013.2293127

Webster, M., Donohoo, P., & **Palmintier, B.** (2013). Water-CO2 trade-offs in electricity generation planning. *Nature Climate Change*, 3(12), 1029–1032.

Technical Reports

Palmintier, B., Giraldez, J., Gruchalla, K., Gotseff, P., Nagarajan, A., Harris, T., … Baggu, M. (2016). *Feeder Voltage Regulation With High Penetration PV Using Advanced Inverters and a Distribution Management System: A Duke Energy Case Study* (NREL Technical Report No. NREL/TP-5D00-65551). Golden, CO: National Renewable Energy Laboratory.

Palmintier, B., Broderick, R., Mather, B., Coddington, M., Baker, K., Ding, F., … Bharatkumar, A. (2016). *On the Path to SunShot: Emerging Issues and Challenges in Integrating Solar with the Distribution System* (NREL Technical Report No. NREL/TP-5D00-65331). Golden, CO: National Renewable Energy Laboratory. Retrieved from http://www.nrel.gov/docs/fy16osti/65331.pdf

Palmintier, B., Hale, E., Hansen, T., Jones, W., Biagioni, D., Baker, K., … Hodge, B.-M. (2016). *Integrated Distribution-Transmission Analysis for Very High Penetration Solar PV (Final Technical Report)* (NREL Technical Report No. NREL/TP-5D00-65550). Golden, CO: National Renewable Energy Laboratory. Retrieved from http://www.nrel.gov/docs/fy16osti/65550.pdf

Palmintier, B., & Pratt, A. (2015). *Evaluation of the Netherlands' International Test Facility for Smart Grids* (NREL Technical Report No. NREL/TP-5D00-63638). Golden, CO: National Renewable Energy Laboratory

Denholm, P., Margolis, R., **Palmintier, B.**, Barrows, C., Ibanez, E., Bird, L., & Zuboy, J. (2014). *Methods for Analyzing the Benefits and Costs of Distributed Photovoltaic Generation to the U.S. Electric Utility System* (NREL Technical Report No. NREL/TP-6A20-62447). Golden, CO: National Renewable Energy Laboratory (NREL).

Cochran, J., Miller, M., Zinaman, O., Milligan, M., Arent, D., **Palmintier, B.**, et al. (2014). *Flexibility in 21st Century Power Systems* (NREL Technical Report No. NREL/TP-6A20-61721). Golden, CO: National Renewable Energy Laboratory

Swartwout, M., Twiggs, R., Kenny, T., Kitts, C., Batra, R., **Palmintier, B.**, et al. (1998). *The Sapphire Project: Mission Overview, Design Description, Launch and Orbit Information*.

Refereed Conference Papers

(Submitted) **Palmintier, B.**, & Krishnamurthy, D. (In Review). A Small Scale Integrated Test System and Test Case for Transmission and Distribution Co-Simulation. In Proceedings of 2017 IEEE Power and Energy Society General Meeting. Chicago, IL.

(Submitted) Gruchalla, K., Brunhart-Lupo, N., Giraldez, J., **Palmintier, B.**, & Baggu, M. (In Review). Immersive Virtual Reality Application for the Study of Electrical Distribution Simulations. In IEEE Virtual Reality 2017. Los Angeles, CA.

Nagarajan, A., **Palmintier, B.**, DIng, F., Mather, B., & Baggu, M. (2016). Improving Advanced Inverter Control Convergence in Distribution Power Flow. In *Proceedings of the North American Power Symposium*. Denver, CO. https://doi.org/10.1109/NAPS.2016.7747887

Palmintier, B., Krishnamurthy, D., & Wu, H. (2016). Design Flexibility for Uncertain Distributed Generation from Photovoltaics. In *Innovative Smart Grid Technologies Conference 2016*. Minneapolis, MN

Palmintier, B., Hale, E., Hodge, B.-M., Baker, K., & Hansen, T. (2016). Experiences integrating transmission and distribution simulations for DERs with the Integrated Grid Modeling System (IGMS). *In Proceedings of the 19th Power Systems Computation Conference (PSCC'16).* Genoa, Italy, June 2016.

Nagarajan, A., **Palmintier, B.**, & Baggu, M. (2016). Advanced Inverter Functions and Communication Protocols for Distribution Management. In *Proceedings of the 2016 IEEE PES T&D Conference and Exposition*, Dallas, TX. May 2016.

(Best Paper Selection) Hanson, T., **Palmintier, B.**, Suryanarayanan, S., Maciejewski, A., & Siegel, H. J. (2015). Bus.py: A GridLAB-D Communication Interface for Smart Distribution Grid Simulations. In *Proceedings of IEEE PES General Meeting 2015*, Denver, CO.

Palmintier, B. (2014). Flexibility in Generation Planning: Identifying Key Operating Constraints. In Proceedings of the *18th Power Systems Computation Conference* (PSCC'14), Wroclaw, Poland.

Palmintier, B., & Webster, M. (2011) Impact of Unit Commitment Constraints on Generation Expansion Planning with Renewables. In *Proceedings of the 2011 IEEE Power and Energy Society General Meeting*.

Lee, R., Watson, R., Kitts, C., Stang, P., & **Palmintier, B.** (2004). On-Board Expert System for the Emerald Nanosatellites. In *Proceedings of the 2004 IEEE Aerospace Conference*. Big Sky, MT.

Lee, R. K., Watson, R., Kitts, C., Stang, P., & **Palmintier, B.** (2004). Anomaly detection using the Emerald nanosatellite on board expert system. In *Proceedings of the 2004 IEEE Aerospace Conference*. Big Sky, MT.

Palmintier, B., Twiggs, R., & Kitts, C. (2000). Distributed computing on Emerald: a modular approach for robust distributed space systems. In *Proceedings of the IEEE 2000 Aerospace Conference*. Big Sky, MT.

Kitts, C., Twiggs, R., Pranajaya, F., **Palmintier, B.**, & How, J. (1999). Emerald: A low-cost spacecraft mission for validating formation flying technologies. In *Proceedings of the 1999 IEEE Aerospace Conference*. Snowmass, CO.

Other Conference Papers (abstract review)

Cale, J., **Palmintier, B**., Narang, D., & Carroll, K. (2014). Clustering Distribution Feeders in the Arizona Public Service Territory. Presented at the 40th IEEE Photovoltaic Specialists Conference [PVSC], Denver, CO.

Williams, T., Fuller, J., Schneider, K. P., **Palmintier, B.**, Lundstrom, B., & Chakraborty, S. (2014). Examining System-Wide Impacts of Solar PV Control Systems with a Power Hardware-in-the-Loop Platform. Presented at the 40th IEEE Photovoltaic Specialists Conference [PVSC], Denver, CO.

Traube, J., Hansen, L., **Palmintier, B.**, & Levine, J. (2008). Spatial and Temporal Interactions of Wind and Solar Resources in the Next Generation Utility - An Update. In *Proceedings of WindPower 2008*. Houston,TX.

Palmintier, B., Hansen, L., & Levine, J. (2008). Spatial and Temporal Interactions of Wind and Solar Resources in the Next Generation Utility. In *Proceedings of the American Solar Energy Society (ASES) Solar2008 Conference*. San Diego, CA.

Kitts, C., Quinn, N., Ota, J., Stang, P., & **Palmintier, B.** (2003). Development and Teleoperation of Robotic Vehicles. In *AIAA Unmanned Unlimited Systems, Technologies and Operations Conference*. San Diego, CA.

Palmintier, B., Kitts, C., Stang, P., & Swartwout, M. (2002). A Distributed Computing Architecture for Small Satellite and Multi-Spacecraft Missions. In *Proceeding of the 16th Annual AIAA/USU Conference on Small Satellites*. Logan, UT.

Townsend, J., **Palmintier, B.**, & Allison, E. (2000). Effects of a Distributed Computing Architecture on the Emerald Nanosatellite Development Process. In *Proceedings of the 14th AIAA/USU Conference on Small Satellites*. Logan, UT.

Kitts, C., Twiggs, R., Pranajaya, F., Townsend, J., & **Palmintier, B.** (1999). Experiments in Distributed Microsatellite Space Systems. In *Proceedings of the AIAA Space Technology Conference and Exhibition*. Albuquerque, NM.

Pranajaya, F. M., Garcia-Sacristan, C., Cutler, J., **Palmintier, B.**, Kitts, C., & Swartwout, M. (1999). Micro-and Nanotechnology Applications at Stanford University. In *Proceedings of the 2nd International Conference on Integrated Micro-Nanotechnology for Space Applications*. Pasadena, CA.

Conference presentation-only (invited or abstract review)

Palmintier, B., & Hodge, B.-M. (2016, September). Smart-DS: Synthetic Models for Advanced, Realistic Testing: Distribution systems and Scenarios. Presented at the Innovative Smart Grid Technologies Conference (ISGT), Minneapolis, MN.

Kroposki, B., & **Palmintier, B.** (2016, September). *Cyber-Physical Systems for Energy Research at NREL*. Presented at the Innovative Smart Grid Technologies Conference (ISGT), Minneapolis, MN.

Palmintier, B. (2016, July). Integrated Models for Transmission & Distribution plus Bonus 1: Unit Commitment + Planning; Bonus 2: Distribution Steady-State + PHIL. Presented at the IEEE Power and Energy Society General Meeting, Boston, MA.

Palmintier, B. (2016, July). Distribution system planning for uncertain DER futures and Adaptive Dynamic Programming (ADP). Presented at the IEEE Power and Energy Society General Meeting, Boston, MA.

Palmintier, B., & Chakraborty, S. (2016, July). Power-Hardware-in-the-Loop (PHIL) for advanced PV inverter testing. Presented at the IEEE Power and Energy Society General Meeting, Boston, MA.

Palmintier, B. (2016, July). Cyber-Physical Systems for Energy Research at NREL. Presented at the NSF Cyber-Physical Workshop, Boston, MA.

Palmintier, B., Ponder, L., & Gantz, J. (2016, February). *Mitigating Challenges with Distributed Solar PV via Smart Inverters & Integrated Volt-var Control.* Presented at the DistribuTECH, Orlando, FL.

(Invited) **Palmintier, B.** (2015, October). *Transmission and Distribution Co-simulation using HPC.* Presented at the EPRI Grid Ops and Planning Advisory Meeting, Baltimore, MD.

Palmintier, B. (2015, July). *The Integrated Grid Modeling System (IGMS) for Combined Transmission and Distribution Simulation.* Presented at the Power and Energy Society General Meeting, Denver, CO.

Palmintier, B., Ponder, L., & Gantz, J. (2015, June). *Mitigating Adverse Impacts of Distributed Solar PV with Smart Inverters & Integrated Volt-var Control.* Presented at the Alstom North American Users Group, Bellevue, WA.

(Invited) **Palmintier, B.** (2015, May). *Ten Starting Thoughts for: Renewables, the Grid, and Storage.* Presented at the MITEI Member Symposium on Energy Storage, Cambridge, MA.

Palmintier, B., & Webster, M. (2011, November). *Electricity Planning with Environmental Policy Uncertainty using ADP: Carbon Policies and Renewables*. INFORMS 2011 Annual Meeting, Charlotte, NC.

Palmintier, B. (2010, June). *Incorporating High Dimensional Uncertainty and Operational Constraints Into Long- Term Generation Expansion Models Using Approximate Dynamic Programming*. FERC Conference on Increasing Market and Planning Efficiency Through Improved Software and Hardware - Enhanced wide-area planning models, Washington, D.C.

Palmintier, B., & Newman, S. (2008, August). *Systems Thinking for Radically Efficient and Profitable Datacenter Design*. Next Generation Datacenter Conference, San Francisco, CA.

Wang, K., & **Palmintier, B.** (2008, April). *Grid Services from Responsive Loads and Electric Drive Vehicles in the Next Generation Utility*. IEEE Power Engineering Society Transmission and Distribution Conference, Chicago, IL.

Palmintier, B. (2002, June). *Using Electronics to Sense the World Around Us: From Satellites to the Soil*. Presented at the Under African Skies 2002, Science & Sustainability Conference: Applying Appropriate Solutions for a Global Society, UNEP, Nairobi, Kenya.

Palmintier, B., & Bellini, P. (1995, April). *Design and Testing of the Georgia Tech Hybrid Rocket Motor (GTHYRM)*. Regional AIAA Student Competition, Atlanta, GA.

Software Developed

Palmintier, Bryan, Dheepak Krishnamurthy, and Wu, Hongyu. 2016. *Dynamo: Dynamic Programming for Adaptive Modeling and Optimization*.

Giraldez, Julieta, **Bryan Palmintier**, and Murali Baggu. 2016. *Feeder Conversion Tools*.

Palmintier, Bryan. 2011-2016. *MEPO: Modular Electricity Planning and Operations*.

Palmintier, Bryan., Hale, E., Hansen, T., Jones, W., Biagioni, D., Sorensen, H., & Hodge, B.-M. *Integrated Grid Modeling System (IGMS)***.** 2013-, unpublished

Timothy Hansen, **Bryan Palmintier,** Elaine Hale. *Bus.py*. 2014-present. https://github.com/NREL/bupy.

Elaine Hale, Timothy Hansen, **Bryan Palmintier**. *glmgen*. Python scripting for GridLAB-D input files. 2014-present. https://github.com/NREL/glmgen.

Bryan Palmintier and Blake Lundstrom. *JSON-link for Python*: Power hardware in the loop co-simulation environment and test code**.** 2013-, NREL internal

Bryan Palmintier and Blake Lundstrom. *JSON-link for Opal*: Power hardware in the loop co-simulation environment for Opal-RT systems 2013-, NREL internal

Bryan Palmintier. *CapPlanDP:* approximate dynamic programming framework for long term generator expansion planning. 2009-2013, unpublished.

Bryan Palmintier. *ADP toolbox:* Matlab toolbox for dynamic programming. 2009-2013, unpublished

Bryan Palmintier. *CTD Database and Tools:* Tools for managing oceanographic data for Antarctic fish research. 2005, UIUC internal

Bryan Palmintier. *The Emerald Suite:* Tools and protocols for modular satellites. 1998-2004, RSL Internal

Bryan Palmintier. *Hybrid Regression in TK:* Flexible hybrid rocket performance analysis. 1994-1997, NRL internal

Guest Lectures and Selected Other Presentations

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Palmintier, B. (2001). *Emerald Nanosatellite Data Architecture*. Stanford University, Aerospace Data Systems Course (AA254) Guest Lecture, Stanford, CA.

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