

Thomas J. Vitolo, Ph.D., Senior Associate

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PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc., Cambridge, MA. *Senior Associate*, 2015 – present, *Associate*, 2011 – 2015.

Conducts research, authors reports, and prepares expert testimony. Consults on issues related to renewable resources, distributed energy resources, PURPA and avoided costs, municipal utility planning, renewable energy and carbon markets, integrated resource planning, coal asset valuation, compliance, and cost-benefit analysis.

Jointown Group Co., Ltd., Wuhan, China. *Systems Engineer Intern*, Summer 2007.

Developed and implemented a modified (s,S) inventory management scheme for over 20,000 warehoused pharmaceutical products, resulting in more orders filled, lower carrying costs, and a reduction in the frequency of product expiration.

MIT Lincoln Laboratory, Division 6, Group 65, Lexington, MA. *Research Assistant*, 2003 – 2006.

Designed algorithm and implemented software to create autonomous wireless point-to-point topologies for aerial, land-based, and nautical vehicles as part of an Optical & RF Combined Link Experiment (ORCLE) funded by Defense Advanced Research Projects Agency (DARPA).

EDUCATION

Boston University, Boston, MA

Doctor of Philosophy in Systems Engineering, 2011. Developed algorithms to discover degree constrained minimum spanning trees in sparsely connected graphs.

Dublin City University, Dublin, Ireland

Master of Science in Financial and Industrial Mathematics, 2001. Researched partial differential equations modeling fluid flow over an erodible bed.

North Carolina State University, Raleigh, North Carolina

Bachelor of Science in Applied Mathematics, 2000. *Summa Cum Laude*.

Bachelor of Science in Computer Science, 1999. *Summa Cum Laude*.

Bachelor of Science in Economics, 1998. *Summa Cum Laude*.

TESTIMONY

Vermont House Committee on Energy and Technology: Oral testimony regarding Vermont's NEM 2.0, NEM 3.0, and NEM 4.0 programs, including magnitude of cost shift, implications for Vermont's climate goals and Comprehensive Energy Plan, and alternatives for increased in-state renewable energy generation. On behalf of Renewable Energy Vermont. April 12, 2019.

Vermont Senate Committee on Natural Resources and Energy: Oral testimony regarding Vermont's NEM 2.0, NEM 3.0, and NEM 4.0 programs, including magnitude of cost shift, implications for Vermont's climate goals and Comprehensive Energy Plan, and alternatives for increased in-state renewable energy generation. On behalf of Renewable Energy Vermont. April 12, 2019.

North Carolina Utilities Commission (Docket No. E-7, Sub 1134): Application of Duke Energy Carolinas, LLC for Approval to Construct a 402 MW Natural Gas-Fired Combustion Turbine Electric Generating Facility in Lincoln County. Direct testimony on behalf of Natural Resources Defense Council and Sierra Club. August 15, 2017.

Public Utility Commission of Oregon (Docket No. UE-323): 2018 Transition Adjustment Mechanism. Direct testimony on behalf of Sierra Club. June 9, 2017.

North Carolina Utilities Commission (Docket No. E-100, Sub 148): Biennial Determination of Avoided Cost Rates for Electric Utility Purchases from Qualifying Facilities--2016. Direct testimony on behalf of Southern Alliance for Clean Energy. March 28, 2017.

Public Service Commission of South Carolina (Docket No. 2017-2-E): Annual Review of Base Rates for Fuel Costs for South Carolina Electric & Gas Company. Direct and surrebuttal testimony on behalf of South Carolina Coastal Conservation League and Southern Alliance for Clean Energy. March 22 and April 3, 2017.

Maryland House of Delegates Economic Matters Committee (SB 771): Oral testimony regarding the rate impacts of Senate Bill 771 and Senate Bill 1131 on low use and low-income customers and energy efficiency programs in the SMECO and Choptank cooperative service territories. On behalf of the Maryland Public Service Commission. February 21, 2017.

Maryland Senate Finance Committee (SB 771): Oral testimony regarding the rate impacts of Senate Bill 771 and Senate Bill 1131 on low use and low-income customers and energy efficiency programs in the SMECO and Choptank cooperative service territories. On behalf of the Maryland Public Service Commission. February 21, 2017.

The Commonwealth of Massachusetts Department of Public Utilities (Docket No. 16-99): Public comments regarding the Town of Brookline's request for approval of a municipal aggregation plan pursuant to G.L. c. 164, § 134. On behalf of the Brookline Climate Action Committee Community Choice Aggregation Subcommittee. September 14, 2016.

Public Service Commission of South Carolina (Docket No. 2016-3-E): Annual Review of Base Rates for Fuel Costs of Duke Energy Carolinas, LLC. Direct and surrebuttal testimony on behalf of South Carolina Coastal Conservation League and Southern Alliance for Clean Energy. August 19 and September 1, 2016.

Public Service Commission of South Carolina (Docket No. 2016-2-E): Annual Review of Base Rates for Fuel Costs for South Carolina Electric & Gas Company. Direct and surrebuttal testimony on behalf of South Carolina Coastal Conservation League and Southern Alliance for Clean Energy. March 24 and April 6, 2016.

Public Service Commission of South Carolina (Docket No. 2016-1-E): Annual Review of Base Rates for Fuel Costs of Duke Energy Progress, LLC. Direct testimony on behalf of South Carolina Coastal Conservation League and Southern Alliance for Clean Energy. May 19, 2016.

Vermont Public Service Board (Docket No. 8586): Direct testimony on the need and economic benefit of the proposed Coolidge Solar 20 MW solar electric generation facility. On behalf of Ranger Solar, LLC. December 14, 2015 and September 14, 2016.

California Public Utilities Commission (Docket No. R.13-12-010): Reply testimony on Phase 1a modeling scenarios in the Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans. On behalf of the California Office of Ratepayer Advocate. December 18, 2014.

Public Service Commission of South Carolina (Docket No. 2014-246-E): Direct testimony regarding a methodology for calculating the costs and benefits of solar net energy metering. On behalf of the Carolina Coastal Conservation League and the Southern Alliance for Clean Energy. December 11, 2014.

Missouri Public Service Commission (Case No. EO-2011-0271): Rebuttal testimony regarding Union Electric Company D/B/A Ameren Missouri. On behalf of the Missouri Office of Public Counsel. October 28, 2011.

PUBLICATIONS

Hopkins, A., T. Vitolo, S. Fields. 2018. *Powering Ohio: A Vision for Growth and Innovative Energy Investment*. Synapse Energy Economics for Environmental Defense Fund

Vitolo, T., M. Whited. 2018. *Net Metering in Vermont: An Assessment of NEM 2.0 and Recommended Adjustments*. Synapse Energy Economics for Renewable Energy Vermont.

Vitolo, T., et al. 2017. *An Analysis of Municipalization and Related Utility Practices*. Synapse Energy Economics for the District of Columbia Department of Energy and Environment.

Vitolo, T., A. Hopkins. 2017. *The Mounting Losses at CWLP's Dallman Station: A Study of the Relative Costs of Operating Each of the Four Dallman Units*. Synapse Energy Economics for the Sierra Club.

Allison, A., T. Vitolo, J. Fisher. 2017. *The Shaky Economics of the J.K. Spruce Power Plant: Weighing the Costs of a Coal Plant Against Renewable Energy Options*. Synapse Energy Economics for the Sierra Club.

Whited, M., T. Vitolo. 2017. Reply comments in District of Columbia Public Service Commission Formal Case No. 1130: *Reply Comments of the Office of the People's Counsel for the District of Columbia Regarding Pepco's Comments on the Office of the People's Counsel's Value of Solar Study*. Synapse Energy Economics. July 24, 2017.

Whited, M., A. Horowitz, T. Vitolo, W. Ong, T. Woolf. 2017. *Distributed Solar in the District of Columbia: Policy Options, Potential, Value of Solar, and Cost-Shifting*. Synapse Energy Economics for the Office of the People's Counsel for the District of Columbia.

Whited, M., E. Malone, T. Vitolo. 2016. *Rate Impacts on Customers of Maryland's Electric Cooperatives: Impacts on SMECO and Choptank Customers*. Synapse Energy Economics for Maryland Public Service Commission.

Stanton, E. A., P. Knight, P. Luckow, A. Allison, T. Vitolo. 2016. *Envisioning Pennsylvania's Energy Future: Powering the Commonwealth's Energy Needs with 100 Percent Renewables by 2050*. Synapse Energy Economics for Delaware Riverkeeper Network.

Woolf, T., M. Whited, P. Knight, T. Vitolo, K. Takahashi. 2016. *Show Me the Numbers: A Framework for Balanced Distributed Solar Policies*. Synapse Energy Economics for Consumers Union.

Wilson, R., S. Fields, P. Knight, E. McGee, W. Ong, N. Santen, T. Vitolo, E. A. Stanton. 2016. *Are the Atlantic Coast Pipeline and the Mountain Valley Pipeline Necessary? An examination of the need for additional pipeline capacity in Virginia and Carolinas*. Synapse Energy Economics for Southern Environmental Law Center and Appalachian Mountain Advocates.

Vitolo, T. 2016. "Senate bill on climate change is the stronger of the two." *Cambridge Chronicle*, July 30.

Jackson, S., P. Luckow, E.A. Stanton, A. Horowitz, P. Peterson, T. Comings, J. Daniel, and T. Vitolo. 2016. *Reimagining Brayton Point: A Guide to Assessing Reuse Options for the Somerset Community*. Synapse Energy Economics for Coalition for Clean Air South Coast, Clean Water Action, and Toxics Action Center.

Vitolo, T., A. Horowitz, P. Luckow, and N.R. Santen. 2015. *Meeting Maryland's RPS*. Synapse Energy Economics for the Maryland Climate Coalition.

Vitolo, T., M. Chang, T. Comings, A. Allison. 2015. *Economic Benefits of the Proposed Coolidge Solar I Solar Project*. Synapse Energy Economics for Coolidge Solar I, LLC.

Vitolo, T. 2015. *Memorandum Reviewing Distributed Generation Policy Proposed by Belmont Citizens*. Synapse Energy Economics for Belmont Clean Energy.

Luckow, P., T. Vitolo, J. Daniel. 2015. *A Solved Problem: Existing Measures Provide Low-Cost Wind and Solar Integration*. Synapse Energy Economics.

Fields, S., P. Luckow, T. Vitolo. 2015. *Clean Energy Future Technical Review*. Synapse Energy Economics.

Vitolo, T., P. Luckow, S. Fields, P. Knight, B. Biewald, E. A. Stanton. 2015. *Lower Electric Costs in a Low-Emission Future*. Synapse Energy Economics.

Takahashi, K., J. Fisher, T. Vitolo, N. R. Santen. 2015. *Review of TVA's Draft 2015 Integrated Resource Plan*. Synapse Energy Economics for Sierra Club.

Vitolo, T., J. Fisher, J. Daniel. 2015. *Dallman Units 31/32: Retrofit or Retire?* Synapse Energy Economics for the Sierra Club.

Woolf, T., M. Whited, E. Malone, T. Vitolo, R. Hornby. 2014. *Benefit-Cost Analysis for Distributed Energy Resources: A Framework for Accounting for All Relevant Costs and Benefits*. Synapse Energy Economics for the Advanced Energy Economy Institute.

Stanton, E. A., J. Daniel, T. Vitolo, P. Knight, D. White, G. Keith. 2014. *Net Metering in Mississippi: Costs, Benefits, and Policy Considerations*. Synapse Energy Economics for the Public Service Commission of Mississippi.

Fagan, R., T. Vitolo, P. Luckow. 2014. *Indian Point Energy Center: Effects of the Implementation of Closed-Cycle Cooling on New York Emissions and Reliability*. Synapse Energy Economics for Riverkeeper.

Vitolo, T., J. Fisher, K. Takahashi. 2014. *TVA's Use of Dispatchability Metrics in Its Scorecard*. Synapse Energy Economics for Sierra Club.

Comings, T., J. Daniel, P. Knight, T. Vitolo. 2014. *Air Emission and Economic Impacts of Retiring the Shawnee Fossil Plant*. Synapse Energy Economics for the Kentucky Environmental Foundation.

Vitolo, T., J. Daniel. 2013. *Improving the Analysis of the Martin Drake Power Plant: How HDR's Study of Alternatives Related to Martin Drake's Future Can Be Improved*. Synapse Energy Economics for Sierra Club.

Vitolo, T., P. Luckow, J. Daniel. 2013. *Comments Regarding the Missouri 2013 IRP Updates of KCP&L and GMO*. Synapse Energy Economics for Earthjustice.

Hornby, R., P. Chernick, D. White, J. Rosenkranz, R. Denhardt, E. A. Stanton, J. Gifford, B. Grace, M. Chang, P. Luckow, T. Vitolo, P. Knight, B. Griffiths, B. Biewald. 2013. *Avoided Energy Supply Costs in New England: 2013 Report*. Synapse Energy Economics for the Avoided-Energy-Supply-Component (AESC) Study Group.

Stanton, E. A., T. Comings, K. Takahashi, P. Knight, T. Vitolo, E. Hausman. 2013. *Economic Impacts of the NRDC Carbon Standard*. Synapse Energy Economics for the Natural Resources Defense Council (NRDC).

Vitolo, T., G. Keith, B. Biewald, T. Comings, E. Hausman, P. Knight. 2013. *Meeting Load with a Resource Mix Beyond Business as Usual: A regional examination of the hourly system operations and reliability implications for the United States electric power system with coal phased out and high penetrations of efficiency and renewable generating resources*. Synapse Energy Economics for Civil Society Institute.

Stanton, E. A., F. Ackerman, T. Comings, P. Knight, T. Vitolo, E. Hausman. 2013. *Will LNG Exports Benefit the United States Economy?* Synapse Energy Economics for Sierra Club.

Ackerman, F., T. Vitolo, E. A. Stanton, G. Keith. 2013. *Not-so-smart ALEC: Inside the attacks on renewable energy*. Synapse Energy Economics for Civil Society Institute.

Fisher, J., T. Vitolo. 2012. *Assessing the Use of the 2011 TVA Integrated Resource Plan in the Retrofit Decision for Gallatin Fossil Plant*. Synapse Energy Economics for Sierra Club.

Woolf, T., M. Whited, T. Vitolo, K. Takahashi, D. White. 2012. *Indian Point Replacement Analysis: A Clean Energy Roadmap: A Proposal for Replacing the Nuclear Plant with Clean, Sustainable Energy Resources*. Synapse Energy Economics for Natural Resources Defence Council (NRDC).

Hornby, R., D. White, T. Vitolo, T. Comings, K. Takahashi. 2012. *Potential Impacts of a Renewable and Energy Efficiency Portfolio Standard in Kentucky*. Synapse Energy Economics for Mountain Association for Community Economic Development and Kentucky Sustainable Energy Alliance.

Keith, G., B. Biewald, E. Hausman., K. Takahashi, T. Vitolo, T. Comings, P. Knight. 2011. *Toward a Sustainable Future for the U.S. Power Sector: Beyond Business as Usual 2011*. Synapse Energy Economics for Civil Society Institute.

PRESENTATIONS AND POSTER SESSIONS

Vitolo, T. 2019. "Energy past, present, and future. Supply, meet demand. Possibility policies and politics." Keynote lecture for the Boston University "Climate Changed: Politics, Place, People and Planning" conference, April 5, 2019.

Vitolo, T. 2018. "How That Thing in Your Pocket Will Cut Carbon Emissions in Half." Lecture for the Boston University City Planning and Urban Affairs Program, April 4, 2018.

Knight, P. and Vitolo, T. 2018. "Trend Setting: Visualizing U.S. Electric Sector Data." Webinar by Synapse Energy Economics, March 16, 2018.

Vitolo, T. 2018. "Thoughts on RECs and Carbon Offsets." Climate Solutions Living Lab, Harvard Law School, March 7, 2018.

Vitolo, T. 2018. "Vermont NEM Case Study." Presentation for EUCI's "Net Energy Metering and Utility Solar Rates Summit," March 2, 2018.

Vitolo, T. 2018. "As a Class, Should Residential Solar Warrant Conventional or Special Rate Consideration?" Presentation for EUCI's "Net Energy Metering and Utility Solar Rates Summit," March 1, 2018.

Kallay, J. and Vitolo, T. 2017. "Local Electricity: The Prudent and Principled Way." Webinar by Synapse Energy Economics, November 16, 2017.

Vitolo, T. 2017. "The Economics of CWLP's Dallman Station." Public Policy Forum, Citizen's Club of Springfield, September 22, 2017.

Hansen, M., Vitolo, T., and Knott, A. 2017. "Sierra Club Report: CWLP Customers Paying More For Power." NPR Illinois 91.9 WUIS, September 22, 2017.

Leach, J., Vitolo, T., and Knott, A. 2017. "Sierra Club Says CWLP Customers Would Save Money Closing Dallman, Buying Power From Grid." News Talk 94.7 and 970 WMAY, September 22, 2017.

Vitolo, T. 2017. "Distributed Solar in the District of Columbia: Policy Options, Potential, Value of Solar, and Barriers." Webinar for the District of Columbia Department of Energy & Environment, May 24, 2017.

Vitolo, T. 2017. "Distributed Solar in the District of Columbia: Policy Options, Potential, Value of Solar, and Barriers." D.C. Solar Congress Conference, May 6, 2017.

Vitolo, T. 2017. "How That Thing in Your Pocket Will Cut Carbon Emissions in Half." Lecture for the Boston University City Planning and Urban Affairs Program, April 11, 2017.

Vitolo, T. 2017. "Thoughts on RECs and Carbon Offsets." Climate Solutions Living Lab, Harvard Law School, February 15, 2017.

Whited, M., and T. Vitolo. 2016. "SB 1131 Energy-Related Study." Maryland Public Service Commission Stakeholder Meeting, November 10, 2016.

Vitolo, T. 2016. "The Influence of Clean Power Plan Compliance Pathway Choice on Renewable Energy Construction." Presentation at the Renewable Energy Markets Conference, October 17, 2016.

Vitolo, T., J. Lazar. 2016. "The Value of Solar: Assessing the Benefits, the Costs, and What it May Mean for Net Energy Metering." Webinar for Regulatory Assistance Project, September 22, 2016.

Vitolo, T. 2016. "Some Value of Solar Remarks." Presentation for EUCI's "Net Energy Metering and Utility Solar Rates" seminar, July 21, 2016.

Vitolo, T., P. Luckow. 2016. "New Renewable Generation Capacity – Why Here and Not There?" Webinar by Synapse Energy Economics, June 22, 2016.

Vitolo, T., D. Lescohier, E. Frey, L. O. Pehlke. 2016. "Comparing Two Brookline Water Department Rate Proposals." Presentation to Brookline Board of Selectmen, Brookline, MA, June 21, 2016.

Vitolo, T. 2016. "Value of Solar: What & How, Who & Where, and Why." Presentation for the Solar Market Pathways Sustainable Communities Leadership Academy, Boston, MA, June 7, 2016.

Vitolo, T. 2016. "Local Action Big Results: Community Choice Aggregation." Presentation at Brookline Climate Week 2016, March 30, 2016.

Vitolo, T. 2016. "Getting a Local Energy Project Up and Running: Community Choice Aggregation." Presentation for Local Environmental Action Conference 2016, March 13, 2016.

Vitolo, T. 2016. "How That Thing in Your Pocket Will Cut Carbon Emissions in Half." Lecture for the Boston University City Planning and Urban Affairs Program, March 8, 2016.

Vitolo, T. 2015. Oral testimony regarding Belmont proposed distributed generation compensation policy. Presentation to Net Metering Working Group, Belmont, MA, July 16, 2015.

Vitolo, T. 2015. "Avoided Costs Associated with Distributed Generation and the Intersection of DG Valuation and Integrated Resource Planning." Presentation in Salt Lake City, UT, May 12, 2015.

Stanton, E. A., B. Biewald, D. Hurley, P. Peterson, T. Vitolo. 2015. "Clean Energy Advocates Bootcamp: Understanding Supply and Demand in New England." Presentation in Cambridge, MA, February 12, 2015.

Vitolo, T. 2015. Oral testimony regarding the Dallman 31/32 coal-fired power plant retrofit or retire decision. Presentation to Springfield Committee of the Whole, Springfield, Illinois, February 10, 2015.

Vitolo, T. 2015. "Community Solar in Context." Presentation at Brookline Climate Week 2015, February 4, 2015.

Vitolo, T. 2014. "Net Metering and Mississippi." Presentation at the 13th Annual Southern BioProducts and Renewable Energy Conference, November 13, 2014.

Vitolo, T. 2014. Comments in New York Association for Energy Economics panel regarding the operation and economics of Indian Point Nuclear Plant, November 4, 2014.

Vitolo, T. 2013. "How Big an Issue is Intermittency? Integrating Renewables into a Reliable, Low-Carbon Energy Grid," Presentation for Civil Society Institute webinar, April 17, 2013.

Vitolo, T. 2009. "RPS in the USA: The Present Impact and Future Possibilities of Renewable Portfolio Standards in America." Presentation at Boston University Energy Club Seminar Series.

Vitolo, T. 2007. "An ILP Approach to Spanning Tree Problems on Incomplete Graphs with Heterogeneous Degree Constraints." Presentation at INFORMS Annual Meeting.

Vitolo T., J. Hu., L. Servi, V. Mehta. 2005. "Topology Formulation Algorithms for Wireless Networks with Reconfigurable Directional Links." Proceedings of the IEEE Military Communications Conference, October 2005.

Vitolo, T. 2004. "Topology Design and Traffic Routing for Wireless Networks with Node-Based Topological Constraints." Presentation at Boston University CISE Seminar Series.

ADDITIONAL EXPERIENCE

TEACHING

- Guest Lecturer, Harvard Law School, 2017 – present
- Guest Lecturer, Boston University City Planning and Urbans Affairs Program, 2015 – present
- Graduate Teaching Fellow, Boston University College of Engineering. *Introduction to Engineering Computation*, 2009
- Guest Lecturer, Boston University Department of Systems Engineering, *Case Studies in Inventory Management*, 2007-2008
- Guest Lecturer, Boston University Department of Systems Engineering, Solving Linear Programs with CPLEX, 2003-2008

GOVERNMENT SERVICE

- *State Representative, 15th Norfolk District, Massachusetts House of Representatives, January 2019 – present*
- *Constable, Brookline, MA, 2010 – 2018*
- *Town Meeting Member, Brookline, MA, 2007 – 2018*
- *Bicycle Advisory Committee Member, Brookline, MA, 2007 – 2018.*

OTHER INFORMATION

FELLOWSHIPS AND SCHOLARSHIPS

- National Science Foundation IGERT Fellowship, 2006 – 2008
- National Science Foundation GK-12 Fellowship, 2002 – 2003
- Mitchell Scholarship, 2000 – 2001
- Park Scholarship, 1996 – 2000

ADDITIONAL SKILLS

- Computer Applications: Microsoft Office, LaTeX
- Programming: Fortran, C, C++, perl, MATLAB, CPLEX

AFFILIATIONS

- Center for Computation Science, Boston University, 2006 – 2010
- Center for Information and Systems Engineering, Boston University, 2002 – 2010

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