

Jimmy Nelson, Ph.D.

44 Montgomery Street, Suite 1500, San Francisco, CA 94104
jimmy.nelson@ethree.com

415.391.5100, ext. 331

ENERGY AND ENVIRONMENTAL ECONOMICS, INC.
Senior Consultant

San Francisco, CA

Dr. Nelson's work focuses on operations, economics, and planning of electricity systems with large fractions of variable renewable energy resources. Prior to joining E3 in 2016, he was an Energy Modeler and a Kendall Science Fellow at the Union of Concerned Scientists. Dr. Nelson received his Ph.D. from the Energy and Resources Group at UC Berkeley in 2013. He received a Link Energy Fellowship during his time at the Energy and Resources Group. His doctoral dissertation was titled "*Scenarios for Deep Carbon Emission Reductions from Electricity by 2050 in Western North America Using the SWITCH Electric Power Sector Planning Model.*" He received a M.S. in Chemistry in 2008 for work on solar energy conversion using nanoparticles and B.S. in Chemistry with High Honors from Haverford College in 2006. He grew up in Portland, Oregon. Dr. Nelson has wide-ranging experience in the non-profit, academic, and consulting sectors, and has provided expert testimony to the California Public Utilities Commission on electricity planning.

Select E3 projects include:

- **Integrated Resource Planning Implementation Support, California Public Utilities Commission, 2016-2017.** Using RESOLVE, E3's in-house capacity expansion model designed for use on high-penetration renewable systems, Dr. Nelson is modeling least-cost resource portfolios for the electricity system consistent with the state of California's long-term greenhouse gas reduction goals. Dr. Nelson has led the implementation of new RESOLVE features, including an effective load carrying capability surface for renewable generators, improved generator operational constraints, and a greenhouse gas emissions limit.
- **BANC EIM Benefits Analysis, Balancing Area of Northern California, 2016.** Dr. Nelson was the technical lead on E3's study of the benefits to BANC members of participating in the Western Energy Imbalance Market. The E3 team worked closely with representatives from all BANC members to model the operations of their respective electric systems accurately using PLEXOS production simulation software, providing a clear illustration of the EIM value proposition for each BANC member.
- **Energy Storage Benefits Analysis, Storage Developer, 2016.** Using the REFLEX model, Dr. Nelson quantified the production cost and renewable curtailment savings associated with developing a storage project in California.

UNION OF CONCERNED SCIENTISTS
Energy Modeling with Senior Energy Analyst Laura Wisland

Oakland, CA
2013 – 2015

Project: Operational flexibility at high fractions of variable renewable energy in California

- Production cost modeling using PLEXOS, REFLEX, and Excel VBA.
- Expert testimony and public comments on energy policy and planning.
 - California Public Utilities Commission: Long Term Procurement Plan

- California Independent System Operator: Frequency Response Stakeholder Process
 - Interaction with many stakeholders in the California electricity modeling and policy community.

UNIVERSITY OF CALIFORNIA, BERKELEY, Energy Resources Group

Berkeley, CA

Doctoral Research with Professor Daniel Kammen

2009 – 2013

Dissertation Title: “Scenarios for Deep Carbon Emission Reductions from Electricity by 2050 in Western North America Using the SWITCH Electric Power Sector Planning Model”

- Electric power system planning using high spatial and temporal resolution computer modeling.
- Renewable energy deployment, integration, economics, and public policy.
- Linear programming, database management, and geospatial information systems.

UNIVERSITY OF CALIFORNIA, BERKELEY, Department of Chemistry

Berkeley, CA

Master’s Research with Professor A. Paul Alivisatos

2006 – 2008

Project: Nanoparticle synthesis, characterization, and computer modeling for solar energy conversion.

Education

University of California, Berkeley

Berkeley, CA

Ph.D., Energy and Resources

December 2013

University of California, Berkeley

Berkeley, CA

M.S., Chemistry

December 2008

Haverford College

Haverford, PA

B.S., Chemistry

May 2006

High Honors in Chemistry

Fellowships and Awards

- Kendall Postdoctoral Fellowship, Union of Concerned Scientists 2013-2014
- Link Foundation Energy Fellowship 2011-2013
- Passed two separate Ph.D. qualifying examinations-Chemistry, Energy and Resources 2008,2012
- High Honors, Chemistry, Haverford College 2006
- American Chemical Society Philadelphia Chapter Undergraduate Award 2006
- American Chemical Society Division of Analytical Chemistry Undergraduate Award 2005

Citizenship

United States

Peer-Reviewed Publications in Energy Analysis

1. Mileva, A.; Johnston, J.; Nelson, J. H.; Kammen, D. M. “Power system balancing for deep decarbonization of the electricity sector.” *Applied Energy*, 162, pp. 1001-1009 (2016).

2. Morrison, G. M.; Yeh, S.; Eggert, A. R.; Yang, C.; Nelson, J. H.; Greenblatt, J. B.; Isaac, R.; Jacobson, M. Z.; Johnston, J.; Kammen, D. M.; Mileva, A.; Moore, J.; Roland-Host, D. Wei, M.; Weyant, J. P.; Williams, J. H.; Williams, R.; Zapata, C. B. "Comparison of low-carbon pathways for California." *Climatic Change*, 131, pp. 545-557 (2015).
3. Sanchez, D.; Nelson, J. H.; Mileva, A.; Johnston, J.; Kammen, D. M. "Biomass Enables the Transition to a Carbon-negative Power System Across Western North America." *Nature Climate Change*, 5, pp. 230-234 (2015).
4. Mileva, A.; Nelson, J. H.; Johnston, J.; Kammen, D. M. "SunShot Solar Power Reduces Costs and Uncertainty in Future Low-Carbon Electricity Systems." *Environmental Science & Technology*, 47 (16), pp. 9053-9060 (2013).
5. Wei, M.; Nelson, J. H.; Greenblatt, J. B.; Mileva, A.; Johnston, J.; Ting, M.; Yang, C.; Jones, C.; McMahon, J. E.; Kammen, D. M. "Deep Carbon Reductions in California Require Electrification and Integration Across Economic Sectors." *Environmental Research Letters*, 8, 014038, (2013).
6. Nelson, J.; Johnston, J.; Mileva, A.; Fripp, M.; Hoffman, I.; Petros-Good, A.; Blanco, C.; Kammen, D. M. "High-Resolution Modeling of the Western North American Power System Demonstrates Low-Cost and Low-Carbon Futures." *Energy Policy*, 43, pp. 436-447 (2012).

Reports and Book Chapters

1. Nelson, J. H.; Wisland, L. M. "Achieving 50 Percent Renewable Electricity in California." *Union of Concerned Scientists* (2015).
2. Nelson, J. H.; Mileva, A.; Johnston, J.; Kammen, D. M.; Wei, M.; Greenblatt, J. B. "Scenarios for Deep Carbon Emission Reductions by 2050 in Western North America using the SWITCH Electric Power Sector Planning Model." CEC-500-2014-109, California Energy Commission (2014).
3. Wei, M.; Nelson, J. H.; Ting, M.; Yang, C., Kammen, D. M.; Jones, C.; Mileva, A.; Johnston, J.; Bhavirkar, R.; Greenblatt, J. B.; McMahon, J. E. "California's Carbon Challenge: Scenarios for Achieving 80% Emissions Reduction in 2050." Tech. Rep. LBNL-5448E, Lawrence Berkeley National Laboratory (2012).
4. Tidwell, V.; Dale, L.; Franco, G.; Averyt, K.; Wei, M.; Kammen, D.; Nelson, J. H. "Energy Impacts." Chapter 12 in: *Assessment of Climate Change in the Southwest United States. Technical Report, U.S. National Climate Assessment*, [Garfin, G., Jardine, A., Merideth, R., Black M., Overpeck, J. (eds.)]. Tucson, AZ: Southwest Climate Alliance (2012).

Selected Presentations

1. Integrated Energy Policy Workshop, California Energy Commission, "Achieving 50 Percent Renewable Electricity in California," Sacramento, CA (07/24/2015).
2. Renewable Energy Markets Conference, "Renewable Ancillary Service Markets for California's Duck Curve," Sacramento, CA (12/03/2014).

3. Briefing to California Legislative Members and Staff on Renewable Energy, Hosted by the Union of Concerned Scientists, "Renewables and Aquatic Animals," Sacramento, CA (03/04/2014).
4. California Climate Policy Modeling Dialogue and Workshop, "Planning Power Systems with Deep Emission Reductions by 2050 Using the SWITCH Model," Davis, CA (12/16/2013).
5. Lead Commissioner Workshop on Evaluating Electricity Sector Needs in 2030, California Energy Commission, "Simultaneous Planning of Generation, Transmission, and Storage Capacity for 2030 and Beyond Using the SWITCH Model," Sacramento, CA (08/19/2013).