# Roderick Go

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**ENERGY AND ENVIRONMENTAL ECONOMICS, INC.**        San Francisco, CA
*Consultant*

Mr. Go's work at E3 has spanned the planning, market analysis, and distributed energy resources (DERs) practice areas, helping to enhance and continue development of multiple E3 analytical tools. He joined E3 in 2016 upon receiving both his M.S.E. in Environmental Management and Economics and his B.S. in Environmental Engineering from the Johns Hopkins University. His education also included receiving a Minor in Engineering for Sustainable Development, with specific interest in urban development. Prior to E3, Mr. Go's research experiences focused on developing novel power systems optimization models and solution algorithms to investigate operational and planning questions for transmission-constrained systems under high renewables. Select projects at E3 include:

- **California Energy Commission, 2017-Present.** Expanded E3's RESTORE model to evaluate the system-wide and locational net benefits of a customer-sited portfolio of solar, storage, and other distributed energy resources.
- **Western Energy Imbalance Market Benefits Studies, 2016-Present.** Analyzed potential operational benefits of subhourly wholesale market transactions via Western EIM integration for NorthWestern Energy, Portland General Electric, and el Centro Nacional de Energía (Mexico). Managed study for the Public Service Company of New Mexico.
- **Orange & Rockland, 2017-Present.** Enhanced E3's spreadsheet-based integrated demand-side model to calculate the net benefits of portfolios of distributed energy resources to meet utility needs for transmission and distribution project deferral.
- **Hawaiian Electric Companies, 2016-Present.** Developed E3's RESOLVE model for specific application in the Hawaiian Electric Companies' December 2016 Power Supply Improvement Plan update. The model provided a set of least cost investment pathways to reach 100% renewables under different stakeholder assumptions out to 2045, helping guide policy and investment decision-making on Hawai'i, Maui, and Oahu islands. Developed a training course for HECO staff to run RESOLVE in-house to aid in future investment decision-making.
- **Puget Sound Energy, 2017.** Assisted in development of PSE's PLEXOS production cost model and used the model to assess intra-hour flexibility challenges at high wind penetrations to support 2017 Integration Resource Plan.
- **Sacramento Municipal Utilities District, 2017.** Updated PLEXOS simulation of SMUD's system to understand the impact of increasing renewable generation and broader regional changes on the utility's energy supply costs
- **Locational Net Benefits Analysis Tool, 2016.** Developed a spreadsheet-based demonstration tool to determine the location-specific avoided costs associated with the installation of distributed energy resources

**SANDIA NATIONAL LABORATORIES**                                    Albuquerque, NM
*Technical Intern—Discrete Math & Optimization*                     June 2015 – June 2016

- o Created a two-stage, stochastic model in Python and Pyomo to co-optimize transmission, generation, and energy storage investments on a large-scale power network
- o Studied the economic value of simultaneously considering bulk energy storage investments with transmission and generation expansion planning decisions for high renewables scenarios
- o Implemented and investigated the use of Bender's decomposition and Lagrangian relaxation methods to accelerate solution of large-scale expansion planning models

**JOHNS HOPKINS UNIVERSITY**                                        Baltimore, MD
*Research Assistant*                                                October 2014 – June 2016

- o Developed a model in GAMS to compare siting and sizing decisions of a merchant energy storage investor recovering costs via energy arbitrage to those of a welfare-maximizing centralized planner
- o Investigated possible issues of market power from energy storage merchants in transmission-constrained networks

**CITY OF BALTIMORE, OFFICE OF SUSTAINABLE ENERGY**                 Baltimore, MD
*Energy Analyst Intern*                                             February 2015 – May 2015

- o Investigated energy storage applications and opportunities for co-locating with solar PV project in Baltimore City based on case studies of existing projects around the US

**COMILLAS PONTIFICAL UNIVERSITY**                                  Madrid, Spain
*Visiting Researcher*                              June 2014 – August 2014, January 2015

- o Developed and compared various unit commitment approximations in GAMS for generation expansion planning models for systems with significant renewables
- o Implemented *k*-means clustering methods in Matlab to estimate system states for use in expansion planning models
- o Organized one-day, workshop on linear and mixed-integer linear programming in power systems for participating students

## Education

The Johns Hopkins University                                       Baltimore, MD
*M.S.E. Environmental Management and Economics*                         May 2016

The Johns Hopkins University                                       Baltimore, MD
*B.S. Environmental Engineering*                                        May 2015
*Minor in Engineering for Sustainable Development – Urban Development*

## Citizenship

United States

## Presentations

1. "Optimal Portfolio Investment of an Energy Storage Merchant in the Energy Imbalance Market." INFORMS Annual Meeting, Philadelphia, PA. November 2015.
2. "Combining the L-Shaped Method and Lagrangian Relaxation for Expansion Planning with Storage Devices and RPS Constraints." INFORMS Annual Meeting, Houston, TX. November 2017.

## Refereed Publications

1. R. Go, F. D. Munoz, J-P. Watson, *"Assessing the Economic Value of Co-Optimized Grid-Scale Energy Storage Investments in Supporting High Renewable Portfolio Standards"*, Applied Energy, 183, 2016, 902-913. http://dx.doi.org/10.1016/j.apenergy.2016.08.134.