

Michael Sontag, P.E.

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ENERGY AND ENVIRONMENTAL ECONOMICS, INC.

San Francisco, CA

Associate Director

Mr. Sontag's work focuses on the interactions between end use loads, the electric grid, and greenhouse gas emissions, as well as leveraging distributed energy resources to enhance a clean energy future. Since joining E3 in 2016, he has led the development of E3's building decarbonization analysis toolkit, including models that calculate upfront consumer costs, ongoing utility bills, grid impacts, avoided utility costs, and attributable emissions for a variety of space heating and water heating technologies in a variety of building types. He has developed avoided cost models that leverage knowledge of wholesale energy markets and utility regulations to calculate the hourly avoided utility costs and emissions impacts of demand side programs and building standards. He has also worked extensively on the topic of flexible loads, both in terms of modeling their impact on building decarbonization efforts, along with understanding the emerging regulatory and wholesale market opportunities for DER technology providers and aggregators. He received his M.S. in Civil and Environmental Engineering (Atmosphere and Energy) from Stanford University, and a B.S. in Mechanical Engineering from the University of California, Berkeley. He earned his Professional Engineer license in California in 2014. Select projects from his work at E3 include:

Flexible Loads, Demand Response and Battery Storage:

- Currently leading E3's team in a project for the **DOE Connected Communities program**, in which we are developing an improved quantitative framework to integrating Distributed Energy Resources into utility Resource Adequacy planning for electric generation capacity.
- Currently leading E3's team in the CEC EPIC grant-funded **CalFlexHub** (EPC-20-025, "Achieving Integrated and Equitable Decarbonized Loads with CalFlexHub"), that uses E3's RESTORE model to determine optimal dispatch, customer bills, value to the grid, lifecycle cost effectiveness, and emissions benefits of a portfolio of flexible load technologies in commercial and residential buildings.
- Led an economic analysis to estimate the value to the grid, and emissions reductions potential of shifting of **California State Water Project** pumping using aquifer storage through both an avoided cost framework and a resource procurement framework (CEC EPIC Grant EPC-16-029").
- Supported E3's broader engagement managing the ongoing **CPUC Integrated Resources Plan (IRP) Proceeding**, with a focus on incorporating potential impacts of demand side loads including Energy Efficiency, Demand Response, and Load Flexibility
- Worked with developers, wholesale market participants, and technology companies across 10+ projects to determine wholesale market revenue potential and regulatory landscape for energy storage, load flexibility, and advanced demand response with a focus on CAISO wholesale markets.

Electric Grid Emissions Factors and Avoided Costs:

- Led E3's analytical team to update the **Time-Dependent Valuation (TDV)** methodology for the 2022 code cycle of **California's Title 24 Building Standards**. TDV factors use an avoided costs framework to evaluate lifecycle cost effectiveness of proposed code measures, within the context of California's forecasted energy landscape. Defined new metrics for long run emissions and source energy to calculate the emissions impact of changes in building load, and enable building electrification requirements.
- Supported multiple cycles of E3's support of the **CPUC Avoided Cost Calculator**, which is used as the foundation to evaluate the costs and benefits of California's publicly-funded Demand Side Management programs
- Developed the incentivize calculation framework for the **Southern California Edison's Clean Energy Optimization Pilot program** (CPUC Decision 19-04-010) - a performance-based demand-side program that incentivizes GHG emissions reductions. Supported SCE through CPUC program application and regulatory approval, including approval to use cap and trade funding to pay for incentives instead of public purpose funding, with a total program budget of \$20 Million.

Building Electrification

- Led development of the Buildings Pathways model for **New York City's LL97 Implementation Action Plan**. This excel-based model characterized New York City's municipal building stock, assigned each building to one of a portfolio of over 60 prototypical building simulations, each with costs and energy performance for energy efficiency and electrification measures. The model identified least cost opportunities for the city to reach 2030 building decarbonization targets and determined necessary capital expenditures to fund opportunities. Model insights were leveraged by the NYC Mayor's Office to commit \$3.6 Billion to associated projects between 2022 and 2030.
- Developed a model to calculate installation costs, customer bills, lifecycle cost impacts, and changes in emissions for potential building electrification measures across a variety of residential and commercial building prototypes for the **City and County of Denver Renewable Heating and Cooling Plan**. This model has since been adapted to allow for building characteristics, and utility rates to granularly represent buildings across the country.
- Led E3's analytical efforts to support regulatory filings for both **Xcel Energy's Colorado Clean Heat Plan** filing and **Minnesota Natural Gas Innovation Act (NGIA)** filing. Modeling included a detailed supply curve of supply and demand side resources that could be procured to decarbonize the gas utility, along with a portfolio creation model that achieved targeted levels of emissions reductions. Both regulatory filings are currently under way.

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Energy Engineer

San Francisco, CA

April 2012 – August 2014

- Created a strategic energy plan for a local regional parks district; led a team that audited facilities at 27 parks. The strategic energy plan consisted of 12 proposed energy efficiency measures resulting in 800,000 kWh and 10,000 th of savings, along with 2 MW of solar systems
- Performed energy audits at over 40 sites, and modeled solar system performance at over 100 sites; worked with clients to identify potential energy savings measures, developed custom energy savings models and financial analyses in excel, and advised on successful project delivery

SERIOUS ENERGY QUIETROCK DIVISION

Product Manager

Sunnyvale, CA

January 2011 – October 2011

- Led product management effort for the development of two new sustainable building products
- Created an Excel model to analyze cost, revenue, and profit margins for the division's entire product line; identified gaps in pricing structure and defined new pricing strategy

Education

Stanford University Palo Alto, CA
M.S., Civil Engineering, Atmosphere and Energy Program 2016

University of California, Berkeley Berkeley, CA
B.S., Mechanical Engineering 2010

Licenses

Professional Engineer: Mechanical Engineering – HVAC/Refrigeration, California, 2014