John C. Stevens, Ph.D.

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

Dr. Stevens' focus areas are electricity market planning and analysis, technoeconomic analyses in the transportation sector, building and process energy efficiency modeling, and renewable fuel production modeling. His recent E3 projects include investigating the economic benefits of dispatchable solar power plants, analyzing global market opportunities for renewable hydrogen, and developing utility strategies to align business models with emerging clean energy policies. Dr. Stevens has significant expertise in Python, Matlab, FORTRAN, as well experience with the modeling tools PLEXOS, COMSOL Multiphysics, eques, H2A and GREET. Dr. Stevens received a Ph.D. in Mechanical Engineering and a M.S. in Mechanical Engineering from the University of California at Berkeley, and a B.S. in Mechanical Engineering from Tufts University.

U.S. DEPARTMENT OF ENERGY Washington, DC
Office of Energy Efficiency and Renewable Energy (EERE), Fuel Cell Technologies Office (FCTO)

Physical Scientist June 2016 to June 2017

- Served in a project management role for the FCTO's H2@Scale initiative. This initiative sought to launch an R&D program to enable electrolyzers to serve as a flexible load to integrate high penetrations of renewable power in a decarbonized electricity grid.
- Worked with the FCTO and national laboratory partners to produce a project economic feasibility analysis, a lifecycle greenhouse gas and criteria pollutant abatement analysis, a project road map, and to identify a demonstration project location for H2@Scale.
- Worked on technoeconomic analyses of market segmentation between fuel cell electric vehicles (FCEVs), battery electric vehicles (BEVs) within the light, medium and heavy duty vehicle sectors. Analyses used Argonne National Laboratory software and in-house developed economic models to calculate total cost of operation of FCEVs and BEVs for multiple vehicle classes. Time-varying fuel and powertrain costs were simulated to assess effects of meeting DOE program goals.
- Participated in FCTO review of research proposals submitted by industry, national laboratory teams, and academia to work with DOE EERE's Energy Materials Network. Reviewed proposals on advanced hydrogen production via photoelectrochemical and electrolysis pathways.

LAWRENCE BERKELEY NATIONAL LABORATORY Berkeley, CA

Graduate Student Researcher January 2011 to December 2015

- Calculated the energy payback time of gigawatt-scale, wireless photovoltaic-based, water-splitting photoelectrochemical plants. Identified and assessed means of improving energy payback time in a follow up study.

- Modeled annual profiles of hourly transient component temperature in field-deployed photoelectrochemical devices. Identified different temperature regulation methods to prevent device failure.
- Developed large-scale multiphysics simulation programs to design optically concentrating, photoelectrochemical systems with greater than 11% annual solar to hydrogen production efficiency.
- Enhanced light capture in wireless photoelectrochemical systems using computational parametric studies of lens and light-managing coatings design.

UNIVERSITY OF CALIFORNIA Berkeley, CA

Lecture Director, Fall Energy Engineering Seminar August 2012 - December 2014

- Led lecture series on emerging clean energy technologies for undergraduate students at UC Berkeley, including presentations on fuel cells, batteries, solar photovoltaic cells and photoelectrochemical cells.

Graduate Student Instructor, Mechanical Engineering 107 Laboratory August 2010 - May 2011

- Led lecture section on testing and validation of 3D-printed wind turbine design using a wind tunnel as part of capstone laboratory class for undergraduate seniors.

EMCOR ENERGY SERVICES San Francisco, CA

Energy Engineer August 2007-July 2009

- Identified energy and peak demand savings through retrofits to and new construction of thermal energy storage systems, chillers, package units, boilers, heat pumps, variable speed drives, fume hoods, and building envelope improvements in municipal, commercial, industrial and institutional facilities in Northern California.
- Audited and planned lighting equipment and sensor retrofits in California and Tennessee. Estimated demand and energy savings resulting from these retrofits.
- Calculated energy savings due to pumping and process retrofits in waste water treatment and food processing plants in California.
- Authored reports on customer energy and demand savings measures for Pacific Gas and Electric to support their non-residential retrofit and demand response energy efficiency program. Communicated findings of these reports with Pacific Gas and Electric, their customers, equipment vendors and other stakeholders.
- Performed inspections of photovoltaic installations to verify their projected energy yield for Pacific Gas and Electric's California Solar Initiative and Self Generation Incentive Programs.

Education

University of California Berkeley, CA
Ph.D. in Mechanical Engineering December 2015

University of California Berkeley, CA
M.S. in Mechanical Engineering May 2012

Tufts University Medford, MA

B.S. in Mechanical Engineering May 2007

Citizenship

United States

Selected Presentations

1. Stevens, J. C., "Grid Modernization and H2@Scale" *Johns Hopkins University*. 9/15/2016.

2. Stevens, J. C., "A Theoretical Comparison of Optically Concentrating, Solar Water-Splitting Devices" *The Electrochemical Society 227th Meeting, Chicago.* 5/24/2015.

Peer-Reviewed Publications

1. Morrison, G.; Stevens, J. C.; Joseck, F. "Relative Economic Competitiveness of Light-Duty Battery Electric and Fuel Cell Electric Vehicles", *Transportation Research Part C.* 2018, 87, 183-196.

2. Stevens, J. C.; Weber, A. Z. "A computational study of optically concentrating, solar-fuels generators from annual thermal- and fuel-production efficiency perspectives" *J. Electrochem. Soc.* 2016, 163, H475-H484.

3. Xiang, C. X.; Weber, A. Z.; Ardo, S.; Berger, A.; Cordian, R.; Fountain, K.; Haussener, S.; Hu, S.; Liu, R.; Lewis, N. S.; Modestino, M.; Shaner, M.; Singh, M. R.; Stevens, J. C.; Sun, K.; Walczak, K. "Modeling, Simulation and Implementation of Solar-Driven Water-Splitting Devices" *Angewandte Chemie* 2016, 55, 12974-12988.

4. Sathre, R; Greenblatt, J. B.; Walczak, K. A.; Sharp, I. D.; Stevens, J. C.; Ager, J. W. III; Houle, F. A. "Opportunities to Improve the Net Energy Performance of Photoelectrochemical Water-Splitting Technology" *Energy Environ. Sci.* 2016, 9, 803-819.

5. Sathre, R.; Scown, C. D.; Morrow, W. R.; Stevens, J. C.; Sharp, I. D.; Ager, J. W. III; Walczak, K. A.; Houle, F. A.; Greenblatt, J. B. "Life-cycle Net Energy Assessment of Large-Scale Hydrogen Production Via Photo-Electrochemical Water Splitting" *Energy Environ. Sci.* 2014**,** 7, 3264-3278**.**

6. Singh, M. R.; Stevens, J. C.; Weber, A. Z. "Design of Membrane-Encapsulated Wireless Photoelectrochemical Cells for Hydrogen Production" *J. Electrochem. Soc.* 2014, 161*,* E3283-E3296.