



Yuchi Sun, Ph.D.

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ENERGY AND ENVIRONMENTAL ECONOMICS, INC.

San Francisco, CA

Managing Consultant

Dr. Yuchi Sun joined E3 after completing his Ph.D. degree at Stanford University. His research focused on using modern machine learning algorithms to mitigate uncertainty in short-term solar production, and on quantifying the value of accurate solar forecasts. Other research projects addressed using CO₂ electrolyzers as seasonal storage devices, carbon capture and sequestration, and GHG accounting of global oil fields.

Dr. Sun works primarily in E3's resource planning practice. As an E3 summer associate in 2018, his projects involved integrated resource planning and the evaluation of resource procurement proposals for various utilities. He is especially experienced with capacity expansion optimization and operational reliability analysis, and with using and developing E3's RESOLVE and RECAP models. Dr. Sun also has experience in siting renewable resources, valuation of renewable and fossil power plants, and simulation of power system operation.

ENERGY AND ENVIRONMENTAL ECONOMICS, INC.

San Francisco, CA

Summer Associate

June – August 2018

- Supported the capacity expansion planning of an integrated utility
- Improved the functionality of E3's long-term planning model (RESOLVE) and reliability model (RECAP)
- Participated in other projects, including market research, internal model testing, database building

BOSCH RESEARCH AND TECHNOLOGY CENTER

Palo Alto, CA

Battery System Intern

June – August 2017

- Modeled battery performance and internal state with machine learning algorithms (NN and LSTM-RNN)
- Modeling approach delivered comparable accuracy faster than traditional electrochemical models

STANFORD UNIVERSITY

Stanford, CA

Teaching Assistant

Autumn 2014 and Winter 2016

- Assisted courses Energy 293A (Solar Cells) and Energy 291 (Energy Systems Optimization)
- Responsibilities included holding office hours, grading homework, and instructing students

WORLD RESOURCE INSTITUTE (CHINA OFFICE)

Intern Analyst

Beijing, China

Summer 2012

- Participated in developing carbon reduction plan for Chengdu (Capital city of Sichuan Province)
- Calculated greenhouse gas emissions from different industrial sectors in Chengdu

Research Projects

- **Short-term Solar Forecast with Convolutional Neural Network** Jun. 2016 – Aug. 2019
Build a machine learning model to predict solar power with cloud images and other features. Identify and predict cloud movement with camera images at 5- to 15-minute time scale.
- **Performance of a CO₂ - reduction Based Seasonal Storage System** Sep. 2015 – Jun. 2016
Calculated the mass and energy balance of a CO₂ electrochemical reduction system. Compared the energy and cost performance of the system to other long-term storage solution.
- **Exergetical Life Cycle Analysis of CCS Enabled Coal Fired Power Plant** Jun.2014 – Aug.2015
Provided a new perspective on CCS technology by accounting the life cycle exergy input/output. Constructed a detailed CCS system model with an emphasis on material cost.
- **Carbon Emissions of Petroleum Production in Global Oilfields** Sep.2013 – Sep. 2014
Calculated the GHG emission from oil production in thirty major oilfields across the globe. Accounted for vastly different oil production technology and indexed them.
- **Development of a Carbon Footprint Calculator on Android Platform** Jun.2011 - Sep.2011
Titled Mr. Carbon (available on Google Play, Search Mr. Carbon). Developed a methodology to calculate direct and indirect carbon footprint for Chinese citizens. 1st place in The Seventh Environmentally Friendly Technology Competition sponsored by HACH

Publications

1. **Sun, Yuchi**, Vignesh Venugopal, and Adam R. Brandt. "Short-term solar power forecast with deep learning: Exploring optimal input and output configuration." *Solar Energy* 188 (2019): 730-741.
2. **Sun, Yuchi**, Gergely Szűcs, and Adam R. Brandt. "Solar PV output prediction from video streams using convolutional neural networks." *Energy & Environmental Science* 11.7 (2018): 1811-1818.
3. Brandt, Adam R., et al. "Energy return on investment (EROI) for forty global oilfields using a detailed engineering-based model of oil production." *PloS one* 10.12 (2015): e0144141.
4. Brandt, Adam R., **Yuchi Sun**, and Kourosh Vafi. "Uncertainty in regional-average petroleum GHG intensities: countering information gaps with targeted data gathering." *Environmental science & technology* 49.1 (2014): 679-686.

Education

Stanford University

Ph.D., Energy Resources Engineering

Stanford, CA

August 2019

Stanford University

M.S., Energy Resources Engineering

Stanford, CA

August 2015

Tsinghua University

B.S., Energy Resources Engineering; B.A., English

Beijing, China

June 2013