FAN TONG

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Current Employment

Energy/Environmental Policy Project Scientist/Engineer 2019/02-
Supervisor: Corinne Scown
Sustainable Energy Systems Group, Sustainable Energy & Environmental Systems Department
Energy Analysis & Environmental Impacts Division, Energy Technologies Area
Lawrence Berkeley National Laboratory

Visiting Postdoc at Energy Institute at Haas 2019/02-
Supervisor: Maximilian Auffhammer
Haas School of Business, University of California, Berkeley

Research Interests

- Develop and perform analysis of sustainable energy systems to inform research, development, and deployment opportunities and strategies.
- Quantify high-resolution society-wide impacts (e.g. economics, climate change, health, and infrastructure) for existing energy infrastructure and prospective energy technologies (e.g. renewable energy, energy storage, alternative transportation fuels, and advanced powertrains) using systems-level methods such as life cycle assessment, integrated assessment model, spatial analysis, and energy systems modeling.
- Identify co-benefits and trade-offs in the energy-climate-health nexus at varying spatial scales from cities to countries.
- Evaluate energy systems transitions under high uncertainty and over multiple time scales (years to decades) using energy systems optimization models, and integrated assessment models.

Education

Carnegie Mellon University, Pittsburgh, Pennsylvania, U.S. 2012-2016

Ph.D. in Engineering and Public Policy, 2016

Thesis: The Good, the Bad, and the Ugly: Economic and Environmental Implications of Using Natural Gas to Power On-Road Vehicles in the United States

Committee: Paulina Jaramillo (co-chair), Inês Azevedo (co-chair), Chris Hendrickson, Jeremy Michalek, Zhen (Sean) Qian

Master of Science (M.S.) in Engineering and Public Policy, 2015

Tsinghua University, Beijing, China 2006-2010

Bachelor of Engineering (B.E.) in Electrical Engineering

Honors and Awards

Full list available upon request.

- **Rising Environmental Leaders Program (RELP) Scholar, Stanford University, 2018**
  20 graduate students and postdoc scholars selected for their excellence and commitment to environmental research across Stanford University
- **Second Prize Student Poster, Carnegie Mellon University's inaugural Energy Week, 2016**
  A competitive award selected by external referees from about 60 posters presented by graduate students and postdoc scholars across the campus
- **Ji-Dian Liang Fellowship, Carnegie Mellon University, 2016**
  A merit fellowship awarded to top one doctoral student of Chinese heritage who excels in scholarship within the School of Engineering
- **Northrop Grumman Fellowship, Carnegie Mellon University, 2013-14**
  A merit fellowship awarded to top two engineering doctoral students whose multidisciplinary research is associated with strategic directions within the School of Engineering.
- **Steinbrenner Institute Graduate Research Fellowship, Carnegie Mellon University, 2013-14**
  A merit fellowship awarded to top four exceptional rising second-year doctoral students at Carnegie Mellon University
- **Tsinghua Friendship-Toshiba Scholarship, Tsinghua University, 2008-09**
  A merit fellowship awarded to top 5% students at Tsinghua University

Publications

Peer-reviewed Journal Articles

In Preparation

14. **Tong, F.**; Azevedo, I.; Michalek, J. A review of hydrogen production pathways, cost, and de-carbonization potential for transportation applications. Draft available.
13. **Tong, F.**; Goldstein, A.; Caldeira, K. Systems-Level Coordination Unlocks Potential Climate Benefits of Energy Innovation. Draft available.

Under Review

12. **Tong, F.**; Yuan, M.; Lewis, N.S.; Davis, S.J.; Caldeira, K. Influence of energy storage cost on variable renewable energy systems. Submitted to *Nature Energy*.
11. Yuan, M.; **Tong, F.**; Duan, L.; Lewis, N.S.; Caldeira, K. Competition between nuclear power and variable renewables in a near-zero-emission energy system. Submitted to *Energy & Environmental Science*.

10. Brown, P.T.; Moreno-Cruz, J.; Saunders, H.; Hausfather, Z.; Davis, S.J.; **Tong, F.**; Caldeira, K.; Global temperature targets under heightened estimates of economic damage from climate change. Under review at *Nature Communications*.
9. **Tong, F.**; Jaramillo, P.; Azevedo, I. Joint Assessment of Climate Change and Air Pollution Damages for Vehicle Pathways across the United States. In preparation for 2nd-round review at *Proceedings of the National Academy of Sciences.*

Published

* denotes corresponding authors.

8. Wang, C.; Wang, R.; Hertwich, E.; Liu, Y.*; **Tong, F.** Water Scarcity Risks Mitigated or Aggravated by the Inter-Regional Electricity Transmission Across China. *Appl. Energy* **2019**, *238*, 413–422.
7. **Tong, F.***; Azevedo, I; Jaramillo, P. Economic Viability of a Natural Gas Refueling Infrastructure for Long-Haul Trucks. *J. Infrastruct. Syst.* **2019**, *25*, 4018039. (https://doi.org/10.1061/(ASCE)IS.1943-555X.0000460)
6. Qin, Y.*; **Tong, F**.; Yang, G.; Mauzerall, D. L.* Challenges of using natural gas as a carbon mitigation option in China. *Energy Policy* **2018**, *117*, 457–462. (https://doi.org/10.1016/j.enpol.2018.03.004)
5. **Tong, F.***; Hendrickson, C; Biehler, A.; Jaramillo, P.; & Seki, S. Life Cycle Ownership and Environmental Externality of Alternative Fuel Options for Transit Buses. *Transp. Res. Part D Transp. Environ.* **2017**, 57, 287–302. (https://doi.org/10.1016/j.trd.2017.09.023)
4. Qin, Y.; Edwards, R.; **Tong, F.**; Mauzerall, D.L.* Can Switching from Coal to Shale Gas Bring Net Carbon Reductions to China? *Environ. Sci. Technol.*, **2017**, 51 (5), 2554-2562. (http://dx.doi.org/10.1021/acs.est.6b04072)
3. **Tong, F.***; Jaramillo, P.; Azevedo, I. Comparison of Life Cycle Greenhouse Gases from Natural Gas Pathways for Light Duty Vehicles. *Energy & Fuels*, **2015**, 29, 6008–6018. (http://dx.doi.org/10.1021/acs.energyfuels.5b01063)
2. **Tong, F.***; Jaramillo, P.; Azevedo, I. Comparison of Life Cycle Greenhouse Gases from Natural Gas Pathways for Medium and Heavy-Duty Vehicles. *Environ. Sci. Technol.*, **2015**, *49 (12), 7123-7133.* (http://dx.doi.org/10.1021/es5052759)
1. Gilbraith, N.*; Jaramillo, P.; **Tong, F.**; Faria, F. Comments on Jacobson et al.'s proposal for a wind, water, and solar energy future in New York State. *Energy Policy*, **2013**, (60), 68-69. (http://dx.doi.org/10.1016/j.enpol.2013.05.006)

Book Chapters

1. Han, W.; Yang, Y. *China Energy Outlook*. Beijing, China: China Economic Publishing House, 2012. (Contributing writer)
   Yang, Y.; **Tong, F.** What is the Future of World Oil Market: A Comparison of *World Energy Outlook* (by International Energy Agency) and *World Oil Outlook* (by OPEC)
   Yang, Y.; **Tong, F.** Understanding Japan's Energy Concern: An Evaluation of *Asian Energy Outlook* (by The Institute of Energy Economics, Japan)

Other Publications

4. Seki, S; **Tong, F.**; Hendrickson, C.; Biehler, A.; Jaramillo, P. Which Alternative Fuel Technology is Best for Transit Buses? January 2017. Policymaker Guide produced by Scott Institute for Energy Innovation & Traffic21 Institute at Carnegie Mellon University. *Available at http://www.cmu.edu/energy/education-outreach/policymaker-outreach/guides.html.*
3. **Tong F.**; Peña, I.; Azevedo, I. Greening Giants: The Good, the Bad, and the Ugly, *TheEnergyCollective*, December 5, 2014. http://theenergycollective.com/inesliaz/2165626/greening-giants-good-bad-and-ugly.
2. Sun, Z.; Feng, L..; **Tong, F.**; Yang, S. Comparative studies on curriculums of energy economics & management majors in Chinese and overseas universities. *Research in Higher Education of Engineering*, **2017**, 166, 130-134. (in Chinese)
1. Yang, Y.; **Tong, F.** What's inside the 'energy bible'? An Evaluation of *World Energy Outlook* Series, *Macroeconomics*, **2012**, 4, 3-13. (in Chinese)

Media Coverage

Full list available upon request.

6. "Natural Gas Adoption And Mitigating China's Coal Use", Science Trends, June 11, 2018, https://sciencetrends.com/natural-gas-adoption-and-mitigating-chinas-coal-use/
5. "Electric buses are coming, and they're going to help fix 4 big urban problems", Vox, October 24, 2017, https://www.vox.com/energy-and-environment/2017/10/24/16519364/electric-buses
4. "CMU analysis finds BEVs powered with natural gas-based electricity have about 40% of the lifecycle GHGs of a conventional gasoline vehicle", Green Car Congress, August 21, 2015, http://www.greencarcongress.com/2015/08/20150821-cmu.html
3. "GHG Benefits Limited When Using NatGas", CSP Daily News, August 12, 2015, http://www.cspnet.com/fuels-news-prices-analysis/fuels-analysis/articles/ghg-benefits-limited-when-using-natgas
2. "CMU study compares lifecycle GHGs of natural gas pathways for MHDVs; MD BEVs can deliver large reductions, but diesel hard to beat for Class 8", Green Car Congress, May 27, 2015, http://www.greencarcongress.com/2015/05/20150527-cmu.html
1. "A Reality Check on a Plan for a Swift Post-Fossil Path for New York", New York Times, June 18, 2013, https://dotearth.blogs.nytimes.com/2013/06/18/a-reality-check-on-a-plan-for-a-swift-post-fossil-path-for-new-york/

Teaching

Teaching Assistant and Guest Lecturer. 19-653/24-640 Climate Change Mitigation. Carnegie Mellon University, 2016 Spring.

- Course descriptions: Graduate-level course with focus on science, technology, social science, and public policy issues related to climate change sciences and mitigation, offered jointly by Department of Mechanical Engineering and Department of Engineering and Public Policy.
- My responsibilities: (1) helped design and graded problem sets, in-class quizzes, mid-term exams, and final exams; (2) held tutorial sessions and office hours, and led in-class paper discussions to help students learn by themselves; (3) served as a guest lecturer and gave two lectures on *Natural Gas and Climate Change*, and *Transportation and Climate Change*.

Leading Teaching Assistant, and Project Manager. 19-452/88-452/90-720 Project Course: Providing Information to Non-English Speakers during Disasters. Carnegie Mellon University, 2014 Fall.

- Course descriptions: Engineering and liberal arts undergraduate students work together on a cutting edge open-ended, real-world project. Project deliverables include two formal presentations and a comprehensive technical report, which are examined by an external review panel of real-world experts.
- My responsibilities: (1) Worked closely with instructors to design the course, track students' progress, evaluate and discuss coaching strategies, and grade students' performance; (2) Met with students in and out of classroom to help them work together effectively; (3) Provided critical feedback to students on their analytical work, presentations, and written reports; (4) Presented guest lectures on visual design (figures and tables) and writing strategies.

Guest Panelist. 19-425/19-625 Sustainable Energy for the Developing World. Carnegie Mellon University, 2015 Spring.

- Course descriptions: An upper-level undergraduate/graduate course examines the current state of energy systems in developing countries and the challenges these countries will face to sustainably meet their energy needs during the 21st century.
- My responsibilities: Served as a guest panelist for discussion and Q&A with students about energy issues in developing areas of the world.

Professional Activities

Invited Talks

2019 Southern University of Science and Technology (Shenzhen, Guangdong, China)
2018 National Renewable Energy Laboratory (Golden, CO, U.S.)
Building Technologies Office, U.S. Department of Energy (Washington, D.C, U.S.)
School of Public Policy and Management, Tsinghua University (Beijing, China)
2017 Center for Air, Climate and Energy Solutions (CACES) (a U.S. EPA funded research center) (Stanford, CA, U.S.)
School of Chemical Engineering and Technology, Sun Yat-sen University (Guangzhou, Guangdong, China)
U.S. Department of Transportation (Washington, D.C, U.S.)

Carnegie Mellon University's policy briefing event at the Cannon House Office Building ("*Pipelines, Trucks, Buses and Automobiles: Where, When, Which?*") (Washington, D.C., U.S.)
National Governors Association (NGA) (Washington, D.C., U.S.)
Energy Systems Division, Argonne National Laboratory (Argonne, IL, U.S.)
National Resources Defense Council (NRDC) (New York City, NY, U.S.)

2016 Center for Air, Climate and Energy Solutions (CACES) (a U.S. EPA funded research center) (Pittsburgh, PA, U.S.)
Scott Hall Dedication Event, Carnegie Mellon University (Pittsburgh, PA, U.S.)
School of Business Administration, China University of Petroleum, Beijing (Beijing, China)

2015 *STEPS Workshop: Technological, Economic and Environmental Potential of Natural Gas as a Sustainable Transportation Fuel in the US*, Institute of Transportation Studies (ITS), University of California, Davis (Davis, CA, U.S.)

2014 Institute of Transportation Studies (ITS), University of California, Davis (Davis, CA, U.S.)

Conference Presentations/Posters with Peer-reviewed Abstracts

Acronyms: IAEE = International Association for Energy Economics; USAEE = United States Association for Energy Economics; ISIE = International Society for Industrial Ecology; ISSST = International Symposium on Sustainable Systems and Technology; GRC = Gordon Research Conference; GRS = Gordon Research Seminar; TRB = Transportation Research Board; AAAS = American Association for the Advancement of Science; ASCE = American Society of Civil Engineers

2018 Young Environmental Scholars Conference, Stanford University (Stanford, CA, U.S.)
IAEE-USAEE (Washington D.C., U.S.)
ISSST (Buffalo, NY, U.S)
GRC & GRS (Les Diablerets, Switzerland)

2017 IAEE-USAEE (Houston, TX, U.S.)
ISIE-ISSST (Chicago, IL, U.S.)
Engineering Sustainability (Pittsburgh, PA, U.S.)
TRB (Washington, D.C., U.S.)

2016 ISSST (Phoenix, AZ, U.S.)
AAAS (Washington D.C., U.S.)

2015 Energy & Resource Systems Engineering (Beijing, China)
IAEE-USAEE (Pittsburgh, PA, U.S.)
ISSST (Dearborn, MI, U.S.)

2014 Energy Policy Research Conference (San Francisco, CA, U.S.)
ASCE Shale Energy Engineering (Pittsburgh, PA, U.S.)
IAEE-USAEE (New York City, NY, U.S.)

Guest editors for Peer-reviewed Journals

Regional Environmental Change – Topical Collection "Mitigation and adaptation strategies under uncertainties in East Asia"

Academic Conference Program Committee
International Symposium on Sustainable Systems and Technology (ISSST) 2018.

Academic Conference Session Chairs
United States Association of Energy Economics (USAEE) Annual Meeting 2018; International Symposium on Sustainable Systems and Technology (ISSST) 2018; International Society for Industrial Ecology-International Symposium on Sustainable Systems and Technology (ISIE-ISSST) 2017 Joint Conference.

Referee for Peer-Reviewed Journals
Proceedings of the National Academy of Sciences; *Environmental Science & Technology*; *Applied Energy*; *Journal of Cleaner Production*; *Journal of Industrial Ecology*; *Energy Policy*; *Transportation Research Part D: Transport & Environment*; *Transportation Research Record; Transport Policy*; *International Journal of Sustainable Transportation*, *Sustainability*; *Energies*; *Social Sciences*; *Environmental Pollution*; *Energy, Ecology and Environment*; *Weather, Climate and Society; Journal of Natural Gas Science & Engineering;*

Referee for Academic Conferences
Transportation Research Board (TRB) Annual Meeting (2018 &2019); International Symposium on Sustainable Systems and Technology (ISSST) 2018; International Society for Industrial Ecology-International Symposium on Sustainable Systems and Technology (ISIE-ISSST) 2017 Joint Conference; Chinese Overseas Transportation Association (COTA) International Conference for Transportation Professionals (CICTP2017)

Referee for Reports
National Renewable Energy Laboratory (NREL), PRIME coalition (a nonprofit organization partnering with philanthropists to place charitable capital into market-based solutions to climate change)

Professional Affiliations
American Chemistry Society (ACS), *International Society of Industrial Ecology (ISIE)*, *American Association for the Advancement of Science (AAAS)*, *International Association of Energy Economics (IAEE)/United States Association for Energy Economics (USAEE)*

Previous Employment

Department of Global Ecology, Carnegie Institution for Science, Stanford, CA, U.S.
Postdoctoral Research Scientist in Dr. Ken Caldeira's group, 2017/08-2019/01

Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA, U.S.
Postdoctoral Research Associate for Prof. Inês Azevedo and Prof. Jeremy Michalek, 2016/10-2017/06.

Research Assistant for Prof. Paulina Jaramillo and Prof. Inês Azevedo, 2012/07-2016/09.
Research Assistant for Prof. Chris Hendrickson, 2014/05-2016/12.

Energy Research Institute, National Development and Reform Commission, Beijing, China
Research Assistant for Dr. Yufeng Yang; Internship: 2010/05-2011/06; Full-time employment: 2011/06-2012/06.

- Analyzed coal and electricity markets in China to understand the price regimes and conflicts.
- Analyzed energy outlook publications as well as developed the first China Energy Outlook.

Tsinghua University, Research Institute of Information Technology (RIIT), Beijing, China
Research Assistant for Prof. Yunzhou Li, 2009/10-2011/06.

- Built a link-level physical-layer simulation tool for LTE-Advanced communication technology.
- Proposed and examined the performance for reference signal designs in channel estimation.

Research Assistant for Prof. Mingxing Xu, 2009.

- Implemented a voiceprint application on a Symbian S60 cellphone with teammates.

EMC Computer System (China) Co., Ltd, Beijing, China
Software Engineer, summer internship, 2009/06-2009/09.

Skills

Programming: Python, Matlab, ArcGIS, R, Stata, Eviews, Java, C/C++, SQL, @Risk, Analytica.

Coursework

I have rigorous training in multiple fields, including policy analysis, quantitative methods, economics, environmental engineering, computer science and engineering, and electrical engineering. Full transcripts are available upon request.