

Aryeh (Ari) Gold-Parker, Ph.D.

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ENERGY AND ENVIRONMENTAL ECONOMICS, INC.
Consultant III

San Francisco, CA

Dr. Gold-Parker joined E3 in 2018 after completing his Ph.D. in Chemistry from Stanford University. To date, his work at E3 has analyzed deep decarbonization strategies for a range of clients, with a focus on understanding and addressing long-term challenges related to building electrification. He has also enhanced E3's modeling capabilities by developing new tools for understanding the impacts of building electrification, both on electric loads and on natural gas revenue requirements and rates. In addition, he has worked to adopt E3's statewide carbon emissions models for the entire U.S. economy. Dr. Gold-Parker's doctoral research, which was published in *Nature Communications* and the *Proceedings of the National Academy of Sciences*, developed and tested next-generation hybrid perovskite materials for solar panels. Prior to completing his Ph.D. at Stanford, Dr. Gold-Parker earned a B.A. in Chemistry and Physics from Harvard University. Notable E3 projects include:

- **The Role of Natural Gas in a Carbon-Constrained Future, California Energy Commission, 2018-19.** Modeled gas utility revenue requirements in different gas throughput scenarios consistent with California's greenhouse gas reduction targets. Developed a model that illustrates how, as building electrification becomes more widespread, declines in gas throughput will impact rates and bills for an ever-shrinking gas customer base. Identified gas system transition strategies, including selective decommissioning of assets and avoiding unnecessary new investments, that can help to mitigate customer bill impacts.
- **Heat Pump Model Development for High-Electrification Scenarios, 2018-19.** Developed a tool that models aggregated, system-level load shapes from the increased use of heat pumps in electrified buildings. The model combines existing data on buildings, historical weather patterns, and heat pump operation to forecast heating demands and simulate hourly electric loads from space and water heating.
- **Modeling Coal Plant Operations Under Carbon Pricing Scenarios, Confidential Non-Profit Organization, 2018-19.** Using unit-level operations data and hourly historical market prices, developed an Excel-based tool to model simplified coal unit dispatch. Analyzed the impact of future carbon prices and capacity values on the operations and profitability of all coal-fired units in a Midwest state. Results informed the client's policy objectives and state-level strategy.

MIKE TONEY RESEARCH GROUP

Menlo Park, CA

SLAC National Accelerator Laboratory – Ph.D. Student Researcher

2013 – 2018

- Studied chemical and physical properties of perovskite materials for next-generation solar cells
- Contributed to successful proposals for research grants from the Department of Energy
- Managed international and interdisciplinary teams of researchers on several projects leading to peer-reviewed publications
- Worked with staff at SLAC National Lab to develop Python software for analyzing results of materials science measurements

ALAN ASPURU-GUZZI RESEARCH GROUP

Harvard University – Undergraduate Student Researcher

Cambridge, MA

2009 – 2012

- Performed computational research for the Clean Energy Project, a distributed computing project that screens organic molecules for use in solar cells

THE ENERGY SEMINAR

Stanford University – Course Assistant

Palo Alto, CA

2014 – 2017

- Assisted in managing a weekly seminar that brings together Stanford’s energy community
- 2017 speakers included Danny Cullenward, Sila Kiliccote, Michael Mastrandrea, Ren Orans, and Mason Willrich

RISING ENVIRONMENTAL LEADERS PROGRAM

Stanford University – Fellow

Washington, D.C. & Sacramento, CA

2016

- Received fellowship to attend week-long science policy workshop for 20 Stanford students
- Met with congressional, White House, and federal agency staff, think tanks, and NGOs
- Attended a 2-day workshop in Sacramento focused on California energy and water policy

Education

Stanford University

Ph.D., Chemistry

Palo Alto, CA

2018

National Science Foundation Graduate Research Fellowship

2014

National Defense Science and Engineering Graduate Fellowship

2014

Harvard University

B.A., Chemistry and Physics

Cambridge, MA

2012

Selected Publications

1. Wei, M., de Arquer, F. P. G., Walters, G., Yang, Z., Quan, L. N., Kim, Y., Sabatini, R., Quintero-Bermudez, R., Gao, L., Fan, J. Z., Fan, F., Gold-Parker, A., Toney, M. F., & Sargent, E. H. (2019). “Ultrafast narrowband exciton routing within layered perovskite nanoplatelets enables low-loss luminescent solar concentrators.” *Nature Energy*. <https://doi.org/10.1038/s41560-018-0313-y>
2. Belisle, R. A., Bush, K. A., Bertoluzzi, L., Gold-Parker, A., Toney, M. F., & McGehee, M. D. (2018). “Impact of Surfaces on Photoinduced Halide Segregation in Mixed-Halide Perovskites.” *ACS Energy Letters*, 3(11), 2694–2700. <https://doi.org/10.1021/acseenergylett.8b01562>
3. Bush, K. A., Rolston, N., Gold-Parker, A., Manzoor, S., Hausele, J., Yu, Z. J., Raiford, J. A., Cheacharoen, R., Holman, Z. C., Toney, M. F., Dauskardt, R. H., & McGehee, M. D. (2018). “Controlling Thin-Film Stress and Wrinkling during Perovskite Film Formation.” *ACS Energy Letters*, 3(6), 1225–1232. <https://doi.org/10.1021/acseenergylett.8b00544>
4. Gold-Parker, A., Gehring, P. M., Skelton, J. M., Smith, I. C., Parshall, D., Frost, J. M., Karunadasa, H. I., Walsh, A., & Toney, M. F. (2018). “Acoustic phonon lifetimes limit thermal transport in methylammonium lead iodide.” *Proceedings of the National Academy of Sciences*, 115(47),

11905–11910. <https://doi.org/10.1073/pnas.1812227115>

5. Leijtens, T., Prasanna, R., Bush, K. A., Eperon, G. E., Raiford, J. A., Gold-Parker, A., Wolf, E. J., Swifter, S. A., Boyd, C. C., Wang, H.-P., Toney, M. F., Bent, S. F., & McGehee, M. D. (2018). "Tin-lead halide perovskites with improved thermal and air stability for efficient all-perovskite tandem solar cells." *Sustainable Energy & Fuels*, 2(11), 2450–2459. <https://doi.org/10.1039/C8SE00314A>
6. Quintero-Bermudez, R., Gold-Parker, A., Proppe, A. H., Munir, R., Yang, Z., Kelley, S. O., Amassian, A., Toney, M. F., & Sargent, E. H. (2018). "Compositional and orientational control in metal halide perovskites of reduced dimensionality." *Nature Materials*, 17(10), 900–907. <https://doi.org/10.1038/s41563-018-0154-x>
7. Rolston, N., Bush, K. A., Printz, A. D., Gold-Parker, A., Ding, Y., Toney, M. F., McGehee, M. D., & Dauskardt, R. H. (2018). "Engineering Stress in Perovskite Solar Cells to Improve Stability." *Advanced Energy Materials*, 8(29), 1802139. <https://doi.org/10.1002/aenm.201802139>
8. Stone, K. H., Gold-Parker, A., Pool, V. L., Unger, E. L., Bowring, A. R., McGehee, M. D., Toney, M. F., & Tassone, C. J. (2018). "Transformation from crystalline precursor to perovskite in PbCl₂-derived MAPbI₃." *Nature Communications*, 9(1), 3458. <https://doi.org/10.1038/s41467-018-05937-4>
9. Leijtens, T., Prasanna, R., Gold-Parker, A., Toney, M. F., & McGehee, M. D. (2017). "Mechanism of Tin Oxidation and Stabilization by Lead Substitution in Tin Halide Perovskites." *ACS Energy Letters*, 2(9), 2159–2165. <https://doi.org/10.1021/acseenergylett.7b00636>
10. Prasanna, R., Gold-Parker, A., Leijtens, T., Conings, B., Babayigit, A., Boyen, H.-G., Toney, M. F., & McGehee, M. D. (2017). "Band Gap Tuning via Lattice Contraction and Octahedral Tilting in Perovskite Materials for Photovoltaics." *Journal of the American Chemical Society*, 139(32), 11117–11124. <https://doi.org/10.1021/jacs.7b04981>
11. Slavney, A. H., Leppert, L., Bartesaghi, D., Gold-Parker, A., Toney, M. F., Savenije, T. J., Neaton, J. B., & Karunadasa, H. I. (2017). "Defect-Induced Band-Edge Reconstruction of a Bismuth-Halide Double Perovskite for Visible-Light Absorption." *Journal of the American Chemical Society*, 139(14), 5015–5018. <https://doi.org/10.1021/jacs.7b01629>
12. Pool, V. L., Gold-Parker, A., McGehee, M. D., & Toney, M. F. (2015). "Chlorine in PbCl₂-Derived Hybrid-Perovskite Solar Absorbers." *Chemistry of Materials*, 27(21), 7240–7243. <https://doi.org/10.1021/acs.chemmater.5b03581>
13. Unger, E. L., Bowring, A. R., Tassone, C. J., Pool, V. L., Gold-Parker, A., Cheacharoen, R., Stone, K. H., Hoke, E. T., Toney, M. F., & McGehee, M. D. (2014). "Chloride in Lead Chloride-Derived Organo-Metal Halides for Perovskite-Absorber Solar Cells." *Chemistry of Materials*, 26(24), 7158–7165. <https://doi.org/10.1021/cm503828b>
14. Hachmann, J., Olivares-Amaya, R., Atahan-Evrenk, S., Amador-Bedolla, C., Sánchez-Carrera, R. S., Gold-Parker, A., Vogt, L., Brockway, A. M., & Aspuru-Guzik, A. (2011). "The Harvard Clean Energy Project: Large-Scale Computational Screening and Design of Organic Photovoltaics on the World Community Grid." *The Journal of Physical Chemistry Letters*, 2(17), 2241–2251. <https://doi.org/10.1021/jz200866s>

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