

# Anna P. Goldstein, Ph.D.

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<http://annagoldste.in>

Executive Director, [Energy Transition Institute](#)  
Research Assistant Professor, Environmental Conservation  
University of Massachusetts Amherst

## EDUCATION

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University of California, Berkeley, Ph.D. in Chemistry, Designated Emphasis: Nanoscale Science and Engineering Dissertation: “Insights into the Controllable Chemical Composition of Metal Oxide Nanowires and Graphene Aerogels”	2014
University of North Carolina at Chapel Hill, M.S. in Chemistry	2009
University of North Carolina at Asheville, B.S. in Chemistry, <i>summa cum laude</i> Thesis: “Steam Reforming of Ethanol over Rhodium(111): Elucidating the Reaction Mechanism from Periodic Density Functional Theory”	2007

## PROFESSIONAL EXPERIENCE

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Executive Director, Energy Transition Institute, University of Massachusetts Amherst	2021-present
Research Assistant Professor, Department of Environmental Conservation, University of Massachusetts Amherst	2021-present
Senior Research Fellow, Department of Mechanical and Industrial Engineering, University of Massachusetts Amherst	2019-2021
Project Associate, Industrial Economics, Inc. Developed tools to measure benefits from applied research and development funding from California’s electric utilities, focusing on renewables integration.	2018-2020
Postdoctoral Researcher, Carnegie Institution for Science, Department of Global Ecology and Stanford University, Global Climate and Energy Project	2017-2018
Postdoctoral Research Fellow, Belfer Center for Science and International Affairs, Harvard Kennedy School, Science Technology and Public Policy program, Energy Technology Innovation Policy research group	2015-2017
Independent Consultant, National Academies of Sciences, Engineering, and Medicine Measured innovation outcomes for energy technology research funding by ARPA-E and assessed the effectiveness of active program management strategies.	2015-2016
Research Fellow, Project Drawdown Modeled future adoption and emissions scenarios for climate solutions including photovoltaics, electric vehicles and hybrid vehicles.	2015
Program Evaluation Specialist, Valley Venture Mentors (VVM) Designed and implemented an evaluation of program efficacy for a business accelerator.	2015
Graduate Researcher, UC Berkeley Discovered previously unknown crystal structure of indium and iron inclusions in zinc oxide nanowires for use in solar water splitting. Studied the formation mechanism of graphene aerogels with high surface area and capacitance for use in energy storage devices.	2009-2014

Graduate Researcher, UNC Chapel Hill	2007-2009
Demonstrated the enhanced potential of light-absorbing molecules for use as an antenna in solar cells by embedding in hard media.	
Undergraduate Researcher, UNC Asheville	2006-2007
Calculated the most favorable mechanism for the catalytic reaction of ethanol to produce hydrogen gas for fuel cells, using computational quantum mechanics.	

## RESEARCH GRANTS

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- PI with Mike Bloomberg, Jimi Oke, and Jay Taneja (UMass Amherst), “Cost-benefit analysis of co-deploying optical fiber and electric cabling underground.” American Public Power Association via subcontract with Massachusetts Municipal Wholesale Electric Company (MMWEC), \$123,198. 2021.
- Co-PI with Timothy Carter (Second Nature): “Exploring New Models for Higher Education’s Climate Solutions Research Enterprise.” Alfred P. Sloan Foundation, \$50,000. 2021.
- Co-PI with Erin Baker (UMass Amherst), “How can we forecast technological change in complex energy technologies? An empirical study using patent data.” Alfred P. Sloan Foundation, \$355,753. 2020.
- Co-PI with Krista Harper, Erin Baker, and Matthew Lackner (UMass Amherst), “Energy Transition Institute – Renewable Energy Equity Partnership (ETI-REEP).” UMass Amherst Institute of Diversity Sciences, \$11,997. 2020.

## JOURNAL ARTICLES

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14. E. Baker; A. P. Goldstein; I. L. Azevedo, “A perspective on equity implications of net zero energy systems,” *Energy and Climate Change*, 2021, 2, 100047. <https://doi.org/10.1016/j.egycc.2021.100047>
13. B. Sun; S. Kolesnikov; A. P. Goldstein; G. Chan, “A dynamic approach for identifying technological breakthroughs with an application in solar photovoltaics,” *Technological Forecasting & Social Change*, 2021, 165, 120534. <https://doi.org/10.1016/j.techfore.2020.120534>
12. A. P. Goldstein; C. Dobliger; E. Baker; L. Diaz Anadon, “Patenting and business outcomes for cleantech startups funded by the Advanced Research Projects Agency-Energy,” *Nature Energy*, 2020, 5, 803-810. <https://doi.org/10.1038/s41560-020-00683-8>
11. A. P. Goldstein; C. Dobliger; E. Baker; L. Diaz Anadon, “Startups supported by ARPA-E were more innovative than others but an investment gap may remain,” *Nature Energy*, 2020, 5, 741-742. <https://doi.org/10.1038/s41560-020-00691-8>
10. A. P. Goldstein; M. Kearney, “Know When to Fold ‘Em: An Empirical Description of Risk Management in Public Research Funding,” *Research Policy*, 2020, 49, 103873. <https://doi.org/10.1016/j.respol.2019.103873>
9. P. Azoulay; E. Fuchs; A. P. Goldstein; M. Kearney, “Funding Breakthrough Research: Promises and Challenges of the ‘ARPA Model’,” in: *Innovation Policy and the Economy*, 2019, 19, 69-96. University of Chicago Press. <https://doi.org/10.1086/699933>
8. A. P. Goldstein; V. Narayanamurti, “Simultaneous Pursuit of Discovery and Invention in the US Department of Energy,” *Research Policy*, 2018, 47, 1505. <https://doi.org/10.1016/j.respol.2018.05.005>
7. G. Chan; A. P. Goldstein; A. Bin-Nun; L. Diaz Anadon; V. Narayanamurti, “Six Principles for Energy Innovation,” *Nature*, 2017, 552, 25. <https://doi.org/10.1038/d41586-017-07761-0>
6. T. Pham\*; A. P. Goldstein\*; J. Lewicki; S. O. Kucheyev; C. Wang; T. P. Russell; M. A. Worsley; L. Woo; W. Mickelson; A. Zettl, “Nanoscale Structure and Superhydrophobicity of sp<sup>2</sup>-Bonded Boron Nitride Aerogels,” *Nanoscale*, 2015, 7, 10449. <https://doi.org/10.1039/C5NR01672J> \* = equal contribution

5. A. P. Goldstein; W. Mickelson; A. Machness; G. Lee; M. A. Worsley; L. Woo; A. Zettl, “Simultaneous Sheet Cross-Linking and Deoxygenation in the Graphene Oxide Sol-Gel Transition,” *J. Phys. Chem. C*, 2014, *118*, 28855. <https://doi.org/10.1021/jp5092027>
4. A. P. Goldstein; S. C. Andrews; R. F. Berger; J. B. Neaton; P. Yang, “Zigzag Inversion Domain Boundaries in Indium Zinc Oxide-Based Nanowires: Structure and Formation,” *ACS Nano*, 2013, *7*, 10747. <https://doi.org/10.1021/nn403836d>
3. M. Rousseas; A. P. Goldstein; W. Mickelson; M. A. Worsley; L. Woo; A. Zettl, “Synthesis of Highly Crystalline sp<sup>2</sup>-Bonded Boron Nitride Aerogels,” *ACS Nano*, 2013, *7*, 8540. <https://doi.org/10.1021/nn402452p>
2. T. E. Knight; A. P. Goldstein; M. K. Brennaman; T. Cardolaccia; A. Pandya; J. M. DeSimone; T. J. Meyer, “Influence of the Fluid-to-Film Transition on Photophysical Properties of MLCT Excited States in a Polymerizable Dimethacrylate Fluid,” *J. Phys. Chem. B*, 2011, *115*, 64. <https://doi.org/10.1021/jp107077t>
1. P. G. Hoertz; A. P. Goldstein; C. Donley; T. J. Meyer, “Using the Voids. Evidence for an Antenna Effect in Dye-Sensitized Mesoporous TiO<sub>2</sub> Thin Films,” *J. Phys. Chem. B*, 2010, *114*, 14772. <https://doi.org/10.1021/jp103867j>

## OTHER PUBLICATIONS

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- A. P. Goldstein, “Federal Policy to Accelerate Innovation in Long-Duration Energy Storage: The Case for Flow Batteries,” Information Technology & Innovation Foundation, Apr. 7, 2021. <https://itif.org/publications/2021/04/07/federal-policy-accelerate-innovation-long-duration-energy-storage-case-flow>
- A. P. Goldstein, “Tackling Tough Decarbonization,” *Issues in Science and Technology*, Forum, Winter 2020. <https://issues.org/forum36-2/>
- A. P. Goldstein; V. Narayanamurti, “Our national experiment in R&D for clean energy just turned 10,” op-ed in *The Hill*, Oct. 26, 2019. <https://bit.ly/2OYcXv5>
- A. P. Goldstein; K. Caldeira; S. Benson, “Involving Industry Experts in the Selection of High-Impact Energy Research Projects,” SSRN, 2019. <http://ssrn.com/abstract=3503614>
- A. P. Goldstein; “Why Are We Waiting?: The Logic, Urgency, and Promise of Tackling Climate Change, by Nicolas Stern,” Book review, *Science and Public Policy*, 2017, *44*, 880. <https://doi.org/10.1093/scipol/scx030>
- A. P. Goldstein; M. Kearney, “Uncertainty and Individual Discretion in Allocating Research Funds,” SSRN, 2017. <https://ssrn.com/abstract=3012169>
- A. P. Goldstein; P. Azoulay; J. Graff Zivin; V. Bulovic, “Promoting Energy Innovation with Lessons from Drug Development,” Policy proposal for the Hamilton Project, Brookings, 2017.
- A. P. Goldstein; M. Kearney, “The Impact of Active Program Management on Innovation at ARPA-E,” Consulting report, National Academies of Sciences, Engineering, and Medicine, 2016.
- A. P. Goldstein, “Scientific, Inventive and Market Engagement Metrics of ARPA-E Awards,” Consulting report, National Academies of Sciences, Engineering, and Medicine, 2016.

## MEDIA AND PUBLIC ENGAGEMENT

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- Interview with *Nature*, [The rise of ‘ARPA-everything’ and what it means for science](#), July 8, 2021.
- Interview with *The Economist*, [A growing number of governments hope to clone America’s DARPA](#), June 3, 2021.
- Research covered in *Canary Media*, [Battery Week: Competitors to lithium-ion batteries in the grid storage market](#), May 14, 2021.
- Interview with *Science*, [New U.K. funding agency would tackle innovative research](#). Feb. 19, 2021.

Interview with *Physics Today*, [ARPA-E can't reach the promised land alone](#). Nov. 1, 2020.

Interview with *Federal News Network*, [How far do clean energy companies go after getting help from ARPA-E?](#) Oct. 23, 2020.

Research covered in *Ars Technica*, [Here's how DOE's first crop of risky energy tech has done](#). Sep. 20, 2020.

Written evidence to UK Parliament, House of Commons Science and Technology Committee, RFA0065 - A new UK research funding agency, Sep. 10, 2020.

Interview with *Vox*, [Many technologies needed to solve the climate crisis are nowhere near ready](#). July 14, 2020.

Interview with *Idea Machines*, [Funding Breakthrough Research with Anna Goldstein](#). Feb. 26, 2020.

## PATENTS

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A. K. Zettl, M. Rousseas, A. P. Goldstein, W. Mickelson, M. A. Worsley, L. Woo, "Crystalline boron nitride aerogels," United States Patent No. US 9611146

A. K. Zettl, M. Rousseas, A. P. Goldstein, W. Mickelson, M. A. Worsley, L. Woo, "Crystalline boron nitride aerogels," United States Patent No. US 9840414

## TEACHING

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Lecturer at Boston University, Questrom School of Business Designed and taught Sustainable Energy Practicum for senior Sustainable Energy minors covering grid modernization and decarbonization.	2018
Workshop Facilitator at UC Berkeley Designed and led full-day workshops for graduate students and postdocs on How to Lead Effectively: Skills for Managing Scientists.	2017, 2018
Visiting Instructor at Mount Holyoke College Designed and taught first-year seminar course on Solar Energy: Technology, Policy & Impact covering climate change, basics of power and energy conversion, photovoltaics, and contemporary energy policy.	2014
Graduate Student Instructor, UC Berkeley, Teaching assistant for Advanced Inorganic Chemistry and General Chemistry	2009-2011
Graduate Student Instructor, UNC Chapel Hill, Teaching assistant for Physical Chemistry I and II	2007-2009
Classroom Teacher and Tutor, Kaplan Test Prep and Admissions	2005-2006

## STUDENT MENTORING

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Trained and mentored student researchers

- April Burrage (2021, PhD Econ.)
- Yiwen Wang (2021, PhD Industrial Eng. & Operations Res.)
- De'Andra Graham (2020, MS Eng. Mgmt.)
- Kaitlin Fung (2020-2021, undergraduate Chem. Eng.)
- Neosha Narayanan (2018, high school)
- Alen Amini (2016, MPP/MBA)
- Kevin Chen (2013, high school)
- Gloria Lee (2012, undergraduate Physics)
- Ariella Machness (2012, undergraduate Physics)

Lead Mentor, Summer High-School Apprenticeship Research Program (SHARP) 2010-2012  
Selected, supervised, and trained graduate student mentors

Volunteer, Students for Environmental Energy Development (SEED) 2009-2012  
Guided a group of 10th graders making a video about nuclear energy.  
Organized a team of volunteers to teach 3rd graders about renewable energy.

## MEETINGS AND PRESENTATIONS

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Organizer, NSF 2026: Equitable Energy Transition Workshop I April 2021

Invited Speaker, Economics of Innovation in the Energy Sector, National Bureau of Economic Research Conference (Remote) Sep. 11, 2020

Session Moderator and Organizer, Enhancing Federal Clean Energy Innovation National Academies of Sciences, Engineering and Medicine Workshop Series (Remote) Aug. 4, 2020

Invited Speaker, Wind Energy Seminar Series University of Massachusetts Amherst, Amherst, MA Feb. 13, 2020

Invited Speaker, La Follette School of Public Affairs, University of Wisconsin–Madison Nov. 14, 2019

Presenter, Atlanta Conference on Science, Technology and Innovation Policy, Atlanta, GA Oct. 14-16, 2019

Participant, University Energy Institute Leadership Summit, Carnegie Mellon University, Pittsburgh, PA Sep. 25-26, 2019

Presenter, East-West Center and Korea Development Institute, Conference on Innovation-Driven Economic Growth, Honolulu, HI June 20-21, 2019

Organizer, Workshop on Guiding Low-Carbon Innovation and Investment Carnegie Energy Innovation, Stanford, CA June 18-19, 2019

Participant, Energy Innovation Boot Camp for Early Career Scholars, Information Technology & Innovation Foundation, Washington, DC May 20-24, 2019

Presenter, Association for Public Policy Analysis and Management Fall Research Conference, Washington, DC Nov. 10, 2018

Participant, Workshop on Promoting Digital Innovations to Enable Clean Energy Systems Council on Foreign Relations, New York, NY Feb. 22-23, 2018

Invited Speaker, Center for International Environment & Resource Policy Fletcher School, Tufts University, Medford, MA Sep. 25, 2017

Invited Speaker, Consortium for Energy Policy Research, Harvard Kennedy School, Cambridge, MA Sep. 18, 2017

Participant, Workshop on Harnessing International Cooperation to Advance Clean Energy Innovation, Council on Foreign Relations, New York, NY	Mar. 29-30, 2017
Presenter, Precourt Institute for Energy, Stanford University, Stanford, CA	Feb. 23, 2017
Presenter, National Bureau of Economic Research Productivity and Innovation Seminar, Cambridge, MA	Oct. 18, 2016
Discussant, Association for Public Policy Analysis and Management Fall Research Conference, Miami, FL	Nov. 12, 2015
Poster presenter, American Chemical Society, National Meeting, Salt Lake City, UT	Mar. 22-26, 2009
Poster presenter, American Chemical Society, National Meeting, New Orleans, LA	April 6-10, 2008
Poster presenter, National Conference on Undergraduate Research Dominican University, San Rafael, CA	April 12-14, 2007

## **VOLUNTEER ACTIVITIES**

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Member, Board of Directors, Pre-Scientist, Inc. 501(c)(3) organization to support equitable access to science education	2018-present
Co-Founder and Organizer, Letters to a Pre-Scientist Program that connects middle school students in low-income communities with scientists from around the world to serve as pen pals	2011-2018
VP of Communities, Berkeley Energy and Resources Collaborative (BERC) Network of student groups across UC Berkeley coordinating energy-related activities	2013-2014
Founder, Science Leadership and Management (SLAM) Seminar series to provide early career researchers with leadership skill development.	2012-2014
Co-Chair, Task Force for Graduate Student and Postdoctoral Professional Development Group commissioned by the Graduate Division of UC Berkeley; led to the creation of a new Center for Graduate Professional Services	2013-2014
Member, Graduate Life Committee, UC Berkeley Department of Chemistry Volunteer group that surveyed students regarding faculty mentoring and expectations	2013
Founding Web Editor, The Berkeley Science Review (BSR) Website and magazine publishing original science writing	2010-2013
Organizer, Photovoltaic (PV) Idea Lab Informal group of researchers working on PV technology meeting biweekly to share results	2010-2012

## **AWARDS AND HONORS**

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Graduate Assistance in Areas of National Need (GAANN) Fellowship  
 National Science Foundation Graduate Research Fellowship: Honorable Mention  
 Francis P. Venable Fellowship, UNC-CH Department of Chemistry  
 Most Valuable Senior, UNCA Department of Chemistry  
 Outstanding Performance in Physical Chemistry, UNCA Department of Chemistry  
 Outstanding Performance in Organic Chemistry, UNCA Department of Chemistry  
 Undergraduate Award in Analytical Chemistry, American Chemical Society  
 Barry M. Goldwater Scholarship: Honorable Mention  
 Southeastern Catalysis Society Eastman Chemical Award  
 Research Scholarship, North Carolina Space Grant

## RELEVANT COURSEWORK

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Empirical Methods II (audit) Harvard Kennedy School	2016
Economics of Ideas, Innovation and Entrepreneurship (audit) MIT Sloan School of Management	2015
Energy Policy (audit) Harvard Kennedy School	2015
Creating Jobs through Better Government Policies for Innovation and Education Goldman School of Public Policy, UC Berkeley	2014
Public Leadership and Management Goldman School of Public Policy, UC Berkeley	2013

## OTHER QUALIFICATIONS

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Analytical tools: ATLAS.ti, MATLAB, Microsoft Excel, Python, SQL, Stata

Expert reviewer for:

Alfred P. Sloan Foundation

*Journal of Cleaner Production*

Massachusetts Clean Energy Center

*Nature Energy*

National Academies of Sciences, Engineering and Medicine

National Science Foundation

*Research Policy*

Environmental Protection Agency