

Kyri Alysa Baker, Ph.D.

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Boulder, CO, USA

Research Interests	Power systems, Optimization, Smart Grid, Renewable Energy, Building-to-Grid Integration, Applications of Machine Learning in Energy
Current Position	Assistant Professor August 2017 - Present <i>University of Colorado Boulder</i> Department of Civil, Environmental, and Architectural Engineering
	Assistant Professor (by courtesy) August 2017 - Present <i>University of Colorado Boulder</i> Department of Electrical, Computer, and Energy Engineering
	Fellow May 2020 - Present Renewable and Sustainable Energy Institute (RASEI)
Previous Position	Research Engineer, Power Systems Group Feb. 2016 - August 2017 <i>National Renewable Energy Laboratory</i>
Postdoctoral Position	Postdoctoral Researcher, Residential Buildings Group Jan. 2015 - Feb. 2016 <i>National Renewable Energy Laboratory</i>
Education	Ph.D, Electrical and Computer Engineering 2010 - Dec. 2014 Carnegie Mellon University , Pittsburgh, PA <i>Thesis:</i> "Coordination of Resources across Areas for the Integration of Renewable Generation: Operation, Sizing and Siting of Storage Devices." [Online]
	M.S., Electrical and Computer Engineering 2009-2010 Carnegie Mellon University , Pittsburgh PA
	B.S., Electrical and Computer Engineering 2006-2009 Carnegie Mellon University , Pittsburgh PA
Selected Awards and Honors	CEAE Department Early Career Researcher Award, 2021 National Science Foundation CAREER Award, 2021 Best Paper Runner-up, ACM e-Energy, 2021 Dean's Faculty Fellowship, University of Colorado Boulder, 2021 Best Paper Award, two papers, IEEE Transactions on Power Systems (8 awards given across 1442 papers published from 2017-2019), 2020 Faculty Appreciation Award, (by undergraduate student vote), 2020 Top Ten Performer, ARPA-E Grid Optimization (GO) Competition, 2020 Best Paper Finalist, IEEE Power & Energy Society General Meeting, 2019 Most Innovative Award, NASA BIG Idea Challenge (Faculty advisor), 2019 R&D 100 Award, for <i>foresee</i>, led by NREL, 2018 Best Paper Award Honorable Mention, International Workshop on NILM, 2018 2nd Place, NASA BIG Idea Challenge (Faculty advisor), 2018 Best Paper Award, Power and Energy Conference at Illinois (PECI), 2017 Employee of the Month, National Renewable Energy Lab., Oct. 2016

Patents

(P1) K. Baker, A. Bernstein, and E. Dall’Anese, “Network-Cognizant Voltage Droop Control,” Pub. No. US20180226799A1, awarded Sept. 2020. [Online]

Publications

Since joining CU: 18 journal papers; 23 peer-reviewed conference proceedings

Journal	# Papers	Impact
Applied Energy	3	9.746
Energy Conversion and Management	1	9.709
IEEE Transactions on Smart Grid	2	8.96
Energy Research & Social Science	1	6.834
IEEE Transactions on Power Systems	4	6.663
IEEE Journal of Photovoltaics	1	3.887
Journal of Water Resources Planning and Management	1	3.404
Energies	2	3.004
Acta Astronautica*	1	2.830
New Space*	1	N/A
IEEE Control Systems Letters	1	N/A

Table 1: Journal publications since joining CU in August 2017 and corresponding impact factors. The * denotes publications with the NASA student teams I advised.

Note: underline denotes CU student (at time of submission); double underline denotes undergraduate (at time of submission), and asterisk (*) denotes my PhD advisor(s).

Journal Articles

(J21) J. Busby, K. Baker, M. Bazilian, A. Gilbert, E. Grubert, V. Rai, J. Rhodes, S. Shidore, C. Smith, and M. Webber, “Cascading Risks: Understanding the 2021 Winter Blackout in Texas,” *Energy Research & Social Science*, vol. 77, Jul. 2021. [Online]

(J20) J. Kravits, J. Kasprzyk, K. Baker, and K. Andreadis, “Screening Tool for Dam Hazard Potential Classification Using Machine Learning and Multi-Objective Hyperparameter Tuning,” *Journal of Water Resources Planning and Management*, vol. 147, no. 10, 2021.

(J19) D. Biagioni, P. Graf, X. Zhang, A. Zamzam, K. Baker, and J. King, “Learning-Accelerated ADMM for Distributed DC Optimal Power Flow,” *IEEE Control Systems Letters*, accepted, 2021. [Online]

(J18) J. Hurtt and K. Baker, “Sensitivity Analysis of Photovoltaic System Design Parameters to Passively Mitigate Ramp Rates,” *IEEE Journal of Photovoltaics*, vol. 11, no. 2, pp. 545-551, Mar. 2021. [Online]

(J17) J. Wang, K. Garifi, K. Baker, W. Zuo, Y. Zhang, S. Huang, D. Vrabie, “Optimal Renewable Resource Allocation and Load Scheduling of Resilient Communities,” *Energies*, Special Issue on Building-to-Grid Integration through Intelligent Optimization and Control, Vol. 13, No. 21, Oct 2020. [Online]

(J16) J. Chin, K. Baker, and G. Hug*, “Consumer privacy protection using flexible thermal loads: Theoretical limits and practical considerations,” *Applied Energy*, vol. 281, Jan. 2021. [Online]

(J15) Y. Fu, X. Han, K. Baker, and W. Zuo, “Assessments of Data Centers for Provision of Frequency Regulation,” *Applied Energy*, vol. 277, Nov. 2020. [Online]

(J14) H. Hava, L. Zhou, C. Mehlenbeck, E. Lombardi, A. King, K. Baker, A. Kaufman, and N. Correll, “SIRONA: Sustainable Integration of Regenerative Outer-space Nature

and Agriculture. Part 2 - Design Development and Projected Performance,” *Acta Astronautica*, in press, 2020. [[Online](#)]

(J13) [A. Allen](#), G. Henze, K. Baker, and G. Pavlak, “Evaluation of Low-Exergy Heating and Cooling Systems and Topology Optimization for Deep Energy Savings at the Urban District Level,” *Energy Conversion and Management*, vol. 222, Oct. 2020. [[Online](#)]

(J12) [K. Garifi](#), K. Baker, D. Christensen, and B. Touri, “Convex Relaxation of Grid-Connected Energy Storage System Models with Complementarity Constraints in DC OPF,” *IEEE Transactions on Smart Grid*, vol. 11, no. 5, pp. 4070 - 4079, Sept. 2020. [[Online](#)]

(J11) S. Chakraborty, R. Verzijlbergh, K. Baker, M. Cvetkovic, L. de Vries, and Z. Lukszo, “A Coordination Mechanism for Reducing Price Spikes in Distribution Grids,” *Energies*, Special Issue on Flexibility in Distribution Systems from EVs and Batteries, Vol. 13, No. 10, May 2020 [**Editor’s Choice Paper**]. [[Online](#)]

(J10) K. Baker and A. Bernstein, “Joint Chance Constraints in AC Optimal Power Flow: Improving Bounds through Learning,” *IEEE Transactions on Smart Grid*, Vol. 10., No. 6, Nov. 2019. [[Online](#)]

(J9) Y. Guo, K. Baker, E. Dall’Anese, Z. Hu, and T.H. Summers, “Data-based distributionally robust stochastic optimal power flow, Part I: Methodologies,” *IEEE Transactions on Power Systems*, Vol. 34, No. 2, Mar. 2019 [**Best Paper Award**]. [[Online](#)]

(J8) Y. Guo, K. Baker, E. Dall’Anese, Z. Hu, and T.H. Summers, “Data-based distributionally robust stochastic optimal power flow, Part II: Case Studies,” *IEEE Transactions on Power Systems*, Vol. 34, No. 2, Mar. 2019 [**Best Paper Award**]. [[Online](#)]

(J7) [N. Glascock](#), [B. Huber](#), [C. Cantrall](#), [W. Evonosky](#), [E. Robinson](#), [B. Dharmadasa](#), and K. Baker, “MAFSA: Mars Autonomous and Foldable Solar Array,” *New Space*, Vol. 6, No. 4, Dec. 2018. [[Online](#)]

(J6) K. Baker, A. Bernstein, E. Dall’Anese, and C. Zhao, “Network-Cognizant Voltage Droop Control for Distribution Grids,” *IEEE Transactions on Power Systems*, Vol. 33, No. 2, pp 2098-2108, Mar 2018. [[Online](#)]

(J5) X. Jin, K. Baker, D. Christensen, and S. Isley, “ForeseeTM: A User-Centric Home Energy Management System for Energy Efficiency and Demand Response,” *Applied Energy*, Vol. 205, pp 1583-1595, Nov 2017. [[Online](#)]

(J4) E. Dall’Anese, K. Baker, and T.H. Summers, “Chance-Constrained AC Optimal Power Flow for Distribution Systems with Renewables,” *IEEE Transactions on Power Systems*, Vol. 32, No. 5, pp 3427-3438, Sep 2017. [[Online](#)]

(J3) K. Baker and B. Toomey, “Efficient Relaxations for Joint Chance Constrained AC OPF,” *Electric Power Systems Research*, 148 (2017), pp. 230-236. [[Online](#)]

(J2) K. Baker, G. Hug*, and X. Li*, “Energy Storage Sizing Taking into Account Wind Forecast Uncertainties,” *IEEE Transactions on Sustainable Energy*, Vol. 8, No. 1, pp. 331-340, Jan 2017. [[Online](#)]

(J1) K. Baker, G. Hug*, and X. Li*, “Distributed MPC for Efficient Coordination of Storage and Renewable Energy Sources across Control Areas,” *IEEE Transactions on Smart Grid, Special Issue on Distributed Energy Management Systems*, Vol. 7, No. 2, pp. 992-1001, Mar. 2016 (444 submissions, 20 published). [[Online](#)]

Journal Articles Under Review/Revision

(J23) A. Allen, G. Henze, K. Baker, G. Pavlak, M. Murphy, “Development of a topology optimization framework for district thermal energy systems,” *under review*, 2021.

(J22) A. Ospina, K. Baker, and E. Dall’Anese, “Estimation of Power System Sensitivities: Low-rank Approach and Online Algorithms,” *under review*, 2021.

Book Chapters

(B1) K. Baker, “Power, Buildings, and Other Critical Networks: Integrated Multi-System Operation,” *New Technologies for Power System Operation and Analysis*, H. Jiang, Y. Zhang, and E. Muljadi (Eds.), Cambridge, MA: Academic Press, 2020.

Peer-reviewed Conference Proceedings

(C36) K. Baker, “Solutions to DC OPF are Never AC Feasible,” *ACM e-Energy*, accepted, 2021.

(C35) B. Chen, P. Donti, K. Baker, Z. Kolter, and M. Berges, “Enforcing Policy Feasibility Constraints through Differentiable Projection for Energy Optimization,” *ACM e-Energy* (full paper acceptance rate **22.6%**), [**Best Paper Runner-up**], 2021.

(C34) J. Hurtt and K. Baker, “Minimum Battery Energy Storage System Sizing Integrated with a Photovoltaic Plant Considering Practical Limitations,” *IEEE PowerTech*, accepted, 2021.

(C33) A. Pigott, K. Baker, and C. Mosiman, “Deep Q-Learning for Aggregator Price Design,” *IEEE Power and Energy Society General Meeting*, accepted, 2021.

(C32) C. Crozier and K. Baker, “Optimal Sizing of an Energy Storage Portfolio Considering Multiple Timescales,” *IEEE Power and Energy Society General Meeting*, accepted, 2021.

(C31) J. Kravits, K. Baker, and J. Kasprzyk, “Multi-Objective Optimal Power Flow Considering Emissions and Voltage Violations,” *IEEE Power and Energy Society General Meeting*, accepted, 2021.

(C30) S. Kim, K. Baker, and J. Kasprzyk, “Operational Revenue Insufficiency in Highly Renewable DC and AC-based LMP Markets,” *52nd North American Power Symposium*, accepted, 2020.

(C29) A. Zamzam and K. Baker, “Learning Optimal Solutions for Extremely Fast AC Optimal Power Flow,” *IEEE SmartGridComm*, Dec. 2020. [[Online](#)]

(C28) J. Wang, K. Garifi, K. Baker, W. Zuo, and Y. Zhang, “Optimal Operation for Resilient Communities through a Hierarchical Load Scheduling Framework,” *2020 Building Performance Analysis Conference and SimBuild*, Chicago, IL, 2020. [[Online](#)]

(C27) Y. Fu, W. Zuo, and K. Baker, “Multi-market Optimization of a Data Center without Storage Systems,” *The American Modelica Conference*, Boulder, CO, 2020.

(C26) K. Garifi and K. Baker, “Considering Integer Chance Constraints for Enforcing Flexible Line Flow Ratings,” *American Control Conference*, Denver, CO, 2020. [[Online](#)]

(C25) B. Kreiger, K. Baker, and W.V. Srubar, “Quantifying Grid Interaction Capabilities of Dynamic Building Envelopes,” *ASHRAE Annual Conf.*, Austin, TX, 2020.

(C24) K. Baker, “Learning Warm-Start Points for AC Optimal Power Flow,” *IEEE International Conference on Machine Learning for Signal Processing* (acceptance rate

≈ 48%), Pittsburgh, PA, 2019. [[Online](#)]

(C23) [A. Allen](#), G. Henze, K. Baker, and G. Pavlak, “Analysis of HVAC Systems for Deep Energy Savings at the Urban District Level,” *The International Centre for Sustainable Development of Energy, Water and Environment Systems (SDEWES) Conference*, Dubrovnik, Croatia, 2019.

(C22) [H. Hava](#), L. Zhou, E. Lombardi, [K. Cui](#), [H. Joung](#), [S. Manzano](#), [A. King](#), [H. Kinlaw](#), K. Baker, A. Kaufman, and N. Correll, “SIRONA: Sustainable Integration of Regenerative Outer-space Nature and Agriculture,” *International Conference on Environmental Systems (ICES)*, Boston, MA, 2019.

(C21) S. Chakraborty, M. Cvetkovic, K. Baker, R. Verzijlbergh, and Z. Lukszo, “Consumer Hedging Against Price Volatility Under Uncertainty,” *IEEE PES PowerTech*, Milan, Italy, 2019.

(C20) [K. Garifi](#), K. Baker, D. Christensen, and B. Touri, “Stochastic Home Energy Management Systems with Varying Controllable Resources,” *IEEE Power and Energy Society General Meeting*, Atlanta, GA, 2019.

(C19) S. Chakraborty, K. Baker, M. Cvetkovic, R. Verzijlbergh, and Z. Lukszo, “Directly Constraining Marginal Prices in Distribution Grids Using Demand-Side Flexibility,” *IEEE Power and Energy Society General Meeting [Best Paper Finalist]*, Atlanta, GA, 2019.

(C18) S. Chakraborty, R. Verzijlbergh, M. Cvetkovic, K. Baker and Z. Lukszo, “The Role of Demand-Side Flexibility in Hedging Electricity Price Volatility in Distribution Grids,” *IEEE Innovative Smart Grid Technologies Conference*, Washington DC, 2019.

(C17) K. Baker and A. Bernstein, “Joint Chance Constraints Reductions through Learning in Active Distribution Networks,” *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, Anaheim, CA, 2018.

(C16) [K. Garifi](#), K. Baker, B. Touri, and D. Christensen, “Stochastic Model Predictive Control for Demand Response in a Home Energy Management System,” *IEEE Power and Energy Society General Meeting*, Portland, OR, 2018.

(C15) K. Baker and [K. Garifi](#), “Power Signature Obfuscation using Flexible Building Loads,” *4th International Workshop on Non-Intrusive Load Monitoring*, [**Best Paper Award Honorable Mention**], Austin, TX, 2018. [[Online](#)].

(C14) Y. Guo, K. Baker, E. Dall’Anese, Z. Hu, and T.H. Summers, “Stochastic optimal power flow based on data-driven distributionally robust optimization,” *American Controls Conference*, Milwaukee, WI, 2018. [[Online](#)].

(C13) K. Baker, A. Bernstein, C. Zhao, and E. Dall’Anese, “Network-cognizant Design of Decentralized Volt/VAR Controllers,” *Innovative Smart Grid Technologies (ISGT)*, Arlington, VA, 2017. [[Online](#)].

(C12) X. Jin, K. Baker, S. Isley, and D. Christensen, “User-Preference-Driven Multi-Objective Model Predictive Control of Residential Building Loads and Battery Storage for Demand Response,” *American Controls Conference*, Seattle, WA, 2017 [[Online](#)].

(C11) [X. Zhou](#), L. Chen, E. Dall’Anese, and K. Baker. “Incentive-Based Voltage Regulation in Distribution Networks,” *American Controls Conference*, Seattle, WA, 2017. [[Online](#)]

(C10) [E. Raszmann](#), K. Baker, Y. Shi, and D. Christensen, “Modeling Stationary

Lithium-Ion Batteries for Optimization and Predictive Control,” *Power and Energy Conference at Illinois (PECI)*, [**Best Paper Award**], Champaign, IL, 2017. [[Online](#)]

(C9) E. Dall’Anese, K. Baker, and T.H. Summers, “Adaptive Optimal Power Flow for Distribution Systems under Uncertain Forecasts,” *2016 Conference on Decision and Control (CDC)*, Las Vegas, NV, Dec. 2016. [[Online](#)]

(C8) K. Baker, X. Jin, D. Vaidhynathan, W. Jones, D. Christensen, B. Sparn, J. Woods, H. Sorensen, and M. Lunacek, “Short Paper: Frequency Regulation Services from Connected Residential Devices,” *ACM BuildSys ’16*, Stanford, CA, Nov. 2016. [**5 out of 68 Short Papers accepted \approx 7%**]. [[Online](#)]

(C7) K. Baker, E. Dall’Anese, and T.H. Summers, “Distribution-Agnostic Stochastic Optimal Power Flow for Distribution Grids,” *IEEE North American Power Symposium*, Denver, CO, Sept. 2016. [[Online](#)]

(C6) B. Palmintier, E. Hale, B.-M. Hodge, K. Baker, and T. Hansen, “Experiences integrating transmission and distribution simulations for DERs with the Integrated Grid Modeling System (IGMS),” *Power Systems Computation Conference (PSCC)*, Genoa, Italy, 2016. [[Online](#)]

(C5) F. Ding, B. Mather, N. Ainsworth, P. Gotseff, and K. Baker, “Locational Sensitivity Investigation on PV Hosting Capacity and Fast Track PV Screening,” *IEEE PES T&D*, Dallas, TX, 2016 [[Online](#)].

(C4) K. Baker, G. Hug*, and X. Li*, “Optimal Storage Sizing using Two-Stage Stochastic Optimization for Intra-Hourly Dispatch,” *IEEE North American Power Symposium*, Pullman, WA, 2014 [[Online](#)].

(C3) K. Baker, D. Zhu, G. Hug*, and X. Li*, “Jacobian Singularities in Optimal Power Flow Problems Caused by Intertemporal Constraints,” *IEEE North American Power Symposium*, Manhattan, KS, 2013 [[Online](#)].

(C2) K. Baker, G. Hug*, and X. Li*, “Inclusion of Inter-Temporal Constraints into a Distributed Newton-Raphson Method,” *IEEE North American Power Symposium*, Urbana-Champaign, IL, 2012 [[Online](#)].

(C1) K. Baker, G. Hug*, and X. Li*, “Optimal Integration of Intermittent Energy Sources Using Distributed Multi-step Optimization,” *IEEE Power and Energy Society General Meeting*, San Diego, CA, 2012 [[Online](#)].

Technical Reports

(TR3) *Home Battery System for Cybersecure Energy Efficiency and Demand Response*, Technical Report NREL/TP-5500-72184, D. Christensen, X. Jin, B. Sparn, S. Isley, S. Balamurugan, S. Carmichael, A. Michalski, A. Sanghvi, M. Martin, K. Baker, K. Garifi, W. Gillies, S. Averitt, E. Gantumur, B. Mendrick, S. Suryanarayanan, P. Aloise-Young, R. Kadavil, S. Lurbe, Nat. Renewable Energy Lab., Nov. 2018 [[Online](#)].

(TR2) *On the Path to SunShot: Emerging Issues and Challenges in Integrating Solar with the Distribution System*, Technical Report NREL/TP-5D00-6533, B. Palmintier, R. Broderick, B. Mather, M. Coddington, K. Baker, F. Ding, M. Reno, M. Lave, and A. Bharatkumar, Nat. Renewable Energy Lab., May 2016 [[Online](#)].

(TR1) *Integrated Distribution-Transmission Analysis for Very High Penetration Solar PV*, Technical Report NREL/TP-5D00-65550, B. Palmintier, E. Hale, T. Hansen, W. Jones, D. Biagioni, K. Baker, H. Wu, J. Giraldez, H. Sorensen, M. Lunacek, N. Merket, J. Jorgenson, B-M. Hodge, Nat. Renewable Energy Lab., Jan. 2016 [[Online](#)].

Datasets

K. Baker et. al., *Grid Connected Functionality*, NREL, 2016. [[Online](#)]

**Active
Projects**

Lead institution specified if not CU Boulder. My portion specified for external grants.

CAREER: Learning-Assisted Optimal Power Flow with Confidence

Sponsor: National Science Foundation

Total Award: \$500,000

My Portion: \$500,000

PI: Kyri Baker

Period: 3/1/2021 - 2/28/2026

Efficacy and equity of demand response programs across socioeconomic groups

Sponsor: Renewable and Sustainable Energy Institute (RASEI)

Total Award: \$25,000

PI: Kyri Baker

Period: 8/1/2021 - 1/22/2022

IUCRC Proposal Phase I: University of Colorado Boulder: Center for Building Energy Smart Technologies (BEST)

Sponsor: National Science Foundation

Total Award: \$750,000

PI: Moncef Krarti

Co-PIs: Kyri Baker, Wangda Zuo, John Zhai, Gregor Henze

Period: 8/1/2021 - 7/31/2026

Center Development on Decarbonization of Chemical Manufacturing - DC-MUSE

Sponsor: Alfred P. Sloan Foundation

Total Award: \$700,000

My Portion: \$22,076

Lead Institution: New York University, PI: Andre Taylor

CU PI: Kyri Baker, CU co-PI: Bri-Mathias Hodge

Period: 9/1/2021 - 8/31/2023

Electric vehicle adoption and associated impacts on infrastructure and society

Sponsor: University of Colorado Boulder, Resilient Infrastructure with Sustainability and Equity

Total Award: \$8,500

PI: Kyri Baker

Co-PIs: Cristina Torres-Machi, Amy Javernick-Will, and Constance Crozier

Period: 1/11/2021 - 9/1/2021

Optimal Co-Design of Integrated Thermal-Electrical Networks and Control Systems for Grid-interactive Efficient District (GED) Energy Systems

Sponsor: Department of Energy - Advanced Manufacturing Office

Total Award: \$4,159,922 (\$3,327,878 federal, \$832,044 cost share)

My Portion: \$300,684

PI: Wangda Zuo

Co-PIs: Kyri Baker, Michael Wetter, Kyle Benne, Luigi Vanfretti, Atila Novoselac, and Raymond Kaiser

Period: 10/1/2020 - 12/31/2023

Intelligent System Partitioning for Agent-Based Security Constrained Optimal Power Flow

Sponsor: U.S. Dept. of Energy Advanced Research Projects Agency-Energy (ARPA-E)

Total Award: \$649,178

My Portion: \$364,000

PI: Kyri Baker

Co-PIs: Javad Mohammadi

Period: 12/13/2018 - 8/11/2022

Integrative Reengineering of Infrastructure for Tomorrow's Communities

Sponsor: Dept. of Education Graduate Assistance in Areas of National Need (GAANN)

Total Award: \$1,210,235 (\$895,500 federal, \$314,735 cost share)

Director: Abbie Liel

Co-directors: Kyri Baker, Sherri Cook, Shideh Dashti, Amy Javernick-Will, and Joseph Kasprzyk, Wil Srubar, Cristina Torres-Machi, and Brad Wham

Period: 1/2019 - 12/2021

Previous Projects

Optimization Under Uncertainty for Improved Economic Efficiency of Cold Storage Warehouses

Sponsor: Lineage Logistics

Total Award: **\$53,992**

PI: Kyri Baker

Period: 12/9/2019 - 8/24/2020

Drought-Contingent Regional Coordination of Thermoelectric Power Plants

Sponsor: University of Colorado Boulder, Water Energy Nexus IRT

Total Award: **\$45,682**

PI: Joseph Kasprzyk

Co-PIs: Kyri Baker, Ben Livneh, and Ashlynn Stillwell (UIUC)

Period: 6/2019 - 6/2020

Reducing Water Consumption via Free Market Renewable Integration

Sponsor: University of Colorado Boulder, Water Energy Nexus IRT

Total Award: **\$19,197**

PI: Kyri Baker

Co-PI: Rafael Frongillo

Period: 2/2018 - 12/2018

Gifts

Coordinating benefits of community solar and demand response

Sponsor: Cloudbreak Energy

Total Amount: **\$15,000**

Mars Autonomous and Foldable Solar Array

Sponsor: National Institute of Aerospace (NIA) / NASA

Total Amount: **\$6,000**

Sustainable Integration of Regenerative Outer-space Nature & Agriculture

Sponsor: National Institute of Aerospace (NIA) / NASA
Total Amount: **\$6,000**

**Research
Advising**

Postdoctoral Researchers:

Constance Crozier, Civil, Environmental, and Architectural Engr, Sept. 2020 - Present.

PhD Students:

James Hurtt, Electrical and Computer Engr., Fall 2017 - Present.

Jacob Kravits, Civil Systems (Co-advised by Joseph Kasprzyk), Summer 2019 - Present.

Aisling Pigott, Architectural Engr. Summer 2020 - Present.

Mostafa Mohammadian, Civil Systems. Spring 2021 - Present.

Masters Students:

Nick Barancyk, Mechanical Engr., Summer 2021 - Present.

Andrew Thibeault, Electrical and Computer Engr., Summer 2021 - Present.

Undergraduate Students:

John Montagu, Applied Math., Summer 2021 - Present.

**Former
Advisees**

Postdoctoral Researchers:

Mohammadhafez Bazrafshan, Postdoctoral Researcher, Civil, Environmental, and Architectural Engr, July 2019 - November 2019.

PhD Students:

Amy Allen, PhD in Architectural Engr. (Primary advisor Gregor Henze), Fall 2017 - Summer 2021.

Kaitlyn Garift, PhD in Electrical and Computer Engr. (Co-advised by Behrouz Touri), Fall 2017- Oct. 2020.

MS Students:

Sung Min Kim, M.S. in Civil Systems. (Co-advised by Joseph Kasprzyk), Fall 2019 - Summer 2021.

Nick Shenberger, M.S. Project in Architectural Engr., Fall 2020 - Summer 2021.

Jessica Stershic, M.S. Thesis in Architectural Engr., Summer 2020 - Spring 2021.

Sarah Dafoe, M.S. thesis in Architectural Engr., Summer 2020 - Spring 2021.

Zachary Peterson, M.S. thesis in Architectural Engr, Fall 2017 - Spring 2019.

Sameera Gudladona, M.S. in Electrical and Computer Engr., Summer 2018 - Jan. 2019.

BS Students:

Ryan Davies, Physics and Environmental Studies (Macalester College), Summer 2021.

Liam Daniel, Architectural Engr., Spring 2021 - Summer 2021.

Sarah Dafoe, B.S. in Architectural Engr., Fall 2019 - Summer 2020.

Landon Baxter, B.S. in Computer Science, Fall 2018.

Thesis Committees Anthony Florita (PhD), Robert Cruickshank (PhD), Baqer Ameer (PhD), Yangyang Fu (PhD), Katherine Glasheen (PhD), Mohammad Dabbagh (PhD), Margarite Jacoby (PhD), Jing Wang (PhD), Ammar Dehwah (PhD), Ayesah Al-Awadhi (PhD), Leo Guadagnin (PhD), Brendan Purcell (MS), Robin Walz (MS), Chrissa Turley (MS) Fatemah Ashraf (MS), Franklin Chiu (MS), Cory Mosiman (MS), Brenton Krieger (MS), Angelique Fathy (MS), Mohammed Almansour (MS), Matthew Steen (MS), Jordan Thompson (MS), Amir Salib (MS), Sourav Dey (PhD), Hayley Kinlaw (MS).

Teaching **AREN 4830/CVEN 5830: Grid Connected Systems** - S19, S20, S21.
Course created by Dr. Baker.

AREN 5001: Building Energy Systems (co-taught) - F18, F19, F20, F21.

AREN 3040: Electrical Circuits for Architectural Engineers - S18, S20, S21.
Course created by Dr. Baker.

ECEN 3030: Circuits for Non-Majors - F18, F19.

AREN 4570/CVEN 5830: Electrical Systems for Buildings - F17, F20, F21.

CVEN 5849/AREN 4849: Independent Study - S19, F19, S20.

Student Group Advising **Faculty Advisor**, University of Colorado Boulder Energy Club 2018 - Present
Faculty Advisor, NASA BIG Idea Challenge 2017 - 2019
Faculty Advisor, IEEE, University of Colorado Boulder Chapter 2017 - 2019
Vice President, CMU Energy Club, Carnegie Mellon University, 2012

Selected Invited Talks / Panels *Invited conference/workshop research talks not included but available upon request.*

Wyoming Bar Continuing Legal Education (CLE), *The Texas Grid Failure: Any Lessons for Wyoming?*, May 27, 2021.

21st Century Energy Transition Symposium, *Panel on Decarbonization Solutions*, May 14, 2021.

Massachusetts Institute of Technology enOPTIMAL Seminar series, *Emulating AC OPF Solvers for Obtaining Sub-second Feasible, Near-Optimal Solutions*, [video], Apr. 30, 2021.

University of Wisconsin Madison Power Hour, *Learning to Imitate AC Optimal Power Flow Solvers for Extremely Fast Optimization*, Apr. 30, 2021.

City University of Hong Kong, *Obtaining Feasible and Near-Optimal Power Flow Solutions in Real-Time*, Mar. 23, 2021.

New York University, *Data-powered smart grids and communities*, Mar. 11, 2021.

Stanford University, *Emulating AC OPF Solvers for Obtaining Sub-second Feasible, Near-Optimal Solutions*, Feb. 12, 2021.

UK Energy Systems Catapult Value in Energy Data Seminar, *Using data to improve the reliability and speed of power grid operations*, [video], Feb. 10, 2021.

Climate Change AI and the Energy Innovation Network, *Optimizing Large-Scale Grids in Real-Time with ML*, [\[video\]](#), Nov. 23, 2020.

Newcastle University, *From Transmission to Thermostat: Integrated Building/Grid Operations*, [\[video\]](#), Nov. 11, 2020.

Denver Museum of Nature and Science and the Institute of Science and Policy, *The Future of Energy: Grid Innovations*, [\[video\]](#), Oct. 13, 2020.

Keynote speaker at the International Virtual Conference on AI and ML Applications in Smart Buildings (AMSB2020), *The Future of ML for Smart Energy Systems*, July 22, 2020.

CU Boulder Alumni Exclusive COVID-19 Webinar Series, *How is COVID 19 Affecting the Electric Power Grid?*, [\[video\]](#), May 26, 2020.

ARPA-E GO Competition Challenge 1 Outreach Event, *Tartan Buffs: Grid Armor (Grid Analytics, Rapid Modeling, and Optimization Routines)*, New Orleans, LA, Feb. 18, 2020.

Colorado State University, *Integrating Renewable Energy: From Transmission to Thermostat*, Fort Collins, CO, Oct. 24, 2019.

Carnegie Mellon University, *Integrating Renewable Energy: From Transmission to Thermostat*, Pittsburgh, PA, Oct. 14, 2019.

**Selected
Media
Appearances/
Research
Mentions**

E&E News, “4 issues to watch as heat disrupts the grid,” Online (interview), [\[link\]](#), Aug. 6, 2021.

Freethink, “Will power plants move into the cloud?” Online (interview), [\[link\]](#), Jul. 30, 2021.

Vox Recode, “The US power grid isn’t ready for climate change,” Online (interview), [\[link\]](#), Jul. 3, 2021.

VICE News, “Solar Was Only Energy Source to Outperform Expectations During Texas Blackout,” Online (interview, research article featured), [\[link\]](#), Jun. 24, 2021.

The Guardian, “Sweltering Texans urged to reduce cooking and cleaning to ease grid strain,” Online (interview), [\[link\]](#), Jun. 16, 2021.

ABC Denver 7, “High heat means significant strain on power grid,” Broadcast (interview), [\[link\]](#), Jun. 14, 2021.

Gizmodo, “Why the Texas Grid Failed, According to Science,” Online (research article featured), [\[link\]](#), Jun. 7, 2021.

The Arizona Republic, “Risk for Texas-style power grid failure is growing in Western states,” Newspaper/Online (interview), [\[link\]](#), Apr. 1, 2021.

Fox 4 Kansas City, “What needs to be done to avoid future rolling power outages,” Broadcast (interview), [\[link\]](#), Feb. 17, 2021.

Fox 31 Denver, “Texas-like blackouts unlikely in Colorado,” Broadcast (interview),

[[link](#)], Feb. 17, 2021.

ABC Denver 7, “Could the Texas energy crisis happen in Colorado? Unlikely, but climate change a concern,” Online (interview), [[link](#)], Feb. 17, 2021.

**National/
International
Service**

Editorial Board, Elsevier Sustainable Energy, Grids and Networks, June 2021 - Present

Associate Editor, IEEE Transactions on Smart Grid and IEEE Power Engineering Letters, May 2020 - Present

Guest Editor, Journal of Modern Power Systems and Clean Energy (MPCE), Special Issue on “Power Systems with Increasing Renewable Penetration: Market, Operations, Planning and Regulation,” 2020-21.

Guest Editor, MDPI Energies, Special Issue on “Building-to-Grid Integration through Intelligent Optimization and Control,” 2020

Vice Chair, IEEE Smart Buildings, Loads, and Customer Services (SBLC) Loads subcommittee, Fall 2019 - present.

Conference Session/Panel Organizer (responsible for inviting speakers, organizing, and chairing session), IEEE Power and Energy Society General Meeting 2021; ASCE Architectural Engineering Institute Conference 2021; Modeling and Optimization: Theory and Applications (MOPTA) 2019.

Technical Committee Member (responsible for making decisions on papers and finding reviewers), ACM BuildSys 2021, ASCE Architectural Engineering Institute Conference 2021, IEEE SmartGridComm 2016, 2019, 2021, ACM International Workshop on Non-Intrusive Load Monitoring 2018, 2020

Conference Session Chair (responsible for chairing conference session), IEEE North American Power Symposium 2016, 2021, ASCE Architectural Engineering Institute Conference 2021, Modeling and Optimization: Theory and Applications (MOPTA) 2019; IEEE Power & Energy Society General Meeting 2019, ACM International Workshop on Non-Intrusive Load Monitoring 2018

Panel Reviewer, National Science Foundation (NSF), 2015, 2016.

Steering Committee/Moderator, NSF/P SERC Workshop: Grid at the Edge, 2021.

Journal, Conference, Proposal, and Book Reviewer, available upon request.

**Service to
the Campus**

Seminars and Conferences Committee, Renewable and Sustainable Energy Institute (RASEI), 2020-present

Search Committee Member, For multiple RASEI searches, 2019-2020, 2021

ACTIVE volunteer, Speaker, application reviewer, participant in the CU Engineering Faculty Development and Leadership Intensive, 2018, 2019.

**Service to
the College
and Dept.**

Search Committee Member, For a college-wide search, 2018-2019; for a department-level search, 2021

Graduate Committee Member, Fall 2019 - Spring 2021

Curriculum Committee Member, Fall 2018 - Spring 2019

Computer Committee Member, Fall 2017 - Present