

Constance Crozier

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Research Interests

FUTURE POWER SYSTEMS GRID OPTIMIZATION MACHINE LEARNING HUMAN-IN-THE-LOOP

Education

- 2019 **D.Phil** in Electrical Engineering, *University of Oxford*
Thesis: The Impact of Domestic Electric Vehicle Charging on Electricity Networks
Advisor: Malcolm McCulloch
- 2016 **M.Eng** in Information Engineering (First Class), *University of Oxford*
Thesis: Bayesian Non-Parametrics for the War in Afghanistan
Advisor: Michael Osborne
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Research Experience

- 2020-pres Postdoctoral Associate, *University of Colorado Boulder*
- 2019-2020 Technical Energy Specialist, *UK Government, Department of Business, Energy & Industrial Strategy*
- 2018 Data Scientist Intern – Route Planning for Autonomous Vehicles, *Five AI*
- 2016-2019 EPSRC Industrial-Case Research Student, *University of Oxford & Jaguar Land Rover*
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Teaching Experience

- 2021 Guest Lecturer, University of Colorado Boulder, *Grid Connected Systems*
- 2020 Project Assessor, Carnegie Mellon University, *Energy Transport and Storage*
- 2017-2019 Stipendiary Lecturer, Christ Church (Oxford), *Electrical Engineering and Mathematics*
- 2018-2019 Stipendiary Lecturer, Mansfield College (Oxford), *Electrical and Information Engineering*
- 2017-2018 Tutor, Department of Engineering Science, University of Oxford, *Signal and Image Analysis*
- 2016-2017 Lab Demonstrator, Department of Engineering Science, University of Oxford *Microcontrollers*

Publications

Ordered reverse chronologically, author's name is shown in **bold**, mentored students denoted by underline.

JOURNAL ARTICLES - PUBLISHED

- [j.11] **C. Crozier**, K. Baker, B. Toomey, Feasible region-based heuristics for optimal transmission switching, *Sustainable Energy, Grids and Networks*, 2022.
- [j.10] **C. Crozier**, C. Quarton, N. Mansor, D. Pagnano, I. Llewellyn, Modeling of the ability of a mixed renewable generation electricity system with storage to meet consumer demand, *Electricity*, 2022.
- [j.9] K. Collett, S. Hirmer, H. Dalkmann, **C. Crozier**, Y. Mulugetta, M. McCulloch, Can electric vehicles be good for Sub-Saharan Africa?, *Energy Strategy Review*, 2021.
- [j.8] **C. Crozier**, T. Morstyn, M. McCulloch, Capturing diversity in electric vehicle charging behaviour for network capacity estimation, *Transportation Research Part D: Transport and Environment*, 2021.
- [j.7] **C. Crozier**, T. Morstyn, M. McCulloch, The opportunity for smart charging to mitigate the impact of EVs on the GB transmission and distribution systems, *Applied Energy*, 2020
- [j.6] **C. Crozier**, M. Deakin, T. Morstyn, M. McCulloch, Co-ordinated electric vehicle charging to reduce losses without network impedance information, *IET Smart Grid*, 2020.
- [j.5] T. Morstyn, **C. Crozier**, M. Deakin, M. McCulloch, Electric vehicle smart charging with battery voltage awareness using second-order cone programming, *IEEE Trans. on Electrification of Transport*, 2020.
- [j.4] **C. Crozier**, M. Deakin, T. Morstyn, M. McCulloch, The case for bi-directional charging of electric vehicles in low voltage distribution networks, *Applied Energy*, 2020
- [j.3] K. Collett, M. Byamukama, **C. Crozier**, M. McCulloch, Energy and transport in Africa and South Asia, *Energy and Economic Growth*, 2020.
- [j.2] **C. Crozier**, D. Apostolopoulou, M. McCulloch, Mitigating the impact of personal vehicle electrification: A power generation perspective, *Energy Policy*, 2018.
- [j.1] J. Cao, **C. Crozier**, M. McCulloch, Optimal design and operation of a low carbon community based multi-energy systems considering EV integration, *IEEE Trans. of Sustainable Energy*, 2018.

JOURNAL ARTICLES - UNDER REVIEW

- [j.12] **C. Crozier**, K. Baker, The effect of renewable electricity generation on the value of cross-border interconnection, *Submitted to: Applied Energy*.

PEER REVIEWED CONFERENCE PAPERS

- [c.11] **C. Crozier**, K. Baker, Y. Du, M. Li, J. Mohammadi, Data driven methods for contingency filtering in security constrained optimal power flow, *International Conference on Probabilistic Methods Applied to Power Systems*, Submitted.

- [c.10] C. Crozier, K. Baker, Data-driven probabilistic constraint elimination for accelerated optimal power flow, *IEEE PES General Meeting*, 2022.
 - [c.9] C. Crozier, A. Pigott, K. Baker, Spatial arbitrage through bidirectional electric vehicle charging, *IEEE PES General Meeting*, 2022.
 - [c.8] M. Li, Y. Du, J. Mohammadi, C. Crozier, K. Baker Numerical comparisons of linear power flow approximations: optimality, feasibility, and computation time, *IEEE PES General Meeting*, 2022.
 - [c.7] A. Pigott, C. Crozier, K. Baker, Z. Nagy, GridLearn: multiagent reinforcement learning for grid-aware building energy management, *Power Systems Computation Conference*, 2022.
 - [c.6] C. Crozier, K. Baker, Optimal sizing of an energy storage portfolio considering multiple time-scales, *IEEE PES General Meeting*, 2021.
 - [c.5] M. Deakin, C. Crozier, T. Morstyn, D. Apostolopoulou, M. McCulloch, Stochastic hosting capacity in distribution networks, *IEEE PES General Meeting*, 2019.
 - [c.4] C. Crozier, M. Deakin, T. Morstyn, M. McCulloch, Incorporating charger efficiency into electric vehicle charging optimization, *Innovation in Smart Grid Technologies (ISGT) Europe*, 2019.
 - [c.3] L. Han, T. Morstyn, C. Crozier, M. McCulloch, Improving the scalability of a prosumer cooperative game with k-means clustering, *IEEE PowerTech*, 2019.
 - [c.2] C. Crozier, D. Apostolopoulou, M. McCulloch, Numerical analysis of national travel data to assess the impact of UK fleet electrification, *Power Systems Computation Conference*, 2018.
 - [c.1] C. Crozier, D. Apostolopoulou, M. McCulloch, Clustering of usage profiles for electric vehicle behaviour analysis, *Innovation in Smart Grid Technologies (ISGT) Europe*, 2018.
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Prizes & Awards

- 2021 Outstanding Postdoc Award, *CU Boulder* (University-wide award, two given annually).
 - 2020 Winner of UK Power Networks Charge Challenge
 - 2020 High Performance Award, *UK Department for Business, Energy & Industrial Strategy* (Department-wide award, decided by review panel)
 - 2017 Best Presentation at Manchester Energy and Electrical Power Systems Workshop
 - 2016-2019 EPSRC Industrial Case Award
 - 2015 Gibbs Prize for Best Part B Project, *University of Oxford*
 - 2014-2016 Academic Scholarship, *Christ Church (University of Oxford)*
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Gifts

- 2021 ARPA-E Grid Optimization Competition Challenge 2 Prize, **\$140,000**.

Grants

- 2022-2025 **Locational Demand Response for Equitable and Sustainable Electricity Networks ***
**Submitted, not currently funded*
PI: Kyri Baker, Co-PI: [Constance Crozier](#)
Budget: \$369,275, Submitted to: *NSF Civil Infrastructure Systems*.
- 2021-2022 **Predicting Binding Constraints using Physics-Informed Deep Learning**
PI: Kyri Baker, Co-PI: [Constance Crozier](#)
Budget: \$23,090, Funding organisation: *Solea*.
- 2021-2022 **Efficacy and equity of demand response programs across socioeconomic groups**
PI: Kyri Baker, Co-PI: Barry Mather, Collaborator: [Constance Crozier](#)
Budget: \$25,000, Funding organisation: *Renewable and Sustainable Energy Initiative*.
- 2021-2022 **Electric vehicle adoption and associated impacts on infrastructure and society**
PI: Kyri Baker, Co-PIs: Cristina Torres-Machi, Amy Javernick-Will, [Constance Crozier](#)
Budget: \$8,500, Funding organisation: *RISE Seed Grant - University of Colorado, Boulder*.
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Supervision & Mentoring

- 2020-pres Aisling Pigott, *PhD Student, University of Colorado Boulder*.
- 2020-2021 Meiyi Li, *PhD Student, Carnegie Mellon University*.
- 2020-2021 Yuhan Du, *Masters Student, Carnegie Mellon University*.
- 2021 John Montagu, *Undergraduate Research Assistant, University of Colorado Boulder*.
- 2019 Lyn Yeoh, *Undergraduate Research Assistant, University of Oxford*.
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Presentations

- 2022 Temple University ECE Department Spring Seminar Series, “Large scale low carbon electricity networks with human-in-the-loop”, Online.
- 2022 University of Oxford Energy and Power Group Seminar Series, “Solving large-scale optimal power flow problems efficiently”, Online.
- 2021 Newcastle University Optimization Group Webinar Series , “Developing fast and scalable algorithms for the ARPA-E grid optimization competition’ , Online [[Link](#)].
- 2021 INFORMS Annual Meeting, “Approximations and heuristics for fast security constrained optimal power flow”, Anaheim, California.
- 2021 ARPA-E GO Competition Challenge 2 Outreach Event, “Electric Stampede’s approach”, Online.

- 2021 IEEE PES General Meeting, “Optimal sizing of an energy storage portfolio considering multiple timescales”, Online.
 - 2019 IEEE PES Innovation in Smart Grid Technologies, “Incorporating charger efficiency into electric vehicle charging optimization”, Bucharest, Romania.
 - 2019 EPSRC Supergen Energy Networks Hub Risk Day, “Stochastic optimization of electric vehicle charging with solar generation”, Cambridge, UK.
 - 2018 IEEE PES Innovation in Smart Grid Technologies, “Clustering of usage profiles for electric vehicle behaviour analysis”, Sarajevo, Bosnia & Herzegovina.
 - 2018 Power Systems Computation Conference, “Numerical analysis of national travel data to assess the impact of UK fleet electrification”, Dublin, Ireland.
 - 2017 IEEE PES Manchester Energy and Electrical Power Systems Workshop, “Clustering of vehicle usage profiles for efficient smart charging, Manchester, UK
 - 2017 WMG Catapult Energy Storage Conference, “The grid impacts of e-mobility”, Coventry, UK.
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Outreach & Engagement

- 2020-pres Write and manage a personal science communication blog, which has had over 40,000 views.
- 2020-pres Created animated graphs for Twitter posts that have attracted 600,000+ views.
- 2019 Helped create a series of challenges designed to help students teach themselves to code in Python.
- 2019 Participated in video series showing an example undergraduate engineering interview.
- 2019 Participated in ‘what engineering means to me’ video for the Women’s Engineering Society.
- 2018 Ran an engineering workshop for school leavers as part of Christ Church Horizons program.
- 2015-2016 Access and academic affairs officer at Christ Church – co-ordinated outreach and the open day.

Last updated: February 10, 2022