

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.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*.
- [j.11] **C. Crozier**, K. Baker, B. Toomey, Feasible region-based heuristics for optimal transmission switching, *First revision submitted: Sustainable Energy, Grids and Networks*.
- [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, *Submitted to: Electricity*.

PEER REVIEWED CONFERENCE PAPERS

- [c.10] **C. Crozier**, K. Baker, Data-driven probabilistic constraint elimination for accelerated optimal power flow, *IEEE PES General Meeting*, Submitted.

- [c.9] M. Li, Y. Du, J. Mohammadi, **C. Crozier**, K. Baker Comparison of active power linearization methods in optimal power flow problems, *IEEE PES General Meeting*, Submitted.
 - [c.8] **C. Crozier**, K. Baker, Y. Du, M. Li, J. Mohammadi, Data driven methods for contingency filtering in security constrained optimal power flow, *Power Systems Computation Conference*, Submitted.
 - [c.7] A. Pigott, **C. Crozier**, K. Baker, Z. Nagy, GridLearn: multiagent reinforcement learning for grid-aware building energy management, *Power Systems Computation Conference*, Submitted.
 - [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).
 - 2021 ARPA-E Grid Optimization Competition Trial 3, Winner Div 1 & 3 and 4th in Div 2 & 4, **\$140,000**.
 - 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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Grants

- 2021-2022 Predicting Binding Constraints using Physics-Informed Deep Learning (Co-PI) **\$23,090**, *Solea*.
- 2021-2022 Efficacy and equity of demand response programs across socioeconomic groups (Primary Author) **\$25,000**, *Renewable and Sustainable Energy Initiative*.

2020-2021 Electric vehicle adoption and associated impacts on infrastructure and society (Co-PI) **\$8,500**, *RISE Seed Grant - University of Colorado, Boulder.*

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.*

Presentations

2022 INFORMS Computing Society (ICS) Conference, “Balancing speed, reliability, and optimality in security constrained optimal power flow”, Tampa, Florida.

2021 Newcastle University Power Systems Optimization Group, “Developing fast and scalable algorithms for the ARPA-E grid optimization competition”, Online.

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.

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: November 11, 2021