Andrey Churkin

Research Associate, Ph.D.

I am a researcher with an electrical engineering background and advanced skills in power systems modelling, mathematical optimisation, electricity markets, energy policies, game theory, and data valuation. By combining these areas of expertise, I address the acute issues of integrating renewable and distributed energy resources in active distribution networks, developing flexibility markets and data marketplaces, making power systems of the future better. I have contributed to large international research projects (e.g., ATTEST project of the EU's H2020 funding programme) and industrial projects, such as consultancy works on active distribution networks and DSO transition for Scottish Power Energy Networks (SPEN). I have also completed several international internships, including the United Nations ESCAP (2017) and the Pontifical Catholic University of Chile (2019). My current research focuses on developing novel solutions and concepts for data-driven flexibility markets, with applications to active distribution networks and transmission-distribution systems coordination.

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Website: https://andreychurkin.ru/
YouTube: https://www.youtube.com/@chuscience/

Appointments held:

March 2024 – present
Imperial College London, UK
Dyson School of Design Engineering
Research Associate in AI and Analytics for Electricity Markets

March 2021 – March 2024
The University of Manchester, UK
Department of Electrical and Electronic Engineering
Research Associate
Project: the EU's Horizon 2020 research and innovation programme, ATTEST project (Advanced Tools Towards cost-efficient decarbonisation of future reliable Energy SysTems)

I have been leading research of work package "Network planning tools" of the ATTEST project, collaborating with international partners, developing reports and other deliverables. As part of the project's deliverables, I have developed network planning tools considering the integration of flexible and distributed energy resources. I have also developed models for tracing, ranking, and valuation of aggregated flexibility in active distribution networks.

Nov 2020 – March 2021
Skolkovo Institute of Science and Technology (Skoltech), Moscow, Russia
Center for Energy Science and Technology
Research Scientist

I contributed to the Skoltech-MIT project "Market Design for Electromobility: New Formulations, Models and Algorithms", which explored data-driven solutions for electric vehicle aggregators and distribution networks.

May 2016 – Oct 2016
CJSC "CROC inc.", IT department, Moscow, Russia
Engineer in industrial solutions for energy

Feb 2015 – May 2016
Moscow Power Engineering Institute, Electric Power Systems Department, Russia
Engineer

Visiting appointments:

Nov 2018 – Feb 2019
Pontificia Universidad Católica de Chile, UC Energy Research Center, Santiago, Chile
Research intern

May 2017 – Sept 2017
United Nations ESCAP, Energy Division, Bangkok, Thailand
Intern

Education:

Oct 2016 – Nov 2020
Skolkovo Institute of Science and Technology (Skoltech)
Center for Energy Science and Technology, Moscow, Russia
Ph.D. degree in Engineering Systems
Advisors: Prof. Janusz Bialek, Dr. David Pozo
Thesis title: Stability analysis in coalitional games for cross-border power interconnection planning

2014 – 2016
Moscow Power Engineering Institute, Electric Power Systems Department, Moscow, Russia
Master's degree in Electrical Engineering

2010 – 2014
Moscow Power Engineering Institute, Electric Power Systems Department, Moscow, Russia
Bachelor's degree in Electrical Engineering

Skills:
- Mathematical programming (optimisation)
- Power system economics
- Electricity markets & policies
- Transmission expansion planning
- Game-theoretic modelling
- Power system operation & control
- Data valuation & data marketplaces
- Network flexibility modelling
- Bibliometric and citation network analysis

Software:
- Julia Programming & JuMP
- Python & Pyomo
- MATLAB
- LaTeX
- PowerWorld
- Gephi
- Wolfram Mathematica
- PSI Control

Publications:

Journal papers (4):

- **A. Churkin**, W. Kong, J. N. Melchor Gutierrez, E. A. Martínez Ceseña, P. Mancarella, "Tracing, Ranking and Valuation of Aggregated DER Flexibility in Active Distribution Networks," IEEE Transactions on Smart Grid, 2023.

- **A. Churkin**, E. Sauma, D. Pozo, J. Bialek, N. Korgin, "Enhancing the Stability of Coalitions in Cross-Border Transmission Expansion Planning," IEEE Transactions on Power Systems, 2021.

- **A. Churkin**, J. Bialek, D. Pozo, E. Sauma, N. Korgin, "Review of Cooperative Game Theory Applications in Power System Expansion Planning," Renewable and Sustainable Energy Reviews, 2021.

- **A. Churkin**, D. Pozo, J. Bialek, N. Korgin, E. Sauma, "Can cross-border transmission expansion lead to fair and stable cooperation? Northeast Asia case analysis," Energy Economics, 2019.

Conference papers (5):

- **A. Churkin**, W. Kong, M. I. Alizadeh, F. Capitanescu, P. Mancarella, E. A. Martinez Cesena, "Interpreting the Value of Flexibility in AC Security-Constrained Stochastic Transmission Expansion Planning," in Proc. 23rd Power Systems Computation Conference (PSCC), 2024, https://arxiv.org/abs/2310.03610

- **A. Churkin**, M. Sanchez-Lopez, M. Iman Alizadeh, F. Capitanescu, E. A. Martínez Ceseña, P. Mancarella, "Impacts of Distribution Network Reconfiguration on Aggregated DER Flexibility," IEEE PES PowerTech 2023 Conference, Belgrade, Serbia, Jun. 2023.

- **A. Churkin**, W. Kong, J. N. Melchor Gutierrez, P. Mancarella, E. A. Martinez Cesena, "Assessing Distribution Network Flexibility via Reliability-based P-Q Area Segmentation," IEEE PES PowerTech 2023 Conference, Belgrade, Serbia, Jun. 2023.

- **A. Churkin**, D. Pozo, J. Bialek, N. Korgin, and E. Sauma, "Manipulability of Cost and Benefit Allocation in Cross-border Electrical Interconnection Projects," IEEE PES PowerTech 2019 Conference, Milan, Italy, Jun. 2019.

- **A. Churkin**, J. Bialek, "Analysis of the prospective energy interconnections in Northeast Asia and development of the data portal," Proceedings of the Joint Conference on Northeast Asia Regional Power Interconnection, Irkutsk, 29-30 August 2017.

Preprints:

- **A. Churkin**, P. Mancarella, E. A. Martinez Cesena, "Assessing Active Distribution Network Flexibility: On the Effects of Nonlinearities and Nonconvexities," 2022, https://arxiv.org/abs/2209.03845

Note: the updated list of publications can be found in the Google Scholar profile
https://scholar.google.com/citations?user=e3e4exQAAAAJ&hl=en

Other research achievements:

- Invited expert, discussion of electricity interconnections and trading with the Department for Energy Security and Net Zero, the University of Manchester, March 2023
- Outstanding Reviewer Award, IEEE Transactions on Sustainable Energy, 2023
- Award for the best presentation "The Research for Industry Prize" by Scottish Power Energy Networks, Manchester Energy and Electrical Power Systems (MEEPS) symposium 2023
- Invited speaker, the INESC TEC Power & Energy Webinar "Open-source tools for future power systems", 2022, https://energywebinars.inesctec.pt/
- Developer of the network planning tools T3.1 and T3.2 of the ATTEST project. Repository: https://github.com/ATTEST-project
- Developer of the tool for interpretable security-constrained transmission expansion planning. Repository: https://github.com/AndreyChurkin/iSCTEP
- Invited speaker, 2021 International Forum on Regional Cooperation of China, Japan, and South Korea
- Finalist of the Falling Walls Lab competition 2019, Berlin
- Invited speaker, INFORMS Annual Meeting, October 20-23, 2019, Seattle

- Invited speaker, Symposium on Asia International Grid Connection Study Group Second Report, July 2018, Tokyo
- Invited speaker, international conference "International cooperation in energy and innovations," MGIMO university, May 2018, Moscow

Other evidence of academic and professional standing:

- Course certificate "Gurobi Optimization 201 for Data Scientists Training", November 2023
- Exceptional Performance Award 2022/23, Department of Electrical and Electronic Engineering, The University of Manchester
- Participant of the International Summer School in Global Just Transition (Equity in Net Zero), Newcastle University, June 2023
- Consulting work for Scottish Power Energy Networks (SPEN), September 2022 – May 2023. Project "DSO Economic Scenario Analysis"
- Consulting work for Scottish Power UK plc, October – November 2022. Project "Estimating the hydrogen train fleet impact in Scotland"
- Developing a research proposal with SPEN for the Ofgem Strategic Innovation Fund (SIF)
- Course certificate "Gurobi Optimization 101 for Data Scientists", November 2022
- Completed teaching programme "Foundations of Teaching and Learning programme", the University of Manchester, 2022/23
- Completed course "Advanced Modelling of DER-Rich Active Distribution Networks", The University of Melbourne, July 2021
- Reviewer in IEEE journals such as Transactions on Smart Grid, Transactions on Power Systems, Transactions on Sustainable Energy, Transactions on Energy Markets, Policy and Regulation
- Mentor for MSc and PhD students, Skoltech mentorship program