Vladimir Dvorkin, Ph.D.

Postdoctoral Fellow at Massachusetts Institute of Technology

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Education

Technical University of Denmark (DTU) **09/2017 - 03/2021**
Ph.D. – Electrical Engineering Lyngby, Denmark
Thesis: Stochastic and private energy system optimization
Supervisors: Profs. Pierre Pinson and Jalal Kazempour

Technical University of Denmark (DTU) **09/2015 - 07/2017**
M.Sc. – Sustainable Energy Lyngby, Denmark
Primaries: power systems stability & control, convex optimization, decision-making under uncertainty, decomposition techniques, game theory, energy economics&policy
Thesis: Strategic investment in CCGTs and wind power units via progressive hedging
Supervisors: Profs. Pierre Pinson and Jalal Kazempour

Higher School of Economics (HSE) **09/2012 - 06/2014**
M.Sc. – Energy Economics Moscow, Russia
Primaries: microeconomics, finance, fundamentals of energy economics, management

Moscow Power Engineering Institute (MPEI) **09/2008 - 06/2012**
B.E. – Electrical Engineering Moscow, Russia
Primaries: power systems control, planning & optimization

Appointments & work experience

Massachusetts Institute of Technology, Cambridge, US **3/2022 - Present**
MSCA–FIBE Postdoctoral Fellow
Project: Learning ORDER: Operationalizing Data into Energy Management
Department: Energy Initiative

Massachusetts Institute of Technology, Cambridge, US **2/2021 - 2/2022**
Postdoctoral Associate
Developing planning optimization for energy systems operations under uncertainty
Department: Laboratory for Information and Decision Systems & Energy Initiative

Georgia Institute of Technology, Atlanta, USA **07/2019 - 12/2019**
Research Visitor
Differential privacy research towards ethical optimization of energy systems
Department: H. Milton Stewart School of Industrial & Systems Engineering

Higher School of Economics, Moscow, Russia **12/2013 - 08/2017**
Research Assistant
Project work on electricity, gas & heat pricing
Department: Institute of Pricing & Regulation of Natural Monopolies

Khaznah Strategies Ltd, London (remotely), UK **05/2017 - 08/2017**
Consultant
Energy and natural resources price forecasting, software engineering

Power Engineering Group EOL, Moscow, Russia **09/2011 - 11/2013**
Engineering Intern
Designing high-voltage circuits for consumer electronics
Developing the high-voltage devices for mass production.

Awards

- Marie Skłodowska-Curie Actions Postdoctoral Fellowship **03/2022–02/2024**
- Best Paper Award, IEEE Transactions on Power Systems **2021**
- Outstanding Reviewer Award, IEEE Transactions on Power Systems **2021**
- LANL Grid Science Winter School Scholarship **2019**
- Outstanding Reviewer Award, IEEE Transactions on Sustainable Energy **2018**
- DTU Tuition Fee Waiver for MSc Students **08/2015–06/2017**
- HSE Scholarship for Science Achievements **2014**
- HSE Scholarship for Excellency **09/2012–06/2014**
- Semifinalist at the Youth Russian Petroleum&Gas Case Championship **2013**
- MPEI Scholarship for Academic Achievements **09/2008–06/2012**

Funding

1. **LearningORDER.** (Individual postdoctoral fellowship, 03/2022-02/2024, $200,000). Awarded by Marie Skłodowska-Curie Actions and Fundación Iberdrola España. Grant agreement No. 101034297. (Executive summary, presentation)

Publications

In preparation

1. Dvorkin, V. Harnessing data center flexibility using contextual learning.
   In preparation for submission to *IEEE Transactions on Power Systems*
2. Dvorkin, V., Mallapragada, D., Botterud, A. Private synthetic generation of optimization and machine learning datasets for power systems
   In preparation for submission to *IEEE Transactions on Smart Grids*

Submitted

1. Dvorkin, V., Fioretto, N., Van Hentenryck, P., Kazempour, J. and Pinson, P., 2022. Privacy-preserving convex optimization: When differential privacy meets stochastic programming
   Submitted to *Operations Research*
   `https://doi.org/10.48550/arXiv.2209.14152`
2. Zhao, D., Dvorkin, V., Delikaraoglou, S., Lamadrid, A. J., Botterud, A., 2022. Uncertainty-informed renewable energy scheduling: A scalable bilevel framework.
   Submitted to *ACM International Conference on Future Energy Systems (e-Energy)*

Journal Publications

1. Dvorkin, V., Mallapragada, D. and Botterud, A., 2023. Multi-stage decision rules for power generation & storage investments with performance guarantees.
   Accepted at *IEEE Transactions on Power Systems*
   `https://doi.org/10.48550/arXiv.2206.01675`
2. Dvorkin, V., Mallapragada, D., Botterud, A., Kazempour, J. and Pinson, P., 2022. Multi-stage linear decision rules for stochastic control of natural gas networks with linepack. *Electric Power Systems Research (XXII PSCC edition)*, 212, p.108388.
   `https://doi.org/10.1016/j.epsr.2022.108388`
3. Dvorkin, V., Ratha, A., Pinson, P. and Kazempour, J., 2021. Stochastic control and pricing for natural gas networks. *IEEE Transactions on Control of Network Systems*, 9(1), pp.450-462.
   `https://doi.org/10.1109/TCNS.2021.3112764`

4. Dvorkin, V., Fioretto, F., Van Hentenryck, P., Pinson, P. and Kazempour, J., 2021. Differentially private optimal power flow for distribution grids. *IEEE Transactions on Power Systems*, 36(3), pp.2186-2196.
   🏆 Best Paper Award for period 2019–2021
   https://doi.org/10.1109/TPWRS.2020.3031314
5. Dvorkin, V., Kazempour, J. and Pinson, P., 2019. Electricity market equilibrium under information asymmetry. *Operations Research Letters*, 47(6), pp.521-526.
   https://doi.org/10.1016/j.orl.2019.09.005
6. Dvorkin, V., Delikaraoglou, S. and Morales, J.M., 2018. Setting reserve requirements to approximate the efficiency of the stochastic dispatch. *IEEE Transactions on Power Systems*, 34(2), pp.1524-1536.
   https://doi.org/10.1109/TPWRS.2018.2878723

Conference Publications (peer-reviewed)

1. Dvorkin, V., Chevalier, S., Chatzivasileiadis S., 2023. Emission-constrained optimization of gas systems with input-convex neural networks.
   In *Tackling Climate Change with Machine Learning Workshop at ICLR 2023*
   🏆 Selected for Spotlight Talk
   https://doi.org/10.48550/arXiv.2209.08645
2. Dvorkin, V., Kazempour, J. and Pinson, P., 2020, August. Chance-constrained equilibrium in electricity markets with asymmetric forecasts. In *2020 International Conference on Probabilistic Methods Applied to Power Systems* (pp. 1-6). IEEE.
   🏆 Best Paper Award Nomination
   https://doi.org/10.1109/PMAPS47429.2020.9183423
3. Dvorkin, V., Van Hentenryck, P., Kazempour, J. and Pinson, P., 2020, December. Differentially private distributed optimal power flow. In *2020 59th IEEE Conference on Decision and Control* (pp. 2092-2097). IEEE.
   https://doi.org/10.1109/CDC42340.2020.9303768
4. Radoszynski, A.M., Dvorkin, V. and Pinson, P., 2019, June. Accommodating bounded rationality in pricing demand response. In *2019 IEEE Milan PowerTech (pp. 1-6)*. IEEE.
   https://doi.org/10.1109/PTC.2019.8810419
5. Dvorkin, V., Kazempour, J., Baringo, L. and Pinson, P., 2018, December. A consensus-ADMM approach for strategic generation investment in electricity markets. In *2018 IEEE Conference on Decision and Control* (pp. 780-785). IEEE.
   https://doi.org/10.1109/CDC.2018.8619240

Thesis

1. Dvorkin, V., 2021. Stochastic and private energy system optimization. *Ph.D. Thesis*. Technical University of Denmark. (Supervised by Pinson P., Kazempour J. Examined by Chatzivasileiadis, S., Shapiro, A., Wierman, A.)
   https://drive.google.com/file/d/1_OwDZ0nnH0tFnDeQ1S-eeW8QYoRJNRa4/view
2. Dvorkin, V., 2017. Multi-stage strategic investment in CCGTs and wind power units via progressive hedging. *M.Sc. Thesis*. Technical University of Denmark. (Supervised by Pinson P., Kazempour J. Examined by Boomsma, T.K.)
   https://drive.google.com/file/d/16MFeiUVbQ4IQ-d6wvUF9jZYUU-RHUcYa/view

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Teaching training

1. MIT Kaufman Teaching Certificate Program (description ↗). Fall 2022.

Teaching experience

1. *Renewables in Electricity Markets* — DTU
   Head teaching assistant — Spring 2020
   Teaching assistant — Spring 2017
2. *DTU Summer School on Energy Optimization, Learning and Game Theory* — DTU
   Teaching assistant — Summer 2017–2019
3. *Advanced Optimization in Electricity Markets* — DTU
   Teaching assistant — Fall 2018
4. *Decomposition Techniques for Energy Systems Applications* — Skoltech
   Teaching assistant, lecturer — Fall 2018

Supervision experience

1. Michiel Kenis, Toward off-shore bidding zones: the role of generation and transmission capacity investments. *Ph.D. student visitor.* Fall 2022, MIT.
2. Gretta Marija Nikkare, Co-optimization of green hydrogen and power system expansion planning. *M.Sc. thesis.* Spring 2022, MIT.
3. Rafal Michal Mikulowski, Power systems operation and planning using chance-constrained programming. *Coursework.* Fall 2019, DTU.
4. Andrea Marin Radoszynski, Demand response and bounded rationality in electricity markets. *M.Sc. thesis.* Spring 2018, DTU.
5. Eirini Ioanna Barmpati, Stochastic equilibrium models for capacity investment in energy systems. *Coursework.* Spring 2018, DTU.

Selected Invited Talks

1. *Optimization and Learning in Energy Systems: Privacy and Performance.*
   University of Wisconsin–Madison (ECE Department) — February, 2023.
2. *Trustworthy and Privacy-Preserving Stochastic Optimization and Machine Learning for Energy.*
   University of Minnesota (ISyE Department) — January, 2023.
3. *Privacy-preserving convex optimization: When differential privacy meets stochastic programming.*
   University of Edinburgh (School of Mathematics).
   Hosted by: Miguel Anjos — December, 2022.
4. *Differential privacy meets stochastic programming.*
   Copenhagen University (Department of Computer Science).
   Hosted by: Yevgeny Seldin — November, 2022.
5. *Performance guarantees for investments in power systems under uncertainty.*
   Technical University of Denmark (DTU Management).
   Presented at: Seminar on Economics of Green Transition — November, 2022.
6. *Privacy-preserving perturbation of convex optimization programs.*
   California Institute of Technology.
   Hosted by: Adam Wierman and Steven Low — August, 2022.
7. *Privacy-preserving perturbation of convex optimization programs.*
   Massachusetts Institute of Technology.
   Presented at Stats&LIDS Tea Talks seminar series — May, 2022.
8. *Algorithmic privacy for energy system optimization.*
   Massachusetts Institute of Technology.
   Presented at MITEI Research Meets seminar series — May, 2022.
9. *Stochastic control and market design for natural gas networks.*
   Massachusetts Institute of Technology.
   Hosted by: Audun Botterud — September, 2020.

10. *Differentially private optimization of power systems.*
Georgia Institute of Technology.
Presented at DOS Seminars seminar series December, 2019.

11. *Electricity market equilibrium under information asymmetry.*
Johns Hopkins University.
Hosted by: Benjamin Hobbs January, 2019.

Conferences & Workshops

1. *Algorithmic privacy for energy systems optimization.*
2022 INFORMS Annual Meeting. October, 2022

2. *Multi-stage stochastic generation investment with performance guarantees.*
MITEI Future Energy Systems Center Fall 2021 Workshop. December, 2021

3. *Multi-stage investment decision rules for power systems: sensitivities, deterministic equivalents, and performance guarantees.*
2021 INFORMS Annual Meeting. October, 2021

4. *Multi-stage stochastic generation investment with performance guarantees.*
Federal Energy Regulatory Commission. June, 2021

5. *Differentially private optimal power flow for distribution grids.*
IEEE PES Madrid PowerTech 2021. June, 2021

6. *Stochastic control and market design for natural gas networks.*
2020 INFORMS Annual Meeting. October, 2020

7. *Differentially private optimal power flow for distribution grids.*
2020 INFORMS Annual Meeting. October, 2020

8. *Differentially private distribuited optimal power flow.*
2019 GeorgiaTech Energy Systems and Optimization Workshop. November, 2019

9. *Electricity market equilibrium under information asymmetry.*
2019 INFORMS Annual Meeting. October, 2019

10. *Electricity market equilibrium under information asymmetry.*
2019 IEEE PES General Meeting. August, 2019

11. *Electricity market equilibrium under information asymmetry.*
XV International Conference on Stochastic Programming. August, 2019

12. *Power system optimization under information asymmetry.*
Grid Science Winter School, Los Alamos National Laboratory. January, 2019

13. *Consensus-ADMM approach for strategic investment in electricity markets.*
2018 IEEE Conference on Decision and Control. December, 2018

14. *A solution framework for strategic investment problems via progressive hedging.*
XV Conference on Computational Management Science. May, 2018

Reviewer experience

1. IEEE Transactions on Smart Grids	since Apr 2019
2. IEEE Transactions on Automatic Control	since Jan 2019
3. IEEE Transactions on Sustainable Energy	since Jun 2018
4. IEEE Transactions on Power Systems	since Mar 2018
5. Computational Management Science	since Mar 2022
6. European Journal of Operational Research	since Jan 2020
7. International Transactions on Electrical Energy Systems	since Oct 2017
8. PSCC – Power Systems Computation Conference	2018,2020,2022
9. IEEE Conference on Decision and Control	2018 – 2021
10. Smart Energy Systems and Technologies (SEST)	2020

11. IEEE PES PowerTech 2019
12. IEEE American Control Conference 2018

GitHub repositories

1. PrivateOpt: Differentially Private Convex Optimization
2. InvestmentLDR: Investment Linear Decision Rules for Power Systems
3. DP-CC-OPF: Differentially Private Chance-Constrained OPF
4. GasLDR: Linear Decision Rules for Stochastic Control of Gas Networks
5. Stochastic Control and Pricing for Natural Gas Networks

Professional Memberships

IEEE, Member (Power and Energy Society) since 2017
INFORMS, Member (Energy, Natural Resources and Environment section) since 2019.

Other

1. Founder of the enOPTIMAL: Energy, Optimization and Learning seminar series