Iegor Riepin

I am a postdoctoral researcher at the ENSYS @ TU Berlin

My research stands at the intersection of economics and operations research. The overarching goal is to provide empirical and computational evidence to guide public- and private sector stakeholders in dealing with challenges of energy transition. Generally, I enjoy using mathematical models to compute some stuff. I believe in open science, and I try to contribute by sharing my code, data and teaching materials.

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Work experience

2022.03 – present
Postdoctoral researcher | Energy system modeler
Department of Digital Transformation in Energy Systems (ENSYS)
ENSYS @ TU Berlin
I mainly work on the 24/7 Carbon-Free Energy by 2030 project funded by Google. In October 2022, we published the first study. The work on this project is open source: https://github.com/PyPSA/247-cfe.

2014.11 – 2022.02
Research fellow | PhD student
ESM group lead (2021.09 – 2022.02)
Brandenburg University of Technology (BTU CS), Germany
Chair of Energy Economics
I have carried out independent and third-party funded research on energy economics & energy systems modeling. The topics included infrastructure investments, decisions under uncertainty, risk-aversion, sector coupling and energy auctions.

2019.09 – 2019.10
Visiting researcher
University of Victoria, Canada | Institute for Integrated Energy Systems
My work was focused on robust optimization algorithms applied to electricity system expansion problems.

2013.10 – 2014.09
Student assistant
Chair of Energy Economics, BTU CS

2013.09 – 2013.10
Intern
DIW Berlin, Institute for Economic Research, Germany
Department: Energy, Transportation, Environment

Academic background

2014.11 – 2022.06		**PhD (summa cum laude) in energy economics** Supervision: Prof. Felix Müsgens | BTU CS PhD thesis '*Modeling challenges of modern energy markets: studies on uncertainty, complexity, and constant change*' is published in open access.
2012 – 2014		**M.Sc. (Hon) in Power Engineering** BTU CS, Germany | Final grade: 1.2 (/1)
2008 – 2012		**B.Sc. (Hon) in Heat Power Engineering** ZSEA, Ukraine | Final grade: 4.98 (/5)

Third-party projects

2022.03 present	–	*@TUB:* **24/7 Carbon-Free Energy Procurement.** Funding: Google Inc. See Operating on 24/7 Carbon Free Energy by 2030 objective by Google.
2021 (ongoing)		*@BTU:* TransHyDE: **System analysis of transport solutions for green hydrogen.** Funding: BMBF (Federal Ministry of Education and Research) Cooperation: >30 partners | Project web page
2017		*@BTU:* **Design of auctions for market premia for onshore wind generation: theoretical and experimental testing.** Cooperation: CERGE-EI. Summary
2016		*@BTU:* **Strategy 2020: modelling of forward prices for natural gas in European gas markets.** Funding: industry partner. Cooperation: r2b energy consulting GmbH
2014 – 2016		*@BTU:* **Fundamental gas market analysis in a context of the German energy transition process.** Funding: gas trading utility. Cooperation: r2b energy consulting GmbH. Summary

Peer-reviewed journal articles

Research articles #1, #5, #6, #7 formed my PhD thesis.

1. Applied Energy (2022). **Adaptive robust optimization for European strategic gas infrastructure planning**
   Riepin, I., Schmidt, M., Baringo, L., Müsgens, F.,
   DOI: doi.org/10.1016/j.apenergy.2022.119686 \| Code
   Working paper at Optimization Online (2021)

2. **Risk aversion in flexible electricity markets**
   Möbius, T., Riepin, I., Müsgens, F., Adriaan H. van der Weijde
   Working paper at arXiv (2021)
   In review \| Code

3. **Grok it and use it: Teaching energy systems modeling**
   Riepin, I., Sgarciu, S., Bernecker, M., Möbius, T., Müsgens, F.
   In review \| Course GitHub

4. Energy Policy (2022). **Policy choices and outcomes for the global competitive procurement of offshore wind**
   Jansen, M., Beiter, P., Riepin, I., Müsgens, F. Juarez Guajardo-Fajardo, V., Staffell, I., Bulder, B., Kitzing, L.
   DOI: 10.1016/j.enpol.2022.113000 | Data
   Working paper at arXiv (2022)

5. Applied Energy (2021). **Modelling uncertainty in coupled electricity and gas systems—Is it worth the effort?**
   Riepin, I., Möbius, T., Müsgens, F.
   DOI: 10.1016/j.apenergy.2020.116363 | Code
   Working paper at arXiv (2020): arxiv.org/abs/2008.07221

6. Nature Energy (2020). **Offshore wind competitiveness in mature markets without subsidy.**
   Jansen, M., Staffell, I., Kitzing, L., Quoilin, S., Wiggelinkhuizen, E., Bulder, B., Riepin, I., Müsgens, F.
   DOI: 10.1038/s41560-020-0661-2 | Code | Supplementary data
   Nature Energy News & Views | Media coverage: 118 news stories from 116 outlets

7. The Energy Journal (2022). **Seasonal flexibility in the European natural gas market.**
   Riepin, I., Müsgens, F.
   DOI: 10.5547/01956574.43.1.irie | Code
   Cambridge Working Papers in Economics (2019)
   DOI: 10.17863/CAM.43923 | Abstract | Non-Technical Summary | PDF

Peer-reviewed conference articles

8. IEEE EEM (2022). **Modeling of Extreme Weather Events—Towards Resilient Transmission Expansion Planning.**
   Bernecker, M., Riepin, I., Müsgens, F.
   DOI: 10.1109/EEM54602.2022.9921145

9. IEEE EEM (2020). **Regret analysis of investment decisions under uncertainty in an integrated energy system.**
   Möbius, T., Riepin, I.
   DOI: 10.1109/EEM49802.2020.9221935

10. IEEE EEM (2018). **Integrated electricity and gas market modeling – effects of gas demand uncertainty.**
    Riepin, I., Möbius, T., Müsgens, F.
    DOI: 10.1109/EEM.2018.8469790 | preprint version | Video

11. IEEE EEM (2018). **Is offshore already competitive? Analyzing German offshore wind auctions.**
    Müsgens, F., Riepin, I.
    DOI: 10.1109/EEM.2018.8469851 | preprint version | Video

12. IEEE EEM (2016). **Modelling of world LNG market development: focus on US investments and supplies.**

Montenegro, R., Riepin, I., Hauser, P.
DOI: 10.1109/EEM.2016.7521361

13. ZSEA (2011). **Usage of solar energy for heating service and domestic water heating.** Riepin, I. | VII all-Ukrainian scientific conference. Vol. 2, pp. 78 - 83.

14. ZSEA (2011). **Ukrainian market prospects in the field of alternative energy sources.** Riepin, I. | The annual conference for graduate students. pp. 186 - 192.

Science explainers, media, reports

15. (2022) Project report: **System-level impacts of 24/7 carbon-free electricity procurement in Europe.**
Riepin, I. and Brown, T.
Zenodo

16. CarbonBrief (2020). **The era of 'negative-subsidy' offshore wind power has almost arrived**
Riepin, I., Jansen, M., Staffell, I., Müsgens, F.
Guest post

17. e|m|w.trends (2020). **Offshore-Windenergie - subventionsfrei?**
Müsgens, F. and Riepin, I.
Guest post

18. Oxford Institute for Energy Studies & BTU CS (2015). **A note on climate policy negotiations at the threshold of COP-21 in Paris.**
Müsgens, F., Poudineh, R., Riepin, I.
PDF

Some public talks

1. **24/7 A new paradigm for power procurement?**
PDF | Code @ European Climate and Energy Modelling Platform 2022

2. **European Natural Gas Infrastructure Expansion Planning: An Adaptive Robust Optimization Approach**
PDF | Code @ EWI Cologne & BTU CS Research seminars 2021
PDF | Code @ European Conference on Operational Research, Athens, 2021

3. **The costs of ignoring uncertainty and the value of perfect information: a toy model.**
PDF | Code @ Doctoral seminar, BTU CS, 2019

4. **Robust optimization of electricity system expansion.**
PDF | Code @ University of Victoria, Canada, 2019

5. **Economic impacts of uncertainty in integrated electricity and gas markets.**
PDF @ 30th European Conference on Operational Research, Dublin, Ireland, 2019

6. **Integrated electricity and gas market modelling – effects of gas demand uncertainty.**
PDF @ EEM2018 Conference, Lodz, Poland, 2018

PDF @ PhD seminar Cottbus-Leipzig-Dresden, 2018

7. **Integration of electricity and gas market models.**
   PDF @ Energy modelling seminar, IER, Universität Stuttgart, 2018

8. **Application of non-linear and complementarity problems for natural gas market modelling.**
   PDF @ Research seminar with chair of Mathematical Economics, BTU CS, 2017
   PDF @ Internal research seminar, BTU CS, 2016

9. **Natural Gas Storages in Competition with Alternative Flexibility Sources.**
   PDF @ 39th IAEE International Conference, Bergen, Norway, 2016
   PDF @ PhD seminar Cottbus-Leipzig-Dresden, 2016

10. **Prospects for Shale Gas Exploration in Europe: Ongoing Experience.**
    PDF @ 38th IAEE International Conference, Antalya, Turkey, 2015

Teaching experience

WS17/18 WS18/19 WS19/20	**Energy Systems Modelling** (course development, selected lectures, tutorials, supervision of student projects) Lecture: Prof. Dr. Felix Müsgens | Course GitHub page
From WS14/15 until SS2018	**Power System Economics 1** (Winter terms | tutorials) **Power System Economics 2** (Summer terms | tutorials) Lecture: Prof. Dr. Felix Müsgens and Prof. Dr. Stefan Zundel

Scholarships & awards

2017 – 2019	Postgraduate scholarship, BTU CS (Promotionsstipendium des Landes Brandenburg, GradV)
2014	Rheinstahl foundation study scholarship (Master degree)
2013	STIBET study scholarship, DAAD (Master degree)
2010	Zaporizhia city administration scholarship (Bachelor degree)

Some technical skills and languages

Mathematical modelling & programming	**GAMS** (project-related use, research and teaching) **Python** (research and hobby projects) **Git** (version control)
Languages	**English** (fluent), **German** (C1 certificate) **Ukrainian & Russian** (native fluent)

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Berlin, November 2022