

Curriculum Vitae: Oliver Ruhnau

oliver.ruhnau@uni-koeln.de · bit.ly/m/ruhnau

Short bio

I am Assistant Professor for Energy Market Design at the University of Cologne and Research Scientist at the Institute of Energy Economics (EWI). My research interests lie in the field of energy economics and the sustainable transition of energy systems. In my dissertation, I investigated flexible electricity demand in current and future electricity markets, with a focus on heat pumps and hydrogen electrolysis. More recently, I studied natural gas savings in Germany during the energy crisis. I have (co-)developed several numerical energy market models and applied statistical methods for causal inference. Previously, I was Postdoctoral Researcher at the Hertie School in Berlin. I worked as a data scientist in the energy industry and studied engineering and economics at the RWTH Aachen University and the KTH Royal Institute of Technology in Stockholm.

Positions

2023 – present	Assistant Professor of Energy Market Design at the University of Cologne Faculty of Management, Economics and Social Sciences
2023 – present	Research Scientist at the Institute of Energy Economics (EWI) at the University of Cologne Acquisition and implementation of research projects
2022 – 2023	Postdoctoral Researcher at the Hertie School Centre for Sustainability
2019 – 2021	Research Associate at the Hertie School Project: Model comparison for impact analysis of policy instruments (MODEX-POLINS) Funder: German Federal Ministry of Economic Affairs and Energy (BMWi)
2017 – 2019	Data Scientist at Digital Energy Solutions by BMW and Viessmann Tasks: modelling and analysis of integrated energy systems and markets
2014 – 2017	Student Assistant and Internships FCN Institute for Future Energy Consumer Needs and Behavior (Aachen) BET Büro für Energiewirtschaft und technische Planung (Aachen) Grundgrün Energie (Berlin)

Education

2019 – 2022	Doctoral Program in Governance at the Hertie School Title: “Economics of flexible electricity demand” Supervisors: Lion Hirth, Christoph Weber, Ottmar Edenhofer Grade: summa cum laude
2015 – 2017	Master of Science at RWTH Aachen Engineering and economics (Wirtschaftsingenieurwesen) Focus: energy systems, energy economics, renewable energy Grade: excellent (1.3)
2011 – 2015	Bachelor of Science at RWTH Aachen Grade: excellent (1.3)

Teaching

2022 – 2023	Lecturer at Hertie School Course: Net-Zero Energy Systems
2022	Guest lecturer at the German Academic Scholarship Foundation (Studienstiftung) Summer School: Net-Zero Energy Systems (w/ Maren Preuß)
2020 – 2022	Teaching Assistant at Hertie School Courses: Energy Economics, Electricity Market Design (w/ Lion Hirth)
2021	Training Participant at Hertie School Certificate: Introduction to Teaching in Higher Education (by Annika Zorn)
2020	Guest Lecturer at TU Berlin Course: Electricity Economics and Modeling (w/ Anselm Eicke)
2012 & 2016	Teaching Assistant at RWTH Aachen Decision Theory at EFI Chair of Decision Theory & Financial Services (w/ Rüdiger v Nitsch), Energy System Technology at LTT Institute of Technical Thermodynamics (w/ André Bardow)

Advising

2020 – present	Master Thesis Co-Advisor at Hertie School 5 students
2018	Master Thesis Practice Partner at Digital Energy Solutions 1 student

Funding

2022	Project funding from the Federal Ministry of Education and Research (BMBF) Title “Machine Learning for Electricity Market Research” (w/ Lion Hirth and Lynn Kaack)
2020 – 2021	Stipend from the German Economy Foundation (Stiftung der Wirtschaft)
2013 – 2017	Stipend from the German Academic Scholarship Foundation (Studienstiftung)
2013	Stipend from the Ulderup Foundation

International

2021	Research visit at European University Institute’s Florence School of Regulation
2013	Study abroad at KTH Royal Institute of Technology
2007 & 2009	Student exchanges with France and Canada

Honors

2021	2nd-Best Student Paper Award from the International Association for Energy Economics
2017 & 2019	Finalist at awards from the German Association for Energy Economics
2013 – 2015	Dean’s List at RWTH Aachen (Top 5%)

Initiatives

2022 – present	Co-Director of Strommarkttreffen Network for professionals in energy
2020 – 2021	Founding member of the d\carb – Future Economy Forum Organizing public events on the transition toward a sustainable economy
2013 – 2017	Member of Energie Forum Aachen e.V. Organizing public events on energy topics
2012 – 2017	Member of the Board at Hêvî e.V. Local association for education and integration
2009 – 2010	President of the Student Council

Research interests

Energy economics, energy policy, electricity markets (wholesale, retail, balancing), market design, tariff design, market regulation, carbon pricing

Integrated energy systems, wind and solar energy, energy storage, flexible electricity demand, sector coupling, electrification, electric vehicles, electric heat pumps, hydrogen, net-zero energy systems

Numerical and empirical methods, energy market modeling, linear optimization, partial equilibrium models, causal inference, instrumental variables

Publications

[Google Scholar](#)

Full peer-review

1. Ruhnau, O., Stiewe, C., Muessel, J., Hirth, L., 2023. [Natural gas savings in Germany during the 2022 energy crisis](#). *Nature Energy*. (presented at FSR Insights 2023, ENERDAY 2023)
2. Ruhnau, O., Schiele, J., 2023. [Flexible green hydrogen: The effect of relaxing simultaneity requirements on project design, economics, and power sector emissions](#). *Energy Policy*. (presented at the FSR Annual Sustainability Conference 2022)
3. Muessel, J., Ruhnau, O., Madlener, R., 2023. [Accurate and scalable representation of electric vehicles in energy system models: A virtual storage-based aggregation approach](#). *iScience*. (presented at the Smart Energy Systems Conference 2023)
4. Ruhnau, O., 2022. [How flexible electricity demand stabilizes wind and solar market values: The case of hydrogen electrolyzers](#). *Applied Energy*. (2nd-Best Student Paper at the IAEE 2021, presented at INREC 2020, IEW 2021, EAERE 2021, EMP-E 2021, BTU 2022)
5. Ruhnau, O., Qvist, S., 2022. [Storage requirements in a 100% renewable electricity system: Extreme events and inter-annual variability](#). *Environmental Research Letters*. (presented at IEW 2022)
6. Ruhnau, O., Eicke, A., Sgarlato, R., Tröndle, T., Hirth, L., 2022. [Cost-potential curves of onshore wind energy: the role of disamenity costs](#). *Environmental and Resource Economics*. (presented at IAEE Webinar 2023, EGU 2023)
7. Ruhnau, O., Bucksteeg, M., Ritter, D., et al., 2022. [Why electricity system models yield different results: Carbon pricing in a model-comparison experiment](#). *Renewable and Sustainable Energy Reviews*. (presented at ENERDAY 2021, OR 2021, IAEE Webinar 2022)
8. Cloete, S., Ruhnau, O., Cloete, J.H., Hirth, L., 2022. [Blue hydrogen and industrial base products: The future of fossil fuel exporters in a net-zero world](#). *Journal of Cleaner Production*.

9. Pöstges, A., Bucksteeg, M., Ruhnau, O., et al., 2022. [Phasing out coal: An impact analysis comparing five large-scale electricity market models](#). *Applied Energy*.
10. Bucksteeg, M., Wiedmann, M., Pöstges, A., et al., 2022. [The transformation of integrated electricity and heat systems—Assessing mid-term policies using a model comparison approach](#). *Renewable and Sustainable Energy Reviews*.
11. Eicke, A., Ruhnau, O., Hirth, L., 2021. [Electricity balancing as a market equilibrium: An instrument-based estimating supply and demand for imbalance energy](#). *Energy Economics*.
12. Cloete, S., Ruhnau, O., Hirth, L., 2021. [On capital utilization in the hydrogen economy: The quest to minimize idle capacity in renewables-rich energy systems](#). *International Journal of Hydrogen Energy*.
13. Ruhnau, O., Hirth, L., Praktiknjo, A., 2020. [Heating with wind: Economics of heat pumps and variable renewables](#). *Energy Economics*. (presented at YEEES 2019, INREC 2019)
14. Ruhnau, O., Hennig, P., Madlener, R., 2020. [Economic implications of forecasting electricity generation from variable renewable energy sources](#). *Renewable Energy*. (presented at OR 2015)
15. Ruhnau, O., Hirth, L., Praktiknjo, A., 2019. [Time series of heat demand and heat pump efficiency for energy system modeling](#). *Scientific Data*.
16. Ruhnau, O., Bannik, S., Otten, S., Praktiknjo, A., Robinius, M., 2019. [Direct or Indirect Electrification? A review of heat generation and road transport decarbonisation scenarios for Germany 2050](#). *Energy*.

Working papers & works in progress

17. Hirth, L., Khanna, T., Ruhnau, O., 2023. [How aggregate electricity demand responds to hourly wholesale price fluctuations](#). *Working paper*. (presented at INREC 2021, ESEE Pisa 2022, EMEE 2022, IAEE 2023)
18. Stiewe, C., Ruhnau, O., Hirth, L., 2022. [European industry responds to high energy prices: The case of German ammonia production](#). *Working paper*.
19. Ruhnau, O., Muessel, J., 2022. [Update and extension of the When2Heat dataset](#). *Working paper*.

Conference proceedings, dissertation & book chapters

20. Ruhnau, O., Lundström, L., Dürr, L., Hunecke, F., 2023. [Empirical weather dependency of heat pump load: Disentangling the effects of heat demand and efficiency](#). *19th International Conference on the European Electricity Market*.
21. Muessel, J., Ruhnau, O., Madlener, R., 2023. [Simulating charging behavior of electric vehicles: Review and comparison with empirical data](#). *19th International Conference on the European Electricity Market*.
22. Ruhnau, O., 2022. [The Economics of Flexible Electricity Demand](#). *Dissertation*.
23. Madlener, R., Ruhnau, O., 2021. [Variable renewables and demand flexibility: Day-ahead versus intraday valuation](#). In: Sioshansi, F., Variable Generation, Flexible Demand. *Academic Press*.

Software & data

24. Hirth, L., Ruhnau, O., Sgarlato, R., 2021. [The European Electricity Market Model EMMA](#). *Open-source electricity market model, including input data*.
25. Ruhnau, O., 2019. [When2Heat Heating Profiles](#). *Dataset contributed to the Open Power System Data platform*.

Commentaries

26. Hirth, L., Maurer, C., Ruhnau, O., et al., 2022. [Energy policy and energy industry options for Germany and Europe in view of Russia's attack on Ukraine](#). *Open letter at Tagesspiegel Background Energie & Klima*.
27. Osorio, S., Pahle, M., Ruhnau, O., 2022. [If buildings renovation fails, the EU ETS pricing mechanism must change](#). *energypost.eu*.

Review service

Academic journals: *Nature Energy*, *Energy Economics*, *Energy Policy*, *Joule*, *Applied Energy*, *Energy Strategy Reviews*, *IET Renewable Power Generation*, *iScience*, *Data in Brief*, *Resource and Energy Economics*

Grant proposals: [Climate Change AI Innovation Grants](#)

Policy Statements: [Hydrogen Analysis by the Copernicus Research Project Ariadne](#), [Hydrogen Statement by German Advisory Council on the Environment](#) (Sachverständigenrat für Umweltfragen)

Selected media coverage

Written

Frankfurter Allgemeine Zeitung, 2023: [Warum sich die Lage auf dem Gasmarkt entspannt](#)

Tagesspiegel, 2023: [Gasverbrauch ist in Deutschland 2022 stark zurückgegangen](#)

Financial Times, 2022: [Germany dims the light to cope with Russia gas supply crunch](#)

BBC Radio, 2022: [World Business Report on July 8](#)

Spiegel, 2022: [Wer in Deutschland Gas spart – und wer nicht](#)

Zeit Online, 2022: [So schlimm könnte der Gasstopp werden](#)

WirtschaftsWoche, 2022: [„Die Ignoranz gegenüber Preissignalen rächt sich schon jetzt“](#)

Tagesspiegel Background Energie & Klima, 2022: [Studie belegt Spareffekt hoher Gaspriese](#)

Handelsblatt, 2022: [Atomkraftwerke sind die einzige Chance, die Energiewende noch zu schaffen](#)

Radio & podcast

Terra-X – der Podcast (ZDF), 2022: [Wie gefährdet ist unser Stromnetz?](#)

Hessischer Rundfunk (hr-info), 2022: [Aktuell um 15:00 am 1. August zum Gas-Notfallplan der EU](#)

Television

ARD, 2023: [Tagesschau am 5. Mai um 20:00](#)

ntv, 2022: [Telebörse um 12:15 am 1. November \(live\)](#)

Selected talks

Invited speaker & panelist

Florence School of Regulation, 2023: [FSR Insights on Experience with Emergency Gas Measures](#)

German Marshall Fund of the United States, 2022: [The Winter of Discontent. Europe's Energy and Economic Crisis](#)

World Energy Council's Young Energy Professionals, 2022: [Energy markets and state intervention in times of crisis](#)

Conferences

International Energy Workshop (IEW), Freiburg 2022

Empirical Methods in Energy Economics (EMEE), Online Summer Workshop 2022

International Association of Energy Economics (IAEE), Annual Conference 2021, Webinar 2021, 2022, 2023

Strommarkttreffen, Online 2021 & 2022

Smart Energy Systems Conference, Copenhagen 2021

European Association of Environmental and Resource Economists (EAERE), Online 2021

Energy Modeling Platform for Europe Conference (EMP-E), Online 2021

Operation Research Conference (OR), Online 2021

ENERDAY, Online 2021, Dresden 2023