Curriculum Vitae: Lion Hirth

Short bio

Prof. Dr. Lion Hirth is founder and director of Neon, a boutique energy economics consulting firm; assistant professor at Hertie School of Governance, a Berlin-based public policy school; and research fellow at MCC, a climate think tank. He is an energy economist and expert in wind and solar energy, power market modeling, and electricity market design. Lion has consulted clients from the private and public sector on matters of renewable energy and power markets, including the International Energy Agency (Paris), the European Commission (Brussels), the Department for Energy and Climate Change (London), Agora Energiewende (Berlin), and Svensk Energi (Stockholm). He also regularly advises the German government on wholesale and balancing market design. Lion acts as secretary of Strommarkttreffen, a 3000 member network of energy professionals in science, policy and industry. He has developed and maintains the open-source power market model EMMA and coordinates the open energy data platform OPSD. Previously, Lion spent five years with the Swedish utility Vattenfall, where he was concerned with long-term price projections. Lion holds a Ph.D. in energy economics, a Diploma in economics, and a Magister in political science. His academic articles, published inter alia in *Energy Economics, The Energy Journal,* and *Applied Energy*, have won several awards and are heavily cited. Lion has a daughter and lives in Berlin. Contact: hirth@neon-energie.de or +49-157-55 199 715.

Positions

2014 – present **Director of Neon**
Neon Neue Energieökonomik GmbH is a Berlin-based boutique consulting firm for energy economics. Lion is founder and director of Neon.

2017 – present **Assistant professor at Hertie School**
Lion is Assistant Professor of Governance of Digitalization and Energy Policy at Hertie School of Governance, a Berlin-based public policy school. He teaches classes on energy economics, climate change and economic growth.

2014 – 2016 **Post-doc researcher at MCC**
The Mercator Research-Institute for Global Commons and Climate Change is a think tank for climate economics. After completing his post-doctoral research position, Lion remains associated as research fellow.

2009 – 2014 **Market Analyst at Vattenfall**
Lion's tasks at Vattenfall's Group Strategy included renewable energy policy analysis, long-term electricity price modeling, and monitoring of balancing power markets.

Education

2012 – 2014	**Economics (Ph.D.), Technical University of Berlin** The dissertation "The Economics of Wind and Solar Variability" (*summa cum laude*) was supervised by Ottmar Edenhofer.
2004 – 2009	**Economics (Diploma), University of Tübingen** Final grade: 1.1 (corresponds to A+), best degree in economics
2005 – 2010	**Political Science (Magister), University of Tübingen** Final grade: "excellent" (A+)
2006 – 2009	**Study abroad and research visits** University of Massachusetts (USA), Universidad Católica (Chile), John Abbot College (Canada), Potsdam Institute for Climate Impact Research (Germany)
1994 – 2004	**Willi-Graf-Gymnasium, Munich** Final grade: 1.2 (A+)

Teaching

2017 – present	Master-level lectures and seminars at Hertie School
2014 – present	Executive training seminars in power markets and energy economics
2014 – 2016	Master-level courses at TU Berlin on climate economics and climate policy
2013 – 2014	Master-level courses at HTW Berlin on electricity economics
2009 – 2012	Summer schools for Deutsche Schülerakademie
2007 – 2009	Teaching assistant at University of Tübingen and TU Berlin

Honors

2017 - 2018	Fellow Freies Wissen
2017	Open Science Award of Schleswig-Holstein for OPSD project
2015	Best paper award at INREC conference in Essen
2014	Best IAEE working paper award
2013	Selected paper at the Solar Integration Workshop in London
2013	Best paper award, best poster award at IEWT conference in Vienna
2011	Best degree in economics at University of Tübingen
2005 – 2010	Scholarship from Studienstiftung des Deutschen Volkes
2008 – 2009	Scholarship from Hertie-Stiftung
2007 – 2008	Scholarship from DAAD and University of Massachusetts

Initiatives

2009 – today	Founder of Strommarkttreffen, a network for professionals in energy
2014 – today	Founder of the Openmod Initiative, a network for open-source energy modeling

Publications

Lion has published 16 articles in economics and engineering journals, including single-author papers in the leading field outlets *Energy Economics*, *The Energy Journal*, and *Applied Energy*. His Market Value paper is the most cited *Energy Economics* article in recent years (see ranking). See Google scholar page for citation details. Lion's publications have won several awards, including the best paper award of the International Association for Energy Economics.

Click on the title for a link to the journal. Click on "pdf" for a free-access pre-publication version or email me. Download all papers (zip).

First-authored articles in peer-reviewed journals

- The ENTSO-E Transparency Platform. An assessment of Europe's most ambitious electricity data platform, Applied Energy, 2018 (w/ Jonathan Mühlenpfordt & Marisa Bulkeley). open access
- What caused the drop of European electricity prices? A factor decomposition analysis, *The Energy Journal*, 2018. open access
- The role of capital costs for decarbonizing the power sector, *Environmental Research Letters,* 2016 (w/ Jan Steckel). pdf
- The benefits of flexibility: The value of wind energy with hydropower, *Applied Energy*, 2016. pdf
- System-friendly Wind Power, *Energy Economics*, 2016 (w/ Simon Müller). pdf | Best paper award INREC
- Why Wind is not Coal: On the Economics of Electricity Generation, *The Energy Journal*, 2016 (w/ Falko Ueckerdt & Ottmar Edenhofer). pdf
- Balancing Power and Variable Renewables: Three Links, *Renewable & Sustainable Energy Reviews*, 2015 (w/ Inka Ziegenhagen). pdf
- Integration Costs Revisited – An economic framework of wind and solar variability, *Renewable Energy*, 2015 (w/ Falko Ueckerdt & Ottmar Edenhofer). pdf | Best paper award IAEE | Best poster award IEWT | Best paper award IEWT
- The Optimal Share of Variable Renewables: How the Variability of Wind and Solar Power affects their Welfare-optimal Deployment, *The Energy Journal*, 2015. pdf | review
- The Market Value of Solar Power: Is Photovoltaics Cost-Competitive?, *IET Renewable Power Generation*, 2015. pdf | Selected paper Solar Integration Workshop
- The Market Value of Variable Renewables: The effect of solar wind power variability on their relative price, *Energy Economics,* 2013. pdf
- Redistribution Effects of Energy and Climate Policy: The electricity market, *Energy Policy,* 2013 (w/ Falko Ueckerdt). pdf

Co-authored articles in peer-reviewed journals

- The importance of open data and software: is energy research lagging behind?, *Energy Policy*, 2017 (w/ Stefan Pfenninger, Joseph DeCarolis, Sylvain Quoilin & Iain Staffell). open access
- Carpe diem: A novel approach to select representative days for long-term power system models with high shares of renewable energy sources, *Energy*, 2016 (w/ Paul Nahmmacher, Eva Schmid & Brigitte Knopf).

- On the Economics of Renewable Energy Sources, *Energy Economics*, 2013 (w/ Ottmar Edenhofer, Brigitte Knopf, Michael Pahle, Steffen Schloemer, Eva Schmid & Falko Ueckerdt). pdf
- System LCOE: What are the costs of variable renewables?, *Energy*, 2013 (w/ Falko Ueckerdt, Gunnar Luderer & Ottmar Edenhofer). pdf
- Carbon lock-out: Advancing renewable energy policy in Europe, *Energies*, 2012 (w/ Paul Lehmann, Felix Creutzig, Melf-Hinrich Ehlers, Nele Friedrichsen, Clemens Heuson & Robert Pietzcker). open acces

Working paper / under review

- The Market Value of Wind and Solar Power: an Analytical Approach, *USAEE Working Paper*, 2016 (w/ Alexander Radebach).
- Minimal Thermal Generation in Power Systems, *USAEE Working Paper*, 2015.
- How much electricity do we consume? A guide to German and European electricity consumption and generation data, *FEEM Working Paper*, 2014 (w/ Maximilian Schumacher).

Dissertation

- The Economics of Wind and Solar Variability, TU Berlin, 2014.

Other publications

- The importance of open data and software for energy research and policy advise, *SETIS Magazine*, 2016 (w/ Stefan Pfenninger, Joseph DeCarolis, Sylvain Quoilin & Iain Staffell).
- Übertragungsnetzbetreiber erwarten massiven Wertverlust für Solarstrom, *Phasenprüfer*, 7 January 2016 (with Jakob Schlandt)
- Jenseits des Sündenbocks Erneuerbare: Was hat den Verfall des Börsenstrompreises wirklich verursacht? , *Phasenprüfer*, 13 August 2015 (with Christoph Weber).
- Das Ende der Grundlast, *Phasenprüfer*, 26 May 2015.
- Solarstrom - an der Börse immer weniger wert, *pv magazine*, 23 April 2015.
- Die Ökonomie der Energiewende, *Phasenprüfer*, 9 March 2015.
- Wind, Sonne und Regelleistung, *energiewirtschaftliche tagesfragen*, 2013 (with Inka Ziegenhagen). pdf | Mandarin
- The Decreasing Market Value of Variable Renewables: Integration Options and Deadlocks, in: Detlef Stolten & Viktor Scherer (eds.): Transition to Renewable Energy Systems: Energy Process Engineering, Wiley, 2013 (with Falko Ueckerdt). pdf

Press coverage

- Vattenkraft förbättrar vindkraftens lönsamhet, *Second Opinion*, 2016 (Swedish).
- 3 Ways Wind and Solar Can Continue To Grow In a 21st-Century Grid, *Rocky Mountain Institute Outlet,* 2015.
- Renewable energy sector runs the risk of overpowering market, *Financial Times*, 2015. pdf

- No business case for lots of wind and solar, *Energy Transition*, 2015.
- Strom aus Erneuerbaren kannibalisiert sich selbst, *Handelsblatt,* 2015 (German).
- A Look at Wind and Solar, Part 2: Is There An Upper Limit To Variable Renewables?, *TheEnergyCollective*, 2015.
- The Optimal Share of Intermittent Renewables, *TheEnergyCollective,* 2014.
- Doe windenergie niet af als kostenpost van miljarden euro's, *NRC*, 2014 (Dutch).

Google scholar | RePEc | ResearchGate | SSRN

Peer review

Lion has peer-reviewed manuscripts for all major energy economics journals, including:

- Energy Economics
- The Energy Journal
- IEEE Transactions on Power Systems
- IEEE Transactions on Renewable Energy
- Energy Policy
- Economics of Energy and Environmental Policy

Consulting projects

The following list summarizes consulting projects conducted by Neon. An overview of projects that Lion conducted in previous positions as well as letters of reference from clients are available on request.

- **System-friendly wind and solar power (IEA).** Model-based study for the International Energy Agency. Neon assessed the market and system benefits of low-wind speed wind turbines and east- and west-oriented PV. 2014-16. A summary report is published in *Energy Economics*. More
- **Integration costs (Agora Energiewende).** Qualitative study for Agora Energiewende. Neon advised Agora and helped implement workshops in Berlin and Paris. 2015. More
- **Whole system costs (DECC).** Neon reviewed a report on whole system costs of wind and solar power for the UK Department of Energy and Climate Change. 2015.
- **Open Power System Data (BMWi).** Construction of an online platform for European power system data for the German Ministry of Economic Affairs and Energy. Neon coordinates a team of three research institutes. 2015-17. More
- **Electricity market design (IEA-RETD).** Assessment of long-term wholesale and retail power market design under very high shares of variable renewables in cooperation with FTI CL Energy. 2015-16. More
- **Model development (Vattenfall Energy Trading).** Neon supported Vattenfall Energy Trading in model development. 2015.

- **Reasons for the price drop (Swedish Energy)**. Swedish wholesale power prices declined by two thirds from 2010 to 2015. Neon conducted a model-based assessment of the reasons for this price drop. 2016. More
- **Wind value in the Nordic region (Energiforsk)**. Model-based assessment of the market value of wind energy in the hydro-dominated power system of the Nordic region. Neon designed the study, developed the model, and wrote the report, which appeared in *Applied Energy.* 2016. More
- **The benefits of hydropower flexibility (Skekraft)**. Model-based assessment for Skellefteå Kraft, Sweden. 2016.
- **Market value of wind power (Vattenfall Wind Power)**. Evaluation of design options and operation strategies to improve the economics of wind power under market conditions. 2016-17.
- **Generation time series (LEAG)**. Neon provided in-feed time series of wind and solar power from re-analysis models. 2016.
- **Balancing market design (BMWi)**. Policy advise on wholesale market and balancing market for the German Federal Ministry of Economic Affairs and Energy. 2016-18.
- **Nodal pricing (BMWi)**. Consulting on locational price signals in wholesale markets. 2016-17.
- **Portfolio management costs (Vattenfall Energy Trading)**. Regulatory assessment and quantitative cost benchmarks for portfolio management costs of renewable energy. 2017.
- **TSO data quality (European Commissions)**. Assessment of data quality provided by European transmission system operators for DG Energy, Brussels. 2017.
- **Ad-hoc consulting**. Neon regularly advises financial institutions and investment banks on renewable energy and power markets.
- **Power market trainings.** Neon trained staff at IRENA, ERRA, Vattenfall, JRC, IASS Potsdam, UFZ, Swedenergy, Clean Air Task Force, IG Windkraft, Axpo, Renac, Agora Energiewende in topics such as power markets, energy economics, energy policy, and electricity market modeling. More

Teaching (detailed)

Slides and evaluation results are available on request.

2018 **Electricity Systems & Markets.** Hertie School, Master-level.
2018 **Renewable Energy Policies.** Hertie School, Master-level.
2018 **Emission Pricing.** Hertie School, Master-level (w/ Christian Flachsland).
2018 **Economic Growth & Climate Change.** Hertie School, Master-level.
2018 **Electricity Economics & Modelling.** Hertie School, Master-level.
2018 **Electricity Economics & Modelling.** TU Berlin, Master-level.
2017 **Electricity Economics & Technology.** Hertie School, Master-level.
2017 **Renewable Energy Policies.** Hertie School, Master-level.
2017 **Sustainable Energy and Climate Change.** Hertie School, executive Master (w/ Claudia Kemfert).
2017 **Economic Growth and Climate Change.** Hertie School, Master-level.
2016 **The Economics of Climate Change.** TU Berlin, Master-level (w/ Ottmar Edenhofer).
2015 **The Economics of Climate Policy.** TU Berlin, Master-level (w/ Ottmar Edenhofer).
2015 **The Economics of Climate Change.** TU Berlin, Master-level (w/ Ottmar Edenhofer).
2014 **Climate Change, Land Use & Infrastructure**. TU Berlin, Master-level (w/ Ottmar Edenhofer).
2014 **Electricity Economics.** HTW Berlin, Master-level (w/ Andreas Raab).

2013 **Electricity Economics.** HTW Berlin, Master-level (w/ Andreas Raab).

2012 **The Economics of Everything.** Summer school “Deutsche Schülerakademie”. Two weeks full-time undergraduate-level course (w/ Marie-Therese von Schickfus).

2011 **Electricity.** Summer school “Deutsche Schülerakademie”. Two weeks full-time undergraduate-level course (w/ Jonas Peters)

2010 **Energy Revolution.** Summer school “JGW Nachhaltigkeitsakademie”. Ten days full-time undergraduate-level course (w/ Valentin Schwamberger).

2009 **Global Warming**. Summer school “JGW Nachhaltigkeitsakademie”. Ten days full-time undergraduate-level course (w/ Valentin Schwamberger).

2007-9 **Public Finance, Macroeconomics I, Marcoeconomics II.** Teaching assistant at University of Tübingen and Technical University of Berlin.