

## Kristen R. Schell

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CONTACT INFORMATION	1205 Beal St. IOE Building Industrial and Operations Engineering University of Michigan Ann Arbor, MI 48109 USA	<i>Phone:</i> (734) 763-4161 <i>Fax:</i> (734) 764-3451 <i>E-mail:</i> krschell@umich.edu <i>web:</i> kristenschell.com
RESEARCH INTERESTS	<b>Methodological:</b> Stochastic programming, bi-level optimization, complementarity modeling, statistics, probabilistic predictive modeling, machine learning, agent-based modeling, risk, policy analysis  <b>Application Areas:</b> Power system planning, electricity market design with high renewable energy penetration, strategic behavior in electricity markets, renewable energy policy design, designing flexibility into networked engineering systems, management decision making	
EDUCATION	<b>Carnegie Mellon University (CMU)</b> , Pittsburgh, Pennsylvania USA <b>Faculdade de Engenharia da Universidade do Porto (FEUP)</b> , Porto, Portugal Ph.D. (dual degree), Engineering & Public Policy, 2016 <ul style="list-style-type: none"><li>• Dissertation Topic: “Computational Models for Renewable Energy Target Achievement &amp; Policy Analysis”</li><li>• Committee: Paul Fischbeck (CMU), João Claro (FEUP), Gabriela Hug (ETH Zurich), Seth Guikema (UM), João Pecas Lopes (FEUP) &amp; Adam Warren (NREL)</li></ul> <b>Johns Hopkins University</b> , Baltimore, Maryland USA M.S.E., Geography & Environmental Engineering, 2010  <b>Carnegie Mellon University</b> , Pittsburgh, Pennsylvania USA B.S., Chemical Engineering, 2007 <i>with an additional major in Engineering &amp; Public Policy</i>	
HONORS AND AWARDS	Portuguese National Science Foundation Graduate Research Fellowship, 2011 - 2016 <i>(Fundação para a Ciência e a Tecnologia (FCT))</i>  New England Complex Systems Institute (NECSI) Winter School Scholarship, 2014 <i>(NECSI, Boston, MA)</i>	
WORK EXPERIENCE	<i>Postdoctoral Research Fellow</i> Industrial and Operations Engineering, University of Michigan	<b>2016 - Present</b>
	<i>Visiting Researcher</i> Energy Analytics and Markets Group Center for Electric Power and Energy, Technical University of Denmark (DTU)	<b>2016, 2017</b>
	<i>Doctoral Student Researcher</i> Engineering & Public Policy, Carnegie Mellon University Engineering & Public Policy, Faculdade de Engenharia da Universidade do Porto	<b>2011 - 2016</b>
	<i>Researcher</i> Centro de Inovação, Tecnologia e Empreendedorismo (CITE), INESC TEC	<b>2010 - 2011</b>
	<i>Research Associate</i> Energy and Innovation Policy, The Science and Technology Policy Institute (STPI)	<b>2009 - 2010</b>

	<i>Research Assistant</i> Fuel Technologies/Energy & Climate Change, ICF International	<b>2007 - 2009</b>
	<i>Environmental Engineering Intern</i> Environmental Impacts Assessment, Paul C. Rizzo and Associates	<b>Spring 2007</b>
	<i>Chemical Engineering Intern</i> Design of Experiments Intern, ExxonMobil Chemicals	<b>Summer 2006</b>
PEDAGOGICAL EXPERIENCE	<i>Lecturer</i> IOE 201 Economic Decision Making Industrial and Operations Engineering, University of Michigan	<b>Fall 2016, Winter 2018</b>
	<i>Guest Lecturer</i> IOE 691 Predictive Modeling Industrial and Operations Engineering, University of Michigan	<b>Fall 2016</b>
	<i>Advisor</i> Masters student: Fangyuan Chang Electrical Engineering and Computer Science, University of Michigan <b>Topic:</b> Agent-based Modeling of Strategic Behavior in Electricity Markets	<b>2017</b>
	Masters student: Zhaoxi Zheng Industrial and Operations Engineering, University of Michigan <b>Topic:</b> Database design for big data in energy meteorology	<b>2016 - 2017</b>
	Undergraduate student: Yanchao Ni Electrical Engineering and Computer Science, University of Michigan <b>Topic:</b> Database design for big data in energy meteorology	<b>2016 - 2017</b>
	<i>Pedagogical Training Course</i> Industrial & Operations Engineering, FEUP, University of Porto, Portugal	<b>Spring 2015</b>
	<i>Teaching Assistant</i> EPP 19-452 Senior Project Engineering & Public Policy, Carnegie Mellon University	<b>Fall 2013</b>
	<i>Lecturer</i> Energy in All its Forms, <i>including</i> - hydropower turbine design experiment SUCCEED: Summer Center for Climate, Energy and Environmental Decision Making; summer science camp for high school juniors Carnegie Mellon University campus, Pittsburgh, PA, USA	<b>Summer 2013</b>
	<i>Tutor</i> Urban Pathways Tutored inner-city high schoolers in math and science; supported advancement to college Pittsburgh, PA	<b>Fall 2006</b>
PUBLICATIONS	Schell, K.R., P. Pinson, S.D. Guikema, B. McRoberts. Wind Drought Synchronicity with Peak Demand. Sept. 2017. Under review at the <i>Proceedings of the National Academy of Sciences (PNAS)</i> .	
	Loureiro, M.V., J. Claro, P. Fischbeck, K.R. Schell. Renewable integration through transmission network expansion under uncertainty. Under review at <i>Renewable and Sustainable Energy Reviews</i> .	

Schell, K.R., J. Claro, S.D. Guikema. Probabilistic Cost Prediction of Subsea Power Cable Projects. *International Journal of Electrical Power and Energy Systems*. Feb. 2017. doi: 10.1016/j.ijepes.2017.01.017

Schell, K.R., P. Fischbeck, J. Claro. Geographic Attribution of an Electricity System Renewable Energy Target: Local Economic, Environmental and Social Tradeoffs. *Renewable and Sustainable Energy Reviews*. Oct. 2015. doi: 10.1016/j.rser.2015.05.051

PAPERS IN  
PREPARATION

Schell, K.R., A. Staid, S.D. Guikema. Generalized probabilistic wind power prediction model for system planning.

Schell, K.R., M.V. Loureiro, J. Claro. Complementarity Modeling of Renewable Energy Credit (REC) and Electricity Markets to Inform Effective Renewable Energy Policy Formation.

Dent, C.J., R. Sioshansi, J. Reinhart, I. Staffell, S. Pfenninger, K.R. Schell, A.L. Wilson, S. Zachary, M. Lynch, C. Bothwell, C. Steele. The Capacity Value of Solar Power. *In preparation for submission to IEEE Transactions on Power Systems*.

Schell, K.R., A.Y. Abdulla. Japanese Energy Policy Alternatives Assessment and Selection.

Abdulla, A.Y., K.R. Schell, M.C. Schell. Characterizing Risk Cultures in Disparate, High Reliability Domains.

CONSULTING  
PROJECTS

*US Environmental Protection Agency Greenhouse Gas Reporting Rule*

Technical assistance was provided to help the US EPA write the Oil and Natural Gas and Petroleum Refinery sub-rules for the mandatory greenhouse gas (GHG) emissions reporting rule. Specifically assessed was the topic of how fugitive emissions should be reported from Natural Gas systems. The emission factor estimates table in the rule was also created, which allows refineries to use the stated default emission factor values in calculating their company's GHG emissions, where such emissions are not directly measured at the source. Technical assistance was also provided to the EPA in fielding and answering technical questions about the rule during the public commenting process.

*US National Greenhouse Gas Inventory*

Using industry accepted emission factors and associated activity factor drivers, the Petroleum and Natural Gas Systems emissions models for the United States of America were revised and updated, to determine how emissions from these energy systems have changed since 1990. The results of this study were published by the EPA, in the Energy section of the US Greenhouse Gas Inventory Report 2007 (<http://www.epa.gov/climatechange/emissions/usinventoryreport.html>).

*Greenhouse Gas Emissions Management System (GEMS®)*

GEMS® is a tool used by oil and natural gas companies to quantify and manage greenhouse gas emissions. GEMS® creates a Tier III and Tier IV emissions inventory, with the former consistent with the American Petroleum Institutes Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry. GEMS® was further developed by: researching the environmental and economic impact of various mitigation options; completing software development/testing in Microsoft Visual Basic 6.0; contributing to system design specifications and cost estimates; and providing technical support to users.

*Well-to-Wheels Greenhouse Gas Emissions Study, LNG vs. Natural Gas*

This well to wheels study was a comparison of the carbon footprint of the production, processing, transmission and distribution of both Liquefied Natural Gas and conventionally transported natural gas. Process and engineering-economic calculations were performed to characterize greenhouse gas emissions associated with the production, processing, transport, and distribution of North American

natural gas, and LNG from foreign markets. These analyses required thorough understanding of the processes and calculations on pumps, pipelines, heat exchangers, compressors, and other industry equipment.

*Voluntary Carbon Credit Assessment*

As the carbon market grows, so has the need for accurate assessment of project additionality, or the insurance that carbon credits are not double counted in different markets. Additionality was proven for several clients, both by the Clean Development Mechanism (CDM) standards, as well as by those of the Voluntary Carbon Standard (VCS). Carbon credits enable companies to both reduce emissions and increase profits from the project work.

PROFESSIONAL PARTICIPATION	<p><i>Society for Risk Analysis Annual Meeting</i> <span style="float: right;"><b>2017</b></span>  Arlington, Virginia, USA</p> <ul style="list-style-type: none"> <li>• Poster: <i>Assessing the Risk of Wind Drought for Wind Farms</i></li> </ul>
	<p><i>INFORMS Annual Meeting</i> <span style="float: right;"><b>2017</b></span>  Houston, Texas, USA</p> <ul style="list-style-type: none"> <li>• <b>Invited talk:</b> <i>Wind Drought Synchronicity with Peak Demand</i></li> </ul>
	<p><i>WindFarms 2017</i> <span style="float: right;"><b>2017</b></span>  Madrid, Spain</p> <ul style="list-style-type: none"> <li>• Presentation: <i>Synchronicity Assessment for Wind Farm Siting: Wind Drought Dynamics with System Load</i></li> </ul>
	<p><i>Institute of Industrial &amp; Systems Engineers Annual Conference</i> <span style="float: right;"><b>2017</b></span>  Pittsburgh, Pennsylvania, USA</p> <ul style="list-style-type: none"> <li>• <b>Invited Talk:</b> <i>Quality Control and Reliability Engineering Track</i></li> <li>• Presentation: <i>Probabilistic Cost Prediction for Subsea Power Cable Projects</i></li> </ul>
	<p><i>Society for Risk Analysis Annual Meeting</i> <span style="float: right;"><b>2016</b></span>  San Diego, California, USA</p> <ul style="list-style-type: none"> <li>• <b>Panel Session Chair:</b> <i>Energy Systems and Risk</i></li> <li>• Presentation: <i>Incorporating Renewable Generation Risk and Reliability Measures into Electricity System Planning</i></li> </ul>
	<p><i>INFORMS Annual Meeting</i> <span style="float: right;"><b>2016</b></span>  Nashville, Tennessee, USA</p> <ul style="list-style-type: none"> <li>• <b>Invited talk:</b> <i>Predicting Low-wind Events To Inform Planning And Policy Incentives</i></li> <li>• Presentation: <i>Complementarity Modeling Of Electricity And Renewable Energy Credit Markets To Inform Effective Renewable Energy Policy Formation</i></li> </ul>
	<p><i>EU Joint Research Center-IIASA Summer School on Evidence &amp; Policy in Energy</i> <span style="float: right;"><b>2015</b></span>  Laxenburg, Austria</p> <ul style="list-style-type: none"> <li>• Scientists and policymakers examining evidence-based policy strategies</li> </ul>
	<p><i>New England Complex Systems Institute (NECSI) Winter School</i> <span style="float: right;"><b>2014</b></span>  Boston, Massachusetts, USA</p> <ul style="list-style-type: none"> <li>• Presentation: <i>Adaptive Network Modeling: Incorporating Small World Effects &amp; Applying Real-World Dynamics to Epidemic Models</i></li> </ul>
	<p><i>Third International Engineering Systems Symposium</i> <span style="float: right;"><b>2012</b></span>  Delft, Netherlands</p> <ul style="list-style-type: none"> <li>• Presentation: <i>Flexible Network Design Under Uncertainty: A Case Study in Long Term Energy System Planning</i></li> </ul>

*NTNU PhD Winter School*  
Oppdal, Norway

**2011**

- Managing uncertainty in energy infrastructure investments in re-regulated electricity markets

REVIEWER

*IET Renewable Power Generation*  
*The Energy Journal*  
*Risk Analysis*  
*Decision Sciences*

ORGANIZATIONS

*INFORMS, Section on Energy, Natural Resources and the Environment (ENRE)*  
*IEEE, Power & Energy Society (PES)*  
*Society for Risk Analysis*  
*Cigré International Council on Large Electric Systems*  
*Society for Women Engineers*

**2016**

**2016**

**2016**

**2013**

**2003**

PROGRAMMING  
EXPERIENCE

Python, Pyomo, R, QGIS, Matlab, IBM ILOG OPL, GAMS, Visual Basic for Applications

LANGUAGES

**Portuguese**, Advanced, C1  
**English**, Native