

**Inês L. Azevedo**  
 Professor, Department of Engineering and Public Policy  
**Carnegie Mellon University**

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## 1. Education

Year	Degrees	University
2009	Ph.D. in Engineering and Public Policy	Department of Engineering and Public Policy <b>Carnegie Mellon University, US</b>
2009	M.Sc. in Innovation and Management of Technology	Instituto Superior Técnico <b>Technical University of Lisbon, Portugal</b>
2004	B.Sc. in Environmental Engineering	Instituto Superior Técnico <b>Technical University of Lisbon, Portugal</b>

## 2. Employment

Years	Institution
2017-present	<b>Professor (Full Professor with Tenure, effective July 1, 2017), Department of Engineering &amp; Public Policy, Carnegie Mellon University.</b> Prof. Azevedo has published 50+ journal publications in sustainable energy systems and climate change policy, published 90+ conference papers and abstracts, successfully graduated 19 PhD students, and she is currently advising 11 other PhD students. Prof. Azevedo participated as a committee member and co-author in several reports from the National Research Council from the U.S. National Academy of Sciences. She was a co-author for the Global Energy Assessment from IIASA. She received an Early Career Award from the Dean of the Carnegie Institute of Technology, awarded to untenured faculty members who have received extremely strong support during their review for promotion. In 2014, she was awarded the “40 Scientists under 40” award by the World Economic Forum (WEF).
2010-present	<b>PI and co-Director,</b> Center for Climate and Energy Decision Making, <a href="http://www.cedmcenter.org">www.cedmcenter.org</a> , Carnegie Mellon University. Prof. Azevedo leads the Climate and Energy Decision Making Center (CEDM). CEDM aims to solve energy and climate change problems using interdisciplinary approaches and to train the next generation of scientists and engineers that will be prepared to provide solutions to move the world to a sustainable, low carbon energy system. Since 2010 CEDM had a cumulative number of 93+ affiliated graduate students, produced 330+ peer-reviewed journal publications, held 90+ invited speaker seminars, and conducted numerous educational and outreach activities for policymakers and the public. Prof. Azevedo develops and implements the strategic vision for the center. In all, a cumulative total of \$11 million for CEDM’s operation was secured since 2010. Prof. Azevedo serves as joint PI with Prof. Morgan since 2010, and served as Executive Director from 2010-2013, and then co-Director (jointly with Prof. Morgan) since 2013.
2014-2017	Associate Professor, Department of Engineering & Public Policy, Carnegie Mellon University
2016-present	Affiliated Senior Research Fellow, Leeds University, UK
2015-present	Affiliated Researcher, Lawrence Berkeley National Laboratory
2013-2014	Assistant Professor, Department Engineering and Public Policy, Carnegie Mellon University
2010-2013	Assistant Research Prof., Department of Engineering and Public Policy, Carnegie Mellon University
2009-2010	Research Engineer, Department of Engineering and Public Policy, Carnegie Mellon University
10/2008–03/2009	Research Assistant, Environmental & Energy Technologies Division, LBNL, Berkeley, USA.
07/2008–09/2008 07/2007–09/2007	Research Assistant, Energy and Environmental Program, Resources for the Future
2005-2009	Research Assistant, Department of Engineering and Public Policy, Carnegie Mellon University

### 3. Publications

#### A. Books

- Currently writing a book on *Quantitative Methods for Decision and Policy Analysis*, which is being developed for graduate students in engineering working on decision analysis and policy issues, under a Philip L. Dowd Fellowship Award.
- Section: Author of “Science and technology advice to European governments and to the European Union” Section in Chap. 19 (*Science & Technology Advice to Government*) in Prof. Granger Morgan’s book *Theory and Practice in Policy Analysis* (to be published in 2017 by Cambridge University Press).

#### B. National Academies Reports

- Author and committee member for the *National Academies* report on “Reducing the fuel consumption and greenhouse gas emissions of medium- and heavy-duty vehicles, phase two, final report” (*in preparation – to be published in 2017*).
- Author and committee member for the *National Academies* report on “Reducing the fuel consumption and greenhouse gas emissions of medium- and heavy-duty vehicles, phase two, first report” (2014).
- Author and committee member for the *National Academies* report on “Assessment of solid-state lighting” (2013).

#### C. Journal Publications

Note: At Carnegie Mellon University, it is standard practice to co-author with students and for students to assume first authorship. Collaboration and multi-authorship is strongly encouraged.

“+” indicates a Ph.D. student; “\*” indicates Azevedo is the corresponding author.

- 54 Glasgo, B.<sup>+</sup>, Hendrickson, C., Azevedo, I.L., (2017). Assessing the value of information in residential building simulation: Comparing simulated and actual building loads at the circuit level, accepted in *Applied Energy*.
- 53 Lam, L.<sup>+</sup>, Branstetter, L., Azevedo, I.L., (2017). Not all patents are created equal: wind innovation in China, *Energy Policy*, 106, 588–599.
- 52 Sakti, A.<sup>+</sup>, Azevedo, I.L., Fuchs, E.R.H., Michalek, J.J., Gallagher, K., Whitacre, J.F., (2017). Consistency and robustness of forecasting and the need for technological detail: The case of Li-ion batteries for electric vehicles, *Energy Policy*, 106, 415–426.
- 51 Glasgo, B.<sup>+</sup>, Hendrickson, C., Azevedo, I.L., (2017). Using advanced metering infrastructure to characterize residential energy use, *The Electricity Journal*, 30 (3), 64–70.
- 50 Welle, P.<sup>+</sup>, Azevedo, I.L.\* , Doney, S., Small, M., (2017). Estimating the effect of multiple environmental stressors on coral bleaching and mortality, *PlosOne*, 2(5): e0175018. <https://doi.org/10.1371/journal.pone.0175018>.
- 49 Gingerich, D.<sup>+</sup>, Sun, X.<sup>+</sup>, Behrer, P., Azevedo, I.L., Mauter, M., (2017). Air emissions implications of expanded wastewater treatment at coal-fired generators. *Proceedings of the National Academy of Sciences*, doi: 10.1073/pnas.1524396114.

- 48 Markolf, S.<sup>+</sup>, Matthews, H.S., Azevedo, I.L., Hendrickson, C.T., (2017). An integrated approach for estimating greenhouse gas emissions from 100 US metropolitan areas, *Environmental Research Letters*, 12, 024003.
- 47 Peña, I.<sup>+</sup>, Azevedo, I.L.\*<sup>+</sup>, Ferreira, L.M., Was it worth it? (2017). A review of Portuguese wind policies and technology diffusion. *Energy Policy*, 103, 193–202.
- 46 Horner<sup>+</sup>, N., Shehabi, A., Azevedo, I.L. (2016). Known unknowns: indirect energy effects of information and communication technology. *Environmental Research Letters*, 11,10.
- 45 Lam, L.<sup>+</sup>, Branstetter, L., Azevedo, I.L., (2016). China’s wind electricity and cost of carbon mitigation are more expensive than anticipated. *Environmental Research Letters*, 11, 8.
- 44 Glasgo, B.<sup>+</sup>, Azevedo, I.L., Hendrickson, C., (2016). How much electricity can we save by using direct current circuits in homes? Understanding the potential for electricity savings and assessing feasibility of a transition towards DC powered buildings. *Applied Energy*, 180, 66–75.
- 43 Lamy, J.<sup>+</sup>, Jaramillo, P., Azevedo, I.L., Wisner, R., (2016). Should we build wind farms close to load or invest in transmission to access better wind resources in remote areas? A case study in the MISO region. *Energy Policy*, 96, 341–350.
- 42 Horner, N.<sup>+</sup>, Azevedo, I.L., (2016). Power usage effectiveness in data centers: overloaded and underachieving. *The Electricity Journal*, 29, 61-69.
- 41 Yuksel, T.<sup>+</sup>, Tamayao, M-A.<sup>+</sup>, Hendrickson, C., Azevedo, I.L., Michalek, J., (2016). Effect of regional grid mix, driving patterns and climate on the comparative carbon footprint of gasoline and plug-in electric vehicles in the United States. *Environmental Research Letters*, 11, 044007.
- 40 Jenn, A.<sup>+</sup>, Azevedo, I.L., Michalek, J., (2016). Alternative fuel vehicle adoption increases fleet gasoline consumption and greenhouse gas emissions under United States corporate average fuel economy policy and greenhouse gas emissions standards. *Environmental Science & Technology* 50.5, 2165-2174.
- 39 Haaf, C.G.<sup>+</sup>, Morrow, W.R., Azevedo, I.L., Feit, E., Michalek, J.J., (2016). Forecasting light-duty vehicle demand using alternative-specific constants for endogeneity correction versus calibration. *Transportation Research Part B*, 84, 182–210.
- 38 Faria, F.<sup>+</sup>, Klima, K., Posen, I.D.<sup>+</sup>, Azevedo, I.L., (2015). A new approach of science, technology, engineering, and mathematics outreach in climate change, energy and environmental decision making. *Sustainability: The Journal of Record*, 8(5): 261-271.
- 37 Tong, F.<sup>+</sup>, Azevedo, I.L., Jaramillo, P., (2015). A Comparison of life cycle greenhouse gases from natural gas pathways for light-duty vehicles. *Energy and Fuels*, 29 (9), 6008–6018.
- 36 Gillingham, K., Jenn, A.<sup>+</sup>, Azevedo, I.L., (2015). Heterogeneity in the response to gasoline prices: evidence from Pennsylvania and implications for the rebound effect. *Energy Economics*, 52 (1).
- 35 Rubin, E., Azevedo, I.L., Yeh, S., Jaramillo, P., (2015). How to improve modeling approaches to represent the future costs of energy technologies? Reviewing the findings from learning curves from energy technologies. *Energy Policy*, 86, 198–218.
- 34 Tong, F.<sup>+</sup>, Azevedo, I.L., Jaramillo, P., (2015). A Comparison of life cycle greenhouse gases from natural gas pathways for medium and heavy-duty vehicles. *Environmental Science & Technology*, 49, 7123–7133.
- 33 Tamayao, M.<sup>+</sup>, Michalek, J., Hendrickson, C., Azevedo I.L., (2015). Regional variability and uncertainty of electric vehicle life cycle CO<sub>2</sub> emissions across the United States. *Environmental Science & Technology*, 49 (14), 8844–8855.
- 32 Jenn, A.<sup>+</sup>, Azevedo, I.L.\*<sup>+</sup>, Fischbeck, P., (2015). How do we fund our roads? A case of decreasing revenue from electric vehicles. *Journal of Transportation Research Part A: Policy and Practice*, 74, 136–147.

- 31 Hittinger, E., Azevedo, I.L., (2015). Bulk energy storage increases US electricity system emissions. *Environmental Science & Technology*, 49 (5), 3203-3210.
- 30 Posen, I.D. <sup>+</sup>, Griffin, W.M., Matthews, H.S., Azevedo, I.L., (2015). Changing the renewable fuel standard to a renewable material standard: bio-ethylene case study. *Environmental Science & Technology*, 49 (1), 93–102.
- 29 Prasad, S., Abdulla, A. <sup>+</sup>, Morgan, M.G.M., Azevedo, I.L., (2015). Nonproliferation improvements and challenges presented by small modular reactors. *Progress in Nuclear Energy*, 80, 102-109.
- 28 Min, J. <sup>+</sup>, Azevedo, I.L. <sup>\*</sup>, Hakkarainen, P., (2015). Net carbon emissions savings and energy reductions from lighting energy efficiency measures when accounting for changes in heating and cooling demands: a regional comparison. *Applied Energy*, 141 (1), 12–18.
- 27 Gilbraith, N. <sup>+</sup>, Azevedo, I.L. <sup>\*</sup>, Jaramillo, P., (2014). Regional energy and GHG savings from building codes across the United States. *Environmental Science & Technology*, 48 (24), 14121–14130.
- 26 Azevedo, I.L. <sup>\*</sup> (2014). Energy efficiency and rebound effects: a review. *Annual Reviews of Environment and Resources*, 39.
- 25 Pena-Cabra, I. <sup>+</sup>, Azevedo, I.L. <sup>\*</sup>, Ferreira L.M. (2014). Economics analysis on the profitability of wind in Portugal between 1992 and 2010. *Energy Economics*, 45, 353–363.
- 24 Peña, I. <sup>+</sup>, González, E., Azevedo, I.L., Ferreira, L.M., (2014). Difusión de energía eólica: comparación de políticas de incentivos en Estados Unidos y Europa. *Revista Nano Ciencia y Tecnología*.
- 23 Thomas, B.A. <sup>+</sup>, Hausfather, Z., Azevedo, I.L. <sup>\*</sup>, (2014). Comparing the magnitude of residential rebound effects from electric end-use efficiency across the United States. *Environmental Research Letters*, 9 (7).
- 22 Thomas, B. <sup>+</sup>, Azevedo, I.L. <sup>\*</sup>, (2014). Should policy-makers allocate funding to vehicle electrification or end-use energy efficiency as a strategy for climate change mitigation and energy reductions? Rethinking electric utilities efficiency programs. *Energy Policy*, 67, 28-26.
- 21 Lamy, J. <sup>+</sup>, Azevedo, I.L., Jaramillo, P., (2014). The role of energy storage in accessing remote wind resources in the Midwest. *Energy Policy*, 68, 123-131.
- 20 Min, J. <sup>+</sup>, Azevedo, I.L. <sup>\*</sup>, Michalek, J., Bruine de Bruin, W., (2014). Labeling energy cost on light bulbs lowers implicit discount rates. *Ecological Economics*, 97, 42–50.
- 19 Azevedo, I.L. <sup>\*</sup>, Sonnberger, M. <sup>+</sup>, Thomas, B. <sup>+</sup>, Morgan, G., Renn, O., (2013). The Rebound Effect: Implications of Consumer Behaviour for Robust Energy Policies. *International Risk Governance Council (IRGC)*.
- 18 Horner, N. <sup>+</sup>, Azevedo, I.L. <sup>\*</sup>, Hounshell, D., (2013). Effects of government incentives on wind innovation in the United States. *Environmental Research Letters*, 8 (4), 044032.
- 17 Jenn, A. <sup>+</sup>, Azevedo, I.L. <sup>\*</sup>, Ferreira, P., (2013). Impact of federal incentives on the adoption of hybrid electric vehicles in the United States. *Energy Economics*, 40, 936-942.
- 16 Siler-Evans, K. <sup>+</sup>, Azevedo, I.L. <sup>\*</sup>, Morgan, M.G, Apt, J. (2013). Regional variations in the health, environmental, and climate benefits from wind and solar generation. *Proceedings of the National Academy of Sciences*, 110 (29), 11768-11773.
- 15 Abdulla, A. <sup>+</sup>, Azevedo, I.L., Morgan, M. G., (2013). Expert assessments of the cost of small modular nuclear reactors. *Proceedings of the National Academy of Sciences*, 110 (24), 9686-9691.
- 14 Azevedo, I.L. <sup>\*</sup>, Morgan, G.M, Palmer, K., and Lave, L. (2013). Reducing U.S. residential energy use and CO2 emissions: how much, how soon, and at what cost? *Environmental Science & Technology*, 47, 2502–2511.

- 13 Thomas, B.A.<sup>+</sup>, Azevedo, I.L.\* (2013). Estimating direct and indirect rebound effects for US households with input-output analysis, Part 1: Theoretical Framework. *Ecological Economics*, 86, 199–210.
- 12 Thomas, B.A.<sup>+</sup>, Azevedo, I.L.\* (2013). Estimating direct and indirect rebound effects for U.S. households with input-output analysis, Part 2: Simulation. *Ecological Economics*, 86, 188–198.
- 11 Global Energy Assessment, (2012). Lead contributing author to “Chapter 16: Trends and transitions in energy systems”, *International Institute for Applied Systems Analysis (IIASA)*.
- 10 Baptista, P.C.<sup>+</sup>, Azevedo, I.L., Farias, T.L. (2012). ICT solutions in transportation systems: estimating the benefits and environmental impacts in Lisbon. *Procedia Social & Behavioral Sciences*, 54, 716-725.
- 9 Siler-Evans, K.<sup>+</sup>, Azevedo, I.L., Morgan, M.G., (2012). Marginal emissions factors for the US electricity system. *Environmental Science & Technology*, 46 (9), 4742–4748.
- 8 Hittinger, E.<sup>+</sup>, Mullins, K.<sup>+</sup>, Azevedo, I.L. (2012). The electricity consumption and energy savings potential of video game consoles in the United States. *Energy Efficiency Journal*, 5 (4), 531-545.
- 7 Thomas, B.<sup>+</sup>, Azevedo I.L., Morgan, G. (2012). Edison revisited: Should we use DC circuits for lighting in commercial buildings? *Energy Policy*, 45, 399–411.
- 6 Siler-Evans, K.<sup>+</sup>, Morgan, M.G, Azevedo, I.L. (2012). Distributed cogeneration for commercial buildings: Can we make the economics work? *Energy Policy*, 42, 580–590.
- 5 Blackhurst M.<sup>+</sup>, Azevedo, I. L., Matthews, H.S., Hendrickson, C.T. (2011). Designing building energy efficiency programs for greenhouse gas reductions. *Energy Policy*. 39 (9), 5269-5279.
- 4 Blackhurst, M.<sup>+</sup>, Matthews, H. S., Sharrard, A.L, Hendrickson, C.T., Azevedo, I.L., (2011). Preparing US community greenhouse gas inventories for climate action plans. *Environmental Research Letters*, 6 (3), 034003.
- 3 Wiesmann, D.<sup>+</sup>, Azevedo, I.L., Ferrão, P., Fernandez J., (2011). Residential electricity consumption in Portugal: Findings from top-down and bottom-up models. *Energy Policy*, 39 (5), 2772-2779.
- 2 Azevedo, I.L.\* ,Morgan, M.G., Lave, L., (2011). Residential and regional electricity consumption in the US and EU: how much will higher prices reduce CO<sub>2</sub> emissions? *The Electricity Journal*, 24 (1), 1040-6190.
- 1 Azevedo, I.L.\* ,Morgan, M.G., Morgan, F., (2009). The transition to solid-state lighting. *The Proceedings of the IEEE*, 97 (3), 481-510. ISSN: 0018-9219.

#### **D. Technical Reports and Other Writings**

- Shehabi, A., Smith, S.J., Sartor, D.A., Brown, R.E., Herrlin, M., Koomey, J.G., Masanet, E.R., Horner, N., Azevedo, I.L., Lintner, W. (2016). United States Data Center Energy Usage Report.
- Contributor to “Managing Variable Energy Resources to Increase Renewable Electricity’s Contribution to the Grid – A Policy Maker Guide”. Report from the Wilton Scott Institute for Energy Innovation, Carnegie Mellon University (2013).
- Azevedo, I.L., Jaramillo, P., Rubin, E., Yeh, S., (2013). Modeling technology learning for electricity supply technologies. Phase II report for the Electric Power Research Institute.
- Azevedo, I.L., Jaramillo, P., Rubin, E., Yeh, S., (2013). Modeling technology learning for electricity supply technologies. Phase I report for the Electric Power Research Institute.
- Stadler, M., Marnay, C., Azevedo, I.L, Komiyama, R., and Lai, J., (2009). The open source stochastic building simulation tool SLBM and its capabilities to capture uncertainty of

policymaking in the U.S. building sector. LBNL-1884E. May 2009.

- Komiyama, R., Marnay, C., Stadler, M., Lai, J., Borgeson, S., Coffey, B., Azevedo, I. L., 2009. Japan's long-term energy demand and supply: scenario to 2050. Institute of Energy Econ., Japan.
- Samaras, C., Apt J., Azevedo, I.L., Lave, L.B., Morgan, M.G., Rubin, E.S., (2009). Cap and trade is not enough: Improving U.S. climate policy. Department of Engineering and Public Policy, CMU.

## **E. Proceedings in Conferences and Symposia**

1. Horner, N., Azevedo, I.L., Sicker, D., Agarwal, Y. (2016). Dynamic data center load response to variability in private and public electricity costs, IEEE International Conference on Smart Grid Communications, Sydney, Australia, November 6-9, 2016.
2. Baptista, P.C., Azevedo, I.L., Farias, I.L., (2012). ICT solutions in transportation systems: estimating the costs, benefits, and environmental impacts in the Lisbon region, 15<sup>th</sup> Edition of the European Working Group on Transportation, Paris, France, September 10-12, 2012.
3. Abreu, J., Azevedo, I. L., Pereira, F. (2011). A contribution for a better understanding of the residential sector electricity demand, Proceedings of the European Energy Efficiency Council (ECEEE) Summer Study, France, June 6-11, 2011.
4. Azevedo, I.L., (2007). Energy efficiency and conservation: a bright idea with solid-state lighting? European Council for an Energy Efficient Economy (ECEEE) Summer Study, June 4-9, 2007.
5. Lam, L., Azevedo, I.L., Branstetter, L., (2014). The unsustainable rise of the Chinese wind turbine manufacturing industry. NBER conference on The Economics of Environmental Protection in China.

## **F. Conference Presentations with Peer-Reviewed Abstracts**

1. Sergi, B. (speaker), Azevedo, I.L., Davis, A., (2016). Assessing public perceptions of energy tradeoffs with discrete choice analysis, Behavior, Energy, and Climate Change Conference (BECC), Baltimore, MD, US, October 20-22, 2016. (Oral presentation)
2. Meyer, R.M., Sherwin, E.D. (speaker), Azevedo I.L., (2016). Household energy consumption effects of PG&E's electrical efficiency rebate program, Behavior, Energy, and Climate Change Conference (BECC), Baltimore, MD, US, October 20-22, 2016. (Oral presentation)
3. Sun, X. (speaker), Gingerich, D.B., Azevedo, I.L., Mauter, M.S., (2016). Trace element allocation across air pollution control devices in coal-fired power plants, American Chemistry Society (ACS) National Meeting 2016, Philadelphia, PA, US, August 21-25, 2016. (Oral presentation)
4. Sherwin, E.D. (speaker), Henrion, M, Azevedo, I.L., (2016). The US energy system has become more volatile and harder to predict, Western Economic Association International 91st Annual Conference/Association of Environmental and Resource Economists 5th Annual Summer Conference, Portland, OR, US, June 30-July 2, 2016. (Oral presentation)
5. Sergi, B. (speaker and panel chair), Azevedo, I.L., Davis, A., (2016). Understanding public perceptions of tradeoffs in climate, health, and energy using discrete choice analysis, Panel on

- Valuing Health and Climate Trade-offs: Understanding Perceived and Modeled Trade-offs in the Power Sector, Annual meeting of the Association for Environmental Studies and Sciences, Washington, DC, US, June 8-11, 2016. (Oral presentation)
6. Tong, F. (speaker), Jaramillo, P., Azevedo, I.L., (2016). Spatial analysis of air quality impacts from using natural gas for road transportation, The International Symposium on Sustainable Systems and Technology (ISSST 2016), Phoenix, AZ, US, May 16-18, 2016. (Poster presentation)
  7. Glasgo, B. (speaker), Azevedo, I.L., Hendrickson, C., (2016). Assessing the value of information in residential building simulation, The International Symposium on Sustainable Systems and Technology (ISSST 2016), Phoenix, AZ, US, May 16-18, 2016. (Oral presentation)
  8. Tong, F. (speaker), Jaramillo, P., Azevedo, I.L., (2016). Spatial analysis of air quality impacts from using natural gas for road transportation, American Association for the Advancement of Science (AAAS) Annual Meeting 2016, Washington DC, US, February 11-15, 2016. (Poster presentation)
  9. Tong, F. (speaker), Jaramillo, P., Azevedo, I.L., (2015). Spatial analysis of air quality impacts from using natural gas for road transportation, The 33<sup>rd</sup> United States Association for Energy Economics (USAEE)/International Association for Energy Economics (IAEE) North American Conference, Pittsburgh, PA, US, October 25-28, 2015. (Oral presentation)
  10. Glasgo, B. (speaker), Azevedo, I.L., Hendrickson, C., (2015). Understanding the potential for electricity savings and assessing feasibility of a transition towards DC powered buildings, The 33<sup>rd</sup> United States Association for Energy Economics (USAEE)/International Association for Energy Economics (IAEE) North American Conference, Pittsburgh, PA, US, October 25-28, 2015. (Poster Presentation –**won best poster award\***)
  11. Kaack, L.H. (speaker), Apt, J., Morgan, M.G., Sherwin, E.D., Azevedo, I.L., (2015). Introducing probability into energy forecasting, The 33<sup>rd</sup> United States Association for Energy Economics (USAEE)/International Association for Energy Economics (IAEE) North American Conference, Pittsburgh, PA, US, October 25-28, 2015. (Poster presentation)
  12. Lamy, J. (speaker), Azevedo, I., Jaramillo, P., Wisner, R., (2015). Optimal wind farm siting decisions in the Midwest, The 33<sup>rd</sup> United States Association for Energy Economics (USAEE)/International Association for Energy Economics (IAEE) North American Conference, Pittsburgh, PA, US, October 25-28, 2015. (Oral presentation)
  13. Sergi, B. (speaker), Azevedo, I.L., Davis, A., (2015). The impact of climate change and air pollution information on support for CO<sub>2</sub> emissions regulations, The 33<sup>rd</sup> United States Association for Energy Economics (USAEE)/International Association for Energy Economics (IAEE) North American Conference, Pittsburgh, PA, US, October 25-28, 2015. (Poster presentation)
  14. Sherwin, E.D. (speaker), Azevedo, I.L., Henrion, M., (2015). US energy surprises have become more frequent: retrospective analysis of US energy forecasts, The 33<sup>rd</sup> United States Association for Energy Economics (USAEE)/International Association for Energy Economics (IAEE) North American Conference, Pittsburgh, PA, US, October 25-28, 2015. (Poster presentation)
  15. Lamy, J. (speaker), Azevedo, I.L., Bruine de Bruin, W., Morgan, M.G., (2015). Valuing NIMBY concerns about wind farms in Massachusetts, Behavior Energy & Climate Change Conference (BECC), Sacramento, CA, US, October 18-24, 2015. (Poster presentation)



16. Tong, F., Jaramillo, P. (speaker), Azevedo, I.L., (2015). The benefits of using natural gas for road transportation - a county-level analysis of reduced criteria air pollutants from natural gas use for light duty and heavy duty vehicles, 8th Conference of the International Society for Industrial Ecology, Guildford, UK, July 7-10, 2015. (Poster presentation)
17. Markolf, S. (speaker), Matthews, H.S., Azevedo, I.L., and Hendrickson, C.T. (2015). The implications of climatic temperature change and population growth on metropolitan greenhouse gas emissions, The Association of Environmental Engineering and Science Professors (AEESP) Research and Education Conference, New Haven, CT, US, June 13-16, 2015. (Poster presentation)
18. Markolf, S. (speaker), Matthews, H.S., Azevedo, I.L., Hendrickson, C.T. (2015). The implications of climatic temperature change and population growth on metropolitan greenhouse gas emissions, International Symposium on Sustainable Systems and Technology (ISSST), Dearborn, MI, US, May 18-20, 2015. (Oral presentation)
19. Seki, S.M. (speaker), Griffin, W.M., Michalek, J.J., Azevedo, I.L., Hendrickson, C. (2015). An evaluation of potential Natural Gas to Liquid Fuel (NGLF) production processes with an estimate of cost in Pennsylvania, International Symposium on Sustainable Systems and Technology (ISSST), Dearborn, MI, US, May 18-20, 2015. (Poster presentation)
20. Tong, F. (speaker), Jaramillo, P., Azevedo, I.L. (2015). The benefits of using natural gas for road transportation - a county-level analysis of reduced criteria air pollutants from natural gas use for light duty and heavy duty vehicles, International Symposium on Sustainable Systems and Technology (ISSST), Dearborn, MI, US, May 18-20, 2015. (Oral presentation)
21. Glasgo, B. (speaker), Azevedo, I.L., Hendrickson, C., (2015). Understanding the potential for electricity savings and assessing the feasibility of a transition towards DC powered buildings using real load data, Engineering Sustainability 2015: Innovation and the Triple Bottom Line, sponsored by the Mascaro Center for Sustainable Innovation and the Steinbrenner Institute for Environmental Education and Research, Pittsburgh, PA, US, April 19-21, 2015. (Oral presentation)
22. Markolf, S. (speaker), Matthews, H.S., Azevedo, I.L., and Hendrickson, C.T. (2015). The implications of population growth on climate action planning at the metropolitan level, Engineering Sustainability 2015: Innovation and the Triple Bottom Line, sponsored by the Mascaro Center for Sustainable Innovation and the Steinbrenner Institute for Environmental Education and Research, Pittsburgh, PA, US, April 19-21, 2015. (Poster presentation)
23. Horner, N.C. (speaker), Azevedo, I.L., (2015). Energy efficiency in data centers: moving beyond PUE, World Sustainable Energy Days Young Researchers Conference in Energy Efficiency, Wels, Austria, February 25-27, 2015. (Oral presentation)
24. Azevedo I. L. (speaker), (2014). Keep it simple to keep it cool: understanding the performance of energy and climate forecasts, INFORMS, San Francisco, CA, US, November 9-12, 2014. (Oral Presentation)
25. Tong, F. (speaker), Jaramillo, P., Azevedo, I.L., (2014). A comparison of air emissions from natural gas pathways for road transportation, 4<sup>th</sup> Annual Energy Policy Research Conference, San Francisco, CA, US, September 4-5, 2014. (Oral presentation)

26. Tong, F. (speaker), Jaramillo, P., Azevedo, I.L., (2014). A comparison of air emissions from natural gas pathways for road transportation, American Society of Civil Engineers (ASCE) Shale Energy Engineering Conference 2014, Pittsburgh, PA, US, July 20-23, 2014. (Poster presentation)
27. Posen, I. D. (speaker), Griffin, W. M., Matthews, H. S., Azevedo, I.L., (2014). Greenhouse gas mitigation benefits of expanding US biofuel incentives to promote biomass use in chemical feedstocks, Technology, Management and Public Policy Graduate Consortium, Lisbon, Portugal, June 23-25, 2014. (Oral presentation)
28. Tong, F. (speaker), Jaramillo, P., Azevedo, I.L., (2014). A comparison of air emissions from natural gas pathways for road transportation, 37<sup>th</sup> International Association for Energy Economics (IAEE) International Conference. New York City, NY, US, June 15-18, 2014. (Oral presentation)
29. Jenn, A., Azevedo I.L., (speaker), Gillingham, K. (2014). An empirical study of driving behavior and vehicle rebound effects in Pennsylvania, Industry Studies Association, Portland, OR, US, May 27-30, 2014. (Oral presentation)
30. Min, J. (speaker), Azevedo I.L., Hakkarainen, P., (2014) Assessing regional differences in lighting heat replacement effects in residential buildings in the United States, International Symposium on Sustainable Systems and Technology (ISSST) 2014, Oakland, CA, US, May 18-21, 2014. (Oral Presentation). **Paper won paper award, 2<sup>nd</sup> place.**
31. Jenn, A. (speaker), Azevedo, I.L., Michalek, J.J., (2014). Be careful what you ask for: how corporate average fuel economy incentivizing alternative fuel vehicles leads to higher carbon emissions, International Symposium on Sustainable Systems and Technology (ISSST) 2014, Oakland, CA, US, May 18-21, 2014. (Oral Presentation)
32. Posen, I.D. (speaker), Griffin, M., Matthews, H.S., Azevedo, I.L., (2014). Greenhouse gas mitigation benefits of expanding US biofuel incentives to promote biomass use in chemical feedstocks, International Symposium on Sustainable Systems and Technology (ISSST) 2014, Oakland, CA, US, May 18-21, 2014. (Oral Presentation)
33. Tong, F., Jaramillo, P. (speaker), Azevedo, I.L., (2014). A comparison of air emissions from natural gas pathways for road transportation, The International Symposium on Sustainable Systems and Technology (ISSST 2014), Oakland, CA, US, May 18-21, 2014. (Oral presentation)
34. Meyer, R. (speaker), Azevedo, I.L., (2013). Smart rebates: targeting high-value energy efficiency improvements with smart-meter data, Behavior Energy and Climate Change Conference (BECC), Sacramento, CA, US, November 20, 2013. (Oral presentation)
35. Horner, N.C. (speaker), Azevedo, I.L., (2013). Energy efficiency in data centers: PUE doesn't measure what we care about, Behavior Energy and Climate Change Conference (BECC), Sacramento, CA, US, November 20, 2013. (Poster presentation)
36. Jenn, A. (speaker), Azevedo, I.L., Gillingham, K. (2013). An empirical study of driving behavior and vehicle rebound effects in Pennsylvania, Behavior Energy and Climate Change Conference (BECC), Sacramento, CA, US, November 20, 2013. (Oral presentation)
37. Jenn, A. (speaker), Azevedo, I.L., (2013). Do higher fuel efficient vehicles encourage worse driving habits? Western Energy Policy Research Conference, Portland, OR, US, September 4-5, 2013. (Oral presentation)

38. Jenn, A. (speaker), Azevedo, I.L., Fischbeck, P., (2013). How do we fund our roads? A case of decreasing revenue from electric vehicles, Western Energy Policy Research Conference, Portland, OR, US, September 4-5, 2013. (Oral presentation)
39. Min, J. (speaker), Azevedo, I.L., Hakkarainen, P., (2013). Analysis of the heat replacement effect (HRE) in residential buildings across the United States, 13<sup>th</sup> European/International Association for Energy Economics Conference, Dusseldorf, Germany, August 18-21, 2013. (Oral presentation)
40. Peña, I. (speaker), Azevedo, I.L., Ferreira, M., (2013). Economic analysis on the profitability of wind in Portugal between 1992-2010, 13<sup>th</sup> European/International Association for Energy Economics Conference, Dusseldorf, Germany, August 18-21, 2013. (Oral presentation)
41. Jenn, A. (speaker), Azevedo, I.L., Fischbeck, P., (2013). How will the adoption of electric vehicles affect transportation funding deficits in the United States? 32<sup>nd</sup> United States Association of Energy Economics, Anchorage, AK, US, July 28-31, 2013. (Oral presentation)
42. Lamy, J. (speaker), Azevedo, I.L., Jaramillo, P., (2013). Integrating wind resources: siting decisions in the Midwest, 32<sup>nd</sup> United States Association of Energy Economics. Anchorage, AK, US, July 28-31, 2013. (Oral presentation)
43. Peña, I. (speaker), Azevedo, I.L., Ferreira, M., (2013). Economic analysis on the profitability of wind in Portugal between 1992-2010, International Energy Workshop, IEA, Paris, France, June 19-21, 2013. (Oral presentation)
44. Jenn, A. (speaker), Blanco, C., Chernicoff, W., Michalek, J., Azevedo, I.L., (2013). Trends in future vehicle fleet mix in response to CAFE standards using a nested optimization construct, Industry Studies Association, Kansas City, MO, US, May 28-31, 2013. (Oral presentation)
45. Jenn, A. (speaker), Blanco, C., Chernicoff, W., Michalek, J., Azevedo, I.L., (2013). Automotive transition to sustainable technology mix, a response to CAFE standards, International Symposium on Sustainable Systems and Technology, Cincinnati, Ohio, May 15-16, 2013. **Paper won paper award, 3<sup>rd</sup> place.**
46. Jenn, A. (speaker), Blanco, C., Chernicoff, W., Michalek, J., Azevedo, I.L., (2013). Trends in future vehicle fleet mix in response to Corporate Average Fuel Economy standards (CAFE) using an optimization construct, American Association for the Advancement of Science (AAAS), Boston, MA, US, February 16, 2013. (Oral presentation)
47. Lamy, J., (speaker), Morgan, M.G., Azevedo, I.L., (2012). Integrating remote wind resources: the role of energy storage, 31<sup>st</sup> United States Association for Energy Economics Conference (USAEE), Austin, TX, US, November 4-7, 2012. (Oral presentation)
48. Jenn, A. (speaker), Azevedo, I.L., Ferreira, P., (2012). Impact of federal incentives on adoption of hybrid electric vehicles in the US, 31<sup>st</sup> United States Association for Energy Economics Conference (USAEE), Austin, TX, US, November 4-7, 2012. (Oral presentation)
49. IZARD, C.F. (speaker), Azevedo, I.L., Samaras, C., Matthews, H.S., Hendrickson, C.T., (2012). Winners and losers: estimating the regional variation in power plant turnover resulting from the timing of climate change policy, 31<sup>st</sup> United States Association for Energy Economics Conference (USAEE), Austin, TX, US, November 4-7, 2012. (Oral presentation)

50. Thomas, B. (speaker), Azevedo, I.L., (2012). Direct and indirect rebound effects with Input-Output analysis, 31<sup>st</sup> United States Association for Energy Economics Conference (USAEE), Austin, TX, US, November 4-7, 2012. (Oral presentation)
51. Min, J. (speaker), Azevedo, I.L., Michalek, J., Bruine de Bruin, W., (2012). Energy labels increase demand for compact fluorescent bulbs: analyzing consumer preferences for lighting technologies using discrete choice analysis, 31<sup>st</sup> United States Association for Energy Economics Conference (USAEE), Austin, TX, US, November 4-7, 2012. (Oral presentation)
52. Jenn, A. (speaker), Azevedo, I.L., Ferreira, P., (2012). Impact of federal incentives on adoption of hybrid electric vehicles in the United States, European/International Association for Energy Economics Conference (IAEE), Venice, Italy, September 9-12, 2012. (Oral presentation)
53. Izard, C.F. (speaker), Azevedo, I.L., Samaras, C., Matthews, H.S., Hendrickson, C.T., (2012). The sensitivity of power plants retirements to the timing of climate change policy, Gordon Research Conference in Industrial Ecology, Les Diablerets, Switzerland, June 17-22, 2012. (Oral presentation)
54. Thomas, B., (speaker), Azevedo, I.L., (2012). Direct and indirect rebound effects with Input-Output analysis, Empirical Methods in Energy Economics Workshop, Berlin, Germany, June 7-8, 2012. (Oral presentation)
55. Thomas, B., (speaker), Azevedo, I.L., (2012). Direct and indirect rebound effects with Input-Output analysis, Industry Studies Association Conference, Pittsburgh, PA, US, May 29-June 1, 2012. (Oral presentation)
56. Peña, I. (speaker), Azevedo, I.L., (2012). The impact of feed-in tariff policies in wind diffusion in Portugal, Industry Studies Association Conference, Pittsburgh, PA, US, May 29-June 1, 2012. (Oral presentation)
57. Min, J. (speaker), Azevedo, I.L., Michalek, J., Bruine de Bruin, W., (2012). Analyzing consumer preferences for lighting technologies using discrete choice analysis, Industry Studies Association Conference, Pittsburgh, PA, US, May 29-June 1, 2012. (Oral presentation)
58. Jenn, A. (speaker), Azevedo, I.L., Ferreira, P., (2012) Impact of federal incentives on adoption of hybrid electric vehicles in the United States, International Symposium on Sustainable Systems and Technology, IEEE, Boston, Massachusetts, May 16-18, 2012. **Paper won paper award, 1st place.**
59. Azevedo, I.L. (speaker), Morgan, M.G., Palmer, K., Lave, L., (2011). How much will reducing greenhouse gases in the US residential sector cost? International Society for Industrial Ecology Biannual Meeting, Berkeley, CA, US, June 7-11, 2011. (Oral presentation)
60. Blackhurst, M. (speaker), Matthews, H.S., Sharrard, A., Hendrickson, C., Azevedo, I.L., (2011). Community-level energy and greenhouse gas benchmarking practices and implications for local sustainability programming, International Society for Industrial Ecology Biannual Meeting, Berkeley, CA, US, June 7-11, 2011. (Oral presentation)
61. Izard, C.F. (speaker), Azevedo, I.L., Samaras, C., Matthews, H.S., Hendrickson, C.T., (2011). US electricity infrastructure flow analysis: how fast must we build? International Society for Industrial Ecology Biannual Meeting, Berkeley, CA, US, June 7-11, 2011. (Oral presentation)
62. Wiesmann, D. (speaker), Rosado, L., Niza, S., Azevedo, I.L., Ferrão, P., Fernandez, J., (2011). Spatially resolved urban material consumption in the residential sector, International Society for Industrial Ecology Biannual Meeting, Berkeley, CA, US, June 7-11, 2011. (Oral presentation)

63. Siler-Evans, K. (speaker), Morgan, M.G., Azevedo, I.L., (2011). Distributed cogeneration: can we make the economics work? Industry Studies Association Conference, Pittsburgh, PA, US, May 31-June 2, 2011. (Oral presentation)
64. Azevedo, I.L. (speaker), Morgan, M.G., Palmer, K., Lave, L., (2011). The cost of reducing U.S. residential energy use and CO<sub>2</sub> emissions, Industry Studies Association Conference. Pittsburgh, PA, US. May 31-June 2, 2011. (Oral presentation)
65. Azevedo, I.L. (speaker), Venâncio, A., (2011). The impact of feed-in tariffs for renewable energy sources in the creation of green entrepreneurs: evidence from Portugal, Industry Studies Association Conference, Pittsburgh, PA, US, May 31-June 2, 2011. (Oral presentation)
66. Thomas, B. (speaker), Azevedo, I.L., (2010). Non-fungibility of consumer expenditures and the rebound effect, Behavior, Energy and Climate Change Conference, Sacramento, CA, US, November 14-17, 2010. (Oral presentation)
67. Abreu, J. (speaker), Azevedo, I.L., (2010). Key aspects for the design of real time feedback programs – a perspective from experimental research, Behavior, Energy and Climate Change Conference, Sacramento, CA, US, November 14-17, 2010. (Oral presentation)
68. Azevedo, I.L., (2009). Reducing uncertainty in energy efficiency investments, INFORMS 2009, San Diego, CA, US, October 11-14, 2010. (Oral presentation)
69. Samaras, C. (speaker), Azevedo, I.L., (2009). Climate infrastructure analysis for sustainable resource management: how fast should we build? How fast can we build? 5<sup>th</sup> International Conference for Industrial Ecology, International Society for Industrial Ecology, Lisbon, Portugal, June 21-24, 2009. (Oral presentation)
70. Azevedo, I.L. (speaker), Samaras, C., (2009). Carbon saving and cost-effectiveness from efficiency measures: improving decision making under uncertainty, 5<sup>th</sup> International Conference for Industrial Ecology, International Society for Industrial Ecology, Lisbon, Portugal, June 21-24, 2009. (Oral presentation)
71. Stadler, M. (speaker), Marnay, C., Azevedo, I.L., Komiyama, R., (2009). The open source stochastic building simulation tool SLBM and its capabilities to capture uncertainty of policymaking in the US building sector, 32<sup>nd</sup> International Association for Energy Economics Conference, San Francisco, CA, US, June 21-24, 2009. (Oral presentation)
72. Tan, H. (speaker), Azevedo, I.L., (2009). Assessing the effects of EISA mandates and EPA regulations on mercury emissions from residential lighting, 32<sup>nd</sup> International Association for Energy Economics Conference, San Francisco, CA, US, June 21-24, 2009. (Oral presentation)
73. Azevedo, I.L., (speaker), (2009). Uncertainty in energy efficiency projections: Implications for energy and climate policies, United States Society for Ecological Economics Conference, American University, Washington, DC, US, June 1-3, 2009. (Oral presentation)
74. Azevedo, I.L. (speaker), Samaras, C., (2009). How much carbon can I save? How much carbon have I saved? Evaluating the cost effectiveness of US household carbon mitigation strategies under carbon factor uncertainty, US Society for Ecological Econ. Conference, American U., Washington, DC, US, June 1-3, 2009. (Oral presentation)

75. Samaras, C. (speaker), Azevedo, I.L., (2009). Integrating climate economic policy and climate infrastructure policy, United States Society for Ecological Econ. Conference, American U., Washington, DC, US, June 1-3, 2009. (Oral presentation)
76. Azevedo, I.L., Matthews, H.S. (speaker), Fischbeck, P., Newcomer, A., (2008). A framework for academic institutions decision-making on climate change and sustainability issues, Association for the Advancement of Sustainability in Higher Education Biannual Conference, Raleigh, NC, US, November 9-11, 2008. (Oral presentation)
77. Azevedo, I.L., Matthews H.S. (speaker), Fischbeck, P., Cone, J., Ende, J., Park, J., Tan, A., Robl, D., Matsuura, T., Menchin, K., Mikkilineni, S., Cushman, M., Kim, Y., (2008). Development of carbon mitigation tools and benchmarks for universities in the US, Association for the Advancement of Sustainability in Higher Education Biannual Conference, Raleigh, NC, US, November 9-11, 2008. (Poster presentation)
78. Stadler, M. (speaker), Marnay, C., Azevedo, I.L., Aki, H., Komiyama, R., Lai, J., (2008). Radical rethinking in building energy forecasting – the open source stochastic building simulation tool SLBM, Behavior, Energy and Climate Change Conference, Sacramento, CA, US, November 16-19, 2008. (Poster presentation)
79. Stadler, M., Marnay, C. (speaker), Azevedo, I.L., Aki, H., Komiyama, R., Lai, J., (2008). The stochastic building simulation tool SLBM and its new energy forecasting approach, Fifth Annual California Climate Change Research Conference, Sacramento, CA, US, September 8-10, 2008. (Oral presentation)
80. Azevedo, I.L., (2006). Electricity prices and residential electricity consumption: a US/EU comparison, 26<sup>th</sup> USAEE/IAEE North American Conference, Ann Arbor, MI, US, September 24-27, 2006. (Oral presentation)
81. Azevedo, I.L., (2006). Cost effectiveness of end use technologies for carbon mitigation and energy conservation: a comparison between the EU and the US, Technology and Management of Policy Consortium, Instituto Superior Técnico, Lisbon, Portugal, June 25-27, 2006. (Poster presentation)

## 4. Student Education

### A. Ph.D. Students Mentored

#### PhD students for whom I serve or served as primary advisor or joint co-advisor:

##### *Current Students:*

1. Jake Ward (co-advised with ME/EPP Prof. J. Michalek & C. Samaras), “Emissions from transportation,” August 2016 – present.
2. Shayak Sengupta (co-advised with CEE/EPP Prof. P. Adams), “Air quality modeling,” August 2016 – present.
3. Priya Donti (co-advised with SCS Prof. Z. Kolter), “Distributed energy resources,” August 2016 – present.
4. Oluwatobi Adekanye (co-advised with EPP Prof. A. Davis), “Energy efficient buildings,” January 2016 – present.
5. Xiaodi (Daniel) Sun (Azevedo serves as lead advisor), “Implications of power plant wastewater discharge,” August 2015 – present.
6. Cristobal de la Maza (co-advised with EPP Prof. A. Davis), “Climate change adaptation judgments and choices,” August 2014 – present.
7. Nichole Hanus (co-advised with Prof. Gabrielle Wong-Parodi), August 2014 – present.
8. Vedran Lescic (co-advised with Univ. Leeds Prof. W. Bruine de Bruin and Leeds Prof. Matthew Davis), Ph.D. student at Univ. Leeds, “Perceptions of energy consumption,” August 2014 – present.
9. Greg Schivley (co-advised with Prof. Costa Samaras), “Predicting marginal generators,” August 2014 – present.
10. Brian Sergi (Azevedo serves as lead advisor), “Decisions for low carbon-emission electricity generation,” August 2014 – present.
11. Evan Sherwin (Azevedo serves as lead advisor), “How to improve projections of energy quantities and prices,” August 2014 – present.

##### *Graduated Students:*

12. Brock Glasgo, “Assessing the feasibility of residential DC buildings,” August 2013 – May 2017. Present position: Post-doctoral fellow at Carnegie Mellon University.
13. Long Lam, “Wind innovation in China and in the United States,” August 2011 – May 2017. Present Position: AAAS Fellow, Washington DC.
14. Julian Lamy, “Optimal locations for siting wind projects: technical challenges, economics, and public preferences,” August 2011 – December 2016. Present Position: CEO of start-up Watt-Learn, Inc., Pittsburgh, PA, US.
15. Fan Tong, “The good, the bad, and the ugly: economic and environmental implications of using natural gas to power on-road vehicles in the United States,” August 2012 – December 2016. Present Position: Post-doctoral fellow, Carnegie Institution for Science, Stanford, CA, US.
16. Daniel Posen, “Fuel, feedstock, or neither? – Evaluating tradeoffs in the use of biomass for greenhouse gas mitigation,” August 2012 – December 2016. Present Position: Assistant Professor, University of Toronto, Toronto, Canada.

17. Nathaniel Horner, “Powering the information age: metrics, social cost optimization strategies, and indirect effects related to data center energy use,” August 2011 – August 2016. Present Position: President Fellow, Department of Energy, Washington, DC, US.
18. Nathaniel Gilbraith, CMU-Portugal program, “Evaluating how demand side resources affect the environmental and economic performance of energy systems,” August 2012 – December 2015. Present Position: Associate ICAP Mitigation Engineer in the Market Mitigation and Analysis Group, NY ISO, Rensselaer, NY, US.
19. Sam Markolf, “Climate change decision-making at the metropolitan level: current estimates and future drivers of greenhouse gas emissions in US metropolitan areas,” August 2011 – December 2015. Present Position: Social-Ecological-Technical Systems (SETS) Integration Postdoctoral Fellow, Wrigley Institute, Arizona State University, Phoenix, AZ, US.
20. Russell Meyer, “Analysis of selected regulatory interventions to improve energy efficiency,” August 2011 – December 2014. Present Position: Quantitative Analyst, NMR Group, Boston, MA, US.
21. Jihoon Min, “Energy efficient lighting: consumer preferences, choices, and system wide effects,” August 2010 – December 2014. Present Position: Research Scientist, International Institute for Applied Systems Analysis (IIASA), Austria.
22. Ivonne Peña-Cabra, “Retrospective and prospective analysis of policy incentives for wind power in Portugal,” August 2010 – August 2014. Present Position: Researcher, National Renewable Energy Laboratory (NREL), Golden, CO, US.
23. Alan Jenn, “Advanced and alternative fuel vehicle policies: regulations and incentives in the United States,” August 2010 – May 2014. Present Position: Post-doctoral Fellow, Institute of Transportation Systems (ITS), Sustainable Transportation Energy Pathways program, U.C. Davis, Davis, CA, US.
24. Ahmed Abdulla, “Estimating the benefits, costs and risks of small nuclear reactors,” August 2010 – May 2014. Present Position: Post-doctoral Fellow, School of Global Policy and Strategy, U.C. San Diego, San Diego, CA, US.
25. Huimin Tan, “A transition to energy-efficient lighting systems in the US residential sector: an assessment of consumer preferences and perceptions,” August 2009 – December 2013. Present Position: Assistant Professor, School of Business Administration, Southwestern University of Finance and Economics, Chengdu, Sichuan, China.
26. Catherine Izard, “How the timing of climate change policy affects infrastructure turnover in the electricity sector: engineering, economic and policy considerations,” August 2008 – May 2013. Present Position: Strategic Analyst, Demand Side Analytics, Pacific Gas and Electric Company (PG&E), San Francisco, CA, US.
27. Daniel Wiessman, MIT-Portugal PhD program. “Application of statistical methods to special urban metabolism models,” August 2009 – August 2013. Present Position: Founder, Co-urbanize, Boston, MA, US.
28. Brinda Thomas, “Energy efficiency and rebound effects in the US: implications for renewables investment and emissions abatement,” August 2008 – December 2012. Present Position: Data Scientist, Tesla, Palo Alto, CA, US.
29. Kyle Siler-Evans, “Evaluating interventions in the US electricity system: assessments of energy efficiency, renewable energy, and small-scale co-generation,” August 2008 – August 2012. Present Position: Associate Engineer, RAND, Pittsburgh, PA, US.
30. Michael Blackhurst, “Achieving realistic energy and greenhouse gas emissions reductions in US cities,” January 2008 – May 2011. Present Position: Research Development Manager, Urban & Regional Analysis, University of Pittsburgh, Pittsburgh, PA, US.



## **B. Service in Dissertation Committee**

1. José Prada (current student), Ph.D. program in Engineering and Public Policy, CMU. “Markets for electricity ancillary services under uncertainty,” Lead advisor: M. Ilic.
2. Ricardo Prada (current student), Ph.D. program in Engineering and Public Policy, IST-Portugal. “Regulatory frameworks and incentives adequacy for wind power,” Lead Advisor: P. Carvalho.
3. Stephanie Seki, Ph.D. in Engineering and Public Policy, CMU, 2016. “Impacts of alternative fuel use in transportation,” Lead advisors: C. Hendrickson and M. Griffin.
4. Felipe Faria, Ph.D. in Engineering and Public Policy, CMU, 2016. “Climate consequences of hydropower in Brasil,” Lead Advisor: P. Jaramillo.
5. Grace Haaf, Ph.D. in Mechanical Engineering, CMU, 2014. “Vehicle demand forecasting with discrete choice models: 2 logit 2 Quit,” Lead advisor: J. Michalek.
6. Patrícia Fortes, Ph.D. in Environmental Science, Nova University, Portugal, 2014. “Clearing the cloudy crystal balls: Hybrid modeling for energy and climate change mitigation scenarios,” Lead advisor: J. Seixas.
7. Jared Moore, Ph.D. in Engineering and Public Policy, CMU, 2014. “Cost effectiveness of CO<sub>2</sub> mitigation technologies and policies in the electricity sector,” Lead advisor: J. Apt.
8. Mili-Ann Tamayao, dual Ph.D. program between Civil & Environmental Engineering and Engineering & Public Policy, CMU, 2014. “Urbanization and vehicle electrification in the US: CO<sub>2</sub> emissions estimation and climate policy implications,” Lead advisors: C. Hendrickson and J. Michalek.
9. Ana Gonçalves, Ph.D. program in Sustainable Energy Systems from the MIT-Portugal program at IST-Portugal, 2014. “Urban growth and electricity consumption: the power of power laws,” Lead Advisor: T. Domingos.
10. Joana Abreu, Ph.D. program in Sustainable Energy Systems from the MIT-Portugal program at IST-Portugal, 2012. “Smart-meter applications in Portugal,” Lead Advisor: P. Ferrão.
11. Amanda Rehr, Ph.D. in EPP, CMU, 2011. “Environmental decision support integrating scientific input, models, economic valuation, and stakeholder participation,” Lead advisor: M. Small

## **C. Undergraduate Students**

Karen Niu, "Evaluation of AB32 in CA," 2011.

Rebecca Yasner, " US and EU energy consumption by climate zone, electricity prices and income," 2011.

Ya Qi Yu, "Evaluation of AB32 in CA," 2011.

Arushi Chawla, “Understanding the costs of FACTS devices,” 2014-2015 (co-advised with G. Hug).

David Sparks, “How much solar PV can we realistically deploy in the United States?” 2016.

## **D. Master Students**

Ricardo Gomes (2012-2013), MSc Mech. Eng., IST-Portugal (co-advised with T. Sousa & C. Silva).

## **E. Post-doctoral Fellows**

Michael Whiston (2016-present, co-advised with J. Whitacre and S. Lister)

Fan Tong (2016-2017)

Nathaniel Horner (2016, co-advised with D. Sicker)

Patrícia de Carvalho Baptista [IST-Portugal] (2014-present, co-advised T. Farias)

Jihoon Min (2015)

Ahmed Abdulla (2014-2015)

Alan Jenn (2014-2015, co-advised with J. Michalek)

Brinda Thomas (2013)

## 5. Educational Contributions

### A. Courses Created and/or Taught at Carnegie Mellon University

- 1. Climate Change Mitigation: New Course.** This course explores the feasibility of several technological and policy options for responding to the threat of climate change. In this course, we start with an overview of climate-change science, and understanding the sources, sinks and atmospheric dynamics of greenhouse gases. Students then learn about climate change effects and the global and regional policies that have been considered and pursued so far. Since addressing climate change is, to a first order, an issue of transforming energy systems, we then focus on understanding the current systems for energy supply and use. Next, we review the technological options for low-carbon energy supply, such as fossil fuels with carbon capture and sequestration and renewable sources, and the consequences of intermediate strategies such as natural gas. We also study technological options for improving end-use energy efficiency in buildings and in transportation, and finally we review strategies such as geo-engineering the climate. Finally, we assess the potential policy frameworks for implementing reductions of greenhouse gases.
- 2. The Climate and Energy Decision Making Ph.D. Student Seminar Series: New Course.** In 2010, I created, and since then led, this Ph.D. student seminar series. The goal of this seminar series is to create a community of Ph.D. students and faculty that discuss their research in energy and climate. The pedagogical goal is to provide an opportunity for the students to practice presenting their work to an audience, to have feedback on both content and delivery of the presentation by peer colleagues and by faculty, to learn how to provide feedback to peers and how to produce a peer-review of a paper. This effort was formalized as a Ph.D. seminar course in 2011. Currently, about 20 Ph.D. students and about 4+ faculty members participate in these seminars on a weekly basis. Some students take this course for credit, while the others participate without credit. Ph.D. students submit a working paper 2-weeks ahead of their presentation and other fellow Ph.D. students provide a review of these papers. The students present the paper to the whole group in a one-hour seminar, and receive feedback from faculty and fellow students.
- 3. Sustainable Energy Systems Management and Policy: New Course.** Assessment of the potential CO<sub>2</sub> reductions from alternative futures of the global energy system must begin by answering the following key questions: what energy resources are available? How energy can be recovered from these resources? How much energy can be economically delivered to final consumers? This course aims to explore issues in global and regional energy resource assessment and its ties to technology, economics, and sustainability. Different energy sources and associated conversion technologies are examined, including fossil fuels (oil, coal, natural gas), biomass, geothermal energy, nuclear power, wind power, solar energy, hydropower and ocean energy (tides and waves). We explore the effects of end-use energy efficiency in buildings (residential and commercial) and transportation. The learning objectives from this course are to be able to explain how global and regional estimates of energy resources are compiled, the key uncertainties in resource assessments, and how these resource estimates are affected by developments in technology. Students are equipped to explain how concerns over sustainability affect development and use of resources. After participating in the course, the students are able to apply engineering and economic concepts of energy technologies, from the perspective of suppliers and consumers of energy.

4. **Innovation for Energy and the Environment:** This course explores opportunities for economic, environmental and social value creation for several energy cases, each of which has its own set of considerations for resources, stakeholder perspectives, business challenges and technical opportunities. The course emphasizes utilization of methods, tools and frameworks to describe and evaluate potential innovation opportunities in the energy and environmental sectors. Upon completion of the course, students are equipped to evaluate the economic and environmental aspects of business decisions in energy, and know how to assess feasible technology adoption pathways.
5. **Quantitative Methods for Policy Analysis:** This course is **one of the 5 core courses** for Ph.D. students in the Department of Engineering and Public Policy at Carnegie Mellon University. It provides students with the fundamental principles and quantitative methods in policy analysis, namely when applied to technology-related problems. Students learn decision making methods and economic analysis that aid the process of policy analysis, such as decision trees, benefit-cost and cost-effectiveness analysis, distributional issues, decision and risk analysis methods, like sensitivity analysis, multi-attribute decision analysis, regressions, statistical analysis, and simulation. The integration of uncertainty into formal methods is a fundamental component of the course.
6. **Theory and Practice of Policy Analysis:** This course is also **one of the 5 core courses** for Ph.D. students in the Department of Engineering and Public Policy at Carnegie Mellon University. The course reviews and critically examines a set of problems, assumptions and analytical techniques that are common to research and policy analysis in technology and public policy. Topics covered include the difference between science, trans-science and policy analysis, policy problems formulated in terms of utility maximization, issues in the valuation of intangibles, uncertainty in policy analysis, selected topics in risk analysis, limitations and alternatives to the paradigm of utility maximization, issues in behavioral decision theory, issues related to organizations and multiple agents, and selected topics in policy advice and policy analysis for the federal government. The objective is to look critically at the strengths, limitations and underlying assumptions of key policy research and analysis tools and problem framing and prepare the students to the critical issues of professional responsibility, ethics and values that are associated with policy analysis and research.
7. **The Climate and Energy Decision Making (CEDM) Invited Speaker Seminar Series:** In 2010, I have initiated the CEDM Invited Speakers seminar series. Invited external speakers as well as participating investigators in the CEDM present their research work in a 1-hour seminar. The goal of this effort is to provide information on key, up-to-date, research efforts in the area of climate and energy to the investigators and students that are working in the area of climate and energy decision making under uncertainty. Since 2010, we have had 90+ invited speakers.
8. **Education for science teachers and for 9<sup>th</sup> grade students: New Informal Education Initiative.** In 2011, I created 2 informal education activities (w/ Dr. Klima), that were held every summer since then:
  - A weeklong free summer school on climate and energy decision-making for 9<sup>th</sup> grade students from Pittsburgh schools;
  - A 2-day workshop for STEM teachers on how to incorporate climate change and energy topics in their curriculum.

I still provide a supervising and mentoring role, but as of 2016 the organization and leadership of the program comes mostly from EPP Ph.D. students and Dr. Vaishnav (previously Dr. Klima):

<http://cedmcenter.org/succeed/succeed-student-program/>

## B. Course Evaluations

FCE = faculty course evaluation. FCE scale for the course and for the instructor is from 1 to 5 (5 being the highest). Section 5.A provides a description of each course. Gr = graduate students; Un = undergraduate students. <sup>1</sup> = New course that I developed; <sup>2</sup> = Existing course number where I made a significant course revision; <sup>3</sup> = Co-taught.

	Course Title	Units	Class	Offered	Num Students	Num Resp	FCE Course	FCE Instr.
19-702	Quantitative Methods for Policy Analysis <sup>2</sup>	12	Gr	Spring 2017	25	23	4.39	4.74
19-653	Climate Change Mitigation <sup>2,3</sup>	12	Un+Gr	Spring 2016, A	10	7	4.43	4.43
24-640	Climate Change Mitigation <sup>2,3</sup>	12	Gr	Spring 2016, A	10	9	4.44	4.67
19-702	Quantitative Methods for Policy Analysis <sup>2</sup>	12	Un+Gr	Spring 2016, A	14	11	3.73	3.90
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Spring 2016, A	4	4	4.25	4.25
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Fall 2015, A	11	10	4.29	4.13
19-702	Quantitative Methods for Policy Analysis <sup>2</sup>	12	Gr	Spring 2015, A	26	24	3.29	3.71
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Spring 2015, A	5	3	4.00	4.33
19-701	Introduction to Theory and Practice of Policy Analysis <sup>2,3</sup>	12	Gr	Fall 2014, A	45	35	3.86	4.20
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Fall 2014, A	4	4	3.75	4
19-653	Climate Change Mitigation <sup>1,3</sup>	12	Un+Gr	Spring 2014, A	13	9	4.00	4.25
24-640	Climate Change Mitigation <sup>1,3</sup>	12	Un+Gr	Spring 2014, A	13	9	2.78	3.56
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Fall 2013, A2	7	5	4.00	3.80
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Fall 2013, A1	6	1	5.00	5.00
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Spring 2013, A3, A4	12	7	4.00	4.00
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Fall 2012, A2	11	6	4.50	4.40
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Fall 2012, A1	14	2	5.00	5.00
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Fall 2011, A2	11	6	4.33	4.33
19-883	Climate & Energy Decision Making Stud. Seminar <sup>1</sup>	3	Gr	Fall 2011, A1	11	2	4.50	5.00
90-821	Innovation for Energy and the Environment <sup>2,3</sup>	12	Gr	Fall 2010, A	2	1	4.00	4.00
19-688	Innovation for Energy and the Environment <sup>2,3</sup>	12	Un+Gr	Fall 2010, A	23	15	3.93	3.87
19-621	Sustainable Energy Systems Management and Policy <sup>1,3</sup>	6	Un+Gr	Spring 2010, A4	21	13	3.77	4.23
19-688 90-821	Innovation for Energy and the Environment <sup>2,3</sup>	12	Un+Gr	Fall 2009, A	9	6	n/a	n/a

## 6. Grants

### A. PI or co-PI

- Funding from the National Science Foundation. Role: PI (co-PI: Granger Morgan). Center for Climate and Energy Decision Making (CEDM). 2015-2020. **\$4,500,000**.
- Funding from the National Science Foundation. Role: PI (joint PI with Granger Morgan). Center for Climate and Energy Decision Making (CEDM). 2010-2016. **\$5,997,094**.
- Gift funding from Mitsubishi. Role: PI (jointly with Costa Samaras). US carbon intensity index. 2016-2019. \$413,000.
- Award from the Electric Power Research Institute (EPRI). Role: PI (co-PIs: Jeremy Michalek, Alex Davis, Katie Whitefoot). Estimating customer preferences for diverse electric services. 2016-2017. \$82,768.
- Funding from the Alfred P. Sloan Foundation. Role: Co-PI (PIs Jay Whitacre; co-PI: Shawn Lister). A critical assessment of fuel cell technologies. 2016-2018. \$387,546.
- Funding from Scott Energy Institute for Energy Innovation. Role: Co-PI (PI: Ed Rubin; Co-PIs: Meagan Mauter, Jeremy Michalek, Granger Morgan, Jay Whitacre, Kate Whitefoot, Haibo Zhai). Techno-economic assessment methods for energy technologies. 2016. \$25,000.
- Supplementary funding from the National Science Foundation Engineering Directorate for the Climate and Energy Decision Making Center. Role: PI (Co-PI Granger Morgan). 2012-2013. \$201,883.
- Supplementary funding from the National Science Foundation Engineering Directorate for the Climate and Energy Decision Making Center. Role: PI (Co-PIs: Granger Morgan and Jay Apt). 2011-2012. \$250,038.
- Gift funding from Toyota. Role: PI. Understanding the effects of transportation policy designs. 2016-2017. \$30,000.
- Gift funding from Toyota. Role: PI. Understanding the effects of transportation policy designs. 2015-2016. \$65,000.
- Gift funding from Toyota. Role: PI. Understanding the effects of transportation policy designs. 2014-2015. \$25,000.
- Funding from the Scott Energy Institute and from the Department of Engineering and Public Policy to seed the Behavior Energy and Climate Change Research Network. Role: PI. 2014-2015. \$50,000.
- Funding from Toyota. Role: PI. Understanding the effects of policy designs for the future of the US light-duty vehicle fleet. 2013-2014. \$57,686.
- Funding from the Scott Energy Institute. Role: PI (with Co-PI Lee Branstetter). Understanding the causes and consequences of China's wind power manufacturing surge. 2013-2014. \$72,000.
- Funding from the MacArthur Foundation. Role: Co-PI (PI: Granger Morgan; Co-PI: Jay Apt). Implications of small modular reactors (SMRs) for nuclear security. 2013-2016. \$554,863.
- Funding from the Electric Power Research Institute (EPRI). Role: Co-PI (PI: Ed Rubin; Co-PIs: Paulina Jaramillo and Sonia Yeh). Modeling technology learning for electricity supply technologies: a comprehensive review and recommendations for the EPRI REGEN model. 2012- 2013. \$249,052.

- Funding from the Grable Foundation to support the outreach program SUCCEED for 9<sup>th</sup> graders. 2012-2013. Role: PI. \$5,500.
- Funding from the International Risk Governance Council to do research and promote international research collaboration in energy efficiency and the rebound effect. 2011. Role: PI. \$23,900.

## **B. Faculty Associate**

- Environmental Protection Agency. Role: Investigator. (PI: Allen Robinson) Center for air, climate, and energy solutions (CACES). 2016-2021. \$10,000,000.
- Fuel Freedom Foundation. Role: Investigator. (PI: Chris Hendrickson). Assessment of comparative economic and environmental impacts of alternative light duty vehicle liquid fuels. 2014-2016. \$418,000.

## **C. Student Fellowships and Scholarships Awarded to my Ph.D. Students**

- Funding from the National Science Foundation East Asia and Pacific Summer Institute (EAPSI) Fellowship for Ph.D. student Brian Sergi. June 15, 2016-May 31, 2017. \$5,400.
- Funding from the National Science Foundation East Asia and Pacific Summer Institute (EAPSI) Fellowship for Ph.D. student Long Lam. June 15, 2016-May 31, 2017. \$5,400.
- Bertucci Graduate Fellowship for Ph.D. student Brian Sergi used towards tuition. 2016-2017. \$20,000.
- Phillips and Huang Family Fellowship in Energy for Ph.D. student Brock Glasgo used towards tuition. 2016-2017. \$5,000.
- Funding from the National Science Foundation Graduate Fellowship for Ph.D. student Priya Danti. September 2016-August 2020. Approx. \$130,000.
- Liang Ji-Dian Graduate Fellowship from Carnegie Mellon University for Ph.D. student Fan Tong. 2016. \$10,000.
- Funding from Bertucci Graduate Fellowship for Ph.D. student Daniel Posen. January 2016-May 2016. \$20,000.
- Funding from the CMU Graduate Presidential Fellowship for Ph.D. student Shayak Gupta. September 2016-August 2017. \$50,000.
- Funding from the NSF Graduate Research Fellowship Program for Ph.D. student Evan Sherwin. Fall 2014-Spring 2019. Approx. \$130,000.
- Funding from the NSF Graduate Research Fellowship Program for Ph.D. student Nichole Hanus. August 2016-August 2019. Approx. \$130,000.
- Funding from the EPA STAR Graduate Student Fellowship for Ph.D. student Julian Lamy. August 2014-September 2016. \$80,000.
- Funding from the Carnegie Mellon University Dean's Fellowship for Ph.D. student Evan Sherwin. Fall 2014-Spring 2015. Approx. \$43,000.
- Steinbrenner Institute Graduate Fellowship from Carnegie Mellon University for Ph.D. student Fan Tong. 2013-2014. \$39,000.
- Northrop Grumman Fellowship from Carnegie Mellon University for Ph.D. student Fan Tong. 2013-2014. \$6,000.

- Funding from the Steinbrenner Colcom US Environmental Sustainability Fellowship for Ph.D. student Daniel Posen. August 2012-August 2015. Approx. \$175,000.
- Funding from Carnegie Institute of Technology Dean's Fellowship for Ph.D. student Daniel Posen. August 2012-August 2013. Approx. \$40,000.
- Funding from the CMU-Portugal program (Fundação para a Ciência e para a Tecnologia) for Ph.D. student Nathaniel Gilbraith. August 2012 – December 2015. Approx. \$148,000.
- Funding from the CMU-Portugal program (Fundação para a Ciência e para a Tecnologia) for Ph.D. student Long Lam. August 2011-present. Approx. \$160,000.
- Funding from the Steinbrenner Colcom US Environmental Sustainability Fellowship for Ph.D. student Russell Meyer. August 2011-December 2014. Approx. \$155,000.
- Funding from the Russell Sage Foundation's Small Grants in Behavioral Economics program. Project title: “Understanding Consumer Preferences for Energy Efficient Lighting Products” (2011-2014). Grant to support research experiments from Ph.D. student Jihoon Min. \$4,610.
- Funding from the CMU-Portugal program (Fundação para a Ciência e para a Tecnologia) for Ph.D. student Ivonne Peña. August 2010 – August 2014. Approx. \$160,000.
- Funding from the National Science Foundation Graduate Fellowship for Ph.D. student Brinda Thomas. August 2008-December 2012. Approx. \$120,000.

## 7. Awards, Prizes, Honors

### A. Awards

- 2017: Philip L. Dowd Fellowship Award, Carnegie Mellon University. Awarded to a faculty member in engineering to recognize educational contributions and to encourage the undertaking of an educational project such as textbook writing [...].
- 2016: Selected as one of the six scientists to present their research at the Federation of American Scientists 70th Year Anniversary Symposium and Gala, Washington, DC, US: <https://fas.org/event/70th-anniversary-symposium-and-gala/>
- 2016: Participation in the National Academy of Engineering “Frontiers in Engineering,” Irvine, CA, US.
- 2016: Honorable Mention for the 2016 Carnegie Science Award in the Emerging Female Scientist, Pittsburgh, PA, US.
- 2015: C3E Women in Clean Energy award finalist.
- 2014: Selected by the World Economic Forum (WEF) as one of the “Young Scientists Under 40,” and attended the Annual Meeting of the Champions organized by the WEF in Tianjin, China. [http://www3.weforum.org/docs/WEF\\_YoungScientists2014.pdf](http://www3.weforum.org/docs/WEF_YoungScientists2014.pdf)
- 2013: CMU’s CIT Dean’s Early Career Fellowship, “Awarded to deserving untenured faculty members who have received extremely strong support during their review for promotion to the Associate Professor level.”

## **B. Papers and Posters Awards**

- 2015: Poster Award was awarded to my Ph.D. student Brock Glasgo, for our work on “Understanding the potential for electricity savings and assessing feasibility of a transition towards DC-powered buildings,” USAEE Conference in Pittsburgh, PA.
- 2014: 2nd position for the Pike Powers Energy Research Fellowship competition was awarded to my Ph.D. student Brock Glasgo, based on our work on “Understanding the potential for electricity savings and assessing feasibility of a transition towards DC-powered buildings,” co-authored by Brock Glasgo, Inês Azevedo, and Chris Hendrickson. A cash award of \$2,500 was provided.
- 2014: 3rd position for the Pike Powers Energy Research Fellowship competition was awarded to my student Vedran Lescic, based on our work on “Understanding customers’ (mis)perceptions of home energy use,” co-authored by Vedran Lescic, Inês Azevedo, and Tamar Krishnamurti.
- 2014: Paper award, 2<sup>nd</sup> place, at the IEEE ISSST, 2014 awarded to Jihoon Min for our work on “Assessing the magnitude of heat replacement effects from efficient lighting strategies,” co-authored by Jihoon Min, Inês Azevedo, and Pekka Hakkarainen.
- 2013: Paper award, 3<sup>rd</sup> place, at the IEEE ISSST, 2013 awarded to Alan Jenn for our work on “Automotive transition to sustainable technology mix, a response to CAFE standards, co-authored by Alan Jenn, Christian Blanco, William Chernicoff, Jeremy Michalek, and Inês Azevedo.
- 2012: Paper award, 1<sup>st</sup> place, at the IEEE ISSST, 2012 awarded to Alan Jenn for our work on “Impact of federal incentives on adoption of hybrid electric vehicles in the United States,” co-authored by Alan Jenn, Inês Azevedo, and Pedro Ferreira.

## **8. Professional Activities**

### **A. Invited Seminars and Talks**

1. “Understanding the effects of different interventions in the U.S. Power Sector”, invited speaker for the ETH Academy on Sustainability and Technology, ETH Zurich, 06/01/2017.
2. “De-carbonization of the U.S. electricity sector”, CMU Energy Week panel, 03/31/2017.
3. “A presentation of the Climate and Energy Decision Research”, CMU Energy Week Centers presentations, Pittsburgh, 03/29/2017.
4. Presentation to the Pennsylvania Environmental Council meeting on “Achieving Deep Carbon Reductions: Paths for Pennsylvania’s Electricity Future” on Energy Efficiency for Pennsylvania, Pittsburgh, 03/15/2017.
5. “Understanding costs, benefits and environmental justice issues when pursuing different interventions in the US electric system,” Invited seminar for the Energy and Resources Engineering Department, Stanford University, Stanford, CA, 03/13/2017.
6. “Combining social science research and energy systems approaches: what can we learn about energy efficiency rebound effects,” invited speaker at the Colloquia for the Center for Energy Policy and Economics, ETH, Zurich, Switzerland, 12/16/16.



7. “Understanding costs, benefits and environmental justice issues when pursuing different interventions in the US electric system,” invited speaker at the Colloquia for the Institute of Science, Technology and Policy, ETH, Zurich, Switzerland, 12/13/16.
8. “Energy efficiency rebound effects,” invited speaker at the Behavioral Colloquium, ETH, Zurich, Switzerland, 12/13/16.
9. “Understanding the health, environmental and climate change benefits from interventions in the US electricity grid,” invited seminar speaker for the Program in Science, Technology, and Environmental Policy (STEP) invited seminar, Princeton University, NJ, US, 12/5/16.
10. “Location-specific costs and benefits of rooftop solar photovoltaic,” speaker at the iTeam seminar, Carnegie Mellon University, Pittsburgh, PA, 12/2/2016.
11. “Health, environmental and climate change effects of interventions in the US electric grid,” GPS invited seminar, UC San Diego, San Diego, CA, 10/26/2016.
12. “Health, environmental and climate change effects of interventions in the US electric grid,” one of the six invited speakers for the Federation of American Scientists (FAS) 70th Year Anniversary Symposium and Gala, Washington, DC, 09/28/16.
13. “Understanding health, environmental and climate trade-offs and co-benefits in climate change mitigation strategies for the power sector and transportation,” invited seminar at U.C. Irvine, Irvine, CA, 09/21/16.
14. “Understanding health, environmental and climate trade-offs and co-benefits in climate change mitigation strategies for the power sector and transportation,” invited lecture seminar at U.C. Berkeley, Berkeley, CA, 09/12/16.
15. “Getting near zero: decarbonizing the last 20%. Short invited presentation on mitigation for transportation, Aspen Global Change Institute, Aspen, CO, 08/01-05/16.
16. “Understanding the uncertainties in consequences of climate change for the United States power sector infrastructure when considering a realistic mitigation pace and adaptation needs,” invited speaker for the Colloquium of the Institute for Atmospheric and Climate Science, ETH Zurich, Switzerland, 05/30/16.
17. “Overview of CEDM work,” First Steinbrenner Annual Meeting, Pittsburgh, PA, 04/22/16.
18. “Perceived trade-offs in greenhouse cases and criteria air pollutant electricity portfolios,” invited presentation at the Electricity Conference, UT Austin, Austin, TX, 04/21/16.
19. “Energy pathways, policies and decisions,” Andy Talk at the First Energy Week at Carnegie Mellon University, Pittsburgh, PA, 03/14/16.
20. “What can we learn about energy efficiency rebound effects?” invited seminar at Leeds University, Leeds, UK, 11/11/15.
21. “Understanding the health, environmental and climate change damages from interventions in the US electricity grid,” invited seminar at Wayne State University, Detroit, MI, 10/08/15.
22. “Energy efficiency and the rebound effect,” invited presentation at the EMF Climate Change Impacts and Integrated Assessment, Snowmass, CO, 07/23/15.
23. “De-carbonizing the electricity sector in the United States: what big data analytics can tell us about sustainable transitions,” invited presentation at the EMF Climate Change Impacts and Integrated Assessment, Snowmass, CO, 07/23/15.

24. Presentation and panel on “Energy innovation for climate change: systems approaches and societal responses,” Our Common Future Under Climate Change International Scientific Conference, Paris, France, 07/10/15.
25. Presentation and panel on “Decarbonizing electricity/electricity transition,” Our Common Future Under Climate Change International Scientific Conference, Paris, France, 07/09/15.
26. “Consumer choices of lighting products and the feasibility of DC circuits for lighting,” invited speaker at the SPARC International Lighting Event, Sydney, Australia, 05/28/15.
27. “The benefits and costs of pushing renewables,” invited presentation at the 2015 Austin Electricity Conference, Austin, TX, 04/09/15.
28. “Behavior first: powering up innovation by putting people at the center of program design and strategy” (invited discussion panel with Gene Rodrigues, June Flora and Anne Dougherty), Emerging Technologies Summit, San Francisco, CA, 10/21/14.
29. “Keep it simple to keep it cool: improving projections in energy demand,” invited talk at the IRGC workshop on “Improving Demand Projections,” Karlsruhe, Germany, 10/14/14.
30. “China energy innovation,” invited speaker, Tianjin University, Tianjin, China, 09/13/14.
31. “Assessing the regional variations in the health, environmental, and climate benefits of wind and solar generation across the United States,” invited seminar to the 2014 UT Austin’s Energy Institute, Austin, TX, 04/17/14.
32. “Interdisciplinary research in energy efficiency and climate change,” invited seminar speaker to the Power Lunch seminar at Duke University, Raleigh, NC, 02/28/14.
33. “Trade-offs in climate mitigation strategies: assessing the regional variations in the health, environmental, and climate benefits of wind and solar generation across the US,” invited seminar speaker to the Nicholas School for the Environment, Duke University, Raleigh, NC, 02/28/14.
34. “Assessing the regional variations in the health, environmental, and climate benefits of wind and solar generation across the United States,” invited speaker to the IEEE Women in Engineering seminar series, Pittsburgh, PA, 02/12/14.
35. “The need to account for uncertainty,” invited talk to the CRAG-IRGC Symposium, École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, 11/21/13.
36. “Assessing the regional variations in the health, environmental, and climate benefits of wind and solar generation across the United States / Learning curves for energy technologies,” invited seminar to NETL, Pittsburgh, PA, 06/12/13.
37. “Assessing the regional variations in the health, environmental, and climate benefits of wind and solar generation across the United States,” invited seminar speaker to Iniciativa Ambiente, Instituto Superior Técnico, Lisboa, Portugal, 05/28/13.
38. “Assessing the regional variations in the health, environmental, and climate benefits of wind and solar generation across the United States,” invited seminar speaker at Coimbra University, Portugal, 05/27/13.
39. “Research on energy efficient lighting: understanding the engineer-economics aspects, consumer perceptions of light and color and consumer decision-making models,” invited seminar speaker for the Golisano Institute for Sustainability, Rochester Institute of Technology, Rochester, NY, 05/01/13.
40. “Assessing the regional variations in the health, environmental, and climate benefits of wind and solar generation across the United States,” invited seminar speaker to the Conference on Mathematics of Energy and Climate Change, Lisbon, Portugal, 03/26/13.

41. “Energy efficiency supply curves” invited lecturer at the Advanced School on Mathematics of Energy and Climate Change,” Lisbon, Portugal, 03/28/13.
42. “Assessing the regional variations in the health, environmental, and climate benefits of wind and solar generation across the United States,” invited speaker at the Rutgers Energy Institute (REI) seminar series, Rutgers University, New Brunswick, NJ, 02/09/13.
43. “Reducing CO<sub>2</sub> emissions: technology, uncertainty, decision making and consumer behavior,” invited seminar for the Energy & Resources Group at University of California Berkeley and the Lawrence Berkeley National Laboratory, Berkeley, CA, 10/31/12.
44. “Research on energy efficient lighting: understanding the engineer-economics aspects, consumer perceptions of light and color and consumer decision-making models,” invited seminar speaker for the Center for Research in Environmental Decisions (CRED), Columbia University, New York, NY, 04/26/12.
45. “The Importance of Climate Data for Energy Efficiency Investments,” invited seminar speaker for a keynote session at the Asian Pacific Economic Cooperation (APEC) Climate Symposium 2011, Honolulu, Hawaii, 10/17/11.
46. “Learning curves and wind diffusion for wind technology in the European Union,” Innovation in Energy and Environmental Technologies: What can we learn from patent data? Invited talk to the ICCG and ICARUS project, Venice, Italy, 05/20/11.
47. “A transition to solid state lighting,” invited seminar speaker at the Faculdade de Engenharia do Porto (FEUP), Porto University, Portugal, 05/05/10.
48. “An engineering-economic analysis of white light-emitting diodes for general illumination for the US residential and commercial sectors,” invited seminar speaker for the Environmental Energy Technologies Division Seminars, E.O. Lawrence Berkeley National Laboratory, Berkeley, CA, 02/15/08.
49. “Realistic energy efficiency supply curves for the US residential sector,” Climate Decision Making Center Seminar Series, CMU, Pittsburgh, PA, 02/05/08.

## **B. Government Committees, Civic Appointments, Board Memberships**

### ***National Academies:***

- National Research Council Committee on Assessment of Technologies for Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, Phase 2, 2013–*present*. Two reports resulting reports, as listed in Section 4.A.
- National Research Council Committee on Assessment of Solid State Lighting, 2011 – 2013. One resulting report, as listed in Section 4.A.

### ***US Department of Energy:***

- Selected appointed member for the Department of Energy’s Hydrogen and Fuel Cell Technical Advisory Committee, 2016–*present*.

### ***Board Membership and Leadership:***

- Pecan Street Research Data Board member, 2013–*present*. Pecan Street Research is a research and development organization focused on developing and testing advanced technology, business model and customer behavior surrounding advanced energy management systems:  
<http://www.pecanstreet.org/>

### ***Reviewer for International Proposals:***

- Reviewer for the Dutch Social Sciences and Physical Sciences Technology Foundation STW, proposals on “Uncertainty Reduction in Smart Energy Systems” (URSES), 2013.
- Reviewer for the Portuguese Foundation for Science and Technology (Fundação para a Ciência e para a Tecnologia), 2012.

### ***Service for the National Science Foundation:***

- Reviewer for a proposal from the Science of Science and Innovation Policy program, 2016.
- Site visit evaluation for the New Mexico “Experimental Program to Stimulate Competitive Research” (EPSCoR) project, 2016.
- Reviewer for the Graduate Research Fellowships in Economics, 2016.

### ***United States Association for Energy Economics***

- Council Member, 2016–*present*.

## **C. Editorial Roles on Publications, Professional Society Memberships, Reviewer Role and Major Activities in Professional Meetings**

### ***Editorial Role:***

- 2017–present, Executive board member for *Environmental Research Letters*
- 2015–2017, Editorial advisory board member for *Environmental Research Letters*
- 2015, Guest editor for the 2016 issue of *Annual Review of Environment and Resources*
- 2014, Invited editorial role for the Special Issue on “Climate and Energy Decision Making under Uncertainty” for the journal *Environment, Systems, and Decisions*

### ***Reviewer Role:***

Environmental Science and Technology; Environmental Research Letters; Proceedings of the National Academy of Sciences; Annual Review of Environment and Resources; Climatic Change; Energy Economics; Energy Policy; Energy Efficiency; Ecological Economics; Environment, Systems and Decisions; Atmospheric Chemistry and Physics Discussions; Industrial Ecology

### ***Professional Societies Membership:***

American Geophysical Union (AGU); Industry Studies Association (ISA); INFORMS; International Society for Industrial Ecology (ISIE); Society for Risk Analysis (SRA); United States Association for Energy Economics (USAEE); Association for Environmental Studies and Sciences (AESS); American Economic Association (AEA); International Society for Ecological Economics (ISEE); American Association for the Advancement of Science (AAAS); Association of Environmental Resource Economists (AERE).

### ***Leadership in Workshops and Research Meetings:***

1. 2017 (upcoming meeting), Program Committee for the Behavior, Energy and Climate Change Conference (BECC). October 15-18, Sacramento, CA, US.
2. 2017 (upcoming meeting), International Conference on Energy Efficiency in Domestic Appliances and Lighting EEDAL'17 International Program Committee. September 13-15, Irvine, US.
3. 2017, Member of the Program Committee for Energy for Sustainability 2017, Sustainable Cities: Designing for People and the Planet. May 10-12, Funchal, Madeira, Portugal.
4. 2016, Program Committee for the Behavior, Energy and Climate Change Conference (BECC). October 20-22, Baltimore, MD, US.
5. 2016, Scientific Program Committee for BEHAVE 2016. September 8-9, Coimbra, Portugal.  
[http://www.uc.pt/en/org/inescc/org\\_scientific\\_events/behave2016/Committees](http://www.uc.pt/en/org/inescc/org_scientific_events/behave2016/Committees)
6. 2015, Scientific Committee for Energy for Sustainability 2015, Sustainable Cities: Designing for People and the Planet. May, 14-15, Coimbra, Portugal.  
<http://efs2015.uc.pt/projectos/efs2015/index.php?module=sec&id=288>
7. 2015, Program Committee for the Behavior, Energy and Climate Change Conference (BECC), October 18-21, Sacramento, CA, US.
8. 2014, Lead organizer for a strategic workshop sponsored by the Scott Institute for Energy Innovation at Carnegie Mellon University on “Low Carbon Pathways.” May 15th, Pittsburgh, PA, US.
9. 2014, Co-organizer with Ortwin Renn of the workshop on “demand anticipation – using scenarios to improve planning for energy transitions,” with the International Risk Governance Council (IRGC). October 9-10, Karlsruhe, Germany.
10. 2014, Program Committee for the Behavior, Energy and Climate Change Conference (BECC). December 7-10, Washington, DC, US.
11. 2014, Co-lead organizer with Lee Branstetter (Heinz School of Public Policy, CMU) of the workshop “China energy innovation” at the Peterson Institute for International Economics. June 26-27, Washington, DC, US.
12. 2013, Co-organizer with Granger Morgan and Ahmed Abdulla of the workshop on “A workshop on small modular reactors (SMRs); implications of SMRs on low carbon energy and nuclear security,” sponsored by Carnegie Mellon University. The Paul Scherrer Institute, and The International Risk Governance Council, Villigen, Switzerland.
13. 2013, Technical Program Committee member for BuildSys 2013, November 13-1, Rome, Italy,  
<http://www.buildsys.org/2013/>
14. 2013, Co-organizer with Eric Williams (Rochester Institute of Technology) and Marilyn Brown (Georgia Institute of Technology) of a NSF-sponsored workshop on “Informing energy technology policy decisions: understanding technological change,” June 19, Hall of the States, Washington, DC, US.
15. 2012, Scientific Committee member for the International Workshop on Energy Efficiency for a More Sustainable World. September 14-16, Azores, Portugal.  
[http://www.energyefficiency.uac.pt/?page\\_id=18](http://www.energyefficiency.uac.pt/?page_id=18)
16. 2012, Program Committee member for BuildSys 2012. November 6, Toronto, Canada,  
<http://www.buildsys.org/2012/>

17. 2011, Co-organizer with Ortwin Renn (U. Stuttgart) of the second “Energy efficiency and rebound effects” workshop, October 13-14, Stuttgart, Germany. Funding from IRGC and CEDM. <http://cedmcenter.org/energy-efficiency-and-the-rebound-effect/>
18. 2011, Co-organizer with Ortwin Renn (U. Stuttgart) and Granger Morgan (CMU) for the “Energy efficiency and rebound effects workshop. June 27-28, Washington DC, US. Funding support from IRGC, University of British Columbia, and CEDM. <http://cedmcenter.org/energy-efficiency-and-the-rebound-effect/>
19. 2010, Co-organizer for the 3rd workshop on “Smart energy brainstorms: R&D in electric mobility,” a series of meetings jointly organized by the CMU-Portugal and the MIT-Portugal Programs, together with the INOVGRID and the MOBI.E and Projects. October 11, Lisbon, Portugal ([http://smartgrid.cmuportugal.org/?page\\_id=297](http://smartgrid.cmuportugal.org/?page_id=297)).
20. 2010, Main organizer and program chair of the 1st workshop on “Smart energy brainstorms: R&D for the future of smart energy grids: fostering pilot experiences in Portugal,” a series of meetings jointly organized by the CMU-Portugal and the MIT-Portugal Programs, together with the INOVGRID and the MOBI.e and Projects. June 15, Lisbon, Portugal (32 participants, [http://smartgrid.cmuportugal.org/?page\\_id=2](http://smartgrid.cmuportugal.org/?page_id=2)).

***Service on CMU Committees:***

1. 2016–present: Serving on Carnegie Mellon’s College of Engineering Research Ecosystem Committee, which is tasked with targeting effective, robust and thriving research activities and operations at CMU.
2. 2016: Reviewer for the Dowd Fellowship applications at Carnegie Mellon University.
3. 2013–present: Serving on EPP’s Graduate Curriculum Committee, which was tasked with revising the EPP Ph.D. curriculum.
4. 2013–2015: Served on the search committee for an Assistant Professor in Social Sciences for the Department of Engineering and Public Policy.
5. 2014–2015: Served on the search committee for an Assistant Professor in Innovation for the Department of Engineering and Public Policy.
6. Several talks for the Electricity Industry Center Advisory Committee Meetings (2010, 2012, 2013, 2014, 2015).
7. Several talks for the Climate and Energy Decision Making Center (2010, 2011, 2012, 2013, 2014, 2015, 2016).

## 9. Other

In this section I report examples of work coverage by the media (9A), and examples of recent service in communicating science to the community (9B).

### A. Examples of Coverage by Media from My Research Team

2017:

- [1] Co-authored statement by CMU's centre directors regarding the U.S. Paris Agreement withdraw. <http://www.cmu.edu/news/stories/archives/2017/june/statement-by-center-directors.html>
- [2] Interview for WESA, Pittsburgh's NPR stations on PA electricity generation. <http://wesa.fm/post/pa-electricity-generation-moving-away-coal-would-it-move-back-under-trump#stream/0>
- [3] Quoted on Climate Central: <http://www.climatecentral.org/news/electricity-carbon-footprint-us-shrinks-21336>
- [4] Quoted on Pittsburgh next regarding the CMU Carbon Index: <http://www.nextpittsburgh.com/environment/power-sector-carbon-index-shows-big-drop-in-co2-emissions-but-more-needs-to-be-done/>
- [5] Quoted by Union radio, in the Diario de Yucatan, in W Radio, and in La Vanguardia regarding the Paris Agreement. <http://unionradio.net/salir-del-acuerdo-paris-una-decision-trump-inutil-contraproducente/>  
<http://yucatan.com.mx/internacional/norteamerica/salir-del-acuerdo-paris-una-decision-inutil-contraproducente>  
<http://www.wradio.com.co/noticias/economia/salir-del-acuerdo-de-paris-una-decision-de-trump-inutil-y-contraproducente/20170604/nota/3482825.aspx>  
<http://www.lavanguardia.com/vida/20170604/423192548947/salir-del-acuerdo-de-paris-una-decision-de-trump-inutil-y-contraproducente.html>

2016:

- [6] Series of radio interviews with the *National Public Radio* news station *WESA* under the Scott Energy Institute "Energy Bites" Series from Azevedo and co-authors on our research:
  - Episode 178 (Nathaniel Horner): How much electricity do data centers consume? <https://soundcloud.com/scott-institute/how-much-electricity-do-data-centers-consume-ep-178>
  - Episode 177 (Julian Lamy): Coastal towns: wind projects offshore vs wind projects onshore. <https://soundcloud.com/scott-institute/coastal-towns-wind-projects-offshore-vs-wind-projects-onshore-ep177>
  - Episode 176 (Julian Lamy): Where do most people prefer to have wind energy projects located? <https://soundcloud.com/scott-institute/where-do-most-people-prefer-to-have-wind-energy-projects-located-ep-176>
  - Episode 175 (Julian Lamy): What do people think about the prospect of a wind farm in their community? <https://soundcloud.com/scott-institute/what-do-people-think-about-the-prospect-of-a-wind-farm-in-their-community-ep-175>
  - Episode 174 (Julian Lamy): What's the advantage of adding energy storage to a wind project? <https://soundcloud.com/scott-institute/whats-the-advantage-of-adding-energy-storage-to-a-wind-project-ep-174>
  - Episode 173 (Julian Lamy): Where should we build wind energy projects? <https://soundcloud.com/scott-institute/where-should-we-build-wind-energy-projects-ep-173>
  - Episode 172 (Stephanie Seki): Are biofuels good for the environment? <https://soundcloud.com/scott-institute/energy-bite-stephanie-script-5>
  - Episode 142 (Inês Azevedo): Is there one single technology or strategy that could solve the climate problem? <https://energybite.org/2016/02/25/episode-142-is-there-one-single-technology-or-strategy-that-could-solve-the-climate-problem/>
  - Episode 141 (Inês Azevedo): Is the environmental effect of renewables the same everywhere? <https://energybite.org/2016/02/18/episode-141-is-the-environmental-effect-of-renewables-the-same-everywhere/>
  - Episode 140 (Inês Azevedo): Do rebates for energy efficient appliances work? <https://energybite.org/2016/02/11/episode-140-do-rebates-for-energy-efficient-appliances-work/>
  - Episode 139 (Inês Azevedo): Are natural gas vehicles a good idea? <https://energybite.org/2016/02/04/episode-139-natural-gas-vehicles/>

- Episode 128 (Jay Apt): Where should wind and solar plants be located to lower pollution? <https://soundcloud.com/scott-institute/where-should-wind-and-solar-plants-be-located-to-best-lower-pollution-ep-128>
- [7] My Ph.D. student Brock Glasgo interview on DC circuits was featured in *CIT's News Section*: [http://engineering.cmu.edu/media/feature/2016/10\\_27\\_acdc\\_home\\_energy.html](http://engineering.cmu.edu/media/feature/2016/10_27_acdc_home_energy.html)
- [8] My Ph.D. student Long Lam interview on China's energy system was featured in *CIT's News Section*: [https://engineering.cmu.edu/media/feature/2016/09\\_21\\_lam\\_china\\_wind.html](https://engineering.cmu.edu/media/feature/2016/09_21_lam_china_wind.html)
- [9] My Ph.D. student Brian Sergi interview on renewable choices was featured in *CIT's News Section*: [https://engineering.cmu.edu/media/feature/2016/07\\_21\\_brian\\_sergi\\_electricity.html](https://engineering.cmu.edu/media/feature/2016/07_21_brian_sergi_electricity.html)
- [10] My Ph.D. student Evan Sherwin interview on energy forecasts was featured in *CIT's News Section*: [https://engineering.cmu.edu/media/feature/2016/05\\_31\\_sherwin\\_explores\\_energy\\_future.html](https://engineering.cmu.edu/media/feature/2016/05_31_sherwin_explores_energy_future.html)
- [11] Carnegie Mellon University College of Engineering press release for our paper on "Effect of regional grid mix, driving patterns and climate on the comparative carbon footprint of gasoline and plug-in electric vehicles in the United States," published at *Environmental Research Letters*: [http://engineering.cmu.edu/media/press/2016/04\\_20\\_ev\\_depends\\_live.html](http://engineering.cmu.edu/media/press/2016/04_20_ev_depends_live.html)
- [12] Carnegie Mellon University's College of Engineering website interviews authors of Michalek, Jenn, and Azevedo regarding the paper "Alternative fuel vehicle adoption increases fleet gasoline consumption and greenhouse gas emissions under United States corporate average fuel economy policy and greenhouse gas emissions standards," published in *Environmental Science & Technology*:
- [13] [http://engineering.cmu.edu/media/press/2016/03\\_03\\_michalek\\_alternative\\_fuel.html](http://engineering.cmu.edu/media/press/2016/03_03_michalek_alternative_fuel.html)
- [14] *Cleantechica* reports on our results from "Alternative fuel vehicle adoption increases fleet gasoline consumption and greenhouse gas emissions under United States corporate average fuel economy policy and greenhouse gas emissions standards," published in *Environmental Science & Technology*: <https://cleantechica.com/2016/05/18/alt-fuel-vehicle-incentives-increase-fuel-consumption-emissions-short-term/>
- [15] *Green Car Reports* discusses our results from "Alternative fuel vehicle adoption increases fleet gasoline consumption and greenhouse gas emissions under United States corporate average fuel economy policy and greenhouse gas emissions standards," published in *Environmental Science & Technology*: [http://www.greencarreports.com/news/1103898\\_buying-an-electric-car-can-increase-fuel-use-allowed-by-cafe-rules](http://www.greencarreports.com/news/1103898_buying-an-electric-car-can-increase-fuel-use-allowed-by-cafe-rules)
- [16] *Autocar* discusses our results from "Alternative fuel vehicle adoption increases fleet gasoline consumption and greenhouse gas emissions under United States corporate average fuel economy policy and greenhouse gas emissions standards," published in *Environmental Science & Technology*: <http://www.autoblog.com/2016/04/28/map-carnegie-mellon-location-ev-clean-electric-grid/>
- [17] *Phys.org* discusses our results from "Alternative fuel vehicle adoption increases fleet gasoline consumption and greenhouse gas emissions under United States corporate average fuel economy policy and greenhouse gas emissions standards," published in *Environmental Science & Technology*: <http://phys.org/news/2016-03-federal-policy-reverses-benefits-alternative.html>
- [18] *Chemical & Engineering News* discusses our results from "Alternative fuel vehicle adoption increases fleet gasoline consumption and greenhouse gas emissions under United States corporate average fuel economy policy and greenhouse gas emissions standards," published in *Environmental Science & Technology*, at: <http://cen.acs.org/articles/94/web/2016/03/Incentive-electric-cars-increases-CO2.html>
- [19] *Ars Technica* discusses our results from "Alternative fuel vehicle adoption increases fleet gasoline consumption and greenhouse gas emissions under United States corporate average fuel economy policy and greenhouse gas emissions standards," published in *Environmental Science & Technology*: <http://arstechnica.com/cars/2016/02/could-more-electric-cars-mean-greater-fleet-emissions-and-fuel-consumption/>
- [20] *USA TODAY* mentions our results from "Regional variations in the health, environmental, and climate benefits from wind and solar generation," published in the *Proceedings from the National Academy of Sciences*: <http://www.usatoday.com/story/news/2016/09/29/toxic-air-pollution-concentrated-small-number-sites/90846584/>
- [21] Main Carnegie Mellon University website news on our piece on "Regional variability and uncertainty of electric vehicle life cycle CO<sub>2</sub> emissions across the United States," *Environmental Science & Technology*: <http://www.cmu.edu/news/stories/archives/2015/july/greenest-vehicles-by-region.html>
- [22] Radio interview, 90.5 WESA Pittsburgh, Science Friday, October 2016.

## 2015:

- [23] Interview and comments featured in a piece on low carbon pathways from *Carnegie Mellon TODAY*: [http://cmtoday.cmu.edu/energy\\_publicpolicy/fossil-fuels-final-century/](http://cmtoday.cmu.edu/energy_publicpolicy/fossil-fuels-final-century/)
- [24] *Green Car Congress* discusses our work on "Comparison of life cycle greenhouse gases from natural gas pathways for light-duty vehicles", published in *Energy & Fuels*:



<http://www.greencarcongress.com/2015/08/20150821-cmu.html>

[25] *Futurity* reports on our results from “Regional variability and uncertainty of electric vehicle life cycle CO<sub>2</sub> emissions across the United States,” published in *Environmental Science & Technology*:

<http://www.futurity.org/hybrid-electric-vehicles-963162/>

[26] **WIRED** magazine reports on our work “How do we fund our roads? A case of decreasing revenue from electric vehicles,” published in *Journal of Transportation Research Part A*:

<http://www.wired.com/2015/04/electric-cars-intensifying-highway-funding-fiasco/>

[27] **The Scientific American Blog** discusses our work “Bulk energy storage increases US electricity system emissions,” published in *Environmental Science & Technology*: <http://blogs.scientificamerican.com/plugged-in/study-indicates-bulk-energy-storage-would-increase-total-u-s-electricity-system-emissions/>

[28] *RIT News* highlights our work “Bulk energy storage increases US electricity system emissions,” published in *Environmental Science & Technology*: <http://www.rit.edu/news/story.php?id=51342> and CMU’s news.

[29] I was selected by the major Portuguese newspaper *Jornal I* as one of the 50 Portuguese they would like to see returning to the country to promote change.

#### 2014:

[30] **The New York Times** blog *DotEarth* reproduces and discusses my commentary on rebound effects: [http://dotearth.blogs.nytimes.com/2014/10/21/is-there-room-for-agreement-on-the-merits-and-limits-of-efficient-lighting/?\\_r=0](http://dotearth.blogs.nytimes.com/2014/10/21/is-there-room-for-agreement-on-the-merits-and-limits-of-efficient-lighting/?_r=0)

[31] My interview with Kirsi Jansa was featured in the documentary/movie *Sustainability Pioneers*: <http://sustainabilitypioneers.com>

[32] Our findings from “The role of energy storage in accessing remote wind resources in the Midwest,” published in *Energy Policy* were discussed by

- a. The *Chicago Policy Review*: <http://chicagopolicyreview.org/2014/05/27/the-cost-of-wind-energy-tradeoffs-between-energy-storage-and-transmission/>
- b. *Paperblog.com*: <http://en.paperblog.com/researchers-quantify-how-energy-storage-costs-affect-wind-farms-932357/>

[33] Interview with the *Pittsburgh Tribune* on alternative energy for Pennsylvania:

<http://triblive.com/news/adminpage/5133484-74/energy-solar-benefits#axzz2uRPnRUvP>

[34] Interview for the Portuguese paper *Notícias Magazine* (Diário de Notícias) [in Portuguese].

[35] Our work on “Analyzing consumer preferences for lighting technologies using discrete choice analysis”, published in *Ecological Economics* was featured in:

- a. *The Chicago Policy Review*: <http://chicagopolicyreview.org/2014/03/12/discounting-energy-savings-lessons-from-incandescent-light-bulbs/>
- b. *The Pittsburgh Post-Gazette*: <http://www.post-gazette.com/life/homes/2014/02/08/Shedding-light-on-true-cost-of-bulbs/stories/201402080034>
- c. *Carnegie Mellon’s website news section*: [http://www.cmu.edu/news/stories/archives/2014/january/jan10\\_energyefficientbulbs.html](http://www.cmu.edu/news/stories/archives/2014/january/jan10_energyefficientbulbs.html)

[36] The findings from our work “Effects of government incentives on wind innovation in the United States”, published in *Environmental Research Letters* were highlighted at:

- a. *environmentalresearchweb*: <http://environmentalresearchweb.org/cws/article/news/55919>
- b. *CMU’s CIT website*: [http://www.cit.cmu.edu/media/press/2014/05\\_05\\_wind\\_tech\\_patents.html](http://www.cit.cmu.edu/media/press/2014/05_05_wind_tech_patents.html)
- c. *CMU’s website*: [http://www.cmu.edu/news/stories/archives/2014/may/may8\\_windenergypatents.htm](http://www.cmu.edu/news/stories/archives/2014/may/may8_windenergypatents.htm)

#### 2013:

[37] Interview for the Portuguese newspaper *Jornal I*: <http://www.ionline.pt/artigos/portugal/ines-azevedo-incentivos-renovaveis-estao-nitidamente-acima-necessario>

[38] The main findings from our work on “Regional variations in the health, environmental, and climate benefits from wind and solar generation”, published in the *Proceedings of the National Academy of Sciences* were covered in:

- a. **Science**, Editor’s choice: <http://www.sciencemag.org/content/341/6145/twil.full>
- b. **Nature**: [http://www.nature.com/news/location-may-stymie-wind-and-solar-power-benefits-1.13258?WT.mc\\_id=FBK\\_NatureNews](http://www.nature.com/news/location-may-stymie-wind-and-solar-power-benefits-1.13258?WT.mc_id=FBK_NatureNews)
- c. **IEEE Spectrum**: <http://spectrum.ieee.org/green-tech/solar/windiest-or-sunniest-sites-not-necessarily-best-for-wind-and-solar>

- d. *Sustainable Business*: <http://www.sustainablebusiness.com/index.cfm/go/news.display/id/25006>
- e. *PhysOrg*: <http://phys.org/news/2013-06-solar-benefits-vary.html>
- f. *Conservation Magazine*: <http://www.conservationmagazine.org/2013/06/location-scouting/>
- g. *Wind Energy and Electric Vehicle Review*: <http://www.evwind.es/2013/06/24/location-may-stymie-wind-energy-and-solar-power-benefits/33914>
- h. *ReNews*: <http://renews.biz/44729/healthier-site-options-urged-in-us/>

[39] June 26, 2013: Interview with *TribLIVE* on Federal policies for US power plants and climate change: <http://triblive.com/business/headlines/4257332-74/obama-coal-power#axzz2sIFyilV9>

[40] The main findings from “Expert elicitation of the cost of small modular nuclear reactors”, published in the *Proceedings of the National Academy of Sciences*, were covered in *ArsTechnica*: <http://arstechnica.com/science/2013/05/does-a-new-approach-to-nuclear-make-economic-sense/>

## 2012:

[41] The findings from “Edison revisited: Should we use DC circuits for lighting in commercial buildings?” published in *Energy Policy*, were covered by:

- a. *The Wall Street Journal* online: <http://online.wsj.com/article/PR-CO-20120425-909206.html>
- b. *Climate Wire* <http://www.eenews.net/climatewire/2012/03/22>

[42] The results from our work “The electricity consumption and energy savings potential of video game consoles in the United States”, published in the *Energy Efficiency Journal* were covered by:

- a. The blog of *The Wall Street Journal*: <http://blogs.wsj.com/ideas-market/2012/04/11/video-gamers-defeat-energy-efficiency/>:
- b. *ArsTechnica*: <http://arstechnica.com/gaming/2012/04/study-author-defends-findings-on-console-energy-savings-through-auto-power-down/>

## 2010:

[43] December 11, 2010: Interview for *Expresso*, a major Portuguese newspaper.

## B. Examples of Recent Service in Communicating Science to the Community

- October 3<sup>rd</sup>, 2016: Speaker at the Climate Action Plan 3.0 Energy Consensus Workshop, organized by the City of Pittsburgh and the *National Academies* Ambassador Program, Pittsburgh. Available at: [https://www.youtube.com/watch?v=bxmTPiTA86k&index=5&list=PL2L3ZTwe78kENVTH67k08kZIEgU2E\\_4SU](https://www.youtube.com/watch?v=bxmTPiTA86k&index=5&list=PL2L3ZTwe78kENVTH67k08kZIEgU2E_4SU)
- September 23<sup>rd</sup>, 2016: Panel speaker at the Public Engagement Workshop organized by Sense in Science, Carnegie Mellon University, Pittsburgh.
- January 15<sup>th</sup>, 2016: Speaker at the Pittsburgh Energy Forum: Transforming Our Energy System, organized by the *National Academies* Ambassador Program, Pittsburgh.
- 2016: Work with NPR and the Scott Energy Institute on Energy Bites, radio episodes explaining energy and climate change issues (see section on “examples of coverage of work by media”).
- August 28<sup>th</sup>, 2014: ASSET (<https://assetinc.org>) Training of STEM teachers on climate change science, policy, and technology.