

Jay Apt

POSITIONS HELD

Carnegie Mellon University

PROFESSOR, TEPPER SCHOOL OF BUSINESS 2010 — *PRESENT*
CO-DIRECTOR, CARNEGIE MELLON ELECTRICITY INDUSTRY CENTER
AFFILIATED PROFESSOR IN ENGINEERING & PUBLIC POLICY

ASSOCIATE RESEARCH PROFESSOR, TEPPER SCHOOL OF BUSINESS 2003 — 2010
EXECUTIVE DIRECTOR, CARNEGIE MELLON ELECTRICITY INDUSTRY CENTER
DISTINGUISHED SERVICE PROFESSOR IN ENGINEERING AND PUBLIC POLICY 2000 — 2010

iNetworks, LLC Venture Capital

MANAGING DIRECTOR AND CHIEF TECHNOLOGY OFFICER 2000 — 2003

Carnegie Museum of Natural History

DIRECTOR 1997 — 2000

National Aeronautics and Space Administration

ASTRONAUT 1985 — 1997
FOUR SPACE SHUTTLE MISSIONS. TWO MISSIONS INVOLVED PARTNERSHIPS WITH JAPAN AND RUSSIA; ONE INVOLVED TWO SPACEWALKS.

CHIEF OF MISSION SUPPORT BRANCH 1995 — 1996

FLIGHT CONTROLLER, MISSION CONTROL CENTER 1982 — 1985

California Institute of Technology

1980 — 1982

Jet Propulsion Laboratory, Pasadena, California

SCIENCE MANAGER OF OPTICAL FACILITIES, TABLE MOUNTAIN OBSERVATORY
GROUP LEADER, OPTICAL ASTRONOMY GROUP
PLANETARY SCIENTIST IN EARTH AND SPACE SCIENCES DIVISION

HARVARD UNIVERSITY

ASSISTANT DIRECTOR, DIVISION OF APPLIED SCIENCES 1978 — 1980
FOUNDING DIRECTOR, PLANETARY IMAGING COMPUTER CENTER

STAFF, CENTER FOR EARTH AND PLANETARY PHYSICS 1976 — 1980

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

1976

POST-DOCTORAL FELLOW IN LASER SPECTROSCOPY

EDUCATION

A.B. IN PHYSICS (MAGNA CUM LAUDE), HARVARD, 1971
PH.D. IN EXPERIMENTAL ATOMIC PHYSICS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, 1976. ADVISOR: DAVID PRITCHARD
THESIS TITLE: "VELOCITY DEPENDENCE OF EXCITATION TRANSFER IN COLLISIONS OF LASER-EXCITED ATOMS"

P R O F E S S I O N A L M E M B E R S H I P S

INTERNATIONAL ASSOCIATION FOR ENERGY ECONOMICS
SOCIETY FOR RISK ANALYSIS
CIGRE (INTERNATIONAL COUNCIL ON LARGE ELECTRIC SYSTEMS)
INDUSTRY STUDIES ASSOCIATION
INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
AMERICAN GEOPHYSICAL UNION
AMERICAN PHYSICAL SOCIETY
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
ASSOCIATION OF SPACE EXPLORERS

B O A R D S

INDUSTRY STUDIES ASSOCIATION (2012-2014)
EARLY CAREER DEVELOPMENT COMMITTEE – BOARD LIAISON
ELECTRIC POWER RESEARCH INSTITUTE (EPRI) (2007-2013)
AUDIT COMMITTEE
PHIPPS CONSERVATORY AND BOTANIC GARDENS (1997-2003)
CHAIR, FINANCE COMMITTEE
AUDIT COMMITTEE
NATIONAL ASSOCIATION OF ROCKETRY (1998-2007)

C U R R E N T A D V I S O R Y C O M M I T T E E S

CHAIR, SCIENTIFIC ADVISORY COMMITTEE, FUTURE RESILIENT SYSTEMS PROGRAM,
NATIONAL UNIVERSITY OF SINGAPORE/ETH-ZURICH (2015 – PRESENT)

S E L E C T E D H O N O R S A N D A W A R D S

HEINZ HISTORY CENTER HISTORY MAKER'S AWARD FOR INNOVATION (2018)
OUTSTANDING REVIEWER, *ENVIRONMENTAL RESEARCH LETTERS* (2016)
FELLOW, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (2013)
FELLOW, THE EXPLORERS CLUB (2008)
METCALF AWARD FOR OUTSTANDING ENGINEERING ACHIEVEMENT (2002)
DAVID L. LAWRENCE AWARD OF VECTORS / PITTSBURGH (2000)
NASA DISTINGUISHED SERVICE MEDAL (1997)
NASA EXCEPTIONAL SERVICE MEDAL (1993 AND 1995)
FEDERATION AERONAUTIQUE INTERNATIONALE V.M. KOMAROV DIPLOMA FOR
OUTSTANDING ACHIEVEMENTS IN THE FIELD OF EXPLORATION OF OUTER SPACE
(1991 AND 1992), SERGEI P. KOROLEV DIPLOMA FOR A NON-PLANNED REPAIR OF
A BROKEN DEVICE TO MAKE POSSIBLE THE CONTINUATION OF A MISSION (1991),
AND DE LA VAULX MEDAL (1998)

ARCHIVAL JOURNAL PAPERS

122. Apt, J. and D. Epple, Forest Fires: Why The Large Year-to-Year Variation in Forests Burned? In review at Environmental Research Letters.
121. Lavi, Y. and J. Apt, Using PV Inverters for Voltage Support at Night Can Lower Grid Costs. Energy Reports, 2022. **8**: 6347-6354.
120. Smillie, S., N.Z. Muller, W.M. Griffin, and J. Apt, Greenhouse gas estimates of LNG exports must include global market effects. Environmental Science & Technology, 2022. **56**: 1194-1201.
119. Lavin, L. and J. Apt, *The importance of peak pricing in realizing system benefits from distributed storage*. Energy Policy, 2021. **157**: 112484.
118. Freeman, G.M., J. Apt, S. Blumsack, and T. Coleman, *Could on-site fuel storage economically reduce power plant – gas grid dependence in New England?*. The Electricity Journal, 2021. **34**: 106956.
117. Lavin, L., S. Murphy, B. Sergi, and J. Apt, *Dynamic Operating Reserve Procurement Improves Scarcity Pricing in PJM*. Energy Policy, 2020. **147**: 111857.
116. Freeman, G., J. Apt, and J. Moura, *What causes natural gas fuel shortages at U.S. power plants?* Energy Policy, 2020. **147**: 111805.
115. Kirchen, K., W. Harbert, J. Apt, and M.G. Morgan, *A Solar-Centric Approach to Improving Estimates of Exposure Processes for Coronal Mass Ejections*. Risk Analysis, 2020. **40**(5): 1020-1039.
114. Murphy, S., L. Lavin, and J. Apt, *Resource adequacy implications of temperature-dependent electric generator availability*. Applied Energy, 2020. **262**: 114424.
113. Keen, J.F. and J. Apt, *How much capacity deferral value can targeted solar deployment create in Pennsylvania?* Energy Policy, 2019. **134**: 110902.
112. Murphy, S, F. Sowell, and J. Apt, *A time-dependent model of generator failures and recoveries captures correlated events and quantifies temperature dependence*. Applied Energy, 2019. **253**: 113513.
111. Fisher, M., J. Apt, and J. Whitacre, *Can flow batteries scale in the behind-the-meter commercial and industrial market? A techno-economic comparison of storage technologies in California*. Journal of Power Sources, 2019. **420**: 1-8.
110. Klima, K., J. Apt, M. Bandi, P. Happy, C. Loutan, and R. Young, *Geographic smoothing of solar photovoltaic electric power production in the western USA*. Journal of Renewable and Sustainable Energy, 2018. **10**(5): 053504.
109. Freeman, G., J. Apt, and M. Dworkin, *The Natural Gas Grid Needs Better Monitoring*. Issues in Science and Technology, 2018. **34**(4): 79-84.

108. Fisher, M., J. Whitacre, and J. Apt, *A Simple Metric for Predicting Revenue from Electric Peak-Shaving and Optimal Battery Sizing*. Energy Technology, 2018. **6**(4): 649-657.
107. Murphy, S., J. Apt, J. Moura, and F. Sowell, *Resource adequacy risks to the bulk power system in North America*. Applied Energy, 2018. **212**: 1360-1376.
106. Fisher, M.J., F. Sowell, and J. Apt, *The economics of commercial demand response for spinning reserve*. Energy Systems, 2018.**9**(1): 3-23.
105. Kaack, L.H., J. Apt, M.G. Morgan, and P. McSharry, *Empirical Prediction Intervals Improve Energy Forecasting*. Proceedings of the National Academy of Sciences of the United States of America, 2017. **114**(33): 8752-8757.
104. Apt, J., *Forum: Climate Engineering*. Issues in Science and Technology, 2017. **33**(4): 5-8.
103. Clack, C. T. M., S.A. Qvist, J. Apt, M. Bazilian, A.R. Brandt, K. Caldeira, S.J. Davis, V. Diakov, M.A. Handschy, P.D. H. Hines, P. Jaramillo, D.M. Kammen, J.C.S. Long, M.G. Morgan, A. Reed, V. Sivaram, J. Sweeney, G.R. Tynan, D.G. Victor, J.P. Weyant, and J.F. Whitacre, *Evaluation of a proposal for reliable low-cost grid power with 100% wind, water, and solar*. Proceedings of the National Academy of Sciences of the United States of America, 2017. **114**(26): 6722-6727.
102. Fisher, M.J. and J. Apt, *Emissions and Economics of Behind-the Meter Electricity Storage*. Environmental Science & Technology, 2017. **51**(3): 1094-1101.
101. Handschy, M.A., S. Rose and J. Apt, *Is It Always Windy Somewhere? Occurrence of Low-Wind-Power Events over Large Areas*. Renewable Energy, 2017. **101**: 1124-1130.
100. Bandi, M. and J. Apt, *Variability of the wind turbine power curve*. Applied Sciences, 2016. **6**: 262.
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98. Rose, S. and J. Apt, *Quantifying Sources of Uncertainty in Reanalysis Derived Wind Speed*. Renewable Energy, 2016. **94**: 157-165.
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96. Lueken, R., J. Apt and F. Sowell, *Robust Resource Adequacy Planning in the Face of Coal Retirements*. Energy Policy, 2016. **88**: 371-388.
95. Rose, S. and J. Apt, *What Can Reanalysis Data Tell Us About Wind Power?* Renewable Energy, 2015. **83**: 963-969.
94. Klima, K. and J. Apt, *Geographic Smoothing of Solar PV: Results from Gujarat*. Environmental Research Letters, 2015. **10**: 104001.
93. Apt., J., *Recent results on the integration of renewable electric power into the US grid*. MRS Energy & Sustainability - A Review Journal. 2015. **2**: E6.

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91. Moore, J., K. Borgert and J. Apt, *Could Low Carbon Capacity Standards Be More Cost Effective at Reducing CO₂ than Renewable Portfolio Standards?* Energy Procedia, 2014. **63**: 7459-7470.
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86. Rose, S. and J. Apt, *The Cost of Curtailing Wind Turbines for Secondary Frequency Regulation Capacity*. Energy Systems, 2014. **5**(3): 407-422.
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71. Fertig, E., J. Apt, P. Jaramillo, and W. Katzenstein, *The effect of long-distance interconnection on wind power variability*. Environmental Research Letters, 2012. **7**(3): 034017.
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64. Apt, J., C.T. Hendrickson, and G. Morgan, *Lester Lave, Visionary Economist*. Environmental Science & Technology, 2011. **45**(13): 5457-5458.
63. Peterson, S.B., J.F. Whitacre, and J. Apt, *Net Air Emissions from Electric Vehicles: The Effect of Carbon Price and Charging Strategies*. Environmental Science & Technology, 2011. **45**(5): 1792-1797.
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55. Hines, P., J. Apt, and S. Talukdar, *Large Blackouts in North America: Historical trends and policy implications*. Energy Policy, 2009. **37**(12): 5249-5259.
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53. Katzenstein, W. and J. Apt, *Response to "Comment on 'Air Emissions Due to Wind and Solar Power' "*. Environmental Science & Technology, 2009. **43**(15): 6108-6109.
52. Katzenstein, W. and J. Apt, *Air Emissions Due To Wind And Solar Power*. Environmental Science & Technology, 2009. **43**(2): 253-258.
51. Curtright, A. and J. Apt, *The Character of Power Output from Utility-Scale Photovoltaic Systems*. Progress in Photovoltaics, 2008. **16**(3): 241-247.
50. Walawalkar, R., S. Blumsack, J. Apt, and S. Fernands, *An Economic Welfare Analysis of Demand Response in the PJM Electricity Market*. Energy Policy, 2008. **36**(10): 3692-3702.
49. Newcomer, A. and J. Apt, *Implications of generator siting for CO₂ pipeline infrastructure*. Energy Policy, 2008. **36**(5): 1776-1787.
48. Apt, J., L. Lave, and S. Pattanariyankool, *A National Renewable Portfolio Standard? Not Practical*. Issues in Science & Technology, 2008. **25**(1): 53-59.
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41. Patiño-Echeverri, D., B. Morel, J. Apt, and C. Chen, *Should a Coal-Fired Power Plant be Retrofitted or Replaced?* Environmental Science & Technology, 2007. **41**(23): 7980-7986.
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37. Lave, L.B. and J. Apt, *Planning for Natural Disasters in a Stochastic World*. Journal of Risk and Uncertainty, 2006. **33**: 117-130.
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27. Lal, R., M. Griffin, J. Apt, L. Lave, and G. Morgan, *Response to comments on "Managing soil carbon"*. Science, 2004. **305**(5690).
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23. Apt, J. and L.B. Lave, *Electric Gridlock: A National Solution*. Public Utilities Fortnightly, 2003. **141**(18): 14-16.
22. Apt, J., *Toward a natural history museum for the 21st Century: Measuring effectiveness - Challenges and strategies*. Museum News, 1997. **76**(6): 43-46.
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SELECTED RECENT INVITED TALKS

- University of California at San Diego, "Electricity and Gas Reliability", March 31, 2021
- Danish Technical University (DTU), Lyngby, Denmark, "New Techniques to Analyze Variable Renewable Energy", May 23, 2018
- National Academy of Sciences Annual Meeting Symposium: The Energy Transition, "The Changing Character of the Electric Power Grid: Variable Renewable Power", April 30, 2018
- National Academy of Engineering-American Association of Engineering Societies Convocation of the Professional Engineering Societies, "The Growing Challenge of Integrating Variable and Intermittent Sources of Power", April 23, 2018
- University of Michigan Joint Seminar Series Electrical and Computer Engineering, Industrial and Operations Engineering, and School for Environment and Sustainability, "Variable Renewable Energy", March 15, 2018
- Rice University, "Variable Solar and Wind Electric Power Production", May 10, 2016
- Danish Technical University (DTU), Risø, Denmark, "Characteristics of Wind and Solar Power", March 9, 2016
- Vermont Law School, "Are Renewables a Practical Answer?", July 24, 2015
- Columbia University, "Variable Renewable Electricity", February 13, 2015
- University of California at San Diego, "Prospects for Low-CO₂ Electric Power", August 29, 2014
- Vermont Law School, "Are Renewables a Practical Answer?", June 13, 2014
- Harvard University, "New Findings on Variable Renewable Energy and the Electricity Grid", February 5, 2014
- University of California at Los Angeles, "Energy – What's Next?", March 1, 2013
- Columbia University, "Grid-level electricity storage and markets", May 2, 2012
- University of Texas, Austin, "What the Characteristics of Wind and Solar Electric Power Production Mean for Their Future", March 1, 2012

SELECTED RECENT CONFERENCE PAPERS

- Apt, J., "What has been learned from frequency-domain analysis of wind and solar power", 2019 FISE-IEEE/CIGRE Conference - Living the energy Transition (FISE/CIGRE), Medellin, Colombia, December 5, 2019. Best paper award.
DOI: 10.1109/FISECIGRE48012.2019.8984982
- Lavin, L., J. Apt, and S. Murphy, *Resource Adequacy and Scarcity Pricing Implications of Correlated Generator Failures*, United States Association of Energy Economists, Denver, November 3, 2019.

- Freeman, G.M., J. Apt, and J. Moura, *Natural gas fuel starvation at large power plants in the U.S. and the effect of gas supply arrangements on reliability and resilience*, International Association of Energy Economists North American Conference, Washington DC September 23, 2018.
- Freeman, G.M. and J. Apt, *Are U.S. Federal Reporting Thresholds Adequate to Address an Interdependent Electricity and Natural Gas Grid?* United States Association of Energy Economists, Houston. December 14, 2017.
- Murphy, S. and J. Apt, *Resource adequacy risks to the bulk power system in North America*. Society for Risk Analysis annual meeting, San Diego, California. December 13, 2016.
- Kaack, L., J. Apt, and M.G. Morgan, *The Applicability of Empirical Prediction Intervals to Energy Forecasting*. International Association for Energy Economics 39th International Conference, Bergen, Norway. June 20, 2016.
- Klima, K. and J. Apt, *Geographic Smoothing of Solar PV: Results from Gujarat*. American Meteorological Society Seventh Conference on Weather, Climate, Water and the New Energy Economy, New Orleans. January 11, 2016.
- Apt, J., *What the characteristics of wind power mean for integration into power grids*. Invited Keynote address at The International Colloquium On Large Wind-Power Plants: Interaction, Control and Integration, Leuven, Belgium. July 9, 2015.
- Rose, S. M. Handschy, and J. Apt, *Modeling Extreme Low-Wind Speed Events for Large-Scale Wind Power. Technology, Management, and Policy Consortium*, Lisbon. June 23, 2014.
- Moore, J. and J. Apt, *Energy and Capacity Market Effects of Carbon Policies in Restructured Markets*. United States Association of Energy Economists, New York. June 16, 2014.
- Lueken, R., K. Klima, W.M. Griffin, and J. Apt, *The Climate and Health Effects of a USA Switch from Coal to Gas*. United States Association of Energy Economists, New York. June 17, 2014.
- Apt, J., S. Rose, P. Jaramillo, M.J. Small, *Quantifying the Hurricane Risk to Offshore Wind Power* (invited) American Geophysical Union Fall Meeting, San Francisco, CA. Dec. 12, 2013.
- Rose, S., M. Handschy, J. Apt, *Estimating the Probability of Extreme Low-Wind Periods in the Central U.S*. Society for Risk Analysis Annual Meeting, Baltimore, MD. Dec. 9, 2013.
- Zhou, Y., A Sheller-Wolf, N. Secomandi, S. Smith, and J. Apt (2013) Combining Operations Management and Engineering Models to Effectively Manage Electricity Storage. 18th Annual INFORMS MSOM Conference, Fontainebleau, France.
- Zhou, Y., J. Apt, A Sheller-Wolf, N. Secomandi, and S. Smith (2013) Combining Operations Management and Engineering Models to Effectively Manage Electricity Storage. INFORMS Annual Meeting, Minneapolis.
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- Fertig, E. and J. Apt (2012) Optimal investment strategy in low-carbon energy R&D with uncertain payoff. *United States Association of Energy Economists*, Austin, TX.
- Lueken, R. and J. Apt (2012). How Storage Will Transform Power Emissions and Markets. *United States Association of Energy Economists*, Austin, TX.
- Fertig, E., J. Apt, P. Jaramillo, and W. Katzenstein (2012). *The effect of long-distance interconnection on wind power variability*, in *Western Energy Policy Research Conference*. Boise, Idaho.
- Blanco, C.N., P. Jaramillo, and J. Apt (2012). *Generation Valuation Under High Wind Penetration Scenarios*, in *10th Industry Studies Association Conference*, Pittsburgh.
- Hittinger, E., J.F. Whitacre, and J. Apt (2012). *Energy Storage for Grid Applications: Informing Future Development*, in *10th Annual Industry Studies Association Meeting*. Pittsburgh.
- Apt, J. (2012) Smart Integration of Variable and Intermittent Renewables. *Hawaii International Conference on System Science*, Maui.
- Rose, S., Jaramillo, P., Small, M. J., Grossmann, I., Apt, J. (2011) Quantifying the Hurricane Risk to Offshore Wind Turbines. *Society for Risk Analysis 2011 Annual Meeting*, Charleston, SC.
- Rose, S. and J. Apt, *The Cost of Curtailing Wind Turbines for Frequency Regulation and Ramp-Rate Limitation*, in *29th USAEE/IAEE North American Conference*. 2010: Calgary.
- Katzenstein, W. and J. Apt, *The Cost of Wind Power Variability*, in *29th USAEE/IAEE North American Conference*. 2010: Calgary.
- Hittinger, E., J.F. Whitacre, and J. Apt, *Compensating for Wind Variability Using Co-Located Natural Gas Generation and Energy Storage*, in *29th USAEE/IAEE North American Conference*. 2010: Calgary.
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- Apt, J. *The Character of Electric Power Produced by Wind and Solar Plants (invited talk)*. Indo-US Conference on Climate Change. 2009. Chennai, India.
- Peterson, S., J. Whitacre, and J. Apt. *PHEV Battery Performance in a Vehicle to Grid (V2G) Utilization Scenario: a Technological and Economic Analysis*. 5th Annual Lithium Mobile Power Conference. 2009. Boston.
- Gilmore, E.A., P.J. Adams, J. Apt, and L.B. Lave. *The air quality effects of integrating electrical energy storage into electricity grids*. Society for Risk Analysis 2009 Annual Meeting: Baltimore.
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Apt, J. and L. Lavin *What is happening in Texas will keep happening until we take action* (Op-Ed), The Washington Post, February 18, 2021, <https://www.washingtonpost.com/opinions/2021/02/18/texas-power-grid-failure-weather/>

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Muller, N., A. Jha, and J. Apt *The deadly 90-day rule* (Op-Ed), The Pittsburgh Post-Gazette, November 2, 2017, p. A9. <http://www.post-gazette.com/opinion/Op-Ed/2017/11/02/The-deadly-90-day-rule-will-help-coal-barons-not-coal-miners-And-kill-people/stories/201711020013>

- Apt, J. *Low Pollution at the Lowest Cost*. Federation of American Scientists Op-Eds, February 1, 2016, <http://fas.org/oped/low-pollution-at-the-lowest-cost/>
- Apt, J. *Keeping an economic engine running* (Op-Ed), The Pittsburgh Post-Gazette, April 1, 2014, p. B2.
- Apt, J. *Voices on the Future: Jay Apt on the Electric Grid*. The Wall Street Journal, November 12, 2013, p. R4.
- Apt, J. *Blackouts are a fact of life. Let's deal with them* (Op-Ed), The Wall Street Journal, September 17, 2012, p. R4.
- Apt, J., M.G. Morgan and B. Strauss, *This is your captain: Turn off that cell phone!* (Op-Ed), The Pittsburgh Post-Gazette, May 14, 2012.
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- Apt, J. and M.G. Morgan, *Carbon Culprits*, (Op-Ed) The Pittsburgh Post-Gazette, February 25, 2007, p.H1.
- Apt, J. and L. Lave, *Electricity Traffic Control*, (Op-Ed) The New York Times, August 13, 2005, p. A27.
- Strauss, B., J. Apt, M.G. Morgan, and D. Stancil, *Are Personal Electronics a Threat to Aircraft?* Aviation Week and Space Technology. April 10, 2006. **164**(15): 58.
- Apt, J. and L. Lave, *Blackouts are Inevitable*, (Op-Ed) The Washington Post. August 10, 2004. p. A19.
- Apt, J. and L. Lave, *Let There Be Light*, (Op-Ed) The Pittsburgh Post-Gazette. August 15, 2004, p. J3.
- Apt, J., *Orbit: The Astronauts' View of Home* (Cover Story). National Geographic Magazine, November 1996. **190**(5): pp. 2-27.
- Apt, J., *La Terre vue de l'espace: Si belle mais si fragile* (Cover Story), Le Figaro Magazine, November 30, 1996: pp.67-97.

R E C E N T C O U R S E S T A U G H T

45-966 Catastrophic Risk Analysis and Management (MBA); formerly numbered 45-858
45-875 Government and Business (MBA)
45-995 Energy Business Project (MBA) with Prof. Chris Telmer
47-881 Seminar on Electric Power Restructuring (MBA and PhD students)
47-882 Seminar on Low-Carbon Electric Power (MBA and PhD students)
70-376 Energy Systems (Undergraduate Business Majors)
46-851 Problem Design and Verification (Undergraduate CIT optimization methods)
39-405 Engineering Design: The Creation of Products and Processes (Undergraduate CIT)

P h D S T U D E N T S S U P E R V I S E D

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Adam Newcomer, 2008 (now at NiSource)
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Colleen Horin Lueken, 2012 (now at Fluence)
Emily Fertig, 2013 (now at Google)
Steven Rose, 2013 (now at the Midcontinent ISO)
Jared Moore, 2014 (now at Meridian Energy and Policy Consulting)
Roger Lueken, 2014 (now at The Brattle Group)
Daniel Schnitzer, 2014 (now at EarthSpark International)
Michael Fisher, 2017 (now at Centrica plc)
Jeremy Keen, 2019 (now at the National Renewable Energy Laboratory)
Sinnott Murphy, 2019 (now at the National Renewable Energy Laboratory)
Gerard Freeman, 2019 (now at the Pacific Northwest National Laboratories)
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Co-Advisor

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PhD Committee (at Carnegie Mellon University except as noted)

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Inês Margarida Lima de Azevedo, 2009 (now at Stanford University)
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Kathleen Spees, 2008 (now at The Brattle Group)
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Seth Adam Blumsack, 2006 (now at the Pennsylvania State University)
Dalia Patiño-Echeverri, 2006 (now at Duke University)
Joseph Frank DeCarolis, 2005 (now at North Carolina State University)
Chao Chen, 2005 (now at Worley-Parsons)
Dmitri Perekhodtsev, 2004 (now at LECG Paris)

Sompop Pattanariyankool, 2010 (now at the Energy Ministry, Government of Thailand)
Sharon Wagner, 2011 (now at The University of Maine)
Vanessa Schweitzer, 2011 (now at the National Center for Atmospheric Research)
Kyle Meisterling, 2011 (now at UC Santa Barbara)
Yangfang (Helen) Zhou, 2012 (now at Singapore Management University)
Kyle Siler-Evans, 2012 (now at RAND)
Nicholas Siefert, 2013 (now at the US Department of Energy)
Hossein Safaei, 2014 (Harvard University; now at IHS Energy)
Tuhfe Göcmen Bozkurt, 2016 (Danish Technical University; now at DTU Risø)
Lynn Kaack, 2019 (now at ETH Zurich)
Siddharth Singh, 2019 (now at University College, London)
Cristiana Lopes Lara, 2019 (now at Amazon)
Adam F. Abdin, 2019 (Université Paris-Saclay; now at CentraleSupélec)
Marko Jereminov, 2019 (now at Pearl Street Technologies)
Naeem Turner Bandele