Bibliography for NEWEEP Webinar: Wind Power's Impact on Grid Reliability, Backup Supply, and Fossil Fuel Use in New England

http://www.windpoweringamerica.gov/filter_detail.asp?itemid=2837&pga=ne_forum

Journal Articles and Books

Peer Reviewed

- Ackermann, T., Ancell, G., Borup, L., Eriksen, P., Ernst, B., Groome, F., Lange, M., et al. (2009). Where the wind blows. IEEE Power and Energy Magazine, 7(6), 65-75. doi:10.1109/MPE.2009.934658

- Corbus, D., Lew, D., Jordan, G., Winters, W., Van Hull, F., Manobianco, J., & Zavadil, B. (2009). Up with wind. IEEE Power and Energy Magazine, 7(6), 36-46. doi:10.1109/MPE.2009.934260

- DeMeo, E. A., Grant, W., Milligan, M.R., and Schuerger, M. J. (2005). Wind Plant Integration. IEEE Power & Energy Magazine, 3(6), 33-46.

- DeMeo, E. A., Jordan, G. A., Kalich, C., King, J., Milligan, M.R., Murley, C., Oakleaf, B., and Schuerger, M. J. (2007). Accommodating Wind's Natural Behavior. IEEE Power & Energy Magazine. 5(6), 59-67.

- Gramlich, R. (2009). IEEE Xplore - Wind energy & the grid [In my View]. IEEE Power and Energy Magazine, 7(6), 128, 125-126. doi:10.1109/MPE.2009.934263

- Grant, W., Edelson, D., Dumas, J., Zack, J., Ahlstrom, M., Kehler, J., Storck, P., et al. (2009). Change in the air. IEEE Power and Energy Magazine, 7(6), 47-58. doi:10.1109/MPE.2009.934261

- Katzenstein, W., & Apt, J. (2009). Air Emissions Due To Wind And Solar Power. Environmental Science & Technology, 43(2), 253-258. doi:10.1021/es801437t

- Lawhorn, J., Osborn, D., Caspary, J., Nickell, B., Larson, D., Lasher, W., & Rahman, M. (2009). The view from the top. IEEE Power and Energy Magazine, 7(6), 76-88. doi:10.1109/MPE.2009.934264

- Milligan, M., Porter, K., DeMeo, E., Denholm, P., Holttinen, H., Kirby, B., Miller, N., et al. (2009). Wind power myths debunked. IEEE Power and Energy Magazine, 7(6), 89-99. doi:10.1109/MPE.2009.934268

- Mills, Wiser, R., Milligan, M., & O'Malley, M. (2009). Comment on "Air Emissions Due to Wind and Solar Power". Environmental Science & Technology, 43(15), 6106-6107. doi:10.1021/es900831b

- Olken, M. (2009). Power to wind [From the Editor. IEEE Power and Energy Magazine, 7(6), 4-4, 6. doi:10.1109/MPE.2009.934549

- Piwko, R., Camm, E., Ellis, A., Muljadi, E., Zavadil, R., Walling, R., O'Malley, M., et al. (2009). A whirl of activity. IEEE Power and Energy Magazine, 7(6), 26-35. doi:10.1109/MPE.2009.934269

- Smith, J., & Parsons, B. (2009). It's in the air [Guest Editorial. IEEE Power and Energy Magazine, 7(6), 14-24. doi:10.1109/MPE.2009.934262

- Smith, J., Milligan, M., DeMeo, E., & Pasrons, B. (2007). Utility Wind Integration and Operating Impact State of the Art. IEEE Transactions on Power Systems, 22(3), 900-908.

- Various. (2009). IEEE Power and Energy Magazine. IEEE Power and Energy Magazine, 7(6), 1-128. doi:10.1109/MPAE.2009.5233729

Unknown Review Process

- Bryce, R. (2010, August 23). Opinion: Wind Power Won't Cool Down the Planet. wsj.com. Retrieved from http://online.wsj.com/article/SB10001424052748703792704575366700528078676.html?KEYWORDS=robert+bryce

Reports

- AWEA Avoided Emissions Report (PDF 87 KB)

- Eastern Wind Integration and Transmission Study (EWITS) http://wind.nrel.gov/public/EWITS/

- Grid Impacts of Wind Power: A Summary of Recent Studies in the United States. Michael Milligan, Brian Parsons, Bob Zavadil, Daniel Brooks, Brendan Kirby, Ken Dragoon, Jim Caldwell. Presented at the European Wind Energy Conference, Madrid, Spain. June 2003. (PDF 716 KB)

- International Energy Agency, Task 25. Hannele Holttinen, Bettina Lemström, VTT, Finland; Peter Meibom, Risø National Laboratories, Denmark; Antje Orths, Energinet.dk, Denmark; Frans van Hulle, EWEA; Cornel Ensslin, ISET; Albrecht Tiedemann, dena, Germany; Lutz Hofmann, Wilhelm Winter, E.ON Netz, Germany; Aidan Tuohy, Mark O'Malley, UCD; Paul Smith, Eirgrid, Ireland; Jan Pierik, ECN, Netherlands; John Olav Tande, SINTEF, Norway; Ana Estanqueiro, INETI; João Ricardo, REN, Portugal; Emilio Gomez, University Castilla La Mancha, Spain; Lennart Söder, KTH, Sweden; Goran Strbac, Anser Shakoor, DG&SEE, UK; J. Charles Smith, UWIG, USA; Brian Parsons, Michael Milligan, Yih-huei Wan, NREL, USA: International Energy Agency, Task 25. Design and operation of power systems with large amounts of wind power State of the art report. (PDF 3.2 MB)

- Northern Tier Transmission Group (ACE Diversity Interchange and Joint Initiative) http://nttg.biz/site/index.php?option=com_content&task=blogsection&id=5&Itemid=26

- Joint Coordinated System Plan (JCSP) www.jcspstudy.org

- B. Kirby and M. Milligan: Facilitating Wind Development: The Importance of Electric Industry Structure. Electricity Journal. 2008. Pre-print/technical paper.

- B. Kirby and M. Milligan, An Examination of Capacity and Ramping Impacts of Wind Energy on Power Systems, Electricity Journal, Vol 21, #7. Aug-Sep 2008. Pre-print/technical paper. Illustrates how hourly block schedules result in inefficient capacity requirements in both the host and receiving balancing area. This can be mitigated by faster schedules which reduce capacity requirements on the host.

- B. Kirby and M. Milligan (2006) Properties for Cost-causation-based Tariffs for Wind Ancillary Service Impacts. Presented at Windpower 2006, Pittsburg, PA, June 2006.

- M. Milligan, B. Kirby An Analysis of Sub-Hourly Ramping Impacts of Wind Energy and Balancing Area Size, Presented at Windpower 2008, Houston, TX. 2008. Milligan, M.; Kirby, B. (2007). Impact of Balancing Areas Size, Obligation Sharing, and Ramping Capability on Wind Integration: Preprint. 43 pp.; NREL Report No. CP-500-41809. Presented at WindPower 2007, Los Angeles, CA.

- M. Milligan, K. Porter, Determining the Capacity Value of Wind: An Updated Survey of Methods and Implementation. Presented at Windpower 2008, Houston, TX. 2008.

- Milligan, M., & Kirby, B. (2010). Market Characteristics for Efficient Integration of Variable Generation in the Western Interconnection (PDF 1.1 MB). Golden, Colorado: NREL. pp. 1 - 51.

- National Conference of State Legislatures. *Integrating Wind Power into the Electric Grid: Perspectives for Policymakers* NCSL, 2009.

- Nebraska Power Association Wind Integration Study www.nepower.org/wind_study.asp

- NREL Renewable System Integration publication Web site http://www.nrel.gov/wind/systemsintegration/publications.html

- C. Potter, et al (2008) Creating the Dataset for the Western Wind and Solar Integration Study. Presented at the 7th International Workshop on Large Scale Integration of Wind Power and on Transmission Networks for Offshore Wind Farms, Madrid, Spain, May 2008.

- Ten Frequently Asked Questions and Answers about Wind Energy Grid Integration. (PDF 2.7 MB)

- Utility Wind Integration State of the Art (PDF 282 KB). Charlie Smith, Michael Milligan, Ed DeMeo, Brian Parsons. IEEE Transactions on Power Systems. Aug, 2007.

- Western Renewable Energy Zones, a joint initiative of the Western Governors' Association and the U.S. Department of Energy. http://www.westgov.org/wga/initiatives/wrez/

- Western Wind and Solar Integration Study (WWSIS) http://westconnect.com/planning_nrel.php

- Wind Task Force Report to the Clean and Diverse Energy Advisory Committee. Western Interstate Energy Board, Western Governors Association. 2006. http://www.westgov.org/wga/initiatives/cdeac/Wind-full.pdf

Conference Papers

- Milligan, M., Ela, E., Lew, D., Corbus, D., & Wan, Y. (2010). Advancing Wind Integration Study Methodologies: Implications of Higher Levels of Wind (PDF 2.0 MB). (pp. 1-50). Presented at the WindPower 2010, Dallas, Texas: NREL.

- Milligan, M., & Kirby, B. (2010a). Utilizing Load Response for Wind and Solar Integration and Power System Reliability (PDF 748 KB). (Vol. 550, pp. 1-21). Presented at the WindPower 2010, Dallas, Texas: NREL.

- Milligan, M., Kirby, B., & Beuning, S. (2010). Combining Balancing Areas' Variability: Impacts on Wind Integration in the Western Interconnection (PDF 881 KB). (Vol. 550, pp. 1 - 29). Presented at the WindPower 201, Dallas, Texas: NREL.

Integration Studies

- Minnesota Wind Integration Study Final Report - Volume I (PDF 2.8 MB).

- Wind Power Phase 2 Report – System Performance Evaluation (PDF 2.0 MB). NYISO/NYSERDA.

- Northwest Wind Integration Action Plan - published by the Northwest Power and Conservation Council (PDF 794 KB). March 2007.

- Intermittency Analysis Project: Appendix B Impact Of Intermittent Generation On Operation Of California Power Grid (PDF 3.8 MB).

- Wind Integration Study for Public Service of Colorado, Detailed Analysis of 20% Wind Penetration (PDF 1.9 MB).

White Papers, Essays & Other

- Blohm, R. (2010, August). Green Blackouts? Increasing Renewable Generation Threatens Reliability. Public Utilities Fortnightly | Green Blackouts? Retrieved September 7, 2010, from http://www.fortnightly.com/exclusive.cfm?o_id=416

CEPOS Report and Reactions

- CEPOS. (2009). Wind Energy: The Case of Denmark. Copenhagen, Denmark: CEPOS Center for Politiske Studier.

- Danish Wind Industry. (2010, February). Researchers correct the false allegations on Danish wind energy.

- Lund, H., Hvelplund, F., Ostergaard, P. A., Moller, B., Mathiesen, B. V., Andersen, A., Morthorst, P. E., et al. (2010). Danish Wind Power Export and Cost. Denmark: Aalborg University.

Utility Wind Integration Group and Wind Integration Library

http://www.uwig.org

"Best Practices in Grid Integration of Variable Wind Power: Summary of Recent US Case Study Results and Mitigation Measures (PDF 295 KB)," presented at the EWEC '07 Conference in Milan, Italy in May 2007.

"State of the Art of Design and Operation of Power Systems with Large Amounts of Wind Power, Summary of IEA Wind Collaboration (PDF 106 KB)," presented at the EWEC '07 Conference in Milan, Italy in May 2007.

"Grid Impacts of Wind Power Variability: Recent Assessments from a Variety of Utilities in the United States," presented at the 2006 European Wind Energy Conference (EWEC)

- Paper (PDF 1.2 MB)
- Presentation (PDF 647 KB)

"Wind Power Impacts on Electric Power System Operating Costs, Summary and Perspective on Work Done to Date (PDF 66 KB)." Presented at the Global WindPower Conference and Exhibition, March 29-31, 2004.

"Grid Impacts of Wind Power: A Summary of Recent Studies in the United States (PDF 716 KB)." Presented at the European Wind Energy Conference (EWEC) in June 2003.

Summaries of International Studies and Experience

IEA Task 25 - Design & Operation of Power Systems with Large Amounts of Wind Power - Final Report (PDF 4.1 MB). July 2009.

IEA Task 25 - Design & Operation of Power Systems with Large Amounts of Wind Power State-of-the-Art Report (PDF 3.2 MB). 2007.

International Energy Agency Report on Management Options and Strategies for Variability of Wind Power and Other Renewables (PDF 736 KB). June 2005.

NERC Integration of Variable Generation Task Force Report

Executive Summary (PDF 428 KB)

Report (PDF 1.7 MB)

NERC IVGTF Special Reports

Variable Generation Power Forecasting for Operations (PDF 935 KB)

Standard Models for Variable Generation (PDF 2.1 MB)

Flexibility Requirements and Potential Metrics for Variable Generation: Implications for System Planning Studies (PDF 2.3 MB)

Potential Reliability Impacts of Emerging Flexible Resources (PDF 1.0 MB)

U.S. Regional and State Studies

Arizona Public Service Wind Integration Cost Impact Study, September 2007

- Executive Summary only (PDF 1.2 MB)
- Full Report (PDF 3.6 MB)

Avista Corporation Wind Integration Study (PDF 1.1 MB). March 2007.

California ISO Study of Integration of Renewable Resources at a 20% RPS (PDF 4.1 MB)

California ISO Final Report, *Integration of Renewable Resources* (PDF 21.9 MB). November 2007

Download the California Energy Commission Public Interest Energy Research Program Intermittency Analysis Project Final Report, July 2007

- Final Report
- Appendix A - Intermittency Impacts of Wind and Solar Resources on Transmission Reliability
- Appendix B -Impact of Intermittent Generation on Operation of California Power Grid

Xcel/Public Service Company of Colorado Wind Integration Study

Eastern Wind Integration and Transmission Study, January 2010

- Executive Summary and Project Overview
- Full Report
- Project Web Site

ISO New England Report *Technical Requirements for Wind Generation Interconnection and Integration*

Download the Minnesota Public Utilities Commission Statewide Wind Integration Study, November 2006

- 1.pdf Minnesota Wind Integration Study Final Report - Volume I
- 2.pdf Minnesota Wind Integration Study Final Report - *Volume II Characterizing the Minnesota Wind Resource*
- Minnesota Wind Integration Study Presentation

Download the Xcel Energy/Minnesota Department of Commerce Wind Integration Study, September 2004

- Final Report
- Wind Resource Characterization

Download the Minnesota Department of Commerce/Great River Energy Dispersed Renewable Generation Study

- Volume I: Dispersed Renewable Generation Study Phase I Report
- Volume II: Dispersed Renewable Generation Study Phase I Report, Appendix A
- Volume III: Dispersed Renewable Generation Study Phase I Report, Appendices B-I
- Dispersed Renewable Generation Study Presentation-Webinar

Nebraska Power Association Statewide Wind Integration Study

Download the Northwestern Energy Montana Wind Power Variability Study

NYISO 2010 Wind Generation Study

Download the NYISO/NYSERDA New York State Wind Study, 2003

- _1_feb_02_04.pdf Wind Power Phase 1 Report - Preliminary Overall Reliability Assessment, February 2004
- Overview of Wind Energy Generation Forecasting, December 2003
- Wind Turbine Electrical Characteristics, November 2003
- January 14th Technical Conference Presentation, January 2004
- Wind Power Phase 2 Report - System Performance Evaluation, March 2005
- Phase 2 Report Appendices, March 2005

Northwest Wind Integration Action Plan - published by the Northwest Power and Conservation Council, March 2007

SPP Wind Integration Study, January 2010

- Report
- Appendices

Download the Texas Study *Analysis of Wind Generation Impact on ERCOT Ancillary Services Requirements*; GE Energy, March 2008

- Executive Summary
- Full Report
- Informational Filing for PUC

Download the We Energies Wind Impacts Project final report, March 2003

Western Wind and Solar Integration Study, May 2010

- Executive Summary
- Full Report
- Report on Development of Regional Wind Resource and Wind Plant Output Datasets
- Project Web Site

Canadian Studies

Alberta Electric System Operator Wind Integration Study, November 2005

- Phase 1 Report - Incremental Impact on System Operations with Increased Wind Power Penetration
- Phase 2 Report - Assessing the Impacts of Increased Wind Power on AIES Operations and Mitigation Measures

Alberta Electric System Operator Wind Power Forecasting Pilot Project

- Letter of Notice - Wind Forecasting Work Group Report
- Work Group Report
- ORTECH Power Report
- Forecaster Comments
- Forecaster Report - AWS Truewind
- Forecaster Report - Energy & Meteo Systems
- Forecaster Report - WEPROG

Additional information on this project can be found on the AESO web site

Maritime Provinces Wind Power Integration Study, April 2007

2008.pdf Large Scale Wind Power in New Brunswick, August 2008

Analysis of the Impacts of Large-Scale Wind Generation on the Ontario Electricity System, April 2005

Ontario Wind Integration Study, October 2006

European Studies

TradeWind Report: Integrating Wind: Developing Europe's Power Market for the Large-Scale Integration of Wind Power

European Wind Energy Association Report on Large Scale Integration of Wind Energy in the European Power Supply - December 2005

- Executive Summary
- Recommendations
- Full Report

Bart Ummels PhD Thesis on Wind Integration in the Dutch Power System

Integration into the National Grid of Onshore and Offshore Wind Energy Generated in Germany, February 2005

- Press Release on the Study
- Summary of Results
- Energy Management Planning for the Integration of Wind Energy into the Grid in Germany, Onshore and Offshore by 2020

Irish All-Island Grid Study conducted jointly by the Republic of Ireland Energy Department and the Department of Enterprise, Trade and Investment (Northern Ireland), January 2008

- Study Overview
- Workstream 1
- Workstream 2A
- Workstream 2B
- Workstream 3
- Workstream 4

EirGrid Facilitation of Renewables Study

- Final Study
- Executive Overview and Agenda
- Study Web Site

Impact of Intermittency: How Wind Variability Could Change the Shape of the British and Irish Electricity Markets, July 2009

The Impact of Large Scale Wind Power Production on the Nordic Electricity System - Doctoral Dissertation by Hannele Holttinen of VTT, December 2004- Also available on the publications page of VTT

The Costs and Impacts of Intermittency: An Assessment of the Evidence on the Costs and Impacts of Intermittent Generation on the British Electricity Network, March 2006

The Carbon Trust and DTI Renewables Network Impact Study - Annex 4: Intermittency Literature Survey and Roadmap, November 2003