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### EDUCATION

**Stanford University**

Ph.D. in Management Science and Engineering (2002)

M.S. in Management Science and Engineering (1998)

**University of California, Berkeley**

M.S. in Mechanical Engineering (1990)

B.S. in Mechanical Engineering (1988)

### PROFESSIONAL POSITIONS

**University of Maryland, College Park,** Center for Global Sustainability, School of Public Policy, 2019 - Present, *Research Director*

**Joint Global Change Research Institute,** **Pacific Northwest National Laboratory,** 2010–2019, *Senior Scientist, Manager of the Integrated Human Systems Science Group*

**University of Maryland, College Park**, School of Public Policy, 2016–present, *Research Professor*

**Joint Global Change Research Institute, Pacific Northwest National Laboratory,** 2003–2010, *Senior Research Economist*.

**Lawrence Livermore National Laboratory**, 2002–2003, *Systems and Decision Scientist: Applied Statistics and Economics Group*

**Stanford University,** 1997–2002, *Research Assistant*

**Pacific Gas & Electric Company**, 1993–1996, *Senior Project Manager: Customer Energy-Efficiency, Policy and Evaluation Group*.

**RCG/Hagler, Bailly, Inc.**, 1991–1993, *Associate*.

### APPOINTMENTS

**Intergovernmental Panel on Climate Change: Sixth Assessment Report:** Coordinating Lead Author, Working Group III (2017 - present)

**National Climate Assessment:** Lead Chapter Author (2016–2018)

**Energy Policy (Journal):** International Advisory Board (2014–present)

**National Climate Assessment:** Leader for Mitigation Indicators Working Group (2013–2014)

**Carbon Cycle Science Steering Group:** Member (2013–2015)

**Intergovernmental Panel on Climate Change: Fifth Assessment Report:** Coordinating Lead Author, Working Group III (2011–2014)

**Intergovernmental Panel on Climate Change: Fifth Assessment Report:** Lead Author and Topic Coordinator, Synthesis Report (2012–2014)

**American Statistical Association: Committee on Energy Statistics:** Member (2010–2015)

**Climatic Change (Journal):** Associate Deputy Editor (2010–2014)

**Stanford Energy Modeling Forum Study 24, Technology Strategies for Achieving Climate Policy Objectives in the U.S.:** Co-Coordinator of study and co-editor of special issue of *Energy Journal* (2010–2014).

**Intergovernmental Panel on Climate Change: Special Report on Renewable Energy Sources:** Lead Author (2009–2012)

**Stanford Energy Modeling Forum Study 22, Transition Scenarios:** Co-Coordinator of study and co-editor of special issue of *Energy Economics* (2007–2009).

**National Academies’ Study Panel on America’s Climate Choices:** Member of panel on Limiting the Magnitude of Future Climate Change and Working Group on Scenarios (2008–2009).

**U.S. Climate Change Science Program Scenarios (CCSP Product 2.1a):** Coordinator (2005–2007).

**U.S. Department of Energy Benefits Forecasts, External Expert Peer Review Panel:** Member of Panel (2006).

**Intergovernmental Panel on Climate Change Fourth Assessment Report:** Contributing Author, Working Group III (2004–2007).

### JOURNAL ARTICLES

Rogelj, J., Huppmann, D., Krey, V., Riahi, K., Clarke, L., Gidden, M., Nicholls, Z. and Meinshausen, M., 2019. “A new scenario logic for the Paris Agreement long-term temperature goal.” *Nature*, 573.

Clarke L.E., J. Eom, E.L. Hodson, R.L. Horowitz, G.P. Kyle, R.P. Link, and B. Mignone, et al. 2018. "Effects of long-term climate change on global building energy expenditures." *Energy Economics* 72.

Cui Y., K.V. Calvin, L.E. Clarke, M.I. Hejazi, S.H. Kim, and P.L. Patel. 2018. "Regional responses to future, demand-driven water scarcity." *Environmental Research Letters* 13, no. 9.

Feijoo F., G.C. Iyer, C. Avraam, S.A. Siddiqui, L.E. Clarke, S. Sankaranarayanan, and M.T. Binsted, et al. 2018. "The future of natural gas infrastructure development in the United states." *Applied Energy* 228.

Graham, N.T., Davies, E.G., Hejazi, M.I., Calvin, K., Kim, S.H., Helinski, L., Miralles‐Wilhelm, F.R., Clarke, L., Kyle, P., Patel, P. and Wise, M.A., 2018. “Water Sector Assumptions for the Shared Socioeconomic Pathways in an Integrated Modeling Framework.” *Water Resources Research*, 54(9), pp.6423-6440.

Iyer G.C., K.V. Calvin, L.E. Clarke, J.A. Edmonds, N. Hultman, C.A. Hartin, and H.C. McJeon, et al. 2018. "Implications of sustainable development considerations for comparability across nationally determined contributions." *Nature Climate Change* 8.

Lamontagne, J.R., Reed, P.M., Link, R., Calvin, K.V., Clarke, L.E. and Edmonds, J.A., 2018. “Large Ensemble Analytic Framework for Consequence‐Driven Discovery of Climate Change Scenarios.” *Earth's Future*, 6(3), pp.488-504.

Paladugula A., N. Kholod, V. Chaturvedi, P. Ghosh, S. Pal, L.E. Clarke, and M. Evans, et al. 2018. "A Multi-Model Assessment of Energy and Emissions for India’s Transport Sector through 2050." *Energy Policy* 116.

Srinivasan S., N. Kholod, V. Chaturvedi, P. Ghosh, R. Mathur, L.E. Clarke, and M. Evans, et al. 2018. "Water for Electricity in India: A Multi-Model Study of Future Challenges and Linkages to Climate Change Mitigation." Applied Energy 210.

Zhou S., Y. Wang, Y. Zhou, L.E. Clarke, and J.A. Edmonds. 2018. "Roles of wind and solar energy in China's power sector: Implications of intermittency constraints." *Applied Energy* 213.

Calvin KV, B Bond-Lamberty, L Clarke, JA Edmonds, J Eom, CA Hartin, S Kim, GP Kyle, R Link, H McJeon, P Patel, SJ Smith, S Waldhoff, MA Wise. 2017. "The SSP4: A World of Deepening Inequality".  Global Environmental Change 42.

Calvin, K., Wise, M., Kyle, P., Clarke, L. and Edmonds, J., 2017. “A hindcast experiment using the GCAM 3.0 agriculture and land-use module". *Climate Change Economics*, 8(01), p.1750005.

Davidson C.L., R.T. Dahowski, H.C. McJeon, L.E. Clarke, G.C. Iyer, and M. Muratori. 2017. "The value of CCS under current policy scenarios: NDCs and beyond." *Energy Procedia* 114.

Dahowski R.T., C.L. Davidson, S. Yu, J.D. Horing, N. Wei, L.E. Clarke, and S.R. Bender. 2017. "The impact of CCS readiness on the evolution of China’s electric power sector." *Energy Procedia* 114.

Iyer G.C., C.M. Ledna, L.E. Clarke, J.A. Edmonds, H.C. McJeon, G.P. Kyle, and J. Williams. 2017. "Measuring Progress from Nationally Determined Contributions to Mid-Century Strategies." *Nature Climate Change* 7.

Luo W., M.T. Steptoe, Z. Chang, R.P. Link, L.E. Clarke, and R. Maciejewski. 2017. "Impact of Spatial Scales on the Intercomparison of Climate Scenarios." *IEEE Computer Graphics and Applications* 37, no. 5:40-49.

Muratori, M, BK Mignone, H Kheshgi, L Clarke, H McJeon, J Edmonds. 2017. "Carbon Capture and Storage across Fuels and Sectors in Energy System Transformation Pathways". Proceedings of the National Academy of Sciences of the United States of America 57():34-41.

Muratori, M., Ledna, C., McJeon, H., Kyle, P., Patel, P., Kim, S.H., Wise, M., Kheshgi, H.S., Clarke, L.E. and Edmonds, J., 2017. “Cost of power or power of cost: A U.S. modeling perspective.” *Renewable and Sustainable Energy Reviews*, 77, pp.861-874.

Turner S., M.I. Hejazi, S.H. Kim, L.E. Clarke, and J.A. Edmonds. 2017. "Climate impacts on hydropower and consequences for global electricity supply investment needs." *Energy* 141.

Xunzhang, P., Wenying, C., Clarke, L.E., Lining, W. and Guannan, L., 2017. “China's energy system transformation towards the 2° C goal: Implications of different effort-sharing principles”. *Energy Policy*, 103, pp.116-126.

Calvin, KV, M Wise, P. Luckow, GP Kyle, L Clarke, J Edmonds. 2016. “Implications of uncertain future fossil energy resources on bioenergy use and terrestrial carbon emissions”, Climatic Change 136(1):57-68.

Aldy, J, W Pizer, M Tavoni, L Reis, K Akimoto, GJ Blanford, C Carraro, L Clarke, J Edmonds, G Iyer, H McJeon, R Richels, S Rose, F Sano. 2016. "Economic Tools to Promote Transparency and Comparability in the Paris Agreement". Nature Climate Change 6():1000 - 1006.

Gao, J , A Zhang, SK Lam, X Zhang, AM Thomson, E Lin, K Jiang, L Clarke, J Edmonds, GP Kyle, S Yu, Y Zhou, S Zhou. 2016. "An integrated assessment of the potential of agricultural and forestry residues for energy production in China". Global Change Biology Bioenergy 8(5):880-893.

Kim, S, M Hejazi, L Liu, K Calvin, L Clarke, J Edmonds, GP Kyle, P Patel, M Wise, E Davies. 2016. "Balancing Global Water Availability and Use at Basin Scale in an Integrated Assessment Model" Climatic Change 136(2):217-231.

Hallegatte, S, J Rogelj, M Allen, L Clarke, O Edenhofer, C Field, P Friedlingstein, L van Kesteren, R Knutti, K Mach, M Mastrandrea, A Michel, J Minx, M Oppenheimer, GK Plattner, K Riahi, M Schaeffer, T Stocker, D Van Vuuren. 2016. "Mapping the climate change challenge". Nature Climate Change 6(7):663–668.

Iyer, G, L Clarke, J Edmonds, N Hultman. 2016. "Do national-level policies to promote low-carbon technology deployment pay off for the investor countries?". Energy Policy 98():400–411.

D van Vuuren, H. van Soest, K Riahi, L Clarke, V Krey, E Kriegler, J Rogelj, M Schaeffer, M Tavoni. 2016. "Carbon budgets and energy transition pathways". Environmental Research Letters 11(7): Article No. 075002.

van der Zwaan, B, T Kober, S. Calderon, L Clarke, K Daenzer, A Kitous, M Labriet, A Lucena, C Octaviano, N Di Sbroiavacca. 2016. "Energy technology roll-out for climate change mitigation: A multi-model study for Latin America".  Energy Economics 56(May 2016):526–542.

Clarke, L, J McFarland, C Octaviano, B van Ruijven, R Beach, K Daenzer, S Hernandez, A Lucena, A Kitous, M Labriet, AM Loboguerrero, A Mundra, B van der Zwaan. 2016. "Long-Term Abatement Potential and Current Policy Trajectories in Latin American Countries". Energy Economics 56():513–525.

Wang L., PL Patel, S Yu, B Liu, JD McLeod, and LE Clarke. 2016. “Win-Win strategies to promote air pollutant control policies and non-fossil energy target regulation in China.” Applied Energy 163:244–253.

Arent D, J Logan, J Macknick, W Boyd, K Medlock, F O'Sullivan, JA Edmonds, LE Clarke, H Huntington, G Heath, PM Statwick, and M Bazilian. 2015. “A review of water and greenhouse gas impacts of unconventional natural gas development in the United States.” MRS Energy and Sustainability 2:Article No. E4.

Calvin KV, S Rose, MA Wise, HC McJeon, LE Clarke, and JA Edmonds. 2015. “Global Climate, Energy, and Economic Implications of International Energy Offsets Programs.” Climatic Change 133(4):583–596.

Chaturvedi V., M. Hejazi, J. Edmonds, L. Clarke, G. Kyle, E. Davies, and M. Wise. 2015. “Climate Mitigation Policy Implications for Global Irrigation Water Demand.” Mitigation and Adaptation Strategies for Global Change 20(3):389–407.

Fawcett A, GC Iyer, LE Clarke, JA Edmonds, N Hultman, HC McJeon, J Rogelj, R Schuler, J Alsalam, GR Asrar, J Creason, M Jeong, J McFarland, A Mundra, and W Shi. 2015. “Can Paris pledges avert severe climate change?” Science 350(6265):1168–1169.

Iyer GC, N Hultman, J Eom, HC McJeon, PL Patel, and LE Clarke. 2015. “Diffusion of low-carbon technologies and the feasibility of long-term climate targets.” Technological Forecasting and Social Change 90(Part A):103–118.

Iyer GC, LE Clarke, JA Edmonds, BP Flannery, N Hultman, HC McJeon, and D Victor. 2015. “Improved Representation of Investment Decisions in Assessments of CO2 Mitigation”. Nature Climate Change 5(5):436–440.

Iyer GC, LE Clarke, JA Edmonds, N Hultman, and HC McJeon. 2015. “Long-term payoffs of near-term low-carbon deployment policies.” Energy Policy 86:493–505.

Iyer GC, JA Edmonds, AA Fawcett, N Hultman, J Alsalam, GR Asrar, KV Calvin, LE Clarke, J Creason, M Jeong, J McFarland, A Mundra, PL Patel, W Shi, and HC McJeon. 2015. “The contribution of Paris to limit global warming to 2 °C.” Environmental Research Letters 10(12): Article No. 125002.

Kraucunas IP, LE Clarke, JA Dirks, JE Hathaway, MI Hejazi, KA Hibbard, M Huang, C Jin, MCW Kintner-Meyer, K Kleese van Dam, LYR Leung, H Li, RH Moss, MJ Peterson, JS Rice, MJ Scott, AM Thomson, N Voisin, and TO West. 2015. “Investigating the Nexus of Climate, Energy, Water, and Land at Decision-Relevant Scales: The Platform for Regional Integrated Modeling and Analysis (PRIMA).” Climatic Change 129(3–4):573–588.

Liu L, MI Hejazi, PL Patel, GP Kyle, E Davies, Y Zhou, LE Clarke, and JA Edmonds. 2015. “Water demands for electricity generation in the U.S.: Modeling different scenarios for the water–energy nexus.” Technological Forecasting and Social Change 94:318–334.

McFarland J, Y Zhou, LE Clarke, P Sullivan, J Colman, W Jaglom, M Colley, PL Patel, J Eom, SH Kim, GP Kyle, P Schultz, B Venkatesh, J Haydel, C Mack, and J Creason. 2015. “Impacts of rising air temperatures and emissions mitigation on electricity demand and supply in the United States: a multi-model comparison.” Climatic Change 131(1):111–125.

McFarland J, Y Zhou, LE Clarke, P Sullivan, J Colman, W Jaglom, M Colley, PL Patel, J Eom, SH Kim, GP Kyle, P Schultz, B Venkatesh, J Haydel, C Mack, and J Creason. 2015. “Erratum to: Impacts of rising air temperatures and emissions mitigation on electricity demand and supply in the United States: a multi-model comparison.” Climatic Change 132(4):739.

Smith SJ, LE Clarke, JA Edmonds, J Kejun, E Kriegler, T Masui, K Riahi, PR Shukla, M Tavoni, D Van Vuuren, and J Weyant. 2015. “Long History of IAM Comparisons.” Nature Climate Change 5(5):391.

Yin X, W Chen, J Eom, LE Clarke, SH Kim, PL Patel, S Yu, and GP Kyle. 2015. “China’s transportation energy consumption and CO2 emissions from a global perspective.” Energy Policy 82:233–248.

Zhou Y, MI Hejazi, SJ Smith, JA Edmonds, H Li, LE Clarke, KV Calvin, and AM Thomson. 2015. “A Comprehensive View of Global Potential for Hydro-generated Electricity.” Energy and Environmental Science 8(9):2622–2633.

Calvin K., M. Wise, L. Clarke, J. Edmonds, A. Jones, and A. Thomson. 2014. “Near-term limits to mitigation: challenges arising from contrary mitigation effects from indirect land-use change and sulfur emissions.” *Energy Economics* 42:233–239.

Calvin K., M. Wise, G. Kyle, P. Patel, L. Clarke, and J. Edmonds. 2014. “Trade-offs of different land and bioenergy policies on the path to achieving climate targets.” *Climatic Change*, 123(3-4), pp.691-704

Clarke LE, A Fawcett, J Weyant, J McFarland, V Chaturvedi, and Y Zhou. 2014. “Technology and U.S. Emissions Reductions Goals: Results of the EMF 24 Modeling Exercise.” The Energy Journal 35(Special Issue):2.

Chaturvedi V, L. Clarke, J. Edmonds, K. Calvin, and G. Kyle. 2014. “Capital Investment Requirements for Greenhouse Gas Emissions Mitigation in Power Generation on Decade to Century Time Scales and Global to Regional Spatial Scales.” *Energy* 46:267–278.

Chaturvedi V, J Eom, LE Clarke, and PR Shukla. 2014. “Long term building energy demand for India: Disaggregating end use energy services in an integrated assessment modeling framework.” *Energy Policy* 64:226–242.

Fawcett A, J. Weyant, L. Clarke, and S. Rausch. 2014. “Overview of EMF 24 Policy Scenarios.” *The Energy Journal* 35(SI1):33–60.

Hejazi, M., J. Edmonds, L. Clarke, G. P. Kyle, E. Davies, V. Chaturvedi, M. Wise, P. Patel, J. Eom, K. Calvin, R. Moss, and S. Kim. 2014. “Long-term global water projections using six socioeconomic scenarios in an integrated assessment modeling framework.” *Technological Forecasting and Social Change* 81:205–226.

Hejazi, M., J. Edmonds, L. Clarke, G. Kyle, E Davies, V Chaturvedi, M. Wise, P. Patel, J. Eom, and K. Calvin. 2014. “Integrated assessment of global water scarcity over the 21st century: 1- Global water supply and demand under extreme radiative forcing.” Hydrology and Earth System Sciences 18:2859–2883.

Kraucunas, I., L. Clarke, J. Dirks, J. Hathaway, M. Hejazi, K. Hibbard, M. Huang, C. Jin, M. Kintner-Meyer, K. Kleese van Dam, L. Leung, H. Li, R. Moss, M. Peterson, J. Rice, M. Scott, A. Thomson, N. Voisin, and T. West. 2014. “Investigating the Nexus of Climate, Energy, Water, and Land at Decision-Relevant Scales: The Platform for Regional Integrated Modeling and Analysis (PRIMA).” *Climatic Change* 129(3):573-588.

Kriegler, E., J. Weyant, G. Blanford, L. Clarke, J. Edmonds, A. Fawcett, V. Krey, G. Luderer, K. Riahi, R. Richels, S. Rose, M. Tavoni, and D. van Vuuren. 2014. “The Role of Technology for Achieving Climate Policy Objectives: Overview of the EMF 27 Study on Technology Strategies and Climate Policy Scenarios.” *Climatic Change* 123(3–4):353–367.

Krey, V., G. Luderer, L. Clarke, and E. Kriegler. 2014. “Getting from here to there—energy technology transformation pathways in the EMF-27 scenarios.” *Climatic Change* 123(3):369– 382.

McJeon HC, JA Edmonds, N Bauer, LE Clarke, B Fisher, BP Flannery, J Hilaire, V Krey, G Marangoni, R Mi, K Riahi, HH Rogner, and M Tavoni. 2014. “Limited impact on decadal-scale climate change from increased use of natural gas.” Nature 514(7523):482–485.

Scott M., D. Daly, Y. Zhou, J. Rice, P. Patel, H. McJeon, G. Kyle, S. Kim, J. Eom, and L. Clarke.2014.“Evaluating sub-national building-energy efficiency policy options under uncertainty: Efficient sensitivity testing of alternative climate, technological, and socioeconomic futures in a regional intergrated-assessment model.” *Energy Economics* 43(2014):22–33.

Yu, S., J. Eom, M. Evans, and L. Clarke.2014.“A long-term, integrated impact assessment of alternative building energy code scenarios in China.” *Energy Policy* 67(2014):626–639.

Yu, S., J. Eom, Y. Zhou, M. Evans, L. Clarke. 2014. “Scenarios of Building Energy Demand for China with a Detailed Regional Representation.” *Energy* 67:284–297.

Zhou, Y, L. Clarke, J. Eom, G.P. Kyle, P. Patel, S. Kim, J. Dirks, E. Jensen, Y. Liu, J. Rice, L. Schmidt, and T. Seiple. 2014. “Modeling the effect of climate change on U.S. state-level buildings energy demands in an integrated assessment framework.” *Applied Energy* 113:1077–1088.

Wise M., H. McJeon, L. Clarke, K. Calvin, and G. Kyle. 2014. “Assessing the interactions among U.S. climate policy, biomass energy, and agricultural trade.” *The Energy Journal* 35(SI1):165–180.

Calvin K., M. Wise, L. Clarke, J. Edmonds, G. Kyle, P. Luckow, and A. Thomson. 2013. “Implications of simultaneously mitigating and adapting to climate change: Initial experiments using GCAM.” Climatic Change 117(3): 545–560.

Chaturvedi V, S. Kim, S. Smith, L. Clarke, Y. Zhou, G. Kyle, and P. Patel. 2013. “Model evaluation and hindcasting: A zero order experiment with an integrated assessment model.” *Energy* 61:479–490.

Edmonds J., P. Luckow, K. Calvin, M. Wise, J. Dooley, G. Kyle, S. Kim, P. Patel, and L. Clarke. 2013. “Can Radiative Forcing Be Limited to 2.6 Wm−2 Without Negative Emissions From Bioenergy and CO2 Capture and Storage?” Climatic Change 118(1): 29–43.

Le Page Y., G. Hurtt, A. Thomson, B. Bond-Lamberty, P. Patel, M. Wise, K. Calvin, G. Kyle, L. Clarke, J. Edmonds, and A. Janetos. 2013. “Sensitivity of climate mitigation strategies to natural disturbances.” Environmental Research Letters 8(1): 015018.

Zhou S., G. Kyle, S. Yu, L. Clarke, J. Eom, P. Luckow, V Chaturvedi, X. Zhang, and J. Edmonds. 2013. “Energy use and CO2 emissions of China’s industrial sector from a global perspective.” Energy Policy 58:284–294.

Zhou Y, J. Eom, and L. Clarke. 2013. “The effect of climate change, population distribution, and climate mitigation on building energy use in the U.S. and China.” Climatic Change 119(3–4):979-992.

Calvin, K., L. Clarke, V. Krey, G. Blanford, K. Jiang, M. Kainuma, E. Krigler, G. Luderer, PR. Shukla. 2012. “The role of Asia in mitigating climate change: results from the Asia Modeling Exercise.” *Energy Economics* 34(3):S251–S260.

Chaturvedi V., S. Waldhoff, L. Clarke, S. Fujimori. 2012. “What are the Starting Points? Evaluating Base-Year Assumptions in the Asian Modeling Exercise.” *Energy Economics*, 34 (Supplement 3):S261–S271.

Clarke L., V. Krey, J. Weyant, and V Chaturvedi. 2012. “Regional energy system variations in global models: Results from the Asian Modeling Exercise.” Energy Economics 34(3):S293–S305.

Edmonds, J. K. Calvin, L. Clarke, P. Kyle, and M. Wise. 2012. “Energy and technology lessons since Rio.” *Energy Economics* 34(1):S7–S14.

Eom, J., R. Moss, J. Edmonds, K. Calvin, B. Bond-Lamberty, L. Clarke, J. Dooley, S. Kim, R. Kopp, P. Kyle, P. Luckow, P. Patel, A. Thomson, M. Wise. 2012. “Scenarios of Future Socio-Economics, Energy, Land Use and Radiative Forcing.” In Engineering Response to Global Climate Change, 2nd Ed., ed. RG Watts CRC Press Inc, Boca Raton, FL.

Eom J, K. Calvin, L. Clarke, J. Edmonds, S. Kim, R. Kopp, P. Kyle, P. Luckow, P. Patel, R. Moss, M. Wise. 2012. “Exploring the future role of Asia utilizing a scenario matrix architecture and shared socio-ecosystem pathways.” Energy Economics 34(3):S325–S338.

Hejazi, M., J. Edmonds, L. Clarke, G.P. Kyle, E. Davies, V. Chaturvedi, M. Wise, P. Patel, J. Eom, K. Calvin, R. Moss, and S. Kim. 2014. “Long-term global water use projections using six socioeconomic scenarios in an integrated assessment modeling framework.” *Technological Forecasting and Social Change* 81:205–226.

Kyle, P., E. Davies, J. Dooley, S. Smith, L. Clarke, J. Edmonds, M. Hejazi. 2012. “Influence of climate change mitigation technology on global demands of water for electricity generation.” International Journal of Greenhouse Gas Control 13:112–123.

Zhou Y, P Luckow, SJ Smith, LE Clarke. 2012. “Evaluation of global onshore wind energy potential and generation costs.” *Environmental Science & Technology* 46(14):7857–7864.

Eom, J., L. Clarke, P. Kyle, S. Kim, and P. Patel. 2011. “China’s building energy use: a long-term perspective based on a detailed assessment.” *Energy* 46(1):405-419.

Krey V. and L. Clarke. 2011. “Role of renewable energy in climate mitigation: a synthesis of recent scenarios.” *Climate Policy* 11(4):1131–1158.

Kyle G, L. Clarke, S. Smith, S. Kim, M. Nathan, M. Wise. 2011. “The value of advanced end-use energy technologies in meeting U.S. climate policy goals.” *The Energy Journal* 32 (Special Issue) (5).

McJeon, H., L. Clarke, G. Kyle, M. Wise, A. Hackbarth, B. Bryant, and R. Lempert. 2011. “Technology Interactions among Low Carbon Energy Technologies: What Can We Learn from a Large Number of Scenarios?” Energy Economics 33(4):619–631.

Thomson, A., K. Calvin, S. Smith, GP Kyle, A.Volke, P. Patel, S. Delgado Arias, B. Bond-Lamberty, M. Wise, L. Clarke, J. Edmonds. 2011. “RCP4.5: a Pathway for stabilization of radiative forcing by 2100.” *Climatic Change* 109:77–94.

Pugh, G., L. Clarke, R. Marlay, P., M. Wise, H. McJeon, G Chan. 2011. “Energy R&D portfolio analysis based on climate change mitigation.” *Energy Economics* 33(4):634–643.

Kyle, P., L. Clarke, F. Rong, S. Smith. 2010. “Climate Policy and the Long-Term Evolution of the U.S. Buildings Sector.” *The Energy Journal* 31(2):145–172.

Calvin, K., J. Edmonds, B. Bond-Lamberty, L. Clarke, P. Kyle, S. Smith, A. Thomson, M. Wise. 2009. “2.6: Limiting climate change to 450 ppm CO2 equivalent in the 21st century.” *Energy Economics* 31(2):S107–S120.

Calvin, K., P. Patel, A. Fawcett, L. Clarke, K. Fisher-Vanden, J. Edmonds, S. Kim, R. Sands, M. Wise. 2009. “The distribution and magnitude of emissions mitigation costs in climate stabilization under less than perfect international cooperation: SGM results.” *Energy Economics* 31(S2):S254–S267.

Clarke, L., Edmonds, J., Krey, V., Richels, R., Rose, S., & Tavoni, M. 2009. “International climate policy architectures: Overview of the EMF 22 International Scenarios.” *Energy Economics* 31(S2):S64–S81.

Kyle, P., L. Clarke, G. Pugh, M. Wise, K. Calvin, J Edmonds, S. Kim. 2009. “The value of advanced technology in meeting 2050 greenhouse gas emissions targets in the United States.” *Energy Economics* 31(S2):S187–S197.

Wise M., K. Calvin, A. Thomson, L. Clarke, B. Bond-Lamberty, R. Sands, S. Smith, A. Janetos, and J. Edmonds. 2009. “Implications of limiting CO2 concentrations for land use and energy.” *Science* 324(5931):1183–1186.

Wigley T., L. Clarke, J. Edmonds, H. Jacoby, S. Paltsev, H. Pitcher, J. Reilly, R. Richels, M. Sarofim, and S. Smith. 2009. “Uncertainties in climate stabilization.” *Journal of Climate* 97/1-2, 85-121.

Thomson, A., R. Izaurralde, S. Smith, L. Clarke. 2008. “Integrated estimates of global terrestrial carbon sequestration.” *Global Environmental Change* 18(1):192–203.

Clarke, L., J. Weyant, J. Edmonds. 2008. “On sources of technological change: what do the models assume?” *Energy Economics* 30(2):409–424.

Baker, E., L. Clarke, E. Shittu, 2008. “Technical change and the marginal cost of abatement.” *Energy Economics* 30(6):2799–2816.

Edmonds, J., L. Clarke, J. Lurz, M. Wise. 2008. “Stabilizing CO2 concentrations with incomplete international cooperation.” *Climate Policy* 8:355–376.

Edmonds, J., L. Clarke, M. Wise, H. Pitcher, S. Smith. 2008. “Implications for the United States of stabilization of radiative Forcing at 3.4 W/m2.” *Climate Policy* 8:S76–S92.

Richels, R., T. Rutherford, G. Blanford, L. Clarke. 2007. “Managing the transition to climate stabilization.” *Climate Policy* 7:409–428.

Runci, P., L. Clarke, J. Dooley. 2006. “Energy R&D investment in the industrialized world: an update.” *Issues in Science and Technology: Forum*, Spring 2006.

Edmonds J.A., and L.E. Clarke. 2007. Forum. Issues in Science and Technology 23(2):16–17. <http://issues.org/23-2/forum-winter-2007/>

Clarke, L., J. Weyant, A. Birky, 2006. “On sources of technological change: Assessing the evidence.” *Energy Economics* 28(5-6):579–595. DOI: 10.1016/j.eneco.2006.05.004

Baker, E., L. Clarke, J. Weyant. 2006. “Optimal Technology R&D in the Face of Climate Uncertainty.” *Climatic Change* 78(1):157–179. DOI: 10.1007/s10584-006-9092-8

Clarke, L., J. Weyant. 2002. “Modeling induced technological change: an overview” Chapter 12 in A. Grubler, N. Nakicenovic, and W. Nordhaus (Eds.), *Technological Change and the Environment*, Resources for the Future, Washington, D.C.

### SYNTHESIS REPORTS

Clarke, L., L. Nichols, R. Vallario, M. Hejazi, J. Horing, A.C. Janetos, K. Mach, M. Mastrandrea, M. Orr, B.L. Preston, P. Reed, R.D. Sands, and D.D. White, 2018: *Sector Interactions, Multiple Stressors, and Complex Systems. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA

Clarke L., K. Jiang, K. Akimoto, M. Babiker, G. Blanford, K. Fisher-Vanden, J.-C. Hourcade, V. Krey, E. Kriegler, A. Löschel, D. McCollum, S. Paltsev, S. Rose, P.R. Shukla, M. Tavoni, B.C.C. van der Zwaan, and D. van Vuuren, 2014: *Assessing Transformation Pathways. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Fischedick, M., R. Schaeffer, A. Adedoyin, M. Akai, T. Bruckner, L. Clarke, V. Krey, I. Savolainen, S. Teske, D. Ürge‐Vorsatz, R. Wright. 2011. *Mitigation Potential and Costs*. In IPCC *Special Report on Renewable Energy Sources and Climate Change Mitigation* [O. Edenhofer, R. Pichs‐Madruga, Y. Sokona, K Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlömer, C. von Stechow (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Clarke, L., J. Edmonds, H. Jacoby, H. Pitcher, J. Reilly, R. Richels. 2007. *Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations*. Sub-report 2.1A of Synthesis and Assessment Product 2.1 by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Department of Energy, Office of Biological & Environmental Research, Washington, DC., USA, 154 pp.

### TECHNICAL REPORTS, WORKING PAPERS, BOOK CHAPTERS, CONFERENCE PAPERS, OTHER

Edmonds J., K. Calvin, L. Clarke, A. Janetos, S. Kim, M. Wise, H. McJeon. 2011. *Integrated assessment modeling*, in *Encyclopedia of Sustainability Science and Technology* ed. RA Meyers, pp. 5398–5428. Springer, New York, NY.

Clarke, L., K. Calvin, J. Edmonds, P. Kyle, M. Wise. 2008. *Technology and international climate policy*, Discussion Paper 08–21, Harvard Project on International Climate Agreements.

Clarke, L., P. Kyle, M. Wise, K. Calvin, J. Edmonds, S. Kim, M. Placet, S. Smith. 2008. “*CO2 Emissions Mitigation and Technological Advance: An Updated Analysis of Advanced Technology Scenarios*,” Technical Report PNNL-18075, Pacific Northwest National Laboratory.

Edmonds, J.A., M.A. Wise, J.J. Dooley, S.H. Kim, S.J. Smith, P.J. Runci, L.E. Clarke, E.L. Malone, and G.M. Stokes. 2007. *Global Energy Technology Strategy Addressing Climate Change: Phase 2 Findings from an International Public-Private Sponsored Research Program*. Joint Global Change Research Institute, College Park, MD.Edmonds, J., L. Clarke, Lurz, J., and M. Wise, 2007. *Stabilizing CO2 Concentrations with Incomplete International Cooperation*, Technical Report PNNL-16932, Pacific Northwest National Laboratory.

Clarke, L., J. Lurz, M. Wise, J. Edmonds, S. Kim, H. Pitcher, S. Smith. 2007. *“Model Documentation for the MiniCAM CCSP Stabilization Scenarios: CCSP Product 2.1a*,” Technical Report PNNL-16735, Pacific Northwest National Laboratory.

Richels, R., T. Rutherford, G. Blanford, L. Clarke. 2006. “*Managing the Transition to Climate Stabilization*,” Working Paper 07-01, AEI-Brookings Joint Center for Regulatory Studies.

Clarke L., M. Wise, S. Kim, A. Thomson, R. Izaurralde, J. Lurz, M. Placet, S. Smith. 2006. “*Climate Change Mitigation: An Analysis of Advanced Technology Scenarios*,” Technical Report PNNL-16078, Pacific Northwest National Laboratory.

Edmonds, J., L. Clarke. 2005. “Endogenous technological change in long-term emissions stabilization scenarios, *IPCC Expert Meeting on Emissions Scenarios*,” M. Hoogwijk (ed.), IPCC, Bildhoven, The Netherlands. Pp.63–69. PNNL-SA-43916.

Clarke, L., J. Weyant, A. Birky, S. Peabody. 2004. “*Modeling the Sources of Technological Advance in the Climate Context*,” GTSP Working Paper 2004–7, Global Technology Strategy Program.

Blanford, G., L. Clarke. 2003. “*On the Allocation of R&D Resources for Climate Change Technology Development*.” Lawrence Livermore National Laboratory Working Paper, UCRL-TR-200982.

Clarke, L. 2002. “*Emerging Environmental Technologies and Environmental Technology Policy,*” Ph.D. Dissertation, Stanford University, Stanford, CA.

Baker, M., R. Ridge, L. Clarke, B. Tso. 1996. “1994 impact evaluation of PG&E’'s Commercial-Sector HVAC Energy Efficiency Programs. *Proceedings of the 1996 ACEEE Summer Study on Energy-Efficiency in Buildings*, Asilomar, CA.

Coito, F., F. Powell, L. Clarke. 1996. “Impact evaluation of Pacific Gas and Electric’s Industrial Process, Refrigeration, and Miscellaneous Measures Programs.” *Proceedings of the 1996 ACEEE Summer Study on Energy-Efficiency in Buildings*, Asilomar, CA.

Mowris, R., R. Powell, J. Regester, L. Clarke. 1996. “Impact evaluation of Pacific Gas and Electric Company's 1994 Industrial HVAC Programs.” *Proceedings of the 1996 ACEEE Summer Study on Energy-Efficiency in Buildings*, Asilomar, CA.

Randazzo, K., R. Ridge, K. Train, L. Clarke. 1996. “How many mills ratios does it take to estimate net savings?” *Proceedings of the 1996 ACEEE Summer Study on Energy-Efficiency in Buildings*, Asilomar, CA.

Clarke, L. 1990. *Evaluation of the Data Reduction Methodology for Determining Single-Phase Heat Transfer Coefficients for Compact Heat Exchangers*, Master’s Thesis, U.C. Berkeley, Berkeley, CA.

Ashley, H. and Clarke, L., 1987. *On the feasibility of low-speed fighter maneuvers involving extreme angles of attack.* Working Paper, Stanford University