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Adjunct Professor in Energy Systems Modeling
Industrial Ecology and Energy Transitions Programmes
Norwegian University of Science and Technology (NTNU)

EXPERTISE

Integrated Assessment Modeling of climate change and linkages to broader sustainable development objectives including air pollution and health, energy security, energy poverty, water availability and food security; energy systems analysis at different regional (national to global) and temporal scales (medium- to long-term)

PROFESSIONAL APPOINTMENTS

- 2018 – present Adjunct Professor in Energy Systems Modeling, NTNU, Norway
- 2011 – present Deputy Program Director, IIASA, Energy Program, Laxenburg, Austria
- 2007 – 2011 Research Scholar, IIASA, Energy Program, Laxenburg, Austria
- 2006 – 2007 Research Fellow, Institute of Energy Research, Systems Analysis and Technology Evaluation, Research Centre Jülich, Germany
- 2002 – 2005 PhD Candidate, Programme Group Systems Analysis and Technology Evaluation (STE), Research Centre Jülich, Germany

EDUCATION

- 2006 Ph.D. (Doktor-Ingenieur) in Mechanical Engineering, Ruhr-University Bochum, Germany, Thesis: Comparison of short- and long-term oriented optimization approaches with a multi-regional energy systems model under consideration of stochastic parameters
Advisors: H.-J. Wagner (Ruhr-University Bochum), N. Nakicenovic (TU Vienna, IIASA)
- 2002 Diploma in Physics, University of Dortmund, Germany, Thesis: Polarization of J/Ψ Mesons in B Decays

SELECTED PUBLICATIONS

Refereed Journal Articles

- 2018 Luderer, G., Vrontisi, Z., Bertram, C., Edelenbosch, O.Y., Pietzcker, R., Rogelj, J., . . . **Krey, V.**, . . . Kriegler, E.. Residual fossil CO₂ determining carbon dioxide removal requirements in 1.5-2°C pathways. *Nature Climate Change* 8, 626–633. doi: 10.1038/s41558-018-0198-6
- 2018 McCollum, D.L., Zhou, W., Bertram, C., de Boer, H.-S., Bosetti, V., Busch, S. , . . . **Krey, V.**, . . . Riahi, K.. Energy investment needs for fulfilling the Paris Agreement

- and achieving the Sustainable Development Goals. *Nature Energy* 3, 589-599. doi: 10.1038/s41560-018-0179-z
- 2018 Rogelj, J., Popp, A., Calvin, K., Luderer, G., Emmerling, J., Gernaat, D., . . . **Krey, V.**, . . . Tavoni, M. Transition pathways towards limiting global-mean temperature increase below 1.5°C. *Nature Climate Change* 8, 325-333. doi: 10.1038/s41558-018-0091-3
- 2018 Jewell, J., McCollum, D., Emmerling, J., Bertram, C., Gernaat, D.E.H.J., **Krey, V.**, . . . Riahi, K. Limited emission reductions from fuel subsidy removal except in energy-exporting regions. *Nature* 554, 229-233. doi: 10.1038/nature25467
- 2017 Rogelj, J., Fricko, O., Meinshausen, M., **Krey, V.**, Zilliacus, J.J.J., Riahi, K. Understanding the origin of Paris Agreement emission uncertainties. *Nature Communications* 8, 15748, doi: 10.1038/ncomms15748.
- 2017 Riahi, K., Van Vuuren, D.P., Kriegler, E., Edmonds, J., O'Neill, B., Fujimori, S., . . . , **Krey, V.**, . . . Tavoni, M. The Shared Socioeconomic Pathways and their Energy, Land Use, and Greenhouse Gas Emissions Implications: An Overview.. *Global Environmental Change*, 42, 153-168. doi: 10.1016/j.gloenvcha.2016.05.009
- 2017 Fricko, O., Havlik, P., Rogelj, J., Klimont, Z., Gusti, M., Johnson, N., Kolp, P., Strubegger, M., Valin, H., Amann, M., Ermolieva, T., Forsell, N., Herrero, M., Heyes, C., Kindermann, G., **Krey, V.**, . . . Riahi, K. The marker quantification of the Shared Socioeconomic Pathway 2: A middle-of-the-road scenario for the 21st century. *Global Environmental Change*, 42, 251-267. doi: 10.1016/j.gloenvcha.2016.06.004
- 2016 McCollum, D.L., Jewell, J., **Krey, V.**, Bazilian, M., Fay, M., & Riahi, K.. Quantifying uncertainties influencing the long-term impacts of oil prices on energy markets and carbon emissions. *Nature Energy*, 16077. doi: 10.1038/nenergy.2016.77
- 2016 Parkinson, S. C., Djilali, N., **Krey, V.**, Fricko, O., Johnson, N., Khan, Z., . . . Almasoud, A. H. Impacts of Groundwater Constraints on Saudi Arabia's Low-Carbon Electricity Supply Strategy. *Environmental Science and Technology*, 50(4), 1653-1662. doi: 10.1021/acs.est.5b05852
- 2016 Smith, P., Davis, S. J., Creutzig, F., Fuss, S., Minx, J., Gabrielle, B., Kato, E., Jackson, R.B., Cowie, A., Kriegler, E., Van Vuuren, D.P., Rogelj, J., Ciais, P., Milne, J., Canadell, J.G., McCollum, D., Peters, G., Andrew, R., **Krey, V.**, . . . Yongsung, C. Biophysical and economic limits to negative CO2 emissions. *Nature Climate Change*, 6(1), 42-50. doi: 10.1038/nclimate2870
- 2015 Rogelj, J., Luderer, G., Pietzcker, R. C., Kriegler, E., Schaeffer, M., **Krey, V.**, & Riahi, K. Energy system transformations for limiting end-of-century warming to below 1.5 °C. *Nature Climate Change*, 5(6), 519-527. doi: 10.1038/nclimate2572
- 2015 Kriegler, E., Petermann, N., **Krey, V.**, Schwanitz, V. J., Luderer, G., Ashina, S., . . . Van Vuuren, D. P. Diagnostic indicators for integrated assessment models of climate policy. *Technological Forecasting and Social Change*, 90(PA), 45-61. doi: 10.1016/j.techfore.2013.09.020
- 2015 Riahi, K., Kriegler, E., Johnson, N., Bertram, C., den Elzen, M., Eom, J., Schaeffer, M., Edmonds, J., Isaac, M., **Krey, V.**, . . . Edenhofer, O. Locked into Copenhagen pledges - Implications of short-term emission targets for the cost and feasibility of long-term climate goals. *Technological Forecasting and Social Change*, 90(PA), 8-23, doi: 10.1016/j.techfore.2013.09.016.

- 2014 McJeon, H., Edmonds, J., Bauer, N., Clarke, L., Fisher, B., Flannery, B.P., Hilaire J., **Krey V.**, . . . Tavoni, M. Limited impact on decadal-scale climate change from increased use of natural gas. *Nature*, 514(7523), 482-485. doi: 10.1038/nature13837
- 2014 **Krey, V.** Global energy-climate scenarios and models: a review. *Wiley Interdisciplinary Reviews: Energy and Environment*, 3(4), 363-383. doi: 10.1002/wene.98
- 2014 **Krey, V.**, Luderer, G., Clarke, L., & Kriegler, E. Getting from here to there - energy technology transformation pathways in the EMF27 scenarios. *Climatic Change*, 123, 369-382.
- 2013 McCollum, D. L., **Krey, V.**, Riahi, K., Kolp, P., Grubler, A., Makowski, M., & Nakicenovic, N. Climate policies can help resolve energy security and air pollution challenges. *Climatic Change*, 119(2), 479-494.
- 2013 Wilson, C., Grubler, A., Bauer, N., **Krey, V.**, & Riahi, K. Future capacity growth of energy technologies: Are scenarios consistent with historical evidence? *Climatic Change*, 118(2), 381-395.
- 2012 Clarke, L., **Krey, V.**, Weyant, J., & Chaturvedi, V. Regional energy system variation in global models: Results from the Asian Modeling Exercise scenarios. *Energy Economics*, 34(SUPPL. 3), S293-S305.
- 2012 **Krey, V.**, O'Neill, B. C., van Ruijven, B., Chaturvedi, V., Daioglou, V., Eom, J., . . . Ren, X. Urban and rural energy use and carbon dioxide emissions in Asia. *Energy Economics*, 34(SUPPL. 3), S272-S283.
- 2011 McCollum, D.L., **Krey, V.**, & Riahi, K. An integrated approach to energy sustainability. *Nature Clim. Change*, 1, 428-429. doi: 10.1038/nclimate1297.
- 2011 Riahi, K., Rao, S., **Krey, V.**, Cho, C., Chirkov, V., Fischer, G., . . . Rafaj, P. (2011). RCP 8.5-A scenario of comparatively high greenhouse gas emissions. *Climatic Change*, 109(1), 33-57. doi: 10.1007/s10584-011-0149-y.
- 2010 Ekholm, T., **Krey, V.**, Pachauri, S., & Riahi, K. Determinants of household energy consumption in India. *Energy Policy*, 38(10), 5696-5707.
- 2009 Clarke, L., Edmonds, J., **Krey, V.**, Richels, R., Rose, S., & Tavoni, M. International climate policy architectures: Overview of the EMF 22 international scenarios. *Energy Economics*, 31(Supplement 2), S64-S81.
- 2009 **Krey, V.**, & Riahi, K. Implications of delayed participation and technology failure for the feasibility, costs, and likelihood of staying below temperature targets - greenhouse gas mitigation scenarios for the 21st century. *Energy Economics*, 31(Supplement 2), S94-S106.

Edited Volumes (including Special Issues)

- 2014 Weyant, J., Kriegler, E., Blanford, G., **Krey, V.**, Edmonds, J., Riahi, K., . . . Tavoni, M. (Eds.). *The EMF27 Study on Global Technology and Climate Policy Strategies* (Climatic Change, Vol. 123, Issues 3-4).
- 2012 Calvin, K., Clarke, L., & **Krey, V.** (Eds.). *The Asia Modeling Exercise: Exploring the Role of Asia in Mitigating Climate Change* (Energy Economics, Vol. 34, Supplement 3).

Assessment Reports

- 2014 Clarke, L., Jiang, K., Akimoto, K., Babiker, M., Blanford, G., Fisher-Vanden, K., . . . **Krey, V.**, . . . van Vuuren, D. Assessing Transformation Pathways. In O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, J. Minx, S. Kadner, K.

- Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Salvolainen, S. Schlömer, C. von Stechow & T. Zwickel (Eds.), *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.
- 2014 **Krey, V.**, Masera, O., Blanford, G., Bruckner, T., Cooke, R., Fisher-Vanden, K., . . . Zwickel, T. Annex II: Metrics & Methodology. In O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, J. Minx, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Salvolainen, S. Schlömer, C. von Stechow & T. Zwickel (Eds.), *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.
- 2012 Riahi, K., Dentener, F., Gielen, D., Grubler, A., Jewell, J., Klimont, Z., **Krey, V.**, . . . Wilson, C. Energy Pathways for Sustainable Development. *The Global Energy Assessment: Toward a More Sustainable Future.*: IASA, Laxenburg, Austria and Cambridge University Press, Cambridge, UK.
- 2011 Fishedick, M., Schaeffer, R., Adedoyin, A., Akai, M., Bruckner, T., Clarke, L., . . . , **Krey, V.**, . . . Luderer, G.. Chapter 10: Mitigation potential and costs. In O. Edenhofer, R. Pichs, Y. Sokona, K. Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlömer & C. von Stechow (Eds.), *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation*. Cambridge: Cambridge University Press.

COORDINATION EXPERIENCE

- since 2015 Co-Principal Investigator, CD-LINKS Horizon 2020 project, <http://www.cd-links.org>
- 2013 – 2016 Work Package leader, ADVANCE FP7 project, WP1 on *Model transparency, validation, and common database*, <http://fp7-advance.eu/>
- 2011 – 2014 Coordinating Lead Author, IPCC 5th Assessment Report of Working Group III, Annex II: Methods and Metrics
Lead Author, Summary for Policymakers, Technical Summary, Chapter 6: Assessing Transformation Pathways
- since 2010 Co-Chair, Scientific Working Group on Data Protocols and Management, Integrated Assessment Modeling Consortium (IAMC)
- 2010 – 2017 Member of the IPCC Task Group on Data and Scenario Support for Impact and Climate Analysis (TGICA) for the 5th Assessment Report cycle
- 2009 – 2012 Lead Author, Global Energy Assessment, Chapter 17: Energy Transition Pathways for Sustainable Development
- 2009 – 2011 Lead Author, IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation, Summary for Policymakers and Chapter 10: Mitigation Potential and Costs

SELECTED PROFESSIONAL ACTIVITIES

- since 2010 Associate Deputy Editor of the journal *Climatic Change*