Juan B. Moreno-Cruz, Canada Research Chair in Energy Transitions

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Education

2010, Ph.D. Economics, University of Calgary.
2004, M.Sc. Electrical Engineering, Universidad de Los Andes.
2003, B.Sc. Electrical Engineering, Universidad de Los Andes.

Current Affiliations

2025-Present, Full Professor, School of Environment, Enterprise and Development, University of Waterloo

2021-Present, Department of Economics (Cross-appointed), University of Waterloo

2021-Present, BSIA Fellow, Balsillie School of International Affairs

2018-Present, Canada Research Chair in Energy Transitions

2018-Present, Research Network Affiliate, CESifo

Previous Positions

2018-2025, Associate Professor, School of Environment, Enterprise and Development, University of Waterloo

2017-2018, Associate Professor, School of Economics, Georgia Institute of Technology

2011-2017, Assistant Professor, School of Economics, Georgia Institute of Technology

Grants

Total: $13,696,729 (PI: $2,106,696, Co-I: $11,590,033)

- Nominee: Canada Research Chair in Energy Transitions, SSHRC, 2024-2029 ($500,000)
- Co-Investigator: Modelling Canada's Heavy-Duty Vehicles (HDV) Energy Demands for Low-Emission Innovations and Practical Infrastructure Solutions, NRCan ($1,114,749)
- Principal Investigator: Effects of Methane Capture Adoption on Local Economies, Environmental Defense Fund, 2025 ($41,500)
- Principal Investigator: Effects of AI on Energy Use in the Economy, Google, 2025 ($103,000)
- Co-Investigator: Climate Response Interactions: Mapping, Scenarios and Policy Pathways, BSIA Seed Grants, 2025 ($14,000)
- Co-Investigator: Sustainable Energy Transitions, Individuals, and Communities: Connecting Canadian and German Researchers, Activities, and Regions, BSIA Seed Grants, 2025 ($5050)
- Co-Investigator: Development of tools for incorporation of population health and environ-mental justice endpoints in decarbonization policies, NSERC Discovery Horizons, 2024-2029 ($500,000)
- Principal Investigator: A Generative Artificial Intelligence Driven Decision Support System for Spatial Optimization of Terrestrial Nature-Based Solutions in Canada, 2024-2025, MITACS (RBC Partner), ($45,000)

- Co-Investigator: Wisdom across cultures beyond traditional decision-making paradigms, 2024-2027, Templeton World Charity Foundation, ($1,511,182)
- Principal Investigator: The Role of Narratives in Sustainable Food Consumption, SSHRC Insights Development Grant, 2023-2025 ($147,856)
- Co-Investigator: SOLUTIONSCAPES: Designing Climate and Water Smart Agricultural Solutions in Complex Working Landscapes, Grant, Advancing Climate Change Science and Technology, 2022-2027 ($4,634,313)
- Co-Investigator: Robust Decision Making Using Dynamic Adaptive Policy Pathways For Direct Air Capture Deployment in Canada, Advancing Climate Change Science and Technology, 2022-2026 ($564,125)
- Co-Investigator: The role of chemical fuels in Canada's net zero transition, NSERC Alliance, 2023-2026 ($1,500,000)
- Co-Investigator: Route-based Market Analysis of Emission Reduction Strategies for Sustainable Aviation: AI Optimization of Sustainable Aviation Fuels Allocation, Tourism Markets, and Electrification, WISA Research for Impact Grant, 2023-202 ($246,614)
- Co-Investigator: Carbon Capture by Boreal Afforestation: feasibility for Canada's net-zero emission goals, NSERC Alliance, 2023-2026 ($1,500,000)
- Principal Investigator: Recoupling the Livestock Nutrient Economy: Developing sustainable and integrative solutions to food-water-energy challenges, NFRF, 2021-2023 ($ 250,000)
- Principal Investigator: Canada Research Chair in Energy Transitions, SSHRC, 2018-2023 ($ 600,000)
- Principal Investigator: Regional Industrial Structure, Economic Resilience and Energy Consumption: Comparative Evaluation, Historical Analysis and Pathway towards a More Sustainable Economy, NSF, 2015-2018 ($ 300,000)
- Principal Investigator: Energy in an Information Age, Strategic Energy Institute, 2017 ($40,000)
- Principal Investigator: GT-FIRE "Prosumers and the disruption of the economic system." ($31,840)
- Principal Investigator: Small Research Grants, Ivan Allen College, 2016 ($13,000)
- Principal Investigator: Brook Bryers Fellowship 2015-2018 ($4500)
- Principal Investigator: Small Research Grants, Ivan Allen College, 2014 ($18,000)
- Principal Investigator: Small Research Grants, Ivan Allen College, 2013 ($12,000)

Honors and Awards

Canada Research Chair in Energy Transitions (2018 – 2029)

Appointment Center of Economic Studies ifo (CESifo) (2019-Onwards)

Brook Byers Sustainability Fellow (2017-2018)

Award for High Performance in Academic Publication by the School of Economics (2017)

National Academy of Sciences Kavli Frontiers of Science Fellow (2016)

Gold Star Award at the Ivan Allen College for excellence in research (2016)

Environmental Research letters Highlights of 2013 for "Strategic Incentives for Climate Geoengineering Coalitions to Exclude Broad Participation" (2013)

Environmental and Resource Economics Commendation for Excellence for "The Intergenerational Transfer of Solar Radiation Management Capabilities and Atmospheric Carbon Stocks" (2014).

Class of 1969 Teaching Fellows, 2011.

Young Scientist Summer Program, Institute for Applied Systems Analysis, Laxenburg, Austria. 2003.

Peer-reviewed Publications

h-index=31, i10-index=48, citations=2857: Google Scholar, October 2025.

63. Anthony Harding, Juan Moreno-Cruz, "A unifying theory of foreign intervention in domestic climate policy." Journal of Economic Behavior & Organization. Vol 243

62. Estrada F, Bastien-Olvera BA, Calderon-Bustamante O, Altamirano MA, Muñoz-Sánchez R, Moreno-Cruz J, Botzen W. "Economic assessment of SRM under socio-political and geophysical tipping dynamics." Environmental Research: Climate. 2026 Mar 1;5(1):015015.

61. Ofosu E, Dsouza KB, Amaogu DC, Pigeon J, Boudreault R, Moreno-Cruz J, Maghoul P, Leonenko Y. "Climate benefits of afforestation and reforestation with varying species mixtures and densities in the north-western boreal lands." Environmental Research Letters. 2025 Dec 1;20(12):124026.

60. Dsouza KB, Ofosu E, Boudreault R, Moreno-Cruz J, Leonenko Y. "Carbon capture capacity estimation of taiga reforestation and afforestation at the western boreal edge using spatially explicit carbon budget modeling." Communications Earth & Environment 6, Article number: 893 (2025) .

59. Harding A, Moreno-Cruz J. "Watts and Bots: The energy implications of AI adoption." Forthcoming *Environmental Research Letters.*

58. Dsouza KB, Ofosu E, Boudreault R, Moreno-Cruz J, Leonenko Y. "Carbon capture capacity estimation of taiga reforestation and afforestation at the western boreal edge using spatially explicit carbon budget modeling." Forthcoming Communications Earth & Environment.

57. Anthony Harding, Juan Moreno-Cruz, Martin Quaas, Wilfried Rickels, Sjak Smulders, "Distribution of climate damages in convergence-consistent growth projections," *Energy Economics*, 149, (2025)

56. Dsouza KB, Ofosu E, Salkeld J, Boudreault R, Moreno-Cruz J, Leonenko Y. "Assessing the climate benefits of afforestation in the Canadian Northern Boreal and Southern Arctic." *Nature Communications.* 2025 Feb 25;16(1):1964.

55. Blanco-Murcia, L., Moreno-Cruz, J. "The role of care in creating narratives for sustainability." *Sustainability Sciences* 2025 20, 1863–1881.

54. Motlaghzadeh, K., Craik, N., Moreno-Cruz, J. et al. "Applying equity principles leads to higher carbon removal obligations in Canada." *Commun Earth Environ* 6, 88 (2025).

53. Oliver ME, Moreno-Cruz J, Gillingham KT. "Microeconomics of the solar rebound under net metering." *Journal of the Association of Environmental and Resource Economists.* 2025 Sep 1;12(5):1317-53.

52. Besedes T, Moreno-Cruz J, Nitsch V. "Depth and Death: Trade Agreements and Trade Duration." *Review of International Economics.* 2025 Aug;33(3):519-36.

51. Moreno-Cruz J, McEvoy DM, McGinty M, Cherry TL. The economics and governance of solar geoengineering. *Review of Environmental Economics and Policy.* 2025 Jan 1;19(1):1-24.

50. Cortinovis SR, Craik N, Moreno-Cruz J, Motlaghzadeh K, Schweizer V. "Scaling carbon removal systems: deploying direct air capture amidst Canada's low-carbon transition." (2024) *Frontiers in Climate.* May 20;6:1338647.

49. Parson, E. A., Buck, H. J., Jinnah, S., Moreno-Cruz, J., Nicholson, S. (2024). "Toward an evidence-informed, responsible, and inclusive debate on solar geoengineering: A response to the proposed non-use agreement." *WIREs Climate Change,* e903.

48. Davis SJ, Alexander K, Moreno-Cruz J, Hong C, Shaner M, Caldeira K, McKay I. "Food without agriculture." *Nature Sustainability.* 2024 Jan;7(1):90-5.

47. David Kelly, Garth Heutel, Juan Moreno-Cruz, Soheil Shayegh. "Solar Geoengineering, Learning, and Experimentation." *Journal of the Association of Environmental and Resource Economists*, 11:6, 1447-1486

46. Ken Caldeira, Lei Duan, Juan Moreno-Cruz. "The value of reducing the Green Premium: Cost-saving innovation, emissions abatement, and climate goals." (2023), *Environmental Research Letters* 18:104051.

45. Kasra Motlaghzadeh, Vanessa Schweizer, Neil Craik, Juan Moreno-Cruz. "Key uncertainties behind global projections of direct air capture deployment." (2023), *Applied Energy* 348:121485.

44. Todd Cherry, Stephan Kroll, David McEvoy, David Campoverde, Juan Moreno-Cruz. "Climate cooperation in the shadow of solar geoengineering: an experimental investigation of the moral hazard conjecture." (2023), *Environmental Politics* May 5:1-9.

43. Raphael Ayambire, Jeremy Pittman, Michael Drescher, Juan Moreno-Cruz, Andrea Olive. "Governance of working landscapes: a conceptual framework." (2022), *Sustainability Science* 17 (6), 2579-2596

42. David Billedeau, Juan Moreno-Cruz. "Defining and Advancing the Study and Practice of Sustainability Management." (2022), *Journal of Management and Sustainability* 12, 52

41. Joseph Aldy, Tyler Felgenhauer, William Pizer, Massimo Tavoni, Mariia Belaia, Mark Borsuk, Arunabha Gosh, Garth Heutel, Daniel Heyen, Joshua Horton, David Keith, Christine Merk, Juan Moreno-Cruz, Jesse Reynolds, Katharine Ricke, Wilfried Rickels, Soheil Shayegh, Hwake Smith, Simone Tilmes, Gernot Wagner and Jonathan Wiener, "Social science research to inform solar geoengineering" (2021), *Science* Vol 374, Iss. 6569:815-818

40. Christopher Blackburn and Juan Moreno-Cruz, "Energy Efficiency in General Equilibrium with Input-Output Linkages." (2021), *Journal of Environmental Economics and Management* Vol 110, October 2021, 102524

39. Mariia Belaia, Juan Moreno-Cruz and David Keith, "Optimal Climate Policy in 3D: Mitigation, Carbon Removal and Solar Geoengineering." (2021), *Climate Change Economics*, Vol. 12, No. 03, 2150008

38. Laura Pereira, David Morrow, Valentina Aquila, Brian Beckage, Sam Beckbesinger, Lauren Beukes, Holly Buck, Colin Carlson, Oliver Geden, Andrew Jones, David Keller, Katherine Mach, Mohale Mashigo, Juan Moreno-Cruz, Daniele Visioni, Simon Nicholson, Christopher Trisos, "From fAIrplay to Climate Wars: Making climate change scenarios more dynamic, creative and integrative." (2021), *Ecology and Society* Vol 25 No 4 Art 30.

37. Lei Duan, Juan Moreno-Cruz and Ken Caldeira, "Balancing climate and development goals." (2020), *Environmental Research Letters*, vol 15, 124057

36. Patrick Brown, Juan Moreno-Cruz and Ken Caldeira, "Break-even year: a concept for understanding intergenerational trade-offs in climate change mitigation policy." (2020), *Environmental Research Communications*, Vol 2, no 9

35. Wilfried Rickels, Martin Quaas, Juan Moreno-Cruz, Kate Ricke, Johannes Quaas and Sjak Smulders, "Who Turns the Global Thermostat and by How Much?" (2020) *Energy Economics* Vol 91 104852

34. Juan Moreno-Cruz and M. Scott Taylor, "Food, Fuel and the Domesday Economy." (2020), *European Economic Review*, Vol 128 103501

33. Christopher J. Blackburn Mallory E. Flowers, Daniel C. Matisoff and Juan Moreno-Cruz, "Do Pilot and Demonstration Projects Work? Evidence from a Green Building Program." (2020), *Journal of Policy Analysis and Management*

32. Caleb Robinson, Bistra Dilkina, Juan Moreno-Cruz, "Modeling migration patterns in the USA under sea level rise." (2020), *PlosONE* 15(1): e0227436

31. Anthony R. Harding, Katharine Ricke, Daniel Heyen, Douglas G. MacMartin, Juan Moreno-Cruz, "Climate econometric models indicate solar geoengineering would reduce inter-country income inequality." (2020), *Nature Communications* 11, 227

30. Juan Moreno-Cruz "Understanding the industrial contribution to pollution offers opportunities to further improve air quality in the United States." (2019), *Proceedings of the National Academy of Sciences* Vol 116 no6, 19768–19770

29. Jane A Flegal, Anna-Maria Hubert, David R Morrow, Juan Moreno-Cruz, "Solar Geoengineering: Social Sciences, Legal, Ethical and Economic Frameworks." (2019), Annual Review of Environment and Resources Vol 44.

28. Rong Wang, Harry Saunders, Juan Moreno-Cruz, Ken Caldeira "Induced Energy-Saving Efficiency Improvements Amplify Effectiveness of Climate Change Mitigation." (2019), *Joule* Volume 3, no 9, 2103-2119

27. Xi Liu, Huibin Du, Zengkai Zhang, John C Crittenden, Michael L Lahr, Dabo Guan, Zhifu Mi, Jian Zuo, Juan Moreno-Cruz "Can virtual water trade save water resources?" (2019), *Water Research* Vol 163, 114848.

26. Gregory Casey, Soheil Shayegh, Juan Moreno-Cruz, Martin Bunzl, Oded Galor and Ken Caldeira, "The impact of climate change on fertility." (2019), *Environmental Research Letters* Vol 14, no 5.

25. Daniel Heyen, Joshua Horton and Juan Moreno-Cruz, "Strategic implications of counter-geoengineering: Clash or cooperation?" (2019), *Journal of Environmental Economics and Management* Vol95, 153-177.

24. Eve Tsybina, Alexey Tereshin and Juan Moreno-Cruz, "Liberalisation lowers primary energy efficiency: Evidence from twin power systems." (2019), *Energy* Vol 173, 423-435.

23. Jevan Cherniwchan and Juan Moreno-Cruz, "Maize and Precolonial Africa." (2018), *Journal of Development Economics* Vol 136, 137-150.

22. Garth Heutel, Juan Moreno-Cruz and Soheil Shayegh, "Solar Geoengineering, Uncertainty, and the Price of Carbon." (2018), *Journal of Environmental Economics and Management* Vol 87, Pages 24-41

21. Chris Blackburn, Tony Harding and Juan Moreno-Cruz, "Toward Deep-Decarbonization: An energy-service system framework." (2017), *Curr Sustainable Renewable Energy Rep.* DOI 10.1007/s40518-017-0088-y.

20. Rong Wang, Juan Moreno-Cruz, and Ken Caldeira, "Will the use of a carbon tax for revenue generation produce an incentive to continue carbon emissions?" (2017), *Environmental Research Letters* Vol 12, no 6.

19. Yuan Wang, Nan Lai, Jian Zuo, Juan Moreno-Cruz, John Crittenden, and Yi Jin, "Air pollutants emission from economic sectors in China: A linkage analysis." (2017), *Ecological Indicators* Vol 77, pp 250-260

18. Juan Moreno-Cruz and Scott Taylor, "An Energy-centric Theory of Agglomeration." (2017), *Journal of Environmental Economics and Management* Vol 84, pp 153-172

17. Juan Moreno-Cruz and Sjak Smulders, "Revisiting the economics of climate change: the role of geoengineering." (2017), *Research in Economics* 71 (2), pp 212-224

16. Tony Harding and Juan Moreno-Cruz, "Solar geoengineering economics: from incredible to inevitable and half-way back." (2016), *Earth's Future* Vol 4(12), pp 2328-4277

15. Soheil Shayegh, Juan Moreno-Cruz and Ken Caldeira, "Adapting to rates versus amounts of climate change: A case of adaptation to sea-level rise." (2016), *Environmental Research Letters* vol 11(10).

14. Garth Heutel, Juan Moreno-Cruz and Soheil Shayegh, "Climate Tipping Points and Solar Geoengineering." (2016), *Journal of Economic Behavior and Organization.* Volume 132, Part B, pp 19-45

13. David Keith, Gernot Wagner and Juan Moreno-Cruz, "Modelling the effects of climate engineering." (2016), *Science* 352, 1526-1527

12. M. Burke, M. Craxton, C. D. Kolstad, C. Onda, H. Allcott, E. Baker, L. Barrage, R. Carson, K. Gillingham, J. Graff-Zivin, M. Greenstone, S. Hallegatte, W. M. Hanemann, G. Heal, S. Hsiang, B. Jones, D. L. Kelly, R. Kopp, M. Kotchen, R. Mendelsohn, K. Meng, G. Metcalf, J. Moreno-Cruz, R. Pindyck, S. Rose, I. Rudik, J. Stock, R. S. J. Tol, "Opportunities for advances in climate change economics," (2016), *Science* Vol 352, pp. 292-293

11. Garth Heutel, Juan Moreno-Cruz and Kate Ricke, "Climate Engineering Economics." (2016), *Annual Review of Resource Economics.* Vol. 8, pp 99-118

10. Kate Ricke, Juan Moreno-Cruz, Jacob Schewe, Anders Levermann and Ken Caldeira, "Policy Thresholds in Mitigation." (2016), *Nature Geosciences* Vol 9 (5-6)

9. Xuewei Yu, Juan Moreno-Cruz, and John C. Crittenden, "Regional energy rebound effect: the impact of economy-wide and sector level energy efficiency improvement in Georgia, USA." (2015), *Energy Policy* Vol 87, pp 250-259.

8. Paul Y Kerl, Wenxian Zhang, Juan Moreno-Cruz, Thanos Nenes, Matthew J Realff, Armistead G Russell, Joel Sokol and Valerie M. Thomas, "A New Approach for Optimal Electricity Planning and Dispatching with Hourly Time-Scale Air Quality and Health Considerations." (2015), *Proceedings of the National Academy of Sciences* Vol 112 (35), pp 10884-10889

7. Juan Moreno-Cruz, "Mitigation and the Geoengineering Threat." (2015), *Resource and Energy Economics* Vol 41, pp 248-263

6. Gregory Macfarlane, Laurie Garrow and Juan Moreno-Cruz, "Does Atlanta Value MARTA? Selecting an autoregressive model to recover willingness to pay." (2015), *Transportation Research Part A: Policy and Practice* Vol 78, pp 214-230

5. Kate Ricke, Juan Moreno-Cruz and Ken Caldeira, "Strategic incentives for climate geoengineering coalitions to exclude broad participation." (2013), *Environmental Research Letters* 8 (1), 014021

4. Timo Goeschl, Daniel Heyen and Juan Moreno-Cruz, "The Intergenerational Transfer of Solar Radiation Management Capabilities and Atmospheric Carbon Stocks." (2013), *Environmental and Resource Economics* Vol 56, Issue 1, pp 85-104

3. Juan Moreno-Cruz and David Keith, "Climate Policy under Uncertainty: A Case for Solar Geoengineering." (2013), *Climatic Change* Vol 121, Issue 3, pp 431-444

2. Juan Moreno-Cruz, Kate Ricke and David Keith. "A simple model to account for regional inequalities in the effectiveness of solar radiation management." (2012), *Climatic Change* Vol 110, Issue 3-4, pp 649-668

1. David Keith and Juan Moreno-Cruz, "Pitfalls of coal peak prediction." (2011), *Nature* 469, 472

Book Chapters

7. Juan Moreno-Cruz. "Teaching feminist economics to challenge the hidden assumptions in economics." (2023), in *Teaching Environmental Justice* pp 228-232 Edward Elgar Publishing

6. Sikina Jinnah and Juan Moreno-Cruz. "Should solar geoengineering be used to address climate change? An ethics bowl-inspired approach." (2023), *Teaching Environmental Justice* pp 103-120 Edward Elgar Publishing

5. Soheil Shayegh, Garth Heutel and Juan Moreno-Cruz, "Regulating Geoengineering: International Competition and Cooperation." (2021), in *Climate Geoengineering: Science, Law and Governance* pp 229-247

4. Kate Ricke and Juan Moreno-Cruz, "Geo-Wedges: A Portfolio Approach to Geoengineering the Climate." (2020), in *Volume 9 Renewable Energy and the Environment* Trevor Letcher, ed. Elsevier.

3. Tony Harding and Juan Moreno-Cruz, "Economics of Geoengineering." (2018), in *Managing Global Warming: an interface of technology and human issues* Trevor Letcher, Ed. Elsevier

2. Juan Moreno-Cruz, Kate Ricke and Gernot Wagner, "The Economics of Climate Engineering." (2015), in Geoengineering Our Climate: Science, Ethics and Governance. EarthScan.

1. Scott Barrett and Juan Moreno-Cruz, "The alternatives to unconstrained climate change: Emission reductions versus carbon and solar geoengineering." (2015), *Towards a Workable and Effective Climate Regime* ed. Scott Barrett, Carlo Carraro, Jaime de Melo

Reports

3. Field, C; Cheung, W; Dilling, L; Frumhoff, P; Greely, H; Hordequin, M; Hurrell, J; Light, A; Lin, A; MacMartin, D; McHenry, R; Moreno-Cruz, J; et al. (2021). "Reflecting Sunlight: Recommendations for Solar Geoengineering Research and Research Governance." pp 328. National Academy of Sciences

2. David Keith and Juan Moreno-Cruz, "Is the Photovoltaic Learning Curve Flattening?" (2011), NearZero.

1. Juan Moreno-Cruz, "A Sustainable Policy Making - Energy System for Colombia." (2004), IIASA IR 009

Working papers

9. Dsouza KB, Watt GA, Leonenko Y, Moreno-Cruz J. "Structuring Collective Action with LLM-Guided Evolution: From Ill-Structured Problems to Executable Heuristics." arXiv preprint arXiv:2509.20412. 2025 Sep 24.

8. Dsouza KB, Ofosu E, Amaogu DC, Pigeon J, Boudreault R, Maghoul P, Moreno-Cruz J, Leonenko Y. "BoreaRL: A Multi-Objective Reinforcement Learning Environment for Climate-Adaptive Boreal Forest Management." arXiv preprint arXiv:2509.19846. 2025 Sep 24.

7. Dsouza KB, Watt GA, Leonenko Y, Moreno-Cruz J. "Bridging Farm Economics and Landscape Ecology for Global Sustainability through Hierarchical and Bayesian Optimization." arXiv preprint arXiv:2508.06386. 2025 Aug 8.

6. Ofosu E, Dsouza KB, Amaogu DC, Pigeon J, Boudreault R, Moreno-Cruz J, Maghoul P, Leonenko Y. "Boreal Afforestation's Underestimated Cloud Influence on Earth's Energy Imbalance." arXiv preprint arXiv:2508.09295. 2025 Aug 12.

5. Ofosu E, Dsouza KB, Amaogu DC, Pigeon J, Boudreault R, Moreno-Cruz J, Maghoul P, Leonenko Y. "Climate benefits of afforestation and reforestation with varying species mixtures and densities in the north-western boreal lands." arXiv preprint arXiv:2506.03300. 2025 Jun 3.

4. Erik Johnson and Juan Moreno-Cruz, "Air-quality and Health Impacts of Electricity Congestion." (2024), CESifo Working Paper

3. Juan Moreno-Cruz, Gernot Wagner and David Keith, "An Economic Anatomy of Optimal Climate Policy." (2017), Harvard Kennedy School Working Paper RWP17-028.

2. Massimo Tavoni, Valentina Bosetti, Soheil Shayegh, Drouet, L., Johannes Emmerling, Fuss, S., Timo Goeschl, Guivarch, C., Lontzek, T.S., Manoussi, V. and Juan Moreno-Cruz, "Challenges and opportunities for integrated modeling of climate engineering." (2017).

1. Juan Moreno-Cruz and M. Scott Taylor, "Back to the Future of Green-Powered Economies." (2012), NBER Working Paper WP 18236

Conferences

33. "The Spatial Economy and Energy Transitions in the Long Run," Urban Economics Association Meetings, Montreal, October 3-4, 2025

32. "Energy Transitions in the Long Run: Theory and Evidence from English Coal," Canadian Economic Association Meetings. Montreal, May 30, 2025

31. "A Unifying Theory of Foreign Intervention in Domestic Climate Policy" APAMM 2023, Nov 9-11 Atlanta, USA 2023

30. "The Role of Narratives of Care in Sustainable Consumption" CANSEE 2023, Toronto, Canada, Oct 11-13 2023

29. "The Hegemon and the Free-Driver." Canadian Economic Association Meetings, Ottawa, Canada, 2022

28. "ECW Keynote." Canadian Resource and Environmental Economics Association Meetings, Ottawa, Canada, 2022

27. "Solar Geoengineering and Learning." CESifo Area Conference Energy and Environment, Munich [Zoom], Germany, 2021

26. "The Hegemon and the Free-Driver." Latin American Energy and Resource Economics, Bogota [Zoom], 2022

25. "Adaptation to Climate Change by Heterogeneous Agents." Canadian Resource and Environmental Economics Association Meetings, Charlottetown, Canada, 2019

24. "American Slavery and the Repeal of the Corn Laws in England." Canadian Economic Association Meetings, Banff, Canada, 2019

23. "Adaptation to Climate Change by Heterogeneous Agents." Climate Change Research Workshop, Ottawa, Canada, 2019

22. "Solar Geoengineering and Learning." World Congress of Energy and Resource Economists, Gothenburg, Sweden, 2018

21. "Climate Tipping Points and Solar Geoengineering." EAERE Meetings, June 22-25, Zurich, Switzerland

20. "The environmental effects of electricity congestion." AESS Meetings, June 8-11, Washington D.C.

19. "Climate Tipping Points and Solar Geoengineering." Research Frontiers in the Economics of Climate Change October 9-10, SEEPAC, Stanford University, Stanford, California

18. "Climate Tipping Points and Solar Geoengineering." Thresholds, Tipping Points and Random Events in Dynamic Economic Systems July 27-28, Howard H. Baker Jr. Center for Public Policy University of Tennessee, Knoxville, TN

17. "Solar Geoengineering and the Social Cost of Carbon" 3rd Northeast Workshop on Energy Policy and Environmental Economics, May 21-22,Yale, New Haven, CT

16. "Solar Geoengineering and the Social Cost of Carbon" Spring Meetings NBER EEE, March 2015, Boston, MA.

15. "Trade Integration and the Fragility of Trade Relationships: Theory and Empirics" Empirical Investigations in Trade and Investment, March 17-19, Bali, Indonesia

14. "The Environmental Impacts of Electricity Congestion" Southern Economic Meetings, November 2014, Atlanta, GA.

13. "Hydraulic Fracturing Practices Explored Through County Demographics in Texas" APPAM Fall Conference, November 2014, Albuquerque, NM.

12. "New World Crops and African Slavery" Canadian Economic Meetings, May 2014, Vancouver, BC, Canada.

11. "A Spatial Approach to Energy Economics" SITE Summer Workshop, Stanford University, Stanford, August 12-13, 2013

10. "Back to the Future of Green-powered Technologies" NBER Summer Institute, Boston, July 22-23, 2013

9. "A Spatial Approach to Energy Economics" AERE Summer Conference, Banff, June 6-8, 2013

8. "Long-term environmental problems and strategic intergenerational transfers," Canadian Economic Association Meetings, Ottawa, Ontario. June 2nd - June 5th, 2011.

7. "Climate policy under uncertainty: a case for geoengineering" World Congress of Environmental and Resource Economics, Montreal, Quebec. June 28th -July 2nd, 2010.

6. "Geoengineering and Catastrophic Climate Change" Canadian Economic Association Meetings, Quebec City, Quebec. March 28th - 30th, 2010.

5. "The Long and Short of Climate Change: Abatement vs. Geoengineering." National Bureau of Economic Research, NBER Summer Institute Environmental Workshop (Short-presentation). Boston, Massachusetts. July 20th - 21st, 2009.

4. "The Simple Economics of Geoengineering." Technology Management Policy Graduate Consortium. Vancouver, British Columbia. June 22nd - 24th, 2009.

3. "Cost-effective Groundwater Protection as a Dynamic Game." CAES-NAREA meetings. Quebec City, Quebec. June 30th - July 1st, 2008.

2. "Geoengineering under Uncertainty." Technology Management Policy Graduate Consortium, Utrecht, June 22nd - 25th, 2008.

1. "Geoengineering and Economic Growth: Making Climate Change Irrelevant or Buying Time." International Energy Workshop, Stanford University. Stanford, California. June 27th, 2007.

Invited Seminars

50. Multistakeholder Consultative Workshop on Solar Radiation Modification: Knowledge Sharing and Inclusive Exchange, United Nations Environment Program, 9-10 September 2025

49. Consultative Workshop and Science-Policy Dialogue on Solar Radiation Modification (SRM), 19-20 May 2025, Geneva, United Nations Environment Program and World Meteorological Organization, Switzerland

48. "The Repeal of the Corn Laws in 1846 and its Impact on Antebellum America," Queen's University, April 25, 2025

47. "Back to the Future of Green Powered Economies" Wilfrid Laurier University, November 29, 2024

46. "A Unifying Theory of Foreign Intervention in Domestic Climate Policy" CIREQ-CIRANO Interdisciplinary Day on Geoengineering, Montreal, April 26, 2024

45. "Monitoring Solar Geoengineering" International Monitoring for Solar Radiation Modification, April 24-26, 2024, Duke University, Durham, NC

44. "Carbon capture and storage and enhanced oil recovery: a two-sided market story." Sloan CCUS Economics and Policy Workshop, Austin [Zoom], 2022

43. "The Hegemon and the Free-Driver." Resources for the Future Solar Geoengineering Research, Washington D.C. [Zoom], 2022

42. "Solar Geoengineering Clubs." Workshop on environmental clubs and trade measures, Quebec City, Canada, 2022

41. "The Economics of Carbon Dioxide Removal." NASEM Ocean-based CDR Workshop Part 1, Washington D.C. [Zoom], 2021

40. "Solar Geoengineering in Integrated Assessment Models and Optimal Policy." Solar Geoengineering Policy Seminar Series at the Harvard Kennedy School, Cambridge [Zoom], 2021

39. "The Role of Solar Geoengineering in Climate Policy." Harvard Kennedy School Energy Policy Seminar, Cambridge [Zoom], 2021

38. "The impacts of climate change on tourism," World Bank Seminar, [Zoom] 2021

37. "The Repeal of the Corn Laws and its Impact on Antebellum America." Seminar Series Economics Department Appalachian State University, Boone [Zoom], 2020

36. "Balancing Mitigation and Solar Geoengineering." SRM Dialogues Resources for the Future, Washington D.C. [Zoom], 2020

35. "The Repeal of the Corn Laws and its Impact on Antebellum America." Seminar Series Economics Department Southern Methodist University, Dallas [Zoom], 2020

34. "Energy Efficiency in General Equilibrium with Input-Output Linkages." Seminar Series Economics Department West Virginia University, Morgantown [Zoom], 2020

33. "Energy Efficiency in General Equilibrium with Input-Output Linkages." Seminar Series Economics Department University of Ottawa, Ottawa, Canada, 2019

32. "Solar Geoengineering Science and Economics." Science Cafe, Leipzig, Germany, 2019

31. "Use of IAM to Design Solar Geoengineering Policy." Summer School in Solar Geoengineering, Banff, Canada, 2019

30. "American Slavery and the Repeal of the Corn Laws in England." Empirical Investigations in International Trade, Tokyo, Japan, 2018

29. "Do Pilots and Demonstration Projects Work? Evidence from a Green Building Program." Northeast Workshop on Energy Policy and Environmental Economics, New York, 2018

28. "Economics of Geoengineering." Faculty of Law, University of Calgary, 2018

27. "Back to the Future of Green-powered Economies." Seminar Series School of Forestry Yale University, New Haven. 2018

26. "An Economic Anatomy of Optimal Climate Policy" University of Kiel, October 16-18, Kiel, Germany.

25. "Integrated Assessment Models of Climate Engineering: Brief History and a Look Ahead" Gordon Research Conference, July 23-28, Portland, Maine.

24. "Back to the Future of Green-Powered Economics." Appalachian State University, April 21, Boon, NC.

23. "Simple Analytics of Climate Change Induce Migration." RSMAS, University of Miami, April 18, Miami, FL.

22. "The environmental effects of electricity congestion." Engineering and Public Policy Department, Carnegie Mellon University, November 28, Pittsburgh, PA.

21. "The Economics of Solar Radiation Management." SRMGI Brazil, November 21-22, Sao Pablo, Brazil.

20. "Governing the Free-Driver." FEEM Workshop on Modeling Climate Engineering, November 3-4, Milano, Italy

19. "Climate Tipping Points and Solar Geoengineering." University of Alberta, March 18, Edmonton, Alberta, Canada

18. "Climate Tipping Points and Solar Geoengineering." Harvard Seminar in Environmental Economics and Policy, Nov 4, Harvard University, Cambridge, Massachusetts

17. "Trade Integration and the Fragility of Trade Relationships" 3rd Advances in International Trade Workshop, November 2014, Atlanta, GA.

16. "Solar Geoengineering: International and Intergenerational Equity — An Economic Perspective" Climate Policy Seminar, Earth Institute, Columbia University, New York. November 13th, 2013

15. "Solar Geoengineering: International and Intergenerational Equity — An Economic Perspective" 24th U.S. Kavli Frontiers of Science, Irvine. November 2nd, 2012

14. "Back to the Future of Green Powered Economies," Georgia State University, Atlanta. October 2nd, 2012

13. "Back to the Future of Green Powered Economies," University of Georgia, Athens. September 18th, 2012

12. "Back to the Future of Green Powered Economies," Georgia Institute of Technology, Atlanta. September 18th, 2012

11. "Long-term environmental problems and strategic intergenerational transfers," Department of Geography and Earth Sciences at University of North Carolina, Charlotte. Feb 18th , 2012.

10. "A game-theoretic analysis of coalitions to engineer climate" Climate and Energy Decision Making Center, Pittsburgh, Pennsylvania March 18th-19th, 2012

9. "An Energetic Approach to Energy Transitions," Macro Economics and the Environment: Climate Change, Policy Design and Sustainability, Tempe, Arizona. Thursday, May 5, 2011

8. "Geoengineering: when and how much?" Climate Decision Making Center Annual Meeting, Pittsburgh, Pennsylvania. March 18th - 19th, 2010.

7. "Flexible Climate Policies: Abatement and Geoengineering." Plan Z Workshop. Fergus, Ontario. September 17th - 18th, 2009.

6. "Optimal climate policy with uncertain geoengineering." Climate Decision Making Center, Carnegie Melon University, Pittsburgh, PA. May 18th - 21st, 2009

5. "An impartial look at geoengineering." The Long Haul Workshop, Victoria, British Columbia. August 11th - 13th, 2008.

4. "Geoengineering and the value of information." Invited presentation, Liu Institute, University of British Columbia, Vancouver, British Columbia. June 3rd, 2008.

3. "Un sistema sostenible para la creacion de politicas energeticas." VI Congreso Internacional de Analisis y Mercados Energeticos, Medellin. 2003.

2. "A Sustainable Energy System for Colombia." Mid Summer Workshop Young Scientist Summer Program. Laxemburg. 2003.

1. "A Sustainable Energy System for Colombia." Third World Academy of Sciences. Trieste. 2003.

Opinion Columns:

1. Edmonton Journal "Methane mitigation could be Canada's next growth industry" https://edmontonjournal.com/opinion/columnists/opinion-methane-mitigation-could-be-canadas-next-growth-industry
2. National Observer "Canada and Germany should double down on their energy partnership" https://www.nationalobserver.com/2025/06/13/opinion/canada-germany-should-double-down-their-energy-partnership
3. The Hill Times "Where does Canada Stand on Geoengineering? Nobody knows": https://www.hilltimes.com/story/2024/06/12/where-does-canada-stand-on-geoengineering-nobody-knows/424914/
4. Calgary Herald "Canada should take advantage of the U.S. immigration debacle and capitalize on high-skilled labour fleeing the US": https://calgaryherald.com/opinion/columnists/canada-should-take-advantage-of-the-u-s-immigration-debacle-and-capitalize-on-high-skilled-labour-fleeing-the-us
5. The Hill Times "A successful low-carbon energy transition starts in cities and grows from there": https://www.hilltimes.com/story/2021/06/07/a-successful-low-carbon-energy-transition-starts-in-cities-and-grows-from-there/269105/
6. The Conversation "Solar geoengineering could limit global warming, but Canada should study risks and benefits first": https://theconversation.com/solar-geoengineering-could-limit-global-warming-but-canada-should-study-risks-and-benefits-first-162230
7. LSE Business Review "Solar geoengineering: what if countries could move the earth's thermostat?": https://blogs.lse.ac.uk/businessreview/2019/04/17/solar-geoengineering-what-if-countries-could-move-the-earths-thermostat/
8. VoxEU "Alternatives to emissions reduction: Using climate engineering to tackle global warming" https://cepr.org/voxeu/columns/alternatives-emissions-reduction-using-climate-engineering-tackle-global-warming

Teaching Experience

University of Waterloo, SEED

Year/Term	Course No.	Title	Enroll.
2025 F	ENBUS 103	Economics and Sustainability	154
2025 W	ENVS 220	Ecological Economics	126
2024 W	ERS 619/GEOG 669/INDEV 606	Energy Sustainability	18
2024 W	ENVS 220	Ecological Economics	137
2023 W	ERS 619/GEOG 669/INDEV 606	Energy Sustainability	32
2023 W	ENVS 220	Ecological Economics	108
2022 W	SUSM 603	Research Methods	15
2022 W	SUSM 702	Research Methods	17
2022 W	ERS 619/GEOG 669/INDEV 606	Energy Sustainability	29
2021 W	SUSM 603	Research Methods	31
2021 W	SUSM 702	Research Methods	21
2020 W	SUSM 603	Research Methods	20
2020 W	SUSM 702	Research Methods	15
2018 F	SUSM 702	Research Methods	20
2018 F	ERS 619/GEOG 669/INDEV 606	Energy Sustainability	17

Georgia Institute of Technology, School of Economics

Econ 6160: Econometric Analysis, Econ 4321: Tech and Entrepreneurship/Econ 6440: Economics of Technology, Econ 4813: Sports Economics, Econ 6106: Microeconomic Analysis, Econ 6380: Environmental Economics, Econ 7032: Macro of Innovation, Econ 7102: Environmental Economics

Students Supervised

Masters [n=5]

Name	Dates	Institution	Role
Fernanda Breña	2024–	University of Waterloo	Supervisor
Mohamed Yousuf	2021–2023	University of Waterloo	Co-Supervisor
Mingtao Xu	2013–2015	Georgia Tech	Co-supervisor
Sarah Porter	2011–2012	Georgia Tech	Supervisor
Xiaoqi Wang	2011–2013	Georgia Tech	Co-supervisor

Doctoral [n=13]

Name	Dates	Institution	Role
Geetam Saha	2024–	University of Waterloo	Supervisor
Isra Saeed	2020–	University of Waterloo	Supervisor
Kaylia Little	2018–	University of Waterloo	Supervisor
Blessing Ajayi	2021–2023	University of Waterloo	Supervisor
Farhan Latif	2021–2025	University of Waterloo	Co-Supervisor
Laura Blanco Murcia	2020–2024	University of Waterloo	Supervisor
Zixing Shen	2019–2024	University of Waterloo	Supervisor
Xi Mao	2015–2020	Georgia Tech	Supervisor
Tony Harding	2015–2020	Georgia Tech	Supervisor
Christopher Blackburn	2014–2019	Georgia Tech	Supervisor
Xuewei Yu	2011–2015	Georgia Tech	Co-supervisor
Gregory Macfarlane	2011–2014	Georgia Tech	Co-supervisor
Jenna McGrath	2013–2018	Georgia Tech	Co-supervisor

Doctoral Committees [n=10]

Name	Dates	Institution
Stephanie Cortinovis	2024–	University of Waterloo
Kasra Motlaghzadeh	2023–	University of Waterloo
Burgess Langshaw Power	2023–	University of Waterloo
Sarah Norton	2023–	University of Waterloo
Jackeline Ouellete	2021–	University of Waterloo
Nicole McCallum	2020–	University of Waterloo
David Billedeau	2021–2024	University of Waterloo
Tara Atleo	2021–2023	University of Waterloo
Raphael Ayambire	2021–2022	University of Waterloo

Professional Service

Internal

- 2025 – Faculty Research Council
- Acting Executive Director, Waterloo Climate Institute 2024
- Associate Director, Waterloo Climate Institute, 2022-2023
- 2024 University Research Chair Search Committee
- 2021 Ontario Energy Chair Search Committee
- 2023 SACA assistant professor in Sustainable finance and/or ESG
- 2021 SACA Lecturer in Sustainability and Financial Management

External

- **Board Member:** Canada Climate Institute, Mitigation Panel
- **Co-Editor:** Contemporary Economic Policy (2020-Current)
- Academic Editor, PLOS Sustainability Transformation (2025 - Current)
- **Advisory Panel Member:** Environmental Research Letters (2025 – Current)
- **Editorial Board:** Journal of Industry Competition and Trade (2022-Current), Frontiers in Climate Economics (2020-Current), Frontiers in Environmental Economics and Management (2020-Current)
- **Referee for journals:** Quarterly Journal of Economics, Journal of the Association of Environmental and Resource Economists, Nature Communications, Proceedings of the National Academy of Sciences, Journal of Economic Behavior and Organization, Anthropocene Review, Canadian Journal of Economics, Climate Policy, Climatic Change Journal, Contemporary Economic Policy, Ecological Economics, Energy Journal, Energy Policy, Energy and Environmental Economics, Environment and Development Economics, Environmental Research Letters, Environmental Science and Technology, Frontiers, Journal of Environmental Economics and Management, Nature Climate Change, Socio-economic Planning Sciences.
- **Referee for grants applications:**
  - DEGREES Socio-Political Fund (2023-2024)
  - Major Innovation Fund of Alberta (2022)
  - Energy and Environment program at the Alfred P. Sloan Foundation (2021)
  - National Science Foundation (NSF) for the programs "Environmental Sustainability, Energy and Industrial Ecology Panel" and "Dynamics of Coupled Natural and Human Systems" (2016)
  - German Federal Ministry for Education and Research (BMBF) for the program "Economics of Climate Change" (2016)
  - Ivan Allen College of Liberal Arts "Small Research Grants Program" (2013-2018)

Media Coverage

1. Global News "Solar Geoengineering: Can it solve the climate crisis" https://globalnews.ca/video/10443124/solar-geoengineering-can-it-solve-the-climate-crisis
2. The Atlantic "Playing God with the Atmosphere": https://www.theatlantic.com/science/archive/2024/04/dubai-oman-flooding-cloud-seeding-geoengineering/678114/?gift=TC-umliihxh31hyjiYnixS37jkjSayVo-m3IBk2uBEo&utm_source=copy-link&utm_medium=social&utm_campaign=share
3. Agence France-Press "Stratospheric aerosol injections not 'root cause' of global warming" https://factcheck.afp.com/doc.afp.com.349J6TQ
4. New York Times "It Seems Odd That We Would Just Let the World Burn": https://www.nytimes.com/2021/07/15/opinion/climate-change-energy-infrastructure.html
5. Washington Post "Leave Africa's Carbon Emissions Alone": https://www.washingtonpost.com/business/energy/leave-africas-carbon-emissions-alone/2022/11/15/90f07bcc-64ab-11ed-b08c-3ce222607059_story.html

6. Quirks and Quarks, CBC "Scientists say we don't know enough about the potential of using geoengineering to fight climate change": https://www.cbc.ca/radio/quirks/apr-24-mars-helicopter-narwhal-tusks-and-pollution-t-rex-in-their-billions-and-more-1.5998160/scientists-say-we-don-t-know-enough-about-the-potential-of-using-geoengineering-to-fight-climate-change-1.5998164

7. CTV News "COP26 has 'mountain to climb' with world still set for 2.4C warming": https://www.ctvnews.ca/climate-and-environment/cop26-has-mountain-to-climb-with-world-still-set-for-2-4c-warming-1.5658419

8. Bloomberg "We Won't Know If Solar Geoengineering Is Working": https://www.bloomberg.com/news/articles/2021-02-09/we-won-t-know-if-solar-geoengineering-is-working

9. Discover Magazine "The Planet-wide Problem That Is Solar Geoengineering": https://www.discovermagazine.com/technology/the-planet-wide-problem-that-is-solar-geoengineering

10. NPR Short Wave "Who Should Control Earth's Thermostat?": https://www.npr.org/2021/05/20/998710686/who-should-control-earths-thermostat

11. UWaterloo News "Our options for saving the Earth are becoming riskier": https://uwaterloo.ca/news/global-impact/our-options-saving-earth-are-becoming-riskier

12. Financial Post "End of the road? Quebec's goal to ban gas-guzzling cars latest move to hasten oil's decline": https://financialpost.com/commodities/energy/end-of-the-road-quebecs-goal-to-ban-gas-guzzling-cars-latest-move-to-hasten-oils-decline

13. Business Insider "Any hope of keeping Earth habitable now requires sucking carbon back out of the atmosphere, a new study found": https://www.businessinsider.com/climate-change-too-late-carbon-capture-needed-2020-11

14. The Narwhal "Trans Mountain, Coastal GasLink, Keystone XL: where things stand with Canada's pipeline projects": https://thenarwhal.ca/trans-mountain-coastal-gaslink-keystone-xl-canada-pipeline-projects/

15. CTV news "Researcher finds significant pollutant has dropped 30-40 per cent in major Ontario cities": https://kitchener.ctvnews.ca/researcher-finds-significant-pollutant-has-dropped-30-40-per-cent-in-major-ontario-cities-1.4905765

16. IFL Science "These Are The Top Cities People Will Relocate To After Losing Their Homes To Sea Level Rise": https://www.iflscience.com/these-are-the-top-cities-people-will-relocate-to-after-losing-their-homes-to-sea-level-rise-54846

Work Experience in Colombia

Energy and Natural Gas Regulatory Commission: Advisor, 2004-2005

Responsibilities: Development of the regulatory framework to bring electricity to rural areas in Colombia.
Development of the regulatory framework for distributed generation in Colombia.
Study of the retail electricity system in Colombia.

Consultoria Colombiana S.A.: Engineering Assistant, 2002

Responsibilities: Power systems designer and database manager.

Citizenship	Colombian, Permanent Resident Canada

Last updated: March 3, 2026