Juan B. Moreno-Cruz

ADDRESS

School of Economics
Georgia Institute of Technology
Old CE Building Room 319
221 Bobby Dodd Way
Atlanta, Georgia
USA 30332

Telephone: (404) 385-1100

E-mail: morenocruz@gatech.edu

Web: jmorenocruz.gatech.edu

CITIZENSHIP

Colombian.
Permanent Resident US.

EDUCATION

Ph.D. Economics, University of Calgary, 2010.

Thesis: "Essays on the Economics of Geoengineering"

Advisors: Professors David Keith and Sjak Smulders

M.Sc. Electrical Engineering, Universidad de Los Andes, 2004.
B.Sc. Electrical Engineering, Universidad de Los Andes, 2003.

RESEARCH INTERESTS

Energy, Environmental and Natural Resources Economics.
Technological Change, Economic Growth and Institutions.
Climate Change Economics and Climate Engineering.

CURRENT POSITION

Assistant Professor School of Economics — Georgia Institute of Technology.
Since August 2011

CURRENT ACADEMIC APPOINTMENTS

Visiting Researcher in the Department of Global Ecology — Carnegie Institution for Science, Stanford. Since October 2014

Brook Byers Fellow at the Brook Byers Institute for Sustainable Systems
Since July 2015

Researcher at the Center for Climate and Energy Decision Making — Engineering and Public Policy, CMU. Since August 2011

GRANTS

PI: Regional Industrial Structure, Economic Resilience and Energy Consumption: Comparative Evaluation, Historical Analysis and Pathway towards a More Sustainable Economy, NSF, 2015-2018 ($ 300,000) (John Crittenden, Co-PI)

Energy in an Information Age, Strategic Energy Institute, 2017 ($40,000)

Small Research Grants, Ivan Allen College, 2016 ($13,000)

Brook Bryers Fellowship 2015-2018 ($1500 per year, for three years)

Small Research Grants, Ivan Allen College, 2014 ($18,000)

Small Research Grants, Ivan Allen College, 2013 ($12,000)

Honors and Awards

Kavli Frontiers of Science Fellow, National Academy of Sciences, 2016.

Class of 1969 Teaching Fellows, 2011.

Best Paper Presentation, Technology Management Policy Consortium, 2009.

Graduate Student Research Scholarship, Department of Economics, 2007.

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

Peer-reviewed Papers

"Revisiting the economics of climate change: the role of geoengineering." (2017) with Sjak Smulders. Forthcoming *Research in Economics*

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

"Adapting to rates versus amounts of climate change: A case of adaptation to sea-level rise" (2016) with Soheil Shayegh and Ken Caldeira. *Environmental Research Letters* vol 11, No 10.

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

"Opportunities for advances in climate change economics" (2016) with 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, R. Pindyck, S. Rose, I. Rudik, J. Stock, R. S. J. Tol. *Science* Vol 352, pp. 292-293

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

"Policy Thresholds in Mitigation" (2016) with Katharine L. Ricke, Jacob Schewe, Anders Levermann, Ken Caldeira. *Nature Geosciences* Vol 9 (5-6)

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

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

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

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

"Strategic incentives for climate geoengineering coalitions to exclude broad participation." (2013) with Katharine Ricke and Ken Caldeira. *Environmental Research Letters* 8 (1), 014021

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

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

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

Book Chapters

"The Economics of Climate Engineering." (2015) with Katharine Ricke and Gernot Wagner. Forthcoming in Geoengineering Our Climate: Science, Ethics and Governance. EarthScan.

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

Papers under review

"An Energy-centric Theory of Agglomeration.," (2016) with M. Scott Taylor. NBER Working Paper WP 22964

"Maize and Precolonial Africa." (2016) with Jevan Cherniwchan.

"Understanding the impacts of climate change on fertility" (2016) Gregory Casey, Soheil Shayegh, Juan B Moreno-Cruz, Martin Bunzl, Oded Galor and Ken Caldeira.

"Air pollutants emission from economic sectors in China: A linkage analysis" (2016) Yuan Wang, Nan Lai, Jian Zuo, John Crittenden,Yi Jin, and Juan Moreno-Cruz.

"Effects of carbon-tax revenue maximization on CO2 mitigation" (2016) Rong Wang, Juan Moreno-Cruz and Ken Caldeira.

"Regional Industrial Structure and Energy Use: Decomposition Analysis for U.S. States." (2014) with Xuewei Yu and John C. Crittenden.

Working papers

"Solar Geoengineering, Uncertainty, and the Price of Carbon." (2015) with Garth Heutel and Soheil Shayegh. R&R JEEM

"Air-quality and Health Impacts of Electricity Congestion." (2015) with Erik Johnson.

"Trade Integration and the Fragility of Trade Relationships: Theory and Empirics" (2015) with Tibor Besedeš and Volker Nitsch.

"Economic Diversity and Economic Resilience: A Regional Comparative Analysis of U.S. States between 1997 and 2010." (2014) with Xuewei Yu and John C. Crittenden.

"A Spatial Approach to Energy Economics," (2014) with M. Scott Taylor. NBER Working Paper WP 18908

"Back to the Future of Green-Powered Economies," (2012) with M. Scott Taylor. NBER Working Paper WP 18236

Letters and Reports

"Modelling the effects of climate engineering" (2106) with David Keith and Gernot Wagner. *Science* 352, 1526-1527

"Is the Photovoltaic Learning Curve Flattening?" (2011) with David W. Keith. NearZero.

"Pitfalls of coal peak prediction" (2011) with David Keith. *Nature* 469, 472

"A Sustainable Policy Making - Energy System for Colombia," IIASA IR 009, 2004.

Book review

"Energy Market Restructuring and the Environment," Governance and Public Goods in Globally Integrated Markets. Washington, DC: Helfred Publications, 2003.

Conferences and Invited Seminars

2016

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

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

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

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

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

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

2015

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

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

"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

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

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

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

2014

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

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

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

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

2013

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

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

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

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

2012

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

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

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

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

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

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

2011

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

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

2010

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

"Geoengineering and Catastrophic Climate Change" CEA Meetings, Quebec City, Quebec. March 28th - 30th, 2010.

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

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

"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.

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

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

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

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

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

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

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

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

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

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

Professional Service and Other Activities

Current Students: Mao Xi (PhD), Chris Blackburn (PhD), Tony Harding (PhD)
Past Students: Xuewei Yu (PhD. Committee Member), Greg Macfarlane (Masters and PhD Committee Member), Sarah Porter (Masters), Jingwen Qu (Masters), Mingtao Xu (Masters), Greg Macfarlane (Masters)

Service Committees: Recruiting committee (2013, 2015). School of Economics. Georgia Institute of Technology.

Ph.D. Admission Committee. School of Economics. Georgia Institute of Technology.

Conferences and workshops organized:
Fourth Annual Summer School on Climate Engineering, Cambridge, MA, USA. August 4th - 10th, 2013. Jointly organized by the University of Harvard and Heidelberg University.

Second Annual Summer School on Climate Engineering, Banff, AB, Canada. August 1st - 7th, 2011. Jointly organized by the University of Calgary, Heidelberg University and Carnegie Mellon University.

Conferences and workshops attended:
Geoengineering Our Climate: Science, Ethics and Governance. Ottawa January 18th - 20th, 2012

Solar Geoengineering Scenarios Workshop, Yale Climate and Energy Institute. September 9th - 11th, 2011

Summer School on Global Governance of Climate Engineering, Heidelberg. July 12th - 26th, 2010.

Asilomar International Conference on Climate Intervention Technologies. Pacific Grove California, March 22nd - 26th, 2010.

Referee for:
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 Science and Technology, Journal of Environmental Economics and Management, Nature Climate Change, Socio-economic Planning Sciences.

Academic Experience

Georgia Institute of Technology, School of Economics

Assistant Professor (Term, Evaluations out of 5)

Econ 6160, Econometric Analysis (Spring 2016, 4.4)

Econ 4321: Tech and Entrepreneurship/Econ 6440: Economics of Technology (Spring 2016, 4.4)

Econ 4813, Sports Economics (Spring 2013, 4.7) (Spring 2015, 4.4)

Econ 6106, Microeconomic Analysis (Fall 2011, 4.12) (Fall 2012, 4.11)(Fall 2014, 3.8)(Fall 2015, 4.3)

Econ 6380, Environmental Economics (Spring 2012, 5) (Spring 2012, 4.875)

Econ 7032, Macro of Innovation (Fall 2011, 4.75) (Fall 2012, 4.4) (Fall 2013, NA) (Fall 2014, 4.3) (Fall 2015, 4.7)

Econ 7102, Environmental Economics (Fall 2012, 5)

Universidad de Los Andes

Invited Lecturer: Advanced Microeconomic Theory (Undergrad) (Summer 2012)

University of Calgary, Energy and Environmental Systems Group

Post-doctoral fellow (January 2010 - August 2011)

University of Calgary, Department of Economics

Instructor: Environmental Economics (Spring 2010)

Research Assistant: David W. Keith (2005-2009), M. Scott Taylor (2009), Jean François Wen (2008-2009), Sjak Smulders (2007-2008),

Ted Horbulyk (2008).

Universidad de Los Andes, Department of Electrical Engineering

Instructor: Linear Algebra and Optimization, Fall 2004.

Research Assistant: Angela Cadena (2002-2003), Maria Rueda de Torres (2001-2002).

Non-academic Experience

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.

Languages

Spanish: Mother language.
English: Excellent.

Last updated: January 28, 2017