Stanford

Edgar Virgüez

Research Engineer

Energy Science & Engineering

Curriculum Vitae available Online Resume available Online

Bio

BIO

Edgar Virgüez is a Research Engineer in the Department of Energy Science & Engineering at Stanford University, where his work advances reliable, low-carbon energy systems. His research has resulted in more than 40 scholarly outputs and over 1,000 citations in leading journals, including Energy & Environmental Science, PNAS, and Science. He serves on the Editorial Board of Environmental Research: Energy and, in 2026, was awarded the IOP Publishing Editorial Excellence Award in recognition of his individual excellence and leadership, as one of 10 outstanding board leaders among more than 1,000 members across over 100 IOP journals. Beyond his editorial service, he contributes as a reviewer for more than 15 journals, including Nature Communications and Nature Sustainability.

Complementing his scholarship, Dr. Virgüez serves as Managing Director of the $23 million U.S. Department of Energy-funded EARNEST Consortium, led by Stanford University. This initiative brings together 16 universities, 3 national laboratories, and 2 research organizations to advance solutions for the future of the U.S. electricity system. Beyond EARNEST, he has worked with the World Bank and the Inter-American Development Bank, contributing expertise in life cycle assessment, cost-benefit analysis, and decarbonization strategies for governments.

Globally, Dr. Virgüez contributes to major energy and climate initiatives. Since 2024, he has served as an Expert Advisor to the Earthshot Prize, founded by Prince William, reviewing nominations in the Fix Our Climate category and assessing their potential for innovation, impact, and scalability toward a $1.25 million annual award. He also serves in advisory roles for institutions such as Schmidt Sciences, evaluating research programs advancing scalable decarbonization and energy systems solutions, and provides expert review of energy-related reports for organizations including the International Energy Agency.

For his contributions, Dr. Virgüez has received 22 awards totaling $34,365. Among his honors are the Science for Solutions Award (2025) from the American Geophysical Union, recognizing significant contributions to applying Earth and space science to societal challenges, and the K. Patricia Cross Future Leaders Award (2020) from the Association of American Colleges and Universities, which highlights scholars with strong promise as future leaders in higher education. As an educator, Dr. Virgüez has taught 17 courses to approximately 600 students, with consistently outstanding evaluations and recognition for innovative teaching. In 2021, he received the Graduate School Dean’s Award for Excellence in Teaching from Duke University, the institution’s highest teaching honor for graduate scholars.

At the highest levels of university governance, he previously served on Duke University's Board of Trustees, the institution's top governing body and one of its most selective and distinguished leadership appointments. He continues this leadership through his service on the Nicholas School of the Environment Board of Visitors and the Climate Commitment Campaign Board at Duke University.

Dr. Virgüez holds a Ph.D. in Environmental Sciences and Policy, with a Certificate in College Teaching (2022), and an M.A. in Environment, with a Geospatial Analysis Certificate (2018), from Duke University. He also holds an M.Sc. in Environmental Engineering (2010) and dual B.Sc. degrees in Chemical and Environmental Engineering (2009) from Universidad de los Andes. He has completed professional certificates in Australia, the United States, and Colombia, and has received more than $795,000 in competitive scholarships and fellowships, including support from the Sloan Foundation.

ACADEMIC APPOINTMENTS

- Research Engineer, Energy Science & Engineering

HONORS AND AWARDS

- Editorial Excellence Award - Environment and Energy, Institute of Physics (IOP) Publishing (2026)
- Science for Solutions Award, American Geophysical Union (AGU) (2025)
- Best Student Paper Award (Energy and Environment Specialty Group), American Association of Geographers (2022)
- U.S. Carbon Program Leadership Award, U.S. Carbon Cycle Science Program & North American Carbon Program (2022)
- LatinX Awards: Excellence in Activism Award, Duke University (2022)
- Dean's Award for Excellence in Teaching (<0.1% of Duke University's Ph.D. students), Duke University Graduate School (2021)
- Forever Duke Student Leadership Award (<0.5% of Duke University Class of 2021), Duke University & Duke Alumni Association. (2021)
- Chron15: 15 leaders, pioneers, and icons at Duke University, Duke University Chronicle (2021)
- International Awards Program: Graduate/Professional Academic Wizard of the Year, Duke University International House (2021)
- Advancing Diversity and Inclusion Award (Energy and Environment Specialty Group), American Association of Geographers (2021)
- K. Patricia Cross Future Leader Award, Association of American Colleges and Universities (2020)
- Australia Awards International Fellow, Australia's Department of Economic Development, Jobs, Transport and Resources (2015)
- Procter & Gamble's Prestige Award, Procter & Gamble (P&G) Colombia (2008)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Trustee (Board Member), Duke University (2022 - 2025)
- Expert Advisory Panel, Earthshot Prize (2024 - present)
- Executive Editorial Board Member, Environmental Research: Energy (2023 - present)
- Future Leaders Society Advisory Committee, American Association of Colleges and Universities (2022 - 2023)

PROFESSIONAL EDUCATION

- Ph.D., Duke University , Environmental Sciences and Policy (2022)
- Certificate, Duke University , College Teaching (2022)
- M.A., Duke University , Energy & Environment (2018)
- Certificate, Duke University , Geospatial Analysis (2018)
- M.Sc., Universidad de los Andes , Environmental Engineering (2010)
- B.Sc., Universidad de los Andes , Chemical Engineering & Environmental Engineering (double major) (2009)

SERVICE, VOLUNTEER, AND COMMUNITY WORK

- Nicholas School of the Environment Board of Visitors (3/26/2026)

- Board of Trustees (July 1, 2022 - 6/30/2025)
- Executive Editorial Board Member (June 1, 2023)
- Expert Advisory Panel (February 1, 2024)

LINKS

- LinkedIn Profile: https://www.linkedin.com/in/edgarvirguez/
- Personal Site: https://sites.duke.edu/edgarvirguez/

Publications

PUBLICATIONS

- **The effect of land costs on the economic and sustainability performance of solar photovoltaics in China.** *Proceedings of the National Academy of Sciences of the United States of America*
  Chen, S., Lu, X., Hao, J., Virgüez, E., Caldeira, K., Davis, S. J.
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- **Planning reliable wind- and solar-based electricity systems** *ADVANCES IN APPLIED ENERGY*
  Ruggles, T. H., Virguez, E., Reich, N., Dowling, J., Bloomfield, H., Antonini, E. G. A., Davis, S. J., Lewis, N. S., Caldeira, K.
  2024; 15
- **Copy-and-paste fixes can't decarbonize Global South cities** *Nature Cities*
  Virguez, E.
  2024; 1 (8): 492-493
- **How I balanced my Ph.D. research with opening doors for others** *Science*
  Virguez, E.
  2022; 662: 376
- **High-resolution data shows China's wind and solar energy resources are enough to support a 2050 decarbonized electricity system** *APPLIED ENERGY*
  Li, M., Virguez, E., Shan, R., Tian, J., Gao, S., Patino-Echeverri, D.
  2022; 306
- **Utility-scale photovoltaics and storage: Decarbonizing and reducing greenhouse gases abatement costs** *APPLIED ENERGY*
  Virguez, E., Wang, X., Patino-Echeverri, D.
  2021; 282
- **Variability of technology learning rates** *ADVANCES IN APPLIED ENERGY*
  Carlino, A., Wongel, A., Duan, L., Virguez, E., Davis, S. J., Edwards, M. R., Caldeira, K.
  2025; 20
- **Economic development, air conditioning and adaptation to warming** *ENVIRONMENTAL RESEARCH LETTERS*
  Wongel, A., Freese, L. M., Virguez, E., Davis, S. J., Caldeira, K.
  2025; 20 (12)
- **Renewable energy quality trilemma and coincident wind and solar droughts** *COMMUNICATIONS EARTH & ENVIRONMENT*
  Li, M., Ma, Q., Shan, R., Abdulla, A., Virguez, E., Gao, S., Patino-Echeverri, D.
  2024; 5 (1)
- **Oahu as a case study for island electricity systems relying on wind and solar generation instead of imported petroleum fuels** *APPLIED ENERGY*
  Covelli, D., Virgueez, E., Caldeira, K., Lewis, N. S.
  2024; 375
- **The Influence of Regional Geophysical Resource Variability on the Value of Single- and Multistorage Technology Portfolios.** *Environmental science & technology*
  Li, A. X., Virguez, E., Dowling, J. A., Wongel, A., Covelli, D., Ruggles, T. H., Reich, N., Lewis, N. S., Caldeira, K.

2024

- **Preventing bad behavior in academia.** *Science (New York, N.Y.)*
  da Cruz Albino, R., Brimble, M. A., Zdenek, C., Vandenbroeck, K., Masud, S., Zhang, X., Cosentino, M., Gupta, A., Abdul-Ghani, R., Gerarduzzi, C., Jackson, P., Oomen, R., Servais, et al
  2024; 385 (6704): 22-24
- **The climate sciences need representation from the Global South** *ONE EARTH*
  Virguz, E., Leon, L., Freese, L. M.
  2024; 7 (3): 370-373
- **Identification of reliable locations for wind power generation through a global analysis of wind droughts** *COMMUNICATIONS EARTH & ENVIRONMENT*
  Antonini, E. G. A., Virguez, E., Ashfaq, S., Duan, L., Ruggles, T. H., Caldeira, K.
  2024; 5 (1)
- **The role of dispatchability in China's power system decarbonization** *ENERGY & ENVIRONMENTAL SCIENCE*
  Li, M., Shan, R., Abdulla, A., Virguez, E., Gao, S.
  2024; 17 (6): 2193-2205
- **Changing outdated expectations.** *Science (New York, N.Y.)*
  Singh, G., Teng, D., Turki, H., Bouchard, L., Chen, Y., Chugh, M., Wen, J., Chen, E. Y., Bezerra, P., Wu, L., Huang, J., Wen, Q., Hartzell, et al
  2024; 383 (6678): 24-26
- **Reframing international students' success: Institutional responsibility for international student wellbeing and belongingness** *Supporting College Students of Immigrant Origin: New Insights from Research, Policy, and Practice*
  Suresh, M., Wagnon, J., Hall, T., Campos, R., Wakio, S., Virguez, E., Sperling, J.
  Cambridge University Press.2024; 1: 332-351
- **Opportunities and constraints of hydrogen energy storage systems** *Environmental Research: Energy*
  Dowling, J., Ruggles, T., Virguez, E., et al
  2024; 1 (3)
- **Disproportionate energy disruptions afflicted rural Hispanic households during winter storm Uri** *Environmental Research: Energy*
  Kumar, A., Ruggles, T., Virguez, E.
  2024
- **Low-carbon transition pathways of power systems for Guangdong-Hongkong-Macau region in China** *ENERGY & ENVIRONMENTAL SCIENCE*
  Liu, Z., Li, M., Virguez, E., Xie, X.
  2024; 17 (1): 307-322
- **Move up or move over: mapping opportunities for climate adaptation in Pakistan's Indus plains** *ENVIRONMENTAL RESEARCH LETTERS*
  Schmitt, R. J. P., Virguez, E., Ashfaq, S., Caldeira, K.
  2023; 18 (11)
- **NextGen Voices: Historic introductions.** *Science (New York, N.Y.)*
  Bismuth, K., Sharma, V., Powell, J. R., Tang, H., Cao, B., Huang, J., Patel, R. J., Bezerra, P., Zhang, X., Wen, Q., Oda, F. S., Verstiuk, O., Khan, et al
  2023; 382 (6666): 28-30
- **AI in search of human help** *SCIENCE*
  Heim, A., Bharani, T., Konstantinides, N., Powell, J., Srivastava, S., Cao, X., Agarwal, D., Waiho, K., Lin, T., Virgueez, E., Strielkowski, W., Uzonyi, A.
  2023; 381 (6654): 162-163
- **The Effect of Down-Cascade Re-Regulation on Alleviating the Flow Regime Alteration Induced by an Up-Cascade Reservoir** *WATER*
  Wang, Y., Wang, X., Virguez, E., Zheng, K., Hu, T., Mei, Y., Wang, H.
  2023; 15 (12)
- **The future of scientific societies.** *Science (New York, N.Y.)*
  da Silva, C. F., Virguez, E., Eker, S., Zdenek, C. N., Bergh, C., Gerarduzzi, C., Ge, Y., Klinger, M., Allareddy, V., Hoots, E., Henriquez, T., Waiho, K., D'Ippoliti, et al

2023; 380 (6640): 30-32

- **Guiding the deployment of electric vehicles in the developing world** *ENVIRONMENTAL RESEARCH LETTERS*
  Dioha, M. O., Lukuyu, J., Virguez, E., Caldeira, K.
  2022; 17 (7)
- **What I promised my mother.** *Science (New York, N.Y.)*
  Virguez, E.
  2022; 376 (6593): 662
- **Integrating wind and photovoltaic power with dual hydro-reservoir systems** *ENERGY CONVERSION AND MANAGEMENT*
  Wang, X., Virguez, E., Mei, Y., Yao, H., Patino-Echeverri, D.
  2022; 257
- **Energy storage reduces costs and emissions even without large penetration of renewable energy: The case of China Southern Power Grid** *ENERGY POLICY*
  Li, M., Shan, R., Virguez, E., Patino-Echeverri, D., Gao, S., Ma, H.
  2022; 161
- **Graduate student perspectives on transforming academia** *CONSERVATION SCIENCE AND PRACTICE*
  Sykora-Bodie, S. T., Jones, J., Hastings, Z., Lombardi, E., Barnett, M., Davis, O. N., Ferrari, O. M., Polanco, V., Hofner, A. N., Hunter, B., Ippolito, T., Krantz, W., Neyra, et al
  2022; 4 (1)
- **Embracing the value of cultural wealth from underrepresented groups** *Teaching Gradually: Practical Pedagogy and Classroom Strategies for Graduate Students by Graduate Student*
  Virguez, E.
  Stylus Publishing LLC.2021: 190-196
- **Clustering and dispatching hydro, wind, and photovoltaic power resources with multiobjective optimization of power generation fluctuations: A case study in southwestern China** *ENERGY*
  Wang, X., Virguez, E., Xiao, W., Mei, Y., Patino-Echeverri, D., Wang, H.
  2019; 189
- **New Index for Runoff Variability Analysis in Rainfall Driven Rivers in Southeastern United States** *JOURNAL OF HYDROLOGIC ENGINEERING*
  Wang, X., Virguez, E., Chen, L., Duan, K., Dong, Q., Ma, H., Mei, Y., Wang, H.
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- **Integrating wind, photovoltaic, and large hydropower during the reservoir refilling period** *ENERGY CONVERSION AND MANAGEMENT*
  Wang, X., Virguez, E., Kern, J., Chen, L., Mei, Y., Patino-Echeverri, D., Wang, H.
  2019; 198
- **Abating carbon emissions by means of utility-scale photovoltaics and storage: The Duke Energy Progress/Carolinas case study** *Cigre Conference*
  Virguez, E., Patino-Echeverri, D.
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- **Uncertainty of greenhouse gas emission models: A case in Colombias transport sector**
  Valenzuela, M. M., Espinosa, M., Virguez, E. A., Behrentz, E.
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- **Influence of driving patterns on vehicle emissions: A case study for Latin American cities** *TRANSPORTATION RESEARCH PART D-TRANSPORT AND ENVIRONMENT*
  Rodriguez, R. A., Virguez, E. A., Rodriguez, P. A., Behrentz, E.
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- **On the assessment of marginal life saving costs for risk acceptance criteria** *STRUCTURAL SAFETY*
  Fischer, K., Virguez, E., Sanchez-Silva, M., Faber, M. H.
  2013; 44: 37-46

- **Defining guidelines for the application of the marginal life saving costs principle for risk regulation**
  Fischer, K., Virguez-Rodriguez, E., Sanchez-Silva, M., Faber, M. H.
  edited by Faber, M. H., Kohler, J., Nishijima, K.
  CRC PRESS-TAYLOR & FRANCIS GROUP.2011: 444-451
- **Supporting decisions on global health and life safety investments**
  Faber, M. H., Virguez-Rodriguez, E.
  edited by Faber, M. H., Kohler, J., Nishijima, K.
  CRC PRESS-TAYLOR & FRANCIS GROUP.2011: 434-443