Pablo Busch

Ph.D. Energy Systems, M.Sc. Statistics & Public Policy, Industrial & Environmental Engineer
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EDUCATION

Stanford University — Stanford, CA
Postdoctoral Scholar – Stanford Doerr School of Sustainability & Stanford STEER — *Sep. 2025 – Present*
- Sustainable Mining Supply Chains
- Global Material Footrpint

University of California, Davis — Davis, CA
Ph.D. Energy Systems — *2023 – June 2025*
- Quantitative modeling of Demand and Supply for Energy Transition Minerals

M.Sc. Statistics - Data Science — *2021 – 2022*
- Outstanding Master's Student Award. GPA: 4.0

M.Sc. Environmental Policy and Management — *2020 – 2022*
- Environmental & Resource Economics
- Spatial Information Science

Pontificia Universidad Católica de Chile — Santiago, Chile
Civil Engineer of Industry, Diploma in Environmental Engineering — *2011 – 2016*
- Title conferred with maximum distinction
- Award for Best Student of the Hydraulic and Environmental Engineering Department
- Honor award, Highest GPA of the class (2014 and 2015)

PROFESSIONAL EXPERIENCE

Researcher — Apr. 2021 – Aug. 2025
University of California, Davis — *Davis, CA*
- **Institute of Transportation Studies** & **Energy and Efficiency Institute**
  - Developed a global critical mineral demand and supply model to evaluate supply risks associated with lithium-ion batteries decarbonization technologies
  - Developed a global trade supply chain model for electric vehicle production and policy scenarios
  - Analyzed lifecycle emissions assessment of hydrogen pathways to zero-carbon emission vehicles in California
  - Evaluated decarbonization strategies and policies for the cement & concrete sector

Policy Analyst — Sep. 2021 – Jun. 2022
Chile Lagos Limpios — *Davis, CA - Valdivia, Chile*
- Summarized policy lessons and impact metrics from Lake Tahoe conservation experience to protect North-Patagonian lakes

Senior Project Engineer — Aug. 2018 – Nov. 2020
GreenLab, Dictuc S.A. — *Santiago, Chile*
- **Air Quality**
  - Conducted an ecological study to analyze the relationship between air pollution ($PM_{2.5}$), derived mainly by wood combustion, and COVID-19 mortality rates in Chile
  - Designed the methodological guide for estimating atmospheric emissions from point sources in Chile
  - Executed a technical and economic analysis to implement an environmental policy instrument to improve air quality in the inner zone of the Valparaíso region
- **Life Cycle Assessment**
  - Designed and directed the development of a web tool of life cycle assessment in the packaging sector, using local data from the industry
- **Health & Risk Assessment**
  - Developed an automated model to calculate the national base incidence rates of mortality and morbidity for air pollution in Chile
  - Summarized the main risk perception challenges of hydrogen combustion technologies in the mining sector

Project Engineer Sep. 2016 – Jul. 2018
GreenLab, Dictuc S.A. *Santiago, Chile*

- **Climate Change & Air Quality**
  - Calculated the first national emissions inventory of short lived climate pollutants in Chile
  - Designed a handbook for the elaboration of emissions inventory in Chile
  - Improved the methodology for the estimation of health benefits derived from atmospheric pollution reductions
- **Environmental Economics**
  - Executed an econometric analysis for a contingent valuation study to estimate environmental benefits associated with adequate disposal of car waste, such as tires, motor oils and batteries
  - Conducted a specialized technical assistance in matters of information analysis of environmental inspection activities
- **Life Cycle Assessment**
  - Analyzed the social and economic impacts of a return and refund system on returnable containers for soft drinks

Research Internship Jan. 2016
Technische Universität Berlin *Berlin, Germany*

- Analyzed methodologies for life cycle assessment

SKILLS

Languages: Spanish Native, English Proficient, German Intermediate
Programming: Advanced in R, julia, Python, SQL, JavaScript D3, Git, LaTeX, VBA
Software: Advanced in R Studio, Visual Studio Code, MS Office, ArcGIS, QGIS, Tableau, MS SQL Server, Stata, Analytica

SCIENTIFIC ARTICLES

1. Santero, N., Nelson, L., Chen, Y., Meredith, M., **Busch, P.**, Kendall, A. (2026). Electrifying light vehicles in the United States shows emission reduction potential for all vehicle types and powertrains. *Communications Sustainability*
2. **Busch, P.**, Chen, Y., Ogbonna, P., Kendall, A. (2025). Effects of Demand and Recycling on the When and Where of Lithium Extraction. *Nature Sustainability*, 1-11.
3. **Busch, P.**, Pares, F., Tal, G., Kendall, A. (2025). Who Will Have Enough? Battery Mineral Demand and Sufficiency in Vehicle Producing Countries. *Environmental Science & Technology*, 59(45), 24392-24403
4. Chandra, M., **Busch, P.**, Pares, F., Tal, G. (2025). Paths of progress: Forecasting global electric vehicle demand amidst demographic and economic growth. *Transportation Research Part D: Transport and Environment*,147, 104928
5. **Busch, P.**, Kim, A., Miller, S.A., Murphy, C.W. (2025). Policy mechanisms to decarbonize cement production: through the lens of California. *Environmental Research: Infrastructure and Sustainability*, 5(2), 025003.
6. Pares, F., **Busch, P.**, Chandra, M., Tal, G. (2024). Shifting Manufacturing: Electric Vehicle Supply Strategy using the Model for International EV Trade. *Journal of Cleaner Production*, 144357.
7. **Busch, P.**, Rocha, P., Lee, K., Cifuentes, L., Tai, X. (2024). Short-term exposure to fine particulate pollution and elderly mortality in Chile. *Communications Earth Environment*, 5(1), 469.
8. **Busch, P.**, Pares, F., Chandra, M., Kendall, A., Tal, G. (2024). Future of Global Electric Vehicle Supply Chain: Exploring the Impact of Global Trade on Electric Vehicle Production and Battery Requirements. *Transportation Research Record*, 2678(11), 1468-1482.
9. Brandao, M., **Busch, P.**, Kendall, A. (2024). Life cycle assessment, quo vadis? Supporting or deterring greenwashing? A survey of practitioners. *Environmental Science: Advances.* 3(2), 266-273
10. **Busch, P.**; Kendall, A., Lipman, T. (2023). A systematic review of life cycle greenhouse gas intensity values for hydrogen production pathways. *Renewable and Sustainable Energy Reviews, 184*, 113588.
11. **Busch, P.**; Cifuentes, L.A., Cabrera, C. (2023). Chronic exposure to fine particles ($PM_{2.5}$) and mortality: Evidence from Chile. *Environmental Epidemiology. e253.*
12. **Busch, P.**; Kendall, A., Murphy, C.W., Miller, S.A. (2022). Literature review on policies to mitigate GHG emissions for cement and concrete. *Resources, Conservation and Recycling, 182*, 106278.

ACADEMIC EXPERIENCE

Scholar | *Resources for the Future* Sep. 2024 – Jun. 2025

- Research scholar at the Critical Minerals Research Lab, an interdisciplinary collaboration to ensure a reliable and equitable supply chain for critical minerals

Committee Member | *ENAMI, Chile* May – July 2024

- Participation as expert on the Chilean Committee for new Technologies for Lithium Extraction

Consultant | *Inter American Development Bank* March – June 2024

- Report on emerging energy supply chain opportunities for Latin America and the Caribbean

Conference Presentation | *TRB, Washington DC* Jan. 2024

- Future of Global Electric Vehicle Supply Chain: Exploring the Impact of Global Trade on Electric Vehicle Production and Battery Requirements

Awards

Dissertation Grant: National Center for Sustainable Transportation University Transportation Center. Award: $20,000 USD to complete dissertation titled "A quantitative model of critical mineral supply and demand for a clean energy system".

Most Downloaded Paper: Article "Literature review on policies to mitigate GHG emissions for cement and concrete" was the most downloaded paper from 2022-2024 in the journal *Resources, Conservation Recycling (RCR)*.