David Quiroz

170 Stocker Center, Ohio University, Athens, OH *740-597-9626* dquiroz@ohio.edu

PROFESSIONAL EXPERIENCE:

Assistant Professor, (August 2025 – Present) Department of Mechanical Engineering, Ohio University

Research Scientist, (April 2023 – August 2025) Department of Mechanical Engineering, Colorado State University

EDUCATION:

COLORADO STATE UNIVERSITY, Fort Collins, Colorado

Doctor of Philosophy, Mechanical Engineering (GPA 4.0/4.0) *April 2023*

- Dissertation Title: Integrated Environmental and Economic Evaluation of Algal Biofuels
- Research: Microalgae biofuels sustainability and risk assessment coupled with weather and reliability modeling, environmental impacts of biorefineries, water footprint accounting
- Academic Advisors: Jason C. Quinn (ME), Bryan Willson (ME), Bret Windom (ME), Kenneth Reardon (CE)

COLORADO STATE UNIVERSITY, Fort Collins, Colorado

Master of Science, Mechanical Engineering *August 2021*

- Thesis Title: Geographical Assessment of Algal Productivity and Water Intensity across the United States
- Research: Microalgae systems modeling coupled with geographically resolved life cycle assessment
- Academic Advisors: Jason C. Quinn (ME), Anthony Marchese (ME), Kenneth Reardon (CE)

ARKANSAS TECH UNIVERSITY, Russellville, Arkansas

Bachelor of Science, Mechanical Engineering *December 2018*

- Minor in Mathematics

RESEARCH EXPERIENCE:

Research Scientist, (April 2023 – August 2025) Department of Mechanical Engineering, Colorado State University, Fort Collins, CO

Doctoral Research, (August 2021 – April 2023) Department of Mechanical Engineering, Colorado State University

Intern Graduate III – Environmental Engineering, (November 2021 – February 2023) National Renewable Energy Laboratory, Strategic Energy Analysis Center, Impact Analysis Group, Remote

Masters Research, (May 2019 – July 2021) Department of Mechanical Engineering, Colorado State University

ARCHIVAL PUBLICATIONS:

1. Fariha, A., Bashir, S., **Quiroz, D.,** Miller, L., Kim, H., Wang, S., Kim, T., Jun, YS., Lee, S.S., Yang, Y. Antiscalants in Reverse Osmosis Concentrates: Impact, Removal Strategies, and Pathways to Zero Liquid Discharge. *ACS Environmental Science & Technology Engineering*, *2025*
2. Ryland, A., Chen, P., Zivojnovich, M., Kim, S., Davis, R., Eckels, T.P., Quinn, J.C., **Quiroz, D**. Techno-economic analysis and life cycle assessment of algal turf scrubbers treating wastewater effluent for renewable diesel production. *Algal Research,* 104459

3. Bashir, S., Athkia, F., Miller, L., **Quiroz, D.,** Young-Shin, J., Yang, Y., Kim, T. Antiscalant effects on pH-mediated electrochemical precipitation of scaling ions in brackish water reverse osmosis concentrates. *ACS EST Engg.* 2025, 5, 12, 3249–3261
4. **Quiroz, D.,** Greene, J.M., Limb, B. J., & Quinn, J. C. (2025). Prospective Life Cycle Assessment of Sustainable Aviation Fuel Systems. *Environmental Science & Technology.* 59, 36, 19269–19282
5. **Quiroz, D.,** McGowen, J., & Quinn, J. C. (2025). Techno-economic analysis of microalgae cultivation strategies: batch and semi-continuous approaches. *Algal Research, 90, 8, 104109*
6. Greene, J.M., **D. Quiroz.**, Limb, B.J, & Quinn J.C. (2025). Geographically Resolved Techno-Economic and Life Cycle Assessment Comparing Microalgae-Based Renewable Diesel and Sustainable Aviation Fuel in the United States. *Environmental Science & Technology, 59, 7, 3472–3483*
7. **Quiroz, D**., Ravi, V., Zhang, Y., Bhatt, A. & Heath, G. (2025). Conversion of herbaceous biomass to renewable hydrocarbon fuels: net greenhouse gas and air pollutant trade-offs. *ACS Environmental Science & Technology Air. ACS EST Air* 2, 2, 175–186.
8. **Quiroz, D.,** McGowen, J., & Quinn, J. C. (2024). Implications of pond reliability on the techno-economic and life cycle environmental impacts of algal biofuels. *Journal of Cleaner Production*, 469, 143178
9. **Quiroz, D**., Greene, J.M., Limb, B. J., & Quinn, J.C. (2023). Global Life Cycle and Techno-Economic Assessment of Algal-Based Biofuels. *Environmental Science & Technology, 57(31), 11541-11551.*
10. **Quiroz, D.**, Greene, J. M., & Quinn, J. C. (2022). Regionalized Life-Cycle Water Impacts of Microalgal-Based Biofuels in the United States. *Environmental Science & Technology, 56, 22, 16400 – 16409.* https://doi.org/10.1021/ACS.EST.2C05552
11. **Quiroz, D**., Greene, J. M., McGowen, J., & Quinn, J. C. (2021). Geographical assessment of open pond algal productivity and evaporation losses across the United States. *Algal Research*, *60*, 102483.
12. Greene, J. M., **Quiroz, D**., Compton, S., Lammers, P. J., & Quinn, J. C. (2021). A validated thermal and biological model for predicting algal productivity in large-scale outdoor cultivation systems. *Algal Research*, *54*, 102224.
13. Cruce, J. R., Beattie, A., Chen, P., **Quiroz, D.,** Somers, M., Compton, S., … Quinn, J. C. (2021). Driving toward sustainable algal fuels: A harmonization of techno-economic and life cycle assessments. *Algal Research*, Vol. 54, p. 102169.
14. Wilson, M. H., Shea, A., Groppo, J., Crofcheck, C., **Quiroz, D.,** Quinn, J. C., & Crocker, M. (2021). Algae-Based Beneficial Re-use of Carbon Emissions Using a Novel Photobioreactor: a Techno-Economic and Life Cycle Analysis. *Bioenergy Research*, *14*(1), 292–302.

PEER REVIEWED INVITED TECHNICAL SESSIONS (SPEAKER NAME IN *ITALIC*)**:**

1. *Huber, H*., Quinn, J.C., **Quiroz, D**. (2025). From Field to Flight: Spatially Resolved Life Cycle Impacts of Corn and Miscanthus-Derived Sustainable Aviation Fuel. *American Center for Life Cycle Assessment Conference,* Atlanta, Georgia, October 2025
2. *Triminio L.A.*, Chen, P., Ryland A., **Quiroz, D.,** Quinn, J.C. (2025). Bridging the Gap Between Lab and Field: Simulating Realistic Algal Turf Scrubber Conditions Through Integrated Engineering Solutions. *Algae Biomass Summit,* Tempe, Arizona, October 2025
3. ***Quiroz, D.,*** McGowen, J., Quinn, J.C., (2025). Predictive Modeling of Algal Growth in Open Ponds: A Step Toward Digital Twin Implementation. *International Conference on Algal Biomass, Biofuels and Bioproducts,* Tempe, Arizona, June 2025
4. *Ryland, A.,* **Quiroz, D.,** Zivojnovich, M., Kim, S., Davis, R., Eckles, T., Quinn, J.C., (2025). Techno-Economic and Life Cycle Analysis of Algal Turf Scrubber Systems and Conversion of Biomass to Renewable Diesel Considering Nutrient Credits. *International Conference on Algal Biomass, Biofuels and Bioproducts,* Tempe, Arizona, June 2025
5. *Chen, P*., Ryland, A., **Quiroz, D.,** Janiszewski, L., Quinn, J.C., (2025). Characterizing an Algal Turf Scrubber Community by Phenotypic Expression Under Different Hydrodynamic Flow Operations. *International Conference on Algal Biomass, Biofuels and Bioproducts,* Tempe, Arizona, June 2025

6. ***Quiroz, D.,*** Greene, J. M., Quinn, J.C., (2024). Prospective Life Cycle Assessment of Algal Sustainable Aviation Fuel, *Algae Biomass Summit 2024*, Houston, TX, October 2024
7. *Greene, J.M.,* **Quiroz, D.,** Limb, B.J., Quinn, J.C., (2024). The Future of Biofuels: Techno-Economic and Life Cycle Insights into Microalgae Biorefineries for Large-Scale Production of Renewable Diesel and Sustainable Aviation Fuel, *Algae Biomass Summit 2024*, Houston, TX, October 2024
8. *Ryland, A.,* **Quiroz, D.,** Chen, P., & Quinn, J. C. (2024). Using Techno-Economic Analysis and Life Cycle Assessment of Algal Turf Scrubber to Investigate the Impact of Optimized Productivity Through of Hydrodynamic Controls. *Algae Biomass Summit 2024*, Houston, TX, October 2024
9. *Chen, P.,* Ryland, A., **Quiroz, D.,** & Quinn, J. C. (2024). Establishing a relationship between hydrodynamic characteristics and biomass productivity in an Algal Turf Scrubber, *Algae Biomass Summit 2024*, Houston, TX, October 2024
10. ***Quiroz, D***., Cole, G. M., Schideman, L., Botte, G., & Quinn, J. C., (2024). Addressing outstanding obstacles to the adoption of anaerobic membrane bioreactors for sustainable wastewater treatment infrastructure through techno-economic analysis and life cycle assessment, *International Symposium on Systems, Sustainability and Technology*, Baltimore, MD June 2024
11. ***Quiroz, D***., & Quinn, J. C. (2024). Leveraging Prospective Life Cycle Inventory Databases for Dynamic Life Cycle Assessment of Sustainable Aviation Fuels, *International Symposium on Systems, Sustainability and Technology*, Baltimore, MD June 2024
12. ***Quiroz, D***., McGowen, J., & Quinn, J. C. (2024) The Role of Pond Reliability on the Sustainability of Algal Biofuels, *International Conference on Algal Biomass, Bioproducts, and Biofuels*, Clearwater, FL, June 2024
13. *Quinn, J.C.,* Limb, B.J., **Quiroz, D.,** Greene, J.M., Simske, S., Smith, J., Integrating Techno-Economic and Environmental Perspectives: Advancements in Renewable Energy and Sustainable Aviation Fuel. *International Conference on Algal Biomass, Bioproducts, and Biofuels*, Clearwater, FL, June 2024
14. *Ryland, A.,* **Quiroz, D.,** Chen, P., & Quinn, J. C. (2024). Comparative techno-economic analysis and life cycle assessment of algal turf scrubber systems. *International Conference on Algal Biomass, Bioproducts, and Biofuels*, Clearwater, FL, June 2024
15. *Greene, J. M.*, **Quiroz, D.,** Limb, B.J., & Quinn, J. C. (2024). Geographically Resolved Techno-Economic and Life Cycle Assessments of Algae-Based Diesel and Sustainable Aviation Fuel Considering the Current State of Technology. *International Conference on Algal Biomass, Bioproducts, and Biofuels*, Clearwater, FL, June 2024
16. ***Quiroz, D***., Greene, J. M., Limb, B.J., & Quinn, J. C. (2023). Global Life Cycle Assessment of Algal Biofuels, *American Center for Life Cycle Assessment 2023 Conference*, Burlington, VT, United States
17. ***Quiroz, D***., Greene, J. M., Limb, B.J., & Quinn, J. C. (2023). Sustainability of Algal Biofuels: A Global Environmental Impact and Economic Assessment, *American Center for Life Cycle Assessment 2023 Conference*, Burlington, VT, United States
18. ***Quiroz, D.,*** Banks, A., J. C., Quinn. (2023). Concurrent Economic and Environmental Assessment of Attached Algal Flow-Ways. *Algae Biomass Summit 2023*, Madison, WI, United States
19. *Greene, J.M.,* **Quiroz, D.**, & Quinn, J.C. (2023). Sustainable aviation fuel from microalgae: Defining performance targets for economic and environmental sustainability through spatiotemporal techno-economic analysis and life cycle assessment, *Algae Biomass Summit*, 2023, Madison, WI, United States
20. *Greene, J.M.,* **Quiroz, D.**, & *Quinn, J.C*. (2023). Evaluating the potential of microalgae and macroalgae grown in open raceway ponds for direct air capture and sequestration, *Algae Biomass Summit*, 2023, Madison, WI, United States
21. ***Quiroz, D****.,* Greene, J. M., & Quinn, J. C. (2022). Regional life cycle water footprint and scarcity assessment of microalgae-based biofuels, *Algae Biomass Virtual Summit*, October 2022
22. ***Quiroz, D****.,* McGowen, J., & Quinn, J. C. Sustainability assessment of semi-continuous and batch cultivation of algal biomass, *Algae Biomass Virtual Summit*, October 2022

23. ***Quiroz, D**.,* Greene, J. M., & Quinn, J. C. (2022). Understanding the relationships between weather variability and algal biomass yields in outdoor algal cultivation, *Algae Biomass Virtual Summit*, October 2022
24. ***Quiroz, D**.,* Greene, J. M., & Quinn, J. C. (2022). A Comprehensive Water Life Cycle Assessment of Algal Fuels, *International Symposium on Systems, Sustainability and Technology*, Pittsburgh, PA, June 2022
25. *Greene, J.M.,* **Quiroz, D.,** Reardon, K.F., Adkins, J., Quinn, J.C. (2022). Life cycle assessment of suspended algal cultures in outdoor open pond systems: investigating carbon utilization efficiency and CO2 sourcing, *Algae Biomass Virtual Summit*, September 2022
26. *Quinn, J.C.,* Banks, A., **Quiroz, D.**, Davis, R.W. (2022). Geographically resolved techno-economic evaluation of an algal turf scrubber biorefining concept, *Algal Virtual Biomass Summit*, September 2022
27. *Quinn, J.C.,* Greene J.M., **Quiroz, D.,** Compton, S., Lammers, P.J., McGowen, J. (2022), A validated thermal and biological model for predicting algal productivity in large scale outdoor open pond systems, *Algal Virtual Biomass Summit*, September 2022
28. *Greene, J.M.,* **Quiroz, D**., Compton, S., Quinn, J.C. (2022) Modeling algae cultivation at scale: Productivity, pond reliability, and resource consumption across the United States, *International Symposium of Sustainable Systems and Technology*, Pittsburgh, PA, June 2021
29. ***Quiroz, D**.,* Greene, J. M., McGowen, J., & Quinn, J. C. (2021) National evaluation of the water footprints of algal biomass, proteins, and biofuels, *American Center for Life Cycle Assessment Virtual Conference*, September 2021
30. ***Quiroz, D**.,* Greene, J. M., McGowen, J., & Quinn, J. C. (2021). Geographical and temporal evaluation of the water demand of algae-based products and comparison to traditional biomass feedstocks, *Virtual International Symposium of Sustainable Systems and Technology*, June 2021
31. ***Quiroz, D**.,* Greene, J. M., McGowen, J., & Quinn, J. C. (2021). A Geographical and Temporal Assessment of the Water Requirements and Temperature Tolerances for Large-Scale Cultivation of Microalgae, *Algal Biomass, Biofuels, and Bioproducts Virtual Conference*, June 2021
32. ***Quiroz, D**.,* McGowen, J., Seger, M., Lammers, P., & Quinn, J. C. (2020). Impact of Open Raceway Pond Reliability on Seed Train Economics, *Algae Biomass Virtual Summit*, September 2020

OTHER PRESENTATIONS AND PARTICIPATIONS:

1. Huber, H., *Cole, G*., Quinn, J.C., **Quiroz, D.** (2025). Techno-Economic Analysis of Sustainable Aviation Fuel in the South-Central U.S., Poster session presented at: *International Symposium on Sustainable Systems and Technology,* June, 2025, Minneapolis, MN
2. ***Quiroz, D.** (2025).* Sustainability Modeling: Integrating Techno-Economic Analysis and Life Cycle Assessment for Technology Advancement, *Research Seminar*, Ohio University, January 2025, Athens, OH, United States
3. **Quiroz, D.** & Quinn, J. C. (2024). Prospective Life Cycle Assessment of Algae-Based Sustainable Aviation Fuel, Poster session presented at: Algal Biomass, Biofuels and Bioproducts, 2024
4. ***Quiroz, D***. (2024). Integrating Techno-Economic Analysis and Life Cycle Assessment to Accelerate Technology Development, *Research Seminar*, Colorado State University, May 2024, Fort Collins, CO, United States
5. ***Quiroz, D.** (2023).* Driving Algal Technology Forward with Sustainability Assessment informed by Experimentally Validated Process Models, *Research Seminar*, Arizona State University, February 2023, Tempe, AZ, United States
6. **Quiroz, D**., Greene, J. M., & Quinn, J. C. (2023). A Dynamic Thermal and Growth Model as A Tool to Assess the Sustainability of Algae Biofuels, Poster session presented at: Algal Biomass, Biofuels and Bioproducts, 2023
7. **Quiroz, D**., Greene, J. M., & Quinn, J. C. (2020). A Dynamic Thermal and Growth Model as A Tool to Assess the Sustainability of Algae Biofuels, Poster session presented at: Colorado State University, Graduate Student Showcase 2020

8. **Quiroz, D**., Beckstrom, B. D., Wilson, M. H., Crocker, M., Zeller, A., & Quinn, J. C. (2019). Techno-Economic and Life-Cycle Assessment of Microalgae Based Bioplastics with Biofuels Co-Product, Poster session presented at: Colorado State University, Graduate Student Showcase 2019
9. **Quiroz, D**., Beckstrom, B. D., Wilson, M. H., Crocker, M., Zeller, A., & Quinn, J. C. (2019). Proteins to Bioplastics: Techno-Economic Analysis and Life Cycle Assessment, Poster session presented at: *Bioenergy Sustainability Conference*, TN 2019

ACADEMIC SERVICE:

Conference Session Chair:

1. Life Cycle, Techno-Economic, and Sustainability Modeling and Analysis on Algal Biomass, Bioproducts, and Biofuels, Tempe, AZ, June 2025
2. Economic and Sustainability Analyses, International Conference on Algal Biomass, Bioproducts, and Biofuels, Clearwater, FL, June 2024

Conference Track Chairs:

1. Downstream Processes and Economics, Algal Biomass Summit, Algal Biomass Organization, Madison, WI, 2023
2. Downstream Process and Economics, Algal Biomass Summit, Algal Biomass Organization, Houston, TX, 2024

Poster Session Committee:

1. Poster Session, Algal Biomass Summit, Algal Biomass Organization, Virtual, 2021

Peer Service and Review:

1. Reviewer, Elsevier, *Algal Research,* December 2025
2. Reviewer, Springer Nature, *npj Sustainable Agriculture,* November 2025
3. Reviewer, Springer Nature, *npj Clean Water,* August 2025- October 2025
4. Reviewer, MDPI*, Carbon*, June 2025
5. Reviewer, Elsevier, *Industrial Crops and Products*, May 2025
6. Abstract reviewer, International Symposium of Sustainable Systems and Technology, 2022
7. Abstract reviewer, Algae Biomass Summit, Algal Biomass Organization, Virtual, 2022
8. Abstract reviewer, Algae Biomass Summit, Algal Biomass Organization, Virtual, 2021
9. Abstract reviewer and poster judge, Multicultural Undergraduate Research Art and Leadership Symposium, Colorado State University, Fort Collins, 2022, 2023, 2024

TEACHING EXPERIENCE:

Instructor, ME4900/5900 *Life Cycle Assessment,* Mechanical Engineering, Ohio University, Athens, OH
Fall 2025 – 8 students

Co-Instructor, GES 441 *Analysis of Sustainable Energy Solutions,* School of Global Environmental Sustainability, Colorado State University, Fort Collins, CO
Spring 2024 – 6 students

- Curriculum Development: Lectures, Homework, Exams, & Design Problems
- Objective: Examine methods of evaluating sustainable energy technologies, including life cycle assessment, energy return on investment, technoeconomic analysis, and political ecology.

Guest Instructor

GES 441 *Analysis of Sustainable Energy Solutions,* School of Global Environmental Sustainability, Colorado State University, Fort Collins, CO, Spring 2023 15 students

MECH 408 *Engineering Economics,* Mechanical Engineering, Colorado State University, Fort Collins, CO, Spring 2025 20 students

Graduate Student Research Advisor,

Mechanical Engineering, Ohio University, Athens, OH

- Maria Flores, Zero Liquid Discharge Sustainability Modeling, Fall 2025 - Currently

Mechanical Engineering, Colorado State University, Fort Collins, CO

- Hannah Hubber, Sustainable Aviation Fuels Sustainability Modeling, Fall 2024- October 2025
- Ashley Ryland, Algal Turf Scrubber Systems Sustainability Modeling, May 2023 – June 2025

Undergraduate Student Research Advisor,

Mechanical Engineering, Colorado State University, Fort Collins, CO

- Aidan Smith, Algal Turf Scrubber System Cultivation, Summer 2023
- Alyssa Singh, Algal Turf Scrubber System Cultivation, Spring 2023 – Fall 2023
- Kay Willock, Sustainability of Algal Wastewater Treatment, Spring 2023 – Spring 2024