

Yuan Yao

Assistant Professor of Industrial Ecology and Sustainable Systems
Yale School of the Environment
380 Edwards Street, New Haven, CT 06511
Email: y.yao@yale.edu; Phone: +1 2034325475
Lab website: <https://yao.research.yale.edu/>

Education

- 2011-2016 **Northwestern University**, Evanston, IL
Doctor of Philosophy, Field of Chemical Engineering
Management for Scientists and Engineers, Kellogg School of Management
- 2007-2011 **Northeastern University**, Shenyang, Liaoning, China
Bachelor of Science in Metallurgical Engineering

Professional Experience

- 2020 - **Assistant Professor of Industrial Ecology and Sustainable Systems**
Yale School of the Environment, Yale University
Assistant Professor of Chemical & Environmental Engineering
Secondary Appointment, School of Engineering & Applied Science, Yale University
- 2016-2020 **Assistant Professor of Sustainability Science and Engineering**
Department of Forest Biomaterials, North Carolina State University
- 2011-2016 **Research Assistant**
Department of Chemical and Biological Engineering, Northwestern University

Research Statement

My research investigates how emerging technologies and industrial development will affect the environment. My research use transdisciplinary approaches in Industrial Ecology and Sustainable Engineering. I develop new methods and integrated modeling frameworks to assess, advance, and optimize industrial systems for improved environmental and societal outcomes.

Awards

- 2024 Honorable Mention, 2024 James J. Morgan Early Career Award in the Americas Region, American Chemical Society
- 2023 Scialog Fellow on Negative Emissions Science, Research Corporation for Science Advancement, Alfred P. Sloan Foundation, and ClimateWorks Foundation
- 2021 Laudise Medal. International Society for Industrial Ecology. Awarded for outstanding achievements in industrial ecology by a researcher under the age of 36.
- 2021 Rising Star Award, Yale School of the Environment, Yale University
- 2020 American Institute of Chemical Engineers 35 Under 35 Award
- 2019 U.S. National Science Foundation Faculty Early Career Development (**CAREER**) Award.
- 2017 Outstanding Reviewer of 2016, Environmental Research Letter
- 2015 ISIE Young Professional Scholarship, International Society of Industrial Ecology
- 2015 ISIE Scholarship, International Society of Industrial Ecology
- 2013 ISEN Fellowship, Institute for Sustainability and Energy at Northwestern
- 2013 Graduate Travel Grant, Northwestern University
- 2013 AIChE top 4th cited paper from 2012
- 2011 Dean's Excellent Graduate, Northeastern University

Editorship

- Associate Editor, *Resources, Conservation & Recycling*, Elsevier, 2020 – present
- Editorial Advisory Board, *GCB Bioenergy*, Wiley, 2020 – present

- Editorial Advisory Board, *Energy Technology*, Wiley, 2020 – present
- Editorial Board, *Clean Technologies and Environmental Policy*, Springer Nature, 2020 – present
- Editorial Board, *Engineering Research Express*, IOPscience, 2019 – 2023
- Guest Editor, special issue of Advanced Life-Cycle Modeling of Energy And Agroecosystems, *Renewable & Sustainable Energy Reviews*, 2020 – 2021
- Guest Editor, special issue of Life Cycle Sustainability Assessment for Sustainable Development Goals, *Journal of Industrial Ecology*, 2020 – 2022

Publications

Publications with advisees underlined (graduate/undergraduate students and postdocs)

*denotes the corresponding author. In my field, a principal advisor/project leader takes the last and/or the corresponding authorship.

ORCID ID: 0000-0001-9359-2030

Google Scholar: https://scholar.google.com/citations?user=Pkt_adYAAAAAJ&hl

Peer-Reviewed Journal Publications

47. Zhang, B., Kroeger, J., Planavsky, N. and **Y. Yao*** (2023). Techno-Economic and Life-Cycle Assessment of Enhanced Rock Weathering: A Case Study from the Midwestern United States. *Environmental Science & Technology*. <https://doi.org/10.1021/acs.est.3c01658>
46. Lee, T., Yao, Y., Graedel, T. and A., Alessio (2023). Dynamic Material Flow Analysis of The Critical Material Requirements and Recycling Opportunities of The U.S. Energy Transition. *Journal of Industrial Ecology*. Under review.
45. Zhang, Z., Huang, J., **Yao, Y.**, Peters, G., MacDonald, B., La Rosa, A.D., Wang, Z. and L. Scherer (2023). Environmental Impacts of Cotton and Opportunities for Improvement. *Nature Reviews Earth & Environment*. <https://doi.org/10.1038/s43017-023-00476-z>
44. Lan, K., Wang, H., Lee, T. Assis, CA de, Venditti, R., Zhu, Y. and **Y. Yao*** (2023). Towards Greener and More Cost-Effective Production of Cellulose Nanomaterials. *Green Chemistry*. Under review.
43. Zhang, B., Lan K., Harris, T., Ashton, M. and **Y. Yao*** (2023). Climate-Smart Forestry Through Innovative Wood Products and Commercial Afforestation and Reforestation on Marginal Land. *Proceedings of the National Academy of Sciences*. 120(23): e2221840120. <https://www.pnas.org/doi/10.1073/pnas.2221840120>
42. Lan, K., Zhang, B., Lee, T. and **Y. Yao*** (2023). Soil Organic Carbon Change Can Reduce the Climate Benefits of Biofuel Produced from Forest Residues. *Joule*. In press.
41. Wang, H. and **Y. Yao*** (2023). Machine Learning for Sustainable Development and Applications of Biomass and Biomass-Derived Carbonaceous Materials in Water and Agricultural Systems: A Review. *Resources, Conservation and Recycling*. 190, 106847, <https://doi.org/10.1016/j.resconrec.2022.106847>
40. Ding, Y., Pang, Z., Lan, K., **Yao, Y.**, Panzarasa, G., Xu, L., Ricco, M., Rammer, D., Zhu, J. Y., Hu, M., Pan, X., Li, T., Burgert, I., and L. Hu (2023). Emerging Engineered Wood for Building Applications. *Chemical Reviews*. 123, 5, 1843–1888. <https://doi.org/10.1021/acs.chemrev.2c00450>
39. Wu, N., Lan, K. and **Y. Yao*** (2023). An Integrated Techno-Economic and Environmental Assessment for Carbon Capture in Hydrogen Production by Biomass Gasification. *Resources, Conservation and Recycling*. 188, 106693, <https://doi.org/10.1016/j.resconrec.2022.106693>
38. Lan, K., Zhang, B. and **Y. Yao*** (2022). Circular Utilization of Urban Tree Waste Contributes to the Mitigation of Climate Change and Eutrophication. *One Earth*. 5, 8, 944-957. <https://doi.org/10.1016/j.oneear.2022.07.001>

37. Zargar, S., **Yao, Y.** and Q. Tu (2022). A Review of Inventory Modeling Methods for Missing Data in Life Cycle Assessment. *Journal of Industrial Ecology*. 26, 1676-1689. <https://doi.org/10.1111/jiec.13305>
36. **Lan, K** and **Y. Yao*** (2022). Feasibility of Gasifying Mixed Plastic Waste for Hydrogen Production and Carbon Capture and Storage. *Communications Earth & Environment*. 3, 300. <https://doi.org/10.1038/s43247-022-00632-1>
35. **Buitrago-Tello, R.**, Venditti, R., Jameel, H., **Yao., Y.** and **D. Echeverria** (2022). Carbon Footprint of Bleached Softwood Fluff Pulp: Detailed Process Simulation and Environmental Life Cycle Assessment to Understand Carbon Emissions. 10, 28, 9029–9040. *ACS Sustainable Chemistry & Engineering*. <https://doi.org/10.1021/acssuschemeng.2c00840>
34. **Yao, Y*** (2022). How Does COVID-19 Affect the Life Cycle Environmental Impacts of U.S. Household Energy and Food Consumption? *Environmental Research Letters*. 17, 034025. <https://doi.org/10.1088/1748-9326/ac52cb>
33. **Zhang, ZZ.**, Martin, K., Stevenson, K. and **Y. Yao** (2022). Equally Green? Understanding the Distribution of Urban Green Infrastructure Across Student Demographics in Four Public School Districts in North Carolina, USA. *Urban Forestry & Urban Greening*. 67, 127434. <https://doi.org/10.1016/j.ufug.2021.127434>
32. Li, Z., Chen, C., Xie, H., **Yao, Y.**, Zhang, X., Brozena, A., Li, J., Ding, Y., Zhao, X., Hong, M., Qiao, H., Smith, L. M., Pan, X., Briber, R., Shi, SQ., and L. Hu. (2022). Sustainable High-Strength Macrofibres Extracted from Natural Bamboo. *Nature Sustainability*. 5, 235–244. <https://doi.org/10.1038/s41893-021-00831-2>
31. **Echeverria, D.**, Venditti, R., H. Jameel and **Y. Yao*** (2022). Process Simulation-Based Life Cycle Assessment of Dissolving Pulps. *Environmental Science & Technology*. 56, 7, 4578–4586 <https://doi.org/10.1021/acs.est.1c06523>
30. **Lan, K.** and **Y. Yao*** (2022). Dynamic Life Cycle Assessment of Energy Technologies under Different Greenhouse Gas Concentration Pathways. *Environmental Science & Technology. Cover Paper*. 56, 2, 1395–1404. <https://doi.org/10.1021/acs.est.1c05923>
29. **Liao, M.**, **Lan, K** and **Y. Yao*** (2022). Sustainability Implications of Artificial Intelligence in the Chemical Industry: A Conceptual Framework. *Journal of Industry Ecology*. 26: 164–182. <https://doi.org/10.1111/jiec.13214>
28. Xia, Q., Chen, C., Yao, Y., He, H., Gao, J., Zhou, Y., Li, T., Pan, X., **Yao, Y.*** and L. Hu* (2021). A Strong, Biodegradable and Recyclable Lignocellulosic Bioplastic. *Nature Sustainability*. 4, 627–635. <https://doi.org/10.1038/s41893-021-00702-w>.
27. **Van Schoubroeck, S.**, G. Thomassen, S. Van Passel, R. Malina, J. Springael, S. Lizin, R. A. Venditti, **Yao, Y.** and M. Van Dael (2021). An Integrated Techno-Sustainability Assessment (TSA) Framework for Emerging Technologies. *Green Chemistry*. 23, 1700-1715. <https://doi.org/10.1039/D1GC00036E>
26. **Liao, M.** and **Y. Yao*** (2021). Applications of Artificial Intelligence-Based Modeling for Bioenergy Systems: A Review. *GCB Bioenergy*. 13: 774-802. <https://doi.org/10.1111/gcbb.12816>. **GCB Bioenergy Top Cited Article in 2021-2022.**
25. **Lan, K.**, Ou, L., Park, S., Stephen SS., Nepal, P., Kwon, H., Cai, H. and **Y. Yao*** (2021). Dynamic Life-Cycle Carbon Analysis for Fast Pyrolysis Biofuel Produced from Pine Residues: Implications of Carbon Temporal Effects. *Biotechnology for Biofuels*. 14, 191. <https://doi.org/10.1186/s13068-021-02027-4>
24. **Lan, K.**, Ou, L., Stephen SS., Park, S., English, BC., Yu, TE., Larson, J., and **Y. Yao*** (2021). Techno-Economic Analysis of Decentralized Preprocessing Systems for Fast Pyrolysis Biorefineries with Blended Feedstocks in the Southeastern United States. *Renewable and Sustainable Energy Reviews*. 143: 110881. <https://doi.org/10.1016/j.rser.2021.110881>

23. Echeverria, D., R. Venditti, H. Jameel and **Y. Yao*** (2021). A General Life Cycle Assessment Framework for Sustainable Bleaching: A Case Study of Peracetic Acid Bleaching of Wood Pulp. *Journal of Cleaner Production*. 290: 125854. <https://doi.org/10.1016/j.jclepro.2021.125854>
22. Xiao, S., Chen, C., Xia, Q., Liu, Y., **Yao, Y.**, Chen, Q., Hartsfield, M., Brozena, A., Tu, K., Eichhorn, S. J., Yao, Y., Li, J., Gan, W., Shi, S. Q., Yang, V. W., Ricco, M. L., Zhu, J. Y., Burgert, I., Luo, A., Li, T., and L. Hu (2021). Lightweight, Strong, Moldable Wood via Cell Wall Engineering as A Sustainable Structural Material. *Science. Cover Paper*. 374, 465-471. <https://doi.org/10.1126/science.abg9556>
21. Lan, K., S., Kelley, S., Nepal, P., and **Y. Yao*** (2020). Dynamic Life Cycle Carbon and Energy Analysis for Cross-Laminated Timber in the Southeastern United States. *Environmental Research Letters*. 15, 124036. <https://doi.org/10.1088/1748-9326/abc5e6>
20. Lan, K., Park, S., Kelley, S., English, B., Yu, E., Larson, J. and **Y. Yao*** (2020). Impacts of Uncertain Feedstock Quality on the Economic Feasibility of Fast Pyrolysis Biorefineries with Blended Feedstocks and Decentralized Preprocessing Sites in the Southeastern United States. *GCB Bioenergy*. 12: 1014– 1029. <https://doi.org/10.1111/gcbb.12752>
19. Tomberlin, K., Venditti, R., and **Y. Yao*** (2020). Life Cycle Carbon Footprint Analysis of Pulp and Paper Grades in the United States Using Production-line-based Data and Integration. *BioResources*. 15 (2), 3899-3914. doi:10.15376/biores.15.2.3899-3914.
18. Johnson, S., Echeverria, D., Venditti, R., Jameel, H. and **Y. Yao*** (2020). Supply Chain of Waste Cotton Recycling and Reuse: A Review. *AATCC Journal of Research-Textile Science*. 7(1):19-31. <https://doi.org/10.14504/ajr.7.S1.3>
17. Liao, M., Kelley, SS. and **Y. Yao*** (2020). Generating Energy and Greenhouse Gas Inventory Data of Activated Carbon Production Using Machine Learning and Kinetic Based Process Simulation. *ACS Sustainable Chemistry & Engineering*. 8, 2, 1252-1261. <http://dx.doi.org/10.1021/acssuschemeng.9b06522>
16. Lan, K., Ou, L., Park, S., Kelley, SS. and **Y. Yao*** (2020). Life Cycle Analysis of Decentralized Preprocessing Systems for Fast Pyrolysis Biorefineries with Blended Feedstocks in the Southeastern United States. *Energy Technology*. 8: 1900850. <https://doi.org/10.1002/ente.201900850>.
15. Lan, K. and **Y. Yao*** (2019). Integrating Life Cycle Assessment and Agent-Based Modeling: A Dynamic Modeling Framework for Sustainable Agricultural Systems. *Journal of Cleaner Production*, 238, 117853. <https://doi.org/10.1016/j.jclepro.2019.117853>
14. Nabinger, A., Tomberlin, K., Venditti, R., and **Y. Yao*** (2019). Using a Data-Driven Approach to Unveil Greenhouse Gas Emission Intensities of Different Pulp and Paper Products, *Procedia CIRP*, 80, 689-692. <https://doi.org/10.1016/j.procir.2018.12.001>
13. **Yao, Y.*** and R. Huang (2019). A Parametric Life Cycle Modeling Framework for Identifying Research Development Priorities of Emerging Technologies: A Case Study of Additive Manufacturing. *Procedia CIRP*, 80, 370-375. <https://doi.org/10.1016/j.procir.2019.01.037>
12. Liao, M., Kelley, SS, and **Y. Yao*** (2019). Artificial Neural Network Based Modeling for the Prediction of Yield and Surface Area of Activated Carbon From Biomass. *Biofuels, Bioproducts and Biorefining*, 13: 1015-1027. <https://doi.org/10.1002/bbb.1991>
11. **Yao, Y.***, Marano, J., Morrow, W. R. and E. Masanet (2018). Quantifying Carbon Capture Potential and Cost of Carbon Capture Technology Application in the U.S. Refining Industry. *International Journal of Greenhouse Gas Control*, 74, 87-98. <https://doi.org/10.1016/j.ijggc.2018.04.020>.
10. **Yao, Y.***, Chang, Y., Huang, R., Zhang, L. and E. Masanet (2018). Environmental Implications of the Methanol Economy in China: Well-to-Wheel Comparison of Energy and Environmental Emissions for Different Methanol Fuel Production Pathways. *Journal of Cleaner Production*, 172, 1381-1390. <https://doi.org/10.1016/j.jclepro.2017.10.232>

9. **Yao, Y.*** and E. Masanet (2018). Life-Cycle Modeling Framework for Generating Energy and Greenhouse Gas Emissions Inventory of Emerging Technologies in the Chemical Industry. *Journal of Cleaner Production*, 172, 768-777. <https://doi.org/10.1016/j.jclepro.2017.10.125>
8. **Yao, Y.*** (2016). Models for Sustainability. *BioResources*, 12(1), 1-3. doi:10.15376/biores.12.1.1-3
7. Chang, Y., Li, G., **Yao, Y.**, Zhang, L., and C. Yu (2016). Quantifying the Water-Energy-Food Nexus: Current Status and Trends. *Energies*, 9(2), 65. <https://doi.org/10.3390/en9020065>
6. **Yao, Y.***, Graziano, D. J., Riddle, M., Cresko, J., and E. Masanet (2016). Prospective Energy Analysis of Emerging Technology Options for the United States Ethylene Industry. *Industrial & Engineering Chemistry Research*. 55, 12, 3493-3505. <https://doi.org/10.1021/acs.iecr.5b03413>
5. **Yao, Y.**, Graziano, D. J., Riddle, M., Cresko, J., and E. Masanet (2015). Understanding Variability to Reduce the Energy and GHG Footprints of U.S. Ethylene Production. *Environmental Science & Technology*, 49(24), 14704-14716. <http://dx.doi.org/10.1021/acs.est.5b03851>
4. Masanet, E., Chang, Y., **Yao, Y.**, Briam, R., and R. Huang (2014). Reflections on A Massive Open Online Life Cycle Assessment Course. *The International Journal of Life Cycle Assessment*, 19(12), 1901-1907. <https://doi.org/10.1007/s11367-014-0800-8>
3. **Yao, Y.**, Graziano, D., Riddle, M., Cresko, J., and E. Masanet (2014). Greener Pathways for Energy-Intensive Commodity Chemicals: Opportunities and Challenges. *Current Opinion in Chemical Engineering*, 6, 90-98. <http://dx.doi.org/10.1016/j.coche.2014.10.005>
2. **Yao, Y.***, Chang, Y., and E. Masanet (2014). A Hybrid Life-Cycle Inventory for Multi-Crystalline Silicon PV Module Manufacturing in China. *Environmental Research Letters*, 9(11), 114001. <https://doi.org/10.1088/1748-9326/9/11/114001>
1. Gebreslassie, B. H., **Yao, Y.**, and F. You. (2012). Design Under Uncertainty of Hydrocarbon Biorefinery Supply Chains: Multiobjective Stochastic Programming Models, Decomposition Algorithm, and A Comparison Between CVaR and Downside Risk. *AIChE Journal*, 58(7), 2155-2179. <https://doi.org/10.1002/aic.13844>

Book Chapters

Lan, K., Park, S. and **Y. Yao*** (2019). Biofuels for a More Sustainable Future: Life Cycle Sustainability Assessment, Multi-Criteria Decision Making, and Supply Chain Design, Chapter 10, Key Issue, Challenges, and Status Quo of Models for Biofuel Supply Chain Design. Elsevier. <https://doi.org/10.1016/B978-0-12-815581-3.00010-5>

International Guidelines, White Paper, and Scientific Committee Reports

4. United Nations Environment Programme & Yale Center for Ecosystems + Architecture (2023). Building Materials and the Climate: Constructing a New Future. <https://wedocs.unep.org/20.500.11822/43293>.
3. National Academies of Sciences, Engineering, and Medicine. Thomas, V., Avidan, A., Dunn, J., Gurian, P., Hill, J., Khanna, M., Lévassieur, A., Martin, J., Michalek, J., Mueller, S., Pavlenko, N., Scott, D., Scown, C., Shrestha, D., Taheripour, F. and **Y. Yao** (2022). Current Methods for Life Cycle Analyses of Low-Carbon Transportation Fuels in the United States. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26402>.
2. Matlock, M., Pfister, S., Ridoutt, B., Rosentrater, K., Thoma, G. and **Y. Yao** (2022). Goals, Strengths, And Limitations Governing the Use of Life Cycle Assessment in Food and Agriculture. Council for Agricultural Science and Technology (CAST). Ames, IA, USA. <https://www.cast-science.org/publication/goals-strengths-and-limitations-governing-the-use-of-life-cycle-assessment-lca-in-food-and-agriculture/>
1. Livestock Environmental Assessment and Performance Partnership in Food and Agriculture Organization of the United Nations (FAO LEAP). Kebreab, E., Benchaar, C., Becquet, P. et al. and

Y. Yao (2020). Environmental performance of feed additives in livestock supply chains – Guidelines for assessment. Rome, Italy. <https://www.fao.org/documents/card/en/c/ca9744en/>

Conference Proceedings:

18. **Yao, Y.*** and **B. Zhang** (2023). Climate-Smart Forestry through Synergetic Carbon Dioxide Removal Approaches. AGU Fall Meeting 2023. San Francisco, CA.
17. **Zhang, B., Kroeger, J., Planavsky, N.** and **Y. Yao*** (2023). Carbon Dioxide Removal and Techno-Economic Potential of Enhanced Rock Weathering in the Midwestern United States. AGU Fall Meeting 2023. San Francisco, CA.
16. **Yao, Y.*** (2022). Systems Modeling for Sustainable Biomass Utilization in Urban and Rural Areas. AGU Fall Meeting 2022. Chicago, IL.
15. **Yao, Y.*** (2022). Climate Smart Forestry through Co-Producing Biochar and Wood Products. AGU Fall Meeting 2022. Chicago, IL.
14. **Lan, K.,** Ou, L., Stephen SS., Park, S., Kwon, H., Cai, H., Wang, M. and **Y. Yao*** (2019). Understanding the Uncertainties in Environmental Life Cycle Energy and Carbon Analysis for Biofuel from Forest Residue in the United States. AIChE Annual Meeting, Orlando, FL
13. **Lan, K.,** Park, S., Kelley, SS., Ou, L., English, B., Yu, T., Larson, J. and **Y. Yao*** (2019). Techno-Economic Analysis and Life Cycle Assessment of Decentralized Preprocessing System for Fast Pyrolysis Biorefineries with Blended Feedstocks in the Southeastern USA. AIChE Annual Meeting, Orlando, FL
12. **Liao, M.,** Kelley, SS, and **Y. Yao*** (2019). Evaluating Variability of Energy Consumption and Carbon Emissions of Activated Carbon Production from Wood Using Artificial Neural Network Integrated Process Simulations. AIChE Annual Meeting, Orlando, FL
11. **Lan, K.,** Ou, L., Stephen SS., Park, S., Kwon, H., Cai, H., Wang, M. and **Y. Yao*** (2019). Quantifying Variability in Life Cycle Environmental Footprints of Biofuel Produced from Forest Residues in the United States. AIChE Annual Meeting, Orlando, FL
10. **Zhang, ZZ.,** Martin, K., Gary, J., Stevenson, K. and **Y. Yao** (2018). Evaluating Machine Learning Approaches For Mapping Flood Risk, AGU Fall Meeting, Washington, DC, USA.
9. **Liao, M.** and **Y. Yao*** (2018). The Predictive Life Cycle Assessment of Activated Carbon Production via different Pathways: An Artificial Neural Network and Kinetic based Model (poster), Frontiers in Biorefining Conference, St. Simons Island, GA, USA.
8. **Echeverria, D.,** Venditti, R., Jameel, **Y. Yao*** (2018). Environmental Life Cycle Assessment of Peracetic Acid Application in the Pulp and Paper Industry, AIChE, Pittsburg, Pennsylvania.
7. **Yao, Y*.,** Graziano, D., Riddle, M., and E. Masanet (2015). Looking into the Future of the Ethylene Industry: A Generic Assessment Model for Emerging Technologies, AIChE Annual Meeting, Salt Lake City, Utah, USA.
6. **Yao, Y*.**(2015). Accelerating the Development of Green Technologies for Chemical Production through Multiscale Life-Cycle Technology Assessment, AIChE Annual Meeting, Salt Lake City, Utah, USA.
5. **Yao, Y.,** Graziano, D., Riddle, M., and E. Masanet (2014). A Macro-Level Impact Assessment Tool for Emerging Technologies in Chemical Industry. AIChE Annual Meeting, Atlanta, Georgia
4. **Yao, Y*.,** Chang, Y., and E. Masanet (2013). Hybrid Life Cycle Assessment Model of Silicon Photovoltaics. AIChE Annual Meeting, San Francisco, CA, USA.
3. **Yao, Y.,** Thwaites, F., and E. Masanet (2013). Hybrid Techno-economic Modeling Tool for Greener Chemicals Supply Chains. AIChE Annual Meeting, San Francisco, California
2. **Yao, Y.** and F. You (2013). Life Cycle Energy, Environmental and Economic Comparative Analysis of CdTe Thin-film Photovoltaics Domestic and Overseas Manufacturing Scenarios. Proceedings of

the 23rd European Symposium on Computer Aided Process Engineering (ESCAPE). Computer Aided Chemical Engineering, 32, 733-738.

1. Gebreslassie, B.H., **Yao, Y.**, and F. You (2012). Multiobjective Optimization of Hydrocarbon Biorefinery Supply Chain Designs under Uncertainty. Proceedings of the 51st IEEE Conference on Decision and Control (CDC), 5560-5565.

Research Grants and Contracts

- Life Cycle Analysis of Biochar Derived from Pulpwood (2023-2026). U.S. Forest Service. **Single PI** of Yale Contract with USFS Southern Research Station. \$100,000
- FMRG: Eco: Future Eco Manufacturing of Recyclable Soft Electronics (2022-2025). US National Science Foundation. **Single PI** of Yale Sub-Award. \$400,000
- Biobased, Fully Soil-Biodegradable Mulch Films Prepared from Biomass for Sustainable Bioeconomy (2023-2025). National Institute of Food and Agriculture, US Department of Agriculture. **Single PI** of Yale Sub-Award. \$130,000
- Planetary Solution Project Seed Grant (2023-2024). Flow Photocatalysis to Boost Organic Carbon Synthesis from Methane and CO₂ for Soil Restoration. **Co-PI** \$80,000
- Measurement and verification of CO₂ uptake and trace metal leakage during Enhanced Weathering: Field and modeling studies using whole watershed sentinel sites. Google. **Co-PI**. \$150,000
- Planetary Solution Project Seed Grant (2022-2023). Innovative Wood-Product as a Nature-Based Solution to Planetary Challenges. **Lead PI** \$80,000
- YCNCC - The Natural Carbon Consequence of Cross Laminated Timber (2022-2024). **Lead PI** \$98,867
- YCNCC - Sequestering Carbon through Protection and Production: A Case Study of Industrial Reforestation in Mata Atlantica, Brazil (2022-2024). **Co-PI** \$250,000
- Wood Honeycombs for Lightweight, Energy-Efficient Structural Applications. ARPE-E (2021-2023). **Lead PI** of Yale Sub-Contract. \$45,000
- Building Materials and the Climate: Status and Solutions. United Nations Environment Programme (2022-2023). **Co-PI**. \$400,000
- Brown Postdoctoral Fellowship (2021-2022). Yale University. **Single PI**. \$56,629
- Life Cycle Assessment of 3D Printing Technology (2020-2023). Private Funding. **Co-PI** \$100,000
- CAREER: Biochar Systems for Sustainable Applications in the Food-Energy-Water Nexus (2019-2024). US National Science Foundation, **Single PI**. \$519,401
- Investigating the Energy and Environmental Implications of Artificial Intelligence Applications in the Chemical Manufacturing Industry (2018-2020). Environmental Law Institute – Prime: Alfred P. Sloan Foundation. **Single PI**. \$35,000
- Developing Standards-Based Educational Modules for Green Buildings and Sustainable Materials (2018-2020). NIST. **Lead PI**. \$75,000
- Holistic Assessment of End of Life Options of Cotton for Environmental and Economic Sustainability in the Promotion of Cotton Recycling (2018-2019). Cotton, Inc. **Lead PI**. \$70,000
- Environmental Life Cycle Assessment of Woody Biomass to Biofuels/Biochemical (2018-2019). Argonne National Laboratory – Prime: US Department of Energy. **Lead PI**. \$74,812

- Life Cycle Inventories of Pulp (2018-2020). Eastman. **Lead PI.** \$134,901
- Optimizing Biochar Systems for Transformative Food-Energy-Water Nexus (2018-2019). NCSU Faculty Research & Professional Development Fund. **Lead PI.** \$7,500
- Environmental Life Cycle Assessment of Peracetic Acid Application in the Pulp and Paper Industry (2018-2019). Eastman. **Lead PI.** \$80,343
- Database Integration Workshop: Building the Data Capacity for Food-Energy-Water Research (2017-2018). US Department of Agriculture - National Institute of Food and Agriculture. **Lead PI.** \$37,198
- Scaling Up Biocrude Derived Anode Material (BDAM) (2021-2025). US Department of Energy. **Co-PI.** \$3,999,938
- Renewable Natural Gas from Carbonaceous Wastes via Phase Transition CO₂/O₂ Sorbent Enhanced Chemical Looping Gasification (2019-2022). US Department of Energy. **Co-PI.** \$2,499,461
- Interdisciplinary Doctoral Education Program in Animal Production from Renewable Forest Resources (2018-2023). US Department of Agriculture - National Institute of Food and Agriculture. **Co-PI.** \$238,500
- Catalytic Upgrading of Carbohydrates in Waste Streams to Hydrocarbons (2018-2021). US Department of Energy. **Co-PI.** \$2,475,807
- Green Infrastructure in Schools: Creating a Network for Stormwater Management and Student Engagement and Well-being (2018-2019). Water Resource Institute of the UNC System. **Co-PI.** \$10,000
- Environmental Life Cycle Assessment of Woody Biomass Torrefaction Process to Displace Coal at Portland General Electric's Boardman Power Plant. US Endowment of Forestry and Communities (2017-2019). **Co-PI.** \$249,227
- The Potential for Tall Wood Building to Sequester Carbon, Support Forest Communities and Create New Options for Forest Management (2017-2018). US Endowment of Forestry and Communities. **Co-PI.** \$300,013
- Preparing Diverse and Rural Students and Teachers to Meet the Challenges in the Bioproducts and Bioenergy Industry (2017-2021). US Department of Agriculture. **Co-PI.** \$2,750,000
- Next Generation Logistics Systems for Delivering Optimal Biomass Feedstocks to Biorefining Industries in the Southeastern United States (2016- 2019). US Department of Energy. **Co-PI.** \$561,000
- Carbon Cycling, Environmental & Rural Economic Impacts from Collecting & Processing Specific Woody Feedstocks into Biofuels (2015- 2019). US Department of Energy. **Co-PI.** \$240,000

Service

Advisory Board and Committee

- Provisional Committee for Current Methods for Life Cycle Analyses of Low-Carbon Transportation Fuels in the United States. The *National Academies* of Sciences, Engineering, and Medicine's Board on Environmental Studies and Toxicology, 2021-2022
- Forest Embodied Carbon & Related Impacts, Technical Advisory Committee, Ecotrust, 2021- present
- Advisory Board Member for DOE project on Machine Learning Based Modeling Framework to Relate Biomass Properties with Handling and Conversion Performances, 2021 - present

- Technical Advisory Group, The Partnership on Livestock Environmental Assessment and Performance, Food and Agriculture Organization of the *United Nations*, 2018-2020

Invited Reviewer

- Proposal Reviewer:
 - U.S. National Science Foundation: Environmental Sustainability Program, Graduate Research Fellowships Program, Faculty Early Career Development Program (CAREER), Small Business Innovation Research (SBIR)/ Small Business Technology Transfer (STTR) Programs
 - National Research Foundation of Singapore
- Project Reviewer:
 - ARPA-E HESTIA Program (Harnessing Emissions into Structures Taking Inputs from the Atmosphere)
- Report Reviewer:
 - U.S. Environmental Protection Agency
 - The Aluminum Association
- Journal Reviewer:

- Science	- Energy and Environmental Science
- Nature Climate Change	- Environmental Science and Technology
- Nature Sustainability	- Environmental Research Letters
- Nature Communications	- Communications Earth & Environment
- Nature Chemical Engineering	- Resources, Conservation & Recycling;
- Joule	- ACS Sustainable Chemistry & Engineering
- Journal of Cleaner Production	- Reaction Chemistry & Engineering
- Journal of Industrial Ecology	- Renewable & Sustainable Energy Reviews
- Energy Science & Engineering	- Biofuels, Bioproducts & Biorefining
- Science of the Total Environment	- Sustainable Materials and Technology
- Current Opinion in Chemical Engineering	- Renewable Energy
- Applied Energy	- ACS ES&T Engineering
- BioResources	- BioEnergy Research
- International Journal of Life Cycle Assessment	- Water-Energy Nexus
- Journal of Engineering	- Green Chemical Engineering
- Energy Reports	- Sustainable Materials and Technology
- Energy & Fuels	- Environmental Impact Assessment Review
- Computers and Chemical Engineering	
- Journal of Environmental Management	
- Journal of Clean Technologies and Environmental Policy	
- Physicochemical Problems of Mineral Processing	
- Book Proposal Reviewer – Elsevier
- Conference Reviewer:
 - 11th International Conference on Industrial Ecology, Leiden, the Netherlands, 2023
 - ASME 2021 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference IDETC/CIE2021
 - Joint Conference ISIE and ISSST, Chicago, IL, 2017
 - International Symposium on Sustainable Systems and Technology, 2018, 2019, 2021

Service to Scientific and Professional Organizations

- Director, Forest Bioproducts Division, American Institute of Chemical Engineers, 2023 - present

- Invited LCA expert, Enhanced Rock Weathering standard development: life cycle assessment session. Cascade Climate, Nov. 6th, 2023. Virtual.
- Invited LCA expert, NASEM-Breakthrough Energy LCA Expert Meeting, National Academy of Sciences, Engineering, and Medicine, Nov. 1st, 2023, Washington, D.C.
- International Scientific Committee Member for 11th International Conference on Industrial Ecology, Leiden, the Netherlands, 2023
- Award Committee Member for International Society of Industrial Ecology, 2023.
- Chair of MRS conference (Materials Research Society) session on Lignocellulose: Understanding, Processing and Application, 2022. Virtual.
- Co-Chair of Infrastructure - Water and Waste Session at AEESP Conference 2022 (Association of Environmental Engineering and Science Professors). 2022. St. Louis, MO.
- Chair/Co-Chair of AIChE National Meeting Sessions on
 - Life Cycle Analysis of Bio-Based Fuels, Energy, and Chemicals, 2017 - 2023
 - The Food-Energy-Water Nexus, 2017 – 2022
 - Going to a Decision Point in Sustainability Analysis, 2020
 - Process Design: Innovation for Sustainability, 2017 and 2018
- Scientific Committee Member, 2022 International Conference on Resource Sustainability (icRS 2022). August 1-5. 2022. Virtual.
- Panelist, New Horizons Conference, March 30th, 2022. Virtual.
- Panelist, Webinar for Commentary, Goals, Strengths, and Limitations Governing the Use of Life Cycle Assessment (LCA) in Food and Agriculture, hosted by the Council for Agricultural Science and Technology (CAST). January 25th, 2022.
- Invited participant, Cross Laminated Timber Workshop, Department of Energy, BTO. April 19th, 2021
- Invited participant, Carbon Negative Building Materials Workshop, ARPA-E, March 23rd and 25th, 2021
- Working Group on New Technologies in LCA, Society of Environmental Toxicology and Chemistry, North America, 2021 – present.
- Invited Author for “Goals, Strengths, and Limitations Governing the Use of Life Cycle Assessment (LCA) in Food and Agriculture”, Council for Agricultural Science and Technology, United States, 2021–2022
- Program Chair, Organizing Committee of ISSST (International Symposium for Sustainable Systems and Technology), 2020 – 2021
- Board member of International Society of Industrial Ecology Life Cycle Sustainability Assessment Division, 2017–2022
- Chair for Food-Energy-Water Nexus Systems in International Symposium on Sustainable Systems and Technology (ISSST), Portland, Oregon, 2019.
- International Scientific Committee, 26th Life Cycle Engineering (LCE) Conference, the International Academy for Production Engineering, 2018-2019
- Invited participant, Interagency Working Group on Biological Data Sharing Workshop, Institute for Bioscience and Biotechnology Research, Rockville, MD, 2019
- Chair of Organizing Committee, USDA-funded workshop on database integration for Food-Energy-Water Nexus (FEW), 2018-2019
- Discussion Lead, NSF INFEWS Solicitation Workshop, RTP, organized by NCSU, Duke University, and Chapel Hill, May, 2018
- Chair of Joint Conference ISIE and ISSST on Session LCA Applications, Chicago, IL, 2017

- Participant, Department of Energy Biorefinery Optimization Workshop, Chicago, October 2016
- Co-Chair of AIChE Midwest Session on Energy, Sustainability and the Environment, Chicago, IL, 2014.
- Chair of LCA XIII Conference Session on Fossil Fuels 1, Orlando, FL, 2013
- Chair of LCA XIV Conference Session on Health, San Francisco, CA, 2012

University Service

- Panelist, Academic Career Panel for MESC Students (ENV550 Research Methods), Fall 2023.
- YSE MESC/MFS Review Committee, 2022 Fall – present
- Learning Community Faculty Coordinator for Industrial Ecology and Green Chemistry, YSE, 2022 Fall – present
- YSE Research Committee, 2021 – 2023
- Liaison for the Yale School of the Environment, Faculty Steering & Council of the Women Faculty Forum at Yale University, 2020 - present.
- Invited Panelist for Research Universities Panel - Survival Skills for Finishing Doctoral Students, YSE, March 2nd, 2023
- Learning Community Faculty Co-Coordinator for Industrial Ecology and Green Chemistry, YSE, 2022 Spring
- Panelist, Student Open House Faculty Panel, 2021, 2022.
- YCNCC Faculty Search Committee, 2021 – 2022
- Environmental Engineering Special Investigation Committee Member for Ph.D. Students, 2021–2022
- Panelist, YSE Admissions Event for Inclusivity: Envisioning Space for Underrepresented Student Groups, 2021
- Committee Chair for the Mochen Liao Award, 2021, 2022, 2023.
- MESC/MFS Admission Committee, 2021
- Judge for 2021 YSE Research Day, April 16, 2021
- Member of the Advisory Committee for the Climate Positive Forest Product Initiative, The Forests Dialogue, Yale School of the Environment, 2020 – 2021.
- Session Coordinator, Hixon Center Urban Conference- Future Cities' Material Flows: Implications of Design, Production & Waste, Yale, November 6, 2020
- Forest Biomaterials Faculty Search Committee, NCSU, 2019-2020
- Ph.D. Qualify Exam Committee. Department of Forest Biomaterials, 2018 and 2019
- The Research and Extension Computing Advisory Team (RECAT), School of Natural Resources, NCSU, 2018-2020
- System Programmer Analyst Search Committee, School of Natural Resources, NCSU, 2018 Fall
- Graduate School Representative for Ph.D. Preliminary and Final Exams, NCSU:
 - Berit Janssen, College of Textile, 2016-2017;
 - Alec Falzone, Chemistry, 2016-2017;
 - James Michael Madden, Marine, Earth & Atmos Sciences, NCSU, 2018-2019;
- IT Director Search Committee, School of Natural Resources, NCSU, 2017 Fall
- Faculty Search Committee, Department of Forest Biomaterials, NCSU, 2017-2018

Professional Affiliations

- Association of Environmental Engineering and Science Professors (AEESP) (2020-present)
- American Institute of Chemical Engineers (AIChE) (2012-present)

- International Society of Industrial Ecology (2013-present)
- LCSA Division Board Member, International Society of Industrial Ecology (ISIE) (2017-2022)
- American Center for Life Cycle Assessment (ACLCA) (2013-present)
- American Chemical Society (ACS) (2017-present)
- Society of Environmental Toxicology and Chemistry (2017-present)

Education Activities

Courses

- 2021 - ENV 884a Industrial Ecology, Yale School of the Environment
 2021 - ENV 838b Life Cycle Assessment, Yale School of the Environment
 2021 - ENV 695 01 (FA21): YFF Series: The Future of Wood Building Products in a Changing Climate: Mass Timber and Biomaterials
 2019 - 2020 FB 595 Standards of Sustainable Materials and Green Building, NCSU
 2018 - 2020 PSE 476/FB 576 Environmental Life Cycle Analysis, NCSU
 2017 - 2020 SMT 483 Capstone in Sustainable Materials and Technology, Forest Biomaterials, NCSU
 2017 - 2020 NR 595 Interdisciplinary Approach to Sustainability Science, NCSU

Online Education Materials Developed

- Green Buildings and Sustainable Materials, sponsored by the National Institute of Standards and Technology. URL: <https://faculty.cnr.ncsu.edu/yuanyao/green-buildings-and-sustainable-materials/>
- Environmental Life Cycle Analysis, <https://campus.extension.org/enrol/index.php?id=1778>

Students and Postdoctoral Scholars

- **Current PhD Students (Primary Advisor)**
 - Youyi Xu, Yale School of the Environment, 2023 – present
 - Amma Asantewaa, Agyei Boakye, Yale School of the Environment, 2022 – present
 - Jennifer Kroeger, Yale School of the Environment, 2021 – present
 - Hannah Wang, Yale School of the Environment, 2021 – present
Awards: Yale Graduate Student Assembly Conference Travel Award, 2023; International Society for Industrial Ecology Scholarship, 2023.
- **Current Ph.D. Students (Committee Member)**
 - Thomas Harris, Yale School of the Environment, 2022 – present
 - Yan Du, Chemical and Environmental Engineering, 2022 – present
 - Koichi Kanaoka, Yale School of the Environment, 2019 – present
- **Current Postdoctoral Scholars**
 - Fan Yang, Ph.D. in Life Cycle Assessment, 2023 – present
 - Zhengyin Piao, Ph.D. in Environmental Engineering, 2022 – present
 - Bingquan Zhang, Ph.D. in Renewable Energy System Analysis, 2021– present
- **Current Master Students**
 - **Masters Thesis Advisor**
 - Tessa Lee, Master of Environmental Science, 2021– present
Awards: Sustainability Research Scholarship from the Air & Waste Management Association and Environmental Education and Research Foundation Scholarship
 - **Independent Study Advisor**
 - Jennifer Jung, Master of Forestry, 2023 Spring
 - **Research Project Advisor**
 - Jinyue Li, Master of Environmental Science, 2021-present
 - Yiheng Zhou, Master of Science in Health Informatics, 2022-present

- **Past PhD Students**
 - Rodrigo Buitrago, Ph.D. in Forest Biomaterials, NCSU 2018-2023
Current Position: Postdoctoral Fellow, Argonne National Laboratory
Award: Best Poster Award in the ISSST Conference 2019
 - Darlene Echeverria, Ph.D. in Forest Biomaterials, NCSU, 2018 - 2022
Current Position: Advanced Chemical Engineer, Circular Economy Integration Team, Eastman
Award: Student Poster Competition Award at LCA XIX Conference 2019
 - Zhenzhen Zhang, Ph.D. in Forestry and Environmental Resources. NCSU, 2017-2021
Current Position: Data Scientist, Revibe.
Awards: North Carolina Water Resources Research Institute and NC Sea Grant Joint Graduate Student Research Funding (US\$10,000)
 - Kai Lan, Ph.D. in Forest Biomaterials, NCSU, 2017-2020
Current Position: Assistant Professor, NC State University, USA
Award: Best Poster Award in the ISSST Conference 2019
- **Past Postdoctoral Scholars**
 - Kai Lan, Yale School of the Environment. 2021 – 2023
Current Position: Assistant Professor, NC State University, USA
 - Na Wu, Yale School of the Environment, 2021 – 2023
Current Position: Assistant Research Professor, Zhejiang University, China
- **Past PhD Committee Member**
 - Maria Alejandra Herrera Diaz, Ph.D. in Forest Biomaterials, NCSU, 2016 – 2021
Current Position: Postdoctoral Research Associate, Idaho National Laboratory
- **Dissertation Reader**
 - Paul Wolfram, Ph.D., Yale School of the Environment, 2022
- **Academic Advising for MEM Students**
 - 2021-2023: Isobel Campbell and Joe Miller
 - 2020-2022: Aditi Bhatkhande and DeNeile Cooper
- **Past Master Students**
 - **Masters Thesis Advisor**
 - Mochen Liao, Forest Biomaterials, NCSU, 2017-2020
Awards: Second Place in Graduate Student Poster Competition at 2019 AIChE Annual Conference. First Place Award in the 2018 ACLCA Students Poster Contest
 - Darlene Echeverria, Forest Biomaterials, NCSU, 2017-2018
 - Kristen Tomberlin, Forest Biomaterials, NCSU, 2017-2019
 - **Research Project Advisor**
 - Ayushi Khan, Master of Environmental Science, 2022– 2023
 - Cicy Geng, Master of Environmental Management, 2022
 - Isobel Campbell, Master of Environmental Management, 2022
 - Jikai Wang, Master of Environmental Management, 2022
 - Yihong Zhu, Master of Forest Science, 2021-2022
 - Shelby Warrington, Master of Environmental Management, 2021-2022
 - Meghana Kharod, Master of Environmental Management, 2020-2022
Current Position: Associate Consultant, WSP USA
 - Wan Ping Chua, Master of Environmental Management, 2021 summer
Current Position: Life Cycle Associate, SCS Global
 - Hardik Pokhrel, Master of Environmental Management, 2020-2021
Current Position: Associate, Sol Systems

- Sara Johnson, Textile Engineering, NCSU, 2018-2019
Current Position: Circularity Analyst, PVH Corp.
- **Past Undergraduate Researcher**
 - Alec Nabinger, Sustainable Materials and Technology, NCSU, 2017-2019.
 - Ross Petersen, Sustainable Materials and Technology, minor in Computer Science, NCSU, 2019-2020.
- **Visiting Scholar**
 - Sophie Van Schoubroeck, Hasselt University, Belgium. 2019.

Workshop Organized

- Database Integration Workshop: Building the Data Capacity for Food-Energy-Water Research. Sept 11, 2018, NC State University Raleigh, NC. Sponsored by the U.S. Department of Agriculture, Workshop URL: <https://faculty.cnr.ncsu.edu/yuanyao/database-integration-workshop-building-the-data-capacity-for-food-energy-water-research/>

Invited Talk

- 12/18/2023, Webinar, AIChE Decarbonization and Sustainable Solutions Webinar Series
- 12/5/2023, Seminar, Yale Alumni Academy, Climate Change Conversations
- 10/25/2023, Invited Speaker, YCNCC Donor Meeting, Yale School of the Environment
- 10/18/2023, Seminar, Civil and Mineral Engineering, University of Toronto, Toronto, Canada
- 10/16/2023, Seminar, Computational and Data Systems Initiative, Trottier Institute for Sustainability in Engineering and Design, McGill University, Montreal, Canada
- 09/20/2023, BIOMES Seminar, Yale School of the Environment
- 07/18/2023, Invited Speaker, Japan-American Frontiers of Engineering Symposium, hosted by the U.S. National Academy of Engineering and Engineering Academy of Japan, Tokyo, Japan.
- 06/19/2023, Frontiers in Industrial Ecology Seminar, Virtual
- 05/19/2023, Speaker, Congressional Visit, YSE, New Haven, CT
- 05/08/2023, Planetary Solutions Spring Showcase, Climate Solutions and Economic Systems, Yale
- 04/21/2023, Seminar, Chemical Engineering, Michigan Technological University, Houghton, MI, U.S.
- 12/15/2022, Invited Speaker, Yale Information Security All Hands Meeting. Virtual.
- 12/09/2022, Invited Speaker, Research at Yale Speaker Series. Yale Office of Development. Virtual.
- 12/06/2022, Invited Speaker, MRS conference (Materials Research Society), 2022. Virtual.
- 12/02/2022, Chemical Engineering Seminar, Oxford University. Virtual.
- 10/27/2022, Invited Speaker, Faculty Conversation on Sustainable Aviation Fuels (SAF), Energy Science Institute, Yale.
- 10/04/2022, Invited Speaker, Public Seminar. Planted Forests and Circular Economy, YFF Seminar Series of (Re) Considering Planted Forests for the 21st Century. Virtual.
- 09/22/2022, Invited Speaker, Mass Timber Research Workshop, Madison, WI, U.S.
- 09/16/2022, Keynote Speaker, Yangling International Agri-Science Forum, China (virtual)
- 09/16/2022, Seminar, Yale Beijing Center, Beijing, China (virtual)
- 07/21/2022, Public Seminar, Environmental Systems Engineering Summer School hosted by the Chinese Society of Industrial Ecology
- 06/17/2022, AI in Chemistry Workshop, hosted by OPCW and IUPAC, the Netherlands
- 06/15/2022, Gordon Research Conference Industrial Ecology, Newry, ME. U.S.
- 05/05/2022, Public Seminar, Yale Climate Day, U.S.

- 03/30/2022, New Horizons 2022 Conference. Navigating Academia: Publish, Perish, Thrive. Virtual
- 10/14/2021, Public Seminar, Wood as Sustainable Materials, Yale Forest Forum, U.S.
- 10/6/2021, Seminar, Bio & Ag Engineering, UC Davis, California, U.S. (virtual)
- 09/30/2021, Seminar, Yale Beijing Center, Beijing, China (virtual)
- 09/24/2021, Seminar, Yale Institute for Biospheric Studies, Yale University
- 09/22/2021, Invited Talk, Environmental Impacts of Textiles, Facilitating a Circular Economy for Textiles, National Institute of Standards and Technology (virtual)
- 8/15/2021, Plenary Speaker, Sustainable Materials Research Summit (SMART), Annual Meeting 2021, Kunming, China.
- 10/30/2020 Seminar, Department of Chemical and Environmental Engineering, University of Cincinnati, virtual.
- 10/02/2020, Invited Speaker, NSF Convergence Accelerator Workshop: Re-think Nature for Innovative Solutions to Grand Challenges, hosted by the University of Maryland.
- 09/09/2020, Seminar, Department of Chemical and Environmental Engineering, Yale University, New Haven, CT
- 06/14-06/19/2020 Plenary speaker, 2020 Industrial Ecology Gordon Research Conference - The Impact of Data Science Advances on Industrial Ecology and Sustainability Systems Science, Newry, ME (rescheduled due to COVID-19)
- 03/05/2020, Seminar, McCormick School of Engineering, Northwestern University, Evanston, IL
- 02/20/2020, Seminar, School of Environment and Sustainability, University of Michigan, Ann Arbor, MI
- 02/06/2020, Seminar, School of Forestry and Environmental Studies, Yale University, New Haven, CT
- 10/01/2019, Seminar, Energy Seminar Series, NC State University, Raleigh, NC
- 06/06/2019, Invited Talk, American Chemistry Society Climate Change and Sustainability Seminar, Research Triangle Park, NC
- 04/25/2019, Seminar Natural Resources Foundation, Raleigh, NC
- 03/21/2019, Seminar, University Research Symposium, NCSU, Raleigh, NC
- 11/09/2018, Invited Speaker, Digital Economy Project, UC Berkeley, Berkeley, CA
- 06/08/2018, Invited Speaker, FREEDM Annual Conference Meeting, Raleigh NC
- 02/16/2018, Seminar, NCSU Energy Collaboration Group, Raleigh, NC
- 12/07/2017, Invited Speaker, ExxonMobil Research Center, Huston, TX
- 08/24/2017, Invited Speaker, Water-Nano GRIP Meeting (Game-Changing Research Incentive Program), Raleigh, NC
- 08/18/2017, Invited Speaker, NSF Secure and Trustworthy Cyberspace Meeting, Raleigh, NC
- 06/21/2017, Invited Speaker, U.S. Forest Product Lab, Madison, WI
- 12/21/2016, Invited Speaker, Argonne National Lab Meeting, NCSU, Raleigh, NC
- 11/21/2016, Seminar, Department of Chemical and Biomolecular Engineering, NCSU, Raleigh, NC

Conference Oral Presentations

Presenter underlined

55. **Yao, Y.*** and B. Zhang (2023). Climate-Smart Forestry through Synergetic Carbon Dioxide Removal Approaches. AGU Fall Meeting 2023. San Francisco, CA.
54. **Zhang, B.,** Kroeger, J., Planavsky, N. and **Y. Yao*** (2023). Carbon Dioxide Removal and Techno-Economic Potential of Enhanced Rock Weathering in the Midwestern United States. AGU Fall Meeting 2023. San Francisco, CA.

53. **Yao, Y.*** (2023). Regionalized Dynamic Life Cycle Assessment of Waste Biomass Utilization AICHE. Orlando, FL
52. **Yao, Y.*** (2022). Systems Modeling for Sustainable Biomass Utilization in Urban and Rural Areas. AGU Fall Meeting 2022. Chicago, IL.
51. **Yao, Y.*** (2022). Climate Smart Forestry through Co-Producing Biochar and Wood Products. AGU Fall Meeting 2022. Chicago, IL.
50. **Yao, Y.*** (2022). Systems Modeling Approaches for Sustainable Material Development: Techno-Economic and Environmental Considerations. MRS Conference. Virtual
49. Lan, K., Zhang, B. and **Y. Yao*** (2022). Multi-Scale Life Cycle Environmental Impact Of Urban Tree Waste Valorization. AICHE. Phoenix, AZ
48. **Yao, Y.*** (2022). Multi-Scale Life Cycle Assessment for Forest Resource Utilization. ACLCA 2022 Conference. Virtual.
47. **Yao, Y.*** (2022). Techno-Economic-Environmental Impacts of a Circular Bioeconomy for Forest Resource Utilization. 2022 International Conference on Resource Sustainability (icRS 2022). Virtual.
46. **Yao, Y.*** (2022). Systems Modeling Approaches to Support Decision-Making for Sustainable Agriculture, Energy, and Water Systems. Association of Environmental Engineering & Science Professors (AEESP) 2022 Conference. St. Louis, MO.
45. **Yao, Y.*** (2022). Circular Economy for Sustainable Biomass Utilization: Techno-Economic and Environmental Considerations, Gordon Research Conference Industrial Ecology. Newry, ME.
44. **Yao, Y.*** (2021). Systems Modeling Approaches to Support Decision-Making for Sustainable Materials. Sustainable Materials Research Summit (SMART) Annual Meeting 2021. Virtual.
43. **Lan, K.**, Stephen SS., Prakash, N. and **Y. Yao*** (2021). Understanding the Dynamic And Variabilities In Life Cycle Carbon And Energy Analysis For Cross-Laminated Timber Produced In The Southeastern United States. ISSST Conference. Virtual.
42. **Yao, Y.*** (2020). Life Cycle Modeling for Emerging Technologies: A Parametric Approach to Guide Research and Development for Additive Manufacturing. AICHE Annual Meeting, virtual.
41. **Lan, K.**, Ou, L., Park, S., Stephen SS. and **Y. Yao*** (2020). Carbon and Energy Implications of Fast Pyrolysis Biorefineries with Blended Feedstocks and Decentralized Supply Chain Design in the Southeastern United States. AICHE Annual Meeting.
40. **Liao, M.**, Kelley, SS, and **Y. Yao*** (2020). Integrating Machine Learning and Process Simulation to Estimate Energy and Greenhouse Gas Emissions of Activated Carbon Production. AICHE Annual Meeting.
39. **Lan, K.** and **Y. Yao*** (2020). A Life-Cycle Modeling Framework for Dynamic Energy And Water Footprints of Agriculture Systems. AICHE Annual Meeting
38. **Lan, K.**, Ou, L., Stephen SS., Park, S., Kwon, H., Cai, H., Wang, M. and **Y. Yao*** (2019). Understanding the Uncertainties in Environmental Life Cycle Energy and Carbon Analysis for Biofuel from Forest Residue in the United States. AICHE Annual Meeting, Orlando, FL
37. **Lan, K.**, Park, S., Kelley, SS., Ou, L., English, B., Yu, T., Larson, J. and **Y. Yao*** (2019). Techno-Economic Analysis and Life Cycle Assessment of Decentralized Preprocessing System for Fast Pyrolysis Biorefineries with Blended Feedstocks in the Southeastern USA. AICHE Annual Meeting, Orlando, FL
36. **Liao, M.**, Kelley, SS, and **Y. Yao*** (2019). Evaluating Variability of Energy Consumption and Carbon Emissions of Activated Carbon Production from Wood Using Artificial Neural Network Integrated Process Simulations. AICHE Annual Meeting, Orlando, FL
- 35.. **Liao, M.**, Kelley, SS, and **Y. Yao*** (2019). A Data-Driven Framework for Biomass Selection and Process Optimization of Activated Carbon Production. AICHE Annual Meeting, Orlando, FL

34. Lan, K., Ou, L., Stephen SS., Park, S., Kwon, H., Cai, H., Wang, M. and **Y. Yao*** (2019). Quantifying Variability in Life Cycle Environmental Footprints of Biofuel Produced from Forest Residues in the United States. AIChE Annual Meeting, Orlando, FL
33. Lan, K., Ou, L., Park, S., Stephen SS., and **Y. Yao*** (2019). Life Cycle Carbon and Energy Analysis of Decentralized Preprocessing Systems for Fast Pyrolysis Biorefineries with Blended Feedstocks. LCA XIX Conference, Tucson, AZ
32. Lan, K., Ou, L., Stephen SS., Park, S., Kwon, H., Cai, H., Wang, M. and **Y. Yao*** (2019). Dynamic Life-Cycle Energy and Carbon Analysis for Biofuel from Forest Residue in the United States. LCA XIX Conference, Tucson, AZ
31. **Yao, Y.*** and R. Huang (2019). A Parametric Life Cycle Modeling Framework for Identifying Research Development Priorities of Emerging Technologies: A Case Study of Additive Manufacturing. 26th CIRP Conference on Life Cycle Engineering: Advancing Industrial Sustainability. Purdue University, West Lafayette, IN
30. Nabinger, A., Tomberlin, K., Venditti, R., and **Y. Yao*** (2019). Using a Data-Driven Approach to Unveil Greenhouse Gas Emission Intensities of Different Pulp and Paper Products. 26th CIRP Conference on Life Cycle Engineering: Advancing Industrial Sustainability. Purdue University, West Lafayette, IN
29. **Yao, Y.***, Liao, M., and SS. Kelley, (2019). A Machine Learning-Based Modeling Framework for Generating Life Cycle Inventory Data of Activated Carbon Production from Woody Biomass, LCA XIX Conference, Tucson, AZ
28. Buitrago, R., D., Venditti, R., Jameel, H., **Y. Yao*** (2019). Process Simulation-Based Life Cycle Inventory Analysis of Dissolving Pulp from the Sulfite Process, LCA XIX Conference, Tucson, AZ
27. **Yao, Y.***, Liao, M., and SS. Kelley (2019). Data-Driven Approaches for Sustainable Biochar Production and Applications, Biochar & Bioenergy 2019, Fort Collins, CO, USA.
26. Liao, M., Kelley, SS, and **Y. Yao*** (2019). Quantifying Energy Demand and GHG Emissions of Activated Carbon Production from Diverse Woody Biomass: A Predictive Modeling Framework of Artificial Neural Network and Kinetic Based Simulation, ISSST Conference, Portland, Oregon, USA.
25. Lan, K. and **Y. Yao*** (2019). An Integrated Life-Cycle Modeling Framework for Dynamic Agriculture Systems, ISSST Conference, Portland, Oregon, USA.
24. **Yao, Y.*** Huang, R., Venditti, R., Lan, K., and Z. Zhang (2019). Insights from the Database Integration Workshop: Building the Data Capacity for Food-Energy-Water Research, ISSST Conference, Portland, Oregon, USA.
23. **Yao, Y.*** and R. Venditti (2019). Using Big Data to Understand the Variability of Carbon and Energy Footprints of Pulp and Paper Products, ISSST Conference, Portland, Oregon, USA.
22. **Yao, Y.***, Venditti, R. and SS. Kelley (2018). Promoting Bioeconomy for Sustainable Food-Energy-Water Systems: The Need of Interdisciplinary Research from a Data Point of View, Database Integration Workshop: Building the Data Capacity for Food-Energy-Water Research, Raleigh, NC, USA.
21. **Yao, Y.*** and R. Huang. (2018) Using Life Cycle Analysis to Understand the Sustainability of Emerging Technologies and Guide Research and Technology Development, International Workshop for Global Sustainability, Research Triangle, NC, USA.
20. Echeverria, D., Venditti, R., Jameel, H., **Y. Yao*** (2018) Comparative Life Cycle Assessment of Peracetic Acid Application in the Pulp and Paper Industry, ACLCA, Fort Collins, CO, USA.

19. **Yao, Y***, and R. Huang (2018). Using Prospective Life Cycle Assessment to Guide Research and Technology Development, ISSST Conference (International Symposium on Sustainable Systems and Technology), Buffalo, New York, USA.
18. **Echeverria, D., Yao, Y***, Venditti, R., Jameel (2017). Environmental Life Cycle Assessment of Peracetic Acid Application in the Pulp and Paper Industry, AIChE, Minneapolis, MN, USA.
17. **Yao, Y***, Huang, R., and E. Masanet (2017). Multi-Scale Prospective Modeling to Enhance Decision Making for Next-Generation Technologies, ISIE-ISSST 2017: Science in Support of Sustainable and Resilient Communities, Chicago, IL, USA.
16. **Huang, R., Yao, Y**, and E. Masanet (2017). Enabling Retrospective Life Cycle Assessment in the Prospective Context for Emerging Technologies, ISIE-ISSST 2017: Science in Support of Sustainable and Resilient Communities, Chicago, IL, USA.
15. **William R., Marano, J., and Y. Yao*** (2017). A Techno-Economic Assessment of Centralized Carbon Capture in US Petroleum, Refineries," IETC, College Station, TX, USA.
14. **Yao, Y***, Graziano, D., Riddle, M., and E. Masanet (2015) Looking into the Future of the Ethylene Industry: A Generic Assessment Model for Emerging Technologies, AIChE Annual Meeting, Salt Lake City, Utah, USA.
13. **Yao, Y***. (2015) Accelerating the Development of Green Technologies for Chemical Production through Multiscale Life-Cycle Technology Assessment, AIChE Annual Meeting, Salt Lake City, Utah, USA.
12. **Yao, Y**, Graziano, D., Riddle, M., and E. Masanet (2015) A Case Study of MAMTech Assessment Model: Prospective Life-cycle Technology Assessment of Future U.S. Ethylene Production, LCA XV Conference, Vancouver, Canada.
11. **Yao, Y**, Graziano, D., Riddle, M., and E. Masanet (2015) Integrated Life-cycle Technology Assessment Model for Sustainable Chemical Production, International Society for Industrial Ecology Conference, London, U.K.
10. **Yao, Y.**, Graziano, D., Riddle, M., and E. Masanet (2015). Opportunities and Challenges for Energy-Intensive Chemicals: Emerging Technology Review. 7th Annual Midwest AIChE Meeting, Chicago, Illinois, USA.
9. **Yao, Y.**, Graziano, D., Riddle, M., and E. Masanet (2014). A Life-cycle, Techno-economic Modeling Framework for Net Impact Assessment of Emerging Technologies in the U.S. Chemical Industry. LCA XIV Conference, San Francisco, California, USA.
8. **Yao, Y.**, Graziano, D., Riddle, M., and E. Masanet (2014). A Macro-level Impact Assessment Tool for Emerging Technologies in Chemical Industry. AIChE Annual Meeting, Atlanta, Georgia
7. **Yao, Y.**, Graziano, D., Riddle, M., and E. Masanet (2014). Investigating the Impact of Shale Gas Utilization in Bulk Chemical Production. Annual AIChE Midwest Meeting, Chicago, Illinois
6. **Yao, Y.***, Chang, Y., and E. Masanet (2013). Hybrid Life Cycle Assessment Model of Silicon Photovoltaics. AIChE Annual Meeting, San Francisco, California, USA.
5. **Yao, Y.**, Thwaites, F., and E. Masanet (2013). Hybrid Techno-economic Modeling Tool for Greener Chemicals Supply Chains. AIChE Annual Meeting, San Francisco, California
4. **Yao, Y.**, Chang, Y., and E. Masanet (2013). Life Cycle Greenhouse Gas Emissions and Energy Consumption of Silicon Photovoltaics Based on Hybrid Assessment Model. LCA XIII Conference, Orlando, Florida, USA.
3. **Yao, Y.** and F. You (2012). Optimal Design of County-level Hydrocarbon Biorefinery Supply Chains Under Uncertainty: A Case Study for the State of Illinois Using Spatially-Explicit Model. AIChE Annual Meeting, Pittsburg, Pennsylvania, USA.

2. Yao, Y. and F. You (2012). Multiobjective Stochastic Programming Models and Algorithms for Robust Design and Optimization of Biofuels Supply Chains. AIChE Annual Meeting, Pittsburg, Pennsylvania, USA.
1. Yao, Y. and F. You (2012) Life Cycle Assessment of Thin-Film CdTe Photovoltaics. AIChE Annual Meeting, Pittsburg, Pennsylvania, USA.

Conference Poster Presentations

Presenter underlined

16. Zhang, B., Lan, K. and **Y. Yao*** (2022). Carbon Benefits from Commercial Reforestation and Afforestation on Marginal Lands in the Southeastern U.S. Gordon Research Conference Industrial Ecology. Newry, ME.
15. Wang, H. and **Y. Yao*** (2022). Stochastic Programming for Optimizing Recycled/Virgin Paper Production. Gordon Research Conference Industrial Ecology. Newry, ME.
14. Lee, T., Graedel, T. and **Y. Yao*** (2022). Material Requirements of the United States Energy Transition. Gordon Research Conference Industrial Ecology. Newry, ME.
13. Lan, K. and **Y. Yao*** (2022). Techno-Economic Analysis of H₂ Produced from the Gasification of Mixed Plastic Waste. Gordon Research Conference Industrial Ecology. Newry, ME.
12. Wu, N., Lan, K. and **Y. Yao*** (2022). An Integrated Techno-Economic and Environmental Assessment for Carbon Capture in Hydrogen Production by Biomass Gasification. Gordon Research Conference Industrial Ecology. Newry, ME.
11. Kroeger, J., Zhang, B. and **Y. Yao*** (2022). Life Cycle Assessment of Enhanced Weathering Using Waste Materials. Gordon Research Conference Industrial Ecology. Newry, ME.
10. Echeverria, D., Venditti, R., Jameel, H. and **Y. Yao*** (2019). Generating Life Cycle Inventory Data of Pre-Hydrolysis Kraft Pulp from Diverse Wood Sources Using Process Simulation, LCA XIX Conference, Tuscon, AZ. **Student Poster Award**.
9. Lan, K., Park, S., Kelley, SS., Ou, L., English, B., Yu, T., Larson, J. and **Y. Yao*** (2019). Techno-Economic Analysis and Life Cycle Assessment of Decentralized Preprocessing System for Fast Pyrolysis Biorefineries with Blended Feedstocks in the Southeastern United States, ISSST Conference, Portland, Oregon, USA. **Best Poster Award**
8. Liao, M., Kelley, S. and **Y. Yao*** (2019). A Data-Driven Framework for Biomass Selection and Process Optimization of Activated Carbon Production. AIChE Annual Meeting, Orlando, FL, USA. **Second Place Award** of Student Poster Competition in AIChE 2019 Sustainable Engineering Forum.
7. Liao, M. and Y. Yao* (2019). Investigating the Environmental Implications of Artificial Intelligence Applications in the Chemical Manufacturing Industry, NCSU Cybersecurity Manufacturing Summit, NCSU, Raleigh, NC, USA.
6. Parida, D., Zambrano, M., Venditti, R. and **Y. Yao*** (2019). Development of Non-Conventional Sustainability Indicators for Biopolymers, 26th Bio-Environmental Polymer Society (BEPS), Clemson University International Center for Automotive Research, Greenville, SC, USA.
5. Yao, Y.* (2019). Developing Decision-Support Tool for Industrial Sustainability, University Research Symposium, NCSU, Raleigh, NC, U.S.
4. Zhang, Z., Martin, K., Grey, J., Stevenson, K.T., & **Y. Yao** (2018). Evaluating Machine Learning Approaches for Mapping Flood Risk. Poster presented at the American Geophysical Union Annual Meeting, Washington, DC, U.S.
3. Liao, M. and **Y. Yao*** (2018) The Predictive Life Cycle Assessment of Activated Carbon Production via different Pathways: An Artificial Neural Network and Kinetic based Model, Frontiers in Biorefining Conference, St. Simons Island, Georgia, U.S.

2. Liao, M. and **Y. Yao*** (2018) A Predictive Life Cycle Assessment Model of Activated Carbon Production using Artificial Neural Network, ACLCA, Fort Collins, CO, USA. ***First Place Award*** of Student Poster Contest.
1. Lan, K. and **Y. Yao*** (2018) Integrating Life Cycle Assessment and Agent-Based Modeling: A Dynamic Modeling Framework for Sustainable Agriculture Systems, ACLCA, Fort Collins, CO, U.S.