Yuan Yao
Assistant Professor of Industrial Ecology and Sustainable Systems
Yale School of the Environment

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, New Haven, CT

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, Evanston, IL

Research Interest

- Industrial Ecology (IE): Life Cycle Assessment, Input-Output Analysis, and Material Flow Analysis. Integrating IE with Machine Learning and Operations Research to Enhance Decision Making towards Sustainability
- Sustainable Systems: Sustainable Design, Development, and Optimization for Bioeconomy, Renewable Energy, Food-Energy-Water Nexus, Emerging Technology, Industrial Decarbonization, and Circular Economy

Awards

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

Research Grants and Contracts

- CAREER: Biochar Systems for Sustainable Applications in the Food-Energy-Water Nexus (2019-2024). U.S. National Science Foundation, Single PI. $519,562
- 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. $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
- 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

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

Invited Reviewer

- Grant Reviewer: U.S. National Science Foundation (2017 spring, 2018 spring, 2019 spring and fall)
- Journal Reviewer:
  - Nature Climate Change
  - Joule
  - Journal of Cleaner Production
  - ACS Sustainable Chemistry & Engineering
  - Energy Science & Engineering
  - Current Opinion in Chemical Engineering
  - Bioresources
  - International Journal of Life Cycle Assessment
  - Journal of Engineering
  - Energy Reports
  - Journal of Clean Technologies and Environmental Policy
  - Energy & Fuels
  - BioEnergy Research
  - Energy and Environmental Science
  - Environmental Science and Technology
  - Environmental Research Letters
  - Resources, Conservation & Recycling;
  - Reaction Chemistry & Engineering
  - Renewable & Sustainable Energy Reviews
  - Science of the Total Environment
  - Sustainable Materials and Technology
  - Molecules
  - Water-Energy Nexus
  -
- Book Proposal Reviewer – Elsevier
- Conference Reviewer:
  - Joint Conference ISIE and ISSST, Chicago, IL, 2017
  - International Symposium on Sustainable Systems and Technology, 2018 and 2019

Service to Scientific and Professional Organizations

- Board member of ISIE Life Cycle Sustainability Assessment Division (ISIE: International Society of Industrial Ecology), 2017-Present
- 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, 05/2018
- Chair of Joint Conference ISIE and ISSST on Session LCA Applications, Chicago, IL, 2017
- Chair/Co-Chair of AIChE National Meeting Sessions on
  - Life Cycle Analysis of Bio-Based Fuels, Energy, and Chemicals, 2017 - 2020

  - The Food-Energy-Water Nexus, 2017 – 2020
  - Going to a Decision Point in Sustainability Analysis, 2020
  - Process Design: Innovation for Sustainability, 2017 and 2018
- Participant, Department of Energy Biorefinery Optimization Workshop, Chicago, 10/2016
- 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

- 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

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 – present

Professional Affiliations

- American Institute of Chemical Engineers (AIChE) (2012-present)
- LCSA Division Board Member, International Society of Industrial Ecology (ISIE) (2017-present)
- International Society of Industrial Ecology (2013-present)
- 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

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 Lief Cycle Analysis, https://campus.extension.org/enrol/index.php?id=1778

Students and Postdoctoral Scholars

- **Current Ph.D. Students (Committee Chair/Co-Chair)**
  - Mochen Liao, School of the Environment, Yale University, 2020 - present
  - Rodrigo Buitrago, Forest Biomaterials, NCSU 2018 - present
  - Darlene Echeverria, Forest Biomaterials, NCSU, 2018 - present
  - Zhenzhen Zhang, Forestry and Environmental Resources, NCSU, 2017 - present
  - Maria Herrera, Forest Biomaterials, NCSU, 2016 – present
- **Past PhD Students (Committee Chair)**
  - Kai Lan, 2020, PhD in Forest Biomaterials, NCSU, 2017-2020
    Dissertation Topic: Dynamic and Parametric Life Cycle Assessment Modeling Frameworks for Biomass Production and Biomass-based Products.
- **Past Master Students (Committee Chair)**
  - Mochen Liao, Forest Biomaterials, NCSU, 2017-2020
    Thesis Topic: Evaluating the Variability of Energy Consumption and Carbon Footprints of Activated Carbon Production Using Machine Learning Integrated Process Simulation
- **Past Master Students (Committee Co-Chair)**
  - Darlene Echeverria, Forest Biomaterials, NCSU, 2017-2018
    Thesis Topic: Life Cycle Assessment of Peracetic Acid and Application in the pulp and paper industry
  - Kristen Tomberlin, Forest Biomaterials, NCSU, 2017-2019
    Thesis Topic: Life Cycle Carbon Analysis of US Pulp and Paper Grades Using Self-Reported Mill Data.
- **Past Master Students (Research Project Advisor)**
  - Sara Johnson, Textile Engineering, NCSU, 2018-2019. Project "Supply Chain Analysis of Waste Cotton and End-of-Life Applications"
- **Past Undergraduate Researcher**
  - Alec Nabinger, Sustainable Materials and Technology, NCSU, 2017-2019. Project "Data-Driven Approach to Unveil Greenhouse Gas Emission Intensities of Different Pulp and Paper Products".
  - Ross Petersen, Sustainable Materials and Technology, minor in Computer Science, NCSU, 2019-2020. Project "Data Analysis for Sustainability Reporting".

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/

Publications

Publications with advisees underlined (graduate and undergraduate students)
*denotes the corresponding author. In my field, a principal advisor/project leader takes the last and/or the corresponding authorship.

Peer-Reviewed Journal Publications

25. Lan, K. Ou, L., Park, S., Stephen SS., Nepal, P., Kwon, H., Cai, H.*, and **Y. Yao*** (2020). Dynamic Life Cycle Carbon Analysis for Fast Pyrolysis Biofuel Produced from Pine Residues: Examine Carbon-Neutral Assumption for Woody Biomass. Biotechnology for Biofuels (under review).
24. Lan, K., Ou, L., Stephen SS., Park, S., English, BC., Yu, TE., Larson, J., and **Y. Yao*** (2020). Techno-Economic Analysis of Decentralized Preprocessing Systems for Fast Pyrolysis Biorefineries with Blended Feedstocks in the Southeastern United States. Renewable & Sustainable Energy Reviews (under review).
23. Lan, K., S., Kelley, S., Nepal, P., and **Y. Yao*** (2020). Dynamic Life Cycle Carbon and Energy Analysis for Cross-Laminated Timber in the Southern U.S. Environmental Research Letters. (under preparation).
22. Lan, K., Ou, L., Park, S., Kelley, S., English, B., Yu, E., Larson, J. and **Y. Yao*** (2019). Understanding the Effects of Feedstock Quality Uncertainties on the Economic Feasibilities of Fast Pyrolysis Biorefineries with Blended Feedstocks and Decentralized Preprocessing Sites in the Southeastern United States. GCB Bioenergy (under preparation).
21. Liao, M. and **Y. Yao*** (2020). Sustainability Implications of Artificial Intelligence in the Chemical Industry: A Review and A Methodology Framework. Journal of Industry Ecology (under review).
20. Tomberlin, K., Venditti, R., and **Y. Yao*** (2020). Life Cycle Carbon Analysis of Different U.S. Pulp and Paper Grades Using Process-Based Data Integration. Bioresources. 15 (2), 16. DOI: 10.15376/biores.15.2.3899-3914.
19. Echeverria, D., Venditti, R., Jameel, H. and **Y. Yao*** (2019). Life Cycle Assessment of Peracetic Acid Application in the Pulp and Paper Industry. International Journal of Life Cycle Assessment (under review).
18. Johnson, S., Echeverria, D., Venditti, R., Jameel, H. and **Y. Yao*** (2019). Supply Chain of Waste Cotton Recycling and Reuse: A Review. AATCC Journal of Research-Textile Science. In press. 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. 2020, 8, 2, 1252-1261. http://dx.doi.org/10.1021/acssuschemeng.9b06522

16. 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.
15. Lan, K., Ou, L., Park, S., Kelley, SS. and **Y. Yao*** (2019). Life Cycle Assessment of Decentralized Preprocessing Systems for Fast Pyrolysis Biorefineries with Blended Feedstocks in the Southeastern United States. Energy Technology. https://doi.org/10.1002/ente.201900850.
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. doi: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, 2018, 1381-1390. doi: 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. doi: 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.
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. doi: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. doi: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. doi: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(0), 90-98. doi: 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.
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. doi: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, Challenges and Status Quo of Models for Biofuel Supply Chain Design. Elsevier. https://doi.org/10.1016/B978-0-12-815581-3.00010-5.

Conference Proceedings:

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.

Invited Talk

- 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 McCormick School of Engineering, Northwestern University, Evanston, IL
- 02/20/2020 School of Environment and Sustainability, University of Michigan, Ann Arbor, MI
- 02/06/2020 School of Forestry and Environmental Studies, Yale University, New Haven, CT
- 10/01/2019 Energy Seminar Series, NC State University, Raleigh, NC
- 06/06/2019 American Chemistry Society Climate Change and Sustainability Seminar, Research Triangle Park, NC
- 04/25/2019 Natural Resources Foundation, Raleigh, NC
- 03/21/2019 University Research Symposium, NCSU, Raleigh, NC
- 11/09/2018 Digital Economy Project, UC Berkeley, Berkeley, CA
- 06/08/2018 FREEDM Annual Conference Meeting, Raleigh NC
- 02/16/2018 NCSU Energy Collaboration Group, Raleigh, NC
- 12/07/2017 ExxonMobil Research Center, Huston, TX
- 08/24/2017 Water-Nano GRIP Meeting (Game-Changing Research Incentive Program), Raleigh, NC
- 08/18/2017, NSF Secure and Trustworthy Cyberspace Meeting, Raleigh, NC
- 06/21/2017 U.S. Forest Product Lab, Madison, WI
- 12/21/2016 Argonne National Lab Meeting, NCSU, Raleigh, NC
- 11/21/2016 Department of Chemical and Biomolecular Engineering, NCSU, Raleigh, NC

Oral Presentations

Presenter underlined

38 Lan, K., Ou, L., Stephen SS., Park, S., Kwon, H., Cai, H., Wang, W. 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, W. 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, W. 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. **Y. Yao*** 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.

Poster Presentations

Presenter underlined

9. Echeverria, D., Venditti, R., Jameel, H., **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
8. 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.
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, USA.
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, USA.

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, USA.
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.
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, USA.