Biographical Sketch

Guiyan Zang

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PROFESSIONAL POSITIONS

Associate Professor	January 2026-Present
Institute for Northwest Energy Futures and School of Engineering & Applied Sciences, Washington State University	Richland, WA
Joint Appointment	March 2026-Present
Applied Materials Division, Argonne National Laboratory	Lemont, IL
Data Modeling Analyst	June 2025-December 2025
Applied Materials Division, Argonne National Laboratory	Lemont, IL
Technoeconomic Analysis Research Lead	August 2023-May 2025
MIT Energy Initiative, Massachusetts Institute of Technology	Cambridge, MA
Research Scientist	April 2022-July 2023
MIT Energy Initiative, Massachusetts Institute of Technology	Cambridge, MA
Energy System Analyst	May 2021-March 2022
Energy System Division, Argonne National Laboratory	Lemont, IL
Postdoctoral Appointee	June 2019-April 2021
Energy System Division, Argonne National Laboratory (ANL)	Lemont, IL

EDUCATION

Ph.D. in Mechanical Engineering May 2019
College of Engineering, the University of Iowa, U.S.
Thesis: "Biomass gasification application on power generation: BIGCC systems comparison and other system design"

Master of Engineering in Power Engineering
Institute of Engineering Thermophysics, Chinese Academy of Sciences, China July 2013
Thesis: "Co-production system of hydrogen and electricity based on coal partial gasification with CO_2 capture"

Bachelor in Thermal Energy and Power Engineering
College of Power and Energy Engineering, Harbin Engineering University, China June 2009

TECHNOLOGY SUMMARY

- **Simulation Tools:** SESAME, GREET, OpenLCA, Aspen Plus, Pro/ENGINEER/PTC, ANSYS Fluent, MATLAB, Wolfram Mathematica
- **Programming Language**: C#, C++, FORTRAN, Python, R
- **Experimental Facilities:** Gas Chromatography (GC), Scanning Electron Microscope (SEM)

HONORS AND AWARDS

- **Impact Argonne Award** 2022
- **Impact Argonne Award** 2021
- **Ballard and Seashore Dissertation Fellowships** 2019
- **Rajalakshmi & Shankar Planjery Memorial Mechanical Engineering Graduate Award** 2016

ACADEMIC SERVICE

- Energy, Ecology & Environment (E3). Youth Editor
- Science. Reviewer
- Joule. Reviewer

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- Nature Chemical Engineering. Reviewer
- Renewable and Sustainable Energy Reviews. Reviewer
- Journal of Environmental Chemical Engineering. Reviewer
- Energy, An International Journal. Reviewer
- Energy Conversion and Management. Reviewer
- Applied Thermal Engineering. Reviewer
- Journal of Cleaner Production. Reviewer
- Biomass Conversion and Biorefinery. Reviewer
- Biofuels, Bioproducts and Biorefining. Reviewer
- Processes, An Open Access Journal from MDPI, Reviewer.
- Energies, An Open Access Journal from MDPI, Reviewer.

PUBLICATIONS

Journal publications (2022-Present)

[1] Woojae Shin, Haoxiang Lai, Gasim Ibrahim, **Guiyan Zang*,** Toward a Sustainable Energy Future Using Ammonia as Energy Carrier: Global Supply Chain Cost and Greenhouse Gas Emissions. *Energy and Environmental Science*. 2026; 19 (1), 162-188. https://doi.org/10.1039/D5EE05571G

[2] Christopher M. Douglasa, Haoxiang Lai, Mohammad Ostadi, Woojae Shin, Leslie Bromberg, **Guiyan Zang*.** Techno-economic analysis and life-cycle assessment of methanol synthesis plants using renewable hydrogen and carbon dioxide feedstocks. *Energy Conversion and Management*. 2026; 347, 120374. https://doi.org/10.1016/j.enconman.2025.120374

[3] Mats ten Cate, Michael Dienstknecht, Evrim Ursavas, **Guiyan Zang**, Stuart X Zhu. From CO2 emissions to jet fuel: Analysis of potential sustainable aviation fuel supply chains in Europe. *Applied Energy*. 2025; 369, 126131. https://doi.org/10.1016/j.apenergy.2025.126131

[4] Seyed Mojtaba Alirahmi, Meng Qi, Chang He, Gurkan Sin, **Guiyan Zang**, Zhenhua Rui, Truls Gundersen, Haoshui Yu, Allam cycle-based integrated energy storage system for cross-sector decarbonization. *Journal of Energy Storage.* 2025; 130, 117327. https://doi.org/10.1016/j.est.2025.117327

[5] Sayandeep Biswas; Angiras Menon; Randall Field; **Guiyan Zang**; William Green, A comprehensive costing and emissions analysis of blue, green, and combined blue-green ammonia production. *Energy & Fuel*. 2025; 39 (38), 18694-18710. https://doi.org/10.1021/acs.energyfuels.5c03111

[6] Yifu Ding, Jansen Wong, Serena Patel, **Guiyan Zang**, Dharik Mallapragada, Robert Stoner. A Dataset of the Operating Station Heat Rate for 806 Indian Coal Plant Units using Machine Learning. *Data in Brief.* 2025/8/5, 111939. https://doi.org/10.1016/j.dib.2025.111939

[7] Mohammad Ostadi, Leslie Bromberg, **Guiyan Zang**, Daniel R Cohn. Potential Expansion of Low-Carbon Liquid Fuel Production Using Hydrogen-Enhanced Biomass/ Municipal Solid Waste Gasification. *Sustainability*. 2025; 17 (13), 111939. https://doi.org/10.3390/su17135718

[8] Christopher M. Douglas∗, Santosh Shanbhogue, Ahmed Ghoniem, **Guiyan Zang*.** Well-to-Wake Cost and Emissions Assessments for the Western Australia–East Asia Green Shipping Corridor. *Applied Energy.* 2025; 384 (15), 125465. https://doi.org/10.1016/j.apenergy.2025.125465

[9] Woojae Shin, Bosong Lin, Haoxiang Lai, Gasim Ibrahim, **Guiyan Zang***. Decarbonization approaches for ethylene production: comparative techno-economic and life-cycle analysis. *Green Chemistry*. 2025; 27 (14), 3655-3675. DOI https://doi.org/10.1039/D4GC04538F

[10] Mohammad Ostadi, Daniel R Cohn, Guiyan Zang, Leslie Bromberg, Potential Expansion of Low-Carbon Liquid Fuel Production Using Hydrogen-Enhanced Biomass/Municipal Solid Waste Gasification. *Sustainability*. 2025; 17 (13), 5718. https://doi.org/10.3390/su17135718

[11] Lingyan Deng*, Haoxiang Lai, **Guiyan Zang**, Angiras Menon, Amanda M. Farnsworth, Emre Gençer, Ahmed Ghoniem, William H. Green, Robert J. Stoner. Decarbonizing of power plants by ammonia co-firing:

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design, techno-economic, and life-cycle analyses. *International Journal of Green Energy.* 2024; 21 (15), 3521-3537. https://doi.org/10.1080/15435075.2024.2386066

[12] Mohammad Ostadi, Leslie Bromberg, **Guiyan Zang**, Daniel R Cohn, Emre Gençer. Flexible and synergistic methanol production via biomass gasification and natural gas reforming. *Cleaner Chemical Engineering*. 2024; 10, 100120. https://doi.org/10.1016/j.clce.2024.100120

[13] Gasim Ibrahim, Mohamed S Challiwala, **Guiyan Zang**, Mahmoud M El-Halwagi, Nimir O Elbashir*. A novel framework for the economic and sustainability assessment of carbon capture and utilization technologies. *Gas Science and Engineering*. 2024; 131, 205462. https://doi.org/10.1016/j.jgsce.2024.205462

[14] Mohammad Ostadi, Daniel R Cohn, **Guiyan Zang**, Leslie Bromberg. CH4 and CO2 Reductions from Methanol Production Using Municipal Solid Waste Gasification with Hydrogen Enhancement. *Sustainability*. 2024; 16 (19), 8649. https://doi.org/10.3390/su16198649

[15] Mohammad Ostadi*, **Guiyan Zang,** Leslie Bromberg, Daniel R Cohn, Emre Gençer. Enhancing Biomass-to-Liquid conversion through synergistic integration of natural gas pyrolysis: process options and environmental implications. *Energy Conversion and Management.* 2024; 302: 118142. https://doi.org/10.1016/j.enconman.2024.118142

[16] Guiyan Zang*, Edward J. Graham, Dharik Mallapragada. H_2 Production through Natural Gas Reforming and Carbon Capture: A Techno-economic and Life Cycle Analysis. *International Journal of Hydrogen Energy*. 2024; 49: 1288-1303. https://doi.org/10.1016/j.ijhydene.2023.09.230

[17] Saurajyoti Kar, Troy R Hawkins*, George G Zaimes, Doris Oke, Udayan Singh, Xinyi Wu, Hoyoung Kwon, Shannon Zhang, **Guiyan Zang**, Yan Zhou, Amgad Elgowainy, Michael Wang, Ookie Ma. A Deep Decarbonization Framework for the United States Economy–a Sector, Sub-sector, and End-use Based Approach. *Sustainable Energy & Fuels*. 2024; 8(5): 1024-1039. https://doi.org/10.1039/D3SE00807J

[18] Gasim Ibrahim, Mohamed S Challiwala, Hanif A Choudhury, **Guiyan Zang**, Mahmoud M El-Halwagi, Nimir O Elbashir*. CO2Fix: An Approach to Assess CO_2 Fixation Potential of CCU Reaction Pathways. *Computers & Chemical Engineering*. 2023; 178: 108398. https://doi.org/10.1016/j.compchemeng.2023.108398

[19] Guiyan Zang, Pingping Sun*, Amgad Elgowainy, Pallavi Bobba, Colin McMillan, Ookie Ma, Kara Podkaminer, Neha Rustagi, Marc Melaina, Mariya Koleva. Cost and Life Cycle Analysis for Deep CO_2 Emissions Reduction for Steel Making: BF-BOF and EAF technologies. *International Journal of Greenhouse Gas Control*. 2023; 128: 103958. https://doi.org/10.1002/srin.202200297

[20] Hernan E Delgado, Vincenzo Cappello, **Guiyan Zang**, Pingping Sun*, Clarence Ng, Pradeep Vyawahare, Amgad A Elgowainy, Daniel S Wendt, Richard D Boardman, Jason Marcinkoski. Techno-economic Analysis and Life Cycle Analysis of E-fuel Production Using Nuclear Energy. *Journal of CO_2 Utilization*. 2023; 72: 102481. https://doi.org/10.1016/j.jcou.2023.102481

[21] Guiyan Zang, Pingping Sun*, Amgad Elgowainy, Pallavi Bobba, Colin McMillan, Ookie Ma, Kara Podkaminer, Neha Rustagi, Marc Melaina, Mariya Koleva. Cost and Life Cycle Analysis for Deep CO_2 Emissions Reduction for Steel Making: Direct Reduced Iron Technologies. *Steel Research International*. 2023; 94: 2200297. https://doi.org/10.1002/srin.202200297

[22] Guiyan Zang, Jianan Zhang*, Albert Ratner, Yunye Shi. Techno-economic Analysis of a Cooling, heating, and electricity trigeneration system based on downdraft fixed bed wood and tire gasification: Case Study of a Campus Office Building. *Sustainable energy technologies and assessments*. 2023; 55: 102939. https://doi.org/10.1016/j.seta.2022.102939

[23] Eunji Yoo*, Uisung Lee, **Guiyan Zang**, Pingping Sun, Amgad Elgowainy, Michael Wang. Incremental Approach for the Life-cycle Greenhouse Gas Analysis of Carbon Capture and Utilization. *Journal of CO_2 Utilization.* 2022; 65: 102212. https://doi.org/10.1016/j.jcou.2022.102212

[24] Vincenzo Cappello, Pingping Sun*, **Guiyan Zang**, Shishir Kumar, Ryan Hackler, Hernan E Delgado, Amgad Elgowainy, Massimiliano Delferro, Theodore Krause. Conversion of Plastic Waste into High-value Lubricants: Techno-economic Analysis and Life Cycle Assessment. *Green Chemistry*. 2022; 24 (16): 6306-6318. https://doi.org/10.1039/D2GC01840C

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Reports and Patent (2022-Present)

[1] Guiyan Zang, Pingping Sun, Amgad Elgowainy. The Modeling of Synfuel Production Process: ASPEN Model of FT production with electricity demand provided at LWR scale. 2022. *OSTI.GOV*. https://www.osti.gov/biblio/1845408

[2] Guiyan Zang, Pingping Sun, Hernan Eugenio Delgado, Vincenzo Cappello, Clarence Ng, Amgad Elgowainy. The Modeling of the Synfuel Production Process: Process models of Fischer-Tropsch production with electricity and hydrogen provided by various scales of nuclear plants. 2023. *OSTI.GOV*. https://www.osti.gov/biblio/1868524

[3] Lane T Knighton, Daniel S Wendt, James D Richards, Cristian Rabiti, Abdalla Abou Jaoude, Tyler L Westover, Kurt G Vedros, Samuel Bates, Amgad Elgowainy, Adarsh Bafana, Richard D Boardman, Krishna Reddi, **Guiyan Zang**, Mark Ruth, Bethany Frew, Daniel Levie, Paige Jadun, Jal Desai, Sherry Bernhoft, Brittany Westlakd, David McCollum, Daniel Ludwig, Molly Strasser, Bryan Ramler. Techno-Economic Analysis of Product Diversification Options for Sustainability of the Monticello and Prairie Island Nuclear Power Plants. 2022. *OSTI.GOV*. https://www.osti.gov/biblio/1843030

[4] Pingping Sun, **Guiyan Zang**, Theodore R Krause, Amgad A Elgowainy, Ryan Hackler, Massimiliano Delferro, Vincenzo Cappello. Plastic waste conversion to lubricant production. 2025. U.S. Patent office Application number 17816899, Patent number 12270009. US12270009B2 - Plastic waste conversion to lubricant production - Google Patents