Profile

Caleb is a Research Engineer at Carbon Solutions LLC, working on process simulation and optimization of renewable energy systems. He works on projects related to bioenergy with carbon capture, direct air capture, and industrial decarbonization. He also has experience applying optimization techniques to conservation planning problems.

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Caleb Geissler

Research Engineer | **Carbon Solutions LLC**

Education & Training

Ph.D. | **Chemical and Biological Engineering**
Princeton University | **2019-2024**
B.S. | **Chemical Engineering**
Purdue University | **2015-2019**

Professional Experience

Research Engineer | **Carbon Solutions LLC** | **2024-Present**
Research Associate | **Carbon Solutions LLC** | **2023-2024**
Modeling high-temperature direct air capture in IDAES

Doctoral Student | **Princeton University** | **2019-2024**
Optimization and analysis of bioenergy production with carbon capture | Implementation of bioenergy technologies with carbon capture into nationwide energy systems model (TIMES) | Optimization model development for landscape design of bioenergy crops considering biodiversity and ecosystem services

Undergraduate Summer Research Intern | **Michigan State University** | **2018**
Electrochemical reduction of disulfides into thiols for catalytic lignin deconstruction and valorization

Undergraduate Researcher | **Purdue University** | **2015-2019**
Study of nanosecond electroporation of microalgae for efficient extraction of intracellular liquids for use in biodiesel fuel

Publications

1. **Geissler C.H.,** Haan N.L., Basso B., Fower A., Landis D.A., Lark T.J., Maravelias C.T., (2024), A Multi-Objective Optimization Model for Cropland Design Considering Profit, Biodiversity, and Ecosystem Services, *Ecol Modell*, accepted.
2. O'Neill E.G., **Geissler C.H.,** Maravelias C.T., (2024), Large-scale Spatially Explicit Analysis of Carbon Capture at Cellulosic Biorefineries, *Nat. Energy*, 9, 828-838, *https://doi.org/10.1038/s41560-024-01532-8*
3. Brooks B.J., **Geissler C.H.,** An K., McCoy S.T., Middleton, R.S., Ogland-Hand J.D., (2024), The Performance of Solvent-based Direct Air Capture Across Geospatial and Temporal Climate Regimes, *Front. clim,* 6, *https://doi.org/10.3389/fclim.2024.1394728*
4. **Geissler C.H.,** Ryu J., Maravelias C.T., (2024), The Future of Biofuels in the United States Transportation Sector, *Renew. Sust. Energy. Rev.,* 192, 114276, *https://doi.org/10.1016/j.rser.2023.114276*
5. **Geissler C.H.,** Maravelias C.T., (2022), Analysis of Alternative Bioenergy with Carbon Capture Strategies: Present and Future, *Energy Environ. Sci,* 15, 2679-2689, *https://doi.org/10.1039/D2EE00625A*

6. **Geissler C.H.,** Maravelias C.T., (**2021**), Economic, Energetic, and Environmental Analysis of Lignocellulosic Biorefineries with Carbon Capture, *Applied Energy*, 302, 117539, *https://doi.org/10.1016/j.apenergy.2021.117539*
7. **Geissler C.H.,** Mulligan M.L., Zmola Z.E., Ray S., Morgan J.A., Garner A.L., (**2020**), Electric Pulse Pretreatment for Enhanced Lipid Recovery from *Chlorella prototothecoides, BioEnergy Research,* 13, 499-506, *https://doi.org/10.1007/s12155-019-10064-z*

Conference Presentations

1. **Geissler C.H.,** Granacher J., Maravelias C.T., (**2024**), Systems Analysis of Industrial Electrification, AIChE Annual Meeting, San Diego, CA, USA.
2. **Geissler C.H.,** Maravelias C.T., (**2024**), Multi-Objective Optimization Model for Cropland Design Considering Profit, Biodiversity, and Ecosystem Services, AIChE Annual Meeting, San Diego, CA, USA.
3. **Geissler C.H.,** Maravelias C.T., (**2024**), Biofuels with Carbon Capture and Storage in the United States Transportation Sector, Foundations of Computer Aided Process Design, Breckenridge, CO, USA.
4. **Geissler C.H.,** Maravelias C.T., (**2024**), An Optimization Model for the Maximization of Crop Productivity, Biodiversity, and Ecosystem Services, European Symposium on Computer-Aided Process Engineering/International Symposium on Process Systems Engineering, Florence, Italy.
5. **Geissler C.H.,** Ryu J., Maravelias C.T., (**2023**), Optimization of Bioenergy with Carbon Capture and Storage in the USA Transportation Sector under Governmental Policies, AIChE Annual Meeting, Orlando, FL, USA.
6. **Geissler C.H.,** Maravelias C.T., (**2022**), Optimization of Biomass to Fuels with Carbon Capture: Economic and Environmental Analysis, AIChE Annual Meeting, Phoenix, AZ, USA.
7. **Geissler C.H.,** Maravelias C.T., (**2022**), Optimization and Analysis of Biorefineries with Carbon Capture as a Source of CO_2 for Utilization, International Conference on Carbon Dioxide Utilization, Princeton, NJ, USA.
8. **Geissler C.H.,** O'Neill E.G., Maravelias C.T., (**2022**), Towards Efficient Bioenergy Systems: Understanding the Role of Soil Sequestration, Supply Chain Design, and Carbon Capture, European Symposium on Computer-Aided Process Engineering, Toulouse, France.
9. **Geissler C.H.,** Maravelias C.T., (**2021**), Optimization and Analysis of Carbon Capture in Ethanol Biorefineries, AIChE Annual Meeting, Boston, MA, USA.
10. **Geissler C.H.,** Maravelias C.T., (**2021**), Optimization and Analysis of Ethanol Production with Carbon Capture and Sequestration, Applied Energy Symposium: MIT A+B, Boston, MA, USA.

Geissler C.H., Mulligan M.L., Zmola Z.E., Ray S., Morgan J.A., Garner A.L., (**2018**), Nanosecond and Microsecond Pulsed Electric Field Treatment of Chlorella Prototothecoides for Increased Lipid Extraction, IEEE Power Modulator and High Voltage Conference, Jackson, WY, USA