Profile

Dr. Jonathan Ogland-Hand is the director of carbon removal at Carbon Solutions LLC. In addition to carbon removal, he has researched topics including energy storage, geothermal energy, CO_2 transportation and geologic storage, utilization of geologically stored CO_2, and renewable energy integration. To do this, he has built, used, and integrated tools such as capacity expansion models, economic dispatch models, cost models, coupled plant-level models of wells and power plants, dynamic programs, and reservoir simulation. Personal values he seeks to incorporate into his work-life include teamwork, reflection, direct communication, diligence, and patience.

Contact

Phone:
+1-616-214-6157

Email:
jonathan.ogland-hand@carbonsolutionsllc.com

LinkedIn:
https://www.linkedin.com/in/j-ogland-hand

Website:
https://www.carbonsolutionsllc.com/

Google Scholar Profile:
Link

Jonathan Ogland-Hand

Director of Carbon Removal

Carbon Solutions LLC

Education

Ph.D. | **Environmental Science**
The Ohio State University | 2014-2019

M.Sc. | **Environmental Science**
The Ohio State University | 2014–2017

B.Sc. | **Mechanical Engineering**
Valparaiso University | 2010–2014

Professional Experience

Director of Carbon Removal | **Carbon Solutions LLC** | **2024–Present**

Director of Energy Systems Analysis | **Carbon Solutions LLC** | **2022–2024**

Research Scientist | **Carbon Solutions LLC** | **2021–2022**
Compared Sequestration of CO_2 Tool (SCO_2T) to the FE/NETL CO_2 saline storage cost model | Used SCO_2T to compare the geospatially-distributed cost of CO_2 plume geothermal power and geologic CO_2 storage | Rebuilt SCO_2T in the Julia programming language | Awarded an SBIR Phase I grant from US DOE to begin developing the Negative CO_2 Emission Transition Roadmap (NECTAR) tool | Managed the development of Carbon Solution LLC's website

Postdoctoral Associate | **ETH Zurich** | **2019–2021**
Improved the Sequestration of CO_2 Tool (SCO_2T) with Richard Middleton and Ryan Kammer | Added geologic CO_2 storage to NREL's Regional Energy Deployment System model (ReEDS) with Stuart Cohen | Assisted Ben Adams in his development and application of the generalizable GEOthermal techno-economic simulator (genGEO) | Managed an interdisciplinary team for a 2019 Siemens Next47 project

Doctoral Student | **The Ohio State University** | **2014–2019**
Under the guidance of Jeffrey Bielicki, Ramteen Sioshansi, and Thomas Buscheck, developed and valued approaches for using geologically stored CO_2 for energy storage and created a natural resource economic model for geothermal heat resources | Mentored undergraduate researchers | Procured ~$42k through grant writing

Academic Cooperation Participant | **Lawrence Livermore National Laboratory** | **Summer 2015**
Gained proficiency in running the Non-isothermal Unsaturated Flow and Transport Simulator (NUFT) under the guidance of Thomas Buscheck

Undergraduate Research Intern | **Valparaiso University** | **2013-2014**
Under the guidance of Robert Palumbo, Luke Venstrom, and Scott Duncan, worked with other engineering and chemistry undergraduate students on two concentrating solar power projects: 1) funded by NSF to produce hydrogen from metal oxides; 2) funded by DOE to produce magnesium from magnesium oxide.

Publications

- J. Duggan, **J. Ogland-Hand**, R. Middleton (**2024**). Modeling CCS Policy Support: Implications for Market Performance, Net Emissions, and Welfare, *Applied Energy,* In review.
- E. Cairncross, **J. Ogland-Hand**, B. Adams, R. Middleton (**2024**). Nationwide Cost and Capacity Estimates for Sedimentary Basin Geothermal Power and Implications for Geologic CO_2 Storage, *Frontiers in Energy Research,* In review.

1. B. Brooks, C. Geissler, K. An, S. McCoy, R. Middleton, **J. Ogland-Hand** (**2024**). The Performance of Solvent-based Direct Air Capture Across Geospatial and Temporal Climate Regimes, *Frontiers in Climate*. *10.3389/fclim.2024.1394728*
2. D. Birdsell, B. Adams, P. Deb, **J. Ogland-Hand**, J. Bielicki, M. Fleming, M. Saar (**2024**). Analytical Approaches to Evaluate the Geothermal Energy Generation Potential from Sedimentary-basin Reservoirs, *Geothermics*, *doi.org/10.1016/j.geothermics.2023.102843*
3. M. Miranda, **J. Ogland-Hand,** J. Bielicki, R. Moghanloo, J. DaneshFar, R. Middleton (**2023**). Developing a Roadmap for Carbon Capture and Storage in Oklahoma by Assessing the Viability of Stacked Storage, *Greenhouse Gases: Science and Technology, doi.org/10.1002/ghg.2244*
4. A. Randall, **J. Ogland-Hand** (**2023**). Validity and Validation of Computer Simulations – A Methodological Inquiry with Application to Integrated Assessment Models, *Knowledge*. *doi.org/10.3390/knowledge3020018*
5. J. Bennett, **J. Ogland-Hand**, E. Middleton, J. Eidbo, M. Prorok, B. Ross, S. Yaw, R. Middleton (**2023**). The Transmission Ramifications of Social and Environmental Siting Considerations on Wind Energy Deployment. *Frontiers in Energy Research. doi.org/10.3389/fenrg.2022.1040957*
6. A. Van Brummen, B. Adams, R. Wu. **J. Ogland-Hand**, M. Saar (**2022**). Using CO_2-Plume Geothermal (CPG) Energy Technologies to Support Wind and Solar Power in Renewable-Heavy Electricity Systems, *Renewable and Sustainable Energy Transition*. *doi.org/10.1016/j.rset.2022.100026*
7. E. Jones, S. Yaw, J. Bennett, **J. Ogland-Hand**, R. Middleton, C. Strahan (**2022**). Designing Multi-Phased CO_2 Capture and Storage Infrastructure Deployments, *Renewable and Sustainable Energy Transition. doi.org/10.1016/j.rset.2022.100023*
8. **J. Ogland-Hand,** B. Adams, J. Bennett, R. Middleton (**2022**). A Geospatial Cost Comparison of CO_2 Plume Geothermal (CPG) Power and Geologic CO_2 Storage, *Frontiers in Energy Research, doi.org/10.3389/fenrg.2022.855120*
9. **J. Ogland-Hand,** S. Cohen, R. Kammer, K. Ellett, M. Saar, J. Bennett, R. Middleton (**2022**). The Importance of Modeling Carbon Dioxide Transportation and Geologic Storage in Energy System Planning Tools, *Frontiers in Energy Research, doi.org/10.3389/fenrg.2022.855105*
10. **J. Ogland-Hand**, R. Kammer, J. Bennett, K. Ellett, R. Middleton (**2022**). Screening for Geologic Sequestration of CO_2 : A Comparison Between SCO_2T^{PRO} and the FE/NETL CO_2 Saline Storage Cost Model, *International Journal of Greenhouse Gas Control, doi.org/10.1016/j.ijggc.2021.103557*
11. M. Fleming, B. Adams, **J. Ogland-Hand**, J. Bielicki, T. Kuehn, M. Saar (**2022**). Flexible CO_2-Plume Geothermal (CPG-F): Using Geologically Stored CO_2 to Provide Dispatchable Power and Energy Storage, *Energy Conversion and Management, doi.org/10.1016/j.enconman.2021.115082*
12. **J. Ogland-Hand,** J. Bielicki, B. Adams, E. Nelson, T. Buscheck, M. Saar, R. Sioshansi (**2021**). The Value of CO_2-Bulk Energy Storage with Wind in Transmission-Constrained Electric Power Systems, *Energy Conversion and Management, doi.org/10.1016/j.enconman.2020.113548*
13. R. Middleton, **J. Ogland-Hand**, B. Chen, J. Bielicki, K. Ellett, D. Harp, R. Kammer, (**2020**). Identifying geologic characteristics and operational decisions to meet global carbon sequestration goals, *Energy and Environmental Science*, *doi.org/10.1039/D0EE02488K*
14. R. Middleton, J. Bielicki, B. Chen, A. Clarens, R. Currier, K. Ellett, D. Harp, B. Hoover, R. Kammer, D. McFarlane, **J. Ogland-Hand**, R. Pawar, P. Stauffer, H. Viswanathan, S. Yaw (**2020**). Great *SCO_2T*! Rapid carbon sequestration science and screening, *Applied Computing and Geosciences*, *doi.org/10.1016/j.acags.2020.100035*
15. L. Venstrom, J. Yager, T. Vervynckt, **J. Ogland-Hand,** S. Nudehi (**2020**). Measurement of the Natural Convection Heat Transfer in a Magnesium Oxide Electrolytic Cell Concept, *Journal of Thermal Science and Engineering Applications, doi.org/10.1115/1.4046605*.
16. **J. Ogland-Hand,** J. Bielicki, Y.Wang, B. Adams, T. Buscheck, M. Saar (**2019**). The Value of Bulk Energy Storage for Reducing CO_2 Emissions and Water Requirements from Regional Electricity Systems, *Energy Conversion and Management, doi.org/10.1016/j.enconman.2018.12.019*

Funded Research Proposals

1. **SCO_2T^{PRO}: Unlocking the Nation's Subsurface to Support the Energy Transition (2023).** U.S. Department of Energy, Office of Science, Small Business Innovation Research Program | $1.1M

2. **NECTAR: The Negative CO_2 Emission Transmission Roadmap (2023).** U.S. Department of Energy, Office of Fossil Energy and Carbon Management, Small Business Innovation Research Program | $1.1M
3. **CO_2NCORD: Identifying CO_2 Capture Opportunities for the Nation's Energy Transition (2023).** U.S. National Science Foundation, Small Business Innovation Research Program | $275,000.
4. **Negative CO_2 Emission Transition Roadmap (NECTAR): A Rapid Decision Support Tool for Negative CO_2 Emission Hybrid Energy System Development and Analysis (2022).** U.S. Department of Energy, Office of Fossil Energy and Carbon Management, Small Business Innovation Research Program | $206,500
5. **Developing Capacity for Seasonal Energy Storage Capacity (2018).** The Ohio State University Sustainable and Resilient Economy Program | $21,450.
6. **Engineering the Subsurface to Seasonally Store Energy While Sequestering CO_2 (2018).** The Ohio State University Center for Energy Research, Training, and Innovation | $16,000.
7. **The Value of Bulk Energy Storage for Reducing Water Stress While Meeting the Goal of a Policy that Limits CO_2 Emissions (2016).** The Ohio State University Environmental Policy Initiative Student Grant Competition | $4,500.

Reports and Conference Papers

1. J. Ogland-Hand, B. Adams, B. Brooks, N. Holwerda, N. Johnson, P. Psarras, R. Middleton (**2024**). "Meeting Net-Zero America Direct Air Capture Targets with Sedimentary Basin Geothermal Heat While Considering Environmental Justice," *https://pangea.stanford.edu/ERE/db/GeoConf/papers/SGW/2024/Oglandhand.pdf*
2. J. Ogland-Hand, E. Cairncross, B. Adams, R. Middleton (**2024**). "Nationwide Assessment of Sedimentary Basin Geothermal Power," *https://pangea.stanford.edu/ERE/db/GeoConf/papers/SGW/2024/Oglandhand3.pdf*
3. **J. Ogland-Hand**, K. Cox, B. Adams, J. Bennett, P. Johnson, E. Middleton, C. Talsma, R. Middleton (**2023**). "How to Net-Zero America: Nationwide Cost and Capacity Estimates for Geologic CO_2 Storage," *doi.org/10.31224/3293*
4. J. Bennett, R. Kammer, J Eidbo, M. Ford, S. Henao, N. Holwerda, E. Middleton, **J. Ogland-Hand**, D. Rodriguez, K. Sale, C. Talsma, E. Thomley, M. Fry (**2023**). "Carbon Capture Co-Benefits: Carbon Capture's Role in Removing Pollutants and Reducing Health Impacts," *https://carboncaptureready.betterenergy.org/carbon-capture-co-benefits/*
5. E. Abramson, D. McFarlane, A. Jordan, D. Rodrigues, **J. Ogland-Hand**, N. Holwerda, M. Fry, R. Kammer, E. Thomley (**2023**). "An Atlas of Direct Air Capture: Opportunities for Negative Emissions in the United States," *https://carboncaptureready.betterenergy.org/wp-content/uploads/2023/03/DAC-Hubs-Atlas-2023.pdf*
6. **J. Ogland-Hand**, B. Adams, J. Bennett, R. Middleton (**2022**). "Considering the Potential for Sedimentary Basin Geothermal for Prospective Geologic CO_2 Storage Sites," *dx.doi.org/10.2139/ssrn.4275136*
7. J. Bennett, **J. Ogland-Hand**, K. Cox, P. Johnson, E. Middleton, A. Pompilio, S. Samal, C. Talsma, V. Vesselinov, K. Ellett, R. Middleton (**2022**). "Beam Me up SCO_2T^{PRO}: A Comparison to the FE/NETL CO_2 Saline Storage Cost Model and Updates on Tool Development," *dx.doi.org/10.2139/ssrn.4275200*
8. R. Middleton, J. Bennett, K. Ellett, M. Ford, P. Johnson, E. Middleton, **J. Ogland-Hand**, C. Talsma (**2022**). "Reaching Zero: Pathways to Decarbonize the US Electricity System with CCS," *dx.doi.org/10.2139/ssrn.4274085*
9. D. Birdsell, B. Adams, **J. Ogland-Hand**, J. Bielicki, M. Fleming, M. Saar (**2021**). "Analytical Approaches for Porous Media Geothermal Power Calculations," *doi.org/10.26434/chemrxiv-2022-93cff*
10. B. Adams, **J. Ogland-Hand**, J. Bielicki, P. Schadle, M. Saar (**2021**). "Estimating the Geothermal Electricity Generation Potential of Sedimentary Basins using genGEO (the generalizable GEOthermal techno-economic simulator). *doi.org/10.26434/chemrxiv.13514440.v1*
11. R. Middleton, J. Bielicki, B. Chen, K. Ellett, D. Harp, R. Kammer, **J. Ogland-Hand** (**2021**). "Great SCO_2T! Rapid Tool for Geologic Carbon Sequestration Science, Engineering, and Economics," 15th International Conference on Greenhouse Gas Technologies, Abu Dhabi, UAE, March 15-18, *https://ssrn.com/abstract=3811396*
12. **J. Ogland-Hand**, J. Bielicki, B. Adams, T. Buscheck, M. Saar, (**2021**). "Using Sedimentary Basin Geothermal Resources to Provide Long Duration Energy Storage," Proceedings World Geothermal Congress 2021, Reykjavik, Iceland, May 21-26, *doi.org/10.3929/ethz-b-000467595*
13. S. Maldonado, J. Bielicki, M. Miranda, **J. Ogland-Hand**, C. Howard, B. Adams, T. Buscheck, M. Saar, (**2021**). "Geospatial Estimation of the Electric Power Potential in Sedimentary Basin Geothermal Resources Using Geologically Stored Carbon Dioxide," Proceedings World Geothermal Congress 2021, Reykjavik, Iceland, May 21-26, *doi.org/10.3929/ethz-b-000449699*
14. B. Adams, M. Saar, J. Bielicki, **J. Ogland-Hand**, M. Fleming, (**2020**). "Using Geologically Sequestered CO2to Generate and Store Geothermal Electricity: CO2Plume Geothermal (CPG)," Proceedings Applied

Energy Symposium: MIT A+B, Cambridge, USA, August 12-14. *doi.org/10.3929/ethz-b-000444911*

15. **J. Ogland-Hand**, M. Miranda, J. Bielicki, B. Adams, T. Buscheck, M. Saar, (**2018**). "Operational Characteristics of a Geologic CO_2 Storage Bulk Energy Storage Technology," 14th International Conference on Greenhouse Gas Technologies, Melbourne, Australia, October 21-25, *https://dx.doi.org/10.2139/ssrn.3366316*
16. **J. Ogland-Hand**, J. Bielicki, E. Nelson, B. Adams, T. Buscheck, M. Saar, R. Sioshansi, (**2018**). "Effects of Bulk Energy Storage in Sedimentary Basin Geothermal Resources on Transmission Constrained Electricity Systems," Proceedings of the 43rd Workshop on Geothermal Reservoir Engineering, Stanford CA, February 12-14, *https://pangea.stanford.edu/ERE/pdf/IGAstandard/SGW/2018/Oglandhand.pdf*
17. M. Fleming, M. Saar, B. Adams, **J. Ogland-Hand,** T.Kuehn, T. Buscheck. J. Bielicki, J. Randoph (**2018**). "High Efficiency and Large-Scale Subsurface Energy Storage with CO_2," Proceedings of the 43rd Workshop on Geothermal Reservoir Engineering, Stanford CA, February 12-14, *https://pangea.stanford.edu/ERE/pdf/IGAstandard/SGW/2018/Fleming.pdf*
18. **J. Ogland-Hand**, J. Bielicki, T. Buscheck, (**2017**). "The Value of CO_2-Bulk Energy Storage to Reducing CO_2 Emissions," *Energy Procedia*, 114, 6886-6892. *doi.org/10.1016/j.egypro.2017.03.1830*
19. **J. Ogland-Hand**, J. Bielicki, T. Buscheck, (**2016**). "The Value of Bulk Energy Storage in Sedimentary Basin Geothermal Resources for Reducing CO_2 Emissions," Proceedings of the 41st Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford CA, February 22-24, *https://pangea.stanford.edu/ERE/pdf/IGAstandard/SGW/2016/Oglandhand.pdf*
20. J. Bielicki, B. Adams, H. Choi, B. Jamiyansuren, M. Saar, S. Taff, T. Buscheck, **J. Ogland-Hand**, (**2016**). "Sedimentary Basin Geothermal Resource for Cost-Effective Generation of Renewable Electricity from Sequestered Carbon Dioxide," Proceedings of the 41stWorkshop on Geothermal Reservoir Engineering, Stanford CA, February 22-24, *https://pangea.stanford.edu/ERE/pdf/IGAstandard/SGW/2016/Bielicki2.pdf*

Oral Presentations and Guest Lectures

1. **Meeting Net-Zero America Direct Air Capture Targets with Sedimentary Basin Geothermal Heat While Considering Environmental Justice (2024).** Stanford Geothermal Workshop, Palo Alto, CA.
2. **Nationwide Assessment of Sedimentary Basin Geothermal Power (2024).** Stanford Geothermal Workshop, Palo Alto, CA.
3. **Energy System Modeling and SCO_2T^{PRO} (2023).** USEA Saline Storage Cost Modeling Workshop, Washington, DC.
4. **Addressing Climate Change with Direct Air Capture (2022).** Calvin University Department of Engineering Seminar, Grand Rapids, MI.
5. **CO_2 Plume Geothermal: Using Geologically Stored CO_2 to Generate Electricity** (**2022**). Indiana Geologists Monthly Meeting, Indianapolis, IN
6. **Hot Take on a Career in R&D: Take a Leap of Faith** (**2022**). Valparaiso University Undergraduate Summer Research Symposium Keynote Address, Valparaiso, IN
7. **The Importance of Modeling Carbon Dioxide Transportation and Geologic Storage in Energy System Planning Tools** (**2021**). ReEDS User Group Meeting, Golden, CO (Virtual)
8. **Using SCO_2T to Add Geologic CO_2 Storage to ReEDS** (**2020**). 2020 INFORMS Annual Meeting, Washington, D.C. (Virtual)
9. **Representing Geologic CO_2 Storage in Energy System Models** (**2020**). 2020 Swiss Geoscience Meeting, Zurich, Switzerland (Virtual)
10. **Using Geologic CO_2 Storage and Geothermal Energy Resources for Energy Storage** (**2020**). Prof. Harry van der Weijde's Energy Modelling Seminar, University of Edinburgh (Virtual).
11. **Using Geologically Stored CO_2 and Geothermal Energy to Decarbonize the Electricity System** (**2019**). 2019 INFORMS Annual Meeting, Seattle, WA.
12. **Optimally Mining Heat for Geothermal Energy Production** (**2019**). 2019 INFORMS Annual Meeting, Seattle, WA.
13. **Optimizing the Use of CO_2-Bulk Energy Storage for Transmission Deferral** (**2018**). 2018 INFORMS Annual Meeting, Phoenix, AZ.
14. **Using Integrated Models to Value the Use of Bulk Energy Storage for Reducing CO_2 Emissions from Regional Electricity Systems** (**2018**). 2018 INFORMS Annual Meeting, Phoenix, AZ.
15. **Using CO_2-BES to Address Environmental Challenges Facing the Electricity System** (**2018**). Otterbein University Physics Coffee Hour, Westerville, OH.
16. **Effects of Bulk Energy Storage in Sedimentary Basin Geothermal Resources on Transmission Constrained Electricity Systems** (**2018**). 2018 Stanford Geothermal Workshop, Palo Alto, CA.
17. **The Value of CO_2-Geothermal Bulk Energy Storage to CO_2** (**2016**). CO_2 Summit II: Technologies and Opportunities, Santa Ana Pueblo, NM.
18. **Prepared Lecture on Energy Storage** (**2015**). Valparaiso University College of Engineering, Valparaiso, IN.

Poster Presentations

1. **Direct Air Capture Siting Considering Geologic Storage Capacity, Net-Zero Capacity Targets, and Environmental Justice** (2023). CCUS 2023 Conference Hosted by SPE, RAPG, and SEG Houston, TX.
2. **Using Geothermal Resources to Increase Utilization of Wind Energy Technologies and Transmission Infrastructure** (2018). 2018 Geothermal Resource Council Annual Meeting, Reno, NV.
3. **The Value of CO_2-Geothermal Bulk Energy Storage to Reducing CO_2 Emissions** (2016). 2016 American Geophysical Union Fall Meeting, San Francisco, CA.
4. **Optimal Geothermal Heat Extraction Using CO_2** (2016). CO_2 Summit II: Technologies and Opportunities, Santa Ana Pueblo, NM.
5. **Using CO_2 for Renewable Energy Production from Geothermal, Wind, and Solar Resources** (2014). 1st Annual Ohio Conference on the Sustainable Use of Greenhouse Gases, Columbus, OH.
6. **Storing Sunlight in Rust** (2014). 121st ASEE Annual Conference and Exposition, Indianapolis, IN.
7. **Solar Thermal Decoupled Electrolysis: A Study of the Conversion of Fe_3O_4 to Fe_2O_3** (2013). 246th American Chemical Society National Meeting and Exposition, Indianapolis, IN.

Teaching Experience

Instructor of Record: ENR 3900 (Sustainability Metrics) | Spring 2017 | The Ohio State University

Facilitated discussion and taught methods pertaining to life cycle thinking, risk assessment, and sustainability indicators to a class of 43 students enrolled in the Environment, Economy, Development and Sustainability program | Introduced a memo template into the laboratory curriculum and revised the laboratory assignment grading rubrics.

Graduate Teaching Assistant: PUBAFRS 5600 (Science, Engineering, and Public Policy) | Spring 2018 | The Ohio State University

Graded homework and created a midterm exam.

Graduate Teaching Assistant: CIVILEN 5130 (Applied Hydrology) | Fall 2017 | The Ohio State University

Created exam and homework rubrics and graded exams and homework

Graduate Teaching Assistant: ENR 3900 (Sustainability Metrics) | Fall 2016 | The Ohio State University

Taught 40 undergraduate students the basics of Microsoft Excel

Global Humanitarian Volunteer Experience

Sustainable and Resilient Tanzanian Community | August 2015 | The Ohio State University

Mentored a group of eight undergraduate students during a two-week service trip to Tanzania, Africa.

Engineers Without Borders, Valparaiso University Student Chapter | 2010-2013 | Valparaiso University

Traveled to La Palma, Nicaragua for an Initial Assessment Trip in November 2013 | Raised $9,500 through grant writing

Leadership Experience

The Ohio State University

President | *Environmental Science Graduate Program Student Association | 2017-2018 Academic Year*

Student Representative | *Environmental Science Graduate Program Graduate Studies Committee | 2017-2018 Academic Year*

Valparaiso University

President | *Tau Beta Pi Engineering Honors Society Student Chapter | 2013-2014 Academic Year*

President | *Men's Club Soccer | 2013-2014 Academic Year*

Finance Team Leader and Grant Writing Chair | Engineers Without Borders Student Chapter | *2013*

Vice President of Membership Development | *Sigma Phi Epsilon National Fraternity IN Zeta Chapter | 2012*

Treasurer | *American Society of Mechanical Engineers Student Chapter | 2011-2012 Academic Year*