

JEFFREY BIELICKI

Assistant Professor

Joint appointment with the Department of Civil, Environmental, and Geodetic Engineering

Professor Bielicki ([Google Scholar](#) | [ResearchGate](#)) researches the interactions between energy and environmental systems and policy, with a focus on understanding how energy systems have evolved and how this evolution can be directed in ways that improve environmental, economic, and social conditions. His present research focuses on the energy-water nexus, producing geothermal energy with carbon dioxide, health hazards and disclosure of hydraulic fracturing fluids, risks of emerging subsurface technologies, and bioenergy pathways.

Professor Bielicki is an Assistant Professor with a joint appointment in the Department of Civil, Environmental, and Geodetic Engineering and in the John Glenn School of Public Affairs at Ohio State University. He is also on the faculty of the Environmental Science Graduate Program and retains a courtesy appointment in the City and Regional Planning Section of the Knowlton School of Architecture. Prior to joining Ohio State University, he was a Research Associate at the University of Minnesota, a Weinberg Fellow at Oak Ridge National Laboratory, a Fellow for Energy and Environment at the University of Tennessee's Baker Center for Public Policy, and a Research Fellow with the Energy Technology Innovation Policy group at Harvard University. Professor Bielicki received his Ph.D. from Harvard University in 2009.

Professor Bielicki has participated in a number of national and international workshops and reports on energy and the environment and published in a number of journals including *Environmental Science & Technology*, *Applied Energy*, *International Journal of Greenhouse Gas Control*, *Energy*, *Energy Policy*, *Environmental Management*, *Greenhouse Gases: Science and Technology*, *Journal of Occupational and Environmental Hygiene*, and *International Regional Science Review*.

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In the News:

Professor **Bielicki** was the lead author on a recently accepted study that was described by one reviewer as “a clever and significant study of the intersection of probabilistic leakage modeling with standards for retention during injection and deserves to be considered with care in the policy arena.” “An Examination of Geologic Carbon Sequestration Policies in the Context of Leakage Potential,” investigates leakage from reservoirs used to isolate CO₂ from the atmosphere and was accepted for publication by the *International Journal of Greenhouse Gas Control*. Prof. Bielicki conducted the study with colleagues at Princeton University and the University of Minnesota. ([» Click here to read the paper](#)). Prof. Bielicki also lead a previous study by this team that investigated the causes and financial consequences of leakage across numerous stakeholders. ([» Click here to read the paper](#)).

Professor **Bielicki** has had an article on the health hazards of hydraulic fracturing fluids accepted for publication by the *Journal of Occupational and Environmental Hygiene*. Co-authored with colleagues at the University of Minnesota, “Assessment of the Acute and Chronic Health Hazards of Hydraulic Fracturing Fluids,” categorizes the components used in 2,850 hydraulically fractured wells in North Dakota between December 2009 and November 2013, and assesses their known toxicological hazards to human health.

Professor **Bielicki** has received a grant from the U.S. Geologic Survey / Ohio Water Resources Center / OSU Office of Energy and Environment. The one-year grant for \$37,723 is to develop an integrated assessment of water and energy interactions in the state of Ohio.

Professor **Bielicki** has co-authored five abstracts that have been accepted for oral presentation at the *14th Annual Carbon Capture, Utilization, and Sequestration Conference* in Pittsburgh PA. Four of these abstracts involve his graduate students, in addition to collaborators at Princeton University, the University of Minnesota, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and elsewhere.

Professor **Bielicki** participated in an international workshop on The Politics of Global Energy Transitions in Budapest, Hungary, in February 2015. The workshop was the product of a proposal with colleagues throughout the world, including Hungary, Austria, India, China, Sweden, and the U.K.

Professor **Bielicki** is a co-author of six conference papers that were presented at the 12th International Greenhouse Gas Technologies conference in Austin, TX. These papers cover a range of issues related to mitigating CO₂ emissions and reducing climate change, including how using the CO₂ to produce geothermal energy; barriers to the deployment of CO₂ infrastructure; the physiochemical characteristics of storing CO₂ in fractured shale; and quantifying leakage from geologic CO₂ storage reservoirs in the context of the U.S. EPA Underground Injection Control Program. More information about these papers can be found on Prof. Bielicki's website at u.osu.edu/bielicki.2/publications.

Professor **Jeffrey Bielicki** co-authored two recent papers on using carbon dioxide as the primary heat extraction fluid in geothermal energy applications. One study, published in the journal *Energy*, shows systems that generate electricity from geothermal heat can take advantage of a circulation of fluids that automatically develops between the surface and the subsurface, and that carbon dioxide produces a stronger and more vigorous "thermosiphon" circulation than does brine — the fluid that is typically used in geothermal electricity applications ([» Click here to read the paper](#)). The other study, published in the journal *Applied Energy*, estimates the performance of a CO₂ geothermal system—including the subsurface reservoir, the production and injection wells, and the surface power plant—to determine the amount of electricity that could be generated over a variety system designs and geologic properties ([» Click here to read the paper](#)). Both articles were written with colleagues at the University of Minnesota. [» Click here to see an animated video of the CO₂ geothermal system and the "thermosiphon" effect.](#)

Professor **Bielicki** co-authored "CO₂ Deserts: Implications of Existing CO₂ Supply Limitations for Carbon Management," in the journal *Environmental Science & Technology*. The paper, with colleagues at Los Alamos National Laboratory, the University of Virginia, and elsewhere, investigates the availability of carbon dioxide (CO₂) throughout the United States and the limitations on the net emissions reductions that are achievable by approaches that seek to use CO₂ or sequester it from the atmosphere. [» Click here to read the paper](#)

Professor **Bielicki** co-authored a paper with colleagues at the University of Minnesota entitled "Why Rules Matter: Optimizing Pumped Hydroelectric Storage Under Different ISO Markets." The paper, published in the journal *Energy Economics*, shows that the compensation schemes used by Independent System Operators in different parts of the country can result in different operational decisions by an operator of an energy storage facility. One possible downside of these differences is the installation of energy storage approaches may be more profitable in areas of the country where energy storage is least needed. [» Click here to read the paper](#)

For the second year in a row, Professor **Jeffrey Bielicki** has been a co-author of a paper presented at the *Geothermal Resources Council Annual Meeting* was voted one of the best geothermal paper presentations of the year. The 2014 paper was lead by Tom Edmunds, of Lawrence Livermore National Laboratory, and investigated how energy storage in geothermal

resources could be integrated into the electricity system. The 2013 paper was lead by Tom Buscheck, also of Lawrence Livermore National Laboratory, and investigated new geothermal well designs to use carbon dioxide and nitrogen to enhance geothermal energy recovery. Links to the papers are available at u.osu.edu/bielicki.2, and a video explaining earlier versions of the concepts is available at energypathways.org.

Along with colleagues at Los Alamos National Laboratory, Southern Methodist University, New Mexico Institute of Mining and Technology, and Witcher & Associates, Professor **Bielicki** has received a grant totaling \$444,000 from the U.S. Department of Energy. This research seeks to develop methods to use disparate and spatially disaggregated data to identify the likelihood of geothermal resources.

Professor **Bielicki** was the lead author on "National Corridors for Climate Change Mitigation: Managing Industrial Carbon Dioxide Emissions in France," which was published by the journal *Greenhouse Gases: Science & Technology*. In this paper, Bielicki and his co-authors from Los Alamos National Laboratory and the Centre International de Recherche sur l'Environnement et le Développement (France) identify priorities for pipeline routing and rights-of-way acquisition for the deployment of carbon dioxide (CO₂) capture and storage technology in France. This is the first paper to use a geospatial optimization model to identify routes that robust to uncertainty in future locations and quantities of CO₂ emissions and disposal options. » [Click here to read the paper](#)

Professor **Bielicki** has received \$544,219 of a \$1.9 million grant from the National Science Foundation's Sustainable Energy Pathways (NSF SEP) program to investigate innovative ways to use carbon dioxide for geothermal energy production and storage. » [Click here to learn more](#)

Selected Research

Bielicki, J., Peters, C., Fitts, J., and Wilson, E., (forthcoming). "[An Examination of Geologic Carbon Sequestration Policies in the Context of Leakage Potential.](#)" *International Journal of Greenhouse Gas Control*.

Adams, B., Kuehn, T., **Bielicki, J.**, Randolph, J., and Saar, M. (2015). "[A Comparison of the Electric Power Output of CO₂ Plume Geothermal \(CPG\) and Brine Geothermal Systems for Varying Reservoir Conditions.](#)" *Applied Energy*, 140, 365-377.

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Haase, R., **Bielicki, J.**, and Kuzma, J. (2013). "[Innovation in Emerging Energy Technologies: A Case Study Analysis to Inform the Path Forward for Algal Biofuels.](#)" *Energy Policy*, 61, 1595-1607.

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Middleton, R., Kuby, M. and **Bielicki, J.** (2012). "[Generating Candidate Networks for Optimization: The CO₂ Capture and Storage Optimization Problem.](#)" *Computers, Environment, and Urban Systems*. 36, 18-29.

Dammel, J., **Bielicki, J.**, Pollak, M., and Wilson, E. (2011). "[A Tale of Two Technologies: Hydraulic Fracturing and Geologic Carbon Sequestration.](#)" *Environmental Science & Technology*, 45,5075-5076.

Kuby, M., **Bielicki, J.**, and Middleton, R. (2011). "[The Optimal Spatial Deployment of CO₂ Capture and Storage with a Price on Carbon.](#)" *International Regional Science Review*, 3, 285-305.

Middleton, R., and **Bielicki, J.** (2009). "[A Scaleable Infrastructure Model for Carbon Capture and Storage: SimCCS.](#)" *Energy Policy*, 37, 1052-1060.