

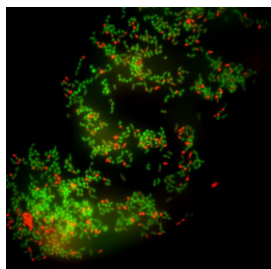
# Methane-Generating Microbes

Department of Geology



## Overview

Microbes common to subsurface energy reservoirs can form methane, the primary component of natural gas, by degrading organic matter in coal, shale, and depleted oil reservoirs. This process is known as microbial methanogenesis. **Microbial methanogenesis may be the future of energy extraction from subsurface hydrocarbon reservoirs.** By learning about these microbial communities and the environmental controls on their activity, we may be able to develop strategies to stimulate their growth. Those strategies could not only boost energy recovery but also decrease demands for wastewater treatment and disposal.



K-State researchers are studying microbial communities and geochemistry in coalbeds in the Cherokee Basin of southeastern Kansas. Their findings have shed light on links between the salinity of formation water and biological pathways of natural gas formation. Their results are significant because they help us understand how commercial gas production activities could alter natural gas formation in unconventional natural gas reservoirs to enhance methanogenesis.

## Impact

Natural gas is an important energy source for many countries around the world. Burning of natural gas also releases lower quantities of carbon dioxide and nitrogen oxides into the atmosphere than burning coal or oil. Natural gas is therefore viewed as a “bridging fuel” that can help nations lower their carbon emissions while transitioning from fossil fuels to renewable forms of energy.



Through their studies of the Cherokee Basin coalbeds, K-State faculty and student researchers are helping to **decode nature** by improving our understanding of the links between formation water geochemistry, microbial communities, and methane formation. This basic science could lead to **impactful technologies** in the future that help us increase natural gas production and fully utilize available resources.

## About Kansas State University

Kansas State University was established in 1863 as the nation’s first operational land-grant university. We’ve held firmly to the land-grant philosophy of serving our world through discovery and innovation. Today, the university is on its way to becoming a Top 50 public research university by 2025 through supporting, encouraging, and growing our research efforts.

Important  
points in time  
for K-State  
Research



**1887** Agricultural Experiment Station  
built to analyze horticultural and  
entomological subjects



**1967** Alf Landon Lecture  
Series on Public Issues  
established



**2015** National Bio and  
Agro-Defense Facility  
groundbreaking

**1863** Kansas State University  
founded



**1944** First U.S. patent application  
filed for a plastic container for  
frozen foods



**1997** Hale Library expansion  
completed



RECENT SUCCESSES: **\$184.9 million** in FY2014 research expenditures  
**14 patents** granted in 2014

**\$473.9 million**  
in FY2014 endowment

**4 USAID**  
Feed the Future Innovation Labs  
**1,000** research grants in FY2014

**4,493** graduate students

**KANSAS STATE**  
UNIVERSITY

Office of the  
Vice President for Research

[k-state.edu/research](http://k-state.edu/research)

@KState\_RSCAD