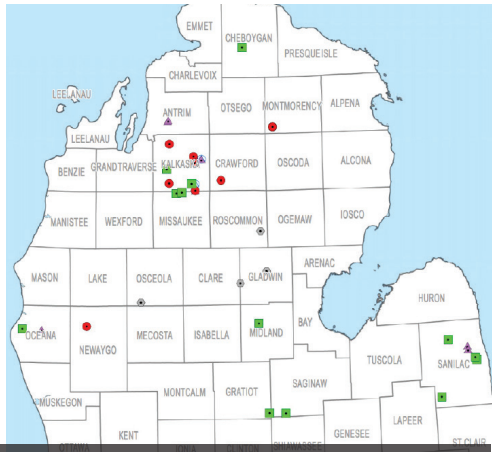
GRAHAM
SUSTAINABILITY INSTITUTE
UNIVERSITY OF MICHIGAN

GRAHAM.UMICH.EDU



Hydraulic Fracturing in Michigan Integrated Assessment

There has recently been an increase in natural gas extraction efforts across the U.S., including in Michigan. Much of this increase is due to the expanded use of the process called hydraulic fracturing–popularly known as "fracking," a method of natural gas extraction used since the 1940s. Fracking has been at the center of both wide support and concern by community members, industry, and state governments.

AN ANALYSIS OF OPTIONS FOR HIGH VOLUME HYDRAULIC FRACTURING

To understand what hydraulic fracturing options exist for Michigan decision-makers today and how to minimize any negative future impacts, researchers from the University of Michigan (U-M) partnered with a multi-sector group of industry representatives, environmental organizations, and state regulators to undertake a research project of unprecedented scope: "The Hydraulic Fracturing in Michigan Integrated Assessment (IA)."

The IA aimed to comprehensively examine hydraulic fracturing options in the State of Michigan and identify policy approaches for decision makers to consider. Using the IA process of facilitating a structured dialog among scientists and decision makers, project teams established the guiding question: "what are the best environmental, economic, social, and technological approaches for managing hydraulic fracturing in the State of Michigan?" Based on this idea, U-M-funded researchers from diverse disciplines gathered and assessed information to help inform decision makers.

RESEARCH PROCESS

Public Participation: Hydraulic fracturing intersects numerous issues of concern to Michigan residents, including drinking water, air quality, water supply, local land use, energy security, economic growth, tourism, and natural resource protection. Following the project's robust stakeholder engagement process, the IA integrated public participation into its entire process, including:

- Keeping the public updated on the project's progress and focus through presentations and webinars.
- Gathering stakeholder comments through an online form, open from the start of the project in 2012 to its completion in 2015. Stakeholder input was shared with the researchers and advisory committee.
- Facilitating formal public comment periods for the technical and draft IA reports. Over 200 public comments were received on the technical reports, and this input provided guidance for developing the final IA report.

Advisory Committee: Bringing the often disparate interest groups concerned with hydraulic fracturing together is challenging. To give a diversity of voices representation in the process, the project team created an advisory committee with representatives from multiple sides of the debate–corporate, governmental, and non-governmental organizations–to provide project input. The project team consulted the committee on the reports and received advice reflecting the views of key stakeholder groups. Committee input was used to ensure the project's scope was relevant to decision-makers.

KEY TERMS

It's important to understand the terms "fracking," "hydraulic fracturing," and "high volume hydraulic fracturing." Many people use the term fracking to describe the entire natural gas extraction process–including leasing, drilling, and well completion. Hydraulic fracturing is the injection of fluids (e.g., water, chemicals) into rock to create fissures or cracks that allow natural gas or oil to be pumped to the surface of the ground and used. The State of Michigan defines high volume hydraulic fracturing as hydraulic fracturing that uses a large volume–more than 100,000 gallons–of fluid injected into rock to extract oil or gas.

Image Credits:
Front Left: Heather Rousseau, Circle of Blue
Front Right: Michigan DEQ. See full "Map of of Hydraulic Fracturing Activity in Michigan" at bit.ly/2jW9V8t

Peer Review: In addition to getting public input, the project solicited input from experts in hydraulic fracturing from around the country. A panel of subject-matter experts were given drafts of the IA report to review, as well as the public input the team had received. The peer review process evaluated 1) scientific legitimacy, 2) study rigor, and 3) the integrity of the report and research that went into it.

AVOIDING CONFLICTS OF INTEREST

For the report to be considered a legitimate policy guide and ensure its relevance to a majority of stakeholders, it was essential to ensure unbiased science was used throughout the IA process. To achieve this, the project was entirely supported through U-M to avoid funding-based conflicts of interest that could bias the research process. Additionally, all team members and peer reviewers filled out conflict of interest forms adapted from the National Academy of Sciences.

KEY PROJECT OUTCOMES

The project produced the most comprehensive, Michigan-focused source on hydraulic fracturing to date, addressing the issues and impacts of the process in Michigan from a non-advocacy position. The project team presented information and clarified policy options to facilitate informed decision-making about the future of hydraulic fracturing in Michigan. The project was completed in 2015 and has been praised by both state regulators and environmental organizations. The IA process also contributed to new state administrative rules for strenghthening water protection and giving the public more information.

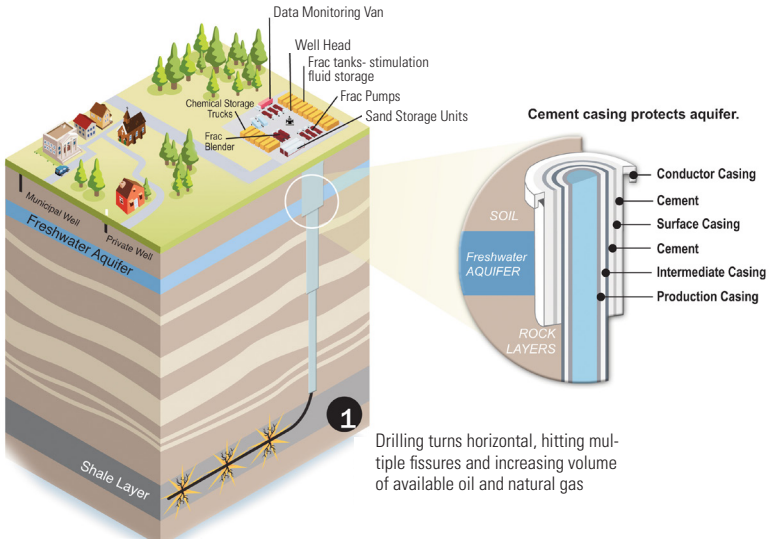
KEY PRODUCTS

- **Final Project Report:**
  The project team provided an analysis of Michigan-specific policy options for hydraulic fracturing focusing on 3 key issues: chemical use, water resources, and public participation.
- **7 Technical Reports:**
  The technical reports cover technology, geology/hydrology, environment/ecology, public health, policy/law, economics, and public perceptions.

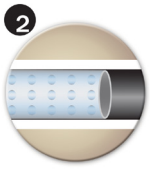
For more details and to access the reports visit the project webpage:
http://graham.umich.edu/emopps/hydraulic-fracturing

PARTICIPATING U-M FACULTY

- Niladri Basu, School of Public Health (SPH)
- Mark Barteau, Energy Institute
- Diana Bowman, SPH
- Allen Burton, School of Natural Resources and Environment and College of Literature, Science and the Arts (LS&A)
- Brian Ellis, College of Engineering (COE)
- Sarah Gosman, Law School
- Andrew Hoffman, School of Business
- Ryan Kellogg, LS&A
- Erin Kort, COE
- Shaw Lacy, Graham Sustainability Institute
- Ryan Lewis, SPH
- Andrew Maynard, Risk Science Center
- John Meeker, SPH
- Knute Nadelhoffer, LS&A
- Johannes Schwank, COE
- Kim Wolske, Erb Institute
- Roland Zullo, Institute for Research on Labor, Employment, and the Economy

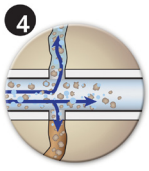


Drilling turns horizontal, hitting multiple fissures and increasing volume of available oil and natural gas

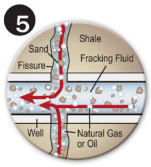


Production casing inserted into borehole, then surrounded with cement.

Casing is perforated blasting small holes through pipe, cement, and shale.



After drilling, the well is hydraulically fractured. A mixture of water, sand and chemicals (fracking fluid) is pumped into the wall at high pressure.



The fluid generates numerous small fissures in the shale, freeing trapped oil and gas that flow back up the pipeline to the wellhead. The sand keeps the fissures open to increase the flow of oil and natural gas.

Tip of the Mitt Watershed Council, 2013