

# Hydraulic Fracturing in Michigan Integrated Assessment



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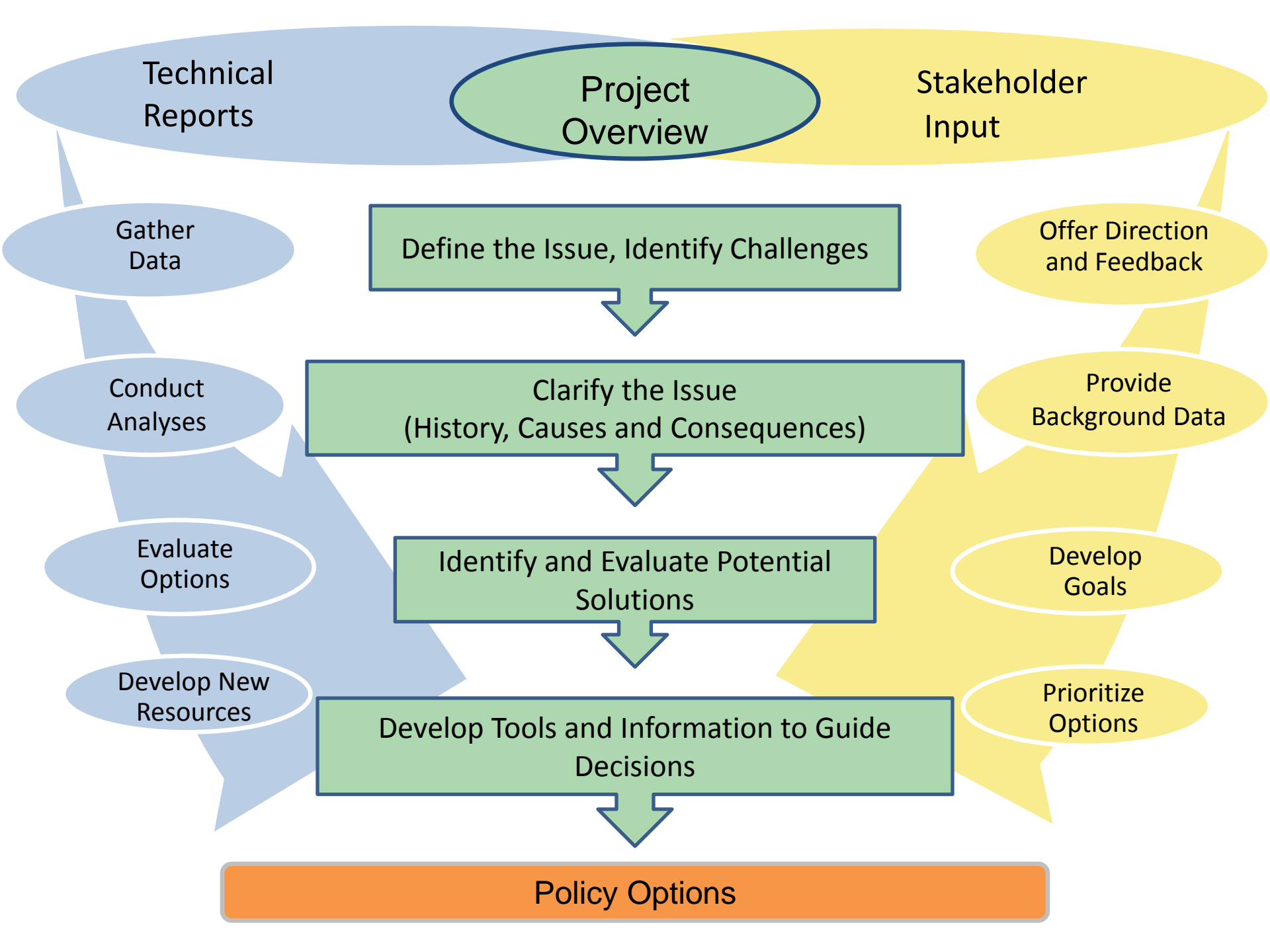
**ENERGY INSTITUTE**

*Charting paths to a secure, affordable,  
and sustainable energy future*



## ***Integrated Assessment Program Objective:***

*To carry out the Institute's mission of sustainability problem solving by using Integrated Assessment as a methodology for connecting academics, decision makers, and stakeholders.*



Technical Reports

Project Overview

Stakeholder Input

Gather Data

Define the Issue, Identify Challenges

Offer Direction and Feedback

Conduct Analyses

Clarify the Issue (History, Causes and Consequences)

Provide Background Data

Evaluate Options

Identify and Evaluate Potential Solutions

Develop Goals

Develop New Resources

Develop Tools and Information to Guide Decisions

Prioritize Options

Policy Options

# Benefits of Integrated Assessment

*As identified by participants in previous assessments*

- Generates reports and supporting data
- Modifies perspectives
- Creates new partnerships
- Changes processes
- Leverages resources



# Hydraulic Fracturing in Michigan

## **Key Points:**

- Hydraulic Fracturing (HF) has been used in thousands of wells in Michigan for decades
- 2003 State Review of Oil and Natural Gas Environmental Regulations (not HF specific ) – *“MDEQ has a well-managed oil and gas environmental regulatory program”*
- Integrated Assessment developed to focus on High Volume Hydraulic Fracturing (HVHF) but data and analyses may cover a range of activity depending on topic or issue
- Limited HVHF activity in Michigan at present
- Broad range of perspectives on benefits/problems of expanded natural gas use

# Resources for the Future Expert Survey

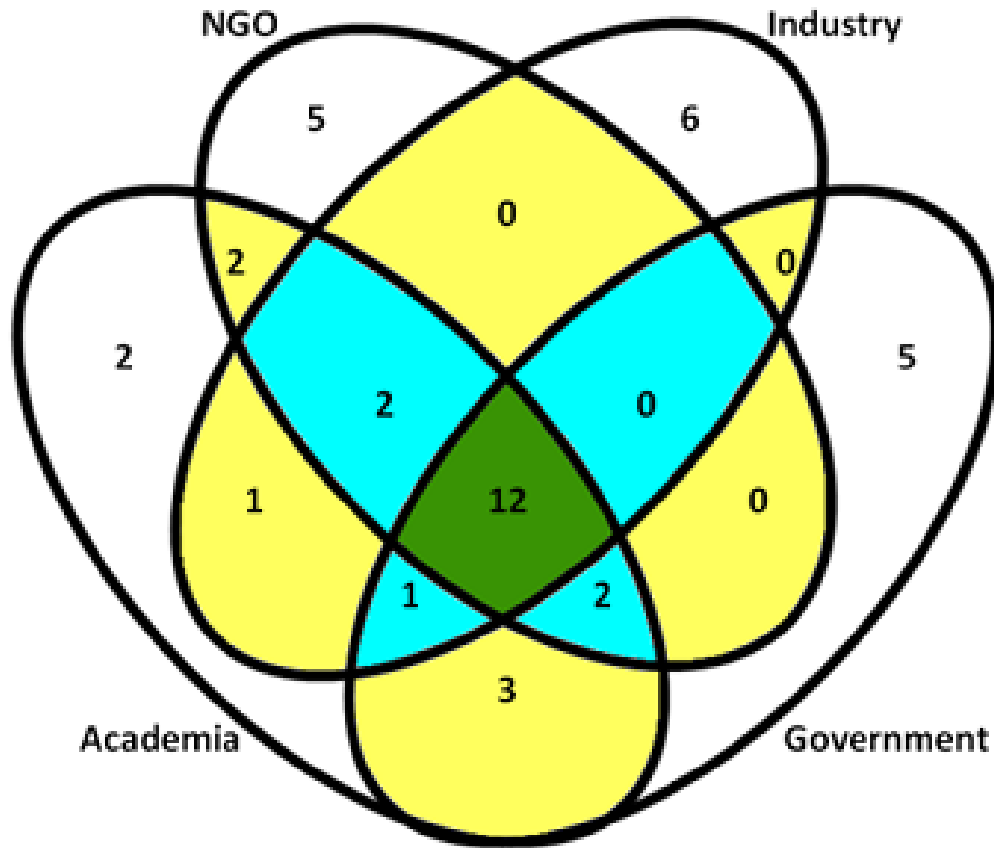
## **Pathways to Dialogue: What the Experts Say about the Env. Risks of Shale Gas Development**

215 experts who responded to the survey questions were asked to choose from a total of 264 “risk pathways” that link specific shale gas development activities—from site development to well abandonment—to burdens such as air pollution, noise, or groundwater contamination.

National focus involving Industry, Government, NGO and Academia

[http://www.rff.org/centers/energy\\_economics\\_and\\_policy/Pages/Shale\\_Gas.aspx](http://www.rff.org/centers/energy_economics_and_policy/Pages/Shale_Gas.aspx)

# Resources for the Future Expert Survey



Of the 12 consensus risk pathways that *all* of the expert groups most frequently chose as priorities

- 7 involve potential risks to surface water quality,
- 2 involve potential risks to air quality,
- 2 involve potential risks to groundwater quality, and
- 1 is related to habitat disruption.
  
- Only 2 are shale gas specific; potential impact of fracturing fluids on surface water during use and storage/disposal

# Phase 1: Technical Reports

*Phase 1: Technical Reports -the first phase of the project will involve the preparation of technical reports on key topics related to hydraulic fracturing in Michigan.*

- **Human health**
- **Environment/ecology**
- **Economics**
- **Technology**
- **Social/public perception**
- **Policy/law**
- **Geology/hydrodynamics**

Each report will consider a range of impacts/issues related to the primary topic. It is likely that there will be overlaps of impacts/issues analyses, as many of the items connect to multiple topics.



# Phase 2: Integrated Assessment

***Phase 2: Integrated Assessment (IA) - the IA will build from the technical reports, focusing on an analysis of options regarding hydraulic fracturing in Michigan.***

The IA will likely be formed around topics identified in the technical reports. Key aspects of the IA that will distinguish it from the technical reports include:

- Focus on the analysis of (policy) options,
- Collaboration and coordination across research teams to identify common themes and strategies,
- Regular engagement with decision makers, and
- Stakeholder engagement process to gauge public concerns and perceptions.

# Timeline

Late March 2013	Technical Reports sent out for Peer Review and shared with Steering Committee
Late April 2013	Steering committee and Technical Report leads meet to discuss plans for Phase 2
Early June 2013	Technical Reports are released with 30 day Public Comment period
Late July 2013	Phase 2 Plans finalized
Mid 2014	Final Integrated Assessment Report released (tentative)

# Project Funding

*At present, the project is entirely funded by the University of Michigan.*

The project is expected to cost at least \$600,000 with support coming from the University of Michigan's [Graham Institute](#), [Energy Institute](#) and [Risk Science Center](#).

Current funding sources are limited to the U-M [general fund](#) and [gift funds](#), all of which are governed solely by the University of Michigan.

As the project develops, the Graham Institute may seek additional funding to expand stakeholder engagement efforts. All funding sources will be publicly disclosed.

# Steering Committee

- Claire Allard, Strategy Advisor, Office of Strategic Policy, State of Michigan
- Mark Barteau, Director, U-M Energy Institute
- Valerie Brader, Senior Strategy Officer, Office of Strategic Policy, State of Michigan
- John Callewaert, Int.Assessment Program Director, U-M Graham Sustainability Institute
- James Clift, Policy Director, Michigan Environmental Council
- John De Vries, Attorney, Mika Meyers Beckett & Jones; Michigan Oil and Gas Association
- Hal Fitch, Director of Oil, Gas, and Minerals, Michigan Department of Environmental Quality
- Gregory Fogle, Owner, Old Mission Energy; Michigan Oil and Gas Association
- James Goodheart, Senior Policy Advisor, Michigan Department of Environmental Quality
- Manja Holland, Research Programs Officer, U-M Graham Sustainability Institute
- Andy Hoffman, Director, U-M Erb Institute for Global Sustainable Enterprise
- Drew Horning, Deputy Director, U-M Graham Sustainability Institute
- Andrew Maynard, Director, U-M Risk Science Center
- Don Scavia, Director, U-M Graham Sustainability Institute
- Tracy Swinburn, Managing Director, U-M Risk Science Center
- Grenetta Thomassey, Program Director, Tip of the Mitt Watershed Council
- John Wilson, Consultant, U-M Energy Institute

# Technical Report Leads

**Technology:** Johannes Schwank, Chemical Engineering; John Wilson, Energy Inst.

**Geology/hydrodynamics:** Brian Ellis, Civil and Environmental Engineering

**Environment/ecology:** Allen Burton, School of Natural Resources & Env.; Knute Nadelhoffer, Dept. of Ecology and Evolutionary Biology

**Human health:** Nil Basu, School of Public Health

**Policy/law:** Sara Gosman, Law School

**Economics:** Roland Zullo, Inst. for Research on Labor, Employment, & the Economy

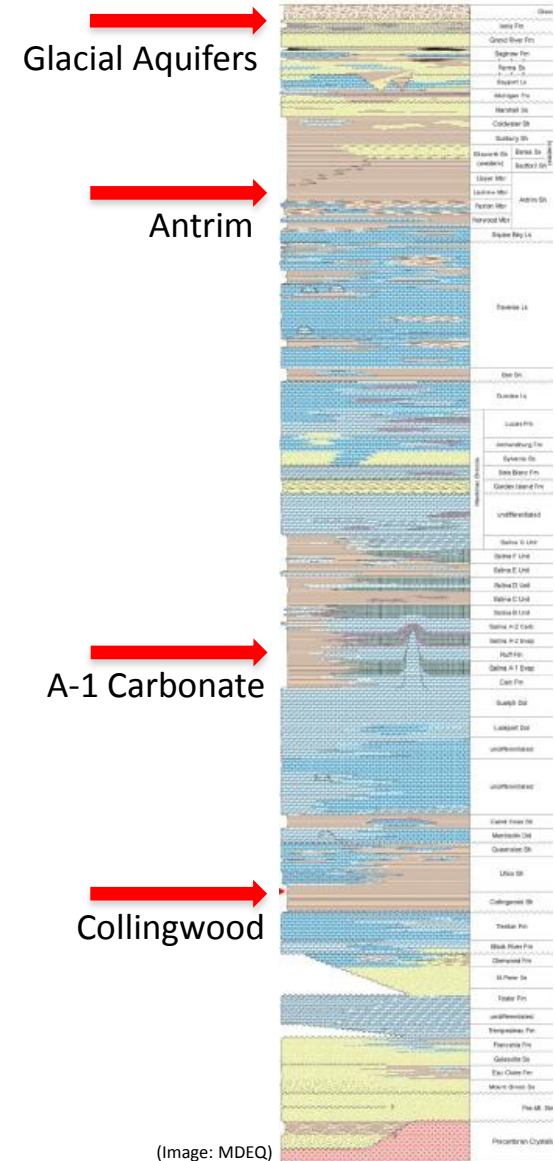
**Social/public perception:** Andy Hoffman and Kim Wolske, Erb Institute for Global Sustainable Enterprise

# *TECHNOLOGY – key areas*

- Technical issues related to hydraulic fracturing technologies and related gas recovery
  - Emphasis on methods used in Michigan
- Identification of issues that require additional research
  - Emphasis on Utica-Collingwood shales and the deeper
  - A-1 and A-2 carbonate deposits

# GEOLOGY – key areas

- Proximity of unconventional reservoirs to subsurface drinking water resources
- Potential fluid migration pathways
- Factors controlling chemical composition of flowback fluids
- Disposal of flowback fluids



# *ECOLOGY – key areas*

- Site disturbance and resulting erosion with solids and nutrient inputs into sensitive streams
- Water withdrawal impacts to neighboring streams/wetlands during drought conditions
- Review of operation “footprint” decision making in light of sensitive ecological areas
- Quality control during operations and site construction



# *HUMAN HEALTH – key areas*

- A number of hazards have been identified
  - Workplace: accidents, silica, toxic chemicals...
  - Ecosystem: water & air pollution, ecosystem services...
  - Community: risk perception, “boomtown” impacts...
- Hazard  $\neq$  Risk
- Relative tradeoffs & human health risk/benefits need careful consideration

# *POLICY/LAW – key areas*

- Laws governing life cycle of a HF well
- Level of government
- Type of law
- Policy approach

# *ECONOMICS – key areas*

- Provide an overview of the major economic issues related to the natural gas extraction industry (hydraulic fracturing) in Michigan, with an emphasis on employment.
- Estimate the employment effects of expanding natural gas extraction:
  1. Direct industry employment
  2. Indirect supplier employment
  3. Induced regional employment

# *SOCIAL/PUBLIC PERCEPTIONS – key areas*

- What does the public think about “fracking?”
- What factors influence perceptions?
- What might we expect if HVHF increases in MI?
- What is the nature of the dialogue about fracking in Michigan?

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<http://graham.umich.edu/ia/hydraulic-fracturing.php>



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