

# Energy Partnership: U.S. Department of Energy and State of New Mexico

Carlsbad Mayor's Energy Summit  
October 16, 2017

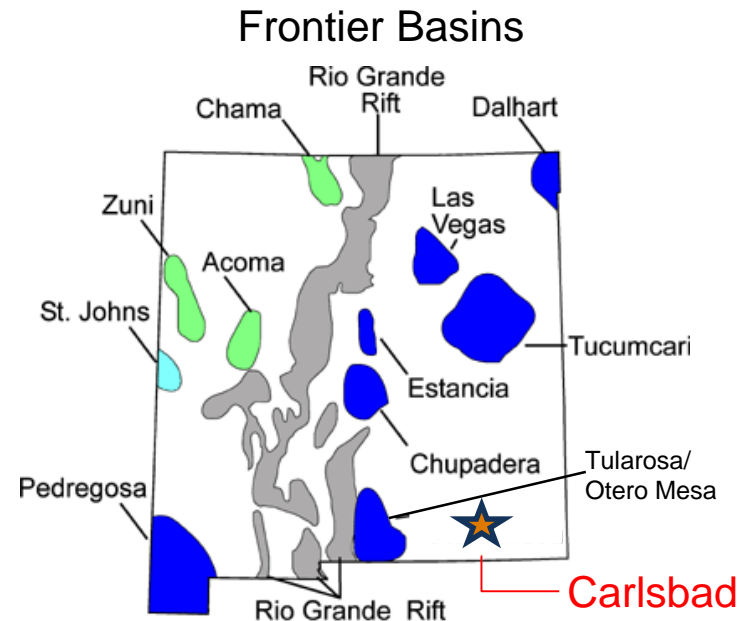
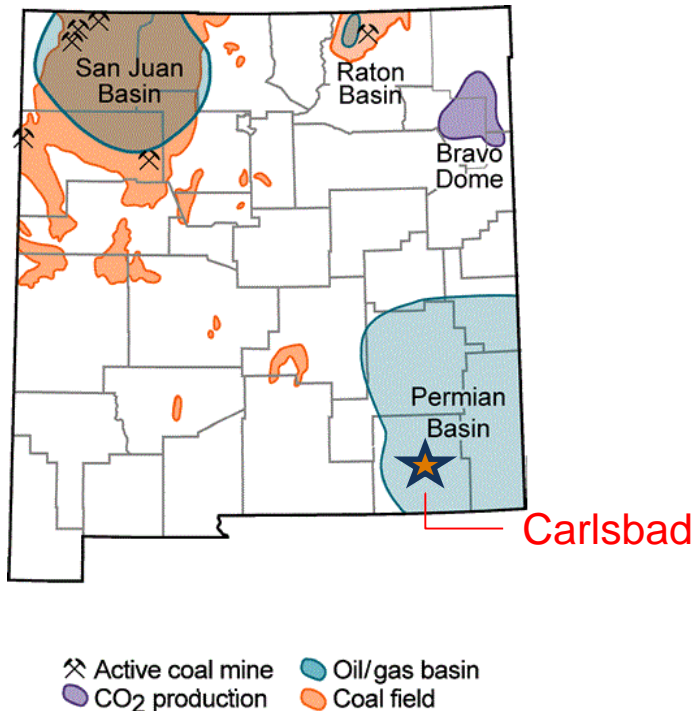
Dr. Alan J. Cohen  
Director of Research  
Office of Oil and Natural Gas  
U.S. Department of Energy



## NEW MEXICO 7<sup>TH</sup> LARGEST SUPPLIER OF FOSSIL ENERGY IN THE USA

***"We will export American energy all over the world, all around the globe."***

– President Trump, June 2017



*We owe thanks "...to American ingenuity... [to the] freedom to innovate, ...[to develop] new technology ...[resulting in] expanded oil and gas supply, [and] lower costs..."*

– Secretary Perry, September 2017



# DOE Oil and Gas Activities

## DOE Oil and Gas Program Mission

Maximize the value of U.S. oil and gas resources to the public and ensure their responsible development and delivery through policy, research, innovation, and outreach

	Program Focus	New Mexico Highlights
Unconventional Oil & Gas	<i>Developing technologies to maximize recovery and reduce environmental impacts from unconventional oil &amp; gas development (UOG)</i>	<ul style="list-style-type: none"><li>▪ <i>Field-based research program to increase resource recovery, spur new technology development</i></li></ul>
Prudent Development	<i>Responsible development of shales with the specific goals of promoting safe practices</i>	<ul style="list-style-type: none"><li>▪ <i>Technologies and decision tools to manage and reuse produced water</i></li><li>▪ <i>Enhance coordination on scientific research to understand and mitigate seismic activity</i></li></ul>
Field Laboratories & Fundamental Shale	<i>Advance fundamental shale research by investigating the processes associated with hydrocarbon extraction from unconventional shale reservoirs</i>	<ul style="list-style-type: none"><li>▪ <i>Scientific insight into the micro-scale features within shales and evaluate the efficiency and environmental impacts of shale production</i></li></ul>
Midstream	<i>Develop new technologies to reduce methane emissions from midstream infrastructure to enhance the efficiency of natural gas delivery in the United States</i>	<ul style="list-style-type: none"><li>▪ <i>Methane emissions assessments to characterize (composition and volume), identify and develop cost abatement technologies to mitigate fugitive emissions</i></li></ul>
Crude By Rail	<i>Mitigate risks associated with frequent and large volume rail transport of crude oil in general and tight oil in particular</i>	<ul style="list-style-type: none"><li>▪ <i>Characterize tight and conventional crudes and identify properties that may contribute to increased likelihood and/or severity of combustion events</i></li></ul>

# DOE PRODUCED WATER RESEARCH IN NEW MEXICO

*Produced water is an important issue nationwide. In particular, the Permian Basin has significant PW production and a high water management cost.*

## Cost-Effective Treatment of PW Using Co-Produced Energy Sources

PI: New Mexico Institute of Mining and Technology (NMIMT)



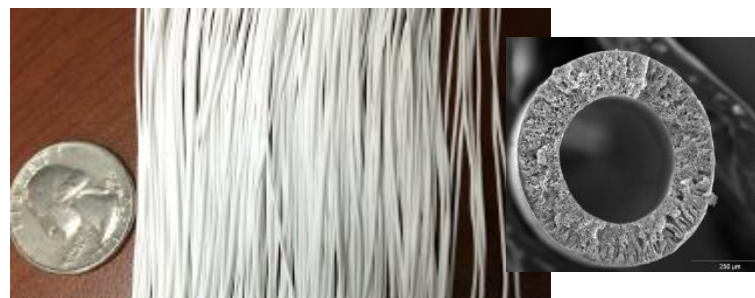
## Membrane Technology for PW in Lea County

PI: Lea County Government and NMIMT



## A Portable, Two-Stage, Antifouling Hollow Fiber Membrane Nanofiltration Process

PI: NMIMT

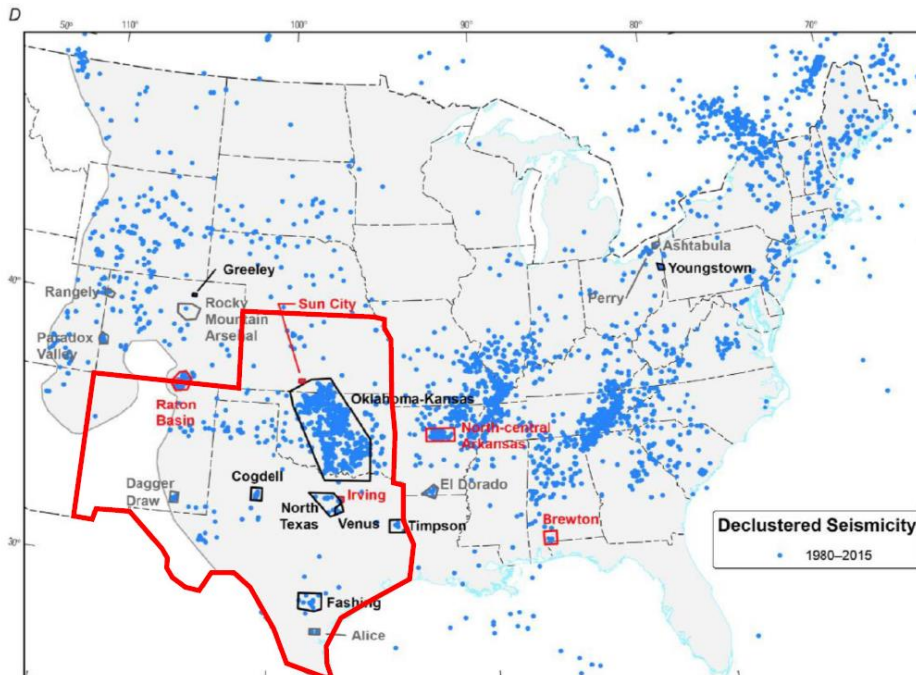


# DOE ENABLES CREATION OF REGIONAL INDUCED SEISMICITY COLLABORATIVE

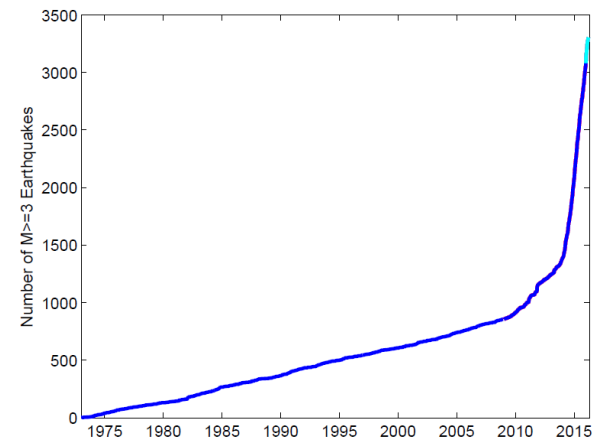
*States continue to be proactive in addressing the potential for induced seismicity*

State geologic surveys in cooperation with DOE and the Ground Water Protection Council

- New Mexico Bureau of Geology and Mineral Resources at New Mexico Tech, Kansas, Oklahoma and Texas
- Network for enhanced coordination on scientific research to understand and mitigate seismic activity



**Seismic Activity in the Central and Eastern U.S.:  
Natural and Human-Induced**



Source: USGS



# DOE NATIONAL LABORATORIES IN NEW MEXICO

## Department of Energy National Laboratories

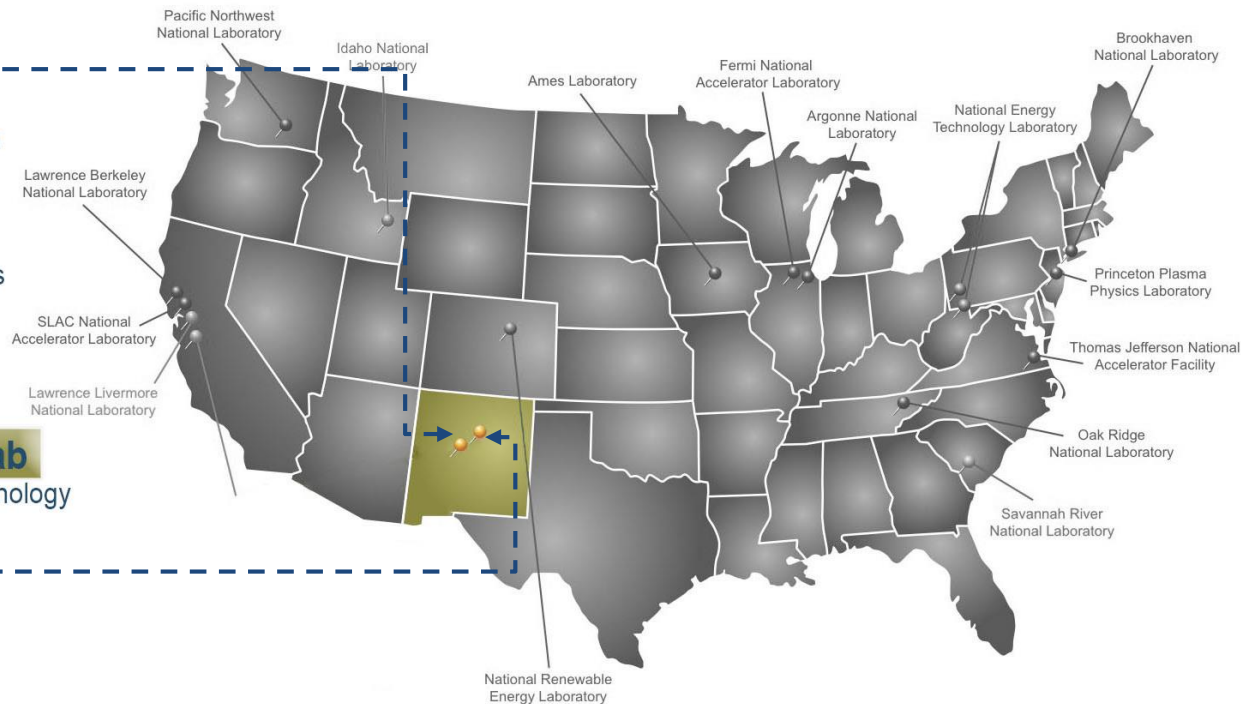


### Sandia National Lab

- Bioscience
- Computing Science Information
- Engineering Science
- Geosciences
- Materials Science
- Nanodevices and Microsystems
- Radiation Effects and High Energy Density Science

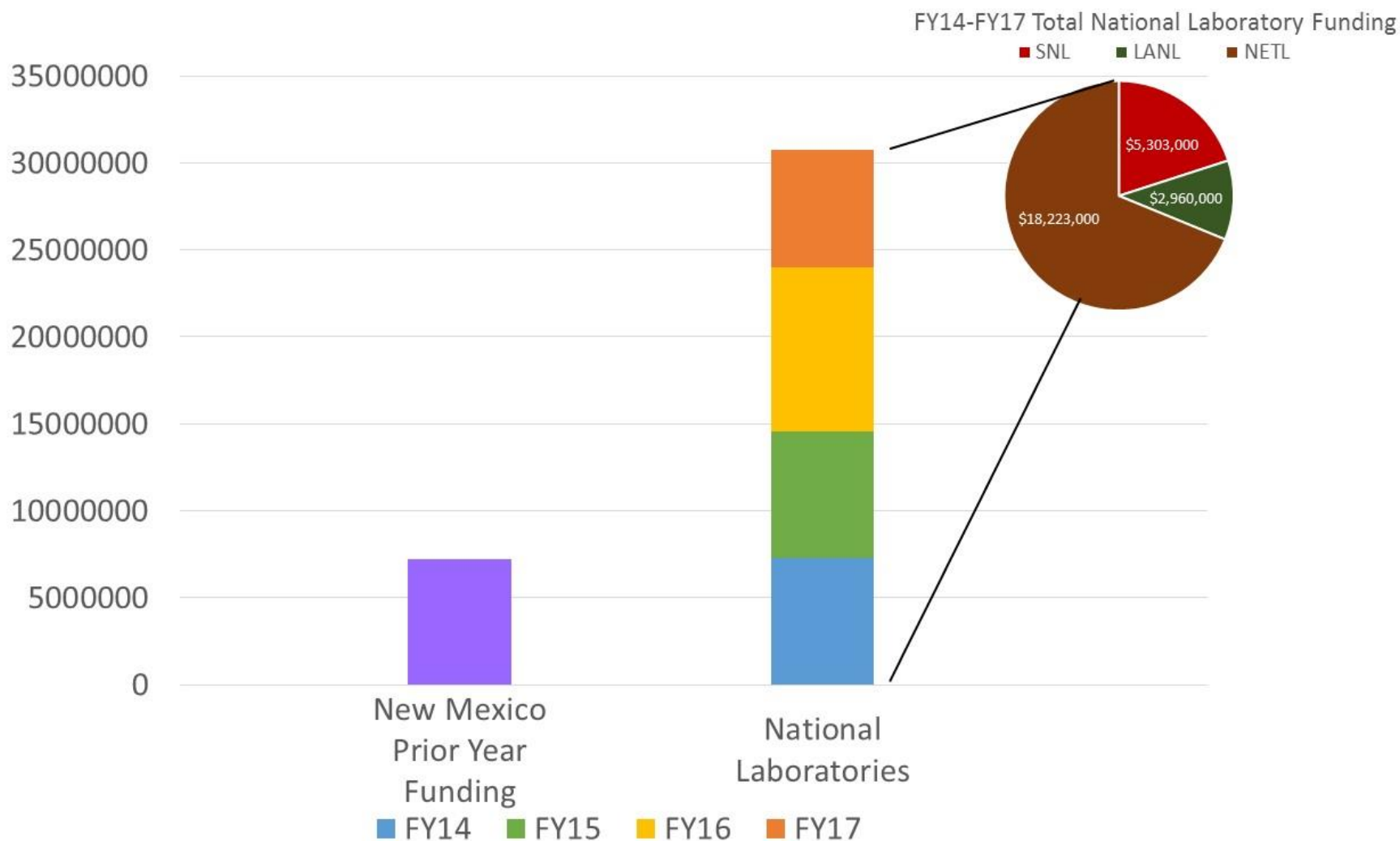
### Los Alamos National Lab

- Information, Science, and Technology
- Materials for the Future
- Nuclear and Particle Futures
- Science of Signatures



# DOE NATIONAL LABORATORIES IN NEW MEXICO

*DOE Partnerships include industry and academia*



# NEW MEXICO ENERGY ROADMAP PROJECT 2017-2018

State of New Mexico  
Energy, Minerals and Natural Resources Department

Susana Martinez  
Governor

Ken McQueen  
Cabinet Secretary

Matthias Sayer  
Deputy Cabinet Secretary

Office of the Secretary  
emnr

FOR IMMEDIATE RELEASE  
March 9, 2017

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## EMNRD Awarded \$300,000 Grant to Help Create Energy Sector Jobs

*'Energy Roadmap Project' builds on Governor's comprehensive energy plan*

**Santa Fe, NM** – Today, the Energy, Minerals and Natural Resources Department (EMNRD) announced their recent award from the U.S. Department of Energy of \$300,000 to develop a plan that supports partnerships and stakeholder involvement with energy producers in oil and gas, coal, nuclear, electric and renewable energy industries; helping to create more energy sector jobs in New Mexico. The Energy Roadmap Project will build on Governor Susana Martinez's comprehensive energy plan – the first of its kind in nearly 25 years – that she announced in 2015.

"New Mexico has been truly blessed with natural resources," said EMNRD Cabinet Secretary Ken McQueen. "The roadmap, along with the Governor's energy plan, will help us do everything we can to create energy sector jobs for New Mexicans for generations to come."

The New Mexico energy roadmap supports partnerships and stakeholder involvement with energy producers including the oil and gas industry, coal mining industry, electric utilities, the nuclear power industry and the renewable energy industry. With the roadmap, the Department will analyze future environmental requirements, policies, supply, demand and resiliency and future measures needed for a more diverse energy portfolio.

Governor Martinez's Energy Policy and Implementation Plan include:

- Improving New Mexico's Energy Infrastructure
- Promoting Greater Production of ALL Sources of Energy – Especially Low-Carbon Sources
- Improving Energy Workforce Training at Higher Education Institutions

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*"The roadmap, along with the Governor's energy plan, will help us do everything we can to create energy sector jobs for New Mexicans for generations to come."*

## New Mexico's Roadmap

- Build synergies and connections between economic development and energy assurance/resilience

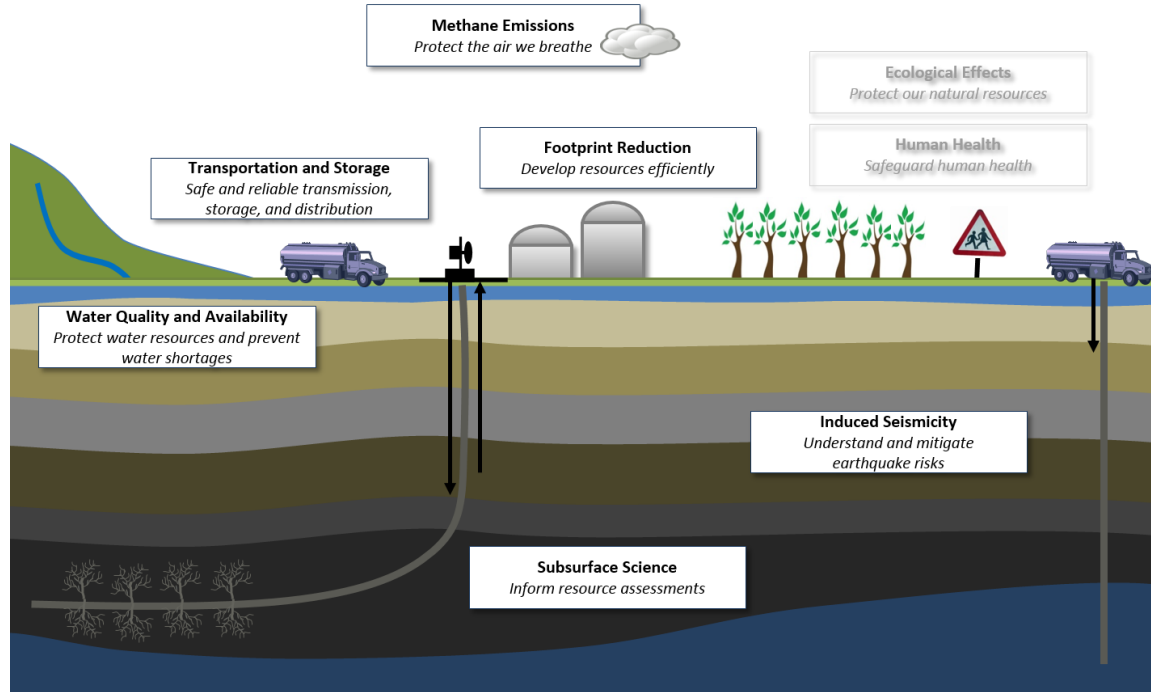
## DOE Funding will enable New Mexico

- Build on the 2015 Energy Policy
- Sustainable, state-wide energy Implementation Plan





# DOE RESEARCH: DEVELOPMENT OF UNCONVENTIONAL RESOURCES



- Enhanced recovery of shale gas and shale oil resources
- Technologies and decision tools to manage and reuse produced water
- Improved ability to relate specific seismic activity to UOG operations
- Reduced risk of groundwater contamination through improved wellbore design
- Improved methods for detecting wastewater spills
- Enhanced methods for measuring air quality and emissions

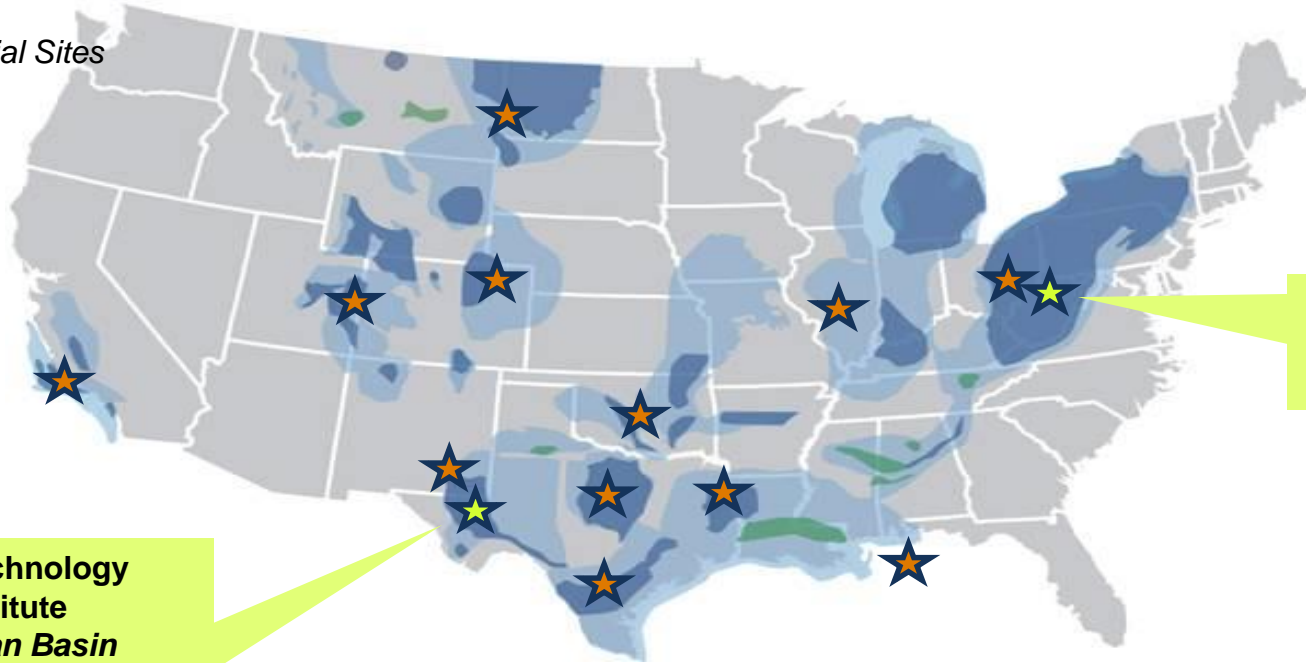


# SHALE DEVELOPMENT: FROM LAB TO FIELD: SPANNING MULTIPLE TRL

## Regional Field Observatories

★ Current Sites

★ Potential Sites



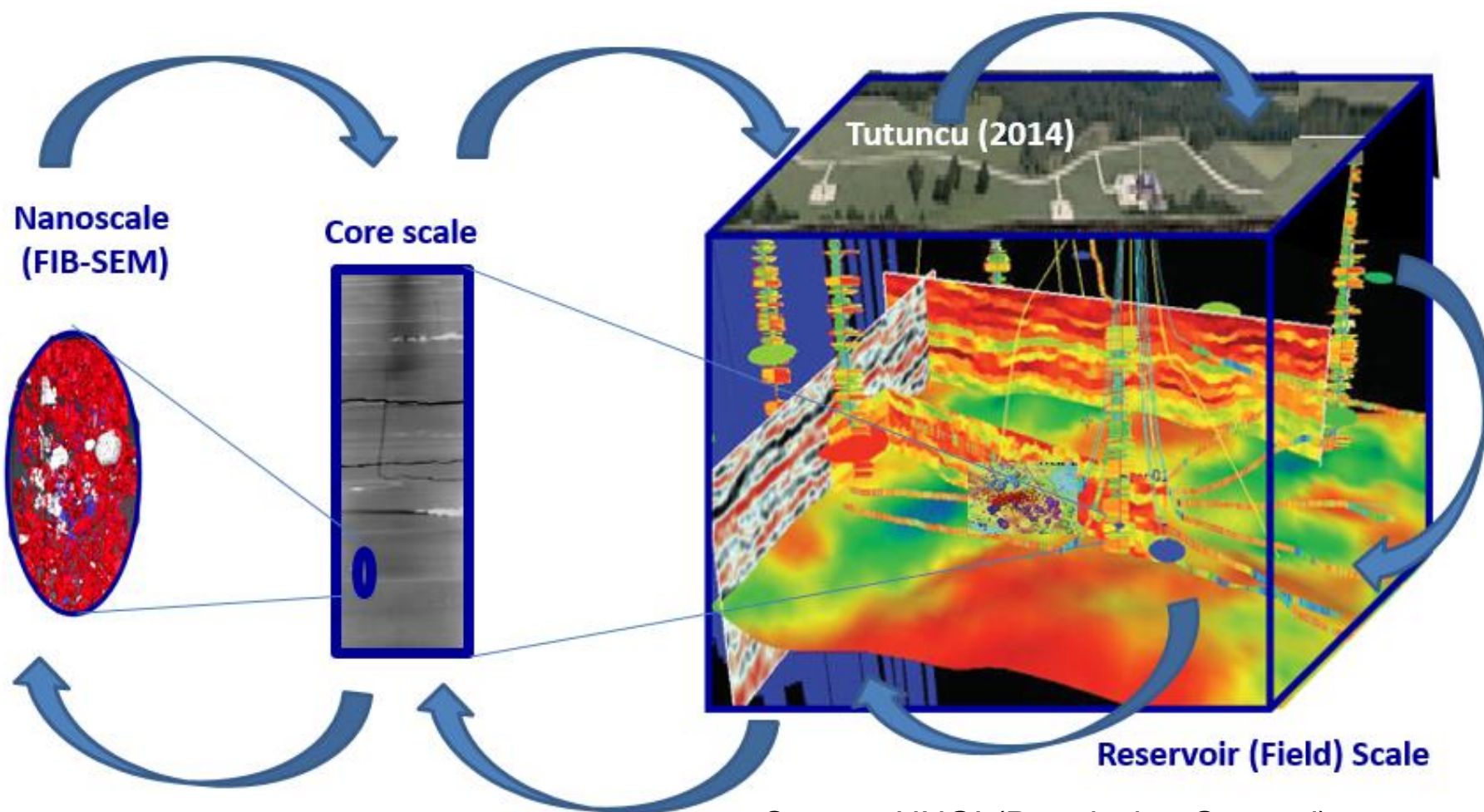
**West Virginia U. Marcellus Shale**  
eastern, dry-gas

**Gas Technology Institute**  
**Permian Basin**  
(western, liquid-rich play)

- Field-based hydraulic fracturing research program
- Advanced diagnostics including coring through hydraulically fractured reservoirs
- Insights expected to increase resource recovery, spur new technology development, and improve fracture models

# DOE NATIONAL LABORATORIES RESEARCH FOCUSED

*Nanoscale, core scale and reservoir scale*



Source: UNGI (Permission Granted)

**COLORADO SCHOOL OF MINES**  
EARTH • ENERGY • ENVIRONMENT

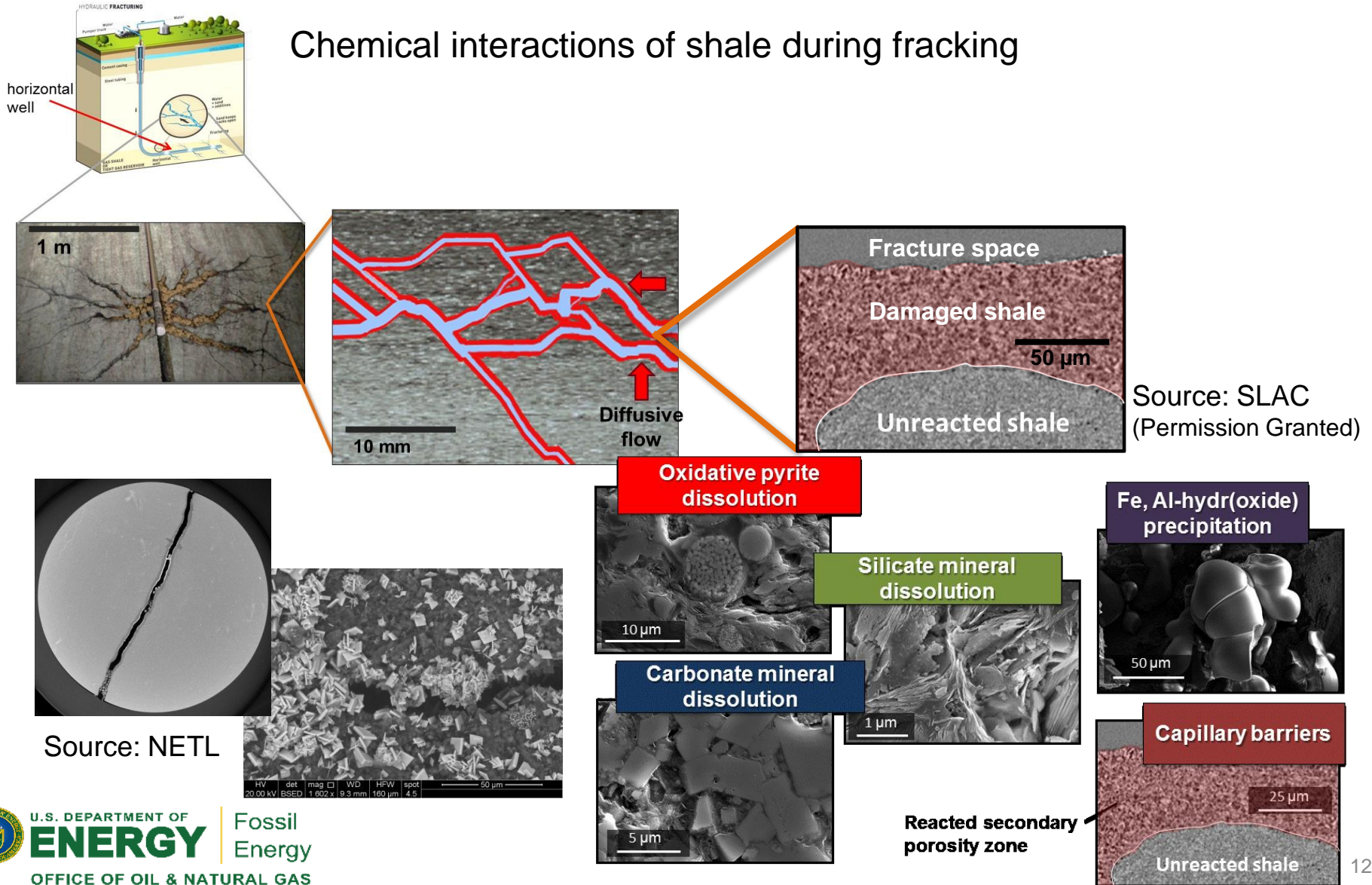




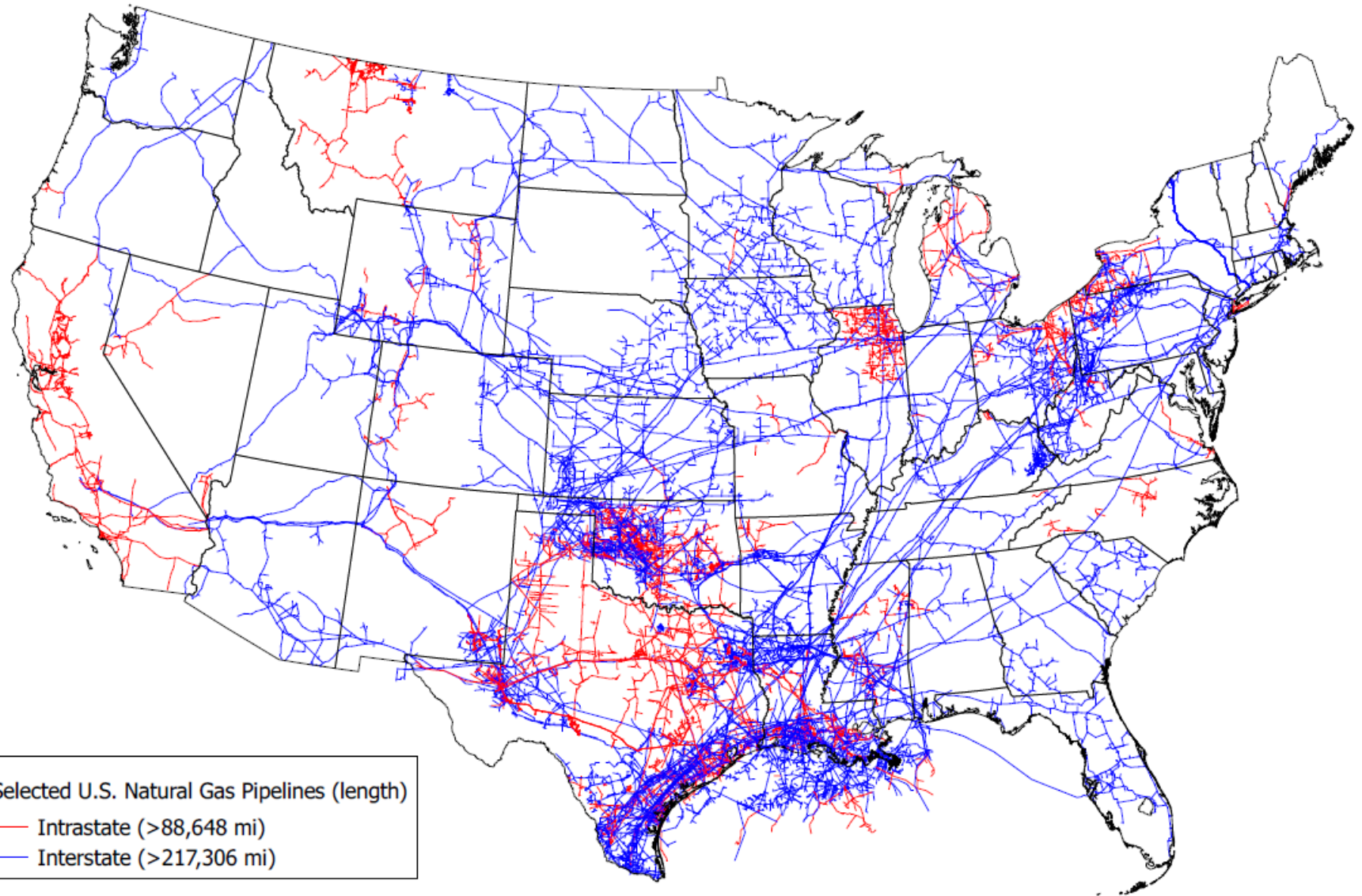
# FUNDAMENTAL SCIENCE AT NANOPORE SCALE

*Develop technologies to enable prudent use of shale resources and increase recovery efficiency through improved reservoir stimulation*

## Chemical interactions of shale during fracking



# ROBUST U.S. NATURAL GAS PIPELINES CONNECT SUPPLY WITH DEMAND





# MIDSTREAM INFRASTRUCTURE RESEARCH

## Pipeline Inspection & Repair

- Expand mitigation efforts into remote leak detection and repair for valves, controllers, and compressors.

## Smart Sensors for Pipeline Operational Efficiency

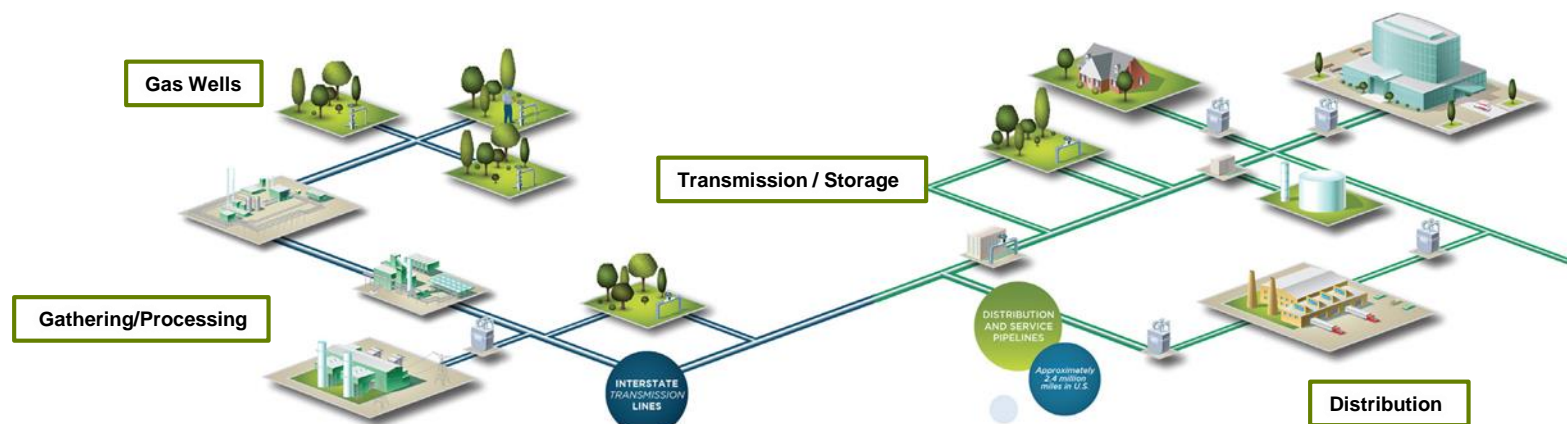
- Development of robust and reliable smart in-pipe sensors to monitor pipeline operations in real-time

## Advanced Materials Research

- Accelerate advances in materials science that can enhance pipeline integrity and enable pipes to transport natural gas along with other critical fuels and fluids

## Leak Detection & Monitoring

- Improved external leak detection and flow rate quantification technologies for gathering lines and underground gas storage facilities



# CRUDE BY RAIL RESEARCH CHALLENGE

## Concerns/Problem

- Crude transport risks
- Train derailments hazards
  - Oil spills
  - Environmental contamination
  - Fire
  - Property damage
  - Fatalities



## Regulators Tighten Enforcement of Rail-Safety Rules



January 20, 2016 | The Wall Street Journal | Federal regulators are enforcing rail-safety rules more stringently, issuing more alleged violations against Amtrak and freight carriers amid worries over shipping crude oil and hazardous chemicals.

The Federal Railroad Administration leveled 6,485 violations carrying civil penalties against railroads in the fiscal year ended Sept. 30, up 23% from the previous year, according to the agency's annual enforcement report expected to be announced Wednesday.

## SAE Plan and Steering Committee established 2015

THANK YOU MAYOR DALE W. JANWAY  
FOR THE OPPORTUNITY TO PRESENT TODAY



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