# *Research and Participatory Science:* Contributing to Sustainable Development in Minerals and Energy Development Projects

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# Basic premise

- By creating research projects that integrate “participatory science”, energy and minerals development can better contribute to sustainable development

# What are the problems we need to solve?

- Mining and energy production has the potential to impact environmental, economic and social aspects in local communities
- Communities distrust “scientific data”
- Companies want to assure compliance with regulations and CSR at lowest reasonable cost
- Regulators and other governance structures may be absent, lacking in appropriate resources or distrusted by all parties

# Why research based solutions?

- Answers basic questions about cause and effect
- Allows for development of  best practices and innovation
- Reduces environmental costs and promotes addressing key issues
- Removes regulatory conflicts by creating new focus on real problems and science
- Informs the public discussion and creates opportunity for “**social license”**
- Academia may be trusted by all parties

# What is "participatory science"?

- New term in this context to extend the concept of "citizen science"
- *Participation of trained members of the stakeholder community as an integral part of a research team under the supervision of an academic researcher to conduct data gathering focused on answering a particular research question*

# How does it differ from "citizen science"?

- Citizen science has in many cases been conducted without full "research rigor"
- Many citizen science projects have bias towards finding problems
- Many citizen science programs are sponsored and conducted by NGOs
- Citizen science projects not necessarily community empowering
- Good models do exist, however

# Major research areas that have involved citizen science

- Colorado Bats/Inactive Mines Project (BIMP)
- Crowdsourced Interactive Health Research Studies
- Christmas Bird Count
- And HUNDREDS more examples

# Why engage in participatory science?

- Companies, regulators, citizens and researchers are partners in design of research question and collection of appropriate data
- Training for participants results in building in the community
- Research helps build focus of professionals on real problems facing contributions of energy and raw materials to sustainable development

# Required commitment from companies

- Resources
  - Funding
  - Access
- Commitment to results
  - Providing “authority” to research
  - Supporting capacity building and partnership
  - Supporting professional development

# Who are potential partners?

- Industry
- Academia
- NGOs
- Neighbors
- Schools
- Regulators
- Local government
- Grass roots organizations

# Specific Research Example

- Evaluating impact of horizontal hydraulic fracturing on drinking water wells
  - Academic researcher wants to look at fluid transport in fractured rock
  - Community concerns about health
  - Regulatory concerns about  following permits, regs, etc.
  - Company concerns about being allowed to operate, cost of operation and chemicals, recovery of maximum resource
- Participatory research project
  - Citizens trained to gather water samples from water wells, surface streams and other appropriate locations.  Local HS students also participate
  - Researcher provides for analysis of samples and shares data with all, as well as ongoing modeling work
  - Regulator uses data to evaluate whether company followed well construction requirements and operational standards
  - Company understands what's going on and receives better reputation

# Research can address:

- Environmental Management
  - Water Impacts
  - Waste Placement
- Impacts of Energy and Mining Systems
  - Wildlife impacts
  - Noise impacts
- Community Development
  - Economic
  - Social

**OR**

**SUSTAINABLE DEVELOPMENT IN MINING AND ENERGY**

# Benefits of Participatory Science

- May allow for development of  best practices and innovation in community relationship building
- Potentially reduces environmental compliance costs and promotes addressing key issues
- Removes conflicts by creating new partnerships and focus on real problems and science
- Informs the public discussion and creates opportunity for "**social license**"
- Builds capacity in community, encourages STEM education, enhances professional careers

# How does participatory science contribute to sustainable development?

- Enhances economic benefit to all parties
  - Less wasted on controversies
- Builds effective local governance
- Enhances community capacity
- Enhances environmental performance
- Builds social capital

# What next?

- Need to demonstrate how it works in practice
- Determine how to integrate with ongoing efforts
- Need to develop a “best practices” manual for others to try
- Evaluate the opportunities for transdisciplinary research