

Managing the Risks of Unconventional Oil and Gas Development

What Local Communities Can Learn from Others' Experiences

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Rapid expansion of oil and gas development around the nation has both provided benefits and sparked concern and opposition among some residents about the risks that they may bear.

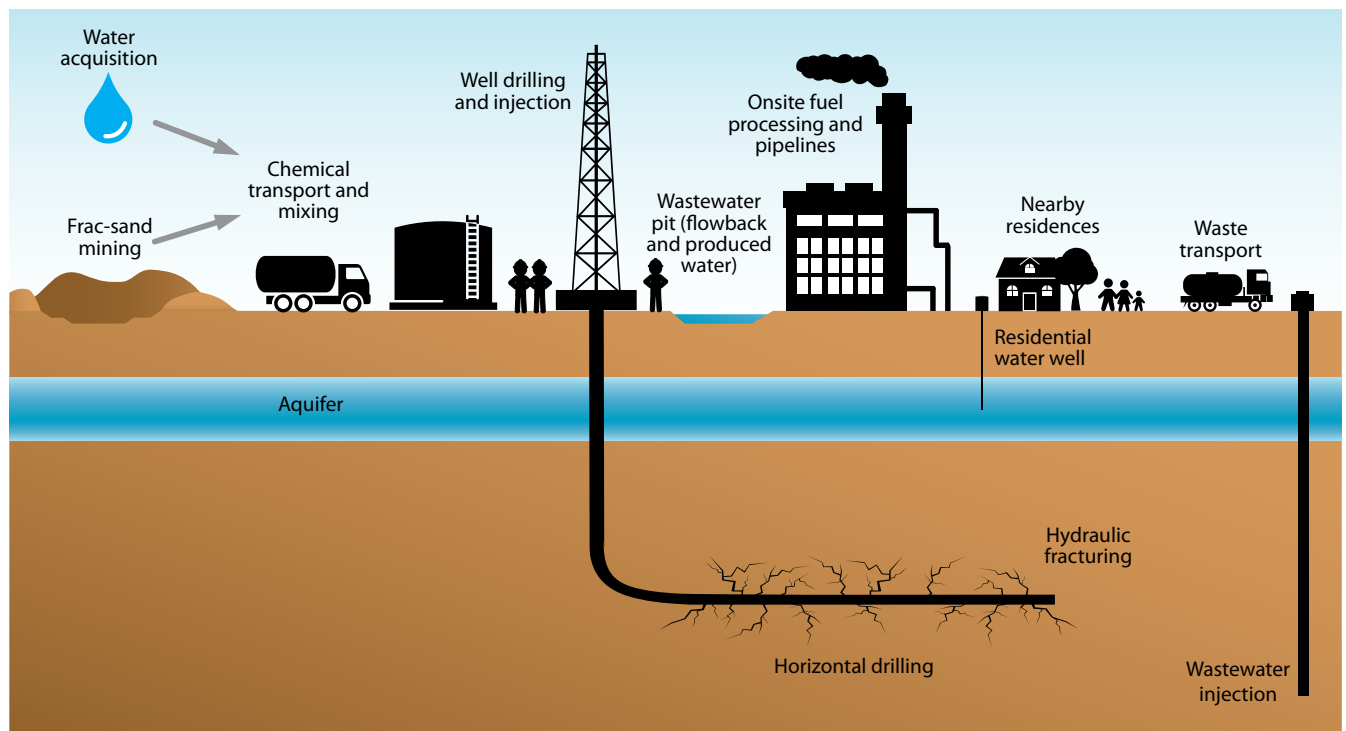
Since the late 1990s, horizontal drilling and high volume hydraulic fracturing—commonly called “fracking”—have enabled recovery of oil and gas from previously uneconomic or inaccessible shales and other tight rock formations (see the figure). Such tapping of “unconventional” oil and gas reserves has not only expanded production both in areas historically rich in oil and gas, but also has allowed oil and gas to be accessed from completely new regions (UCS 2013).

County and municipal governments must decide how to respond to oil and gas development in their jurisdictions, balancing benefits against risks and impacts—a task compli-

cated by the fact that the pace of development is faster than full scientific understanding about those risks and long-term impacts. And local government officials often face debates about the science, fragmented public opinion, and divisive politics in the face of decision making.

This report, based on interviews of local public officials, highlights regulatory, non-regulatory, and fiscal tools that may be available to local officials and decision makers to assess, manage, and minimize the impacts and risks associated with oil and gas development. Because localities differ in physical features, priorities, and concerns, this report does

Illustration of Typical Steps of Unconventional Oil and Gas Development



Although hydraulic fracturing has been done for several decades in vertical wells as well as in horizontal wells for oil, the scale, number of wells drilled, and technology involved have advanced rapidly in the last few years and also allowed an increase in extraction of natural gas and oil. This expansion has opened up development of many oil and gas resources previously thought inaccessible (EPA 2013).

BOX 1.

Local Impacts of Unconventional Oil and Gas Development

Unconventional oil and gas development can have both positive and negative effects on local communities.

BENEFITS:

- **Wealth Generation**—Owners of mineral rights, property, housing, stores, restaurants, and other local supporting businesses may profit.
- **Property Values**—May increase for mineral-rights owners and for the local property owners due to local economic growth.
- **Job Creation**—High-paying blue-collar and white-collar jobs. Locals may supplant outsiders over time as they train up and as outsiders put down roots.
- **Economic Growth**—Oil and gas industry can impel secondary growth in manufacturing and service sectors, but long-term economic returns can flag due to industry downturns and eventual depletion of oil and gas.
- **Fiscal Benefits**—Local governments may receive severance, property, and sales taxes, and payments and contributions from companies, allowing investment in services and infrastructure, debt retirement, and saving.

COSTS AND RISKS:

- **Water**—Stress on subsurface and surface water and quantity can be acute in areas of low rainfall or drought. Water quality can be affected by contamination due to

faulty well construction, underground methane migration, and leaks and spills of chemicals and drilling wastewater.

- **Air, Odors, Toxic Gases, Noise, and Light**—Localized air pollution and odors from gases, dust and exhaust from trucks and equipment, and noise and brilliant light may persist around the clock from drilling and attendant operations.
- **Chemical Exposure**—Accidents and spills of toxic materials and hazardous waste may occur on drilling sites or during transport.
- **Socioeconomic**—Local population may surge, resulting in increased rents and costs of living, and changes in community character. Conflict between neighbors may arise around lease revenue and impacts.
- **Property Values**—May decrease for residential properties near sites for drilling and well completion, at least for a while.
- **Fiscal Costs**—Includes damage to roads from trucking; increased risk of traffic accidents due to heavy truck traffic; and increased social, public safety, emergency service, infrastructure, and administrative costs.
- **Seismic Risks**—Earthquakes may occur in areas where fracking wastewater is disposed through injection wells, even in areas not known for seismic activity.

not advocate for or against specific approaches. Instead, it presents examples of approaches that local governments in eight states have used, along with a few case studies, as options that may be available to local officials (see “Methodology,” p. 11). Moreover, because state-level frameworks limit what local governments can legally do, local officials should consult additional resources, such as legal counsel or nearby local governments, to fully understand what tools are available to them in their specific state.

Unconventional Development, Its Benefits, and Its Costs

The surge in unconventional oil and gas development in the United States can affect local communities in various ways (see Box 1). In addition to local benefits and costs, there are national and even global implications of unconventional oil

and gas development. Benefits include reduced dependence on foreign sources of energy for the United States, economic stimulus resulting from lower energy costs, and reduced reliance on coal-fired power plants (thereby reducing pollution near coal mines and power plants and heat-trapping gas emissions from coal). Costs include the climate impacts resulting from a continued dependence on natural gas and other fossil fuels, particularly as cheaper oil and natural gas may retard investment and adoption of clean, renewable energy sources (UCS 2015).

Context and Challenges for Local Governments

Oil and gas development is regulated primarily by state governments. As states claim primary regulatory authority and have supremacy over local governments, states also decide how

much regulatory discretion to allow at the local level. Some states allow local control over some areas, while others minimize local discretion in favor of implementing a uniform state-wide regulatory regime (see the table). Conflicts between local and state governments often are adjudicated by state courts.

Each community has a unique culture, landscape, set of values, history, and economic context that animate its response and approach to oil and gas development. For instance, some communities are more welcoming of industry and business while others prioritize strong environmental protection. History also shapes a community’s perspective: a positive or negative history of oil and gas development, mining, or manufacturing can make residents either more comfortable or more wary, respectively. Concerns about property rights can also play out in complex ways—between neighbors, for example, when development activities have spillover impacts on adjacent property, and, in “split estate” situations, between the different owners of surface lands and the underlying mineral estate. Finally, the strength of the local economy, and the impact of oil and gas development on tourism and other established industries, can strongly influence constituents’ responses. Of course, no community is homogenous and made up exclusively of like-minded stakeholders; it falls to local government officials to manage conflicting perspectives and interests and devise a policy that strikes the appropriate balance for each particular community.

Furthermore, for competitive reasons, companies often work quickly and confidentially to secure leases in shale rock formations considered viable for oil and gas development. Thus, local government officials may not be aware of the full extent of activity in their jurisdiction until it is already inten-

sive. In regions that do not have a history of oil and gas development or have not had it recently, local officials have to scramble to get up to speed on a new, highly technical industry.

The task of assessing the local implications of oil and gas development is made more difficult by the lack of widely trusted information, with even basic terminology (such as the word “fracking”) used divergently by different parties. In this context of strongly held, differing opinions, public discussion in many communities becomes dominated by conflict. Thus, local officials can find it challenging to determine which information sources to trust and which concerns to prioritize (see Box 2).

How Local Governments Have Responded to Unconventional Oil and Gas Development

Local governments have employed a variety of creative regulatory, non-regulatory, and fiscal tools to manage and minimize the impacts and risks associated with oil and gas development.

REGULATORY APPROACHES

Although the ability of local jurisdictions to regulate varies widely depending on the state, local regulatory approaches include:

Land use planning and regulation. Land use planning and zoning ordinances constitute the most robust suite of regulatory tools for local governments to manage risk. Designating oil and gas development as a special/conditional use activity can enable local governments to ensure that the industry

Examples of Regulatory Authority That Local Governments May Exercise

	California	Colorado	New Mexico	Ohio	Pennsylvania	Texas	West Virginia	Wyoming
Roadways	X	X	X	X	X	X		X
Location-based Regulations	X	X	X		X	X		X
Nuisance and Safety Issues	X	X	X		X	X		X
Technical Regulations			X			X		

The table illustrates the types of authority that local governments have to regulate in eight example states. Within each category of authority, the actual regulations that local governments can enact vary greatly from state to state: for example, some states that allow location-based land use regulations allow localities to use zoning or setback requirements, but most have specific limitations on the use of these tools. Note that West Virginia forbids local regulation of any area related to oil and gas development (Kansal and Field 2013; Goho 2012). Additional information about the types of regulations encompassed by each category is provided in the “Regulatory Approaches” section.

BOX 2.

Trusted Information Sources

The following information sources were cited as most useful and trusted by local officials:

- local governments with longer experience with oil and gas development
- visits to drilling sites and affected communities
- local oil and gas operators
- university extension programs
- university-published reports
- municipal/county government associations
- environmental and conservation organizations
- state government agencies

complies with health, safety, and environmental regulations. In addition, local governments in many states can exercise some control over where oil and gas development occurs through zoning and setbacks (see Box 3 for an example), as well as special provisions for particular geographies such as wetlands or 100-year floodplains.

Information disclosure and communications requirements. Many local governments require that companies provide decision makers, local emergency services officials, and local residents with information about the planned development and specific events, such as water resources use, flaring (burning off of natural gas from oil wells when gas collection equipment has not been installed), or site abandonment. Some jurisdictions require operators to notify residents 30 to 90 days in advance of exploration or drilling. Others also require operators to provide forums for engaging with the public and being accessible in case an emergency or other need arises.

Surface water and groundwater protection. Concerns about water contamination have received much attention. Because much of the drilling activity occurs underground or otherwise relates directly to operations—generally an area of state regulation—local governments in most states have limited regulatory authority. Because so few communities have adequate pre-development groundwater and surface water monitoring data, it can be difficult to determine whether gas and oil development is the cause of suspected pollution found post-drilling. Local jurisdictions thus can define setbacks from watercourses and wetlands and mandate that

companies inform local residents before drilling so residents and local scientists can first test water to determine its baseline quality. They can also develop regulations governing the storage and disposal of fracking liquids and wastes (see Box 4, p. 6), including the design, location, and use of storage pits, the use of closed-loop storage (enclosed tanks as opposed to open pits), and the proper storage and disposal of hazardous and non-hazardous wastes.

Public health and safety regulations. Local jurisdictions may be able to implement regulations to reduce the likelihood of spills and accidents at a drilling site, and minimize their severity if they do occur. Examples include measures to limit site access, to require site upkeep, and to maintain safety and fire equipment of defined specification; measures that require operators to communicate necessary information to local first responders to facilitate a timely and effective emergency response (such as orienting emergency personnel to the site, providing information about chemicals used, and informing them in advance of riskier operations); and requirements about how quickly operators must respond in the event of an incident.

Nuisance regulations. Oil and gas development activity, particularly in early construction, drilling, and completion phases, can have “nuisance” impacts on nearby residents. These include higher levels of noise, dust, bright lights around the drilling site at night, localized air pollution, unpleasant odors from the drilling site, traffic congestion, and vibration of the earth. Local jurisdictions have implemented a variety of regulations to address these quality of life issues (see Box 5, p. 7).

Mitigating visual and landscape impacts. The presence of oil and gas infrastructure and equipment can damage the

BOX 3.

Farmington, NM

This community requires the following setbacks in its regulations:

- oil or gas wells, storage tanks, separators, and dehydrators set back 200 feet from residences, commercial and industrial buildings; set back 300 feet from places of assembly, institutions, and schools
- production equipment set back 75 feet from streets
- no building constructed or moved within 100 feet of existing wellhead or production equipment (City of Farmington 2015)



J Henry Fair (www.IndustrialScenes.com)/flight provided by LightHawk (www.LightHawk.org)

Trucking activity can be very heavy during the early stages of developing an oil or natural gas well; these trucks most commonly transport construction equipment and materials; water, sand, and chemicals for hydraulic fracturing; and wastes. This photo shows trucks used to inject water underground at high pressure during hydraulic fracturing.

physical landscape and degrade attractiveness of the local scenery. Many jurisdictions include specific language encouraging or discouraging certain practices and outcomes, such as visual screening, the placement of equipment, and operating in ways that minimize landscape impacts.

Mitigating road and traffic impacts. Impacts on roads and traffic are common in local communities. Trucks typically transport equipment, millions of gallons of water, chemicals, and proppants (material, usually silica sand, used to keep fractured wells open) to the well pad, and transport oil, natural gas, and fracking wastewater away from the drilling site. Each horizontal well can require some 1,000 truck trips (and six or more wells can be drilled per pad), causing deterioration of roadways, traffic congestion, and elevated risks of accidents and spills. In anticipation, local jurisdictions can designate haul routes (see, for example, Box 6, p. 8), prescribe road and site construction standards, mandate operational procedures, and use diverse fiscal tools (described in “Fiscal Strategies and Tools,” below).

Site restoration and reclamation requirements. Once an operator abandons a drilling site, counties and municipalities

can set maximum time limits for restoration activities, set standards for restoring the site to its pre-drilling condition, and require that a local inspector sign off before a site is considered restored.

BOX 4.

Bakersfield, CA

This city has the following regulations regarding hazardous waste disposal:

- shall not be discharged into or upon any streets, canals, storm drains, or flood control channels
- shall be contained in leak-proof containers, lined earthen sumps, or other methods approved by the State Regional Water Quality Control Board, to prevent contamination of potable groundwater supplies
- all wastes disposed of at an authorized disposal site as regulated by the state (City of Bakersfield n.d.)

Local jurisdictions may be able to implement regulations to reduce the likelihood of spills and accidents at a drilling site, and, if they do occur, minimize their severity.

Bans and moratoria. Finally, some municipalities and counties have enacted temporary moratoria to allow local governments time to study and understand local issues and anticipated impacts as well as residents' priorities and concerns about the risks posed by unconventional oil and gas development. Jurisdictions have used zoning, enacted ordinances, and amended town charters to enact bans. While state courts have generally struck down local bans as an infringement on the state government's regulatory authority, many have been more sympathetic to time-limited moratoria.

NON-REGULATORY APPROACHES

Local jurisdictions also may use non-regulatory approaches to address residents' concerns and yield desired outcomes for communities. Notably, non-regulatory approaches can achieve results when local regulatory action is preempted by state regulation.

Community engagement. Local governments can help residents navigate concerns and challenges about unconventional oil and gas development by serving as a reliable source of information and a point of contact for concerns and complaints. Local governments can use websites, links to studies from local experts and universities, printed publications, and public meetings to provide information, field questions, and hear residents' concerns. They can also host discussions between community members, local scientists, and industry operators to understand residents' opinions, areas of agreement and disagreement, and areas of continuing confusion. Local governments can also dedicate staff to interface with all stakeholders and resolve problems as they arise, create local multi-stakeholder bodies to jointly address concerns and complaints, and support discussions between community members and operators to encourage voluntarily adoption of impact-mitigation measures.

Industry engagement. Many local governments benefit from building and maintaining strong working relationships with

representatives from oil and gas operators, and vice versa. Establishing such relationships can help head off potential problems by keeping all parties informed about actions, consulting in advance of taking action, and communicating quickly and clearly as needed. Local government officials can hold regular meetings with operators to share information; maintain open communication channels for problem solving; educate operators on local regulatory environment, expectations, and culture; and request that operators voluntarily adopt impact-mitigation measures.

Incentives. Some municipalities and counties offer incentives to oil and gas developers to adopt best practices to protect local health, safety, and well-being beyond what is required through regulation. Incentives include greater speed and certainty, and reduced fees, in permitting their operations. For example, some jurisdictions offer operators a choice between pursuing a standard or an expedited track through the conditional/special use review process. The expedited track is a voluntary process whereby operators can obtain an expedited review or a quicker approval if the proposed operation meets particular siting and other objective criteria to minimize impacts for the community (see Box 7, p. 9).

Contractual mechanisms. Local governments may be able to sign legally binding agreements with oil and gas developers and with state regulatory officials to promote certain outcomes or to enhance their local authority. Negotiated

BOX 5.

Collier Township, PA

This township has enacted the following regulations to mitigate noise pollution:

- some activities prohibited at night
- operators required to establish a pre-drilling ambient noise level; ambient level not to be exceeded by more than 7 decibels during daytime, by more than 5 decibels during nighttime, and by more than 10 decibels during hydraulic fracturing, with provisions to exceed these increased levels for short periods during each hour
- in case of an excess noise complaint, operator required to provide monitoring record for 48 hours to township, meet with township representatives and affected property owners, and present a noise abatement plan (Township of Collier 2011)

BOX 6.

Arlington, TX

This city regulates where and how gas pipelines cross rights-of-way (such as city streets). The city enters into Pipeline License Agreements under which operators can install pipelines under city rights-of-way, provided they do not interfere with existing water, sewer, and gas lines. The regulation allows Arlington to minimize disturbance to residents' property, enhance safety, and protect existing infrastructure (City of Arlington 2011).

agreements with operators can cover a variety of areas that may not be under local governments' regulatory authority, including placement of wells, mitigation of nuisance issues, enhanced public safety measures, additional environmental protections, and operational practices. Local governments may also be able to negotiate intergovernmental agreements with their state government to, for example, enhance local inspection authority or grant greater deference to local land use planning authority.

Research, monitoring, and data collection. Acknowledging current gaps in scientific knowledge about certain impacts of oil and gas development, some local jurisdictions (see Box 8 for an example) have opted to support research, monitoring, and data collection to better answer outstanding questions, sometimes in partnerships with local universities and scientists. Such efforts can be especially useful for local decision makers because impacts can vary from place to place due to different geologies, prevailing air currents, proximity to development, and other factors.

Keeping state policy makers and regulators informed. Recognizing that state policy governing oil and gas development often shapes local outcomes, many local officials proactively provide information to state decision makers. Local governments can provide input to state legislators, commissions, and taskforces through hearings and during regulatory rule-making processes. They can provide input about public sentiment in their communities, their experiences with oil and gas operators, the effectiveness of their approaches to managing oil and gas development at the local level, and results from research and monitoring efforts.

FISCAL STRATEGIES AND TOOLS

Oil and gas development can generate new and significant sources of revenue for local government coffers but also

imposes additional costs and increases demands for services. Local governments can employ the following tools and strategies to manage or offset the costs and exposure to financial risk from oil and gas activity (Raimi and Newell 2014; Headwaters Economics 2012). As with regulatory tools, not all of these options are available in all states.

Severance taxes. Localities may receive a mandated percentage of revenues from state severance tax (an excise tax on natural resources). Even though localities lack control over the amount and timing of severance tax revenues, they can budget for anticipated revenues, taking into account the value of current collections and the time lag for receipt.

Property taxes. Property tax is one of the more stable, predictable forms of revenue related to oil and gas development that is available to, and controlled by, local governments. Even in states where oil and gas production property is exempt from property taxes, non-production property, such as oil and gas industrial facilities and corporate offices, is taxable.



Developing a new oil or gas site can have “nuisance” impacts on nearby residents, including higher levels of noise, dust, bright lights, and traffic. Local jurisdictions might implement regulations to address these impacts (such as the padded sound barriers seen here).

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BOX 7.

Boulder County, CO

This county offers operators expedited permits if they agree to:

- use existing well pads;
- enact stronger air quality protections;
- enact stronger water quality protections;
- increase setbacks from buildings, natural resources, and infrastructure;
- locate outside of wetlands, inhabited areas, and floodways;
- minimize impact on roads and traffic; and
- minimize landscape impacts (Boulder County 2012).

Sales taxes. Sales taxes increase as economic activity increases and accrue fastest during the most active periods of oil and gas development. Local sales tax can help offset infrastructure and service costs that accompany the exploration, drilling, and completion stages of development activity. In addition to general sales taxes that apply to the sale of most goods and services, local jurisdictions may also have the option of levying a specific sales tax on oil and gas field services and equipment purchases.

Fees and earnings. Local governments can impose a variety of fees on operators to help offset their own costs, including: permit application fees, oversize/overweight road-use permit fees, land records fees, inspection fees, impact fees, and road maintenance fees. In addition to fees, local governments have also earned revenue from selling or leasing goods, services, or assets for oil and gas development, such as water or water rights.

Lease payments and royalties. Many local governments, particularly counties, have also earned revenues in the form of

Oil and gas projects can generate revenue for local governments but also can impose costs and increase demand for services.

royalties, bonuses, and rents for oil and gas production on government-owned land. Such revenues may be available more quickly than tax revenues.

In-kind and voluntary contributions. In some localities, oil and gas operators have funded equipment and training for fire companies and other emergency services; repaired and upgraded roads and bridges; provided money to schools, hospitals, and conservation efforts; and built and endowed facilities such as town parks, daycare centers, and economic development offices.

Road maintenance agreements. Road maintenance agreements have been negotiated by many communities (and by some states; see Box 9, p. 11) to ensure that oil and gas operators cover the costs of maintaining roadways subject to increased truck traffic.

Insurance and bonding. Many local jurisdictions require operators to post bonds and carry insurance to cover infrastructure repairs, site restoration, and various liabilities.

Best Practices

Based on the experiences of local officials from villages, towns, cities, and counties across the country, some best practices emerge as aids to local governments responding to unconventional oil and gas development.

MAINTAIN OPEN COMMUNICATION AND TRANSPARENCY

Local governments are the first point of contact for many residents regarding concerns around the risks and impacts of unconventional oil and gas. Thus, they have an excellent opportunity to serve as an honest broker to help the members

BOX 8.

Garfield County, CO

This county has funded monitoring and assessment in:

- air quality trends;
- air emissions and dispersion from drilling and hydraulic fracturing;
- water quality studies;
- health impact assessments; and
- socioeconomic impacts (Wynn 2014).

Local governments can serve as honest brokers to their residents regarding oil and gas development.

of their community better understand how oil and gas development works and who the operators and contractors are, and to host a balanced discussion of the benefits, costs, and risks associated with development. Open communication includes both relaying information to community members and listening carefully to understand the diversity of concerns, confusions, disagreements, and priorities through community meetings, advisory groups, task forces, facilitated discussions, and polling. Residents may have grave concern about fracking and what it will mean for them and their community. Their concerns are often amplified by worries about who benefits financially, the fragmented nature of the unconventional oil and gas industry, a lack of full disclosure of chemicals used, and discreet ways in which some companies secure leases. Engaging the public early in the process, sharing best-available data and information, and being transparent when engaging with the industry can help alleviate residents' concerns about motivations and access.

MATCH A JURISDICTION'S RESOURCES WITH THE SCALE AND PACE OF DEVELOPMENT

Unconventional oil and gas development can move fast. Thus, local governments may need to respond quickly with the



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Increased truck traffic from oil and gas operations can damage local roadways. Many communities have negotiated road maintenance agreements that require operators to cover the costs of roadway maintenance.

information and resources available to them at that time in order to manage its impacts. Local governments may need to hire staff or consultants to expand capacity or develop partnerships with neighboring jurisdictions, local universities, and scientists to collect data and leverage resources. Local governments also can seek to slow the scale and pace of development by implementing a temporary moratorium or by deliberately slowing the local permitting process to allow time to collect scientific and economic data to help inform a policy response appropriate for their community.

PLAN FOR THE DISCRETE PHASES OF DEVELOPMENT

In oil and gas development, the first phase consists of construction, drilling, and completion, and is relatively short-lived, labor-intensive, and has peak impact on communities in terms of population influx, noise, truck traffic, economic impact, and so forth. The second phase, production, is long-lived and features a small but steady labor force. The third phase, reclamation, is also often longer-term and features a small steady labor force. Local government officials can work with operators to understand what benefits and impacts their community will experience during each stage of development and use the tools outlined above to mitigate those impacts before development begins.

ACCOUNT FOR THE DIFFERENCES BETWEEN RURAL AND URBAN CONTEXTS

The incentives and impacts facing rural and urban areas from oil and gas development can be quite distinct. Larger rural landholders often stand to see greater financial benefit from leasing their mineral resources than property owners in urban areas. While production in rural areas can have landscape impacts, affect agricultural operations, and fragment wildlife habitats, urban residents near development sites can have greater concern about nuisance impacts, safety, and health. Roadway damage and costs tend to be greater in rural areas while urban areas are more likely to incur costs to expand water and sewer infrastructure. Finally, while new and temporary residents may be more likely to live in towns and cities, population growth and the attendant socioeconomic impacts on government services can be especially costly in rural areas and for small towns.

PAY ATTENTION TO ISSUES THAT MIGHT NOT BE TOP-OF-MIND FOR CONSTITUENTS

While only a few issues may make their way in to the public discourse, there are often less advocated issues that communities should pay attention to. For instance, water and air quality concerns may overwhelm the attention to more likely risks

BOX 9.

Ohio

Both counties and municipalities throughout Ohio have negotiated road use maintenance agreements with energy companies that include the following types of provisions:

- defining the route covered by the agreement;
- requiring insurance and bonding;
- maintaining roads during drilling;
- filing a pre-drilling engineering report, including videotaping of roadways;
- providing a list of 24-hour emergency contacts; and
- creating an appendix for additional requirements negotiated between locality and company (County Engineers Association of Ohio 2014).

from heavy truck traffic, infrastructure strains, road damage, housing pressures, emergency services, and other socioeconomic impacts. Decision makers need to weigh risks that draw public worry as well as those that do not get sufficient media and public attention, to ensure they tend to both obvious and less obvious impacts, to the extent possible.

CREATE DIVERSE REVENUE AND ENERGY STREAMS TO PLAN FOR THE FUTURE

While oil and gas development can be a large revenue source for local governments, the revenues can also be volatile given energy price fluctuations and resulting boom-bust cycles typical of energy industries. Local governments would be wise to create a rainy day fund and budget ahead in terms of the severance tax revenues they receive and identify more reliable and immediate revenue sources, such as property and sales taxes. Non-revenue tools, such as road maintenance agreements, bonding, and insurance, can also help reduce exposure to financial risk. Finally, investing in economic and energy diversification and accompanying training and recruitment opportunities can help when oil and gas prices decline, or when these resources are depleted and the oil and companies and operators move out of the region.

A Path to Informed Decision Making on Unconventional Oil and Gas Development

Local governments throughout the country face immense pressure from residents, industry, and state governments alike to forge a path forward on unconventional oil and gas development that balances economic benefits with public protections. Although the priorities and concerns of each local jurisdiction vary, there are regulatory, non-regulatory, and financial tools that local officials can creatively employ to defer, avoid, and mitigate attendant risks and impacts. Residents, responsible industry actors, local scientists and experts, and neighboring local and state governments can have an important role in demanding and helping local officials make informed decisions on unconventional oil and gas development so as to promote and protect their communities.

Methodology

This report is primarily based on information generated through interviews and workshops held with officials representing local governments in California, Colorado, New Mexico, New York, North Dakota, Ohio, Pennsylvania, Texas, West Virginia and Wyoming. Twenty-one interviews were conducted and approximately 115 people participated in the workshops, representing approximately 80 local jurisdictions. The questionnaire used for the interviews is online at www.ucsusa.org/frackinglocalresponse. The agenda, presentations, and proceedings of the workshop are at www.cbuiding.org/project/local-responses-unconventional-oil-and-gas-development. In addition to these primary sources, the authors obtained detail and supporting material about the tools, strategies, and programs used by local governments from these jurisdictions' websites and directly from the interviewees. Information was also gathered from the publications cited in the References.

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