

MICHIGAN HOUSE OF REPRESENTATIVES



The Natural Gas Subcommittee Report on
**ENERGY AND
JOB CREATION**

The Michigan House of Representatives Subcommittee on Natural Gas was tasked with investigating the current and future supply of natural gas in Michigan. Known as a clean burning fuel, many see natural gas playing a large part as the bridge between fossil fuels and renewable energy. With an abundant supply of natural gas being found throughout the country and the potential for new developments throughout Michigan, along with large storage capabilities and the center of American manufacturing, Michigan can continue to grow as a center for natural gas development, storage, and use innovation.

With energy prices continuing to soar, it is important that we develop a diverse energy portfolio that protects Michigan consumers and also creates thousands of energy jobs throughout our state. Oil and natural gas in Michigan generate \$2 billion in economic activity, making Michigan a key producer. The subcommittee took testimony and met with a diverse group of energy experts, producers, regulators, and environmentalists, exploring Michigan's future role in production, transmission, and storage of natural gas here in Michigan.

With recent discoveries in Michigan, this report will detail the need for increasing production for several reasons. More than 97 percent of the natural gas our country uses comes from right here in North America, with proven domestic reserves that will last well into the next century and continue to grow with new technology.

The primary goals of the subcommittee were to:

- 1.) Examine the responsible exploration, development and harvest of natural gas;
- 2.) Explore a regulatory environment that encourages the reliable and safe production, transmission, distribution, and use of natural gas;
- 3.) Find responsible ways to expand the use of natural gas in manufacturing, transportation, and generation; and
- 4.) Create stability of price by matching supply and demand to create a secure and stable environment for producers and users.

This report provides a study of our existing energy resources that will help us understand how to improve the regulatory environment to create more and better jobs for Michigan families and expand on the benefits of natural gas. The members of the subcommittee held a series of hearings, field visits, and meetings on the production, storage, transmission, and energy generation sites.



Sincerely,

A handwritten signature in blue ink that reads "Aric Nesbitt".

ARIC NESBITT

State Representative, House District 80

Toll-Free (800) 577-6212 :: E-Mail AricNesbitt@house.mi.gov

www.RepNesbitt.com

THE JOBS AND ENERGY REPORT

By the subcommittee on Natural Gas

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IMPROVING MICHIGAN'S ECONOMY

The Shale Gas Revolution

Known as a clean, domestic and versatile source of energy, natural gas has quickly become a favorite among leaders in the energy, manufacturing, and environmental communities to diversify America's energy portfolio. In the past decade the U.S. has moved from looking at importing natural gas from overseas to having enough American supply to develop a real potential to moving towards energy independence and away from international price shocks. The debate a mere seven years ago was where to site liquefied natural gas (LNG) import facilities as companies looked to import the massive amounts of energy needed to fuel America's economy. Two old technologies, horizontal drilling and hydraulic well stimulation (or hydraulic fracturing), were combined to harvest natural gas from shale formations that were not economical without fusing these two technologies together. Large shale formations are distributed widely throughout the continental U.S. containing immense reserves of natural gas.

Shale gas is natural gas that is stored within the shale bed, typically thousands of feet underground. There are over two dozen shale fields located throughout the continental U.S. at varying stages of development. The most active shale formations have been Marcellus (NY, PA, & WV), Haynesville (TX & LA), Fayetteville (AR), Antrim (MI), Barnett (TX & NM), and New Albany (IN, KY, & IL). Each of the shale formations differ in production potential and have unique characteristics that present exploration, operational, and production challenges. Historically, states have retained authority over oil and natural gas drilling and production as each geographic formation has state-specific issues. However, all federal environmental protections for clean air, clean water, and clean ground must still be followed.

The process of horizontal well drilling and hydraulic well stimulation involves drilling thousands of feet underground and pumping a water mixture with enough pressure to crack layers of rock and release the seams of natural gas trapped inside. The EPA released a report in 2004 about the impact of well stimulation on drinking water and concluded that the practice is safe when safety measures are followed. **The EPA's administrator, Lisa Jackson, recently admitted to the U.S. House Committee on Energy and Commerce that she is "not aware of any proven case where the fracking process has affected water."**

The production level of shale gas in the United States has increased fivefold since 2006, and has played a significant role in stabilizing prices and driving imported natural gas out of the domestic market. The current market heavily favors natural gas as it is one of the very few commodities, and more specifically energy resources, to decrease in price over the past several years. As Michigan consumers continue to be squeezed by the price of gasoline at the pump, the eighty percent of Michigan households connected to natural gas lines have seen their monthly energy bills go down. **In fact, because of the low prices of natural gas, it is expected the average U.S. household will save \$926 per year in disposable income between 2012 and 2015.** As an important energy source, not just for home heating, but for commercial, industrial, and electrical energy generation, the shale gas revolution helps keep prices down while making Michigan manufacturers more competitive.

Michigan is fortunate to have a long history of development in shale formations as our regulatory structure and industry have continuously balanced production with environmental stewardship.



Michigan's two main natural gas shale formations, the Antrim and the Collingwood-Utica, are in different levels of development. The Antrim shale has a long history of producing natural gas in the northern portion of Michigan's Lower Peninsula. The Antrim shale formation has produced natural gas dating back for several decades using hydraulic well stimulation.

Although the 1930s and 1940s saw some initial development in the Antrim shale, it was not until the late 1980s that large investment and development began. Michigan has seen the safe development of nearly 12,000 well stimulations during this time. In recent years, natural gas production from the Antrim Shale has decreased as these fields have matured. It was not until the success of bringing together horizontal drilling with hydraulic fracturing that we have seen new interest in the Collingwood-Utica formation.

As conventional sources of natural gas in the U.S. decline, shale gas will play a vital role in the nation's energy demand over the next decades. The Antrim and Collingwood-Utica Shale formations are estimated to hold vast amounts of natural gas. These resources will prove to be important for Michigan as the state currently depends heavily on natural gas for electricity generation, heating, and manufacturing.

The main difference between traditional natural gas development and shale natural gas development is the extensive use of horizontal drilling and the higher amount of fluids needed to bring the wells online for production.

According to Kent Perry of the Gas Technology Institute (GTI), Michigan has an advantage while drilling for natural gas because of the permeability in the shale. Long ago Michigan was naturally fractured by the glaciers that covered the land. This is especially true in northern Michigan's Antrim shale formation, which helped make the Antrim shale economically viable before they fused this technology with horizontal drilling.

While other states have experienced regulatory issues dealing with environmental and other community issues, Michigan has enjoyed a long history with natural gas and oil development, and has continued to ensure the state's regulatory structure protects the land and water, while allowing for the safe-development of these resources. Hal Fitch, the Director of the Office of Oil, Gas, and Minerals (formerly the Office of Geological Survey) in the Michigan Department of Environmental Quality (DEQ), said Michigan's regulations protect our valuable natural resources, as well as make Michigan a place where energy exploration can expand. In fact, Michigan has led the nation in developing regulations for oil and gas exploration that continue to be modernized to ensure safe development of Michigan's natural resources.

The Natural Gas Economy

Natural gas production continues to help diversify and expand Michigan's economy. In 2008, an IHS Global Insight study estimated that natural gas development helped drive nearly \$6 billion of economic activity in Michigan and support more than 23,000 jobs in the state. Nationally, natural gas development supports more than 600,000 workers, and with the development of shale gas throughout the U.S., that number is expected to grow by up to 1.6 million workers. Private sector capital expenditure in shale natural gas development will result in nearly \$1.9 trillion in new capital investments by 2035, expecting to increase from \$33 billion annually in 2010 to \$126 billion annually in 2035.

The worker in the shale gas sector is paid an average of \$23.16 an hour. In the next 25 years annual federal, state, and local taxes are expected to triple from shale related natural gas development, from \$18 billion to \$57 billion annually. These dollars will not just support the regulatory framework to oversee the industry, but state-related programs such as education, healthcare, and transportation benefitting the population of the whole. Shale natural gas production is estimated to grow from less than a quarter of U.S. natural gas supply to nearly two-thirds in 2035. This means that without domestic natural gas shale production, imports would have to increase by nearly six hundred percent in the next twenty five years, which would mean less money in the pocket of the American worker and more reliance on foreign energy.

New economically productive natural gas finds have created a massive new domestic supply, meaning American industry can once again compete globally. Natural gas is a critical fuel for a variety of manufacturers, including metals, chemicals, refining food processors, farmers, and pulp/paper manufacturers. Natural gas is an important feedstock for plastics, chemicals, and fertilizers. According to Dow Chemical, natural gas price stability has assisted in the creation of nearly a quarter million manufacturing jobs in the past two years alone. Previously, the massive investments in developing American shale natural gas and the instability of natural gas resulted in pushing much of the American fertilizer industry off-shore; with the now lower prices of natural gas, new investments are being looked at on-shore in the U.S. These low prices have resulted in an increase of \$4.5 billion in exports just in basic chemicals in 2010, helping our balance of trade and putting even more Americans back to work.

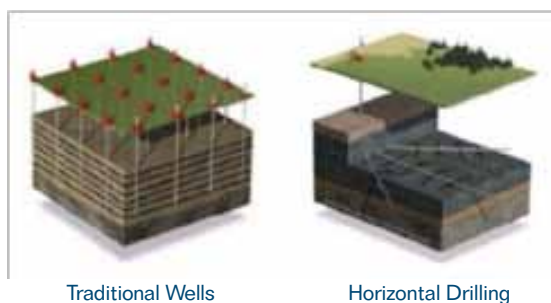


To help ensure the reliability and delivery of natural gas, nearly \$80 billion in private sector money will be spent in expanding and modernizing natural gas pipelines across the nation. Continued development of this resource will mean more Americans will be put to work across a wide array of sectors in the U.S. Studies from the U.S. Department of Energy, Massachusetts Institute of Technology, and Cambridge Energy Research Associates have all stated that America's vast natural gas supply will help keep prices stable in the future. This is of critical importance as Michigan continues to diversify and rebuild our economy

New Technology Leading the Way for Environmentally Friendly Exploration

As explained earlier, new technology developed for the extraction of natural gas has resulted in smaller surface impacts, fewer wells producing more energy, and less air emissions according to Matthew Most at the American Natural Gas Alliance. He credits the DEQ and the Environmental Protection Agency (EPA) with the safer extraction processes.

While traditional wells limit the amount of area accessible for the harvest of natural gas and increases cost, using horizontal well stimulation limits the environmental impact on the surface, while increasing production. Combining hydraulic well stimulation with horizontal drilling, as opposed to conventional vertical drilling, has helped to take advantage of areas that were once cost prohibitive to produce. **As shown in the pictures, in a one square mile section, one pad with six to eight wells drilled horizontally provides more exposure than sixteen single vertical wells.**



This will minimize the number of access roads, pipelines, production facilities and will lessen the overall impact to the area. Estimates by the U.S. Department of the Interior show that a 4-well horizontal drilling pad with supporting utilities and access roads would disturb an estimated 7.4 acres of land, compared to 16 vertical wells that would disturb approximately 77 acres of land. This also means less traffic, localized pollution, and local habitats bothered. In fact, the DEQ is currently reviewing policies that would limit wells to one to every 640 acres in some formations instead of one to every 40 to 80 acres; this could only be possible with the advent of horizontal well stimulation.

Evaluating Michigan Regulations

As shale gas development continues to grow nationally in areas that have traditionally not seen development, questions continue to be asked on whether regulations are stringent enough to protect the environment. This has mostly grown from questions on the water, sand and additives used for stimulating the wells, along with the amount of water used. Both are established technologies with significant track records. While both vertical and horizontal well types are used by natural gas producers, more and more are finding that horizontal well stimulation is the favored way to produce shale gas to enhance well recovery and improve the economics of drilling.

The development of shale gas is regulated by an extensive array of federal, state, and local rules established to manage every aspect of development. In Michigan this is primarily led by an established set of rules and regulations, enforced by the DEQ. State regulations focus on conservation of gas resources, protection of property and mineral property owners' rights, preventing the destruction of wildlife habitats, ensuring good air quality, protecting worker safety,



protecting the environment, water management, and ensuring waste from drilling and production are properly contained and disposed of or recycled.

Natural gas exploration has a history of safety while producing more than a million wells nationally, and 12,000 successfully within Michigan. However, it is important to examine the benefits and the risks of exploration. In Michigan, we are fortunate to have a rule-making environment where the Office of Oil, Gas, and Minerals within the DEQ, producers, and concerned citizens have worked together to make sure Michigan continues to vigorously defend one of our state's most valuable resources: our water. As stated by the League of Conservation Voters, "Natural gas- if extracted safely... can be a part of this transition to cheaper and cleaner energy." As

we continue to move toward building a reliable, safe, and diverse energy portfolio, it is essential that we keep the environment in mind.

Despite Michigan's long history with well stimulation to produce natural gas, some citizens have expressed concerns regarding this process. Some activist groups are calling for a moratorium on all new natural gas drilling in Michigan until stricter legislation can be passed, even though the DEQ recently introduced some of the nation's toughest environmental regulations for extraction of natural gas. This is mostly in response to issues that have been raised in other states, along with new interest in the Collingwood-Utica formations, which relative to the Antrim are deeper and may require increased volumes of water to allow for natural gas production. As the DEQ continues to evaluate their practices and update the regulations, they issued updated instructions in May 2011 to foster better transparency in the industry, while ensuring our environment is protected. These new rules regulate water withdrawal, monitoring and reporting of the pressure and rates of well stimulation, reporting of additives used in the development, and the reporting of water that flows back from the well stimulation.

Michigan has proven that the state can effectively regulate drilling and the horizontal well stimulation process that protects our natural resources, including ground and surface water. Gas wells are reinforced with multiple layers of cement and steel casings not just through the water table but far below it. In Michigan, the DEQ has not found any cases where well stimulation in either vertical or horizontal wells has caused adverse impacts to the environment or public health. Reviews by both regulators and the industry will be necessary to continue to safeguard some of our most precious resources.

To generate the fractures needed to produce natural gas using horizontal well stimulation, a water-sand mixture along with some additives are needed to expand natural fractures or create new ones. The additives used in the well stimulation process vary depending on the geological

conditions of the well being drilled. Although each well stimulation job could use numerous additives and compounds, any single job will only have to use a few depending upon the shale formation and the water. Water and silica-sand make up 99.5 percent of the fluid used for natural gas well stimulation. The remaining mixture includes compounds to help maintain viscosity of the fluid, prevent corrosion scale deposits in the piping and eliminate bacteria. State regulations and long-standing industry practices help ensure these compounds are handled safely. Many of these compounds are common chemicals that people interact with frequently or are used in industry to sterilize, disinfect, or produce other consumer products.

The DEQ requires that companies provide the state with Material Safety Data Sheets, or MSDSs, of all compounds used in horizontal well stimulation. These data sheets provide information on the “physical characteristics, toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill response,” for each compound. These are posted on the DEQ’s website for public review.

The current rules have effectively protected Michigan natural resources as well as the public health and safety. As more commercial horizontal well stimulation development comes online the potential for increased production is currently unknown, as natural gas prices continue to be at historic lows and more test wells will be needed to see the full potential of Michigan’s reserves. The DEQ continues to be proactive in examining Michigan’s rules related to oil and gas development.

It is important to remember that the environmentally-friendly method of natural gas production is important is natural gas being one of the cleanest burning fossil fuels. Natural gas contains less than half the carbon content of other fossil fuels, and a fraction of other pollutants, such as nitrogen oxide and sulfur dioxide. Many environmentalists see it as a bridge fuel between fossil and renewable fuels. With its large natural gas resources, Michigan has the potential to become a significant supplier of energy. Additional regulations could make it a far less attractive to recover natural gas in Michigan and cost the state revenue, jobs, and other opportunities to revitalize our state’s economy.

Michigan’s Collingwood–Utica Shale

The Collingwood-Utica Shale formations are located in the northern third of Michigan’s Lower Peninsula and are about 4,000 to 10,000 feet deep and 40 feet thick. Recent test wells have shown some positive signs for future development of this formation. Two of the wells have started production. The test well was drilled horizontally to about a mile and half and produced about 6.5 million cubic feet per day of natural gas. The other was drilled about a mile and a quarter horizontally and achieved 3.1 million cubic feet of natural gas production per day. With the low price of today’s natural gas, there is debate on whether the economics are present to invest in further production in Michigan’s Collingwood-Utica fields. However, the recent results show these fields are rich in natural gas liquids that go for higher prices in the market than dry

natural gas. Natural gas liquids may include propane, ethane, normal butane, and isobutene, among others. These findings show that up to 90 barrels of natural gas liquids are produced with every 1 million cubic feet of gas. If these results continue and dry natural gas continues to be at historically low prices, more interest in these fields could result.

Michigan's Collingwood-Utica shale formations have seen increased interest over the past several years. Currently, Encana, Chesapeake, and Bayside Energy are the largest mineral leaseholders in Michigan. An auction in May 2010 netted the state \$178 million in payments, breaking the previous record set in 1981 of \$23.6 million. An auction in October of that same year brought in another \$10 million from the lease of 273,000 acres, netting about \$40 per acre compared to nearly \$1,500 per acre in May.

Carbon Capture and Enhanced Oil Recovery Opportunities

Michigan has a long history of oil production and many oil wells have been plugged and restored as they met the end of economic production. Enhanced oil recovery using the injection of carbon dioxide has a long history in other states, as it allows for recovery of "stranded oil," once thought to be unrecoverable, from old wells. Currently there is only one operation in the Midwest using carbon dioxide to flood old oil reservoirs and retrieve more oil, while storing the carbon dioxide underground after the oil has been recovered. The carbon dioxide is pumped underground using an injection well and moves the oil to the production well so it can be pumped above ground. At the site, carbon dioxide contained in natural gas produced nearby is removed during the compressing process before being piped. The carbon dioxide used to be vented into the atmosphere, but now significant amounts are captured and piped to depleted oil fields to be used in the enhanced oil recovery process. When the fields are further depleted and can no longer produce oil through the Enhanced Oil Recovery process, the wells are plugged and the carbon dioxide is stored underground, providing an economic incentive for a form of carbon capture and sequestration, or CCS. In the western parts of the United States carbon dioxide pipelines have been established to carry carbon dioxide from electricity generation plants, and coal-liquefaction plants. Utilizing the carbon dioxide emitted from some of Michigan's producers of carbon dioxide could help enhance Michigan's oil production while also encouraging the capture and storage of carbon dioxide that would otherwise be released into the atmosphere.

The United States is the global leader in enhanced oil recovery using carbon dioxide. West Texas and southeastern New Mexico are the global epicenter for enhanced oil recovery. The U.S. Department of Energy has been working with the industry to develop tools since the 1980's to identify places where enhanced oil recovery would be useful. Private industry is screening larger swaths of land in the northern part of Michigan's Lower Peninsula to determine potential capped wells for further development. The project in Northern Michigan is the only EPA-approved project of its kind in the Greater Midwest/Northeast region. Nationally, U.S. carbon dioxide-enhanced oil recovery production has increased from 10 million barrels per year in the early 1980's to nearly 90 million barrels annually.

Implementing enhanced oil recovery projects is capital-intensive and involves much work on wells to serve as injector wells for carbon dioxide to production wells. Higher oil costs have helped make some of this work more economical, however, the costs in oil fields have also increased. The U.S. Department of Energy National Energy Technology Laboratory estimates that carbon dioxide enhanced oil recovery costs can amount from twenty-five to fifty percent of the variable costs per barrel to produce oil, plus high initial capital costs. The return on carbon dioxide enhanced oil recovery projects tends to be low, with the potential for a longer term payout.

What Natural Gas Means for Michigan Jobs

Michigan currently ranks thirteenth in the U.S. in natural gas production. The United States' and Michigan's job growth could flourish while energy prices go down as natural gas production in shale continues to expand. Oil and natural gas production provides more than 8,000 direct jobs in Michigan and natural gas supports nearly 23,000 jobs in Michigan. As Dow testified, as a raw material feedstock for chemical companies, natural gas has eight times the value compared to simply combusting it, which helps to fuel high paying chemical industry jobs in Michigan while acting as another key ingredient to American manufacturing.

Through 2035, it is estimated that \$205 billion in new gas infrastructure will be needed to help ensure the reliable transport of natural gas throughout the U.S. Nearly \$10 billion will be spent in the Great Lakes region, mainly used to improve mainline pipe construction and compression stations. As new investments continue to gather, **based upon current discoveries and current technology, the United States has a supply of natural gas that could last 100 years.** As

more natural gas becomes available, prices continue to drop, and America becomes more energy independent. Through new technology it is estimated that the Antrim shale formation alone will provide six to eight trillion cubic feet of natural gas in Michigan within the next 20 years. With these estimates, companies have come to Michigan to acquire oil and gas rights they believe will turn out to be a fruitful investment. The money raised from auctions and production royalties on state lands fund the Michigan Natural Resources Trust Fund which supports projects that helps future generations to further enjoy Michigan's great outdoors.



TRANSMISSION AND STORAGE

Overview

According to the Michigan Public Service Commission there are 55,777 miles of natural gas distribution mains in Michigan and 3,249,532 service connections. The MPSC is tasked with regulating the safe and reliable transmission and distribution of energy at reasonable rates. The MPSC regulates the pipeline construction and safety, natural gas storage, gas purchase contracts, and gas well connections. Michigan has an extensive network of pipelines for gathering of natural gas, compression stations, and wide distribution to end users, resulting in nearly 80 percent of households having access to natural gas pipelines. Jerry Norcia of MichCon told the subcommittee that gas demand in Michigan has been impacted by the slow economy and as the economy improves so will demand. As development grows in the Collingwood-Utica shale area, ensuring gathering pipelines for the further production of natural gas in Michigan is a critical issue.

Michigan—Natural Gas Storage Capital of the Nation

Natural gas can be stored for long periods of time; this is typically done underground due to the space required. There are several methods and geological requirements for storing natural gas, but the most common in Michigan is to keep the gas in a depleted oil or gas field. Tests are performed to ensure that the geological formation is able to hold natural gas without environmental impact. An injection method is used to refill the depleted fields with natural gas until demand for the use of natural gas climbs. These are ideal storage facilities because they require limited effort on the part of the company storing natural gas. **It is these facilities that make Michigan the nation's leader in natural gas storage.**

The fields already have the necessary equipment and geological surveys, and

need limited modifications to convert to storage fields. In Michigan, due to the geological makeup, there are a multitude of storage sites which provide Michigan with more storage capacity than any other state in the nation. Storage capacity allows companies to fill with natural gas during off-peak seasons when the price of the commodity is lower for use during the peak season when the market price is higher to reduce volatility.



Pipeline Safety Programs

Natural gas is commonly distributed through underground pipelines that span the United States. It travels at a very high pressure, monitored frequently by gas transmission companies at compression stations, meters, and valves. A multitude of safety measures, including robots and leak detection equipment, are used to help identify leaks and to ensure pipeline integrity. The pipe system is expanding with the increased use of natural gas, but the abundance of interstate pipelines means that the federal government has the overriding jurisdiction on most pipeline safety measures.

The federal government recently passed pipeline safety legislation to respond to specific safety issues. The comprehensive update included a broad range of public safety protections which include: increase in the maximum fines for safety violations; new transmission pipeline safety technology requirements; and new intensive inspection requirements to areas beyond which they are currently mandated, a requirement that pipeline operators notify federal authorities within one hour of discovery of a leak; and rules requiring gas transmission pipeline operators to verify the maximum allowable operating pressure of their pipelines

The local distribution of natural gas to consumers is a state issue. At points along the transmission pipeline, delivery stations allow local distribution companies to transport gas to the consumers through their own pipeline networks. These delivery stations are often known as “city gates” and they usually cover all natural gas needs within a geographic area. Local pipe networks implement similar safety precautions and monitoring features as the larger interstate lines.

Since 2000, the number of main line leaks has decreased significantly due to better technology and improved detection. Increased technology and tools able to perform thorough internal inspections of the pipeline continue to help provide better detection and integrity testing. Excavation is still the number one cause of residential natural gas leaks, which means increased education and awareness is necessary for home and business owners and excavators. Corrosion is the second largest cause of pipeline leaks and with better technology and improved pipeline construction this is an area where pipeline companies continue to work toward improved pipeline integrity. In the last several years the MPSC has steadily increased the number of pipeline inspections. In 2005, 331 pipeline safety inspections were conducted; in 2009 that number reached 502, over a fifty percent increase in inspections.



Courtesy of the Michigan Public Service Commission (MPSC)

Private companies are also increasing investment in transmission pipelines. Consumers Energy has completed inspections of 91% of high consequence areas in the past 10 years and has invested \$154.4 million in pipeline safety and modernization with another \$186.5 million scheduled for the next five years. Distribution pipelines will see nearly \$300 million in investments over the next five years on top of the over \$250 million spent the last five. These investments represent just one company's investments and a fraction of what will help ensure the long-term viability and safety of Michigan's natural gas pipelines. Compressor stations are another important element of the supply chain ensuring proper pressure in the lines and flow-through for the pipelines. Upgrades to the White Pigeon and Ray Compressor Stations represent a \$213 million investment into Michigan's future.

Planning for the Future

Currently, Michigan produces approximately 134 billion cubic feet of natural gas each year. **However, Michigan imports nearly 80% of the natural gas it utilizes.** Emerging development in the Collingwood-Utica geological formations in northern Michigan has the potential to significantly increase Michigan's production that could be used in the state. With recent onerous EPA regulations concerning other forms of energy production like coal being instituted, natural gas-fired generation could have continued favorable economics compared to older, smaller coal plants being cost prohibitive in the near future. There is great potential for significant increase in natural gas demand and the need for gas system infrastructure upgrades to allow for the larger gas volume necessary to meet this demand. This demand could also be unpredictable, as gas-fired electric generation can quickly ramp up or down in power as electric demand warrants.

Estimates are that the permitting, design and construction of a new gas-fired combined cycle facility can be completed within a three year span. The infrastructure necessary to support the new gas-fired electric generating facility would have to be available within that same period. Upgrades required could include compression stations, gas transmission pipelines, lateral pipelines to hook up to the facility, along with storage facilities or new facilities may be required to ensure the large gas demand swing characteristics of gas-fired generation operation can be accommodated without disruption of service. These natural gas infrastructure upgrades will also support higher utilization of Michigan's existing natural gas-fired combined cycle generating facilities. This utilization will provide the most immediate stimulation to natural gas demand and will also be beneficial to Michigan consumers by more fully utilizing existing natural gas-fired combined cycle generating facilities before investing the capital required to build similar new facilities.

A review of the permitting process for upgrading existing or construction of new gas infrastructure would make Michigan an easier place for gas-fired plant owners to do business. Each municipality has different requirements for installing the necessary facility

and support infrastructure. Local governmental units have very different ordinances on how to restore wetlands, control soil erosion and cross drains, making compliance difficult and potentially expensive.

Similarly, existing gas system upgrades and new support facilities will be needed to take advantage of the lower natural gas prices from shale gas production regions. Should the Collingwood-Utica shale reach potential, new systems would have to be installed to handle the capacity. Both upgraded and new gas pipelines and supporting facilities will be needed in Michigan in order to receive the larger volumes of gas from delivering interstate pipelines that may bottleneck the flow and to minimize pipeline transport cost constraints.

NATURAL GAS END USE

Clean, Domestic, Cost-Effective Source of Energy

Using the levelized cost of energy (LCOE), a process for calculating the utility scale and distribution generation of energy resources, in comparison to other forms of generation, natural gas costs are low. The current price for natural gas makes it a competitively priced fuel for electricity generation, home heating, transportation, feedstock for chemical production, fertilizer production, and the manufacturing process. A stable price environment of natural gas is something that American producers, manufacturers, utilities, and consumers can greatly benefit from. America has traditionally had some of the highest natural gas prices

in the world, as there was not a single world market. Instead, natural gas was all regionally priced depending upon regional supply and demand pressures.



Natural gas is used not just in electricity generation and residential/commercial distribution, but also as a basis for many chemicals and fertilizers. Additionally, nearly 98 percent of all manufactured products have natural gas involved with their production. Stability for natural gas prices is critical for manufacturing, chemical, and agriculture jobs, as energy is a critical component to economic growth and natural gas becomes more popular. A recent Wall Street Journal article addressed the increased competitiveness of manufacturing, saying the “U.S. is benefiting from cheaper energy costs—mainly because of the shale-gas boom...”

In addition, natural gas-fired combustion turbine-based power generation is fast-starting and responsive and can operate when needed and shut off when the demand is not present. As a clean, reliable source of generation, many see natural gas as able to provide a complimentary resource to non-base-load alternative energy

production, as it can be shut off when wind or solar generation is high and turned on when wind generation production is low. Gas-fired generation is projected to increase from 16 percent of all generation in 2000, to 27 percent in 2020, representing a potential incremental investment of approximately \$66 billion. However, as increased pressure is placed on demand, it is critical to keep price volatility at a minimum to ensure long-term competitiveness for American manufacturing, chemical processors, and production agriculture.

Expand Natural Gas Access

With the projected low price of natural gas and the disparity between natural gas and other fuels it is feasible to consider a growth strategy for Michigan that looks at making natural gas more available as a fuel of choice for residential, agriculture, industrial, and commercial use. As Michigan continues to utilize key assets such as storage and geology to take full advantage of current commodity prices of natural gas, this will encourage business growth in agriculture, commercial, and industrial areas. Cost-effective and efficient pipeline infrastructure to deliver a low-cost commodity could help take advantage of savings for consumers and allow for increased business growth.

The traditional expansion of gas infrastructure and connection to utilities' natural gas lines in some areas can be costly and limits the ability to take advantage of natural gas prices. The complex formula and significant up-front payments keep the connection to these systems out of reach of many users. For a variety of reasons connection is often limited to where natural gas lines currently exist and thus the cost savings and growth opportunities are limited under the current utility rules and cost models.

Although a thoughtful growth and infrastructure plan provides an opportunity for all, a special case exists for Michigan residents. As deliverable fuels have decoupled from natural gas in pricing and continue to rise in price, there is an opportunity to provide residential savings for families. The unprecedented market disparities among fuels can be used to save Michigan residents money on their utility bills. Providing access to safe and cost-effective natural gas can provide this needed relief. The U.S. Department of Energy estimated that in 2011, natural gas was the lowest cost conventional energy source available for residential use. On average, the current fuel differential would allow struggling Michigan families to enjoy near \$2,400 of annual savings in energy costs. These savings are real dollars that our state's struggling residents can use in these tough economic times.

There are thousands of residents within 500 feet of current pipelines that are not hooked up to natural gas; this includes nearly 6,700 on SEMCO's lines and over 18,000 on Consumers Energy's. Creating a cost-effective method to hook up to natural gas infrastructure will help families and businesses, and spread capital costs over more customers lowering the per-unit delivery cost.

Some have called for increased incentives for natural gas vehicles (NGV); however, this should be approached with caution as there are special interest groups working to shut down the huge increases in production of American shale gas and force Americans to rely more on expensive



imported natural gas. And, some companies are already seeing the current economic benefits of switching to NGV's as an option. For example, AT&T is investing an estimated \$350 million nationwide to purchase about 8,000 NGVs through 2013 and has already deployed 2,600 NGVs by the end of 2011. DTE Energy has added 173 NGVs to their fleet since 2010, and continues to view NGVs as a cost-effective option. The economics can work, especially with the current price of natural gas and what is forecast in the long-term. As demonstrated by AT&T's case, fleet vehicles are the most likely candidates to switch from traditional gas and diesel to natural gas, as refueling stations are still limited, with fourteen presently in Michigan and two additional stations currently under construction. The demand for retail refueling has not reached critical mass to encourage the kind of investments necessary to make NGVs a more widely utilized option. There are some commercially available home refueling options, but these investments continue to be high in cost. Research and development continue for more cost effective residential refueling station as 55 million homes throughout the U.S. are connected to natural gas lines.

Natural Gas in Manufacturing

Natural gas is an essential fuel and raw material for American industry, as over 98% of manufactured goods come in contact with natural gas through the manufacturing process. It is used for heating, cooling, waste treatment and processing and is a raw material for the manufacturing of chemicals, plastics, fertilizer, pharmaceuticals and other products. Due to technological advances, domestic shale gas reserves are and will remain abundant and gas-based raw material will be advantageous over oil-based raw material in North America for the foreseeable future. Natural gas at a stable, competitive price will incentivize American manufacturers to invest and create jobs in the United States.

As the supply of natural gas increases, price volatility has decreased making it a stable source of energy for businesses. In fact, the stability of natural gas prices have helped create over 250,000 manufacturing jobs nationwide since 2010. With the abundance of natural gas right here under our own native soil, getting it out of the ground will help rebuild manufacturing in this country and in Michigan. This presents an opportunity for growth in manufacturing. Natural gas is a base product in plastics, paints, fertilizer, anti-freeze, medicines, and fabrics, and is consumed by a host other products. In agriculture it is used in everything from fertilizer to drying operations for grains and processing. Industry is the largest consumer of natural gas, accounting for 43 percent of natural gas use across all sectors.



Saving Michiganders Money: Energy Optimization Reform



Energy optimization programs in Michigan were introduced with Public Act 295 in 2008 with the intent to delay or prevent the construction of new electric generating plants. This statement about the goal of the energy optimization programs was included in the law:

The overall goal of an energy optimization plan shall be to reduce the future costs of provider service to customers. In particular, an EO plan shall be designed to delay the need for constructing new electric generating facilities and thereby protect consumers from incurring the costs of such construction. The

proposed energy optimization plan shall be subject to approval in the same manner as an electric provider's renewable energy plan under subpart A. A provider may combine its energy optimization plan with its renewable energy plan.

It appears from the statement that EO program requirements for gas utilities do not fit the legislative goal of the state's energy optimization plan. Gas utilities were lumped in with electric utilities at the time PA 295 was passed, without a discussion of the difference between the two. Nevertheless, Michigan collects over \$160 million each year from utility customers for EO programs. There is also a redundancy with other public, private, state, and federal energy efficiency programs.

Gas use from utility customers has been declining steadily over the past several decades since better building standards, material, and higher efficiency appliances have been installed. According to the American Gas Association, natural gas use per residential customer has decreased by about one percent per year since the mid-1970s. While the number of residential gas utility customers has increased by about seventy-one percent since 1970, total use of natural gas has been flat in the same period. The Michigan EO programs for gas utilities seem to be paying customers to do things they were doing in response to economics and individual conditions.

It has become apparent that Michigan's EO plan is a one-size-fits-all approach that was meant for electric utilities and fails to fully take into consideration the differences among other utility providers, failing to take into consideration the uniqueness of gas utilities that do not fit the stated purpose of PA 295. With trends for existing natural gas customers going down, low natural gas prices, and different utility economics, examination of providing cost savings for customers should be considered. It is prudent that the committee should ensure the program has value for the customers who are paying for it.

CONCLUSION

As the subcommittee has clearly seen, the natural gas renaissance is upon us and further exploration will have numerous benefits to both Michigan and the United States by providing jobs and lowering the cost of electricity, heat, and products. With a natural gas supply that will last nearly 100 years, long term price stability, reduced emissions, reliability and a domestic energy solution that will produce significant economic contributions, natural gas is a resource that Michigan should be investing in for future generations of energy consumption.

Creating Jobs, Protecting the Environment, and Lowering the Price of Energy for Consumers: Safely Producing Natural Gas through Horizontal Well Stimulation

We recommend keeping state regulations dealing with horizontal well stimulation current to help encourage the development of Michigan's job providers in the natural gas industry while protecting the environment. Hydraulic well stimulation is a procedure that has safely been conducted for nearly 60 years. The DEQ continues to be progressive in its approach to regulations to ensure production is allowed and the environment is protected. With the recent increase in regulations in 2011, it is important to provide flexibility to the DEQ to respond to technological advancements and environmental protection.

We also recommend the following:

- *Protect Michigan's role in the regulation of drilling and the processes used for drilling in the state. There have been recent developments where the EPA is working to take over the state's role of regulating the sand-water mixtures in well stimulation.*
- *Work to ensure that this continues to stay under the purview of the state government as has been the tradition for the past several decades and will allow each state to respond to local environmental, geological, and economic needs of the state.*
- *Protect Michigan's right to regulate drilling and gas production in Michigan at the state level, as this is of critical importance.*
- *Ensure that federal officials know that the State of Michigan has numerous concerns with the EPA's proposals.*

Providing for Land Owner Rights: State Leases on State and Private Land and Private Leases on Private Land

Background:

The DNR has authority under statute to auction more than 6 million acres of state-owned minerals for lease. However, it only administers 6,200 oil and gas leases on 714,821 acres.

Today, there are half as many state acres leased as there were in 1977. Past legislative efforts aimed at reuniting the state's mineral interests with current surface owners who are more inclined to lease minerals have not effectively forced the state to lease, sell or divest its mineral interests.

Another issue with the state-owned minerals is a prohibition on utilizing the land for oil or natural gas extraction in certain areas of Michigan on state-owned land. Some of the largest areas of oil and natural gas deposits sit on state-owned lands currently unavailable to extraction. With the safeguards provided by current state law in place, Michigan should use all of its available resources to promote job creation and natural gas utilization in an environmentally responsible manner.

Recommendation(s):

Considering the sudden interest in acquiring mineral rights and extracting those minerals, the Committee should take the following actions to facilitate greater mineral leasing in Michigan:

Legislation should be introduced that would create a "lease or lose" situation for the state's 5.3 million acres that are not currently leased. This legislation would effectively force the state to lease all mineral interests not currently leased. A deadline should be put in place by which such minerals should be leased. If that deadline is not met, any state-owned minerals not leased would be automatically reverted to the current surface owners.

Discussions should begin to evaluate drilling and extraction of minerals in currently prohibited areas.

Legislation should be considered to ensure that oil and gas leases on private lands are not extinguished by mortgage foreclosures.

Increase Energy Production and Creating Jobs: **Enhanced Oil Recovery**

Background:

Enhanced oil recovery is a method of extracting more oil from fields that have stopped producing oil from traditional production methods. Carbon capture and sequestration methods place carbon dioxide gas in the ground as opposed to releasing them into the atmosphere. These two concepts interplay with one another to reduce emissions and increase oil production.

Enhanced oil recovery using carbon dioxide injection enables further recovery from old oil well sites. Texas, Arkansas, and Mississippi have policies that encourage the use of enhanced oil recovery systems. It encourages the use of carbon dioxide, a bi-product of natural gas extraction and burning of fossil fuels, to help maximize the extraction of oil from the ground.

CONCLUSION

With additional EPA regulations on carbon emissions either causing the closure or expensive modification of coal-generating power plants, and the EPA's continued assault on fossil fuels, Michigan's regulations should be prepared for carbon capture and sequestration projects that stand to benefit enhanced oil recovery procedures.

These policy changes will also enhance property rights and royalties for land owners, encourage increased carbon capture in the state to reduce emissions, and provide new opportunities for workers.

Recommendation(s):

Introduce legislation that would provide a 50% discount on the 6% severance tax to companies that use carbon dioxide in the enhanced oil recovery method in Michigan. This is similar to the policies in Mississippi, Arkansas, and Texas.

Examine legislation that would classify carbon as a mineral if placed in the ground for storage and streamline permitting, transportation, and storage rules to make it cost-effective and viable for carbon producers who need alternative methods to dispose of carbon and make it a royalty interest to mineral owners willing to store it.

The Legislature should review reducing the \$1,000 application fee and \$2 per acre storage fee for all commodities on state land, so long as liability and regulatory processes are in place to allow the state to seek recourse.

Effectively Managing State Resources: **State Lease Database**

Background:

The 2011 Michigan Department of Natural Resources budget requires the department to report on all active oil and gas leases entered into prior to July 1995 larger than 160 acres and whether those parcels are being effectively managed.

These big parcels of land which are being leased and not used to their full capacity are slowing Michigan's natural gas production potential. An explanation of why these parcels are only producing on small sections of the large piece of land should be given and whether or not smaller parcels (less than 160 acres) should be considered to enhance exploration.

Recommendation(s):

The committee should explore whether a legislative solution is necessary to address this issue.

Safe Storage and Reliable Infrastructure

Background:

With the potential of the Collingwood-Utica shale formations, Michigan's natural gas industry is poised for incredible growth. With other states also recognizing the benefits of horizontal well stimulation methods to extract additional natural gas and the EPA's continued push to regulate coal burning plants out of business, the demand for natural gas electricity production will increase. However, without proper procedures to take advantage of this growth, Michigan could fall behind in maximizing the benefits of the boom.



The siting process for new natural gas pipelines and natural gas plants should be examined to ensure the state is able to handle capital investments for the delivery of natural gas to homes and businesses and generation of electricity. The pipeline infrastructure both within and connecting out of state should be examined to ensure capacity and reliability.

State-level permitting processes for gas pipeline and compression infrastructure projects could allow utilities to have gas service available for new gas-fired generators on a more predictable basis. In addition, a state level permitting process would facilitate upgrades and new installations of gas infrastructure while maintaining consistent application of environmental protection standards. Utilizing existing DEQ wetland guidelines for all pipeline construction activities would make the planning and compliance much easier, thereby reducing construction costs and post-construction restoration. A streamlined permitting process for gas infrastructure projects could allow utilities to be able to make the gas infrastructure investments needed to reduce costs to customers and promote business growth in Michigan by providing greater access to a low-cost commodity.

Increasing capacity for potential upgrades in facilities and product deliveries could create a corresponding influx of construction and other jobs that would greatly benefit Michigan's economy in addition to the benefits lower cost natural gas will provide.

Recommendation(s):

Require the Public Service Commission to work collaboratively with utilities and submit reports to the Legislature outlining Michigan's natural gas infrastructure capabilities and where expansion may be needed in terms of transmission and storage of natural gas. Also, the state should be required to convene a review board or working group to look at possible ways to further streamline the permitting and construction process for upgrading existing or constructing new gas system infrastructure.

Saving Consumers Money: Expand Natural Gas Access

Background

Additionally, the state needs to ensure that residents are able to take advantage of the low rates and increased production of natural gas. New customers will enjoy historically low costs for their heat, and long-term customers will have the added benefits of lower costs defrayed by a larger service base for the utility.

It is estimated that over 9,700 MICHCON customers, 6,700 SEMCO customers, and over 18,000 Consumers Energy customers are within 500 feet of lines for service. Determining the cost of adding those customers would go a long way towards helping expand the potential of natural gas in the state. Increasing access would require increased capital investments, and generate new work orders for the employees of these companies.

Recommendation

Request a study be done to explore cost-effective methods to connect to natural gas infrastructure that will help families and businesses, and spread capital costs over more customers lowering the per-unit delivery cost. It is recommended that the Michigan Public Service Commission consider a regulatory solution for all utilities that allocates and shares costs to extend gas mains and distribution service. This recommendation should address the utility rules and cost model to extend gas mains and distribution service to Michigan's residents.

Relief for Consumers: Energy Optimization Reform

Background:

Public Act 295 of 2008 promotes the development of clean and renewable energy and energy optimization through the implementation of standards that will cost-effectively provide greater energy security, diversify the energy resources used to meet consumers' needs, encourage private investment in renewable energy and energy efficiency, and improve air quality. However, when the legislation was passed there was no sunset for this program. A sunset would force the legislature to examine the economics, performance, and efficiency of these programs to see if they continue to be warranted in the future.

Recommendation(s):

Introduce legislation that would place a sunset on the energy optimization program for natural gas that was put into place in PA 295 (2008), in order to reduce rates on ratepayers.

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- GARRICK ROCHOW, *Consumers Energy VP for Energy Delivery*
- GEORGE SCHREIBER JR., *CEO of SEMCO Energy*
- JERRY NORCIA, *President and COO, MichCon*
- PHIL KORO, *Chevron*
- ANGELA SCHORR, *VP of Regulatory Affairs for Direct Energy*
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- TIMOTHY SPARKS, *Vice-President for Energy Supply Operations, Consumers Energy*
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