Natural Gas Pipeline Infrastructure and Its Impact on Michigan and Ohio Agriculture

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Introductory Letter from the Ohio State Grange

On behalf of the Ohio State Grange, I write to express our support for the responsible improvement and expansion of natural gas pipeline infrastructure here in our great state and throughout the Midwest. The Grange has long supported our nation's pursuit of energy independence and, given recent development of domestic energy resources, now is the time to take action and provide farmers and ranchers the peace of mind that comes from a stable domestic supply of energy to power agricultural operations.

In 1935, the peak of American farming, there were over 6 million agricultural operations in the United States. Today, there remains only 2 million and that number continues to decline each year. In 2013 alone, over 1.03 million acres of U.S. farmland went out of operation. Unfortunately, a large percentage of farm closures are family farms that can no longer remain profitable and are forced to sell their land. Every acre of farmland no longer in production is one less acre producing food for the growing population.

As a family farming organization dedicated to growing a healthy and vibrant agricultural supply, we at the Ohio State Grange find these farm losses deeply troubling. We hear regularly from our members about the need to stabilize and lower their farming expenditures, in hopes of keeping more family-run farms in operation now and in the future.

Energy is often among the highest expenses for American agricultural producers, constituting 30 percent or more of total expenditures, and fluctuating prices impact operations dramatically. Knowing the interrelationship between energy prices and the success of agricultural operations, the Ohio State Grange solicited the help of two agricultural economists at Hillsdale Policy Group to conduct a study to measure the impact to the agriculture sector from access to affordable natural gas supplies used to power family farm operations.

Over the past 40 years, natural gas has provided between one third and one half of the traditional energy used by U.S. farms. Its versatility, affordability and low carbon footprint make it an ideal energy source for agriculture. The following study finds that increased access to natural gas can benefit farmers by reducing the cost of fertilizer, providing cheaper fuel for farm machinery, and helping to stabilize the price of electricity. Farmers here in Ohio, many of them corn and soybean producers, would especially benefit from these natural gas advantages.

However, the study also revealed that a lack of adequate pipeline infrastructure with which to efficiently transport natural gas can prohibit farmers in many regions from benefiting from access to affordable, domestic natural gas. That dynamic is true especially here in the eastern Midwest where existing pipelines are outdated and unreliable. Without an updated and expanded natural gas pipeline infrastructure, Midwest farmers may not receive the full benefit of growing energy production in southeast Ohio.

In addition, proposed natural gas pipeline projects – like Rover pipeline – will carry billions of cubic feet of gas each day from the production site to the consumer. Necessary planning, discussion, and analysis must be conducted between farmers and companies proposing pipeline construction to ensure accommodations are made, minimal disruption to agricultural operations occurs, and appropriate compensation for land use and crop damages is paid. Pipeline construction is estimated to provide short- and long-term benefits for state and local economies by creating jobs, increasing tax revenues, and providing energy security. In Ohio alone, the construction and operation of the proposed Rover Pipeline will generate over $135 million in tax revenue for cash-strapped localities. Across the whole project, there are plans to create at least 10,000 jobs during construction. Companies must also demonstrate to farmers their plans for long-term maintenance and maintaining safety of pipeline projects. Pipelines are statistically the safest means of transporting natural gas, with much better safety records than both truck and rail; however companies must work with local officials and members of the communities to appropriately prepare should an incident occur.

With an increased supply and improved pipeline infrastructure, natural gas can provide farmers with a secure, clean, and affordable energy source to power their businesses. It is our duty, both as Americans and advocates of responsible farming practices, to ensure that the safest and most reliable means of power finds its way to American farms and ranches so they may continue providing food, fuel, and fiber for our nation and the world.

Sincerely,

Robert White, President, Ohio State Grange

Executive Summary

This paper analyzes the interrelationship between proposed pipeline infrastructure projects in Michigan and Ohio that move natural gas from the Marcellus shale formation to market and what the likely impact those projects would have on the agriculture sector in Michigan, Ohio, and the eastern Midwest. Hillsdale Policy Group (HPG) finds that new natural gas pipelines appear to offer substantial benefits to agricultural producers in Michigan, Ohio, and the Midwest in general, with minimal downsides. Our argument is summarized as follows:

- Despite forecasts for strong U.S. and world demand for agricultural products, prices for agricultural commodities are projected to face global downward pressure from increasing supply. In this environment, cost control will be central for agricultural operations to be profitable and competitive.
- Energy prices have fluctuated dramatically as have energy costs as a share of farm expenses. These trends are likely to continue in the absence of new energy development.
- Reducing energy expenses by accessing new energy sources is likely to be one of the most promising routes for cost control. Natural gas appears to be particularly promising because of availability, cost effectiveness and environmental concerns.
- In particular, new sources of natural gas from shale deposits in Pennsylvania, West Virginia, and eastern Ohio have the potential to reduce costs of electricity, fuel, and agricultural chemicals.
- Michigan, Ohio, and the eastern Midwest in general lack adequate pipeline infrastructure for accessing this resource. In addition, availability of an alternative fuel used in agriculture, propane, appears to be shrinking.
- Accessing the new natural gas sources requires new pipeline infrastructure.
- The risks associated with buried natural gas pipelines appear to us to be substantially less than alternatives such as truck or rail transport.

Increasing access to affordable and clean natural gas in the eastern Midwest will provide great benefit to farmers, whose agricultural operations face growing concerns from global competition and rising input costs. In order to increase access to gas, the eastern Midwest must invest in new, safe natural gas infrastructures. New projects are the most likely means of alleviating constraints on energy in Michigan and Ohio in the near future. The Rover Pipeline in particular is well advanced in the FERC (Federal Energy Regulatory Commission) permitting process and projected to be completed by June 2017. For these reasons, Hillsdale Policy Group believes that a new buried natural gas pipeline infrastructure is the safest and most cost-effective option for providing Michigan and Ohio with the additional energy needed for agriculture, as well as for other commercial and residential use.

Introduction

Earlier this year the Ohio State Grange commissioned an analysis from the Hillsdale Policy Group (HPG) on how proposed pipeline projects in the Midwest are likely to impact agricultural industries, with particular attention to Michigan and Ohio. We find that proposed pipeline projects, such as the Rover and Nexus pipelines, appear to offer substantial benefits to agricultural producers in Michigan, Ohio, and the Midwest in general, with minimal downsides. Some attention has been given to the impact on drainage tiles and soil remediation. These issues deserve thorough review and discussion. Given the importance of natural gas to agriculture operations, proposed pipelines deserve timely review and approval when design, construction, and operations plans are intact. Natural gas is important for agriculture, and when completed, proposed pipelines will provide stable, safe, and low-cost access to natural gas. These projects may help reduce agricultural production costs for farm operations, stable prices for electricity, and lower prices for fertilizer and pesticides. In turn, this would strengthen the profitability and competitiveness of agriculture in the region. This HPG policy analysis paper explains this case, showing that:

1. Energy expense is a major and growing component of agricultural productivity costs.
2. Driving down costs of crop production is crucial to profitable farming.
3. Increased use of natural gas holds the most promise for cost control.
4. A key constraint to tapping the rapidly growing natural gas production of the Marcellus and Utica shale formations in the eastern U.S. is inadequate pipeline infrastructure.

We conclude that it is important for Michigan and Ohio agricultural producers that proposed natural gas pipeline projects, such as the Rover and Nexus pipelines, be completed.

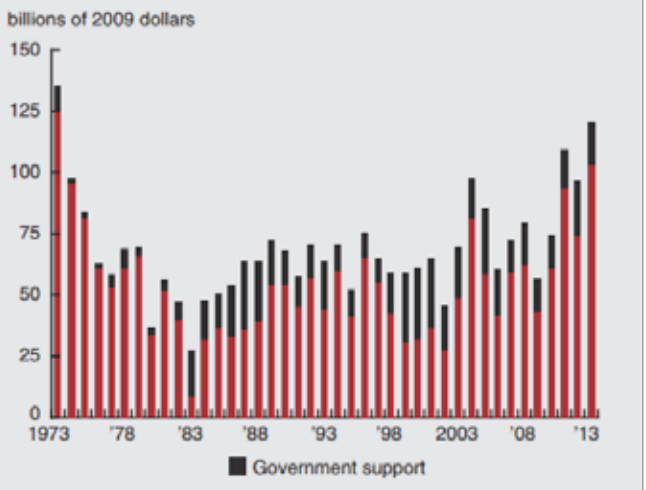
I. Production Costs and the Promise and Plight of Farming

As the global population continues to grow, so does worldwide demand for agricultural products. American agricultural products in particular are in high demand, both domestically and abroad, as the U.S. leads the world in agricultural productivity, quality, and diversity. However, at the same time, high production supplies and bumper crops result in lower prices for agricultural commodities, putting downward pressure on farm incomes. Despite recent increases in the prices of corn and other crops resulting primarily from ethanol mandates, the longer run forecasts are for continued downward pressure on revenues. (Oppedahl 2015)

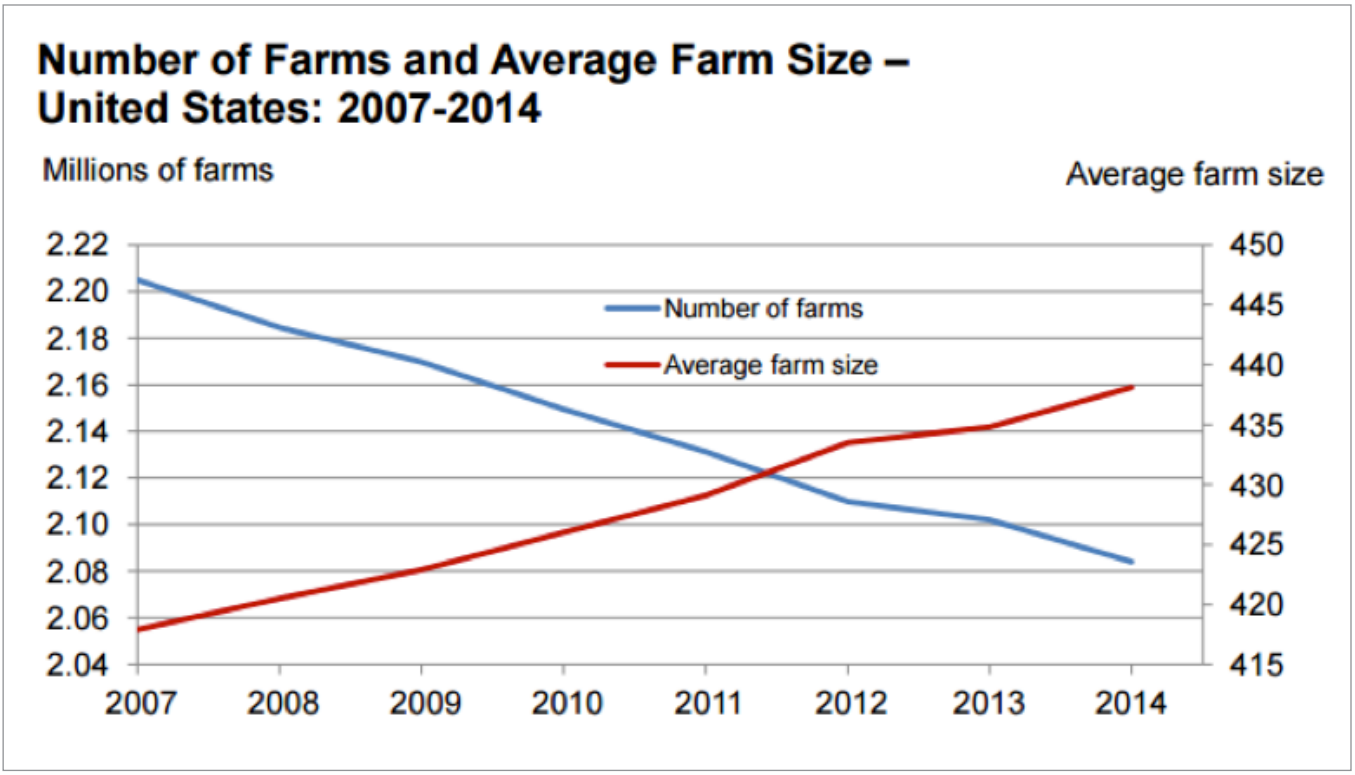
Thus, despite increasing demand for agricultural products, farm operations are under pressure. According to the USDA's *Farms and Land in Farms 2014 Summary*, there are approximately 2.08 million farms in the United States, a decrease of 18 thousand from 2013. The land cultivated by these farms now totals 913 million acres, a decrease of 1.03 million acres from 2013. (USDA 2015) While there are many factors contributing to this decline, the underlying cause is nearly always a problem of profitability: revenues are insufficient to cover costs. High costs, including high energy prices, and a lack of energy options for many rural areas are a genuine problem for agricultural producers, particularly in the Midwest.

If producers cannot count on high prices for their crop, the key to profitability becomes controlling costs. All else equal, lower per-unit production costs mean that a farm operation makes more profit at a given price per unit of product. Likewise, with reduced expenses, a farmer can remain profitable at lower prices per unit of product. Lower production costs make a farm more competitive in both domestic and foreign markets.

1. Real net farm income, 1973–2013



Sources: Author's calculations based on data from the U.S. Department of Agriculture, Economic Research Service and Office of the Chief Economist, adjusted by the Personal Consumption Expenditures Price Index from the U.S. Bureau of Economic Analysis from Haver Analytics.



Consider, for example, the competitiveness of American agriculture in international markets. In general, America imports more goods than it exports, but agriculture is an important exception. American agriculture is a strong exporter, thanks to the high quality of American products and efficiency of American producers. However, foreign demand for American products is very price sensitive. Recent measures of export demand elasticities – a measure of how sensitive foreign purchases are to price increases[2] – show that a one percent increase in price results in more than a one percent *decrease* in quantity demanded, that is, commodity price increases cause a fall in export revenues. (Reimer et al. 2012)

As an illustration, for corn, the Reimer, et al. estimate means an increase in price of 1 percent leads to a 1.64 percent decrease in exports. Exports of soybeans and wheat are similarly price sensitive.[3] For at least two of these crops, corn and wheat, the price sensitivity seems to be growing. Note that this cuts two ways, for Americans can import foreign agricultural commodities as well. The lesson from this is simple. It's true that higher prices for agricultural commodities make farming more profitable, but farmers cannot count on higher prices. However, lower prices are not necessarily a disaster for farmers if costs are also kept low. Among other things, lower prices mean *increased* revenues from agricultural exports, potentially a great benefit to farmers *if* they can keep costs down. Either way, high or low prices, cost control is crucial to economically viable farm operations. Since energy is a growing share of production cost, lower cost energy is especially important for cost control, and HPG's analysis finds that improved access to natural gas could be a crucial component of this.

[2] Formally, the export demand elasticity is the percent change in quantity exported for a percentage change in price. The number is negative, since quantity demanded falls as price increases, all else constant. An elasticity greater than 1 in absolute value means that revenue gains from a higher price per unit are overcome by the effect of reduced sales, causing revenue to decrease. The estimates of export demand elasticities for American agricultural products by Reimer, Zheng, and Gehlhar appear to be the best available.

[3] Reimer, Zheng, and Gehlhar calculate the long run (i.e. one year and longer) export demand elasticities for corn, soybeans, and wheat to be -1.64, -1.45, and -1.25 respectively. Van Eenoo and Purcell (2000) find U.S. beef exports to be similarly price sensitive, or elastic.

II. Energy Costs in Agriculture

For a farm operation to be economically viable, cost control is essential. One of the likeliest sources of potential cost savings for Michigan and Ohio agriculture is expanded use of natural gas. Energy is a major component of farm production expenditures, accounting for over 30 percent of costs. While historically the agricultural sector has consumed only a small percentage of energy used in America, continued increases in energy prices, especially since 2001, have made it one on the largest expenditures for farming operations. For example, in corn production, energy accounts for 34% of production costs on average. (Beckman et al. 2013)

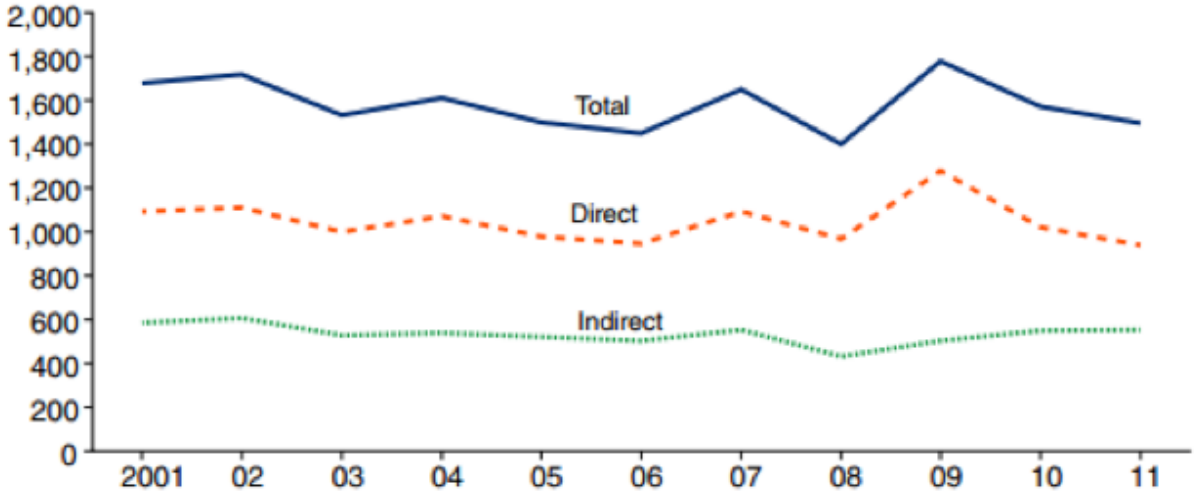
However, while energy prices have tended to increase, recent breakthroughs in gas and oil production offer an opportunity to reverse this trend. In particular, new hydraulic fracturing techniques allow access to enormous pools of gas and oil previously inaccessible, especially in shale formations such as the Marcellus and Utica formations of Pennsylvania and eastern Ohio. Shale gas in particular has driven an energy revolution, as it is cheaper, cleaner, and safer than traditional energy sources such as coal and petroleum.

However, a region cannot benefit from natural gas production if there is no cost-effective way of obtaining the gas; i.e., if it is without an adequate transportation infrastructure.

Transporting natural gas via pipeline is safer, cheaper, and more efficient than transporting it via trucks and railcars, and helps to drive down the overall price (Furchtgott-Roth 2013). Furthermore, increased production and transportation of natural gas is more likely to benefit local communities along pipeline routes when compared to other energy sources. Unlike petroleum-based energy, which is transferred to refineries far from the drill site and then shipped nationally and even internationally, natural gas is most often transferred by pipeline to liquefaction or compression facilities, and then again by pipeline to demand centers and, increasingly, the agricultural sector. This too helps reduce the price by cutting down on transportation expenses.

Figure 7

Direct, indirect, and total energy consumed on U.S. farms, 2001-11



III. Types of Energy Utilization on Farms

Agricultural operations are sensitive to energy price shifts in two ways: directly through such sources as fuel and electricity and indirectly through sources like fertilizer and pesticides. In 2011, direct energy use accounted for 63% of agricultural energy consumption, compared with 37% for indirect use. However, though direct energy sources constitute a larger share of energy consumption on farms, expenditures on indirect uses represent a larger share of farm expenses (Beckman et al. 2013). A recent study by the U.S. Department of Agriculture shows these results stem from higher indirect energy input cost more per unit of energy compared to direct energy purchases. In other words, producing fertilizer or pesticides is energy intensive and can influence farm operation costs significantly.

Agricultural operations consume energy in two ways: directly through such sources as fuel and electricity and indirectly through sources like fertilizer and pesticides.

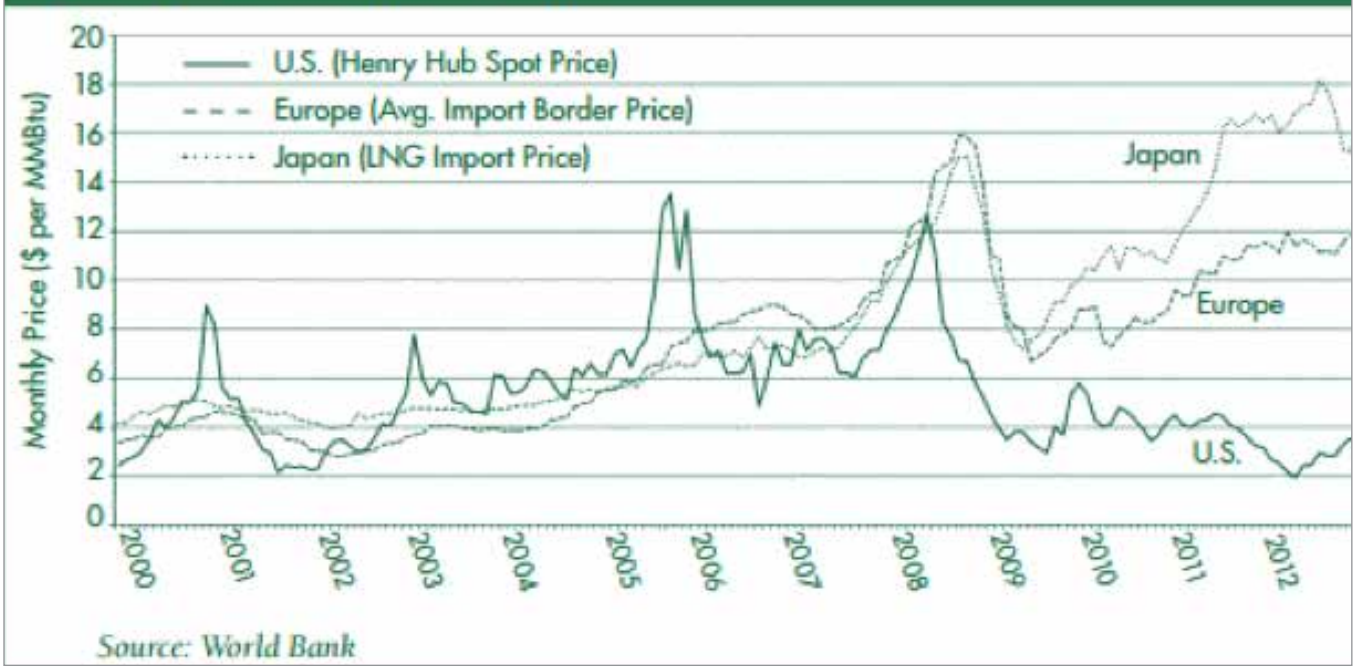
Direct Uses: Grain Drying, Fuel, and Electricity

While direct energy use is a smaller share of farm production costs than indirect, it is the most visible and likely the first to respond to increased availability of natural gas. Direct use includes natural gas used in energy production such as farm co-ops, fuel for farm vehicles and equipment, and fuel for grain drying.

Grain Drying

Natural gas is an essential tool for drying crops, mostly grains, after harvesting. Many crops, including corn and soybeans, must meet certain specifications for moisture content before they are sent to market. By controlling the moisture content, farmers are also able to limit the growth of fungus and bacteria. Before the advent of artificial crop drying, farmers allowed grain to dry in the field before harvest, and in the case of corn, stored harvested ears in open-air cribs and waited

Figure 2. Natural Gas Prices by Region



Source: World Bank

for the corn to dry naturally before beginning the process of shelling kernels from the cobs. Advances in agricultural technology over the last 40 years have produced more efficient harvesters that automatically shell the kernels from the cob during harvest, saving significant time. However, this technique presents a different challenge: corn kernels are more difficult to air dry.

Farmers now ensure grain is properly dried using heavy-duty drying equipment run either on natural gas or on propane, a by-product of natural gas refining. Burning the fuel generates heat and then electric powered fans circulate hot air through the storage unit, drying the grains more effectively. This approach grants farmers the ability to dry grain independently of the weather. However, despite its many benefits, artificial crop drying adds substantial energy expenditures to farmers' bottom lines. Where available, natural gas is typically much less expensive per Btu than propane. Propane is used in part because it is more easily transported by truck and rail and hence can be used where natural gas sources are unavailable. Better transportation infrastructure, i.e. pipelines, for natural gas would help in two ways. First, this would permit wider use of this inexpensive fuel for drying. Second, propane is a byproduct of natural gas production, so increased natural gas production will also increase propane supplies, putting downward pressure on propane prices as well.

Natural gas holds great promise for reducing costs of electricity. Realizing this promise depends, though, on the ability to make natural gas available where it is needed.

Agricultural demand for propane is substantial. In 2008, more than 1.1 billion gallons of propane were sold for agricultural purposes, including crop drying (American Petroleum Institute 2009). Although natural gas tends to be cheaper where available, lack of access to natural gas means propane is commonly used. Unfortunately, propane supplies themselves suffer from inadequate distribution networks, and consequently farmers have suffered recent propane shortfalls. For example, in 2013 a bumper corn crop and wet harvest combined to drive up propane demand and prices for Midwest farmers. Compounding the problem, propane supply constraints are tightening because an important propane pipeline for the Midwest, the Cochin Pipeline, is being reversed to ship light

condensate to Canada. (Mitchell 2013, Shaffer 2013, EIA 2014) Continued pipeline constraints would be expected to drive up the prices of both natural gas and propane unless new infrastructure is constructed in the years ahead.

Fuel

Natural gas is also being used to lower fuel costs for farm vehicles, as well as expenses associated with transporting goods off the farm. Combustible fuels to run heavy machinery, including diesel and gasoline, account for the dominant share of direct energy use on U.S. farms (Beckman et al. 2013). Such machines are used for planting, tilling, harvesting, transporting goods, and managing livestock. Farm fuel consumption has been relatively consistent since 2000, with a minor exception in 2009 when high commodity prices and lower fuel rates resulted in a large increase in fuel use (Beckman et al. 2013).

Better transportation infrastructure, i.e. pipelines, for natural gas would help in two ways. First, this would permit wider use of this inexpensive fuel for drying.

Natural gas tanks can now be installed on conventional gas-burning machines and mixed with diesel fuel to create a cheaper and cleaner fuel alternative. For example, a recent piece in Farm Show Magazine highlights how Warsaw, Ohio farmer Ed Jones uses natural gas on his machines, turning two natural gas storage tanks into the equivalent of 25 gallons of diesel fuel. "In the tractors we usually can run a full day on one fill, depending on the work we're doing. I can really notice the difference in power output on the 4-WD and in the combine when we're using CNG [natural gas]," Jones says. "Burning natural gas with diesel boosts horsepower by about 30%, helps the engines run cleaner and saves us money on fuel." (Farm Show 2012) He also cites improved fuel economy and horsepower in a diesel pickup he powers with natural gas. Part of the cost effectiveness, though, stems from the fact that Jones has his own gas well and is able to access gas directly. Better natural gas transportation could make these kinds of efficiency gains and savings available to farmers situated farther from gas sources.

Continued pipeline constraints would be expected to drive up the prices of both natural gas and propane.

Electricity

Perhaps the most immediate direct energy advantage of an increased natural gas supply is the role it plays in setting the price of electricity. Although fossil fuel prices have tended to fall because of the "energy revolution" associated with advances in hydraulic fracturing, electricity prices have climbed to record highs. (Jeffrey, 2015a, 2015b) In the United States, coal and natural gas account for nearly 70% of the total electricity produced. In 2012, 30% of electricity was produced using natural gas units. (Shift Data Portal 2015). In Ohio alone, coal and natural gas account for more than 82% of electricity produced (Public Utilities Commission of Ohio, 2015) and in Michigan, nearly 72% (U.S. Energy Information Administration, 2015). Natural gas generators play an important role in setting the price of electrical power, as they provide sources of electricity at the margin and are often used at peak times to power the grid. Thus, lower natural gas prices would lead directly to lower wholesale electricity prices.

How much lower? Carter and Novan (2012) cite research by IHS Global Insight that suggests the price of electricity could drop by ten percent over the next twenty five years thanks to the decrease in natural gas prices

resulting from increased shale gas production and distribution. Consequently, according to U.S. Energy Information Administration projections, by 2035 electricity generated by natural gas will have surpassed electricity generated by coal. This is due to rising market and political concerns regarding coal carbon emissions, lower fuel costs for natural gas plants, and rising construction costs for new coal-fired power plants (EIA 2013).

Lower electricity costs would be beneficial for agricultural producers, especially for livestock and dairy operations that are historically high users of electricity. It also would be advantageous for crop producers who rely heavily on irrigating their crops, since one of the largest determinants of water use is the cost of electricity (Miranowski, J. 2005). However, in recent years, only 7.5% of U.S. cropland and pastureland were irrigated, and these acres were highly concentrated in California and other western states where droughts are more common (Schaible and Aillery 2012).

To control costs, it is important that agricultural producers and supporting industries be able to diversify into cheaper and abundant energy sources, especially natural gas

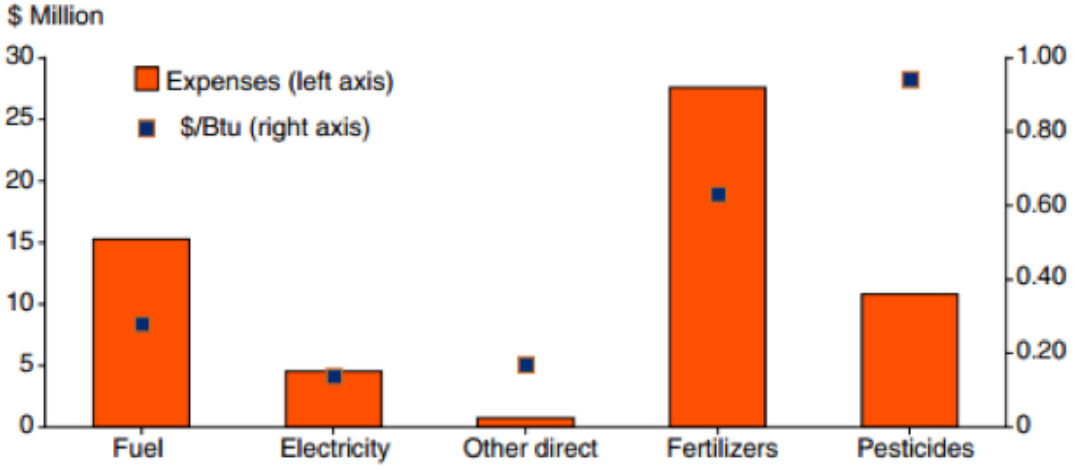
To summarize, increased access to reliable and low-cost natural gas holds great promise for reducing costs of electricity. Realizing this promise depends, though, on the ability to make natural gas available where it is needed.

Indirect Use: Fertilizers and Pesticides

Indirect use of energy in farming consists of using products with energy intensive inputs, predominantly fertilizers and pesticides. In dollar terms, the highest consumption of natural gas on American farms occurs indirectly through the use of fertilizer, the most energy-intensive farm input. In fact, natural gas represents approximately 70% of the cost in manufacturing fertilizer, as it is an essential ingredient in synthesizing ammonia, a key input for fertilizer (Gellings and Parmenter 2004). Fertilizer itself accounted for over half of all indirect energy consumption on U.S. farms in 2011 (Beckman et al. 2013).

Figure 14

Total expenditures and cost of direct and indirect uses of energy, 2011



Source: USDA, National Agricultural Statistics Service, *Quick Stats* (2012). Btu = British thermal units.

Due to the reliance of fertilizer production on natural gas, gas and fertilizer prices tend to trend together. The rates of both peaked in September of 2008 and have since declined. However, unlike natural gas prices, the price of fertilizer has not fallen back to its early 2001 levels, partly due to high demand for fertilizer and manufacturing constraints that limit the production of U.S. fertilizer (Schnitkey 2011). One such constraint has historically been the availability and expense of natural gas. While the price of natural gas was volatile from 2000 to 2012, new extraction technologies, especially developments in hydraulic fracturing, have dramatically increased its supply and in turn driven the price down to early 2001 levels.

Together, Michigan, Ohio, and Pennsylvania contain nine fertilizer production sites; all of which could benefit from expanded pipeline infrastructure to quickly and safely transport natural gas regionally to benefit their facilities. These states are also high producers of corn, a fertilizer-intensive crop that accounted for over 45% of U.S. fertilizer consumption in 2010 (Beckman et al. 2013).

Pesticides are another indirect energy-intensive farm input and over 1.25 billion pounds are used in the United States annually. Pesticides accounted for slightly less than 50% of indirect energy used on U.S. farms in 2010, and slightly less than 15% of total energy use (Kiely et al. 2004). Like fertilizer, the production of pesticides requires more energy than their actual application on the farm. The majority of natural gas consumption for pesticides occurs in the development process and the construction and maintenance of the manufacturing facilities themselves. Furthermore, although total energy use in pesticide manufacturing is much less than that of fertilizer, their development requires two to five times more energy per pound (Pimental 1992).

In short, the indirect use of energy in the form of agricultural inputs is the leading component of energy expenses on farms. While less visibly a use of energy, prices of these inputs are very sensitive to energy costs. Direct and indirect energy costs together make up a growing share of farm expenditures, as modern farming is an energy-intensive enterprise. To control costs, it is important that agricultural producers and supporting industries be able to diversify into cheaper and abundant energy sources, especially natural gas.

Completion of proposed pipeline projects in the Midwest, such as the Rover pipeline, would especially benefit local areas as well. Natural gas is generally used in areas near pipeline routes, benefitting area business, agricultural, and residential customers.

IV. Natural Gas and New Pipeline Infrastructure

Shale gas holds great promise for reducing production costs in agriculture and increasing efficiency and profitability, especially since new hydraulic fracturing techniques have made accessible the abundant gas of the Marcellus and Utica formations of Pennsylvania and eastern Ohio. The primary obstacle to utilizing these resources is an inadequate infrastructure for transport.

Improved access to natural gas would offer the following benefits to Michigan and Ohio agricultural producers. First, it is a cheap and efficient energy source that has the potential to reduce energy costs. Due to the substantial reserves of shale gas and the long term (20 year) supply contracts already obtained by several proposed pipelines, we expect this source of energy to be less subject to price volatility and market risk than other sources. For example, petroleum is far more subject to fluctuations in the worldwide forces of supply and demand. Petroleum is in part vulnerable because substantial supply comes from less stable regions of the world, including the Middle East, Russia, Africa, and South America.

No option is risk free, and HPG believes the risks associated with pipelines are less than risks of alternative approaches, including the status quo.

In addition to being a stable source of affordable energy, natural gas is also cleaner than alternatives such as coal and oil. For example, using natural gas in electricity generation instead of coal emits substantially smaller quantities of greenhouse gases for equivalent electricity.[4] (EPA, no date) Similarly, as a fuel for farm vehicles, natural gas is cleaner than diesel and gasoline for equivalent energy production. (AFDC, no date) As concerns about climate risk and air pollution grow, switching to natural gas is likely to be an important way of mitigating environmental harm and meeting government regulatory standards while

[4] Comparing average emissions from coal and natural gas fired electricity generation, EPA (no date) claims natural gas emits one half the carbon dioxide, less than a third of the nitrogen oxides, and one percent as much sulfur oxide.

obtaining needed energy. As such it is also likely to be less subject to political risk than other major energy sources.

Completion of proposed pipeline projects in the Midwest, such as the Rover pipeline, would especially benefit local areas as well. Natural gas is generally used in areas near pipeline routes, benefitting area business, agricultural, and residential customers. The twenty year contracts for supply obtained by Rover LLC indicate that the pipeline operation would provide a stable, dependable energy source for years to come, allowing Michigan and Ohio farmers to reap efficiency gains and expand operations. In addition, the Rover Pipeline is well advanced in FERC (Federal Energy Regulatory Commission) permitting process, and the pipeline is projected to be completed by June 2017. This makes it the most likely means of alleviating constraints on energy in Michigan and Ohio in the near future.

In sum, natural gas appears to offer great promise to Michigan and Ohio agriculture. It is an inexpensive, clean, safe resource that has the potential to control and even reduce energy costs. However, for Michigan and Ohio producers, utilizing this resource requires new pipeline development.

V. Pipeline Safety Concerns

The downsides of natural gas pipeline development are the associated risks. This is primarily the risk of rupture with the possibility of explosion and fire. While these concerns are not to be taken lightly, HPG believes they are minimal. No option is risk free, and HPG believes the risks associated with pipelines are less than risks of alternative approaches, including the status quo. The status quo, i.e. doing nothing, entails a very high probability of continued escalating energy costs. Alternative transport methods for gas are clearly much riskier. According to both the NTSB and PHMSA, pipeline transportation is easily the safest method of transport, far superior to truck and rail. (PHMSA, no date; Furchtgott-Roth 2013) There do not seem to be alternative energy sources on the horizon, making the pipeline the lowest risk option. In addition, natural gas is unlike petroleum. Although leaks are low probability events, in the event of a leak, natural gas is unlikely to contaminate water and soil the way that oil does. Natural gas is lighter than air and would tend to dissipate into the atmosphere, rather than contaminate soil or ground and surface water.

VI. Conclusion: Building New Natural Gas Pipeline Infrastructures

In the opinion of HPG, new proposed natural gas pipeline projects are in the best interest of Michigan and Ohio agricultural producers. In summary, our findings are as follows.

- Energy prices have increased over time, as have energy costs as a share of farm expenses. These trends are likely to continue in the absence of new energy development.
- Cost control is crucial to the profitability and competitiveness of Michigan and Ohio agriculture.
- Reducing energy expenses by accessing new energy sources is one of the most promising routes for this.
- In particular, new sources of gas from shale deposits in Pennsylvania and eastern Ohio have the potential to reduce costs of electricity, fuel, and agricultural chemicals.
- Accessing this energy source requires new pipeline infrastructure.
- The risks associated with the pipeline appear to us to be substantially less than alternatives such as truck or rail transport.

The Rover pipeline appears to us the safest and most cost-effective option for providing Michigan and Ohio with additional energy needed for agriculture as well as for other commercial and residential use. Shale gas is projected to be an increasingly important energy resource owing to its growing availability. We believe the Rover pipeline project would allow the agricultural sector of Michigan and Ohio to share in the benefits of America's energy revolution.

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