



An Offer We Can Refuse? Corporate Social Responsibility and the Environmental Impact of Marcellus Shale Drilling

Ray Jones, Audrey J. Murrell, and Elizabeth Smith¹

University of Pittsburgh, School of Business, USA

Abstract. With natural gas companies offering to pay thousands of dollars an acre for the right to drill natural gas reserves within the Marcellus Shale, many landowners find themselves caught between new economic opportunity and environmental impact. The owners of a small size organic farm within Southwestern Pennsylvania, while dedicated to environmental sustainability, have found themselves debating these very issues after receiving a lucrative offer from a large energy company. This case provides a real example of the competing pressures that can exist between financial and corporate social responsibility concerns. The owners must balance their sense of stewardship with the economic incentives presented by the promise of natural gas drilling. This case presents the opportunity for students to identify, analyze, and prioritize stakeholders, as well as the opportunity to relate principles of corporate social responsibility, servant leadership and global environmental stewardship as they develop recommendations for the three owners of this organic farm.

Keywords: corporate social responsibility, global stewardship, servant leadership.

1. The Offer at Hand

It is an unusual time to be a farmer in Western Pennsylvania. While farmers still spend long hours preparing their fields and tending to their crops, many of these dedicated individuals now find themselves having to make important decisions on lucrative offers from natural gas companies. With Western Pennsylvania becoming one of the leading centers of new drilling, gas company officials have been approaching farmers with complex offers to lease portions of their farms for drilling, promising large royalty checks once functioning natural gas wells are established.²

1. Funding for the writing of this case was provided by the David Berg Center for Ethics and Leadership and was used as the subject matter for the 2011 Berg Cup Undergraduate case study competition. The authors gratefully acknowledge the contribution and support of Greg Boulos, owner of Blackberry Meadows Farm. The case is based on an actual organization while specific names and details have been disguised.

Greg Boulos and his two partners, Sally Williams and John Archer, took out a 30-year mortgage to purchase Greenwood Acres, an 85-acre vegetable farm located 20 miles north of Pittsburgh, PA in a rural suburb known as Natrona Heights. Natrona Heights has been one of the focal points for natural gas companies seeking to establish drilling operations in Pennsylvania's Marcellus Shale natural gas reserves. The partners who each own an equal share in the farm have been approached with leasing offers³ from gas companies like many other farmers within the region. In just three years, the partners have passed on offers for \$100, \$500 and \$1,500-an-acre (with a promise of 12.5% royalties). Most recently, in November, the partners were offered \$2,500-an-acre and the promise of 20% in royalties from The Concord Resources Company, a large privately-owned natural gas firm which has made significant progress in purchasing drilling rights from more than two dozen owners of small farms in Natrona Heights. This series of acquisitions has put Concord in position to launch its initial drilling operations within the next two years.

The three partners were initially unified in passing on earlier offers due to their strong shared commitment toward organic farming and their concerns over the possible negative environmental impact of "fracking" – the process through which natural gas is drilled. As more and more of their neighbors have accepted leasing agreements from Concord, the \$2,500-an-acre offer has generated some spirited debate among the three partners. Greg has always been a strong proponent of the organic farming business model and the advancement of movements to create and sustain local food systems. As such, he has serious concerns over whether drilling will have adverse consequences on organic farming at Greenwood Acres and on the sustainability of the local food supply. At the same time, Greg understands that organic farming is expensive and needs capital for operations and expansion. Sally has a strong business background and has spent a great deal of time researching the possible benefits from the use of natural gas and the economic promise of the development of the Marcellus Shale. She has voiced her opinions about being open-minded regarding leasing and development options for Greenwood Acres, while still showing an appreciation for the social responsibility concerns associated with the business development of the Marcellus Shale. John has a great deal of experience in agricultural development and land use, and thus has taken the opposite approach as Sally, in that he has spent his time researching the possible negative consequences of drilling efforts in the Marcellus Shale particularly on water reserved. John has been rather vocal about his opposition to any drilling at Greenwood Acres, but

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2. Brasier, K. J., Filteau, M. R., McLaughlin, D. K., Jacquet, J., Stedman, R. C., Kelsey, T. W., & Goetz, S. J. (2011), "Residents' perceptions of community and environmental impacts from development of natural gas in the Marcellus Shale: A comparison of Pennsylvania and New York cases", *Journal of Rural Social Sciences*, 26(1), PP. 32-61.
 3. Leasing offers are agreements between local farm or land owners that provide rights and access to energy or shale development companies for the extraction of natural gas resources.

does understand the economic and energy opportunities associated with developing the Marcellus Shale as a natural resource.

A representative from Concord has requested a meeting with the three partners on April 1st regarding the \$2,500-per-acre offer. The company officials have been rather forthcoming in stating that they see Greenwood Acres as a key location in their initial drilling operations in Natrona Heights, with the intent of establishing drilling operations within the next two years (See Table 1). They also have provided the partners with a limited amount of financial performance data on the company (see Table 2), which strongly suggests that, even if the partners do not accept the lease offer, Concord has the resources to alter its drilling plans and still proceed with the drilling without Greenwood Acres. The Concord officials have been blunt though in stating that they prefer to implement their current plan, which would involve drilling on Greenwood Acres. With the offer on the table and an April 1st meeting with Concord looming, Greg, Sally and John need to have a frank and open discussion of their varying perspectives before making their final decision on the latest offer from Concord.

Table 1: Marcellus Shale and U.S. Energy Needs

US Natural Gas Consumption by End Use 2008^a <i>(tcf=trillion cubic feet; Bcf= billion cubic feet)</i>		
Electric Power Generation	6.7 tcf	30%
Industrial	6.7 tcf	29%
Residential	4.9 tcf	21%
Commercial	3.1 tcf	14%
Lease and plant fuel consumption	1.3 tcf	5%
Pipeline and distribution	636 Bcf	3%
Vehicle fuel	31.9 Bcf	<1%
Total	23 tcf	
Estimated technically recoverable resources in Marcellus Shale: 262 tcf		

a. Source: US Department of Energy and Energy Information Administration

Table 2: The Concord Resources Company – Calculation of Revenues and Expenses
(US dollar amounts in thousands)

	<u>2010:</u>	<u>2009:</u>
REVENUES		
Oil and gas sales	\$663,104	\$597,834
Derivative cash settlements	16,878	149,085
Early derivative cash settlements	15,697	-
Transportation and gathering	2,859	4,669
Total Revenue	<hr/> 697,738	<hr/> 751,688
EXPENSES		
Direct operating	95,102	101,480
Production	25,033	23,421
General and administrative	100,529	83,941
Interest expense	94,872	86,817
Total Expenses	<hr/> 287,411	<hr/> 270,596
Cash Margins	<hr/> \$410,327	<hr/> \$481,092

2. About Greenwood Acres

Greenwood Acres is an organic vegetable farm which offers a Community Supported Agriculture subscription program. It is the largest organic farm in the county and hosts its members on a weekly basis to experience the farm and enjoy the produce. It was certified organic in 1992 – the first year of the National Organic certification Program (NOP) – making it the oldest certified organic farm in the county. While it does produce some additional produces (e.g., chicken, eggs), vegetables is the primary product produced at the farm.

Currently, Greenwood Acres serves host to over 30 volunteers and community members who learn about farming and work on the farm to trade for food (called workshares) as well as a number of interns, apprentices and working students. From March's early season greenhouse work through post-harvest processing and preservation in November, Greenwood Acres uniquely offers its friends and supporters access to the wide range of food production knowledge and hands on information (along with a bounty of certified organic food) that is not available anywhere else in the region.

Greg Boulos and his wife Jen are active in the local/organic food movements, volunteering and working for regional, national and international organizations to improve the quality, access and availability of locally produced foods. As socially responsible business owners, they focus mainly on their social bottom

line, engaging their customers in a community of stewardship and cooperative production which ignites a friendly and neighborly farm environment which was more common for our great grandparents – and all but forgotten in today’s fast-paced, over-worked world. By building this type of business community, they have been able to generate enough economic revenue to maintain their farm without the need of outside income but margins are very small and raise concerns over the long-term economic viability of the farm (see Table 3).

Table 3: Greenwood Acres Farm – Calculation of Revenues and Expenses (absolute US dollar amounts)

	<u>2010:</u>	<u>2009:</u>
REVENUES		
Sales at farmers markets	\$19,676	\$17,823
CSA subscriptions	9,000	7,278
Sales to organic grocery stores	14,384	12,539
Total Revenue	43,060	37,640
EXPENSES		
Real estate	20,136	19,987
Machinery	7,600	7,423
Crops and fertilizer	8,124	7,965
Depreciation expense	1,300	1,237
Total Expenses	37,160	36,612
Cash Margins	\$5,900	\$1,028

The social bottom line is so powerful that members and customers have voluntarily gifted funds to the farm (a for-profit company) to help pay for projects like purchasing and maintaining a milk cow and constructing a brick oven for community use. This has inspired the owners to begin developing business plans which allow the community to invest in growth strategies and supporting business structures which will further improve the financial performance of the farm.

As part of the commitment to engage the community as a stakeholder, individuals join the owners every year to participate in the operations of the business. They plant, cultivate, and harvest 13.5 acres of vegetable crops and share in the harvest. While there are many workshares who return year after year to work together, new interns and volunteers join the crews regularly to learn about farm life and experience the rich community spirit which thrives in the hills of farm.

To their peers, Greenwood Acres serves as a resource, loaning equipment, sharing seeds and business plans, to help improve other farms. While there is still some minor competition for wholesale customers, cooperation more aptly describes their approach to engaging with other peer businesses. One of their future plans is to establish a “Value-Added Product Kitchen” on the farm. Jen and Greg have openly shared this plan with others to help other farmers consider many of the nuances of kitchen operation and food branding. As a sign that their efforts are being recognized, Greenwood Acres has received public recognition as a socially responsible organization including a finalizer for the local Business Ethics Awards for small firms.

3. Greg Boulos and the Mission of Organic Farming

Greg Boulos is the business manager for the farm and is a local leader in the area of sustainability and the benefits of local farm production. He first sought out Greenwood Acres as both a business venture and as an opportunity to get directly involved in providing part of the local food supply. With a Master’s in Sustainable Systems from Slippery Rock University, he has expertise in alternative energy, green buildings, and ecological design. He has made an impact in the local community through his role as Western Regional Director for PASA (Pennsylvania Association for Sustainable Agriculture) and is currently the Mid-Atlantic Regional Governor at Slow Food USA, a non-profit organization that supports individual and community access to nutritious food.

One of the interesting challenges for Greg is that the business model driving the farm and its social mission are centered on organic farming. Greenwood Acres is an 85-acre vegetable farm which first earned organic certification in 1992, and has evolved into a high-profile regional farm, featured in award-winning articles in the *Pittsburgh Post-Gazette*, *Pittsburgh Quarterly* and *Pittsburgh City Paper*. While Greenwood Acres is one of more than 63,000 farms in Western Pennsylvania, it is also an example of the economic promise of organic farming, as the premium paid for organic produce generates enough revenue to cover expenses and return a small profit for Greg and his partners (see Table 3).

Small farms like Greenwood Acres are part of the broad national movement toward organic food. Organic farming is a \$21.1 billion national industry, and annual sales of organic food grew sixfold between 1997 and 2008. Organic food sales continue to climb, even in recession years. Sales grew by 15.7% in 2008 and 5.1% in 2009, compared to overall food sales growth of 2.9% in 2008 and 1.6% in 2009. Demand for organic products has outpaced U.S. production, meaning that the U.S. manufacturers and retailers must globally source items for consumers. Leading sources include Canada, Italy, Turkey, China and Mexico. The shortages are felt strongly in areas such as organic feed for dairy cows and

raw materials for processed products. Because only 0.7% of U.S. farmland is dedicated to organic farming, the Organic Trade Association suggests there is significant room for future growth and potential revenue in organic cultivation.

More than two-thirds of American consumers report buying organic products occasionally, and 28% buy weekly. Parents report health concerns as a major driver in purchasing organic products, and parents of children under three years of age are more likely than parents of older children to purchase organic products for health reasons. Estimates of future revenue earnings for farms like Greenwood Acres could be significant given the growing market demand for organic food. Greenwood Acres, a registered organic vegetable farm, sells directly to the public through farmers' markets and Community Supported Agriculture (CSA). In CSAs, people buy a "share" in a farm which the farmers invest in growing crops. CSAs help link people with the sources of their food, promoting social connections and an understanding of how and where their food is produced. Greenwood Acres has also positioned itself as a site for socializing and education. Greenwood Acres hosts yoga, nutrition classes, weddings, social picnics and more to promote healthy living and help adults and children learn to reduce their impact on nature. With a well-structured volunteer and internship program, the farm engages many young urban farmers and activists. Greenwood Acres has also received grants to start a network of community seed banks to preserve rare and "heritage" species.

In regard to the latest offer from Concord, Greg is an intelligent person who enjoys spirited debate in order to gather useful information for decision making rather than just merely to win a discussion. He reminds the partners that when they started the farm, they had agreed to measure their success not only by their economic position, but by how well they protected and preserved the environment, promoted healthy living, provided good conditions for their workers, and contributed to the community. In part due to his objection to the practice of fracking, Greg has great concerns over the potential risks associated with allowing gas drilling on the farm. To be certified as an organic farm, owners must provide three years' of documentation of all substances applied to the land, documented management plans and consent to unannounced inspections by the certifying agent. The risks for contamination and damage are too great, and Greenwood Acres' brand would almost definitely suffer if they agreed to allow drilling. Taking such a risk at this time seems rather foolhardy with the organic market growing and prices for organic products on the rise.

While the matter of fracking inherently runs counter to his strong values toward sustainability and the environment, Greg has always been open-minded in hearing and considering a wide range of viewpoints and evidence, particularly from individuals that he respects. Greg realizes that the profit margins on a small farm are razor-thin, which makes it difficult to pursue capital improvements for the farm. Beyond the tiny margins, the estimated total cost of repaying the farm's mortgage is somewhere around \$600,000 over the next 28 years. Steady revenue

from a lease and royalties would provide financial security in covering the mortgage and a source of funding for future capital improvements for the farm. Greg also trusts Sally and John, as both have a great deal of experience in agriculture and have spent a great deal of time doing their own reading and research on the economic and environmental impacts of Marcellus Shale drilling.

4. Sally Williams and the Case for Economic Impact

Sally Williams, whose family has farmed in this area for generations, manages the day-to-day operations of Greenwood Acres and is committed to the business enterprise of local farming production. With her deep knowledge of the community and personal connections, she identifies the best suppliers and works with local officials to manage zoning disputes and hearings. She also has been paying close attention to the economic developments associated with the Marcellus Shale in Western Pennsylvania, and has attended several conferences on Marcellus Shale development held at the Department of Energy and Mineral Engineering at the Penn State University. Sally has a different viewpoint on the Marcellus Shale than Greg and John.

The Marcellus Shale is a formation of black shale (a sedimentary rock) which covers 95,000 square miles (60.8 million acres) and snakes through New York and Pennsylvania to parts of Ohio, West Virginia, Maryland, Virginia, Kentucky and Tennessee (see Figure 1). This shale contains deposits of natural gas that were inaccessible until the development of a process called hydraulic fracturing, or “fracking”. Fracking involves drilling down several miles and then sideways into the shale formation and injecting millions of gallons of water, sand and chemicals at high pressure to break up the rock and release the natural gas inside (see Figure 2). The ability to successfully implement fracking is leading to what has been described as a “modern-day gold rush” and an economic boon to landowners along the Marcellus Shale.

Figure 1: Ariel Picture of Marcellus Shale within Southwestern PA

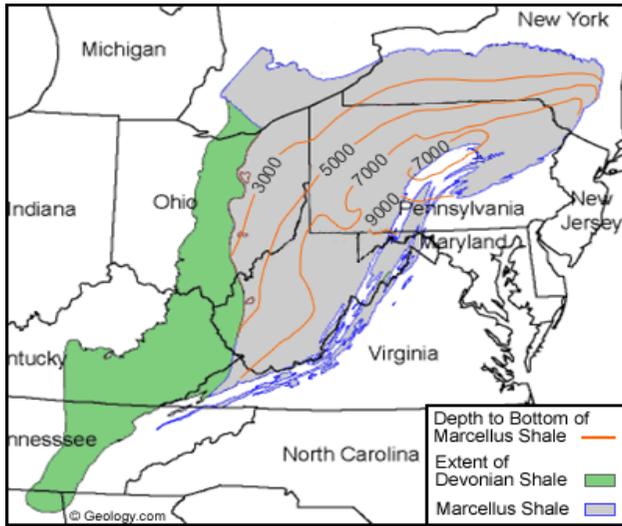
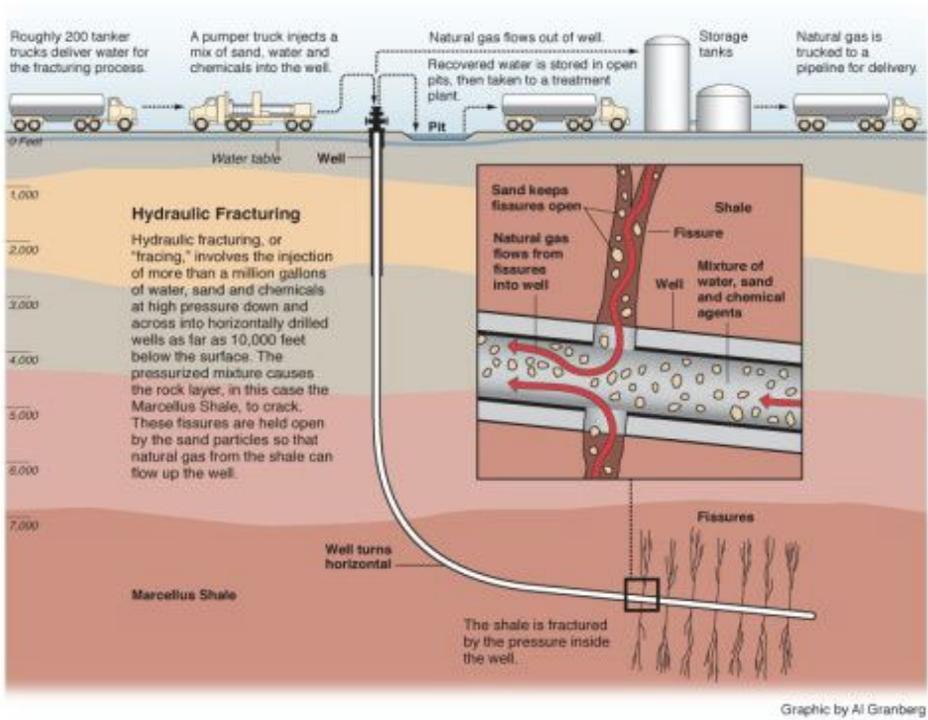


Figure 2: Overview of the Hydraulic Fracturing (“Fracking”) Process



In the material Sally has read so far, the development of the Marcellus Shale has been characterized by many commentators and scholars as a key factor in the future economic growth of the Western Pennsylvania region. According to an industry-funded study by Penn State University (“An Emerging Giant: Prospects and Economic Impacts of Developing the Marcellus Shale Natural Gas Play”), development of the Shale is projected to have generated \$2.3 billion in total value added and will spur job creation, with an estimated 110,000 jobs created in 2010 alone. In fact, the study found that for every dollar invested, \$1.94 was created in total economic output. With more than \$4 billion already invested in the Marcellus Shale, drillers have established a strong economic stake in the region (see Table 4).

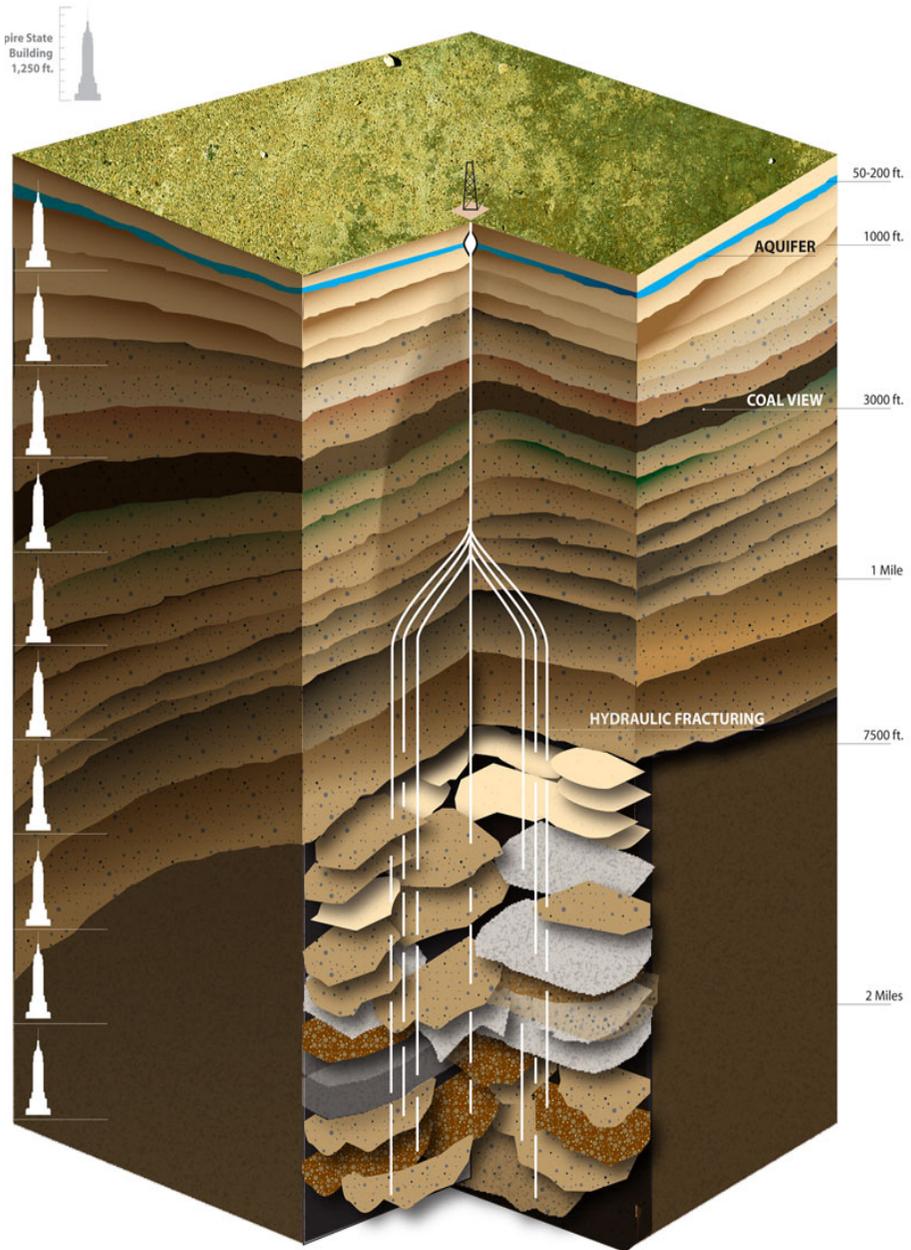
*Table 4: Current and Future Economic Impacts of Marcellus Shale Development*⁴

Year	Million 2008 US Dollars		Thousand
	Value Added	State & Local Taxes	Jobs
2008	2,263.0	238.5	29.28
2009	3,754.7	395.6	48.59
2010	8,271.8	871.6	107.04
2015	12,408.7	1,307.5	160.57
2020	13,500.2	1,422.5	174.70

Sally has also paid a great deal of attention to research on the positive environmental consequences of the Marcellus Shale. Because natural gas burns cleaner than oil and coal and emits fewer greenhouse gases, it has been touted as a bridge to green technology, but drilling raises environmental concerns. Fracking requires environmental safeguards including erosion/sedimentation controls, “fugitive dust” controls, well casing and underground cement barriers between the well and water-bearing geologic zones. In response to concerns about potential water contamination, industry leaders note that drilling occurs far below the surface. At 3,000-11,000 feet below the earth’s surface, this is well below the 1,000-ft depth of the aquifers from which people draw their water, so that if safeguards were to fail, water contamination is unlikely (see Figure 3).

4. Source: The Pennsylvania State University, College of Earth & Mineral Sciences Department of Energy and Mineral Engineering, 2009

Figure 3: Fracking Depths⁵



5. Source: Energy in Depth

She has also come across several industry association publications addressing the likely consequences of fracking. The process requires millions of gallons of water, sand, and chemical lubricating mixture. The Department of Energy estimates that fracking fluid is typically 98%-99.5% water, by volume. The remainder consists of chemical additives to assist the process (see Table 5 below). Flow-back fluid is stored in lined holding ponds/tanks on-site until it can be transported to a DEP-permitted facility or recycled. The average Marcellus Shale producer reuses nearly 60% of the water and continues to explore enhanced recycling, treatment and disposal options. Sites are continually monitored for worker and environmental safety. Since drilling necessarily disturbs the landscape, drillers negotiate with each landowner during the leasing process the terms for landscaping/contouring the property as close to pre-drilling conditions as possible. From everything Sally has read, opinions are mixed over the short and long-term impact on local water sources as a result of the fracking process.

While the fracking process is controversial due to its potential environmental consequences, natural gas itself is the cleanest-burning of all fossil fuels. Natural gas generates 30% less carbon dioxide than oil and nearly 45% less than coal. While burning natural gas does release methane into the environment, the reduction in overall greenhouse gas emissions from increased natural gas use strongly outweighs the negative impacts of the increased methane emissions. Shale gas is composed primarily of methane which some argue is preferred due to the emission of much lower concentrations of toxic nitrogen oxides and sulfur dioxides, 90% less soot and 99% less ash than coal and oil.

Marcellus Shale development could also help meet growing energy needs. The U.S. currently consumes natural gas at a rate that exceeds domestic production, and that gap is projected to grow (see Figure 4 below). In a study published by the U.S. Department of Energy, the authors note that if domestic reserves are not developed to close that gap, the U.S. will become increasingly reliant on foreign sources, decreasing our energy security and redirecting billions of dollars from domestic investment to foreign interests.

Developers note that energy comes with a price; there is always some risk and potential harm in working with natural gas. This is why all well sites are monitored and inspected regularly to make sites as safe as possible. They concede that the production process does strain roads and work with municipalities to minimize this impact: posting bonds to protect and repair roads, posting road flagmen, and repairing any impacts to the environment that may occur temporarily during the drilling process. However, many argue that natural gas drilling is safer than traditional coal drilling as evidence by a number of recent mining disasters such as those at Sago and Upper Big Branch mines (see Table 6 below).

Table 5: Chemicals Used by Hydraulic Fracturing Companies in Pennsylvania⁶

1,2,4-Trimethylbenzene	Glycol Ethers (includes 2BE)
1,3,5 Trimethylbenzene	Guar Gum
2,2-Dibromo-3-Nitriopropionamide	Hemicellulase Enzyme
2.2-Dibromo-3-Nitriopriopionamide	Hydrochloric Acid
2-butoxyethanol	Hydrotreated light distillate
2-Ethylhexanol	Hydrotreated Light Distilled
2-methyl-4-isothiazolin-3-one	Iron Oxide
5-chloro-2-methyl-4-isothiazotin-3-one	Isopropanol
Acetic Acid	Isopropyl Alcohol
Acetic Anhydride	Kerosine
Acie Pensurf	Magnesium Nitrate
Alcohol Ethoxylated	Mesh Sand (Crystalline Silica)
Alphatic Acid	Methanol
Alphatic Alcohol Polyglycol Ether	Mineral Spirits
Aluminum Oxide	Monoethanolamine
Ammonia Bifluoride	Naphthalene
Ammonia Bisulfite	Nitrolotriacetamide
Ammonium Chloride	Oil Mist
Ammonium Salt	Petroleum Distillate Blend
Ammonia Persulfate	Petroleum Distillates
Aromatic Hydrocargon	Petroleum Naphtha
Aromatic Ketones	Polyethoxylated Alkanol (1)
Boric Acid	Polyethoxylated Alkanol (2)
Butan-1-01	Polyethylene Glycol Mixture
Citric Acid	Potassium Carbonate
Crystalline Silica: Cristobalite	Potassium Chloride
Crystalline Silica: Quartz	Potassium Hydroxide
Dazomet	Prop-2-yn-1-01
Diatomaceous Earth	Propan-2-01
Diesel (use discontinued)	Propargyl Alcohol
Diethylbenzene	Propylene
Doclecybenzene Sulfonic Acid	Sodium Ash
E B Butyl Cellosolve	Sodium Bicarbonate
Ethane-1,2-diol	Sodium Chloride
Ethoxylated Alcohol	Sodium Hydroxide
Ethoxylated Oxtylphenol	Sucrose
Ethylbenzene	Tetramethylammonium Chloride
Ethylene Glycol	Titanium Oxide
Ethylhexanol	Toluene
Ferrous Sulfate Heptahydrate	Xylene
Formaldehyde	
Glutaraldehyde	

Figure 4. Comparison of Production, Consumption and Import Trends

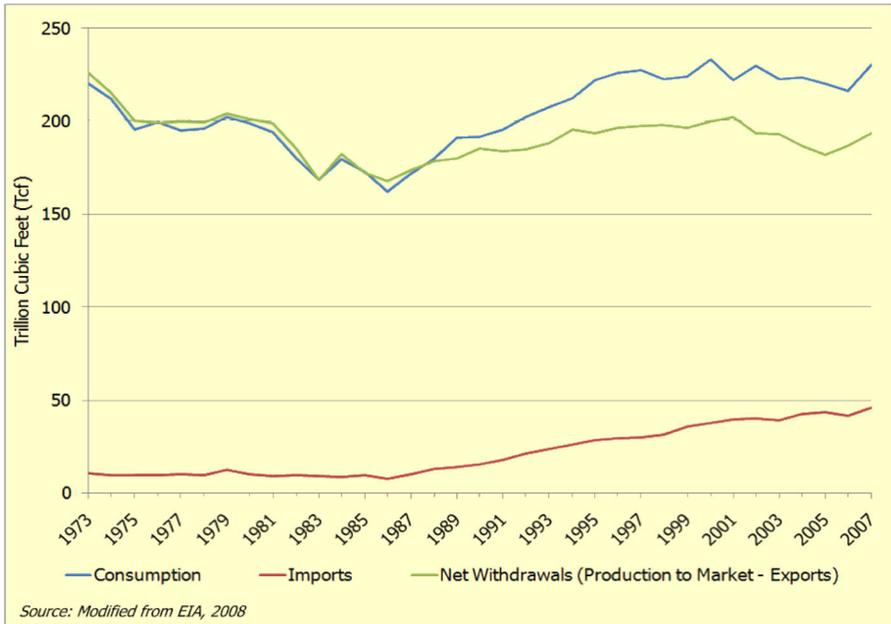


Table 6: Worst US Coal Mining Accidents since 1970⁷

Year	Day	Mine	Location	Type	Deaths
2010	04/05	Upper Big Branch Mine, Massey Energy Company	Montcoal, WV	Explosion	29
2006	01/02	Sago Mine, International Mines Corp.	Tallmansville, WV	Explosion	12
2001	09/23	No. 5 Mine, Jim Walter Resources	Tuscaloosa County, Brookwood, AL	Explosion	13
1984	12/19	Wilberg Mine, Emery Mining Corp.	Emery County Orangeville, UT	Fire	27
1981	12/08	No. 21 Mine, Grundy Mining Co.	Marion County Whitwell, TN	Explosion	13
1981	04/15	Dutch Creek No. 1, Mid-Continent Resources, Inc.	Pitkin County Redstone, CO	Explosion	15
1976	03/9-11	Scotia Mine, Blue Diamond Coal Co.	Letcher County Oven Fork, KY	Explosion	26
1970	12/30	Nos. 15 and 16 Mines, Finley Coal Co.	Leslie County Hyden, KY	Explosion	38

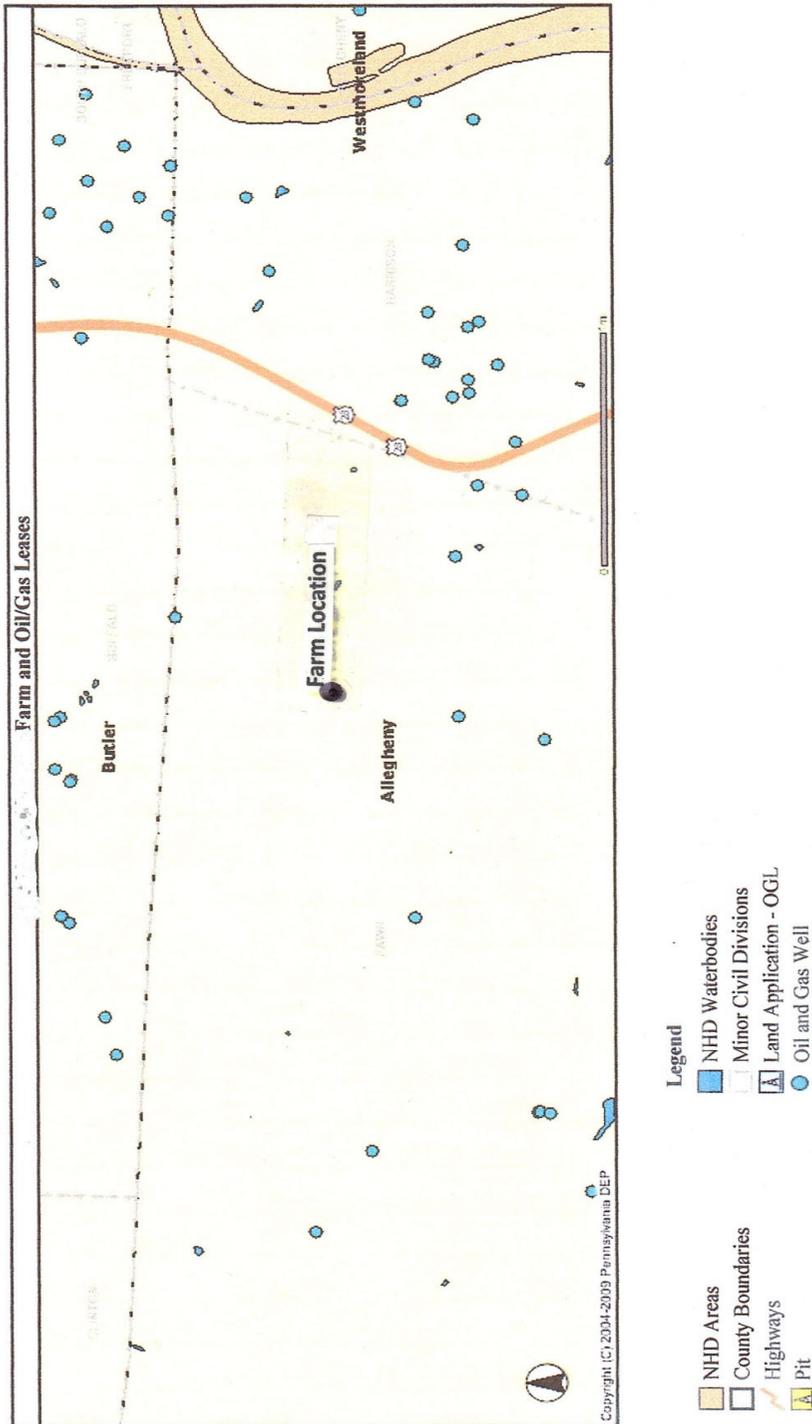
6. Prepared by the Department of Environmental Protection, Bureau of Oil and Gas Management and compiled from Material Safety Data Sheets obtained from Industry.
 7. Source: US Mine Rescue Association, compiled from Individual Bureau of Mines, MESA, and MSHA accident investigation reports.

With hazards properly managed, many believe that communities and individuals can benefit from drilling. Individuals who lease their property for wells or sub-surface drilling receive an immediate payout based on the acreage leased. Current payouts are reported in the range of \$40-\$5,750 per acre. Following the initial lease, leaseholders can potentially benefit from years of royalties if a productive well is drilled on the lease-holder's land. Leaseholders receive anywhere from 12.5% to 25% of revenues over the life of the well. Depending on the well, these royalties could be sustained over several decades. In 2010, 31 Pennsylvania landowners reportedly earned a collective \$1.2 million in royalties.

In Sally Williams's estimation, the decision on Concord's offer should come down to the economic and business impact of developing and drilling in the Marcellus Shale. Based on her own research and on discussions she has had with a local lawyer who has represented landowners in lease negotiations with gas companies, she believes that the property is worth more than \$2,500-per-acre. Due to its vital location in Concord's current plans for drilling in Natrona Heights, she would like to see the partners get the best possible offer in return for any lease agreement. She is a firm believer that the development of the Marcellus Shale is both an opportunity for local landowners and an important regional economic development focus for Western Pennsylvania but her primary focus is on the economic benefits for Greenwood Acres.

At the same time, Sally has always admired Greg for his commitment to sustainable agriculture and enjoys John's strong beliefs in support of the environment. Sally has always seen her business background as a tool that she uses to advance agricultural ventures, and is a strong believer that a free market can support social issues and concerns that benefit communities. For these reasons, she has been cautious in her approach to lease offers from gas companies, and is not willing to simply sell the leasing rights for Greenwood Acres to the highest bidder. For Sally, a lease-holder would have to be a thoughtful steward of the property. Selling lease rights would help Greenwood Acres to become a bigger and better organic farm (see Figure 5).

Figure 5: Map of Greenwood Acres



5. John Archer and the Case Against Fracking

The third partner in Greenwood Acres is John Archer, the resident agricultural expert who spends most of his time working on the farm. He also conducts workshops on farming, health and nutrition, and has a strong passion for educational issues surrounding nutrition and organic foods. With this perspective, John has taken a critical view toward the Marcellus Shale and Concord's offer to lease farm land from Greenwood Acres as part of its drilling efforts. After all that John has read and discussed on the issue, he has a number of grave concerns over the prospect of accepting Concord's offer and allowing drilling on the farm. Still though, John also understands that being an investor (or in this case, a leaseholder) is one of the best ways to monitor and control something vast and complex like the environmental impacts associated with drilling in the Marcellus Shale.

John's skepticism toward drilling in the Marcellus Shale stems from his distrust of industry studies and reports from companies that have a clear financial interest in drilling. For each industry assertion as to why drilling is safe, John has read studies and heard counter arguments from critics who have specific concerns. According to critics, industry claims that they are highly regulated are misleading, as the natural gas drilling industry has secured exemptions to federal regulations, including the Safe Water Drinking Act (SWDA), Clean Water Act (CWA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Superfund. Certain regulations vary state to state (see Table 7 below). Currently, Pennsylvania does not require disclosure of chemicals used, which reportedly number in the hundreds and include known carcinogens. Even with these relaxed regulations, the Pennsylvania Department of Environmental Protection recorded 1,105 violations (with 280 requiring enforcement) from January 2010 through November 2010. Violations range from the minor, such as failing to post permit numbers, to serious environmental health and safety violations, including discharge of pollutants into waters and structurally unsound impoundments. This questionable record-of-compliance from the industry has made John wary of leasing offers from gas companies (see Table 8 below).

Table 7: Oil and Natural Gas Regulation by States⁸

Category of Regulation	Regulation	# States with Regulation
Casing and Cementing <i>Process for Oil and Gas Wells</i>	Cement Set-up/Waiting Period or Integrity Test	21
	Production Casing Cement Height	18
	Production Casing	24
	Surface Casing Cementing Bottom to Top	26
	Surface Casing Below Deepest Ground Water	25
Well Treatment Reporting <i>Practice of providing information on well maintenance and upkeep</i>	Reporting Required	25
	Materials List Required	18
	Volume Use Specified	19
	Report List of Chemicals Used	10
	Report on Treatment Depths	22
	List Volume of Fluid that Flows to Surface	0
	List Estimation of Fluid that Remains in	0
Temporary Abandonment: <i>Allows oil and gas operators to keep wells intact rather than plug them when there is no production.</i>	Temporary Abandonment Allowed	25
	Permit Required	24
	Renewal Allowed	24
	Duration Limited	9
	Well Integrity Required	20
Well Plugging: <i>Permanent seal inside well and wellbore so fluid cannot migrate or create reservoir problems.</i>	Post Plugging Report Required	26
	Plugging Method Specified	14
	Notice of Intent to Plug Required	22
	Prior Plugging Plan Required	20
	Cement Across Ground Water Zones Required	22
	Cement Across Producing Zones Required	22
	Casing Cementing/Removal Required	17
Tanks: <i>Used for storage of oil and produced water.</i>	Dike Required	22
	Dike Capacity Specified	20
	Dike Maintenance Required	16
	Standing Fluids Inside Dike Prohibited	13
	Release of Fluids from Dike Regulated	17
	Tank Must Be Constructed in Manner to Hold	5
	Tank Construction Standards Specified	2
Pits: <i>Used to hold drilling fluids and waste.</i>	Duration of Use Regulated	16
	Prohibited in Water Table	12
	Distance to Surface Water	10
	Minimum Distance ("Freeboard") Required	16
	Liners Required for Some Types of Pits	23
	Prior Authorization Required for Construction/	19
Waste Handling and Spills: <i>Notification of problems and incident reporting</i>	Spill Notification Required	23
	On-Site Spill Remediation Regulated	20
	Cleanup Standard	12

Table 8: Selected Marcellus Shale Violations and Fines by Pennsylvania Department of Environmental Protection (DEP)⁹

Date	Company	Location	Violation Notes	Fine
Jan 2011	Minuteman Environmental Services	Clinton and Union County	Illegal dumping and storing natural gas drill cutting waste	\$7,000
Jan 2011	Chief Oil & Gas	Lycoming County	Illegal discharge of 25,200 gallons of hydrostatic testing water; “unknown industrial waste” was allowed to mix in with water prior to discharge	\$34,000
Jan 2011	Talisman Energy	Bradford County	“Large Diesel Fuel Spill”	\$24,608
Oct 2010	Seneca Resources	Tioga County	Illegal impoundment on exceptional value wetlands	\$40,000
Aug 2010	Atlas Resources	Washington County	Fracking fluid overflowed a waste water pit and contaminated tributary of Dunkel Run; Atlas failed to report the spill	\$97,350
Aug 2010	Talisman Energy	Bradford County	Spill – 4,200-6,300 gallons of fracking fluid into unnamed tributary of Tioga River	\$15,506
Jun 2010	EOG Resources	Clearfield County	Gas well being fracked experienced blowout, shooting fracking fluid and gas 75 feet into the air; well was out of control for 16 hours	\$400,000
May 2010	Range Resources	Washington County	Spill – 250 barrels of fracking fluid into waterway; company did not immediately report spill	\$141,175
Apr 2010	Stallion Oilfield Services	Canondale	Illegal fracking water transfer station; 450-square foot area showed signs of fracking water spill	\$6,500
Mar 2010	Pennsylvania General Energy	Waterville	Airfoam-HD (drilling process chemical) detected running into Pine Creek	\$28,960
Feb 2010	Fortuna Energy	Bradford County	Various – including discharge of fracking fluid into tributary of Sugar Creek	\$3,500
Jan 2010	M.R. Dirt	Avis, PA	Spill – 7 tons “gaswell drilling wastewater sludge	\$6,000
Oct 2009	Cabot Oil & Gas	Dimock, PA	Three separate spills totaling 8,000 gallons water/gel mixture into Stevens Creek and wetland	\$56,650
Jan 2009	Cabot Oil & Gas	Dimock, PA	Methane from wells contaminated residential water supply	\$4.1 million settlement

In addition to his questions over the practices of the industry, John has a number of concerns related to the fracking process, as natural gas drilling has the potential to have a negative impact on the environment in a number of ways. An average of 400 trucks are needed for fluid transportation during the fracking

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8. Source: The U.S. Department of Energy (2009 data) requested regulation information from the 27 states which represent 99.9% of oil and natural gas production in the U.S.
 9. Source: “Environmental Dangers of Hydro-Fracturing the Marcellus Shale”, Robert Myers.

process, often over roads that were not built for such heavy loads in rural communities unaccustomed to such traffic. There have also been instances of damages and injuries resulting from the accidental explosion of methane from wells contaminated by drilling. These are just a few examples of the types of safety and environmental concerns that critics of drilling cite as evidence as to why fracking should be heavily-regulated (or even prohibited). Some of these concerns are present already as owners of farms in the nearby area permit fracking on their land but in John's view the impact is much greater if Greenwood Acres permits drilling on their land.

John also questions Sally's belief that the development of the Marcellus Shale will have a significant positive economic impact on the region. While there is evidence that the economies of local communities have benefitted from Marcellus Shale drilling, there are other studies questioning the claims of economic benefit to Pennsylvania. Energy and drilling firms have reported that it is hard to find workers in Pennsylvania with the experience needed for the most lucrative drilling jobs; instead, those employers are hiring in other parts of the country (such as Texas) for those positions. Most of the job growth is projected to be in ancillary businesses: restaurants, shops and other retailers who will benefit from Marcellus Shale workers' spending. Unlike other states with natural gas drilling, Pennsylvania has not imposed a severance tax, which has cost an estimated \$130 million in lost revenue (see Table 9).

*Table 9: Estimated Severance Tax Value*¹⁰
 Estimated production for Marcellus Shale wells
 MCF = 1000 cubic feet

Year of Production	Yearly Production per Marcellus Shale Well (MCF)	Monthly Production per Marcellus Shale Well (MCF)
1	200,000	16,667
2	135,200	11,267
3	113,568	9,464
4	101,416	8,451

Time Period	Estimated Tax Loss
October 2009-May 2010	\$54,177,890
June 2010-January 2011	<u>\$76,241,274</u>
Total Estimated Tax Loss	\$130,419,164

Based upon Severance Tax Rate: 5% of sales price and \$0.047 per thousand cubic foot (MCF) as proposed in Governor Rendell's 2009-2010 Executive Budget. Sales price updated monthly using Henry Hub price data reported by the Federal Reserve Bank of St. Louis.

10. Source: PA Budget and Policy Center

John is not supportive of the lease offer from Concord. While he understands the argument that the Marcellus Shale lease could help bolster the farm's finances and create economic opportunity in the community, the environmental risks are too great. If there was an accident, the local water supply could be damaged irreparably. Beyond these environmental concerns, John also is cynical regarding the true value of a lease, especially if a gas lease could inhibit the owners' ability to secure a new mortgage on the property or to sell the land in the future. Ultimately though, John does not want to accept the lease because he does not believe that Concord, or any other gas company, can eliminate the possibility of serious environmental damage due to fracking.

Realistically, the only possible way to sway John from his strong opposition is to somehow provide strong evidence that individuals or organizations with a commitment to environmental stewardship will be directing the efforts to develop the resources associated with the Marcellus Shale, with a reputation for protecting the local water and food supplies from day one. John is a strong proponent of the need for water quality and access to clean water as the foundation of sustainable agriculture. Any chance of getting John to go along with a lease offer would have to go beyond the bottom line to display good industry practice and a commitment to the environment and local community development.

6. A Global Request for Greg

Moving away from the "food as a commodity" conversation and growing "food as human fuel", Greenwood Acres is leveraging the power of people who demand the best possible food for their families into a cooperative endeavor to grow, harvest and prepare farm fresh produce. The owners have created this environment for food production because of their personal commitment to their customer community and desire to produce the largest volume of nutrient dense foods in harmony with ecological cycles.

Greg's passion for "community farming" was recognized by an invitation to give an address at the Fédération Nationale d'Agriculture Biologique (www.fnab.org) in France to tell its farm story as part of the Le salon Bio Vivre Autrement (<http://www.salon-vivreautrement.com/>). This event is a well recognized international conference held to educate people across the world that small community based farms that savor rare flavors and share in the labors exist and should be preserved.

Part of the catalyst for the invitation was Greg's public questioning of industrial-related activities in conjunction with shale gas exploration and hydraulic fracturing. Greg had collected efforts on fracking's impact locally and has even produced briefing documents that discuss this matter within his region. Being asked to educate others on the potential risks associated with hydraulic

fracturing meant understanding the global impact of these practices especially on farming and local water resources.

Greg's research quickly uncovered fracking is a global social and environmental issue. Debates, analyses and governmental policies to either allow or to ban fracking were taking place around the world. A PBS broadcast entitled "Fracking Goes Global" discussed a global campaign entitled "Global Frackdown" with the goal to ban the practice of fracking worldwide. However, not every country was on board with recent efforts toward a global fracking ban. For example, in South Africa the government made a recent decision to lift its fracking ban despite citizen protest. As the world's fifth largest storehouse of natural gas, South Africa has a different set of challenges given that underground rights belong to the government which is not the case within the U.S. However, natural gas reserves are most plentiful within the Karoo Basin which is also rich farmland. The South African farmers greatest fear is that gas drilling will place a heavy demand on a region with chronic water shortages and contaminate their scarce water supply.

Differences in ownership rights around the world surfaced as a key issue for Greg as he researched the global fracking issue. Large untapped shale gas resources exist in China where the issue of overutilization of coal production for power has led to serious social and environmental issues such as smog and mine safety. Since the government owns drilling rights as well as some state-owned energy companies, there is an aggressive effort to develop new technology to allow fracking in a way that better utilizes water reserves while still harnessing the natural gas deposits. Similar efforts toward technology development were taking place in some parts of Canada where the government not only released restrictions on drilling but provided financial incentives to oil and gas companies to leverage the economic benefits of drilling for some regions. Perhaps the most extreme in terms of eliminating restrictions was Argentina (with the world's third largest known deposits of natural gas) that had removed virtually all obstacles for private global companies to drill across the country.

However, Greg learned that not all countries were embracing the economic and energy benefits promised by developing natural gas reserves using fracking techniques. In fact, in countries such as India, the explosion of fracking quickly produced competing environmental pressures that caused serious concerns for farmers and for the government. Within India, a substance known as guar can be used to treat the water to increase its effectiveness of the drilling process. However, India produces 85% of the world supply of guar which is used to feed families and livestock as well as a thickening substance in some food production (e.g., ice cream). This has led to concern by Indian farmers and the government over aggressive efforts to develop shale gas throughout the country as its negative impact on valuable guar availability.

Clearly addressing the global audience was going to be more of a challenge than Greg first anticipated. The economic promise of developing gas reserves

could add much needed resources to poor regions across the world. On the other hand, challenges to water, food and other natural resources could not be ignored. A report by a non-profit organization called Food and Water Watch¹¹ painted a disturbing picture of the direct impact of fracking on the world's water resources. Experts from this organization argue that shale development is not an environmentally friendly option for producing natural gas and has its most direct impact on water because of the millions of gallons of fracking fluid needed throughout the process that returns contaminated wastewater to the land. In addition, current fracking techniques require millions of gallons of water per well causing competing pressures between shale development and public water resources which are especially critical in some parts of the world. The debate on the importance of natural gas versus clean water resources has become a global debate.

This has led some governments to rethink fracking within their nations such as France, that placed a moratorium on fracking followed by a national ban. Similar bans have been put in place by governments concerned about preserving water reserves such as Bulgaria where shale gas resources are owned by the state instead of private owners as in the U.S. After reading reports, research studies and a number of commentaries, Greg now has to decide on the message to deliver to the global community concerning gas drilling and its impact on local farms and communities. However, what about Greenwood Acres? Could he deliver an anti-fracking message if the owners decide to sell leasing rights? On the other hand, could he support gas development globally if they do not sell the rights for shale development at Greenwood Acres? To answer these questions, Greg quickly turned his attention toward the immediate business decision facing him and the other owners.

7. Preparing for April 1st – A Meeting with a Team of Management Consultants

In summary, the three owners of Greenwood Acres have been approached by The Concord Resources Company and offered \$2,500-per-acre and a 20% royalty payment for a lease to allow drilling on the land. The lease must be signed by all partners in the property, but the partners are divided over whether to allow drilling on the property and if so, at what level. Concord officials have requested a meeting with the partners on April 1st, as company officials are trying to move forward with their ambitious plans to drill in Natrona Heights within the next two years. The unsigned lease and the April 1st meeting has generated some interesting debate between Greg, Sally and John regarding the case for and against fracking within their agreed-upon aim of developing Greenwood Acres

11. "Fracking: The new global water crisis" (2012). Food and Water Watch. Retrieved at: www.foodandwaterwatch.org

based on a business model to support organic farming as a viable means of enhancing the local food supply.

In preparation for this meeting, the partners would like to sit down with a team of consultants who have a business background, but are still well-versed in the broader social context surrounding the offer from Concord and the arguments for and against fracking as the means through which to develop the Marcellus Shale. While Greg and John have strong reasons to oppose drilling, both men recognize the importance of the economic impact of this offer on being able to sustain the farm operations. And, while Sally is supportive of the lease offer in principle, she wants to see the best possible deal for the future of Greenwood Acres. This involves both the terms of the lease itself and further analysis and discussion over the long-term impact on the local food and water supplies, as well as some consideration of the possible impact on Greenwood Acres' classification and reputation as an organically certificated farm.

Key Question:

1. What recommendation would you make to the partners and how would you apply the business case for ethics and social responsibility in support of your recommendation?