**Recommendations to the Allegheny College**

**Board of Trustees:**

**Natural Gas Leasing in the**

**Bousson Environmental Research Reserve**

**By the students of Economics 421 (Strategic Environmental Management), Spring 2013 – Edited by Don Goldstein, AW Robertson Professor of Economics**

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Strategic Environmental Management is an upper-level course elective in the Economics major, also popular with Environmental Science majors. The last third of the course was devoted to a case study of the deep-shale natural gas industry. The final assignment was to make recommendations to the Board on Allegheny’s managerial decision regarding Bousson reserve hydraulic fracturing (“fracking”) rights. In six teams, students took on particular aspects of the problem; each team presented its work to its peers for feedback and produced a written report. The reports have been edited together here, with a couple of consolidations for brevity and some minor additions.

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**Assignment Case Statement**

*“According to the College’s* [*Bousson Advisory Group*](http://sites.allegheny.edu/boussonadvisorygroup/)*, ‘In the summer of 2012, Allegheny College, as one of many regional landowners with property that overlies Utica Shale, was approached by leasing consultants about the possibility of gas exploration in the* [*Bousson Environmental Research Reserve*](http://sites.allegheny.edu/boussonadvisorygroup/bousson/)*.’ Given Allegheny’s sustainability leadership in the higher education field nationwide, the potential for deep shale natural gas (DSNG) leasing and royalty payments in the millions of dollars poses a difficult management challenge. Can the environmental impacts associated with DSNG extraction be reduced sufficiently to make the economic benefits worthwhile in this case? More broadly, is DSNG part of a transition away from the worst greenhouse gas performers and toward a much lower-carbon energy mix? How can the College’s economic and educational goals be balanced, and the interests of its key stakeholder groups addressed?”*

**Issues Summary**

1. Alongside its considerable economic benefits, hydraulic fracturing – like any fossil fuel extraction – is a heavy industrial process with serious and often unavoidable environmental impacts. Among the most critical of these in the Bousson context are surface disturbance from site preparation and logistics; large-scale water usage; potential ground water methane contamination from faulty well casings, and ground and surface water contamination from spilled or leaked toxic fracking fluid; and fugitive methane emissions to the atmosphere.
2. Recognized best management practices (BMPs) can guide companies in extracting natural gas in the most environmentally and socially responsible manner possible. BMP begins at the earliest development stage, involving engagement with stakeholders and planning at the overall project (not just the site) level, to reduce logistical impacts. It focuses on using recycled flowback water, rigorous well integrity standards and testing to prevent methane water contamination, and protected flowback water storage. Finally, fugitive methane emissions can be reduced by “green completion” wellhead technology and by equipment upgrades and close monitoring all along the supply chain. According to the International Energy Agency, the per-well cost of adopting these “Golden Rules” BMPs is estimated at an additional 7%.
3. Nevertheless, the voluntary nature of BMPs creates an uneven playing field. Fracking is exempted from most Federal water protection laws, and new U.S. standards on fracking air pollution will not be phased in until 2015. Pennsylvania’s Act 13 represents an improvement in some respects, increasing site setback requirements, bonds and penalties, and disclosure requirements. But these steps are partial, and are compromised by a tightening of the ban on local regulation of fracking. To a limited extent, these regulatory gaps can be filled by private stakeholder collaborations, such as third-party certification of DSNG operators. But one regulatory void cannot be fixed: the weakness of policy support for renewable energy development, as it is disadvantaged by fracking’s impact in reducing natural gas prices.
4. Thus, two major kinds of policy change would be required for hydraulic fracturing to be considered a sustainable “bridge” component of a national energy strategy. First, stricter Federal and state regulations would be needed to reduce impacts and encourage improved extraction technologies. Even under the most optimistic renewables scenarios, the U.S. will need a lot of fossil fuel during the next quarter-century. DSNG can only be a preferred source if its extraction and use can be cleaner than is possible under a patchwork of weak rules and laws. Second, policy would need to take advantage of the breathing room and revenue provided by DSNG to hasten the development and adoption of renewable energy technologies.

**Recommendations to the Board**

Class discussion focused on the stakeholder and market issues facing the College. On the one hand, Allegheny faces cost pressures that affect students and alumni in their roles as “customers” and funders, and the potential for natural gas revenues to ease those pressures is keenly felt by these constituencies. At the same time, the College’s paramount strategic goal is to advance our reputational standing in the national, liberal arts sphere by means of focused excellence, innovation, and messaging. A key distinction up to now has been Allegheny’s role and reputation as a higher-education leader in environmental education and performance – especially in the area of climate change. While the financial damage from losing natural gas leasing revenues would be greatest in the short run, the potential reputational costs of compromising our environmental “brand” could set the College’s national strategy back many years.

With these stakeholder factors in mind, and considering the issue findings summarized above and detailed in following sections, the class agreed on the recommendations below. They were supported by a large majority of the students.

1. Allegheny College should engage with the natural gas extraction companies and other property owners and potential lease holders, with the goal of advocating a “Golden Rules” lease incorporating stringent best management practice requirements – including third-party certification by the Center for Sustainable Shale Development. Thus, a first step would be to charge an appropriate College body with developing a model lease proposal. **Only if a Golden Rules lease can be negotiated should Allegheny enter into an agreement for Bousson fracking rights.**
2. If the first recommendation can be satisfied, **the College should dedicate a significant portion of the leasing proceeds to supporting the development and adoption of renewable energy.** This should be in addition to all such support that Allegheny currently provides. It could take the forms of energy purchasing, contributions to established research and development efforts, and educational activity at the College. We suggest a “tithe” approach: 10% of lease revenues.
3. If it enters into a Bousson leasing agreement, **Allegheny should seize the educational opportunity it represents with respect to the first two recommendations.** Faculty and students should be encouraged to engage with defining, supporting, monitoring, testing, and improving the BMPs in the extraction lease. Similar involvement should be facilitated with regard to renewable energy development, both on campus and in collaboration where possible with peers at other schools.

By pursuing these recommendations, Allegheny College can contribute to the national debate on fracking. We can play a true leadership role within the community of our geographical region. We can model the liberal arts practice that we seek to instill in our students. And, if the three recommendations can be met, we can strengthen the College’s financial future while enhancing, not damaging, our national reputation as an environmental leader.

**Background Analysis**

1. *Key Environmental Impacts*

Our research shows that alongside the undoubted economic benefits of hydraulic fracturing, there are serious, and in certain cases unavoidable, environmental impacts. The extent of some of these impacts is well known, but important ones are still uncertain in severity. We focus on four main areas of impact, which will be relevant to the best practices recommended for Allegheny to insist upon: extraction site construction and logistics, water usage, water contamination, and air emissions.

Preparing a well pad location for hydraulic fracturing causes much destruction to the local ecosystem.  The need for new roads, pipelines, flowback water storage, and space for trucks and equipment typically requires extensive forest clearing.  When multiplied by the number of wells (there have been over 9,600 well permits in 2000-2011 in Pennsylvania alone), this “has been shown to negatively affect water quality and runoff…biosphere-atmosphere dynamics that could contribute to climate change…(and) even the long-term survival of the forest itself” (Slonecker et al., 2012). These effects include destruction of habitats, opportunity for invasive species, and heavy short-term road usage leading to fumes and runoff of maintenance chemicals.

The average amount of water used in fracking one well is 5 million gallons. This water either comes from local sources or is trucked in from an outside source. If extracted from local sources, the water use decreases the quantity of water available for other purposes, which in locally sensitive cases may lead to water shortages and even habitat destruction.  When water is trucked in from an outside source, it requires additional truck traffic.

Water contamination from deep-shale gas extraction arises from two main sources. One is methane contamination of ground- and well-water. While the extent of this is controversial, research in the Marcellus shows that water wells near active fracking sites have a greatly elevated likelihood of methane contamination, whose chemical “fingerprint” suggests it is coming from fracked deep-shale deposits and not from natural or old drilling sources closer to the surface (Osborn et al., 2011). The probable cause of such contamination is gas well casing failures.

The other main concern is fracking fluids, which contain chemicals that could potentially harm human health through water source contamination.  Studies have shown that some of these chemicals are considered human carcinogens, hazardous air pollutants under the Clean Air Act, and chemicals regulated under the Safe Drinking Water Act for being harmful to human health. Groundwater contamination can happen through faulty well sealing and casing, old abandoned wells, natural fractures connecting with the new fractures creating a conduit, and using waste water for road dust control (Cooley and Donnelly, 2012; Hammer, 2012). After fracking, waste water (“flowback” or “produced water”) poses another problem. Nearby soils and waters can be contaminated by accidental spills and mismanagement, and “(o)pen pits create a tremendous hazard, from the threat of being flooded and leakage to a pathway for human and animal exposure to chemicals through volatilization of chemicals sitting in the pits” (Catskill). But disposal options are also problematic. Deep-well injection back into the ground can contaminate groundwater and trigger earthquakes (Cooley and Donnelly, p.24), while treatment in centralized waste treatment facilities can introduce high levels of pollutants such as bromide into the local water (NRDC, p.4).

Air quality is also affected by fracking. At a large scale, the most important problem is the release of fugitive emissions: uncaptured methane gas that escapes when the gas, water and fracking fluid is brought back up out of the well (Fischetti, 2012). According to Steven Hamburg (2013), methane is a strong greenhouse gas that, uncombusted, “is 72 times more powerful at increasing the retention of heat in the atmosphere … than carbon dioxide [on a pound for pound basis].” Estimates of the rate of fugitive emissions over the lifetime of a deep-shale gas well range from 1-2% of total gas extracted (EPA), which is consistent with the gas-as-climate-solution case, to 4-8% (Howarth, 2011), which would make fracking worse than coal-burning, climate-wise. In addition, a study done by the Colorado School of Public Health shows that in local areas fracking-related air pollution “contributes to acute and chronic health problems for those living near natural gas drilling sites” (Banerjee, 2012). Some of the toxins that have been discovered in the air space near natural gas wells include benzene, an identified carcinogen, ethylbenzene, toluene and xylene; exposure to these toxins has been linked to asthma symptoms, acute childhood leukemia, and multiple myeloma (Banerjee, 2012).

It is clear that the key environmental impacts of fracking have negative effects on the environment as well as human health. Thus it is important to consider how to reduce/eliminate these impacts in order to consider hydraulic fracturing a bridge fuel to a renewable energy future.

1. *Best Management Practices*

Gas companies who consider the social and environmental externalities of fracking alongside the traditional economic concerns often see a benefit by not having to pay for environmental or social disasters after the fact and maintaining the “social license to operate.” Industry professionals, regulators, investors, and other key stakeholders have developed a variety of best management practices (BMPs) to guide companies in extracting natural gas in the most environmentally, socially, and economically responsible manner. Corresponding to the environmental impacts detailed above, we consider BMPs in the areas of site planning and development, water consumption, well integrity, use and disposal of fracking fluids, and air pollution. It will be seen that many of these recommendations deal with leakages from equipment malfunctions, procedure failures, and accidents, which are thought to account for the greatest category of concern and most prominent argument for best management (Jackson et al., 2011). Our listing of BMPs is not intended to be definitive, but can serve as a starting point as Allegheny College charts its course for the Bousson reserve.

BMPs for site planning and development are crucial, as they establish guidelines and policies that will affect the entire process, up through restoration. As stated by the Investor Environmental Health Network (IEHN, 2013), extraction companies are expected to engage with stakeholder groups before, during, and after the fracking process: providing transparency, addressing concerns, resolving conflicts through third parties, and disclosing information (including any fines, penalties, and infractions). It is necessary to conduct baseline testing of the surrounding soil, air, and water for reference throughout the fracking and restoration processes.  Planning should occur at the level of the overall project, not just at the site level. This can facilitate clustering of wells on well pads and of well pads in close proximity to each other, which can allow sufficient site density to reduce logistical impacts: fewer new road constructions, less widespread truck traffic, and the possibility of piping rather than trucking in water supplies (IEA, 2012).

The best practices to mitigate some of the implications of water usage require dealing with social and environmental water scarcity. Gas companies should understand the water needs of the local area, avoid getting water from stressed areas, use non-potable sources where possible such as water from acid mine drainage or (especially) recycled flowback, and use pipelines to transport water to limit the disruptive truck traffic to the area (Jackson et al., 2011).

BMPs to prevent groundwater contamination address, first, well integrity to prevent methane leakage in the depth ranges of relevance to water wells and groundwater supplies. In drilling and gas extraction, best management practices encourage companies to look down their supply chains and ensure that proper procedure is being followed at all levels.  Supply companies must strictly construct, test, and monitor their casings and drilling equipment to prevent cracks and malfunctions (API, 2009).  These companies should also be provided with incentives to constantly improve and implement new technologies to make the entire process more clean and efficient (Jackson et al., 2011).

Secondly, preventing water contamination involves BMPs on fracking fluids. Proper care and attention must be given to pipes, storage tanks, and other systems that transport or store flowback water and other waste chemicals. Gas companies should store flowback water in closed, covered tanks, use pipelines to limit the chance of spills, and have well-rehearsed spill response plans and equipment ready. The expected BMP for dealing with flowback water is to treat it so that it can be reused. In addition to reducing the burden of fresh water usage, this eliminates the risks of deep-well injection disposal and of overwhelming the capabilities of wastewater treatment plants. If the latter must be used, gas companies must ensure that any plant that receives flowback water has the facilities to handle its quantity and makeup (Cooley & Donnelly, 2012; IEHN, 2013).

The best practices for fugitive air emissions are first and foremost targeted at reducing the release of methane into the atmosphere. Venting (uncombusted gas) should be eliminated entirely, and flaring (burning off gas) kept to a bare minimum (IEA, 2012). Rigorous baseline and ongoing air quality testing should be used to quickly locate and fix any unusual emissions, and “green completion” practices and equipment used throughout to minimize routine and accidental methane releases (IEHN, 2013). In addition, public safety must be protected by having in place an action plan that addresses preventive measures, immediate reactions to emergency releases, and corrective actions for failures. Finally, air quality can be improved by attention to the truck fleet used in the transportation process. BMPs include lightening loads by transporting chemicals in a dry state as opposed to a wet state, and transporting water in pipelines instead of by truck where possible (Marcellus Shale Coalition).

1. *Regulatory Frameworks and Other Incentives*

Given the seriousness of fracking’s environmental impacts and the importance of using best practices to reduce them, how adequate are the regulatory frameworks within which this activity takes place here in Pennsylvania? This section addresses that question, and considers additional means by which BMPs can be encouraged.

Although there are many Federal and state regulations dealing with natural gas and oil exploration, many have limitations and loopholes. Furthermore, the lines are often blurred between Federal and state rules and guidelines. At the Federal level, there are three primary acts that are relevant to water-related fracking emissions and pollution: the Safe Drinking Water Act (SDWA), the Clean Air Act, and the Clean Water Act. Unfortunately, hydraulic fracturing and horizontal drilling are exempt from many important provisions of these acts. The Underground Injection Control program of the SDWA regulates the placement of subsurface fluid but mostly exempts hydraulic fracturing. In addition, the “Halliburton Loophole” in the SDWA allows hazardous chemicals to be injected in or near fresh-water aquifers and underground water sources (EPA, N.d.). In the 1987 amendment to the Clean Water Act, an EPA permitting program for storm water runoff was developed, but oil and gas was largely exempted. In the 1990 amendment to the Clean Air Act, limits on emissions were strengthened, but fracking wells were, again, exempted from certain protections. The Resource Conservation and Recovery Act (RCRA) excludes oil and gas from its coverage (EDC, 2011).

Federal law on fracking is evolving, but – given the rapid spread of this process – too slowly. While many agree that more comprehensive Federal regulations are necessary to protect communities and natural habitats, it is important to point out the lengths that Pennsylvania legislators specifically went to so these things would be protected. By signing Act 13 into law on February 14th, 2012 Governor Tom Corbett made Pennsylvania among the most tightly regulated states in the country in regards to hydraulic fracturing; but even these regulations alone are not adequate in many respects (Center for Climate and Energy Solutions, 2013).

Act 13 tightened the fracking approval process, and it increased bonding requirements and fines for violations. Maximum criminal and civil penalties under Act 13 have increased by a factor of three (“Act 13”, 2012). All fines are listed online, which allows the public to understand who is taking this process seriously and who is not.

Minimum well setbacks from buildings, water wells, streams and other bodies of water, and public water supplies were increased in comparison to prior levels (Hauser, 2010). Containment plans must the ground surface or off the well site. Pits with equipment must be able to hold the volume of the largest container stored in the area plus ten percent to ensure room for miscalculations. Casings, metallic pipelines, all tanks, and all other structures must be properly installed and reported according to DEP standards as well (Pennsylvania DEP, 2012).

The operator is responsible for the area up to 2500 feet around the well for up to a year after completion. This protects more businesses and homes, which was needed, since we do not know the long term health effects fracking has on the environment, communities, and citizens surrounding it (Pennsylvania DEP, 2012). An annual inventory of air emissions helps researchers figure out long term environmental and health impacts.

Inspection and transparency are two areas Act 13 really focused on revising. On site inspection is now required once the erosion and sediment control liners are in place before drilling. The Act requires disclosure of all chemicals and concentrations used in the hydraulic fracturing process within 60 days of completed fracturing. Sites like FracFocus.org have been set in place by the DEP with reports, including penalties if any, of all well-sites in the state, and the DEP requires 24 hour notice on this site prior to critical drilling stages. Within 30 days of completion of drilling a well, when the well is capable of production, an operator must file a record with the DEP that identifies the chemicals used and where they come from. However, some of this is allowed to fall under the “trade secret” category as designated by the DEP. In terms of wastewater from this process, unconventional well operators are required to maintain records for five years and make these records available to the public upon request (Pennsylvania DEP, 2012).

While these are all good laws, more air emissions and other reporting should be required, perhaps monthly because of the uncertainty of this process in the long run. And the fines are still not enough, since given the millions of dollars in revenues involved, most oil companies will not think even the highest penalty allowed under the Act ($75,000) is really that big.

Thus, hydraulic fracturing adjacent to Allegheny College’s Bousson property would be done under PA laws that are much stricter than the national ones, so while “fracking” may not be the cleanest right now that it has the potential to be, it is not a procedure that should be immediately dismissed. But it is important to consider how the regulatory structure could be strengthened, and what other incentive approaches could complement regulation in encouraging best practices.

In order to achieve the “social license to operate” (IEA, 2012) and be accepted by the public, the industry must solve information and coordination problems: a firm’s environmental improvement is affected by the actions of many companies across a complex supply chain and is difficult to credibly communicate to a justifiably suspicious public (Schaltegger et al., 2003). Often this will require that the natural gas industry develop new capabilities and market relationships, allowing for profitable BMP implementation even while reducing social and environmental externalities. We first address regulatory changes that could move in this direction. Then, we will go on to examine the role of stakeholder partnerships in partially filling the gaps in the existing regulatory framework.

Porter and van der Linde (1995) suggest that well-designed regulation aims for “increasing regulatory coordination” (113), “seeding and spreading innovation” (111), and implementing “clear goals, but flexible approaches” (110). An important step that has already been taken toward regulatory coordination across Federal and multiple state levels is FracFocus. This is a national fracking chemical disclosure registry run by the Interstate Oil and Gas Compact Commission and the Ground Water Protection Council, each of which is comprised of the relevant governmental agencies from multiple states (FracFocus, N.d.). Currently ten states, including Pennsylvania, require deep-shale gas producers to use FracFocus to make the chemicals they employ searchable online down to the individual well level. This kind of transparency can be a spur to improved environmental performance.

Clear goals with flexible approaches can be applied to improved regulation in at least two areas. To encourage the reuse of flowback water, a fee per thousand gallons of fresh (not previously used) water per well is recommended, with the rate per gallon rising as the amount of water per well increases. And a limit on overall fugitive methane emissions to air is recommended, one that allows specific companies to develop their own innovative and cost-efficient means of reaching the target.

On the other hand, the environmental impacts of some practices are so critical that sound regulatory principles suggest they simply be banned. This would apply to venting of natural gas at the wellhead, as it contributes to greenhouse emissions in a way that completely negates the climate-related case for fracking, and thus for tolerating its other serious and undeniable environmental problems. Local communities should be empowered, within reasonable limits, to make certain kinds of decisions regarding what practices are acceptable. Thus, Act 13 should be amended to give local government the ability to set zoning regulations on the location of drilling sites. Local regulation can also address concerns regarding noise and road damage from truck traffic and be used to encourage clustering of wells.

In the absence of these regulatory changes, various types of partnerships can be used as venues for negotiation that sets goals, encourages transparency, and defines the responsibilities of the natural gas industry. An important existing initiative is the Center for Sustainable Shale Development, a nongovernmental coalition that recently established a third-party certification based on a set of strong BMPs (CSSD, 2013). It has been argued that voluntary certification is a poor substitute for strong regulation, especially for an industry whose product is a commodity and whose customers are unlikely to exert market pressure for certification (Climate Hawks, 2013). But lacking such regulation, and when there is a downstream party like Allegheny College with the potential to play a strong role in encouraging certification, it can provide an important incentive for BMPs.

Overall, we suggest a re-design of the regulatory framework to ensure that the most effective BMPs are implemented. Allegheny College can participate in this process as a leading partner in coalition groups that encourage transparency and the spread of innovation. The College could also develop a “perfect lease”, in which the administration and faculty fulfill the aforementioned role of the government as a regulatory body in the implementation of BMPs.

1. *Sustainability Analysis*

The managerial context of Allegheny College’s decision on Bousson extraction rights suggests that fracking’s environmental impacts and their potential reduction are a critical question. Having surveyed those impacts, ways of mitigating them through BMPs, and approaches to incentivizing best practices, we conclude by exploring just how environmentally sustainable deep-shale natural gas extraction can be. How consistent can widespread fracking be with basic goals for cleaner energy and environmental protection, given current U.S. energy and environmental policies? And would natural-gas fracking play an important role in a more optimal policy framework? Because of Allegheny’s visibility as a leader in the area of climate change, we focus mainly on climate impacts and strategies.

In the existing policy setting, to what extent can BMPs reduce environmental impacts to acceptable levels? With their application, can deep-shale natural gas be an important bridge between our current situation and a clean-energy future? Despite positive claims from industry leaders, the preceding material suggests that fugitive emissions, water usage, well integrity, and flowback water handling are critical concerns. The foregoing also suggests that BMPs exist that can reduce these risks to reasonable levels at acceptable costs, at least for the last three issues. (An International Energy Agency study (IEA, 2012) estimates a 7% per-well cost increase in conditions like the Marcellus.) Fracking is, like any fossil fuel extraction, a heavy industrial process with serious impacts; but given the country’s short-midterm trajectory for energy demand, and even optimistic scenarios for renewables supply, much of our consumption will have to be provided by fossil fuels for at least a quarter of a century.

Is deep-shale natural gas the preferred source for supplying this needed short-to-medium run fossil fuel? Most fundamentally for climate concerns, this depends on how much fugitive methane emissions escape from thousands of drill sites and the related network of pipelines and processing, storage and combustion facilities – and to what extent this can be reduced by BMPs. Unfortunately, the answers to these questions are simply unknown at this point. Alvarez et al. (2012) argue that anything below a 3.2% fugitive emissions rate would make converting the nation’s coal-fired power fleet to natural gas a gain in climate change terms. While the most recent EPA estimates do not contradict industry claims that this rate is actually at 2% or below, some research studies have suggested it is considerably higher (Howarth et al., 2011). Given this uncertainty, further research is critical. And in the meantime, it is clearly important to push the frontier on BMPs aimed at reducing fugitive emissions.

A potential problem with all of these BMPs involves the Boards of Directors of extraction companies. Best practices as currently understood dictate that an outside member of the Board be appointed to oversee the management of environmental, health, safety, and social impact risks faced by the fracking company. If only one member needs to have specific expertise in managing these impacts, how can they guarantee that the company is efficient in minimizing these negative externalities? How much commitment does a company display simply by designating a Board member this way? Experience with “business as usual” in energy companies suggests that this is unlikely to be sufficient.

What we see are business and public policy decision makers motivated by fracking’s economic reward, which may be a reason for a lenient regulatory environment and poor corporate performance. Accordingly, America’s current status quo suggests that we are not too concerned with bridging towards a cleaner energy alternative. Policy makers have the idea that our current policy and market scenario is aligned with a sustainable economic and environmental future even though BMP as actually observed is not proven to prevent some very serious environmental impacts. And even with continued improvement in voluntary BMPs, the game is lost if low natural gas prices impede the development of renewable energy.

What policy changes could shift us toward a bridge-fuel scenario for deep-shale gas extraction, and what are the implications for Allegheny’s Bousson decision? A look into “sustainability” helps create a starting point.  Fricker (2006) states that the concept of sustainability is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.  The three pillars of sustainability – economic growth, social responsibility, and environmental concern – are important in order for stakeholders to capture the most gain. With this in mind, two major kinds of policy change would be required for hydraulic fracturing to be considered a sustainable “bridge” component of a national energy strategy. First, stricter regulations would have to be in place to reduce impacts and encourage improved extraction technologies; and second, the time and the revenue provided by fracked natural gas would need to be used to hasten the wider viability of renewable energy technologies.

To begin with, the process for extracting DSNG needs to be regulated by the Safe Water and Drinking Act and other major environmental law from which it is currently exempt.  Guidelines for tighter, better regulation can be found in the International Energy Agency’s “Golden Rules” (2012). Many of these recommendations have already been discussed as BMPs. The outline of the Golden Rules are: to integrate engagement with all stakeholders into each phase of a development, establish baselines for key environmental indicators, utilize continued monitoring during operations, require robust and tested well design in synch with well site geology, develop strong clean up strategy, seek opportunities for realizing economies of scale, coordinate development of local infrastructure, take a broad view of environmental responsibilities, and continuously pursue improvements of regulations and operating practices. All of the specifics should be designed according to Porter and van der Linde’s principles for smart, efficient environmental regulation (1995).

The point here is that only when the playing field is leveled by using regulation to make them apply to everyone can fracking and deep-shale gas be a major, transitional part of a long-term sustainable energy and climate strategy. The Golden Rules act as the central nervous system for this side of an effective strategy, earning the industry its “social license to operate.” But the IEA’s own case for a Golden Rules scenario indicates that they will not be enough.

It is now well understood that the shale-gas boom is discouraging the growth of the renewables market (IEA, 2012; Doran and Reed, 2012).  As DSNG has become more prominent, the price of the resource has dropped, putting renewables at a competitive disadvantage.  This means that explicit, proactive steps must be taken for DSNG to become a bridge fuel.  These include policy changes for carbon pricing, renewable energy, and the use of revenues obtained from DSNG.

The first step should be a policy such as a carbon tax or a cap and trade permit system. Either would increase the cost of coal, oil and natural gas and allow for renewables, such as wind and solar, to continue to become more competitive with fossil fuels. In either approach, the costs are being paid by those who are negatively affecting the environment. Market based incentives like these generally allocate the costs more efficiently than a command and control system, by encouraging the affected firms to innovate and getting the bulk of the environmental gains from the ones who can provide them at lowest cost. In addition, the revenues from either can be collected to further invest in renewable energy.  This is important, because when major, systemic shifts in technology are involved, market forces almost always need to be complemented by targeted public support for adoption.

Thus, the second step is to increase public support for renewable energy research, development, and implementation. Even without proceeds from carbon pricing, which is politically dubious in the short run, an extremely small tax on shale-gas revenues could generate a very large pool of funds for public renewables investment. For example, the government could encourage hybrid energy plants that can use renewables but employ natural gas as a backup. There are other kinds of public support that in other countries have successfully provided the framework for faster transitions toward renewable energy – which, in our view, should be the pivotal goal of national energy and environmental policy (Doran and Reed, 2012) – and policy makers here should extract the lessons for the U.S.

Of course, Allegheny College does not have the luxury of waiting around for these policy changes to occur before deciding what to do regarding leasing the underground extraction rights for the Bousson reserve. Nevertheless, the strategic principles discussed above can provide useful guidance:

A Golden Rules regulatory agenda suggests that Allegheny sell Bousson’s extraction rights only under a specially-negotiated lease that commits the natural gas operators to a set of stringent BMPs, including third-party certification by the Center for Sustainable Shale Development.

A renewable energy support agenda suggests that if an acceptable lease can be negotiated, Allegheny should pledge a specified portion of the financial proceeds to furthering the progress of renewable energy in the U.S. This support should be in addition to what the College is already doing in this area.

In both regards, involvement by students, faculty and staff could play an important role in furthering implementation by making it integral to the College’s educational process. A Golden Rules lease would provide opportunities in monitoring, testing, evaluating, and innovating BMPs. Deepened renewable energy support could lead to creation and funding of new faculty and student research here at Allegheny. Both BMPs and renewables work could involve new collaborations with peers at other schools in the areas of discussion, research, and advocacy.

The proposed criteria for Allegheny’s participation in natural gas leasing in the Bousson area are stringent. The College should go into lease negotiations and landowner discussions with a firm willingness to walk away from the table if these guidelines cannot be met. Whichever way it goes, the very act of initiating the necessary conversations will move the national debate on fracking and energy and climate policy forward, and at the same time promote a public stance for the College that is consistent with our mission, principles, and brand.

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