

Comments on the Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Program: Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Resources (SGEIS)

Submitted to New York State Department of Environmental Conservation

Respectfully Submitted by Jannette M. Barth, Ph.D., Economist , Pepacton Institute LLC, PO Box 127, Croton on Hudson, NY 10520, on January 9, 2012

Attachments: An additional 19 documents are included in hard-copy form.

The Economic Assessment conducted by Ecology and Environment, Inc. (E&E) is inadequate and unacceptable. Economic benefits, including employment, income and tax revenue, are highly exaggerated and significant economic costs are ignored.

While it has been reported that DEC Commissioner Martens has asked E&E to do some additional work, it is unclear if the revised assessment will be sufficiently comprehensive to provide a proper basis on which to make decisions regarding shale gas exploration and development in New York State. In a letter to Governor Cuomo, dated December 14, 2011 (Attachment), I, together with two fellow economists, outlined many of the flaws in the assessment done by E&E. When Commissioner Martens later indicated that the work done by E&E was “a little thin” and that additional work has been requested from E&E, I wrote another letter directly to the Commissioner, dated December 29, 2011 (Attachment), stating not only that the public must be allowed sufficient additional time to comment on any revisions to the economic assessment, but also that E&E may not be qualified to do the in-depth analysis that is required. This letter, written on behalf of Catskill Citizens for Safe Energy, was endorsed and supported by over 100 additional organizations and elected officials.

My comments below provide a summary of some of the many omissions, exaggerations and flaws in the economic assessment conducted by E&E. Several critical questions are also asked. Note that one of the studies that is frequently mentioned by gas industry representatives here in New York is the Public Policy Institute’s (PPI) “Drilling for Jobs: What the Marcellus Shale Could Mean for New York,” July, 2011. I am attaching my recent critique of this PPI study, “Critique of PPI Study on Shale Gas Job Creation,” Jannette M. Barth, Ph.D., January 2, 2012 (Attachment). Many of the flaws, omissions and exaggerations in this PPI study, and in the other industry funded studies, also apply to the economic assessment done by E&E. It appears that the assessment done by E&E may have been done in order to please and support the gas industry, instead of to protect the people of New York.

A thorough research effort normally begins with a review of the relevant literature, yet it is clear from the list of references in Section 5 that a literature review was not conducted. There is extensive independent and academic literature that has been

written and published on the subject of economic impact of extractive industries, and these research findings have been ignored. Did E&E fail to conduct a thorough literature review? Or did they simply omit the results of that review? Is it because the unbiased research concludes that areas with extractive industries are economically worse off in the long run? For just a few examples of unbiased research, see “Selected Quotes from Unbiased Research on the Economic Impact of Gas Drilling and Other Extractive Industries,” (Attachment).

A major concern, as evidenced by extensive public comments, is the likelihood that various existing industries that are vital to the region may be severely and negatively impacted. Such industries include agriculture, organic farming, tourism, hunting, fishing, wine and beer making, etc. Why was this concern not treated seriously? While it might require a greater research effort, there are ways to estimate and project the extent of negative impacts on such industries. The assessment report itself states that agriculture and tourism are important industries in all three of the regions studied, yet the potential costs associated with declines in these industries are not properly addressed.

The impacts on agriculture that are mentioned in the assessment report are the increased cost of land as a factor of production and the fact that some land will be taken out of production, but no estimate is made. Major food coops have stated that they will not buy produce from areas that have hydraulic fracturing; and there will be a high cost if our agricultural lands and nearby water become contaminated with toxic or radioactive substances. Why was the potential negative impact to agriculture of water and land contamination risk ignored? Why were the major purchasers of our agricultural products not interviewed and surveyed on whether they would continue to purchase our agricultural products?

Potential negative impacts on the tourism industry were dismissed by simply stating that two counties, Cattaraugus and Chautauqua, with a history of vertical gas drilling in New York State, have a strong tourism industry. This is not a thorough economic analysis of the impact that gas drilling will have on the tourism industry. The assessment report itself indicates that the Catskill Mountains and the Finger Lakes are two of New York State’s most important tourist regions. These regions, and others, should be carefully evaluated for potential negative impacts. Increasing second homeownership is very important to these areas as well, and the impact on that trend should be studied.

Not only are there various ways to attempt to evaluate the negative impacts due to potential declines in other industries, there are also existing studies that E&E could have referenced. For example, one study calculated that the net present value (NPV), using a discount rate of 3% over 100 years, of natural goods and services from ecosystems in the New York State portion of the Delaware River Basin is \$113.6 billion. (Attachment, “Socioeconomic Value of the Delaware River Basin in Delaware, New Jersey, New York and Pennsylvania: The Delaware River Basin, an Economic Engine for Over 400 Years”, Gerald J. Kauffman, University of Delaware, Water

Resources Agency, May 25, 2011.) **That is \$113.6 billion in just the New York State portion of the Delaware River Basin.** Such estimates should be done for all industries that could be negatively impacted in the entire New York State portion of the Marcellus Shale region. And the probability and extent of declines should also be evaluated. It is both shocking and suspect that E&E did not reference or consider results of relevant existing studies, such as the one cited above and others.

Since there have been many concerns voiced about the costs to communities, why was there no attempt to estimate such costs? Costs associated with the increased demand for community social services, police and fire departments, first responders, local hospitals, etc. should be estimated, not simply mentioned and then ignored. The final paragraph of the assessment report simply lists a few of the costs to communities, but there is no effort to estimate any of the costs.

It is possible to estimate potential truck traffic and the related wear and tear on roads, and these costs are not all paid for by the gas industry in other states. Indeed, a confidential New York State Department of Transportation Memorandum, which was leaked, provided data concerning truck traffic and costs. Why were road repair and maintenance costs not estimated, incorporated and analyzed? Was this by design?

Why was there no attempt to measure public health costs? There is much research on the negative health impacts of shale gas drilling, and the public has repeatedly voiced such concerns. The costs associated with these impacts should be set forth.

It is well known that extractive industries create a boom and bust cycle for communities. Why are the costs of a long-term bust not estimated in this assessment?

Why was some research regarding the impact on property values summarized, without mention of the fact that there have been reports that banks may not issue mortgages on properties with or near a gas well? Why were timely data not collected on this issue?

Another important economic impact on the region that is completely ignored in this assessment is the loss of future economic development potential after a spider web of pipelines is built, preventing further building on or near these pipelines. Why is this cost ignored?

A thorough economic assessment would include detailed recommendations regarding action steps to help maximize benefits and minimize costs. Why are such recommendations not made? The pace and scale of drilling can significantly affect long-term economic impacts, and various alternatives regarding pace and scale should be carefully analyzed. Tax policy recommendations should be made to be sure that funding is available to communities for their increased costs and also for environmental mitigation. A long-term, detailed economic development plan for the entire region must be in place that will help to minimize the negative effects of a

potential economic bust. These are just a few examples of the areas for which an economic assessment should provide recommendations.

New York tax policy and its implications for shale gas development have not been properly analyzed. There are many uncertainties regarding the ad valorem tax as it applies to shale gas development. When one considers the potential costs to communities, it is far from clear that the ad valorem tax will be sufficient to pay the costs. There will be significant costs to communities early in the drilling process and tax dollars are not collected at the beginning of operations. It is unclear if the discount rate applied is appropriate to accurately reflect the level of risk associated with shale gas development. A comprehensive risk assessment is necessary in order to select a discount rate. The gas companies, and perhaps even landowners who reap the benefits, must be taxed at a high enough rate, and early enough in the process, to pay for the negative externalities inherent in gas development. To ensure this, we must require both a comprehensive economic analysis and a comprehensive risk assessment; and neither has been conducted.

It is clear that E&E focused only on benefits, and the estimated benefits are exaggerated. All of the employment, income, population and tax revenue projections in the economic assessment are dependent on the natural gas production assumptions. If production assumptions are exaggerated, then employment, income, population and tax revenue projections will all be exaggerated as well. It appears that assumptions regarding both the amount of recoverable shale gas and the production amounts are exaggerated. The assumptions on recoverable gas that were used by E&E were provided by the Energy Information Administration (EIA), but just before this E&E report was released, the US Geological Survey (USGS) issued their revised estimates of recoverable gas. While the new USGS estimate of technically recoverable natural gas in the Marcellus Shale (84 trillion cubic feet) is higher than prior USGS estimates, it is far lower than the EIA estimate. The EIA has publicly stated that they defer to the USGS and that the USGS numbers should be used. There is some controversy regarding the various reserve and recoverable gas estimates, and how much gas can be “technically” and/or “profitably” extracted. E&E should have investigated the differences and explained the controversy in detail. The economic assessment must be improved and must reflect the recently updated USGS estimates, which have been accepted by EIA.

E&E has taken production assumptions from the industry, specifically from IOGA-NY. Why were the production numbers provided by IOGA-NY for the analysis not questioned and reviewed in light of the fact that there are indications that the industry may not be entirely truthful about production estimates? I would expect an independent consulting firm to verify such production assumptions and go to great lengths to explain how industry-provided assumptions were verified, if only to protect the consultant’s reputation as a reliable, impartial expert.

In another exaggeration, on page 4-7, the report states, “each newly constructed well is assumed to have an average productive life of 30 years.” Why was this

assumption used when there are findings that the average life of a shale gas well is far shorter than 30 years? It has been reported that horizontal wells in other shale plays, such as the Barnett and Fayetteville shales, experience an average commercial life of only 7.5 years, with a mode of only four years. E&E should have investigated the research of Arthur Berman and others, and should have provided detailed data analysis of production in other shale plays.

E&E has made unsupported assumptions about transient workers. The report states that 77% of the Marcellus workforce in year 1 would be transient and that by year 30, 90% of all workers could be hired locally. They do not clearly explain the basis for such assumptions. E&E makes this “transient worker” assumption for the purpose of estimating changes in population, and therefore, the population projections appear to be based on a weak underlying analysis. Perhaps a more important flaw is the fact that E&E does not adjust the income projections for a transient workforce. It is obvious that a transient workforce will not be spending all of their wages in the region, and the report does not explain if and how an appropriate adjustment has been made.

For the employment estimates in the assessment, E&E used the Regional Input-Output Modeling System of the US Bureau of Economic Analysis (RIMS II). As I have explained in my paper, “North American Shale Gas Plays: More Unanswered Questions,” January 17, 2011, while input-output analysis can be a useful tool in many situations, in this case it is lacking for a number of reasons. First, it doesn’t capture the cost of environmental degradation, damage and wear and tear on roads, health effects and pollution, and negative impacts on other industries such as agriculture and tourism. Input-output models assume that all populations have identical spending patterns. This exaggerates economic impact if new workers are transient. Input-output analysis assumes constant returns to scale, so that the gas industry would get no volume discounts on supply. This assumption is unrealistic and also exaggerates the impact. Input-output models are static in time and are a-spatial, meaning that transportation costs are not fully reflected. Perhaps most importantly, actual input-output coefficients are unknown in a case where the industry does not already exist in a region, like the gas industry in the Marcellus Shale region of New York. The production function is implicitly assumed to remain constant, so there is no substitution or changes in proportions of inputs as technology or prices change over time. Any thorough analysis using input-output modeling techniques for such an important decision should point out the deficiencies in the technique. This is not sufficiently done in the E&E report.

Another area where the E&E assessment is deficient is in its assumption of full-time-equivalent (FTE) workers, taken directly from Pennsylvania’s Marcellus Shale Education and Training Center. All assumptions, including this one, should be verified by looking at data from other shale plays and multiple sources. E&E assumes 11.3 FTE workers per well during construction and 0.17 FTE workers to operate a well. They adjust the 11.3 downward for vertical wells. I have seen other estimates. For example, there is at least one researcher who has estimated only **one**

FTE job created per well during the drilling and development phase, and anywhere between 0.12 and 0.46 FTE jobs per well during the second phase, which is the operation and maintenance of the well. (Attachment, Thomas Michael Power, University of Montana, 2005). If innocent, then it is at best irresponsible to take just one source for such assumptions without looking into others. The lack of thoroughness in checking assumptions, whether it regards FTE workers, gas reserves estimates, or years of production, is a major flaw in the economic assessment conducted by E&E.

As shown above, E&E has exaggerated economic benefits and ignored economic costs. Where have we seen such flawed economic impact analysis before? The natural gas industry has been conducting such flawed analysis for years. For my critique of the industry-funded studies, see my papers, "Unanswered Questions About the Economic Impact of Gas Drilling in the Marcellus Shale: Don't Jump to Conclusions," March 27, 2010, and "The Truth About Those Industry Funded Studies," March 4, 2011, both are attached.

The Marcellus Shale Coalition (MSC), a lobbying organization for the gas industry, frequently quotes the Penn State studies (which they funded). The MSC claimed that 88,000 new jobs were created in Pennsylvania in 2010 due to Marcellus Shale drilling. Publicly available Pennsylvania data available at that time clearly showed that **total job creation** in the **entire state** was only 65,600. And half of these jobs were in "education and health" and in "leisure and hospitality." The grandiose job creation claimed by the industry is not at all consistent with data from unbiased, publicly available sources. The primary author of the industry-funded Penn State studies was hired by the Manhattan Institute to write another report, which minimally estimates only some of the costs, and ignores others, but again it exaggerates the economic benefits. More recently, gas industry groups such as the Marcellus Shale Coalition and Energy in Depth have continued to mislead the public by mis-interpreting a report from the Pennsylvania Department of Labor & Industry. The report states that there were 48,000 new hires in core and ancillary Marcellus industries from 4th Quarter 2009 through 1st Quarter 2011. The industry has been claiming these 48,000 new hires as employment growth. This is less than the 88,000 jobs claimed for 2010 alone, but it's still a highly inaccurate statement. Anyone familiar with the "New Hires" data knows that these data do not accurately reflect employment growth. The gas industry representatives fail to point out that users of "New Hires" data should not draw conclusions about job growth trends based on "New Hires" data. Note that new hires and the actual change in employment may be vastly different when a large number of jobs are added by some employers during the same period that a large number of jobs are eliminated by other employers. Also, a "new Hire" is not necessarily a "new Job". Official employment numbers out of Pennsylvania, as reported by the Keystone Research Center, show that the Marcellus core industries and ancillary industries, taken together, created less than 6,000 net jobs between 4th Quarter 2007 and 4th Quarter 2010. **That's less than 6,000 net new jobs in three years.**

The gas industry has an incentive to mislead the public in order to gain public support for gas drilling. The DEC should insist on accurate analysis of all impacts that may result from gas drilling, including environmental, health and economic impacts.

Why did the DEC not insist on a thorough economic assessment including a proper estimate of all costs? If a proper economic assessment taking into account and doing the hard work of estimating costs was beyond the capability of a firm like Ecology and Environment, why were academic economists not enlisted in the study? Is it because the results would be harder for DEC to control? Either the DEC must prove to the public that E&E is not conflicted and is qualified to do the work, or the DEC must find qualified researchers who will do a proper assessment.

The gas companies take account of only the costs to them, not the costs to the public. The gas companies consider projected balance sheets and they try to maximize shareholder value, ignoring externalities and passing environmental, public health and other costs on to others. Our decision makers in New York State should take account of all of the many potential costs to the State. It may be helpful for our decision makers in New York State to view the comprehensive impacts of gas drilling in the Marcellus Shale as a balance sheet. The DEC should insist on a thorough evaluation of every asset and every liability and should work to maximize the net value to New York State and its citizens. An example of such a balance sheet is attached as "A Balance Sheet for New York State: What is New York State's Net Equity from Shale Gas Development?" Jannette M. Barth, January 2012.

A proper economic assessment (and evaluation of all items in the balance sheet) would be a time consuming, expensive research endeavor, and it would require a team of qualified experts, each with specific expertise. The people of New York State and future generations deserve a fair and comprehensive assessment of what shale gas extraction might mean for our economy, our health, our environment and our quality of life.

Respectfully Submitted,

Jannette M. Barth, Ph.D.

List of Attachments:

"A Balance Sheet for New York State: What is New York State's Net Equity from Shale Gas Development?" Jannette M. Barth, Ph.D., January 4, 2012.

Letter to Governor Cuomo from three economists (Jannette M. Barth, Ph.D., Edward Kokkelenberg, Ph.D, Timothy Mount, Ph.D.), December 14, 2011. (Also available at www.catskillcitizens.org/barth)

Letter to Commissioner Martens from Jannette M. Barth, Ph.D. and over 100 co-signatories, December 29, 2011. (Also available at www.catskillcitizens.org/barth)

“Critique of PPI Study on Shale Gas Job Creation,” Jannette M. Barth, Ph.D., January 2, 2012. (Also available at www.catskillcitizens.org/barth)

“Economic Impact of Gas Drilling in the Marcellus Shale: Don’t Jump to Conclusions,” Jannette M. Barth, Ph.D., March 27, 2010. (Also available at www.catskillcitizens.org/barth)

“North American Shale Gas Plays: More Unanswered Questions: Prepared in Response to Comments by Concerned Citizens of New Brunswick, Canada,” Jannette M. Barth, Ph.D., January 17, 2011. (Also available at www.catskillcitizens.org/barth)

“The Truth Behind Those Industry Funded Studies,” Jannette M. Barth, Ph.D., March 4, 2011. (Also available at www.catskillcitizens.org/barth)

“Selected Quotes from Unbiased Research on the Economic Impact of Gas Drilling and Other Extractive Industries”

“Fossil Fuel Extraction as a County Economic Development Strategy: Are Energy---focusing Counties Benefiting?”, Headwaters Economics, September 2008 (Revised 7/11/09).

“Mining the Data: Analyzing the Economic Implications of Mining for Nonmetropolitan Regions,” William R. Freudenberg and Lisa J. Wilson, *Sociological Inquiry*, Vol. 72, Fall 2002, 549---75.

“The Economic Impact of Shale Gas Extraction: A Review of Existing Studies,” Thomas C. Kinnaman, *Ecological Economics*, 70 (2011) 1243---1249.

“Hydrofracking a Boom---Bust Endeavor,” Susan Christopherson, *Albany Times Union*, August 14, 2011.

“The Local Economic Impacts of Natural Gas Development in the Valle Vidal, New Mexico,” Thomas Michael Power, January 2005.

“The Economic Value of Shale Natural Gas in Ohio,” Amanda L. Weinstein and Mark D. Partridge, December 2011.

“Booms and Busts: The Impact of West Virginia’s Energy Economy,” Sean O’Leary and Ted Boettner, West Virginia Center on Budget and Policy, July 2011.

“The Economic Impact of Tourism in New York State,” Tourism Economics, An Oxford Economics Company, April, 2010.

“The Economic Impact of Tourism in New York State: Catskills Focus,” 2010
Calendar Year, Tourism Economics, An Oxford Economics Company.

“Socioeconomic Value of the Delaware River Basin in Delaware, New Jersey, New
York, and Pennsylvania: The Delaware River Basin, an economic engine for over
400 years,” Gerald J. Kauffman, University of Delaware Water Resources Agency,
May 25, 2011.

“Impact on Housing in Appalachian Pennsylvania as a Result of Marcellus Shale,”
The Institute for Public Policy and Economic Development, November, 2011.