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December 7th, 2016

Kimberly Bose, Secretary
Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

REFERENCE: Millennium Pipeline Company, LLC
Eastern System Upgrade Project
Docket No. CP16-486-000

Dear Ms. Bose:

Thank you for this opportunity to comment on the Eastern System Upgrade project as proposed by Millennium Pipeline Company, LLC. I am an economist specializing in research on the relationships between natural resource stewardship, environmental quality, and human well-being. I also teach microeconomics, natural resource economics, and natural resource policy at the undergraduate and graduate level.

Key-Log Economics has been retained by Delaware Riverkeeper Network to conduct an independent analysis of economic effects of the proposed ESU project, including changes in property value, costs due to public health impacts, and the social cost of greenhouse gas emissions. As part of our research to date, we have also reviewed Millennium's commissioned research into the potential benefits of the project and its own draft report on socioeconomics, "Resource Report 5" (Concentric Energy Advisors, 2016; Millennium Pipeline Company, LLC, 2016b).

As summarized below and detailed in the attached review, we find that the studies (1) overstate benefits to local communities, and (2) understate the economic costs associated with the project. Key-Log Economics therefore recommends that the Commission undertake more careful assessment of benefits as well as a full accounting of the likely costs (negative economic effects) consistent with best available economic information and current legal and policy guidance. Only with such information can the Commission possibly pass judgement on whether or not the proposed project is in the economic interests of the affected region or the nation as a whole.

1) *The Concentric and Millennium, LLC studies over-estimate the economic benefits associated with the Eastern System Upgrade Project. There are several reasons for this overestimation.*

- The region chosen for analysis of impacts during construction is too large, resulting in inflated multiplier effects.
- The construction period is assumed (by Concentric) to be four times longer than the period proposed by Millennium, resulting in inflated estimates of construction impacts.

- Assumed energy cost savings for end users (electric utility customers)—the basis for most of the estimated long-run economic benefits—may be overestimated for two reasons:
 - Lack of consideration of the effect of guaranteed return on investment on final electric power rates.
 - Lack of consideration of the effect of renewable sources of electric power that are becoming more available and less expensive.
- The input-output modeling approach is inappropriately applied to generate multiplier effects believed to occur more than one year into the future. This is a problem both for years two through four of the construction period as well as for the entire operational period.

2) *The Concentric and Millennium, LLC studies underestimate, mainly by failing to consider, several key costs that would attend the completion of the ESU project.*

- The social cost of carbon, the comprehensive estimate of the economic cost of harm associated with the emission of carbon.
- Public health costs associated with infrastructure of the project.
- Reduced property values near the compressor stations, plus resulting losses in property tax revenue for local communities.

Economic efficiency demands, and both the National Environmental Policy Act and FERC's own policy suggest, that pipeline certification decisions (among other federal actions) be based on a full consideration of public costs and public benefits. To date, information that would support such a consideration has not been provided by the ESU project applicant. We look forward to contributing our estimates of key economic costs to this discussion in the near future. For now we offer the attached brief as caution regarding the benefit estimates that have been presented and as suggestions regarding the scope of costs that the Commissions must take into account.

Sincerely,



Spencer Phillips, Ph.D.
Principal

Economics of the Eastern System Upgrade: Credible and Complete Estimates of Benefits and Costs are Needed

December 4th, 2016

Spencer Phillips, Ph.D.
Sonia Z. Wang

Key Findings

Based on our review of the documents purporting to describe the economic impacts of the proposed Eastern System Upgrade to the Millennium Pipeline, we find that:

- Deficiencies in the Federal Energy Regulatory Commission’s (“FERC”) policy regarding certification of proposed natural gas transmission infrastructure promotes economic waste in the form of too many pipelines, too little public benefit, and too much economically costly and environmentally damage;
- The economic case for the Eastern System Upgrade (“ESU”) is based on unrealistic assumptions about energy cost savings for end users and inappropriate methods for estimating the short- and long-term economic impacts of the ESU’s construction and operation; and
- As in other FERC proceedings, the ESU docket (# CP16-486-000) is, to date, devoid of serious consideration of the likely economic costs of the project, including those stemming from the emission of greenhouse gasses facilitated by the project, from impacts on human health, and from loss of use and enjoyment of private property.

Project Background and Policy Context

Millennium Pipeline Company, L.L.C. (“Millennium LLC”) is seeking a federal permit to expand capacity on parts of the Millennium Pipeline through the Eastern System Upgrade Project. The project would transport an additional 200,000 dekatherms per day of natural gas from the Corning Compressor Station to an interconnect with Algonquin Gas Transmission, L.L.C. in Ramapo, New York (Millennium Pipeline Company, LLC, 2016). The ESU includes the construction of about 7.8 miles of 30- and 36- inch pipeline loop in Orange County, New York, construction of a new compressor station in Sullivan County, New York, adding additional horsepower to the existing Hancock Compressor Station in Delaware County, New York, modifications to the existing Ramapo Meter and Regulator Station in Rockland County, New

York, and additional pipeline facilities at the Huguenot Meter Station and Westtown Meter Station in Orange County, New York (Millennium Pipeline Company, LLC, 2016).

Before construction can begin, the project must be approved, or “certified,” by the Federal Energy Regulatory Commission. Prior to granting that certification, FERC must evaluate the extent to which the proposed project meets a public “purpose and need” and the extent to which the public benefits of the project are balanced against the “potential adverse consequences” of natural gas transmission projects. Because the approval would be a federal action, FERC must also comply with the procedural and analytical requirements of the National Environmental Policy Act (“NEPA”). These include requirements for public participation, conducting environmental impact analysis, and writing an Environmental Assessment (“EA”) or Environmental Impact Statement (“EIS”) that evaluates all of the relevant effects. Of particular interest here, such relevant effects include those direct, indirect, and cumulative effects on or mediated through the economy. As the NEPA regulations state,

“Effects” includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial (emphasis added, 36 CFR 1508.8; Council on Environmental Quality, 1978).

NEPA requires an evaluation of all relevant effects, but of particular interest here are the direct, indirect, and cumulative economics effects of changes in human welfare that might or might not be reflected in the market economy—i.e., external costs.

Table 1. Brief timeline of Millennium LLC’s work with Millennium Pipeline and the ESU project work.

Milestone(s)	
Date	Description
December 1997	Millennium LLC files an application for a certificate of public convenience and necessity authorizing the construction and operation of the Millennium Project
June 2007	FERC authorizes Millennium LLC to commence construction
December 2008	Millennium Pipeline went into service
October 2012	Construction of the Minisink Compressor Station begins
June 2013	Minisink Compressor station went into service
October 2013	Construction of the Hancock Compressor Station begins
April 2014	Hancock Compressor Station went into service

January 2016	Millennium LLC files a request for a pre-filing review with FERC for the ESU project
May 2016	FERC announces that they will prepare an environmental assessment for the ESU project
July 2016	Millennium LLC files an application requesting a certificate of public convenience and necessity authorizing the ESU project

The ESU project is purported to be necessary to meet natural gas market demand in the region. It is also promoted as having the potential to create savings for electric consumers in New York and stimulating local economies during the construction phase. Millennium LLC, through a report written by Concentric Energy Advisors (“Concentric”), estimates that construction will have a total impact of \$314 million and that the first ten years of operation will result in \$703 million in additional economic output. These estimates include predicted consumer energy cost savings, spending on labor and materials during construction and operation, re-spending of consumer cost savings, workers wages and firm revenues in the local economy, and property tax payments from project facilities, associated with the proposed project (Concentric Energy Advisors, 2016; Millennium Pipeline Company, LLC, 2016a).

Concentric (2016) states that the majority of operating expenditures associated with the ESU project will come from property taxes, but does not account for any potential property devaluations due to the project. For reasons detailed below, these figures may represent significant overestimates of what may be the true economic benefits of the construction and operation of the ESU. Millennium LLC/Concentric promote these estimated impacts as sole economic effects of the ESU, but apart from Millennium LLC’s cost of doing business (which are actually treated as economic benefits in the reports) there is no mention of what may be significant (and certainly non-zero) costs of the pipeline. Most importantly, Millennium/Concentric have presented no estimates of likely external or societal costs that would result from the construction and operation of the ESU. By ignoring external/societal costs, Millennium LLC has failed to provide FERC with the critical information necessary for the Commission to evaluate the balance of public benefits and costs of the proposed action.

As outlined below, however, FERC’s own policies and track record, including an over-reliance on the applicants’ own estimates of project benefits, make it extremely unlikely that the ESU project certification process would meet NEPA’s requirement to consider all project costs and benefits, let alone produce a decision that could be construed as generating or supporting net economic benefits.¹

¹ It is important to note that NEPA does not require that federal actions—which in this case would be approving or denying the ESU certification—necessarily balance or even compare benefits and costs. NEPA is not a decisionmaking law, but rather a law requiring decisions be supported by an as full as possible accounting of the reasonably foreseeable effects of federal actions on the natural and human environment. It also requires that citizens have opportunities to engage in the process of analyzing and weighing those effects.

The Economic Impacts of the ESU Project are Overstated

Millennium Pipeline LLC, in *Estimated Savings For New York Consumers From The Millennium Pipeline Eastern System Upgrade Project* (Concentric Energy Advisors, 2016), and echoed in *Resource Report 5: Socioeconomics* (2016a), overestimates the economic impacts of the Eastern System Upgrade in three areas:

- Impacts associated with construction of the project;
- Impacts associated with the ongoing operation of the project; and
- Impacts associated with consumer's spending of assumed savings elsewhere in local economies.

The overestimation of benefits during construction emanate from problems inherent in the conceptual and empirical models used to estimate those benefits and from choices and assumptions made in the empirical model. These include the size of the study/impact region and the application of the model to estimate long-run impacts. Long-term benefits are overestimated partially due to the choice of empirical methods and in part because of the overly optimistic assumptions about whether and to what extent the state of New York would continually use natural gas, especially with the Clean Energy Standard mandating New York get 50% of its electricity from renewable sources by 2030 (Morris, 2016).

Overestimate of Economic Impacts During Construction

The estimates of extra jobs and income stimulated by the ESU project are inflated due to three problems with Concentric's analysis. These are:

1. The use of an economic base model to estimate impacts.
2. Assumption that the construction period will be four times longer than the period stated by Millennium.
3. Choice of the entire State of New York as the region for analysis.

We address each of these in turn.

Concentric uses input-output analysis, specifically, the IMPLAN data and modeling software to generate estimates of the economic impact of the ESU project. Rooted in economic base theory, input-output models purport to translate an exogenous change in the economy—the “input,” which in this case is spending required to construct the proposed project—into “output,” which includes spending by firms contracted by Millennium LLC to build the pipeline, spending by those firms' subcontractors and suppliers, and so on, plus spending by the households whose labor the various firms would hire. Additional rounds of impact occur as the businesses where those households spend their wages (grocery stores, gas stations, physicians, etc.) pay suppliers and their own employees. With each round of spending, some money leaks out of the study region's economy in the form of spending on imported goods or wages paid to workers who reside outside the study region.

In the input-output argot, the spending by Millennium LLC would be a “direct” effect; spending by the other firms would be the “indirect effects”; and spending by those households would be

the “induced effects.” The ratio of the sum of all three effects (direct, indirect, and induced) to the direct effect is called the “multiplier” or the “multiplier effect.”

While intuitively satisfying, empirical input-output models like IMPLAN are built on a very restrictive set of assumptions about how each and every spending and/or hiring decision in the entire economy is made. Namely, the models assume that decisions are made the way they have always been made, and if demand for a product goes up, the only way firms can respond is by doing more of what they did in the past to meet demand. They follow the same recipe, but just increase the amount of each ingredient. They employ more labor, buy more raw materials, and burn more fuel (among other inputs) in exactly the same proportions as before the exogenous change occurred.

Firms in the real world, by contrast, innovate and adjust their manufacturing and other processes to take advantage of economies of scale, new technology, and new business processes. That innovation leads to cost minimization, and cost minimization means firms will do less indirect spending, and that means less induced spending stemming from changes in workers’ wages. As Hoffmann and Fortmann (1996) found, this disconnect from real world behavior means that that input-output models produce overestimates of firm spending and “multiplier effects.”

This is an even bigger problem in the long-run (i.e., more than a year into the future), when real-world firms are able to make even more cost-minimizing changes. Concentric makes two mistakes with regard to the long-run construction period. The first is that “the Construction Phase of the ESU project is assumed [by Concentric] to occur over the four-year period” (Concentric 2016, p. 18). Millennium, on the other hand, states that construction will last from four months to one year, depending on the component of the project (Millennium Pipeline Company, LLC, 2016a, pp. 5-7, 5-8). Right out of the gate, Concentric’s assumptions means a four-fold overestimate of the direct effect of the ESU project, which would translate into a four-fold over-estimate of the indirect and induced effects.

The second problem with the construction period impacts is that even if construction were to require as much time as Concentric assumes, four years is well beyond the short-term (one-year) period for which the IMPLAN model is capable of producing meaningful estimates of multiplier effects. Even within the course of one four-year project, firms would respond to changing market conditions (i.e., relative prices) and adjust practices to minimize cost.

Further overestimation of short-term impacts is the result of Concentric’s decision to use the entire state of New York as the region for analysis. In input-output analysis, the larger the region chosen for analysis, the smaller will be the portion of each round of spending leaking out of the study region, and the larger will be the estimated multiplier effect. Ideally, one would define a study region based on actual data or, failing that, reasonable assumptions about the location of the firms that will supply material, services, and equipment to Millennium and about the location of the households that will supply labor to the project. In this case, it is expected some labor, materials, services, rented machinery, etc. would come from parts of New York beyond the immediate vicinity of the ESU. It would also be reasonable to assume that some construction spending would involve firms and households in nearby Pennsylvania and/or New Jersey. Indeed, it seems at least as likely that some suppliers and temporary workers would hail from

the tri-state area as it is that they would come from Plattsburg, Rochester, or the shores of Lake Erie.

We do recognize that expertise and equipment to construct gas transmission facilities cannot be found just anywhere, and much of it may come from outside the immediate area. However, Concentric provides no reason to assume that it is more likely to come from other parts of New York than from other states. If one were to consider a more realistic study region, construction impacts would be even smaller.

The bottom line is that Concentric defined too large a study region, too long a construction period, and it has misapplied the IMPLAN model to the later years of the construction period. In a best case (or a least bad case) scenario, these errors mean that the estimated construction impacts are at least four times what they should be. Given these considerations, we agree with Millennium's conclusion in Resource Report 5 that "the number of new jobs and indirect jobs from construction and operation would not cause significant socioeconomic impacts" in the ESU project region (2016a, pp. 5-8 and 5-9). (Concentric's estimate is that construction would cause 440 jobs and \$314 million in spending, but as noted, these are overestimated by a factor of four.)

Overestimate of Economic Impacts During Operation

Millennium states that significant job-related impacts due to operation of the ESU project would not occur (2016a). This is in part due to the relatively small number of permanent jobs associated with the pipeline. Fewer direct operational jobs and associated income mean fewer indirect and induced jobs and income—that is, a smaller multiplier. The impact is even smaller than Millennium knows however, due to Concentric's misapplication of the input-output model to estimate long-term effects. This modeling approach, as already noted, is best confined to the estimation of short-term impacts (i.e., those occurring within one year of the initial exogenous change). The approach is ill-suited for the assessment of longer-term economic impacts, and it has been empirically shown to be unreliable for that purpose. As Haynes et al. (1997) note:

Where the economic base approach gets into trouble is when it is used inappropriately as a tool for planning or predicting impacts of greater than one year in duration; a snapshot of current conditions tells little about the form a region's future economy may take.

Because IMPLAN models a static economy, Concentric assumes there will be no changes in relative prices, no input substitution, no technological change in production processes, no labor mobility, no change in products or consumers' tastes and preferences, no regional migration, and no changes in state and local tax laws—to name a few—during the ten years of ESU operation considered. The constant technology assumption, for example, prevents firms from using cost savings innovations, forcing them to be inefficient, and resulting in higher multiplier effects experienced in the real world (Hoffmann and Fortmann, 1996).

Due to their restrictive assumptions, economic base models possess a dismal track record when it comes to predicting economic growth in the real world and in the long run. Again, the "long run" is more than a year into the future, when firms change technology, prices can adjust, and people change what they want to buy. In a review of 23 studies, Krikelas (1991) compared predictions of the economic base model against the actual experience of subject regions and found only 4 studies where the models correctly predicted longer run economic growth.

Similarly, Robertson (2003) tested predictions from input-output models against actual experience in 15 communities in Southeast Alaska (a region in which many of the restrictive assumptions of economic base theory might actually apply). He found that initial economic stimulus does not “cause changes in economic activity serving local demand for the average community.... The implications of these results [are that] secondary economic impacts [i.e., “multiplier effects”] cannot be taken as a foregone conclusion in policy analysis” (p. iii).

Unfortunately, and as Concentric states, IMPLAN is still commonly used. By its estimates from the model, 357 total jobs and \$703 million in new income result from the operation of the ESU project. These impacts include direct jobs and spending necessary for operation of the pipeline itself and indirect and induced effects resulting from those direct effects. The estimated impacts also include energy cost savings realized by consumers, as well as induced effects that would result from consumers’ spending their energy savings in the local economy.²

Regardless of the size of the estimate, to ascribe these indirect and induced jobs to the project assumes that the workers in those indirect and induced jobs would otherwise be idle. Such an assumption is not realistic: idle-workers in the real world typically retrain or relocate to take already open jobs, or they create new employment opportunities for themselves where they live. Those additional jobs, in other words, will most likely exist somewhere (in another sector in the study region or in another region) with or without the direct ESU jobs.

In short, we do not doubt that the construction and operation of the ESU will spur economic activity in the form of jobs and income associated with construction and operation of the project. Because the estimated level of activity presented by the applicant through the Concentric study is grossly overstated, we would amplify Millennium’s assessment and conclude that the employment and income effects are not just minimal, but practically nonexistent.

Energy market savings may be overestimated

Concentric’s report also potentially overestimates the energy cost saving that the added gas transmission capacity could spawn. Concentric’s estimates that electric utility customers in southeastern New York State would collectively realize an average collective annual savings of \$49.5 million per year during the first 10 years of the ESU’s operation. Concentric bases these estimates on its run of the GPCM gas market simulation model, but does not provide important information about the assumptions it has applied for the simulation. In particular, there are two factors that, if excluded from consideration, would tend to result in overestimates of the benefit to electric utility customers of increased natural gas supply. These are:

- The effect of the guaranteed rate of return, as regulated by FERC, on Millennium’s investment in ESU; and
- The effect of competition from other sources of electric power, especially renewables, which could be cheaper for utilities and/or consumers than power generated in coal-fired plants.

² For comparison, employment in the four county study region stood at 410,722 in 2014. Thus, even the inflated total employment impact is less than one one-hundredth of one percent (0.009%) (U.S. Bureau of Economic Analysis, 2015; Headwaters Economics, 2016).

FERC not only approves pipelines, but sets the rate, or tariff, that pipeline operators may charge for the service of transporting natural gas. The tariff is a function of various factors and is intended to guarantee the operator what FERC deems to be a fair return on its investment (“ROI”) in the transmission infrastructure. That ROI is typically 10 percent or more. In the case of the ESU, such a return would mean that natural gas users would ultimately pay \$302.5 million over and above the cost of the gas itself. Assuming a 20 year operation period, Millennium’s customers and, ultimately gas and electricity end users, will pay an average of \$15.1 million per year just to have a pipeline—that is, before they buy the first cubic foot of gas that flows through it.

Whether interstate natural gas transmission is in fact a “natural monopoly” justifying such subsidies is a good question, but we are not opening that question here. Rather, our concern is that the modeled cost savings for energy end users, as modeled by Concentric, might be much larger than it should be. If that is the case, there would be a further overestimation of the induced effects stemming from customers’ spending of the added cost savings. Specifically, unless Concentric has built the recover of pipeline construction costs (including guaranteed ROI) into their model run, the actual consumer savings would be \$34.4 million per year, not \$49.5 million.

The second question regarding Concentric’s GPCM-based estimates deals with competition in the electric power market, rather than in the gas market. GPCM is designed to estimate equilibrium (market clearing) prices of natural gas, not of electric power. Therefore, it does not appear to compute the derived demand for gas based on broader markets for electric power. If gas-fired electricity generation were to face increasing competition from other sources, particularly wind and solar, then derived demand for gas would fall, and at least some gas-related cost savings for electric utility customers would never materialize. In turn, the induced economic impacts from building the pipeline would be smaller than Concentric has estimated.

GPCM does compute market equilibria based on projected demand for gas from utilities. It is not clear, however, that GPCM’s standard demand curves reflect new region-specific policies and/or the continuing decline in the price of wind and solar photovoltaic generation relative to gas- and other fossil-fuel-based generation.

It is true that New York currently relies heavily on natural gas for electricity generation. However, in the latest New York State Energy Plan, the state committed to achieve 50% of its electricity from renewable sources and to reduce greenhouse gas emissions by 40% by 2030 (Morris, 2016; Kennedy, 2016). The market itself is making it easier for the state to achieve its goal. Indeed the levelized cost of electricity estimated by the U.S. Department of Energy shows that solar PV and onshore wind are competitive with gas-fired generation, and Bloomberg has found that onshore wind is “to be fully competitive against gas and coal in some parts of the world, while solar is closing the gap” (U.S. Energy Information Administration, 2016; Zindler, 2015). This is even more true when the cost of greenhouse gas emissions are counted.

With renewable power generation becoming cheaper, end users and public utilities may switch to power from wind and solar, rather than switch to more gas-fired power, as Concentric’s estimates assume. In this scenario, there would be less energy savings due to lower gas prices (the energy savings would in fact come from the shift away from gas), and the economic impacts of the ESU project would be smaller than the estimates put forward by Concentric and Millennium LLC. Concentric neither discusses nor addresses the State Energy Plan or the

changing opportunities and conditions and, therefore, its estimates of economic benefit are rooted in an incomplete understanding of the energy market into which the excess gas transported by the ESU would go.

Millennium LLC fails to provide a full accounting of costs associated with the project

Regardless of the extent to which the benefits of the ESU project have been overestimated, it is impossible to surmise that the project will produce net societal benefits without full consideration of the costs of the project. As described below, important external costs include the cost of carbon emissions the ESU would facilitate, direct and indirect costs of illnesses associated with compressor station emissions, and impacts on property value near gas transmission facilities.

Social Cost of Carbon

The social cost of carbon (“SCC”) is a comprehensive estimate of the economic cost of harm associated with the emission of carbon. The SCC helps better inform regulation because it allows agencies to more accurately weigh the environmental costs and benefits of a new rule or regulation.

After challenges questioning the accuracy of SCC, in April 2016, a federal court upheld the legitimacy of using the social cost of carbon as a viable statistic in climate change regulations (Brooks, 2016). Even more recently, in August 2016, The Council on Environmental Quality (“CEQ”) issued its final guidance for federal agencies to consider climate change when evaluating proposed Federal actions (Council on Environmental Quality, 2016). The CEQ states “agencies should consider applying this guidance to projects in the EIS or EA preparation stage if this would inform the consideration of differences between alternatives or address comments raised through the public comment process with sufficient scientific basis that suggest the environmental analysis would be incomplete without application of the guidance, and the additional time and resources needed would be proportionate to the value of the information included” (2016, p.34).

EPA has also challenged FERC’s failure to consider climate change implications in a similar application process (Westlake, 2016). Citing the CEQ guidance, EPA notes that the Final EIS for the Leach Xpress, Columbia Gulf Transmission LLC-Rayne Xpress Expansion project “perpetuates the significant omission...with respect to a proper climate change analysis to inform the decision making process” and recommends that GHG emissions from end product combustion be counted among the environmental effects of each alternative” (p. 2).

To comply with the CEQ guidance, Millennium, LLC would need to consider the added emissions due to transporting an additional 73,000,000 dekatherms of gas annually. Burning that quantity of gas would emit of 3.9 million metric tons of CO₂ each year (U.S. EPA, 2016). Using the most conservative estimate of the cost per metric ton of carbon (U.S. EPA, 2016a), the ESU’s incremental CO₂ emissions would impose \$48.7 million in external costs annually. FERC must count this significant cost among the economics effects of the proposed pipeline.

Public Health

Compressor stations have been implicated in a variety of illnesses among nearby residents. (Subra, 2009, 2015). The stations can also be noisy, with low-frequency noise cited as a constant nuisance. (“Proximity of Compressor Station Devalues Homes by as much as 50%,” 2015). These issues have led some homeowners to pull-up stakes and move away and to reduced property value assessments for others (Cohen, 2015; “Proximity of Compressor Station Devalues Homes by as much as 50%,” 2015).

One way the compressor stations in the ESU project impacts air quality is by converting forests, which remove normal levels of impurities from the air, to other land uses. There is also concern for impacts that would occur due to the dumping of excess impurities into the air in the first place. The 22,400 horsepower (hp) compressor station proposed for Sullivan County, New York and the additional 22,400 hp for the compressor station in Hancock, New York, for example, will emit noise as well as gas and other substances (lubricants, etc.) as a normal part of operations. The negative effects of the compressor station would include noise and air pollution from everyday operations plus periodic “blowdowns,” or venting of gas in the system to reduce pressure. As a recent study by the New York Department of Environmental Conservation indicates, pollution around compressor stations is common and severe. The five-state study found that “more than 40% of the air samples from compressor stations exceeded federal regulations for certain chemicals like methane, benzene, and hydrogen sulfide” (Lucas, 2015). The study also found high rates of illnesses such as nosebleeds and respiratory difficulties among people living near the stations.

While more definitive epidemiological studies are needed to determine the extent to which natural gas compressor stations add to background rates of various illnesses, these stations are implicated as contributing to a long list of maladies. According to Subra (2015), individuals living within 2 miles of compressor stations and metering stations experience respiratory impacts (71% of residents), sinus problems (58%), throat irritation (55%), eye irritation (52%), nasal irritation (48%), breathing difficulties (42%), vision impairment (42%), sleep disturbances (39%), and severe headaches (39%). In addition, some 90% of individuals living within 2 miles of these facilities also reported experiencing odor events (Southwest Pennsylvania Environmental Health Project, 2015). Odors associated with compressor stations include sulfur smell, odorized natural gas, ozone, and burnt butter. (Subra, 2009). Finally, compressors emit constant low-frequency noise, which can cause negative physical and mental health effects (Lockett, Buppert, & Margolis, 2015).

In Sullivan County, 115 people live within 2 miles of the proposed Highland compressor station (U.S. Census Bureau, 2015). Applying the results of Subra (2015) to the population in Sullivan living within 2 miles, 104 people would experience odor events, 82 people would experience respiratory impacts, 67 people would experience sinus problems, and 45 people would experience sleep disturbances and/or severe headaches.

In Delaware County, 256 people live within 2 miles of the existing compressor station in Hancock (U.S. Census Bureau, 2015). Applying the results of Subra (2015) to the population in Hancock living within 2 miles, 230 people would experience odor events, 182 people would

experience respiratory impacts, 148 people would experience sinus problems, and 100 people would experience sleep disturbances and/or severe headaches.

In addition to the health impacts discussed above, this pollution can cause damage to agriculture and infrastructure. One study found that shale gas air pollution damages in Pennsylvania already amount to between \$7.2 and \$30 million, with compressor stations responsible for 60-75% of this total (Walker & Koplinka-Loehr, 2014). Using the low estimate of 60%, that is between \$4.32 and \$18 million in damages associated with compressor stations.

Property Value: Claims that pipelines do not harm property value are invalid.

In *Draft Resource Report 5: Socioeconomics* (2016), Millennium, LLC cites studies purporting to show that natural gas pipelines have at most an ambiguous and non-permanent effect on property values (Diskin et al. 2011; Integra Realty Resources, 2016). Millennium LLC also cites the authors of Wilde, Loos, & Williamson (2012) and their statement that there is “no credible evidence based on actual sales data that proximity to pipelines reduces property values” (p. 16). While the studies referenced differ in methods, they are similar in that they fail to take into account two factors that void entirely their conclusions that natural gas pipelines have no effect on property values.

First, the studies do not consider that the property price data employed in the studies do not reflect buyers’ true willingness to pay for properties closer to or farther from natural gas pipelines. For prices to reflect willingness to pay (and therefore true economic value), buyers would need full information about the subject properties, including whether the properties are near a pipeline. Second, and for the most part, the studies finding no difference in prices for properties closer to or farther away from pipelines are not actually comparing prices for properties that are “nearer” or “farther” by any meaningful measure.³ The studies compare similar properties and, not surprisingly, find that they have similar prices. Their conclusions are neither interesting nor relevant to the important question of how large an economic effect the proposed pipeline would have.

When the preconditions for a functioning market are not met, observed property prices do not (and cannot) indicate property value.

Economic theory holds that for an observed market price to be considered an accurate gauge of the economic value of a good, all parties to the transaction must possess full information about the good. If, on the other hand, buyers lack important information about a good, in this case whether a property is near a potential hazard, they cannot bring their health and safety concerns to bear on their decision about how much to offer for the property. As a result, buyers’ offering prices will be higher than both what they would offer if they had full information and, most importantly, the true economic value of the property to the buyer.

As Albright (2011) notes in response to the article by Diskin, Friedman, Peppas, & Peppas (2011):

³ With the exception of the Kinnard studies mentioned in Wilde, Loos, & Williamson (2012).

“The use of the paired-sales analysis makes the assumption of a knowing purchaser, but I believe this analysis is not meaningful unless it can be determined that the purchaser had true, accurate and appropriate information concerning the nature and impact of the gas pipeline on, near or across their property... I believe that the authors’ failure to confirm that the purchasers in any of the paired sales transactions had full and complete knowledge of the details concerning the gas transmission line totally undercut the authors’ work product and the conclusions set forth in the article” (p.5).

With more vocal/visible opposition to large, high-pressure natural gas pipelines and associated natural gas infrastructure it also seems likely that prospective home buyers will not have to wait for an incident involving the ESU project to learn of it and, therefore, for the project to affect their willingness to pay (and actual offer prices) for properties nearby. Anyone with an eye toward buying property near the proposed path of the project could quickly learn that the property is in fact near the corridor, that there is a danger the property could be adversely affected by the still pending project approval, and that fossil fuel pipelines and related infrastructure have an alarming history of negative health, safety, and environmental effects.

When people have more complete information about a property, they are able to express their willingness to pay when it comes time to make an offer. Accordingly, the prices buyers offer for homes near the ESU upgrade will be lower than the prices offered for other homes farther away or in another community or region.

Studies concluding that proximity to pipelines does not result in different property values do not actually compare prices for properties that are different.

While the studies cited in Resource Report 5 purport to compare the price of properties near a pipeline to properties not near a pipeline, many or in some cases all, of the properties counted as “not near” the pipelines are, in fact, near enough to have health and safety concerns that could influence prices. In the Interstate Natural Gas Association of America (INGAA) study, the authors compare prices for properties directly on a pipeline right-of-way to prices of properties off the right-of-way (Integra Realty Resources, 2016). However, in almost all of the case studies the geographic scope of the analysis was small enough where most or all of the properties not on the right-of-way were still within the pipelines’ respective evacuation zones (Integra Realty Resources, 2016).⁴

To adequately compare the price of properties with and without a particular feature, there needs to be certainty that properties either have or do not have the feature. This is a situation where comparing apples and oranges is not only reasonable, but also essential, however, the INGAA case studies are only looking at and comparing all “apples.” INGAA relied upon case studies with little to no variation in the feature of interest (i.e., the majority of properties are within the evacuation zone) exists. In the INGAA case studies, the feature of interest is the presence of a nearby risk to health and safety. With no variation in that feature, a systematic variation in the price of the properties is not expected. By comparing apples to apples when rather than

⁴ Proximity of properties to pipelines is based on best estimate of the location of the pipelines derived from descriptions of the pipelines’ locations provided in the studies and an approximation of the evacuation zone based on pipeline diameter and operating pressure (Pipeline Association for Public Awareness, 2007).

comparing apples to oranges, the INGAA studies reach the obvious and not very interesting conclusion that properties that are similar in size, condition, and other features including their location within the evacuation zone of a natural gas pipeline have similar prices.

In short, the conclusion that pipelines do not negatively affect property values cannot be drawn from these flawed studies. To evaluate the effects of the proposed ESU project on property value, FERC and others must look to studies (including those summarized in the next section) in which buyers' willingness to pay is fully informed about the presence of nearby pipelines and in which the properties examined are truly different in terms of their exposure to pipeline-related risks.

Land Value Effects of Compressor Stations

Compressor stations like the new 22,400 horsepower (hp) station proposed for Sullivan County, New York can cause decreases in home values and have even forced some homeowners to move away from the noise, smells, and illnesses associated with living near the stations. In one case from Minisink, New York, a family of six moved to escape the effects of a much smaller (12,600 hp) compressor station operated just south of the proposed Highland compressor station by Millennium Pipeline LLC. After two years of headaches, eye irritation, and lethargy among the children and even lost vigor in their fruit trees, the couple, unable to find a buyer for their home, moved away, leaving their \$250,000 investment in the property on the table with their bank holding the balance of the mortgage (Cohen, 2015).

In Hancock, New York, three homeowners living around the relatively small (15,000 hp) compressor station which would get an additional 22,400 hp upgrade under the ESU project, have had their property assessments reduced, two by 25% and one by 50%, due to the impact of truck traffic, noise, odors, and poor air quality associated with the compressor station ("Proximity of Compressor Station Devalues Homes by as Much as 50%", 2015). The larger of these reductions was for a home very close to the station and reflected physical damage that led to an increase in radon concentrations above safe levels. The two properties devalued by 25% were approximately one half mile away (Ferguson, 2015).

As of this writing, there have not been statistical studies of the relationship between a property's value and its proximity to a compressor station. The mounting anecdotal information does suggest that there is a negative relationship, however, and depending on the particular circumstances, the effect can be large—up to the 100% loss sustained by the family in Minisink (less than whatever the bank can recover at auction). FERC must therefore count the potential loss of property value associated with the compressor station proposed for location in Sullivan County.

For our estimates, we follow the example of the Hancock, New York case and assume that properties within one half mile of the Highland compressor station would lose 25% of their value if the station is built.⁵ We believe this assumption provides a conservative estimate in part because the Highland compressor station would be more than three times the horsepower of the Hancock station. It is therefore likely that its noise, odor events, and other physical effects

⁵ For land value analysis of the compressor stations, we buffered a half mile radius around the parcel containing the station.

would be experienced at a greater distance and/or with greater intensity than in the New York case.

Conclusion

Economic efficiency demands, and both the National Environmental Policy Act and FERC's own policy suggest, that pipeline certification decisions (among other federal actions) be based on a full consideration of public costs and public benefits. Without such consideration it is impossible to say whether, or to what extent, approval of projects like the Millennium Pipeline Eastern System Upgrade produce net benefit for the public. Unfortunately, Millennium LLC has provided less than half of the necessary economic information. Namely, the company provided estimates of economic benefit that, for reasons explained above, may be grossly overstated. Moreover, the company has not provided any information about several key economic costs. In the case of reduced property value, the company raises, but incorrectly dismisses important impacts on the people who would be affected by the ESU.

To correct this situation and make an economically and, given the procedural requirements of NEPA, legally defensible decision regarding the ESU, FERC should undertake or commission its own investigation into the full costs and potential benefits of the project.

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