2014 Draft State Energy Plan Comments
NYSERDA
17 Columbia Circle
Albany, NY 12203-6399

May 30, 2014

Dear New York State Energy Planning Board:

Thank you for the opportunity to comment on the 2014 Draft New York State Energy Plan. Founded in 1988, Earthworks is a nonprofit organization dedicated to protecting communities and the environment from the negative impacts of mineral and energy development while seeking sustainable solutions.

Like every other state in an era of accelerating climate change and fossil fuels that are more difficult to access, New York confronts significant economic, social, and environmental challenges in meeting energy demand.

On the one hand, the 2014 Draft Energy Plan boldly addresses this reality by emphasizing growth in renewable energy and green jobs, more efficient electricity and transportation systems, and technological and market innovation. New York deserves additional credit for emphasizing the critical role of health, environmental justice, and climate impacts in energy planning.

On the other hand, the Plan maintains status quo thinking about energy options. The Plan presumes that because New York is currently a high consumer of natural gas, the state must continue to expand its use of natural gas and build a future of more pipelines, compressor stations, processing facilities, and drilling waste dumps. Yet the state does not spell out what this type and scale of expansion would mean for New York's air and water quality and the health and safety of its residents. Such issues have only become more critical in light of the March 12 explosion in Harlem that claimed eight lives, apparently due to a leaking natural gas line.

While aging gas lines may need to be replaced to ensure safety, expanding and building new gas processing and delivery infrastructure would only increase future risks. In the following pages, Earthworks details its concerns about increasing New York's reliance on natural gas and the negative environmental and health impacts of associated infrastructure. Such investments would put New Yorkers at risk of serious harm and would increase demand for risky drilling in other states that would endanger air, water, homes and health.

Importance of moving away from fossil fuels

In an ideal world, it would be possible to both extract and burn more natural gas (increasingly from shale formations) and quickly develop and adopt clean energy systems. But a growing body of science on the impacts of natural gas development indicates that the natural gas "bridge" doesn't lead anywhere but back to a continued reliance on dirty energy, supplies of which are ultimately limited.

Expanding natural gas use contradicts a premise of the Energy Plan: that climate change threats are severe and the window of time left to address them is closing rapidly. A new analysis of 200 studies shows that federal estimates of methane emissions from natural gas have been vastly underestimated.[1] Other studies show that the so-called climate benefits of natural gas disappear when emissions are assessed over a 20-year timeframe—in other words, closer to the window of opportunity we may still have to avert climate disaster.[2]

Banking on natural gas also doesn't make sense in an Energy Plan that identifies production, distribution, and pricing volatility as major problems with a reliance on fossil fuels. The Plan presumes many decades of stable growth in natural gas supplies, based on estimates of untapped reserves. Yet recent analyses of actual drilling data show that in all the major shale plays nationwide (including the Marcellus), well decline rates range from 79 to 95 percent after just three years and that future US production estimates have likely been vastly overestimated.[3]

It is illogical to think that New York can simply improve and expand natural gas infrastructure and then easily transition away. Pipelines, compressor stations, and plants for liquefied and compressed natural gas are long-term investments that will further lock the state into dependence on an increasingly costly supply of fossil fuels. Yet as the inevitable spider web of facilities grows across the state, more and more communities will pay dearly with impacts to their health and air quality.

The Energy Plan details the many pieces of the clean energy puzzle that New York already has in place: geography, innovation, capital, established programs, and political support. Is it then possible that the renewable energy and efficiency and conservation goals laid out in the Plan could be met more quickly and even exceeded?

New York and the Board face a difficult dilemma. Energy supplies and markets are shifting, and the state clearly must change its consumption patterns and energy systems. The Energy Plan states, "The boldness of our solutions should match the magnitude of our challenges." That is exactly right. The stakes are high, and New York has the opportunity and ability to lead the nation toward a clean energy future.

Need to Consider Negative Natural Gas Infrastructure Impacts

---

[1] A. R. Brandt, G.A. Heath, E.A. Kort, et al. "Methane Leakage from North American Natural Gas Systems." *Science,* February 14, 2014.
[2] R.W. Howarth, R. Santoro, and A. Ingraffea. "Methane and the Greenhouse Gas Footprint of Natural Gas from Shale Formations." *Climatic Change Letters,* 2011.
[3] J. D. Hughes. *Drill, Baby, Drill: Can Unconventional Fuels Usher in a New Era of Energy Abundance?* Post Carbon Institute, 2013.

Earthworks is especially concerned with the sparse discussion in the Energy Plan about what increased reliance on natural gas will mean for the state in terms of infrastructure development. While the state has decided not to develop its own shale gas resources (a position that Earthworks strongly supports due to the significant risks), the draft Energy Plan foresees importing more natural gas from shale and other gas-bearing formations located out of state.[4] Such imports will mean more pipelines and associated facilities such as compressor stations and processing plants. The draft plan's section on impacts mentions some of the risks associated with such facilities, such as habitat disturbance, the use of herbicides, and emissions from leaks.[5] However, many risks are omitted from the draft.

As the Region II Office of the Environmental Protection Agency (EPA) wrote in 2011 in its comments on New York State's shale gas drilling plan (the Draft Revised Supplemental Generic Environmental Impact Statement), the state "should include an evaluation of the environmental impacts associated with the construction and siting of associated gathering lines and pipelines" that would convey the natural gas from wells to customers if shale gas were developed in New York.[6] The EPA further recommended that the New York Department of Environmental Conservation (DEC) work with the Public Service Commission to study this issue.[7]

Though the state has continued a de facto moratorium on shale gas drilling and associated well sites within New York, the EPA's recommendation should also apply to the expansion of natural gas pipelines and ancillary processing and delivery equipment, which according to the Energy Plan would be needed to bring natural gas produced in other states into New York.[8] There is no indication in the Plan or from agencies such as DEC that the state is planning such an analysis – an analysis that would help identify the impacts of infrastructure on land, air, water, and communities—and should therefore precede any decision to expand the state's natural gas infrastructure.

Pipelines Can Cause Deadly Explosions and Fires

The Energy Plan's proposal to increase natural gas transport and delivery systems rests on the expansion of existing pipelines and development of new pipelines. Yet the state has not considered the potential for natural gas pipeline explosions, a risk that would likely increase along with pipeline miles. While pipeline explosions may be relatively rare considering that more than two million miles of pipelines crisscross the United States, they can be catastrophic.[9]

Recent examples include:

---

[4] 2014 New York State Draft Energy Plan, Volume 2, Sources, at 103, http://energyplan.ny.gov/.
[5] 2014 New York State Draft Energy Plan, Volume 2, Impacts, at 43-46.
[6] U.S. Envtl. Prot. Agency, Region II, Comments on Revised Draft NYSDEC Revised dSGEIS for Horizontal Drilling and High- Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs, Jan. 11, 2012.
[7] Ibid.
[8] 2014 New York State Draft Energy Plan, Volume 2, Sources, at 102-108, http://energyplan.ny.gov/.
[9] Pipeline Safety Trust, Landowner's Guide to Pipelines (Sept. 2011), http://pstrust.org/docs/landownersguide.pdf, at 15-17.

On March 12, 2014, an explosion killed eight people and leveled two buildings in Harlem. Investigators believe the explosion was caused by a leaking gas pipeline.[10]

On November 21, 2011, a section of El Paso Corp.'s Tennessee pipeline exploded in rural Ohio, causing a fire that stretched 1,000 feet into the sky. Three houses and two barns caught fire from the radiant heat, and a woman suffered burns on the back of her legs while running from the column of fire. The Pipeline and Hazardous Materials Safety Administration found that the incident was caused in part by failure to restore proper support beneath the pipeline following an excavation in 2000. The pipeline was first installed in 1946. In February 2011, a weld on the same pipeline ruptured about 150 miles away, sparking another fireball. Another weld failure caused a significant gas leak in March 2011 without a fire. The Tennessee pipeline stretches from the Texas Gulf Coast through the Marcellus shale in northern Pennsylvania and into New England.[11] Among the gas carried by the pipeline is production from the Marcellus shale that is transported into the Niagara Falls area of New York.[12]

On February 9, 2011 in Allentown, Pa., five people were killed, 60 injured, and eight homes were destroyed by an explosion and fire. A subsequent investigation found that the explosion was caused by a crack in an 83-year-old cast iron gas pipeline near the homes.[13]

On January 18, 2011 in Philadelphia, a cast iron gas pipe exploded and caused a fire that killed one gas utility employee and injured several other people while utility crews were responding to a report of a natural gas leak.[14]

On September 9, 2010, eight people were killed in San Bruno, Calif. when an improperly welded natural gas pipeline installed in the 1950s ruptured, causing an explosion and subsequent inferno that destroyed 38 homes and left a crater 72 feet long by 26 feet wide. The section of steel pipe that ruptured was 30 inches in diameter, 28 feet long and weighed about 3,000 pounds. It was found 100 feet south of the crater.[15] The National Transportation Safety Board (NTSB) found that a cause of the disaster was the California Public Utilities Commission's and the U.S. Department of Transportation's exemptions of existing pipelines from water pressure tests that likely would have revealed the welding defect. The NTSB reported that nationally, there are 180,000 miles of natural gas transmission pipelines that were installed before 1970, when the

---

[10] Marc Santora, At Least 3 Killed as Gas Explosion Hits East Harlem, New York Times (Mar. 13, 2014) at A1. Patrick McGeehan et al., Beneath Cities, a Decaying Tangle of Gas Pipes, New York Times, Mar. 24, 2014 at A1, http://www.nytimes.com/2014/03/24/nyregion/beneath-cities-a-decaying-tangle-of-gas-pipes.html?_r=0.

[11] Joseph Tanfani and Craig R. McCoy, Powerful Pipes, Weak Oversight, Philadelphia Inquirer, Dec. 10, 2011. Pipeline and Hazardous Materials Safety Administration, Failure Investigation Report – Tennessee Gas Pipeline Line 100-1, Batesville, Mississippi (Mar. 21, 2013), http://www.phmsa.dot.gov/staticfiles/PHMSA/PipelineFailureReports/TGP%20Batesville%2011-22-11%20Redacted.pdf, at 10.

[12] Kinder Morgan, Natural Gas Pipelines, Northeast Supply Diversification (2013), http://www.kindermorgan.com/business/gas_pipelines/east/TGP/NSD/.

[13] Colin McAvoy, Allentown Gas Explosion Recalled as Sen. Bob Casey Calls for More Federal Funds, Allentown Express-Times (Feb. 21, 2014), http://www.lehighvalleylive.com/allentown/index.ssf/2014/02/allentown_gas_explosion_recall.html.

[14] 77 FR 17,119-17,120.

[15] National Transportation Safety Board, Pacific Gas and Electric Company, Natural Gas Transmission Pipeline Rupture and Fire, San Bruno California, Sept. 9, 2013, Accident Report NTSB/PAR-11/01, PB2011-916501 (Aug. 30, 2011), http://www.ntsb.gov/doclib/reports/2011/PAR1101.pdf, at 1.

requirement for so-called hydrostatic pressure testing was implemented.[16]

While these disasters generally involved older pipelines, a four-part series published in the *Philadelphia Inquirer* in 2011 found significant problems with newer pipelines and their regulation, including pipelines in the Marcellus shale region:

- In 2011, Terry Langley, veteran welder turned organizer for a national pipeline union, told the *Inquirer* that a 20-inch gathering pipeline in southwestern Pennsylvania near Waynesburg was riddled with welds that failed inspection and had to be redone. When Langley sought to complain to authorities, he found that the pipeline was unregulated, due to gaps in federal and Pennsylvania laws. The gaps fail to cover gathering lines in rural areas that transport natural gas from wells to transmission lines. The transmission lines, in turn, deliver gas to distribution lines that transport the gas to industrial, commercial, and residential consumers.[17]

- The *Inquirer* found that "PHMSA [Pipeline and Hazardous Materials Safety Administration], the main U.S. regulator, has been criticized for decades as ineffectual and overwhelmed. The safety of the entire system largely hinges on industry self-policing. But when inspectors have visited job sites, they have turned up some shoddy welds, substandard steel, and other potentially dangerous construction errors - particularly about five years ago, when the industry was going through another boom period."[18]

- In 2008, PHMSA became alarmed by problems in pipeline construction as a building boom left the industry desperate for workers. The agency inspected 35 projects and "found steel that didn't meet specifications, inadequate coating on pipes, and slipshod welding techniques. The agency found the problems were exacerbated when the lines cut through hills and streams - common terrain in Pennsylvania's shale fields" – and also common terrain in New York's Southern Tier, where at least some new pipelines are planned.[19]

- In January 2011, workers discovered a leak in the Millennium Pipeline that brings Marcellus shale gas into New York State and had been put into operation just three years earlier.[20] An investigation revealed that a section of the pipeline had failed a visual inspection and was set aside but was later installed by accident. The pipeline's owner, Millennium Pipeline Co., said that it had thoroughly inspected the pipeline after conducting repairs and "verified the integrity" of the line. The pipeline was then put into

[16] National Transportation Safety Board, Pacific Gas and Electric Company, Natural Gas Transmission Pipeline Rupture and Fire, San Bruno California, Sept. 9, 2013, Accident Report NTSB/PAR-11/01, PB2011-916501 (Aug. 30, 2011), http://www.ntsb.gov/doclib/reports/2011/PAR1101.pdf, at xii, 107.
[17] Joseph Tanfani and Craig R. McCoy, Powerful Pipes, Weak Oversight, *Philadelphia Inquirer*, Dec. 10, 2011. Pipeline Safety Trust, Landowner's Guide to Pipelines, http://pstrust.org/docs/landownersguide.pdf, at 5.
[18] Id.
[19] Id.
[20] Millennium Pipeline Company, LLC. http://www.millenniumpipeline.com/about.html

operation again, at full pressure.[21]

- A national inspection program designed to prevent leaks and explosions went into effect in 2004, but "the program can confer a false promise of safety," the *Inquirer* found, because the standards cover only seven percent of lines that run near densely populated areas or malls or schools. In addition, pipeline audits under the program are usually analyses of paper records that are sometimes missing or inaccurate. For example, in the explosion in San Bruno, Calif., an investigation by the NTSB found that records held by the utility that owned the pipeline did not reveal that it was constructed with short sections of leftover pipe and included low-quality steel and dangerous welds.[22] Two audits by state and federal regulators failed to uncover these problems "despite the fact that many of them should have been easy to detect," the NTSB found.[23]

Floods Can Pose Serious Risks of Pipeline Ruptures

Extreme weather events—recognized in the Energy Plan as a growing environmental and economic hazard for New York—pose a particular risk for pipelines buried under streams and rivers. Intense rain and floods can scour stream and river bottoms, in turn exposing areas under which pipelines are buried. Such scouring can expose pipelines to moving debris which can rupture them. Yet such risks would inevitably be taken if pipelines are expanded and built.[24]

A very real recent example of this problem occurred in July 2011 when a pipeline owned by Exxon ruptured and spilled 1,500 barrels of crude oil into Montana's Yellowstone River during a flood. The pipe had been buried 5-8 feet beneath the river until the flooding exposed it.[25] The spill "fouled nearby agricultural fields, pastures and lawns along the banks" according to a report by the Pipeline and Hazardous Materials Safety Administration.[26] "Debris caught on the exposed pipe during the flooding gradually increased external stress on the pipe until it ultimately failed," PHMSA found.[27] The Pipeline and Hazardous Materials Safety Administration found that Exxon's "failure to recognize the risk of flooding and river bottom scour" as part of its plan to mitigate and prevent risks to the pipeline "was a major cause of the failure."[28] PHMSA noted

---

[21] Id. Leigh Dana, Gas Leak Requires Repairs on Millennium Pipeline, WBNG-TV (Jan. 14, 2011) http://www.wbng.com/news/video/Gas-Leak-Requires-Repairs-On-Millennium-Pipeline-113611489.html
[22] Joseph Tanfani and Craig R. McCoy, Powerful Pipes, Weak Oversight, Philadelphia Inquirer, Dec. 10, 2011.
[23] National Transportation Safety Board, Pacific Gas and Electric Company, Natural Gas Transmission Pipeline Rupture and Fire, San Bruno California, Sept. 9, 2013, Accident Report NTSB/PAR-11/01, PB2011-916501 (Aug. 30, 2011), http://www.ntsb.gov/doclib/reports/2011/PAR1101.pdf, at 120.
[24] Spectra Energy, Algonquin Incremental Market (AIM) project. http://www.spectraenergy.com/Operations/New-Projects-and-Our-Process/New-Projects-in-US/Algonquin-Incremental-Market-AIM-Project/
[25] Id at 5. Jack Nicas, "Chance of Oil Spill Rises With Floodwaters," Wall Street Journal, Aug. 4, 2011, at A3.
[26] Pipeline and Hazardous Materials Safety Administration, Notice of Probable Violation Proposed Civil Penalty and Proposed Compliance Order, March 25, 2013, http://phmhqnwas062.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Enforcement%20Decisions%20Files/PCO_03252013.pdf, at 1-2.
[27] Id. at 2.
[28] Pipeline and Hazardous Materials Safety Administration, Notice of Probable Violation Proposed Civil Penalty and Proposed Compliance Order, March 25, 2013, http://phmhqnwas062.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Enforcement%20Decisions%20Files/PCO_03252013.pdf, at 5.

that between 2009 and 2011, two pipelines within 500 feet upriver of Exxon's pipeline had failed, at least one due to erosion and flooding.

That pipeline's operator, Williston Basin Interstate Pipeline, simply responded by replacing the old pipeline with a new line installed with directional drilling 40-50 feet beneath the river.[29] Yet the Wall Street Journal reported that even some pipelines buried 40-50 feet underground might not be safe. U.S. Geological Survey (USGS) scientists found in 2011 that along the Missouri River at Bismarck, N.D. near five clusters of pipelines, scouring appeared to have created two 40-foot holes in the riverbed.[30] State officials found scouring on the Missouri near Bismarck about 30 feet deep in at least eight locations.[31] Downstream, at least 23 pipelines were buried 20 feet or less below the riverbed.[32]

"All rivers are susceptible to scouring," the *Journal* reported, noting that scouring caused at least two pipeline breaks in Iowa and Nebraska in 1993 and eight ruptures near Houston in 1994. "Scouring has been a suspected culprit in many pipeline breaks since."[33]

Pipelines in New York are likely to be at risk from scouring because the state has had so many severe floods in the past decade. In at least 4 of the past 10 years, the state has experienced serious flooding in some counties where the proposed Constitution Pipeline may be installed, including Broome, Chenango, Delaware, and Schoharie Counties.[34] What may exacerbate the risk is that the DEC acknowledged in its draft shale gas plan in 2011 that the Federal Emergency Management Agency's maps that identify floodplains in New York have proved inaccurate in recent floods. Most areas impacted by floods in 2004 and 2006 in the Delaware and Susquehanna River basins were located outside of designated floodplains.[35] Therefore, there is a risk that areas in which pipelines are installed might be impacted by flooding even if these areas

---

[29] Id. at 3.
[30] Jack Nicas, "Chance of Oil Spill Rises With Floodwaters," Wall Street Journal, Aug. 4, 2011, at A3.
[31] Id.
[32] Id.
[33] Id.
[34] Federal Energy Regulatory Commission, Draft Environmental Impact Statement for Constitution Pipeline, http://www.ferc.gov/industries/gas/enviro/eis/2014/02-12-14-eis.asp (stating that the pipeline will pass through Broome, Chenango, Delaware and Schoharie counties.) Lloyd T. Brooks, U.S. Geological Survey, Flood of September 18-19, 2004, http://ny.water.usgs.gov/pubs/of/of051166/ (reporting that the flood affected Delaware, Orange and Sullivan Counties and that the flood in some sites exceeded 500-year levels). Thomas P. Suro et al., U.S. Geological Survey, Flood of June 26-29, 2006, Mohawk, Delaware, and Susquehanna River Basins, New York, http://pubs.usgs.gov/of/2009/1063/ (reporting that the flood affected Broome, Chenango, Delaware, Sullivan and Ulster counties and that the flood in some sites exceeded 100-year levels. Carolyn O. Szabo et al. Federal Emergency Management Agency, Designated Areas: New York Hurricane Irene (Major Disaster Declaration declared on Aug. 31, 2011) (reporting that counties receiving disaster designation included Delaware and Schoharie), http://www.fema.gov/zh-hans/disaster/4020/designated-areas. U.S. Geological Survey, New York Water Science Center News Volume 17, October 2013, 2011 Year of the Flood, http://ny.water.usgs.gov/projects/news/NY-News-v17-Oct2013.pdf (reporting that flooding in some areas exceeded 100- and 500-year levels). Federal Emergency Management Agency, President Declares Disaster for New York (July 12, 2013) (declaring disaster from severe storms and flooding in multiple counties including Chenango and Delaware).
[35] N.Y. State Dep't. Envtl. Conservation, Supplemental Generic Envtl Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic fracturing to Develop the Marcellus Shale and other Low-Permeability Gas Reservoirs (2011), at 2-30 through 2-34.

are not designated as floodplains.

The DEC has expressed concerns about flooding and inaccurate floodplain maps in the counties that would be home to the proposed Constitution Pipeline if it is approved, as well as about Steuben and Tioga counties where the pipeline extension known as the "Tuscarora Lateral Project" would be built if it is approved.[36]

Federal rules that apply to interstate natural gas pipelines generally require pipelines to be buried at least four feet below a stream bed when the pipeline is installed in soil or at least two feet below the stream bed when the pipeline is installed in "consolidated rock."[37] "That's dangerous policy…scour depths can exceed four feet easily," Howard Chang, a professor emeritus of river engineering at San Diego State University told the *Wall Street Journal* in 2011. Chang and other experts say that pipeline placement and depth should be tailored to particular locations to reduce risks.[38]

The Federal Energy Regulatory Commission (FERC) has found that, in the case of the proposed Constitution Pipeline, there would be "a minimum of 5 feet of cover over the pipeline at waterbodies." However, USGS data suggest that this depth could be insufficient, particularly because in 2011, flooding scoured five feet of stream bed in at least two places, Biscuit Brook in Ulster County[39] and West Kill in Schoharie County.[40] In other words, even if the Constitution pipeline were buried to a depth of five feet beneath a stream, it could be exposed to debris and rupture during a flood.

New York state should assess the integrity of existing pipelines and carefully examine the potential for scour in flood-prone areas, particularly with regard to whether existing or proposed pipelines would be at risk. The state should also investigate how many miles of pre-1970 pipeline in the state—particularly those running underneath rivers and streams—have not been subject to hydrostatic pressure tests and whether these lines pose risks to safety and health.

Compressor Stations Raise Air Pollution and Health Concerns

Moving more gas into New York will require not only new and larger pipelines, but also numerous compressor facilities to keep gas moving through them. Compressors are typically placed along natural gas pipelines every 50 to 100 miles at areas of lower pressure; they compress incoming natural gas using electric or natural gas-powered engines and send the gas

[36] N.Y. State Dep't. Envtl. Conservation, Supplemental Generic Envtl Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic fracturing to Develop the Marcellus Shale and other Low-Permeability Gas Reservoirs (2011), at 2-32. Empire Pipeline, Tuscarora Lateral Project Presentation (April 23, 2013), http://www.natfuel.com/Empire/TLP/docs/Tuscarora%20Open%20House%20Presentation%2004-23-2013.pdf.
[37] 49 C.F.R. 192.327 (e).
[38] Jack Nicas, "Chance of Oil Spill Rises With Floodwaters," Wall Street Journal, Aug. 4, 2011, at A3.
[39] U.S. Geological Survey, Water-Data Report 2012, 01434025, Biscuit Brook Above Pigeon Brook at Frost Valley, NY.
[40] U.S. Geological Survey, Water-Data Report 2012, 01349810, West Kill Near West Kill, NY.

onward at higher pressure.[41]

Several compressor stations have been recently constructed in New York, and the Energy Plan references proposals to build new facilities or upgrade and expand existing facilities.[42] For example, in May 2013, the Millennium Pipeline Company began operating a compressor station in Minisink in order to increase capacity.[43] The company recently completed a 15,000 horsepower natural gas-powered compressor station in the town of Hancock, also to increase capacity in the Millennium pipeline.[44] The proposed Constitution Pipeline will be accompanied by the Iroquois Gas Transmission System's Wright Interconnect Project, which would involve the construction of new compressor facilities adjacent to, and within the boundaries of, Iroquois' existing Wright Compressor Station in Schoharie County.[45]

Documented health impacts. Compressor stations include numerous sources of air emissions, including tanks, fugitive emissions from leaks, dehydrators, heaters, and engines. Contaminants released from these sources can include carbon monoxide (CO); nitrogen oxides (N2O); fine and coarse particulate matter (PM2.5 and PM10); sulfur dioxides (SOx); volatile organic compounds (VOC), hazardous air pollutants (HAP) (e.g., formaldehyde; benzene; toluene; xylenes; n-hexane; 2,2,4-trimethylpentane), and greenhouse gases such as methane, carbon dioxide, and nitrous oxides.[46]

The specific chemicals and volumes of chemicals emitted from a compressor station vary depending on the size of the compressor (e.g., the larger the compressor station, the more engines it typically has, and therefore, volumes of emissions also increase); and the chemical make-up of the gas being compressed (e.g., wet gas contains heavier hydrocarbons, which along with water need to be removed from the gas, a process that results in air emissions). The polluting effects of compressor stations are particularly pronounced during "blowdown" events (which can be scheduled or accidental), when pressure building in the pipeline system is released through venting into the air.

Over the past few years, Earthworks has conducted air canister testing at sites across Pennsylvania, which were selected due to their close proximity to natural gas wells (conventional and unconventional), wellhead compressor facilities, and/or large compressor stations. The

---

[41] Pipeline Safety Trust, Landowner's Guide to Pipelines (Sept. 2011), at 6, http://pstrust.org/docs/landownersguide.pdf.
[42] 2014 New York State Draft Energy Plan, Volume 2, Sources, http://energyplan.ny.gov/, at 103-105.
[43] Allison Dunne, Minisink Compressor Opponents Ask U.S. Senator to Stand With Them, WAMC Northeast Public Radio, http://wamc.org/term/minisink-compressor-station. Millennium Pipeline Company, Minisink Compressor Project (2011), http://www.millenniumpipeline.com/minisink_compressor.html.
[44] NewsWest9 (Source: Millennium Pipeline Company) (Apr. 3, 2014), http://www.newswest9.com/story/25156662/millennium-pipeline-company-announces-hancock-compressor-station-now-on-line. Dan Hust, Sullivan County Democrat (Mar. 1, 2013), http://sc-democrat.com/news/2012May/08/news3.htm
[45] Federal Energy Regulatory Commission, Draft Environmental Impact Statement Constitution Pipeline and Wright Interconnect Projects (Feb. 2014), http://www.ferc.gov/industries/gas/enviro/eis/2014/02-12-14-eis.asp, at ES-1.
[46] Pennsylvania Department of Environmental Protection. 2013. Air Emissions Inventory Data for the Unconventional Natural Gas Industry, http://www.dep.state.pa.us/dep/deputate/airwaste/aq/emission/marcellus/Nat%20Gas%20Emissions%202012%20-WellFarmStation_20140324.xlsx.

following table shows air canister test results for locations within a half-mile of large compressor facilities similar to those currently being built in New York State: the Springhill compressor in Fayette County and the Cumberland/Henderson compressor station in Greene County. Sampling at these sites took place in 2011 and 2013.[47]

Table 1: VOCs (including methane) detected in ambient air at sites within 1/2 mile of a compressor station.

[47] All of the test locations had a few conventional and/or unconventional gas wells located within a half a mile, so the compressor stations were not the sole source of nearby air emissions. Two homes (in two different counties) had one unconventional well and five conventional wells within ½ a mile. The third location had one unconventional and two conventional wells within ½ a mile.

	n	Number of samples detecting chemical	Percent of samples detecting chemical	Min.	Max.	Mean*
1,1,2-Trichloro-1,2,2-trifluoroethane	14	13	92.8	0.53	0.72	0.62
1,3-Dichlorobenzene	14	3	21.4	3.4	6.7	4.67
2-Butanone	12	3	25	1.20	1.80	1.60
Benzene	14	2	14.3	0.32	0.36	0.34
Carbon tetrachloride	14	14	100	0.51	0.67	0.60
Chloromethane	14	14	100	0.81	1.20	0.99
Dichlorodifluoromethane	2	2	100	2.5	2.8	2.65
Ethylbenzene	14	1	7.1	0.27	0.27	0.27
Methane	12	2	16.7	2.2	8.3	5.25
Methylene Chloride	14	1	7.1	2.3	2.3	2.3
Tetrachloroethylene	14	2	14.3	0.56	1.10	0.83
Toluene	14	8	57.1	0.59	0.95	0.76
Trichloroethylene	14	3	21.4	0.11	0.44	0.23
Trichlorofluoromethane	14	14	100	1.30	1.60	1.47

Concentrations are in micrograms per cubic meter, µg/m^3 except for methane, which is in µg/L.
n = total number of canister samples that were analyzed for a particular chemical.
* Mean of samples detecting chemical. [48]

[48] Some studies calculate the average/mean by including all samples, and for non-detects a value equal to 1/2 of the minimum reporting limit (MRL)/detection limit is used. (For example, see: Pennsylvania DEP. Southern Delaware County Report. p. 11. http://www.dep.state.pa.us/dep/deputate/airwaste/aq/toxics/projects/sdel/sdelrpt3.pdf) We did not do that because the one laboratory had MRLs that were often much higher than the values actually detected by the other two laboratories. So the means would have been skewed (i.e., most likely higher than actual ambient concentrations).

In total, 14 Volatile Organic Compounds (VOCs, which include hazardous air pollutants, or HAPs, such as benzene, toluene, and ethylbenzene) and methane were detected in some of the air samples. Some air contaminants were found in all of the samples (carbon tetrachloride, chloromethane, dichlorodifluoromethane, trichlorfluoromethane), while others were only found in a small number of samples (e.g., methylene chloride, ethylbenzene, benzene, tetrachloroethylene, methane).

Nearby residents reported having symptoms consistent with the scientifically established health effects of the chemicals detected at their homes in close, located in close proximity to these compressor stations (as well as at other sites where Earthworks conducted air testing).[49] Foremost among these were dizziness, headaches, nausea, fatigue, and nosebleeds. These findings are consistent with the conclusions of other studies on air quality in gas and oil fields nationwide.[50]

In addition, the Pennsylvania Department of Environmental Protection (DEP) has published 2011 and 2012 data on emissions from thousands of natural gas facility sites, including compressor stations.[51] As seen from Table 2 below, both the Springhill and Cumberland compressor stations annually released tons of VOCs and HAPs to the atmosphere—despite having relatively low annual emissions of these pollutants compared to other natural gas facilities in Pennsylvania. While operators are not required to specifically identify the various VOCs emitted, they are required to report emissions of benzene, toluene and ethylbenzene—three chemicals that were detected in air canister tests conducted at homes near the compressor stations.

Table 2. Emissions (tons per year) of VOCs and HAPs from Springhill and Cumberland compressor stations.

	Springhill		Cumberland	
	2011	2012	2011	2012
VOCs	23.15	16.11	13.25	11.65
Benzene	0.16	0.35	0.14	0.10
Toluene	0.23	0.57	0.11	0.18
Ethylbenzene	0.01	0.02	0.03	0.0047
Xylenes	0.29	0.06	0.07	0.07
Formaldehyde	5.42	3.44	0.46	0.40
n-Hexane	0.39	0.40	0.24	0.13
2,2,4-trimethylpenta	0.03	0.03	0.07	0.13

[49] **Nadia Steinzor, Wilma Subra, and Lisa Sumi. "Investigating Links Between Shale Gas Development and Health Impacts through a Community Survey Project in Pennsylvania."** ***NEW SOLUTIONS,*** **Vol. 23(1) 55-83, 2013.**

[50] See for example, T. Colborn, K. Schultz, L. Herrick, and C. Kwiatkowski. "An exploratory study of air quality near natural gas operations." *Human and Ecological Risk Assessment: An International Journal,* 2013; and **Lisa M. McKenzie, Roxana Z. Witter, Lee S. Newman, and John L. Adgate. "**Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources." *Science of the Total Environment,* 2012.

[51] Pennsylvania Department of Environmental Protection web site: "Air Emissions Data from Natural Gas Operations." http://www.dep.state.pa.us/dep/deputate/airwaste/aq/emission/marcellus_inventory.html

ne				

Compressor stations are clearly significant sources of VOCs, and can therefore have a negative impact on local and possibly regional air quality. The combination of VOCs with sunlight forms ozone, a pollutant that can impair breathing, aggravate asthma and, over time, may permanently damage lungs.[52] A 2009 study conducted in Texas estimated that emissions of smog-forming compounds from natural gas compressor engines in the Dallas-Ft. Worth area would be 65 tons per day in 2009—the equivalent of roughly a third of all oil and gas emissions in the area and three times the smog-forming emissions (16 tons per day) from the area's airports.[53]

The Texas Commission on Environmental Quality has recorded several complaints from citizens about compressor emissions in Karnes County in the Eagle Ford shale region. "Complainant alleges that he has been getting hydrogen sulfide odors since October 2007 when he moved into his house," read one complaint about the Regency FS LP Kunkle Compressor station filed in December 2008. "In the past, the odor was so bad it woke him up during the night and he began vomiting and had to leave his home. It also sometimes burns his nose. He needs a southeast wind to be downwind of the alleged source."[54] Another complaint filed about the facility in January 2007 read, "This complainant said the stink was unbearable this morning just before 7:00. . .She said she is worried about her children."[55]

Radioactivity a Concern for Drilling Waste, Imported Gas

The increased use of natural gas in New York, especially shale gas, increases the risk that New Yorkers will be exposed to toxic chemicals and radioactivity from waste imported into the state from Marcellus shale drilling operations in Pennsylvania, and possibly even from the gas itself. Greater gas consumption in New York will also continue to facilitate the production of dangerous solid and liquid waste in other states—even though no operator nor state agency has determined how to safely process and dispose of ever-growing volumes.

Both the New York Department of Environmental Conservation and USGS have previously reported that the Marcellus shale is naturally radioactive. The formation contains both uranium and thorium, and the USGS has found that "the Marcellus is readily identified on geophysical logs by its high gamma-ray signal," a type of radiation.[56]

---

[52] U.S. Environmental Protection Agency, Air Quality Index, A Guide to Air Quality and Your Health (August 2009), http://www.epa.gov/airnow/aqi_brochure_08-09.pdf, at 5-6.
[53] Al Armendariz, Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements, report for Ramon Alvarez, Environmental Defense Fund (Jan. 26, 2009), http://www.edf.org/news/report-finds-barnett-shale-emissions-contributing-dfw-smog.
[54] Texas Commission on Environmental Quality, Complaint 117471. http://www2.tceq.texas.gov/oce/waci/index.cfm?fuseaction=home.complaint&incid=117471.
[55] Texas Commission on Environmental Quality, Complaint 86570. http://www2.tceq.texas.gov/oce/waci/index.cfm?fuseaction=home.complaint&incid=86570

[56] N.Y. State Dep't. Envtl. Conservation, Supplemental Generic Envtl Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic fracturing to Develop the Marcellus Shale and other Low-Permeability Gas Reservoirs (2011), [hereinafter NYDEC

It is therefore not surprising that waste produced from the Marcellus shale contains significant amounts of radioactivity. In 2011, USGS found that radium levels in wastewater from oil and gas wells in New York and Pennsylvania, including those in the Marcellus shale, "have a distinctly higher median… than reported for other formations in the Appalachian Basin, and range to higher values than reported in other basins."[57] The median level of radium for the wastewater was 2,460 picocuries per liter,[58] or about 500 times the safe level in drinking water established by the EPA (5 picocuries per liter).[59]

A recent study found that a common EPA-approved test method used to detect radium in water might be significantly underestimating the amount of radium in Marcellus shale drilling wastewater because the "high ionic strength and dissolved solid content" of the wastewater reduces the effectiveness of the tests.[60] The researchers found that the test may fail to detect 99 percent of the radium in Marcellus shale wastewater.[61] The USGS study included radium data generated using this method, as well as data generated by using a method that the recent study found to be accurate and data generated by unknown testing methods.[62] Therefore, it is possible that median radium levels in Marcellus drilling wastewater are even higher than the USGS reported.

According to records collected by the state of Pennsylvania, a portion of the waste generated by unconventional shale gas drilling in the state was shipped to nine New York landfills for disposal between 2010-2013.[63] The facilities are Allied Waste Systems in Niagara Falls, Brant Disposal in Buffalo, Casella Waste Systems in Painted Post, Chemung County Landfill in Lowman, Environmental Products and Services of Vermont, Inc. in Syracuse, Hakes C&D Landfill in Painted Post, Hakes Landfill in Painted Post, Hyland Facility Association in Angelica and Seneca Meadows Landfill in Waterloo. The waste shipments have reportedly included wastewater, drill cuttings (fragments of rock produced when drills bore through the earth), and sand that is injected into the well with the hydraulic fracturing fluid.

Another six facilities have accepted drilling waste from Pennsylvania between 2010 and 2013, apparently from conventional oil and gas wells, including Allegany County Road Spreading in

---

SGEIS] at 4-35, 6-206. E.L. Rowan et al. U.S. Geological Survey, Radium Content of Oil- and Gas-Field Produced Waters in the Northern Appalachian Basin (USA): Summary and Discussion of Data (2011) http://pubs.usgs.gov/sir/2011/5135/, at 15.

[57] E.L. Rowan et al., U.S. Geological Survey, Radium Content of Oil- and Gas-Field Produced Waters in the Northern Appalachian Basin (USA): Summary and Discussion of Data (2011) http://pubs.usgs.gov/sir/2011/5135/, at 15.

[58] Id. at 1.

[59] U.S. Envtl. Prot. Agency, Basic Information About Radionuclides in Drinking Water (Dec. 3, 2013), http://water.epa.gov/drink/contaminants/basicinformation/radionuclides.cfm.

[60] Andrew W. Nelson et al. Matrix Complications in the Determination of Radium Levels in Hydraulic Fracturing Flowback Water from Marcellus Shale, Environmental Science and Technology (Feb. 10, 2014), http://pubs.acs.org/doi/pdf/10.1021/ez5000379, 204-208.

[61] Id. at 207.

[62] E.L. Rowan et al. U.S. Geological Survey, Radium Content of Oil- and Gas-Field Produced Waters in the Northern Appalachian Basin (USA): Summary and Discussion of Data, 2011, http://pubs.usgs.gov/sir/2011/5135/, at 26-31.

[63] Pennsylvania Department of Environmental Protection, PA DEP Oil & Gas Reporting Website, Waste Reports, By Waste Facility (April 24, 2014), https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Waste/WasteByWasteFacility.aspx

Bolivar, Allegany County Road Spreading in Cuba, B&L Enterprises in Dewittville, JJ Bucher TRMT Facility in Bolivar, NY Road Spreading in Chautauqua and Zentz's Well Service. The waste was primarily drilling wastewater. [64] Some of the waste was disposed by spreading it on roads, while a large quantity was treated on site at JJ Bucher TRMT Facility in Bolivar and apparently discharged under the Clean Water Act's National Pollutant Discharge Elimination System. Zentz's Well Service also accepted a small amount of "basic sediment."

In comments made to the Department of Environmental Conservation in 2011 about the DEC's draft shale gas drilling plan, the EPA's Region II office was critical of the department's handling of potentially radioactive drill cuttings. In response to the DEC's statement that, "in New York State, the [naturally-occurring radioactive material] in cuttings is not precluded by regulation from disposal in a solid waste landfill..." the EPA commented that the department appeared to be understating the radioactivity of drill cuttings, and that it is unclear which agency would have responsibility for cleanup or engineering controls at landfills that accept high concentrations of these materials.[65]

In light of the EPA's comments and the high levels of radium in Marcellus shale wastewater, New York State should carefully study the ability of landfills to safely accept Marcellus shale drilling waste and radioactive drilling waste generally. This problem will persist as long as natural gas is produced, whether within New York or imported from other states.

A related concern is the presence of radon in the natural gas that is transported via pipeline from the Marcellus shale region into New York. According to the EPA and the Centers for Disease Control and Prevention (CDC), radon is a naturally occurring radioactive gas and is the nation's second-leading cause of lung cancer, behind smoking.[66] Radon is a radioactive decay product of radium, which, in turn, is a decay product of uranium and thorium, elements that are found in the Marcellus shale. It has a half-life of 3.8 days and does not burn or react chemically.[67] Radon's radioactive decay products include polonium that decays by emitting high-energy alpha particles that damage lung tissue and cause cancer.[68]

Radon can enter homes and other buildings by migrating from underground through cracks and holes in a building's foundation. However, radon can also accumulate in homes through the indoor use of natural gas that was previously contained in underground deposits of uranium- and thorium-bearing rock.[69]

---

[64] Pennsylvania Department of Environmental Protection, PA DEP Oil & Gas Reporting Website, Waste Reports, By Waste Facility (April 24, 2014), https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Waste/WasteByWasteFacility.aspx

[65] U.S. Envtl. Prot. Agency, Region II, Comments on Revised Draft NYSDEC Revised dSGEIS for Horizontal Drilling and High- Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs, Jan. 11, 2012, at 5.

[66] U.S. Envtl. Prot. Agency. A Citizen's Guide to Radon, http://www.epa.gov/radon/pubs/citguide.html.

[67] Agency for Toxic Substances and Disease Registry, Radon Toxicity, What is Radon? http://www.atsdr.cdc.gov/csem/csem.asp?csem=8&po=4.

[68] U.S. Envtl. Prot. Agency. Radiation Protection, Radon, http://www.epa.gov/rpdweb00/radionuclides/radon.html.

[69] U.S. Envtl. Prot. Agency. A Citizen's Guide to Radon. Accessed online June 4, 2013 at http://www.epa.gov/radon/pubs/citguide.html. Agency for Toxic Substances and Disease Registry, Radon Toxicity, What is Radon? Accessed online June 4, 2013 at http://www.atsdr.cdc.gov/csem/csem.asp?csem=8&po=4. Agency

In 2012, the USGS released preliminary sampling data from 10 samples of gas collected near the wellheads of three wells producing from Pennsylvania's Marcellus shale, finding radon levels ranging from one to 79 picocuries per liter, with an average of 36 and a median of 32.[70] The agency's scientists stated that they knew of no other published measurements of radon in natural gas from the Appalachian Basin, which contains the Marcellus shale. They concluded that the number of samples "is too small to… yield statistically valid results" and that "the key to better understanding radon, its sources, and behavior in hydrocarbon reservoirs lies with the collection and interpretation of additional data."[71]

We are not aware of any effort by New York State to collect or analyze data on the potential health effects of radon from natural gas use. Meanwhile, at least one pipeline, the Tennessee, is carrying natural gas from the Marcellus shale into the Niagara Falls area. The proposed Constitution Pipeline extension would also carry Marcellus shale gas to New York and New England from Susquehanna County, Pa., where significant shale gas development is occurring.[72]

In response to these growing risks and realities, Medical Society of the State of New York recently passed a resolution in support of legislation that "protects the public health by ensuring that New York State is committed to reducing sources of excess radon emissions, and monitoring radon gas exposure levels to confirm that these radon gas levels do not exceed the recommended levels set by the Environmental Protection Agency."[73] New York State Representative Linda Rosenthal and State Senator Diane J. Savino have sponsored legislation that would require regular monitoring of radon in natural gas and would prevent distribution of gas with levels of radon above certain limits.[74] In addition, leading public health experts and the American Lung Association of the Northeast sent a letter to Governor Cuomo urging him to assess radon levels in shale gas before making a decision on whether to allow shale gas drilling in New York or the distribution of Marcellus shale gas from out of state.[75]

Given the risks of radon exposure, New York State should analyze the radon levels in natural gas *before* allowing any expansion of Marcellus shale gas into New York state, as called for in the Energy Plan. Increasing reliance on natural gas will only create more incentive to import

---

for Toxic Substances and Disease Registry, Radon Toxicity, Where is Radon Found? Accessed online June 4, 2013 at http://www.atsdr.cdc.gov/csem/csem.asp?csem=8&po=5. U.S. Envtl. Prot. Agency. Radiation Protection, Radon, http://www.epa.gov/rpdweb00/radionuclides/radon.html.

[70] E.L. Rowan and T.F. Kraemer, U.S. Geological Survey, Radon-222 Content of Natural Gas Samples from Upper and Middle Devonian Sandstone and Shale Reservoirs in Pennsylvania: Preliminary Data, 2012. Accessed online June 7, 2013 at http://pubs.usgs.gov/of/2012/1159/.

[71] E.L. Rowan and T.F. Kraemer, U.S. Geological Survey, Radon-222 Content of Natural Gas Samples from Upper and Middle Devonian Sandstone and Shale Reservoirs in Pennsylvania: Preliminary Data, 2012, http://pubs.usgs.gov/of/2012/1159/.

[72] Federal Energy Regulatory Commission, Constitution Pipeline Environmental Impact Statement, http://www.ferc.gov/industries/gas/enviro/eis/2014/02-12-14-eis.asp, at ES-1

[73] Medical Society of the State of New York, Resolution 2014-154, Protecting Public Health from Elevated Radon Exposure, http://concernedhealthny.org/wp-content/uploads/2014/05/MSSNYResolution2014-154-ProtectingPublicHealthfromElevatedRadon.pdf.

[74] New York Assembly Bill No. A06863B, New York Senate Bill No. S04921.

[75] Letter from Dr. Helen Caldicott et al. to New York State Gov. Andrew M. Cuomo regarding radioactivity risks from shale gas drilling (May 8, 2014), http://concernedhealthny.org/wp-content/uploads/2014/05/CuomoLetter-RadiationHazards20140508.pdf.

Marcellus shale gas from Pennsylvania and other states without measures in place to protect the health of New Yorkers.

Compressed, Liquefied Natural Gas Facilities Pose Risks

The Energy Plan suggests that New York might use increased amounts of liquefied natural gas (LNG) and compressed natural gas (CNG) for transportation and other purposes.[76] At a minimum, it would be premature to increase the use of these forms of natural gas without the state first conducting a comprehensive impacts analysis that also considers the health and environmental impacts of processing and producing these fuels. The narrow statement in the Energy Plan that natural gas is "clean-burning" is clearly insufficient evidence in this regard.[77]

Increasing the use of LNG and CNG would likely create more demand for risky gas drilling without clear environmental benefits for New York.

As we noted in previous comments to the DEC regarding proposed regulations for the use of LNG facilities, focusing on whether a fuel is clean-burning ignores the many sources of greenhouse gas (GHG) and air emissions during prior phases of extraction, production, transportation, and application. Yet recent research indicates that a lifecycle or footprint approach can significantly change the balance of environmental costs and benefits associated with natural gas, indicating that it is far more polluting than previously thought.[78] Some work has been done to apply this type of research to the context of LNG facility development, for example through a "well to wheel" or "well to pump" analysis that takes into consideration the processes and energy sources used to produce the fuel.[79]

In 2008, one such lifecycle study concluded that gas-to-liquid (GTL) fuels based on imported natural gas would lead to significant increases in GHG emissions, while even the most optimistic scenario based on high levels of domestic supply and fuel efficiency would provide only a slight reduction.[80] Another more recent study examining methane leakage throughout stages of gas extraction, production, and use indicated that in a 100-year timeframe, there is no statistical difference in greenhouse gas emissions from vehicles fueled by petroleum or compressed natural gas (CNG), while over a 20-year timeframe, emissions from CNG vehicles are higher.[81]

---

[76] 2014 New York State Draft Energy Plan, Volume 2, Sources, http://energyplan.ny.gov/, at 134.
[77] 2014 New York State Draft Energy Plan, Volume 2, Sources, http://energyplan.ny.gov/, at 130.
[78] R.W. Howarth, R. Santoro, and A. Ingraffea. "Methane and the Greenhouse Gas Footprint of Natural Gas from Shale Formations." *Climatic Change Letters,* 2011. S.M. Miller, S.C. Wofsy, A.M. Michalak, et al. "Anthropogenic emissions of methane in the United States." *Proceedings of the National Academy of Sciences,* 2013.

[79] See, for example, the work of Michael Wang and colleagues at the Argonne National Laboratory, including H. Huo, Y. Wu, and M. Wang. "Total versus Urban: Well-to-Wheels Assessment of Criteria Pollutant Emissions from Various Vehicle/Fuel Systems." *Atmospheric Environment,* 2009.

[80] P. Jaramillo, W.M. Griffin, and H.S. Matthews. "Comparative analysis of the production costs and life-cycle GHG emissions of FT liquid fuels from coal and natural gas." *Environmental Science and Technology*, 2008.

[81] A. Burnham and C. Clark. "Examining the Impacts of Methane Leakage on Life-Cycle Greenhouse Gas Emissions of Shale and Conventional Natural Gas." *EM* (the magazine of the Air and Waste Management Association), 2012.

A 2007 study of various fuels used for electricity generation reveals that the lifecycle nitrogen oxide (NOx) emissions of imported LNG could be higher than that of coal when production processes such as liquefaction and regasification are considered; while the study apparently did not examine domestically produced LNG, it did note that domestically-produced, non-liquefied natural gas has NOx emissions comparable to those from coal.[82]

Conclusion

The 2014 New York State Draft Energy Plan deserves credit for promoting growth in renewable energy, green jobs, energy efficient electricity and transportation. The plan also deserves praise for its focus on health, environmental justice, and climate impacts in energy planning. However, the plan would continue to make New York too reliant on dirty sources of energy, particularly natural gas. The plan also fails to fully address many of the significant impacts of expanded natural gas infrastructure both in New York and in the out-of-state communities where much of New York's natural gas would be drilled. These impacts include the potential for catastrophic pipeline explosions and fires – risks that are exacerbated by New York's status as a flood-prone state; air pollution from compressor stations and the use of compressed or liquefied natural gas; radioactive waste generated by shale gas drilling; and the potential for unsafe levels of radon in gas produced from shale formations. Rather than remaining heavily invested in dirty energies of the past, the final plan should move New York decisively toward a clean energy future.

Sincerely,

Dusty Horwitt
Senior Analyst, Earthworks
1612 K St., NW, Suite 808
Washington, DC 20006
dhorwitt@earthworksaction.org
202-887-1872 x117

[82] P. Jaramillo, W.M. Griffin, and H.S. Matthews. "Comparative life-cycle air emissions of coal, domestic, natural gas, LNG, and SNG for Electricity Generation." *Environmental Science and Technology* July 2007.