

## Summary Document

### **Potential Health Effects Associated with Chemical Emissions from Natural Gas-Powered Electric Utilities in New York: 2014**

Human health can be affected by air pollution, and is particularly vulnerable to the complex mixtures of chemicals emitted by industrial sources. When these emissions sources are sited in residential areas, near schools, daycares and other locations where young, elderly, or other highly susceptible individuals reside, there should be continuous pollutant monitoring that shows high level, short term exposures as well as pollutant levels averaged over time. Detailed air monitoring should be paired with the surveillance of potential health impacts occurring among nearby residents.

The purpose of the Report is to identify the specific chemicals, release volumes, and the direct and indirect health effects of air pollution from New York State's natural-gas powered electric utilities (NGEU). The increase in transport of shale gas in New York State, on its way to coastal export terminals, is driving new construction of gas-powered electric plants. In a previous report, the authors documented the amount of emissions, toxic chemicals and health effects related to New York's gas compressor stations, which are also increasing in number. Power plants are an even larger source of toxic air emissions.

#### **General information**

The two primary data resources for chemical emissions are the National Emissions Inventory (the most recent data is from 2014) and the Inventory of U.S. Greenhouse Gas Emissions and Sinks (GHG). Health effects from these chemicals, based on data from the World Health Organization's International Classification of Disease, are directly or indirectly associated with the 20 major categories of human disease.

In 2014, natural gas-powered utilities accounted for 39.8 million pounds of emissions. Natural gas compressor stations were the second largest point source of natural gas combustion emissions, releasing 5.4 million pounds.

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## What is in the Report?

**The Preface** of the report provides a basic context for the data collected on natural gas emissions in New York. Information is presented in terms of total air emissions, New York designated regions, and specific counties affected. Thirty of the state's 62 counties host NGEU. Thirty-two chemicals are reported by industry to the NEI.

In summarizing health effects, the report shows that:

***Each of the 32 chemicals reported by the NEI have directly negative impacts on human health.*** Inhalation of these compounds are documented to cause both immediate and long-term effects.

And...

More specifically, the 32 NEI chemicals are associated with 216 individual diseases, including 57 individual cancers and 159 non-neoplastic diseases.<sup>1</sup>

**Chapter 1** discusses the challenges of finding and using data sources, the value of creating a master list of sources, and linking the list of toxic chemicals with health effects to the appropriate sources. Potential limitations, reliability, and accuracy concerns associated with available data are also discussed.

In **Chapter 2**, the report reviews emission releases by fuel, by source type, by New York region, county, and facility. Readers can locate their region and county to identify total releases, and can identify point sources for specific contributions. Table 2.5 on page 17 lists the total releases by chemical across the state.

**Chapter 3** covers all associated health effects, including those caused by greenhouse gas contributions to climate change. Chapter 3 also details the direct health effects associated with the quantified emissions from NGEU (Table 3, page 24).

The next sections cover each disease category, the associated chemicals, and the amounts emitted by each NGEU. Each disease category review presents the number of associated chemicals and the subcategories of the disease that are targeted by these chemicals. The top NGEU emitters for each disease category and the top affected counties are listed.

*Examples of disease category review (abbreviated):*

### 1. Carcinogens (p.26):

- 27 emitted chemicals are associated with cancers;
- All NGEUs report chemical releases linked to malignant tumors;
- Emissions totaled 39.38 million pounds;
- Five chemicals accounted for 97.8% of all associated releases-

<sup>1</sup> Page 6 of the Report

<sup>2</sup> Safety Assessment of Siting Large Shale Gas Compressor Stations in Residential Neighborhoods in New

- Nitrogen oxides were responsible for nearly one-half of the total (49%)
- carbon monoxide (36%)
- PM10 (2.3 million lbs. 3.9%)
- VOCs (3.5%)
- sulfur dioxide (2.9%)
- Top emitters include:
  - Ravenswood Generating Station in Queens
  - Northport Power Station in Suffolk County
  - Athens Generating Station in Greene County

## 2. Respiratory System Diseases (p.43):

- 21 emitted chemicals are associated with respiratory disease;
- All NGEUs report chemical releases linked to respiratory disease;
- Emissions totaled 39.8 million pounds;
- Two chemicals accounted for 85% of all associated releases
  - Nitrogen oxides were responsible for nearly one-half of the total (49%)
  - Carbon monoxide (36.4%)
- Eight chemicals totaling 39,803,487 pounds are linked to asthma, emphysema and pulmonary edema;
- Top emitters include:
  - Ravenswood Generating Station in Queens
  - Northport Power Station in Suffolk County
  - Athens Generating Station in Greene County

## How to Use the Data to Estimate Health Risk

The potential for health impacts in a local community is determined by the amount of exposure to the full mixture of chemicals present.

EHP has developed a Risk Guidance Table that pairs air exposure levels of a mixture of chemical emissions with possible symptoms and health effects. Previously, we have used this table to show potential impacts for residents living within 10 kilometers of compressor stations, which emit a suite of chemicals similar to those emitted by NGEUs.<sup>2</sup>

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<sup>2</sup> Safety Assessment of Siting Large Shale Gas Compressor Stations in Residential Neighborhoods in New York State. Southwest Pennsylvania Environmental Health Project, 2019. p.14.  
[www.environmentalhealthproject.org](http://www.environmentalhealthproject.org).

**Table 1. Exposure levels of the mixture ( $NO_x$ ,  $CO$ ,  $VOCs$ ,  $Formaldehyde$ ,  $PM$ ) emitted from natural gas compressor stations that can elicit health symptoms. Levels reported in ( $\mu g/m^3$ ).<sup>3</sup>**

Exposure	Air level	Possible symptoms experienced	Physical system affected
Low	less than 500 $\mu g/m^3$	Eye and throat irritation	Ears, eyes, nose and throat
Moderate	500 to 1000 $\mu g/m^3$	Eye and throat irritation, headache	Ears, eyes, nose and throat; neurological
High	1000 to 2500 $\mu g/m^3$	Eye and throat irritation, headache, shortness of breath, palpitations, chest pain, changes in blood pressure and/or heart rate	Ears, eyes, nose and throat; neurological, respiratory, cardiovascular
Extreme	2500 to 5000 $\mu g/m^3$ and above	Eye nose, throat irritation, headache, shortness of breath, palpitations, chest pain, changes in blood pressure and/or heart rate, impaired cognitive function such as confusion and difficulty concentrating	Ears, eyes, nose and throat; neurological, respiratory, and worsening cardiovascular effects

A compressor station that emits a chemical mixture of 55 tons/year, using air model estimates, has the potential to cause two categories of concern: median levels (amounts present 50% of the time) and 10<sup>th</sup> percentile levels (peaks present 10% of the time), as seen below:

**Table 2. Air exposure levels for a Title V compressor station (pre-expansion), emitting an estimated 55 tons/year of the mixture ( $NO_x$ ,  $CO$ ,  $VOCs$ ,  $Formaldehyde$ ,  $PM$ ).**

Distance from compressor	0.1 km fenceline	0.5 km	1 km	2 km	3 km	5 km	10 km
Annual median level	Extreme*	High	Low	Low	Low	Low	Low
Annual peak levels 10% of time	Extreme	Extreme	Extreme	High	High	Moderate	Low

\* See Table 1 for category definitions

<sup>3</sup> See EHP Risk Guidance report in Appendix 3 for Guidance rationale.

For comparison, the New York Department of Environmental Conservation Permit Review for the recently built CPV NGEU in Middletown, NY (too recent to be included in the 2014 NEI) shows a “Potential to Emit” level of about 745 tons/year. This emission rate is greater than that of the compressor station by more than a factor of ten. Based on the EHP Risk Table, if emissions were to reach this maximum level, exposures would be over the extreme levels of risk, even at 10km.

If we assume that emissions do not reach the “Potential to Emit” level of 745 tons/year, a very general estimate of risk level can be applied by scaling the compressor emissions estimates for the annual median levels from Table 2.

**Table 3. Chart showing the effects of “scaled” emissions of 55, 275 and 550 tons/year between 0.5 and 10 kilometers.**

Tons/year and median exposure level	Distance from NGEU						
	0.1 km fenceline	0.5 km	1 km	2 km	3 km	5 km	10 km
55	Extreme*	High	Low	Low	Low	Low	Low
275 (55x5)	Extreme	Extreme	High	High	High	High	High
550 (55x10)	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme

\* See Table 1 for category definitions

In conclusion, the full Report provides the site-specific, quantitative context needed to determine the plausible human health risks near facilities that emit mixtures of chemicals, each with known human health effects. In terms of risks to public health, this information challenges current federal and state regulatory policy which is based on the assumption that the health impact of exposure to a single chemical is identical to the health impact of exposure to multiple toxic chemicals.

The information assembled in this report, from publicly available sources, shows that residential exposure to mixtures of chemicals is occurring in nearly every industrial location listed. EHP recommends that continuous “on the ground” evaluation that shows maximum levels of exposure should be considered by local health departments and should be part of the medical provider evaluations of residents near these sites.

EHP is currently in the process of developing recommendations for continuous, scheduled, local exposure and health-status evaluation near such sites.