DATE:	August 28, 2020
TO:	TDI Holdings Corp.
FROM:	PA Consulting Group, Inc.
RE:	CHPE's Estimated Impact on Harmful Pollutants in New York City

On behalf of TDI Holdings Corp. ("TDI"), PA Consulting Group ("PA") estimated the impacts of the Champlain Hudson Power Express ("CHPE") transmission line on New York City's air quality. CHPE is a high voltage direct current ("HVDC") line that will run from the Canadian border to Queens that is capable of transmitting 1,000 megawatts ("MW") of clean energy around the clock to help serve New York City's electricity demand.

This memorandum describes the estimated emissions reductions in New York City's electric sector from five harmful pollutants (NOx, SO_2, NH_3, $PM_{2.5}$ and VOCs), which are attributable to CHPE's operations in the year 2025 (the expected first full year of CHPE's operations).

Estimation Approach

CHPE's estimated impact on New York City emissions reductions focused on five major pollutants, each having adverse environmental and/or health effects. When burning fossil fuels (e.g. coal, fuel oil, natural gas) to generate electricity, power plants emit these pollutants into the air.

- Nitrogen Oxides (NO_x) are highly reactive gases that can contribute to the development of respiratory diseases such as asthma[1].
- Sulfur Dioxide (SO_2) exposure leads to breathing difficulties and contributes to acid rain[2].
- Ammonia (NH_3) reacts with water in the body to produce ammonium hydroxide which can damage body cells[3].
- Particulate Matter ($PM_{2.5}$) are ultra-fine particles (less than 2.5 µm) that can travel deep into the respiratory tract and affect lung function[4]. Long-term exposure can lead to or worsen asthma and heart disease and can cause chronic bronchitis, and, in some cases, may cause lung cancer.
- Volatile Organic Compounds (VOCs) are a variety of chemicals that can cause eye and throat irritation, and may lead to liver, kidney, and central nervous system damage[5].

PA determined the emission reductions in each of the five pollutants that was attributable to CHPE by simulating the NYISO electric grid with and without CHPE. The analysis, performed for year 2025, used PA's proprietary electricity market model process, which simulates the hourly operations of power plants and transmission lines within NYISO and adjacent electric grids (e.g., ISO-NE) and calculates the associated emissions of individual power plants.

The emissions reductions attributable to CHPE were calculated using a generation-based standard that takes into account the electricity produced, and associated pollutants emitted, from power plants physically located in New York City[6]. The emission reductions were based on PA's 2017 analysis of the NYISO electric grid and CHPE's operations, and while PA's outlook for the NYISO has evolved if PA were to update its prior analysis it would still expect material emissions reductions attributable to CHPE.

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[1] EPA, "Nitrogen Dioxide (NOx) Pollution", Basic Information about NO_2

[2] EPA, "Sulfur Dioxide (SO_2) Pollution", Sulfur Dioxide Basics

[3] NY Department of Health, Emergency Preparedness and Response, "The Facts about Ammonia",

[4] NY Department of Health, Air Quality, "Fine Particles ($PM_{2.5}$) Questions and Answers"

[5] EPA. "Indoor Air Quality", Volatile Organic Compounds' Impacts on Indoor Air Quality

[6] PA excluded the emissions reductions from the Bayonne and Linden power plants from its analysis. While those power plants are electrically interconnected to New York City, they are physically located in New Jersey.

Estimated Emissions Reductions

CHPE is estimated to decrease emissions from New York City power plants for the five harmful pollutants by a total of 1,000 tons in 2025, as shown in the table below. To put this in perspective, 557 tons of NOx reductions would be the equivalent of removing ten New York City peaker plants from service.

It is also worth emphasizing that these are single-year emissions reduction impacts; CHPE's impacts would be cumulatively much larger over CHPE's operating life (expected to be at least 40 years).

Table 1 – New York City Power Plant Emission Reductions from CHPE in 2025 (in short tons)

	NOx	SO_2	NH_3	$PM_{2.5}$	VOCs	Total
Emissions Without CHPE (short tons)	1,558	158	640	561	193	**3,110**
Emissions With CHPE (short tons)	1,000	102	428	400	143	**2,073**
Emissions Delta (short tons)	(-557)	(-57)	(-213)	(-161)	(-50)	**(-1,037)**
Emissions Delta (%)	-36%	-36%	-33%	-29%	-26%	**-33%**

Contact

For any questions about this memorandum, please contact:

Trevor McManamon
Principal Consultant
trevor.mcmanamon@paconsulting.com
720-834-9508

Ethan Paterno
Member of PA's Management Group
ethan.paterno@paconsulting.com
720-566-9953