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VIA HAND DELIVERY

March 2, 2007

Hon. Jaclyn A. Brilling
Secretary
NYS Public Service Commission
Three Empire State Plaza
Albany, NY 12223-1305

Re: Case 06-E-0894 – Proceeding on Motion of the Commission to Investigate the Electric Power Outages in Consolidated Edison Company of New York, Inc.'s Long Island City Network.

Dear Secretary Brilling:

Attached please find an original and ten (10) copies of the *Comments of TransGas Energy Systems LLC on Department of Public Service Staff Long Island City Power Outage Report* in the above-captioned case.

Respectfully submitted,

READ AND LANIADO, LLP
Attorneys for TransGas Energy Systems LLC

By: /s/_____
Sam M. Laniado

SML:tac
Enclosures

cc: Hon. Eleanor Stein (*Via Hand Delivery and Electronic Mail*)
Active Party List (*Via Electronic Mail*)

NEW YORK STATE
PUBLIC SERVICE COMMISSION

Case 06-E-0894 – Proceeding on Motion of the Commission to Investigate the Electric Power Outages in Consolidated Edison Company of New York, Inc.'s Long Island City Network

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COMMENTS OF
TRANSGAS ENERGY SYSTEMS LLC
ON DEPARTMENT OF PUBLIC SERVICE STAFF
LONG ISLAND CITY
POWER OUTAGE REPORT

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Dated: March 2, 2007
Albany, New York

NEW YORK STATE
PUBLIC SERVICE COMMISSION

Case 06-E-0894 – Proceeding on Motion of the Commission to Investigate the Electric Power Outages in Consolidated Edison Company of New York, Inc.'s Long Island City Network

COMMENTS OF
TRANSGAS ENERGY SYSTEMS LLC
ON DEPARTMENT OF PUBLIC SERVICE STAFF
LONG ISLAND CITY
POWER OUTAGE REPORT

Introduction

Pursuant to the NOTICE OF COMMENT SCHEDULE, dated February 13, 2007, TransGas Energy Systems LLC ("TransGas") hereby submits the instant comments concerning the DEPARTMENT OF PUBLIC SERVICE STAFF REPORT ON ITS INVESTIGATION OF THE JULY 2006 EQUIPMENT FAILURES AND POWER OUTAGES IN CON EDISON'S LONG ISLAND CITY NETWORK IN QUEENS COUNTY, NEW YORK, issued February 9, 2007 ("Staff Report"). The technical evaluation contained herein was provided by Pterra, LLC,[1] an Albany-based consulting firm that provides electrical engineering analyses and training concerning, *inter alia*, the transmission and distribution systems of Consolidated Edison Company of New York, Inc. ("Con Edison").

[1] http://www.pterra.com.

As a general matter, the Department of Public Service Staff ("Staff") should be commended for performing a detailed investigation covering many of the questions raised by the Long Island City Network ("LIC") power outages commencing July 17, 2006. Staff could not reasonably have been expected to investigate every possible issue. Accordingly, TransGas' comments focus on a question not addressed in great detail in the Staff Report: what may have caused a secondary cable's insulation to short circuit and start a fire in an underground wooden duct bank, causing two adjacent primary feeders to fail (Staff Report, p. 64). Staff characterizes this event, together with two others, as contributing events, and states that ". . .the overriding cause of the Long Island City Network event was the company's failure previously to address a multitude of issues associated with its overall operation and maintenance of the network. . ." (*Id.*). On the other hand, Con Edison argues that the fire was one of three unrelated, causal events.[2] However the fire is characterized, its role in the ensuing power outages was very important. The ultimate cause of the secondary fire appears undetermined. A reasonable theory, as detailed herein, for the failure of the cable's insulation and the resulting fire, can be explained by overheating caused by low voltage levels due to a reactive power deficiency in the LIC Network prior to the reporting of the fire.

The incidence of insulation failures are known to increase under a condition of higher than normal heating[3] and even more so if the condition repeats over several days. Heating could result from the combination of higher than normal ambient temperature and higher than normal electric currents in the Con Edison secondary circuits. NYC was

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[2] Con Edison Comprehensive Report on the Power Outages in Northwest Queens in July 2006, dated October 12, 2006, p. 1-2.

[3] Transcript of Technical Conference, October 26, 2006, Transcript Reference ("TR") 839.

experiencing high ambient temperatures before July 17, 2006. Furthermore, higher than normal electrical currents (or amperage), causing excessive heating, may have been present from low voltage conditions.

I. LOW VOLTAGE, HIGH CURRENT AND OVERHEATING: OHM'S LAW.

Ohm's Law provides that voltage is inversely proportional to current (or amperage) in an electrical circuit; hence, low voltages result in higher than normal currents. In turn, low voltages can be the result of a reactive power supply deficiency. Reactive power is the component of power that is measured in MVARS and is closely related to the magnitude of voltages at customer loads. Reactive power is differentiated from real power, which is measured in MW, in that real power is more closely related to the horsepower delivered to customer devices. A reactive power supply deficiency is present when the demand for reactive power by customer loads exceeds the available supply of reactive power in the secondary system

High system demand for real power associated with a summer heat wave is also accompanied by an increased demand for reactive power, especially because of the presence of inductive loads such as air conditioners. A summer heat wave imposes stresses on the electric supply and delivery system that includes (a) the sources of real and reactive power, such as generators and capacitor banks; (b) the transmission system that brings bulk power from remote locations to the area substations; and the (c) distribution system which delivers power from the substations to individual customers. Low voltages in the secondary system can occur from a deficiency in any one of these components of the electric power system.

As demand increases over the course of a heat wave, nearby or local large synchronous generators may reach their capability limits for real and reactive power. The LIC Network's access to reactive power through the transmission system was handicapped before and during the week of July 17, 2006 because the Con Edison Dunwoodie-Rainey 345 kV transmission line, one of the key access paths for power from upstate into the LIC Network, was out of service.

During the peak demand periods, a reactive deficiency would appear on the secondary network as widespread low voltages. Although the taps on transformers that supply the secondary will attempt to boost the reactive supply by adjusting the tap-step, if a reactive deficiency is present, the tap-changers can reach their tap-changing limit allowing secondary voltages to drop. When there are many motors on a secondary circuit, the voltage drop can be much faster. Motors, primarily induction type air conditioning units, draw increasing reactive power as voltage drops. Several events in the secondary may occur. As voltage drops, some motors may stall, drawing even more reactive power. But some motors may tripout, which would tend to slightly increase voltage. In addition, non-motor feeder load would decrease reactive demand at voltages below nominal, resulting in an increase in feeder voltage. If voltage recovers incrementally, some motors may restart, causing a drop in voltage. If the reactive deficiency stays for several minutes, some loads start to show a self-restoring quality – these return their power demand to near normal levels even though terminal voltage is below nominal. The combined effect of these various influences results in an equilibrium state, known as a voltage ledge, characterized by low voltage, relatively steady net demand and high line currents. The

condition may remain for several minutes up to several hours, for as long as the reactive deficiency remains.

Hence, as the summer heat wave results in peaking demand during the hottest hours of each day, secondary circuits may be experiencing a repeated reactive deficiency which is characterized by low voltages. The low voltages, by Ohm's law, mean higher than normal currents on the secondary circuits. And, the high line currents lead to heating that may increase the probability of failure of equipment in the distribution system.

II. REACTIVE POWER SUPPLY TO THE LIC NETWORK.

Con Edison reports that the company does not measure reactive power flows at points within the LIC Network.[4] Rather, reactive power demand in the LIC Network is measured on the 27 kV side of the substation transformers, and solely reflects the contribution of the capacitors in service at the North Queens Substation in the LIC Network.[5] Con Edison also reports that:[6]

> For a Summer 2006 peak load projection of 395 MW, the corresponding reactive peak load demand was approximately 190 MVAR at an estimated load power factor of 0.90. The resources for the required reactive power demand were as follows:
>
> 90 MVAR of capacitors connected to the 27 kV distribution bus at the North Queens substation. The balance reactive power requirement of about 100 MVAR <u>were</u> to be supplied

[4] Con Edison Response to PULP-47.4.

[5] Con Edison Response to PULP-47.3.

[6] Con Edison Response to PULP-40.2.

> from the Astoria East 138 kV transmission bus to the North Queens 27 kV bus via four 138/27 kV transformers. (Emphasis added.)

The word "were" appears to mean "expected." Con Edison states that units owned by various independent power producers are directly connected to the Astoria East Substation, which supplies reactive power to the North Queens Substation.[7] Citing confidentiality concerns, Con Edison has declined to provide the actual MVARs being supplied by each of the power plants, prior to the reported fire, and whether each of the plants were at its respective reactive power capability limit prior to the onset of the fire. Some cumulative information has been provided, but it is insufficient to determine whether there was an adequate reactive power supply to the LIC Network prior to the reporting of the fire. More specific data, protected by suitable confidentiality measures, is needed about the MVAR supply to the LIC Network from all sources at various times before the fire as well as whether the generator units were operating at their MVAR limits, thereby suggesting an MVAR deficiency.

Con Edison's witness argued that there was more than enough reactive power supply to the LIC Network (Tr. 856). While the total reactive power supply from the plants and other sources identified by Con Edison may exceed the peak reactive demand for the LIC Network, the plants' respective reactive power supply can be drawn by other distribution networks in Queens. With customer demand rising throughout Queens and NYC due to the heat wave, it is reasonable to conclude that other networks could very well have been drawing reactive power from the Astoria East Substation, leaving the LIC

[7] Con Edison Response to TGE-3 Rev.

Network with a reactive supply deficiency, and heating up. The capacitor banks in the North Queens Substation and local cable charging amount to only 90 MVAR.

III. INDICATIONS OF LOW VOLTAGES CAUSED BY A REACTIVE POWER SUPPLY DEFICIENCY.

Con Edison does not have the technical ability to detect low voltages on the secondary system.[8] The Company relies upon customer complaints. Its witness stated: "[t]here were a small number of low voltage complaints in the network prior to any of the feeder outages." (Tr. 860) But a customer may not call Con Edison if an air conditioner stalls or a computer fails due to low voltage. Furthermore, Con Edison reports that its Customer Operators do not record information about customer complaints specific to air conditioners stalling, not starting or operating intermittently.[9] Nor could Con Edison supply the percentage of air conditioning load in the LIC Network just before the outage.[10]

One of the Staff recommendations is for the Company to report ". . .what changes it will implement or has implemented, to ensure that outages and low-voltage conditions in a network system are estimated accurately."[11] The Company concurred with the substance of this recommendation,[12] and also agreed that it must do a ". . .better job of monitoring the secondary system and doing so on a real-time basis. . ." (*Id*. p. 11).

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[8] Staff Report, p. 87, describing the limitations of the Poly Voltage Load Flow program; *See, also*, App. A, p. 8.

[9] Con Edison Response to TGE-7.

[10] Con Edison Response to TGE-5.

[11] Staff Report, App. A, p. 1.

[12] *See*, Con Edison January 31, 2007 Comments on Staff's Draft Report, p. 4.

Data provided by Con Edison from its Remote Monitoring System – which records, amongst other data, voltage levels at the network transformer level, not the secondary circuit level – show widespread low voltage conditions[13] 25 minutes prior to the report of the first fire at 3:50 p.m. on July 17, 2006. The RMS data showed *193 monitors with low voltage*. Con Edison's specifications require a minimum of 95% functionality for the Remote Monitoring System within each network.[14] However, on July 17, there were only 79.9% of the senior units operating and transferring data to the control room. This is well below the Company's threshold of 95% required by Company operating procedures to provide reliable information to operators.[15] Comparing the percentage of units operating within the network with the percentage of units responding in other Con Edison networks reveals that the Long Island City Network Remote Monitoring System had the lowest percentage of units operating compared to all the other networks in the system.[16] Accordingly, the low voltage levels prior to the reported fire could have been even more widespread. A reactive power supply deficiency, therefore, is a rational explanation for the initial fire on the secondary cable in the LIC Network and the subsequent failure of other cables in the same distribution system *i.e.*, that the heating occurred over a period of time and affected more than just the one cable that failed.

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[13] Con Edison Response to PULP-44.

[14] Con Edison specification EO-10110 – Inspection and Maintenance of Network Type Distribution Equipment.

[15] Con Edison Response to Staff DPS 251, 277.

[16] DPS Report p. 101.

CONCLUSION

Low voltage conditions in the secondary network prior to the onset of the secondary cable fire is a rational explanation for the cause of the fire, an important factor causing in part, and certainly contributing, to the LIC Network outages. Additional generation connected to one of the area substations would provide reactive power support to the LIC Network and surrounding networks and avoid low voltage conditions from damaging equipment over time. With an adequate source of reactive power, there should be no need for Con Edison to resort to voltage reductions – as it did on July 17, 2006 – to reduce load to prevent equipment from overheating. Voltage reductions cause temperatures to rise, not fall.

The Staff Report states the 8% voltage reduction implemented by Con Edison, resulted in about 5.2% reduction in load."[17] This equates to an increase in line current of about 2.8%. Voltage reduction has a negative impact on heating of secondary cables. In the presence of a reactive power supply deficiency, voltage reduction can result in an even larger rise in cable currents and overheating.

The proposed TransGas Cogeneration project, which is the last Article X project pending before the Siting Board, proposes to interconnect to the Rainey and Farragut Substations. It is TransGas' understanding that the Rainey Substation provides, directly or indirectly, reactive power supply to the North Queens Substation as well as others. The TransGas Project would be an excellent source of reactive power as well as in-City MW supplies.

[17] DPS Report, p. 11.

If the Commission initiates the prudence investigation proposed in the Staff Report, one of the issues to be explored should be the adequacy of reactive power supply in the LIC Network and surrounding networks and whether Con Edison should have taken steps to correct any deficiencies prior to the July 17, 2007 secondary cable fire. Suitable confidentiality protections should be ordered so that material data can be thoroughly examined.

Respectfully submitted,

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Dated: March 2, 2007
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