4 The New York Power Grid in Context

On December 1, 1999, the NYISO assumed responsibility for the operation of New York State's bulk power system and of the newly established electric energy markets. New York's wholesale energy markets were established coincident with the establishment of the NYISO. Prior to December 1, operation of the bulk power system was the responsibility of the New York Power Pool. The NYISO is charged with two overriding responsibilities: First, maintain the safe and reliable operation of New York's bulk power system; and second, operate fair, non-discriminatory and effective wholesale electric markets.

Geographically, the New York Control Area (NYCA) is situated in the center of the Northeastern North America electrical grid, which includes the Mid-Atlantic and New England States in the US and the Canadian Provinces of Ontario, Quebec, and Maritimes. Figure 4.1 displays the major electricity markets operating in the region along with summary statistics. This area includes a customer load greater than the entire Western Interconnection and provides electric service to the capital cities of two members of the G-7 nations as well as the financial capital of the world. Figure 4.1 also displays the nominal transfer capabilities between the major markets in the Northeast. *The key point is that the total nominal transfer capability between the control areas in the Northeast is less than 5% of the total peak load of the region. The transfer capability as a percent of the regional load has been steadily declining.*

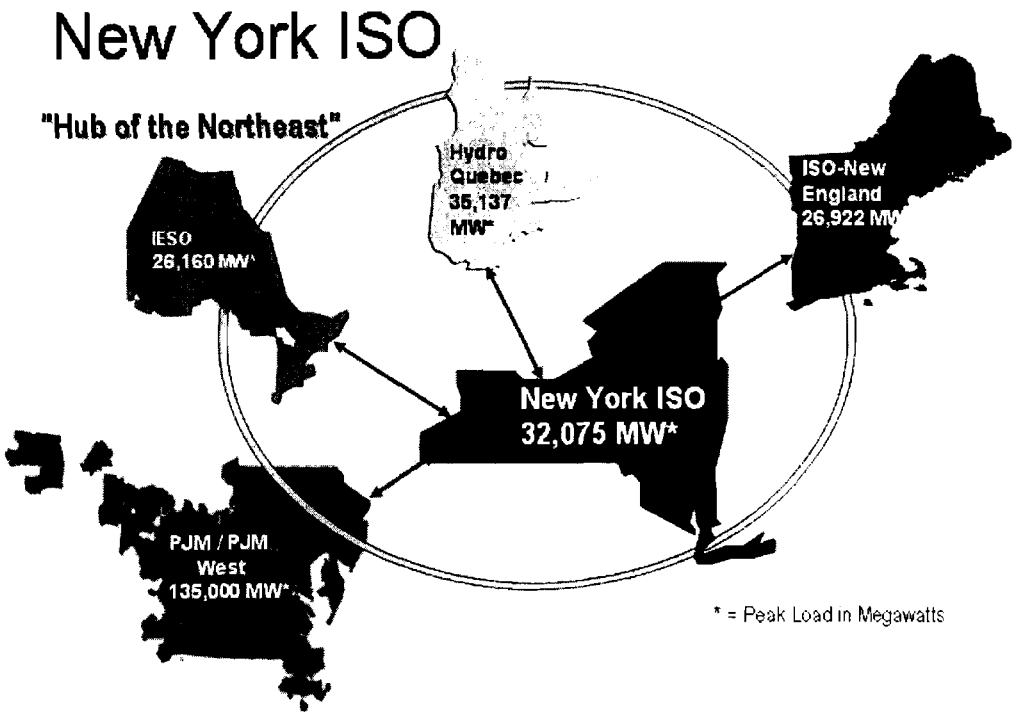

Figure 4.1: Northeast Grid In Context

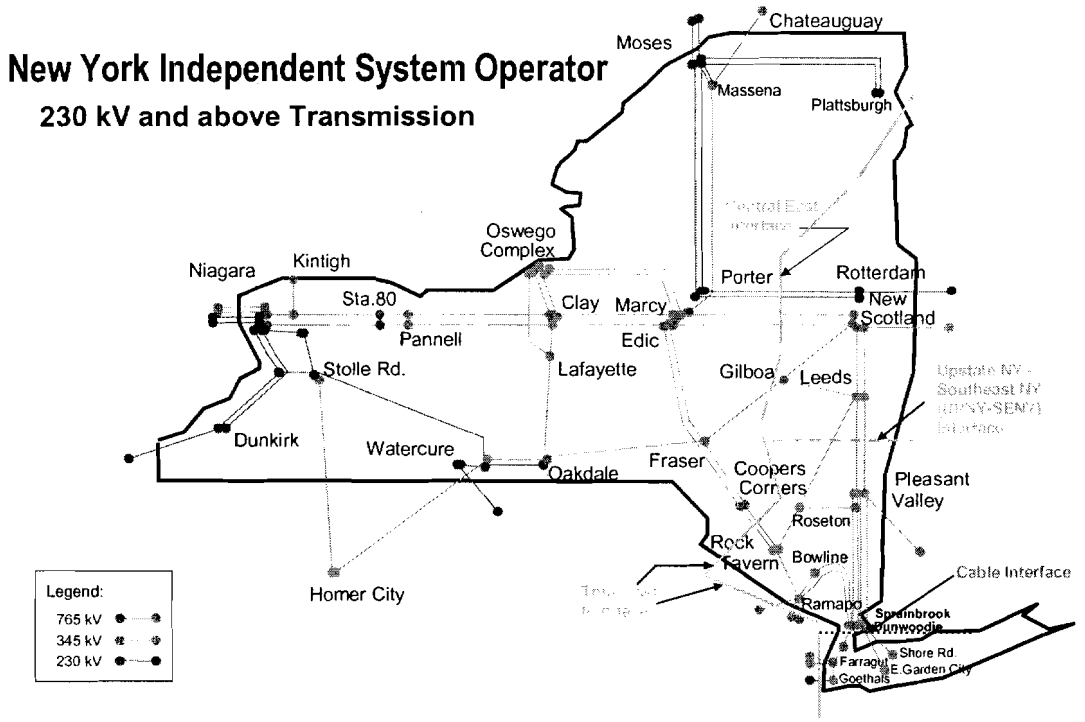

Figure 4.2: NYCA Bulk Transmission System

Figure 4.2 displays the bulk power transmission system for the NYCA. It shows facilities operating at 230 thousand volts (kV) and above. This represents more that 4,000 miles of high voltage transmission lines. If the underlying 138 and 115 kV transmission lines are included, the mileage exceeds 10,000 miles. Figure 4.2 also displays key NYCA transmission interfaces. Transmission interfaces are groupings of transmission lines which measure the transfer capability between regions such as the transfer capability between the Northeastern control areas presented in Figure 4.1.

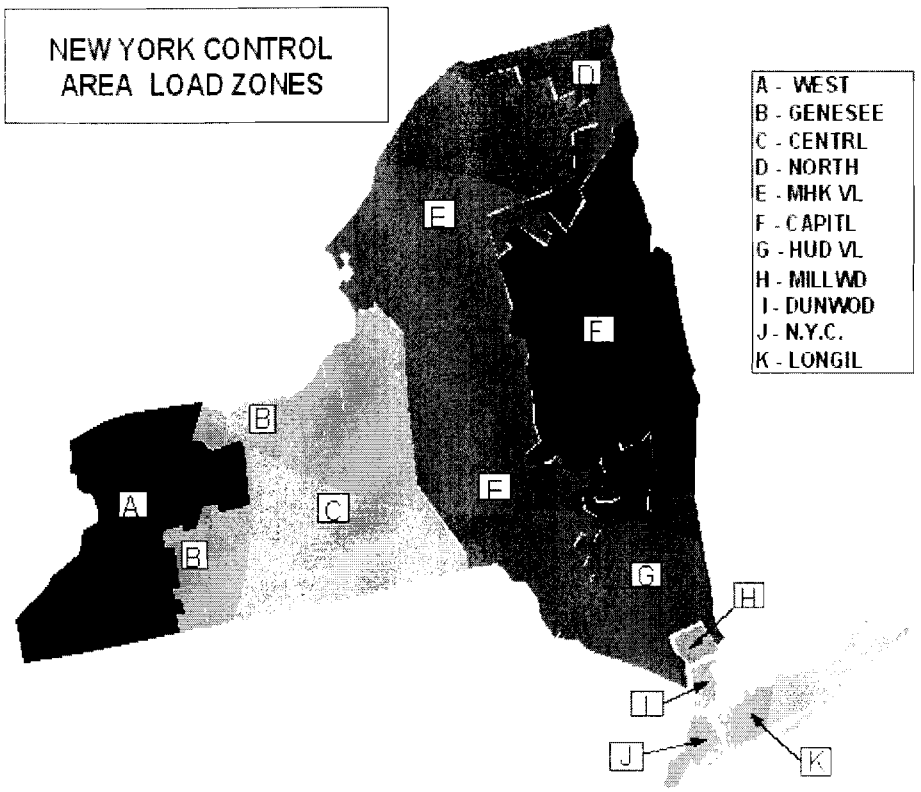

Figure 4.3: NYCA Load Zones

The New York wholesale electricity market is divided into eleven pricing or load zones. Figure 4.3 presents the geographical boundaries for these pricing zones. The development of these load zones was driven primarily by the topology or configuration of the transmission system and secondarily by the franchise areas of the investor owned utilities. These load areas were initially developed by the New York Power Pool after the 1965 Northeast blackout as part of a process of identifying critical bulk power system transmission interfaces. Subsequently, these load zones were utilized to define pricing zones for the wholesale electricity market.

On a pricing basis, zones A-E have relatively homogeneous prices and can be defined as one super zone called West NY, while the balance of the zones can be defined as East NY. Pricing is not homogeneous within the eastern zones. Zones F – I are defined as the Hudson Valley which leaves Zone J (New York City) and Zone K (Long Island) as two additional areas defined in east NY. The boundary between West NY and East NY including the boundary between PJM and the East zones defines the Total East transmission interface. This interface is represented by the orange line on Figure 4.2. The upper half of the Total East interface is defined as the Central East interface while the lower half including the dotted part of the orange line is known as the interface between Upstate NY and Southeast NY or the UPNY – SENY interface. The dotted part of the line effectively divides the Hudson Valley into a lower and upper part electrically. Below the UPNY – SENY interface you have the *cable interface* which includes the red dotted line on the transmission map and also the lower end of the total east interface. This interface

contains all the major underground and/or submarine cables supplying New York City and Long Island.

Table 4.1 presents the approximate non-coincident peak loads and capacity contained in the super zones defined above for summer 2004. Table 4.2 below presents the nominal transfer capability across the major transmission interfaces defined above. The transmission facilities that make up the interfaces are the facilities that tie the zones together electrically.

Table 4.1: Approximate Summer Peak Load/Capacity

Zone	Peak Load (MW)	Capacity (MW)
West (A-E)	8,900	14,430
Upper Hudson Valley (F)	2,180	3,470
Lower Hudson Valley (G-I)	4,490	5,490
New York City (J)	11,150	8,940
Long Island (K)	5,050	5,180

Note: Numbers are approximate and based on the summer of 2004

Table 4.2: Nominal Transfer Capability

Transmission Interface	Transfer Capability (MW)
Total East	6,100
Central East	2,850
UPNY – SENY	5,100
Cable Interface	
• New York City	4,700
• Long Island	1,270

As a result of the distribution of load and capacity on the NYCA power system, power flows are primarily west to east and then southeast or predominantly from the northwest to the southeast into the highly congested urban zones of New York City and Long Island. All power flows from the west including the transmission ties to the neighboring control areas of Ontario, Hydro Quebec and PJM must cross the Total East Interface with large portions flowing across the Central East portion of the interface and then across the UPNY – SENY interface to reach the cable interface. Historical trends in load growth and capacity additions have only increased the importance of the transmission system in maintaining system reliability.

In addition to being highly dependent on the transmission system, the New York City and Long Island zones' electricity generating infrastructure has the highest average age of generating units in the state and, recent plant additions notwithstanding, is still highly dependent on an aging fleet of combustion and gas turbine capacity. Also, the generation mix in Western NY has much larger proportions of hydro, nuclear and coal.

This creates a high potential for economic transfer from West NY to New York City and Long Island (Economic transfer is the transmission of power from a lower cost region to a higher cost region).