APPENDIX C: OVERVIEW OF ELECTRIC DISPATCH MODEL

CRA used the GE Multi-Area Production Simulation (MAPS) model to "commit" and "dispatch" available electricity generating units to meet assumed electricity demands throughout the Northeast. The GE MAPS model simulates the hourly operation of the electric generation and transmission system, including the impacts of transmission constraints and operating reserve requirements. The model minimizes the total system cost of meeting forecasted electricity demands given key economic and engineering assumptions (*e.g.*, fuel costs, heat rates, etc.) for electric generating units.

Input Assumptions

- **Available Generating Capacity**. All generators listed in the 2001 Gold Book are included in our MAPS model runs. Additionally, new units that came on line during 2001 or are expected to come on-line in 2002 are included in all cases analyzed. Assumptions for capacity additions beyond 2002 vary by modeling scenario and are detailed in section 4 of this report. NEPOOL and PJM capacity includes all units listed in 2001 ISO-NE CELT Report and the 2001 MAAC EIA-411 Report, along with new capacity additions shown in Table A4 in Appendix A.

- **Electric Loads**. Table C1 shows our NYCA load assumptions for each year. The 2002 peak load is based on the forecast reported by the NYISO in their February 28, 2002 (Revised March 14, 2002) *Locational Installed Capacity requirements Study*. Loads for later years were estimated by growing the 2002 loads at the rate implied by the forecasts in the 2001 Gold Book. Load forecasts for NEPOOL are from the 2001 ISO-NE CELT Report and forecasts for PJM are from the 2001 MAAC EIA-411 Report.

Table C1

Load Assumptions for MAPS Electric Model
Summer Peak (MW)

Region	2002	2005	2010
NYCA	30,475	31,384	32,824
New York City	10,665	11,015	11,453
Long Island	4,776	4,866	5,129

- **Transmission Upgrades**. The 330 MW HVDC cable between Connecticut and Long Island is included in all of our modeling scenarios. No other transmission upgrades are included.

Overview of MAPS[35]

MAPS is a highly detailed model that calculates hour-by-hour production costs while recognizing the constraints on generation dispatch imposed by the transmission system. MAPS performs a transmission-constrained production simulation, which uses a detailed electrical model of the entire transmission network, along with generation shift factors determined from a solved ac load flow, to calculate the real power flows for each generation dispatch. This makes it possible to capture the economic penalties of redispatching the generation to satisfy transmission line flow limits and security constraints.

Because of its detailed electrical representation of the transmission system, MAPS can be used to study issues that cannot be adequately modeled with conventional production costing software. These issues include:

Locational Spot Pricing - MAPS calculates the hourly spot price ($/MWh) at each bus modeled -- which is the cost of supplying an addition MW of load at the bus. The difference in spot prices at two buses is the short-run marginal wheeling cost between these buses. Hence, MAPS can be used to characterize the value of energy at different locations and the implied short-run value of transmission.

- **Transmission Bottlenecks** - MAPS can determine which transmission lines and interfaces in the system are bottlenecks and how many hours during the year they are limiting. MAPS can then be used to assess, from an economic point of view, the relative value of generation on each side of the interface and the feasibility of various methods, such as transmission line upgrades or the installation of phase-angle regulators, for alleviating the bottlenecks.
- **Power Wheeling** - MAPS can determine which transmission lines are actually carrying wheeled power, including lines that may not be part of the contract path. MAPS can also approximate the change in system losses due to a wheeling transaction.
- **Transmission Access** - The hourly spot price at each bus defines a key component of the total avoided cost that is used in formulating contracts for transmission access by non-utility generators and independent power producers.
- **Loop Flow or Uncompensated Wheeling** - The detailed transmission modeling and cost reconstruction algorithms in MAPS combine to identify which companies are

[35] This overview of MAPS, based on the similarly titled GE publication, has been prepared by CRA. The contents of the GE publication have been reorganized and the text has been edited.

contributing to the flow on a given transmission line and to defining the production cost impact of that loading.

APPENDIX D: GAS-FIRED GENERATION IN THE NEW YORK CONTROL AREA, BY LDC

List Includes: 1) All 2001 Gold Book units whose primary fuel is reported as NG; 2) All Dual Fuel Steam units listed in Gold Book; 3) Planned New Capacity.
LDC/Pipeline Match-ups based on CRA Research

LDC	Pipeline	Owner	Station/Unit	Zone	City	County	State	Summer Capacity (MW)	Winter Capacity (MW)	Type	Primary Fuel	Secondary Fuel	Tertiary Fuel
Existing Capacity													
Central Hudson Gas & Electric		Dynegy Power Inc.	Danskammer 1	G	Newburgh	Orange	NY	63	63	ST	FO6	NG	FO2
Central Hudson Gas & Electric		Dynegy Power Inc.	Danskammer 2	G	Newburgh	Orange	NY	66	64	ST	FO6	NG	FO2
Central Hudson Gas & Electric		Dynegy Power Inc.	Roseton 1	G	Newburgh	Orange	NY	607	590	ST	FO6	NG	FO2
Central Hudson Gas & Electric		Dynegy Power Inc.	Roseton 2	G	Newburgh	Orange	NY	608	589	ST	FO6	NG	FO2
Consolidated Edison		Orion Power Holdings, Inc.	Astoria 2	J	Queens	Queens	NY	171	190	ST	NG	FO6	
Consolidated Edison		Orion Power Holdings, Inc.	Astoria 3	J	Queens	Queens	NY	355	361	ST	FO6	NG	
Consolidated Edison		Orion Power Holdings, Inc.	Astoria 4	J	Queens	Queens	NY	362	375	ST	FO6	NG	
Consolidated Edison		Orion Power Holdings, Inc.	Astoria 5	J	Queens	Queens	NY	361	370	ST	FO6	NG	
Consolidated Edison		Orion Power Holdings, Inc.	Astoria GT 01	J	Queens	Queens	NY	12	15	GT	NG		
Consolidated Edison		New York Power Authority	Bronx Zoo	J	New York	Bronx	NY	3	3	IC	NG	FO2	
Consolidated Edison		Consolidated Edison Co. of NY	East River 6	J	Manhattan	New York	NY	131	137	ST	FO6	NG	
Consolidated Edison		Consolidated Edison Co. of NY	East River 7	J	Manhattan	New York	NY	178	162	ST	FO6	NG	
Consolidated Edison		New York Power Authority	Harlem Rail	J	New York	Bronx	NY	80	89	CT	NG		
Consolidated Edison		New York Power Authority	Hell Gate	J	New York	Bronx	NY	80	89	CT	NG		
Consolidated Edison		Mirant Corporation	Hillburn GT	G	Hillburn	Rockland	NY	37	47	GT	NG	KER	
Consolidated Edison		Orange and Rockland Utilities	Intl. Crossroads	G	Mahwah NJ		NJ	3	3	IC	NG	FO2	
Consolidated Edison		Orange and Rockland Utilities	Lederle	G	Pearl River	Rockland	NY	19	19	CC	NG	FO2	
Consolidated Edison		Mirant Corporation	Lovett 3	G	Tomkins Cove	Rockland	NY	69	69	ST	NG	FO6	BIT
Consolidated Edison			Misc. - NYC (NRG)	J	New York		NY	79	79	GT	NG		
Consolidated Edison			Other Misc. - NYC (JFK)	J	New York	Queens	NY	44	44	CC	NG		
Consolidated Edison		New York Power Authority	Poletti 1	J	Queens	Queens	NY	847	831	ST	FO6	NG	
Consolidated Edison		KeySpan - Ravenswood, Inc.	Ravenswood 1	J	Queens	Queens	NY	9	11	GT	NG		
Consolidated Edison		KeySpan - Ravenswood, Inc.	Ravenswood 1	J	Queens	Queens	NY	353	384	ST	FO6	NG	
Consolidated Edison		KeySpan - Ravenswood, Inc.	Ravenswood 2	J	Queens	Queens	NY	386	392	ST	FO6	NG	
Consolidated Edison		KeySpan - Ravenswood, Inc.	Ravenswood 3	J	Queens	Queens	NY	980	991	ST	FO6	NG	BIT
Consolidated Edison		Mirant Corporation	Shoemaker GT	G	Middletown	Orange	NY	35	33	GT	NG	KER	
Consolidated Edison		New York Power Authority	Vernon Boulevard	J	New York	Queens	NY	80	89	CT	NG		
Consolidated Edison		Consolidated Edison Co. of NY	Waterside 6	J	Manhattan	New York	NY	69	69	ST	FO6	NG	
Consolidated Edison		Consolidated Edison Co. of NY	Waterside 8	J	Manhattan	New York	NY	47	47	ST	FO6	NG	
Consolidated Edison		Consolidated Edison Co. of NY	Waterside 9	J	Manhattan	New York	NY	48	48	ST	FO6	NG	
Elizabethtown Gas Company (NJ)		Consolidated Edison of NY, Inc.	Cogen Tech-Linden	J	Linden NJ		NJ	720	779	CC	NG		
Keyspan Long Island		Long Island Power Authority	Barrett 1	K	Island Park	Nassau	NY	16	21	GT	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 1	K	Island Park	Nassau	NY	192	186	ST	NG	FO6	
Keyspan Long Island		Long Island Power Authority	Barrett 10	K	Island Park	Nassau	NY	41	52	JE	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 11	K	Island Park	Nassau	NY	39	51	JE	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 12	K	Island Park	Nassau	NY	43	52	JE	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 2	K	Island Park	Nassau	NY	16	19	GT	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 2	K	Island Park	Nassau	NY	196	195	ST	NG	FO6	
Keyspan Long Island		Long Island Power Authority	Barrett 3	K	Island Park	Nassau	NY	16	19	GT	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 4	K	Island Park	Nassau	NY	14	19	GT	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 5	K	Island Park	Nassau	NY	16	19	GT	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 6	K	Island Park	Nassau	NY	16	20	GT	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 7	K	Island Park	Nassau	NY	14	19	GT	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 8	K	Island Park	Nassau	NY	16	20	GT	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Barrett 9	K	Island Park	Nassau	NY	41	50	JE	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Far Rockaway 4	K	F Rockaway	Queens	NY	108	110	ST	NG	FO6	
Keyspan Long Island		New York Power Authority	Flynn	K	Holtsville	Suffolk	NY	136	165	CC	NG	FO2	
Keyspan Long Island		Long Island Power Authority	Glenwood 4	K	Glenwood	Nassau	NY	113	115	ST	NG		
Keyspan Long Island		Long Island Power Authority	Glenwood 5	K	Glenwood	Nassau	NY	113	110	ST	NG		
Keyspan Long Island		Long Island Power Authority	LI GT COOL	K			NY	60	0	GT	FO2		
Keyspan Long Island		New York Power Authority	Pilgrim State Hospital	K	Islip	Suffolk	NY	44	49	CT	NG		