DRAFT OUTLINE

New York Independent System Operator

Initial Planning Report

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1 Introduction

The New York Independent System Operator (NYISO) Initial Planning Process is the first phase in the development of a comprehensive 10-year planning process for the NYISO. This is intended to be a “needs analysis” for the NYCA power system. It is anticipated that development efforts on the Phase 2 “comprehensive” planning process will begin upon the completion of the Phase 1 process.

2 Description of Base Case and Assumptions

The Base Case assumptions are fully defined by existing processes, study reports, and existing documents. No additional analytical work is required.

The following information contains the Base Case assumptions. The information is from the “NYISO 2003 Load & Capacity Report.”

2.1 Capacity (by type) and Load by Year for NYCA

Table 2.1. Load and Capacity Table

	Installed Capacity											
Category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	1747	1747	1747	1747	1747	1747	1747	1747	1747	1747	1747	1747
Steam Turbine (Oil & Gas)	10534	10534	10367	9999	9999	9467	9467	9467	9467	9467	9467	9467
Steam Turbine (Gas)	233	233	233	233	233	233	233	233	233	233	233	233
Steam Turbine (Coal)	3783	3783	3783	3783	3783	3783	3783	3783	3783	3783	3783	3783
Steam Turbine (Wood)	38	38	38	38	38	38	38	38	38	38	38	38
Steam Turbine (Refuse)	256	256	256	256	256	256	256	256	256	256	256	256
Steam (PWR Nuclear)	2473	2473	2473	2473	2473	2473	2473	2473	1975	1975	1975	1975
Steam (BWR Nuclear)	2606	2606	2606	2606	2606	2606	2606	1987	1987	1987	1987	1987
Pumped Storage Hydro	1291	1291	1291	1291	1291	1291	1291	1291	1291	1291	1291	1291
Internal Combustion	129	129	129	129	129	129	129	129	129	129	129	129
Conventional Hydro	4533	4583	4633	4683	4733	4783	4783	4783	4783	4783	4783	4783
Combined Cycle	4706	5786	7144	11154	12444	13524	13524	13524	13524	13524	13524	13524
Jet Engine (Oil)	531	531	531	531	531	531	531	531	531	531	531	531
Jet Engine (Gas & Oil)	171	171	171	171	171	171	171	171	171	171	171	171
Combustion Turbine (Oil)	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398	1398
Combustion Turbine (Oil & Gas)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
Combustion Turbine (Gas)	1200	1379	1963	1963	1963	1963	1963	1963	1963	1963	1963	1963
Wind	45	45	45	45	45	45	45	45	45	45	45	45
Other	1	1	1	1	1	1	1	1	1	1	1	1
Import Capability												
Capacity Import	2755	2755	2755	2755	2755	2755	2755	2755	2755	2755	2755	2755
Demand Response Programs	500	500	500	500	500	500	500	500	500	500	500	500
NYCA Demand	31590	32010	32420	32790	33170	33570	33930	34320	34710	35110	35480	35860
Required Capability	36686	37182	37666	38102	38551	39023	39447	39908	40368	40840	41276	41725
Total NYCA Capability	39849	41157	42983	46675	48015	48613	48613	47995	47496	47496	47496	47496
Reserve Margin	28%	31%	35%	45%	47%	47%	45%	42%	39%	37%	36%	34%

*Capacity based on Summer Capability

2.2 Generation by Zone, by Year, by Type

Table 2.2. Generation in Zone A by year and by type

Zone A	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Gas)	1	1	1	1	1	1	1	1	1	1	1	1
Steam Turbine (Coal)	2087	2087	2087	2087	2087	2087	2087	2087	2087	2087	2087	2087
Steam Turbine (Wood)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Refuse)	37	37	37	37	37	37	37	37	37	37	37	37
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	240	240	240	240	240	240	240	240	240	240	240	240
Internal Combustion	9	9	9	9	9	9	9	9	9	9	9	9
Conventional Hydro	2452	2502	2552	2602	2652	2702	2702	2702	2702	2702	2702	2702
Combined Cycle	458	458	458	458	458	458	458	458	458	458	458	458
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Gas)	40	120	120	120	120	120	120	120	120	120	120	120
Wind	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	0	0	0	0	0	0	0	0	0	0	0	0
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	2880	2862	2871	2882	2889	2910	2928	2953	2979	3005	3029	3046
Required Capability	3398	3377	3388	3401	3409	3434	3455	3484	3516	3546	3575	3594
Total Capability	5324	5454	5504	5554	5604	5654	5654	5654	5654	5654	5654	5654
Reserve Margin	85%	91%	92%	93%	94%	94%	93%	91%	90%	88%	87%	86%

*Capacity based on Summer Capability

Table 2.3. Generation in Zone B by year and by type

Zone B	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	247	247	247	247	247	247	247	247	247	247	247	247
Steam Turbine (Wood)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Refuse)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (PWR Nuclear)	498	498	498	498	498	498	498	498	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	2	2	2	2	2	2	2	2	2	2	2	2
Conventional Hydro	30	30	30	30	30	30	30	30	30	30	30	30
Combined Cycle	115	115	115	115	115	115	115	115	115	115	115	115
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	14	14	14	14	14	14	14	14	14	14	14	14
Combustion Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Gas)	14	14	14	14	14	14	14	14	14	14	14	14
Wind	7	7	7	7	7	7	7	7	7	7	7	7
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	1899	1916	1938	1960	1983	2016	2045	2076	2108	2139	2171	2195
Required Capability	2241	2261	2287	2313	2339	2379	2414	2450	2487	2525	2561	2590
Total Capability	2527	2527	2527	2527	2527	2527	2527	2527	2029	2029	2029	2029
Reserve Margin	33%	32%	30%	29%	27%	25%	24%	22%	-4%	-5%	-7%	-8%

*Capacity based on Summer Capability

Table 2.4. Generation in Zone C by year and by type

Zone C	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681
Steam Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	674	674	674	674	674	674	674	674	674	674	674	674
Steam Turbine (Wood)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Refuse)	34	34	34	34	34	34	34	34	34	34	34	34
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	2606	2606	2606	2606	2606	2606	2606	1987	1987	1987	1987	1987
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	22	22	22	22	22	22	22	22	22	22	22	22
Conventional Hydro	122	122	122	122	122	122	122	122	122	122	122	122
Combined Cycle	1386	1386	1386	1386	1386	1386	1386	1386	1386	1386	1386	1386
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Gas)	85	85	85	85	85	85	85	85	85	85	85	85
Wind	30	30	30	30	30	30	30	30	30	30	30	30
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	0	0	0	0	0	0	0	0	0	0	0	0
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	2887	2874	2886	2898	2906	2922	2936	2953	2971	2990	3007	3017
Required Capability	3406	3391	3406	3420	3429	3448	3464	3484	3506	3528	3548	3560
Total Capability	6638	6638	6638	6638	6638	6638	6638	6020	6020	6020	6020	6020
Reserve Margin	130%	131%	130%	129%	128%	127%	126%	104%	103%	101%	100%	100%

*Capacity based on Summer Capability

Table 2.5. Generation in Zone D by year and by type

Zone D	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Wood)	18	18	18	18	18	18	18	18	18	18	18	18
Steam Turbine (Refuse)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	2	2	2	2	2	2	2	2	2	2	2	2
Conventional Hydro	937	937	937	937	937	937	937	937	937	937	937	937
Combined Cycle	321	321	321	321	321	321	321	321	321	321	321	321
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	1525	1525	1525	1525	1525	1525	1525	1525	1525	1525	1525	1525
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	758	892	895	898	899	902	904	906	908	910	912	906
Required Capability	895	1053	1056	1059	1061	1064	1066	1069	1071	1074	1076	1069
Total Capability	2802	2802	2802	2802	2802	2802	2802	2802	2802	2802	2802	2802
Reserve Margin	270%	214%	213%	212%	212%	211%	210%	209%	209%	208%	207%	209%

*Capacity based on Summer Capability

Table 2.6. Generation in Zone E by year and by type

Zone E	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	52	52	52	52	52	52	52	52	52	52	52	52
Steam Turbine (Wood)	20	20	20	20	20	20	20	20	20	20	20	20
Steam Turbine (Refuse)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Hydro	465	465	465	465	465	465	465	465	465	465	465	465
Combined Cycle	332	332	332	332	332	332	332	332	332	332	332	332
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Wind	9	9	9	9	9	9	9	9	9	9	9	9
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	1574	1564	1569	1575	1580	1592	1603	1618	1634	1649	1664	1671
Required Capability	1857	1846	1851	1859	1864	1879	1892	1909	1928	1946	1963	1972
Total Capability	2276	2276	2276	2276	2276	2276	2276	2276	2276	2276	2276	2276
Reserve Margin	45%	46%	45%	44%	44%	43%	42%	41%	39%	38%	37%	36%

*Capacity based on Summer Capability

Table 2.7. Generation in Zone F by year and by type

Zone F	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	368	368	368	0	0	0	0	0	0	0	0	0
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Wood)	1	1	1	1	1	1	1	1	1	1	1	1
Steam Turbine (Refuse)	12	12	12	12	12	12	12	12	12	12	12	12
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	1051	1051	1051	1051	1051	1051	1051	1051	1051	1051	1051	1051
Internal Combustion	5	5	5	5	5	5	5	5	5	5	5	5
Conventional Hydro	426	426	426	426	426	426	426	426	426	426	426	426
Combined Cycle	705	1785	1785	3195	3735	3735	3735	3735	3735	3735	3735	3735
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	0	0	0	0	0	0	0	0	0	0	0	0
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	2239	2223	2229	2237	2242	2260	2275	2296	2320	2342	2362	2376
Required Capability	2642	2623	2630	2640	2646	2667	2684	2710	2737	2764	2787	2804
Total Capability	2568	3648	3648	4690	5230	5230	5230	5230	5230	5230	5230	5230
Reserve Margin	15%	64%	64%	110%	133%	131%	130%	128%	125%	123%	121%	120%

*Capacity based on Summer Capability

Table 2.8. Generation in Zone G by year and by type

Zone G	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	2559	2559	2559	2559	2559	2559	2559	2559	2559	2559	2559	2559
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	723	723	723	723	723	723	723	723	723	723	723	723
Steam Turbine (Wood)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Refuse)	9	9	9	9	9	9	9	9	9	9	9	9
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	14	14	14	14	14	14	14	14	14	14	14	14
Conventional Hydro	100	100	100	100	100	100	100	100	100	100	100	100
Combined Cycle	0	0	0	540	1290	1290	1290	1290	1290	1290	1290	1290
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	18	18	18	18	18	18	18	18	18	18	18	18
Combustion Turbine (Oil & Gas)	102	102	102	102	102	102	102	102	102	102	102	102
Combustion Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	0	0	0	0	0	0	0	0	0	0	0	0
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	2092	2102	2147	2184	2223	2260	2294	2328	2363	2403	2442	2474
Required Capability	2469	2480	2533	2578	2623	2666	2706	2747	2788	2836	2881	2919
Total Capability	3524	3524	3524	4064	4814	4814	4814	4814	4814	4814	4814	4814
Reserve Margin	68%	68%	64%	86%	117%	113%	110%	107%	104%	100%	97%	95%

*Capacity based on Summer Capability

Table 2.9. Generation in Zone H by year and by type

Zone H	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Wood)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Refuse)	51	51	51	51	51	51	51	51	51	51	51	51
Steam (PWR Nuclear)	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	47	47	47	47	47	47	47	47	47	47	47	47
Combustion Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	0	0	0	0	0	0	0	0	0	0	0	0
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	895	913	930	945	959	972	984	995	1006	1018	1028	1030
Required Capability	1056	1077	1097	1115	1132	1147	1161	1174	1187	1201	1213	1216
Total Capability	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072	2072
Reserve Margin	131%	127%	123%	119%	116%	113%	111%	108%	106%	104%	102%	101%

*Capacity based on Summer Capability

Table 2.10. Generation in Zone I by year and by type

Zone I	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Wood)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Refuse)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Hydro	3	3	3	3	3	3	3	3	3	3	3	3
Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil & Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0	0	0	0
Other	1	1	1	1	1	1	1	1	1	1	1	1
Import Capability												
Capacity Import	6625	6625	6625	6625	6625	6625	6625	6625	6625	6625	6625	6625
Demand Response Programs	0	0	0	0	0	0	0	0	0	0	0	0
Demand Forecast	1485	1514	1540	1564	1587	1608	1625	1643	1661	1678	1694	1709
Required Capability	1752	1787	1818	1845	1873	1897	1918	1939	1960	1980	1998	2016
Total Capability	6628	6628	6628	6628	6628	6628	6628	6628	6628	6628	6628	6628
Reserve Margin	346%	338%	330%	324%	318%	312%	308%	303%	299%	295%	291%	288%

*Capacity based on Summer Capability

Table 2.11. Generation in Zone J by year and by type

Zone J	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	66	66	66	66	66	66	66	66	66	66	66	66
Steam Turbine (Oil & Gas)	5190	5190	5023	5023	5023	4491	4491	4491	4491	4491	4491	4491
Steam Turbine (Gas)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Coal)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Wood)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Refuse)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	2	2	2	2	2	2	2	2	2	2	2	2
Conventional Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Combined Cycle	1147	1417	2255	3755	3755	4835	4835	4835	4835	4835	4835	4835
Jet Engine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Jet Engine (Gas & Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Combustion Turbine (Oil)	744	744	744	744	744	744	744	744	744	744	744	744
Combustion Turbine (Oil & Gas)	1177	1177	1177	1177	1177	1177	1177	1177	1177	1177	1177	1177
Combustion Turbine (Gas)	498	629	834	834	834	834	834	834	834	834	834	834
Wind	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900
Demand Response Programs	348	348	348	348	348	348	348	348	348	348	348	348
Demand Forecast	11069	11288	11484	11659	11834	11988	12119	12250	12381	12513	12626	12740
Required Capability	12651	12909	13141	13348	13554	13735	13890	14045	14200	14354	14489	14623
Locational Requirement	8577	8752	8909	9049	9189	9312	9417	9522	9627	9732	9823	9914
Total Capability	13724	14126	15002	16502	16502	17050	17050	17050	17050	17050	17050	17050
Reserve Margin	28%	29%	35%	46%	44%	46%	45%	43%	42%	40%	39%	38%

*Capacity based on Summer Capability

Table 2.12. Generation in Zone K by year and by type

Zone K	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Steam Turbine (Oil)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Oil & Gas)	2418	2418	2418	2418	2418	2418	2418	2418	2418	2418	2418	2418
Steam Turbine (Gas)	233	233	233	233	233	233	233	233	233	233	233	233
Steam Turbine (Coal)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Wood)	0	0	0	0	0	0	0	0	0	0	0	0
Steam Turbine (Refuse)	114	114	114	114	114	114	114	114	114	114	114	114
Steam (PWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Steam (BWR Nuclear)	0	0	0	0	0	0	0	0	0	0	0	0
Pumped Storage Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Internal Combustion	74	74	74	74	74	74	74	74	74	74	74	74
Conventional Hydro	0	0	0	0	0	0	0	0	0	0	0	0
Combined Cycle	241	241	491	1051	1051	1051	1051	1051	1051	1051	1051	1051
Jet Engine (Oil)	531	531	531	531	531	531	531	531	531	531	531	531
Jet Engine (Gas & Oil)	171	171	171	171	171	171	171	171	171	171	171	171
Combustion Turbine (Oil)	575	575	575	575	575	575	575	575	575	575	575	575
Combustion Turbine (Oil & Gas)	139	139	139	139	139	139	139	139	139	139	139	139
Combustion Turbine (Gas)	564	611	911	911	911	911	911	911	911	911	911	911
Wind	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Import Capability												
Capacity Import	1715	1715	1715	1715	1715	1715	1715	1715	1715	1715	1715	1715
Demand Response Programs	152	152	152	152	152	152	152	152	152	152	152	152
Demand Forecast	4849	4977	5052	5124	5198	5275	5356	5445	5536	5635	5740	5844
Required Capability	5542	5694	5782	5867	5954	6045	6141	6246	6353	6470	6594	6717
Locational Requirement	4603	4729	4802	4873	4945	5021	5100	5187	5276	5373	5476	5578
Total Capability	6775	6822	7372	7932	7932	7932	7932	7932	7932	7932	7932	7932
Reserve Margin	44%	41%	50%	60%	57%	55%	52%	50%	47%	45%	42%	39%

*Capacity based on Summer Capability

2.3 Transmission Additions and Upgrades

The Base Case transmission system is as defined in ATR2003. The following table lists new planned transmission projects. All, except the last three items, were included in the Base Case.

Table 2.13. Planned Transmission Projects

Line Owner	Terminals or Project Descriptions	In Service Date
	Bowline point – Ladentown 345kV line	Before 2007
Capline Wawayanda Project	A new 5-breaker ring substation tapping on Coopers Corners-Rock Tavern (CCRT-42) line	Before 2007
	Conversion of the W.49th St. station in Con Edison into a double ring configuration allowing interconnection of the PSE&G C	Before 2007
	Cross Sound DC Cable	2002
	Fault Duty Mitigation • Insert 0.02 p.u. series reactors in the M51, M52, (Sprain Brook-W.49th St.), 71, and 72 (Dunwoodie-Rainey) 345kV • Insert 0.05 p.u. series reactors in the 15055 (E.179th St.-Hell Gate 6) feeder and Corona bus tie • Insert a phase angle regulator in the Astoria East bus tie • Move the Hell Gate #1 and #4 transformers from the Astoria East feeders to the Astoria West feeders • Replace numerous breakers	
PSE&G	Cross Hudson – W. 49th St in Manhattan 345kV cable	2005
	Sills Rd 138kV Substation	2007
Atlantic Energy Partners	Sayerville (New Station, NJ) – W. 49th Street NYC 36 mile 500kV DC tie	2005
LIPA/TE	CT-LI DC Tie-line	
	Spagnoli Rd Substation 1 mile long 138kV 320MVA cable connecting Sapgnoli Rd and Ruland Rd Substations	2006
	Kings Park Substation 4 mile long 138kV cable connecting Kings Park and Pilgrim Substations	2004
	New Substation for Besicorp Empire State Newprint Plant 9 mile long 345kV overhead transmission line connecting the new substation with Reynolds Road 345kV substation	2006
	Goethals Substation upgrades to interconnect 400MW Liberty Project 1 kilometer long 230kV cable connecting new lLberty substation to Goethals substation	2006
CHG&E	Rock Tavern Transformer	In service
LIPA	Riverhead – Southampton 22 mile138kV line	2004
Mirant	Bowline – WestHaverstraw6.72 mile 345kV line	2006
Atlantic Energy Partners	Sayerville (New Station, NJ) – Newbridge, LI 55 mile 500kV DC tie	2004

3 Base Case Adequacy Analysis

As part of Phase 1 analysis, screening for 2008 and 2013 are deemed adequate. The 2008 assessments are currently underway as part of the ATR 2003 activities. The 2013 screening is an attempt to establish system adequacy for a 5-year projection beyond 2008.

For the Base Case, a five-year (2008), and a ten-year (2013), reliability simulations will be performed. Load and generation projections are determined from NYISO 2003 Load & Capacity Report. Reliability simulation will use the MARS set-up from the latest IRM study. Transfer limits in the IRM will be used for years 1 through 4 and impacts derived from the ATR 2003 would be used for years 5 through 10. It may be necessary to repeat some of this work, if the transmission screening analysis reveals any impacts not previously considered.

The transmission screening analysis for 2008 has been completed as part of ATR 2003 and need not be repeated. Transmission screening is required for 2013.

Short circuit analysis will also be performed to ensure potential future fault currents increases will not exceed available circuit breaker interruption capabilities.

3.1 Reliability Analysis

Introduction

This task will focus on evaluating the adequacy of the NYCA transmission system as it impacts the generation system reliability and the determination of the state-wide installed reserve requirements. NYSRC Reliability Rule AR-1 states that the state-wide reserve requirements will be such that: "Adequate resource capacity shall exist in the NYCA such that, after due allowance for scheduled outages and deratings, forced outages and deratings, assistance from neighboring systems, NYS Transmission System transfer capability, uncertainty of load forecasts, and capacity and/or load relief from available operating procedures, the probability of disconnecting firm load due to a resource deficiency will be, on the average, no more than once in ten years." (NYSRC Reliability Rules Manual (www.nysrc.org/documents.html)). This requirement is often stated in terms of maintaining a daily loss-off-load expectation (LOLE) of 0.1 days per year.

MARS

The primary tool for the performance of the reliability analysis will be GE's Multi-Area Reliability Simulation program (MARS). MARS uses a Monte Carlo simulation to compute the reliability of a generation system comprised of any number of interconnected areas or zones. MARS is able to reflect in its reliability calculations each of the factors listed in NYSCR Reliability Rule AR-1, including the impacts of the transfer capability of the transmission system.

Data

A Base Case will be developed that includes the existing system in combination with the generation and transmission system additions and upgrades that are projected to occur throughout the study period. Because emergency assistance from neighboring systems contributes to the reliability of the NYCA system, the load and generation of the neighboring systems was modeled. The source for the data on the existing system was the MARS database maintained by NYISO staff for use in determining the annual installed reserve requirements. The load and generation would be updated through the study period based on data from the latest Load & Capacity Data report issued by NYISO. Similar reports for the neighboring systems will be referenced for updating the data in those regions.

Methodology

The first step in the analysis will be to calculate the NYCA LOLE for the Reference Case assuming no transmission system transfer limitations within the NYCA system. This will indicate whether the installed generation is sufficient to satisfy the load demand. If the system fails to meet the LOLE criterion of 0.1 days per year, generation will be added proportionately throughout the state to improve the system to 0.1 days per year.

The NYCA LOLE will then be computed including the effects of the internal transfer limitations. This will indicate whether the NYCA transmission system is adequate to deliver the generation to the load. If the NYCA LOLE exceeds 0.1 days per year, additional MARS simulations will be run in which the transfer limits of the interfaces that are most severely impacting generation system reliability will be increased until the reliability criterion is met.

3.2 Transmission System Screening Analysis

A comprehensive transmission reliability analysis would include steady-state voltage, thermal, and transfer limit analysis, as well as first-swing stability and short circuit analyses at a minimum. It could also include steady-state or dynamic voltage stability analysis, three-phase cycle-by-cycle electro-magnetic transients (EMT) analysis to investigate power quality, control and/or machine torsional interactions, as well as longer time-frame analyses of second-to-second voltage and frequency regulation. Many of these analyses (e.g., fundamental frequency steady-state, dynamic and short circuit analyses) may be performed annually to ensure a reliable transmission system. Others (e.g., sub-synchronous resonance analysis) may only be performed for specific situations (e.g., addition of significant series compensation to a radial transmission line connecting a large thermal plant to the rest of the power system).

Similarly, some analyses are more likely to uncover significant transmission constraints than others. For instance, a steady-state thermal or transfer limit analysis could identify the need for additional transmission lines between different regions of the state, while a first-swing stability analysis could identify the need for faster relaying on an existing transmission line. In general, additional transmission lines are capital intensive, require a long construction time, and cross multiple administrative districts with each requiring appropriate permits. By contrast, a relay upgrade is frequently located at a single existing substation and can be installed relatively quickly and inexpensively. Therefore, any evaluation of the transmission reliability of an uncertain future system (e.g., 2013) should focus on those analyses most likely to uncover significant problems.

Such a screening level evaluation should focus first on steady-state thermal and voltage analyses. Stability and short circuit analyses can be deferred until the future system configuration is more certain. Specialty EMT and other analysis can be ignored until required of individual developers or manufacturers for particular projects. A detailed description of this type of screening level analysis is described in the following sections.

Objective

The objective of this screening analysis is to identify the regions or corridors requiring significant transmission system upgrades, if any, to meet system reliability criteria in 2013. In particular, the goal is to determine which transmission reinforcement areas could provide the most system performance benefit, over the broadest rage of possible system future conditions. Multiple scenarios representing different possible 2013 system conditions (e.g., generation, load, transmission variations) will be evaluated. The performance of these systems will be compared to that of NYISO's power flow representing 2008 system conditions as studied in the 2003 Area Transmisssion Review.

Power flow analysis alone will be performed, focusing on the voltage and thermal performance of the bulk transmission system as well as limited transfer analysis of selected NY power system interfaces. No evaluation of potential transmission system upgrades will be included.

Study Approach

This study will use a relative approach to determine the performance of the 2013 power system. First, 2008 system performance will be determined in order to establish the benchmark. Then, system performance under the various 2013 scenarios will be determined and compared to the benchmark. This relative approach removes any ambiguities as to the actual impact of the various scenarios since existing criteria violations, if any, will be identified.

Task 1. 2013 Reference Database Development

The 2008 power flow will be modified to represent the Base Case assumptions for transmission system upgrades, generation additions and/or retirements, and load levels. The resulting power flow will be reviewed to identify any pre-contingency thermal, voltage and/or interface transfer violations. Additional modifications may be made, in consultation with NYISO, to eliminate or mitigate these criteria violations. Any remaining pre-contingency violations will be flagged as potential components of a required transmission system upgrade to a particular region or corridor.

Task 2. 2013 Scenario Database Development

The 2013 Base Case power flow will be modified to represent the three scenario case assumptions for transmission system upgrades, generation additions and/or retirements, and load levels. The resulting power flows will be reviewed to identify any pre-contingency thermal, voltage and/or interface transfer violations. Additional modifications may be made, in consultation with NYISO, to eliminate or mitigate these criteria violations. Any remaining pre-contingency violations will be flagged as potential components of a required transmission system upgrade to a particular region or corridor.

Task 3. Contingency Analysis

The objective of this work is to determine whether any of the 2013 cases will be constrained by either voltage or thermal limitations under steady-state post-contingency conditions. The four 2013 system conditions described in Tasks 1 and 2, as well as the 2008 benchmark power flow, will be analyzed.

Approximately 100 contingencies will be evaluated covering all relevant line, transformer, generator and multiple element outages in the study area. The analysis will compare voltage and loading performance against appropriate criteria, as defined under the study assumptions. Criteria violations will be flagged and summarized. Specifically, the incremental impact due to a 2013 case will be identified by any voltage or thermal violations that did not occur in the benchmark 2008 system or under pre-contingency 2013 system conditions.

Task 4. Transfer Limit Analysis

Power transfer limits will be determined for the 2008 benchmark system and the 2013 study systems. Approximately 5 significant interfaces will be evaluated. All interface evaluations will be performed on a relative basis, showing the change in maximum power transfer from the benchmark system to the study system.

The interfaces to be evaluated are as follows:

- New York City Cable system
- UPNY-Con Edison
- UPNY-SENY
- Total East
- Central East

In order to determine transfer limits, it is necessary to vary the power flow across the interface(s) under study by adjusting generation at one or more locations on one side of the interface, and adjusting generation by a like amount at one or more locations on the other side of the interface. The assumed locations for adjusting generation for evaluating transfer limits of the various interfaces will be provided as noted in the study assumptions.

The transfer limit analysis will be performed using a set of contingencies as specified by NYISO.

Task 5. Development of Relative shift Factor Tables

A table of relative shift factors of existing large generators and the proposed projects will be developed.

Task 6. Evaluation of Analytical Results

The results of the analysis described in Tasks 3 and 4 will be evaluated to identify the regions or corridors requiring transmission system upgrades, if any, to meet system reliability criteria in 2013. Some upgrades may be required under a wide variety of potential 2013 system conditions. Others may be primarily dependent upon one or more assumptions in the reference and/or scenario cases.

3.3 Short Circuit Analysis

A fault duty study will be performed using ASPEN to determine the impact of the 2013 maximum generation scenario on local circuit breakers. Additional analyses of other generation scenarios would only be performed if excessive short circuit currents were observed for the maximum generation scenario. The NYISO methodology will be used.

Three-phase, single-phase and line-line-ground short-circuit currents will be determined for up to thirty 345kV substations. These bus level currents will be compared to the breaker ratings provided by NYISO. Any bus fault current that exceeds the breaker fault interrupting capability will be noted, and an individual breaker analysis performed. The individual breaker analyses will be performed to determine whether the fault current seen by a specific breaker exceeds that breaker's rating.

4 Threats to Base Case… Issues Driving Future Scenarios

Introduction

There are multiple drivers that can cause deviations to the NYISO Base Case over the 10-year study period. These drivers could have positive or negative impacts on the existing NY transmission system. Below is a description of the drivers that NYISO has identified as potential causes of deviations to Base Case.

Review of other RTO/ISO planning studies did not reveal additional set of issues.

4.1 Issues

HVDC Transmission Expansion

There are various HVDC projects proposed in New York State, such as the Empire Connection Project. This project entails building 2000 MW HVDC lines that would allow less expensive generation to flow from Upstate NY into NY City. The completion of this project could potentially lead to cancellations or delays for some of the approximately 4000 MWs of proposed NYC generation due to economic competition form NY upstate. In general, HVDC Transmission line Expansion projects such as the Empire Connection would help to increase transmission capability in New York State.

Wind/Renewable Additions

New NY state mandates and targets could cause significant wind and renewable generation additions. The uncertainty associated with the fuel sources for renewable generation such as wind, makes it difficult to associate a pattern to the impact of transmission loading. There is currently a study in progress, sponsored by the NYISO and NYSERDA, to determine the probable impacts that the new renewable generation additions will have on the transmission system in New York.

Generation Expansion

There is currently approximately 9500 MW of proposed new generation in New York state. The current economic climate across the country has caused a significant number of projects to be canceled or delayed. The same phenomena could very likely occur in New York State. Cancellations or delays in load pockets, such as New York City, would require generation from other areas to help meet demand. This would cause heavier loading on the existing transmission system interfaces to NYC

Retirement of Existing Generation

Revenue shortfalls for steam oil and gas plants, caused by the expiration of existing Power Purchase Agreements and competition from new, more efficient combined cycle plants could lead to potential retirements. The loss of generation due to retirements in transmission-constrained areas would cause more loading on the existing transmission system as it tries to meet demand requirements in those areas.

Regulatory issues could also lead to potential retirements. For example, the Indian Point nuclear plant's proximity to population centers has created pressure for the plant to be shut down for safety reasons. Re-licensing of this plant may not occur due to this pressure. This plant helps New York City to meet load obligations. Upstate generation would be needed to help fill this potential void and cause more loading on the existing transmission system.

Transmission Owner Plans

Transmission owners in NY State could possibly build new interconnections with neighboring systems. This would increase the import capability into New York State and allow more power to flow and hence increase loading on the existing transmission system within NY.

Existing Transmission Infrastructure Aging

As the current transmission infrastructure ages, the amount of power that can flow on the transmission lines will steadily decrease. This could potentially cause trouble for load pockets that depend on imports to meet load.

Environmental Compliance

It is likely that environmental regulations in NY State can become more stringent. The existing steam oil/gas and steam coal plants will need to curtail operation or install emission control technology to meet these new regulations. The potential high cost of compliance with the environmental regulations could cause some of these existing units to retire.

There is also a proposal to require Indian Point nuclear unit to build cooling towers to avoid using water from the Hudson River. This would be a high expense and could potentially force Indian Point to retire. As mentioned elsewhere in the report, retiring Indian Point and/or retiring NYC steam oil/gas units will increase transmission loading on the interfaces connecting upstate and downstate NY.

Fuel Availability/Diversity

There is a potential for a natural gas shortage in the New York State. This could cause natural gas fired units to burn other fuels or curtail operation. If unit operation curtailment due to fuel unavailability occurs in load pockets, generation from other areas would need to help meet demand, causing heavier loading on the existing transmission system.

Impact of New Technologies

Many new technologies that are applicable to electricity generation and transmission are under research and development. Some examples are Carbon Filament Transmission Lines, Distributed generation and New Energy Management Systems. The carbon filament lines will allow transmission lines to operate with higher voltages thus, increasing their loading capacity, distributed generation will allow electricity generation at the location of the load and the new energy management system can reduce on-peak demand. New technologies such as these will help to alleviate loading on the existing transmission system.

Load Forecast Uncertainty

There is considerable uncertainty associated with any load forecast. Many events can cause actual loads to deviate from forecasted values. The existing transmission system may or may not benefit from a load forecast swing. Lower than forecasted load would cause less loading on the transmission lines vice versa.

Neighboring System Plans

Neighboring systems could possibly upgrade current transmission interconnections or build new interconnections into New York. These changes would cause more power to flow into New York. This additional power flow from neighboring regions would increase loading on the existing transmission system within NY.

The implementation of a demand response program would help to reduce on-peak demand. An example of this would be having a factory shut down during a peak time to help reduce the load on the system. This type of program could help transmission-constrained areas to decrease loading on the transmission system.

4.2 Quantifying the Effect

The following tables show the changes that appropriately characterize the potential effect of each issue in terms of generation and demand.

HVDC Transmission Expansion

- Empire Project is completed increasing transfer capability from Upstate NY to Zone J by 2000 MW
- New generation proposed for Zone J, after January 1, 2005, is delayed
- Projects are assumed to be delayed 2X of current proposed installation date

Table 4.1. HVDC Transmission Expansion

HVDC Transmission Expansion	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Zone J	0	-660	-1660	-2740	-2740	-2740	-2080	-2080	-1080	-1080	0

Wind/Renewable Additions

- Approximately 3000 MW of new wind generation is proposed to be installed during the study period
- Potential sites are in Zones A, B, C, D, E, & K

Table 4.2. Wind/Renewable Additions

Wind/Renewable Additions	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Zone A	0	+100	+200	+300	+400	+500	+500	+500	+500	+500	+500
Zone B	0	+100	+200	+300	+400	+500	+500	+500	+500	+500	+500
Zone C	0	+100	+200	+300	+400	+500	+500	+500	+500	+500	+500
Zone D	0	+100	+200	+300	+400	+500	+500	+500	+500	+500	+500
Zone E	0	+100	+200	+300	+400	+500	+500	+500	+500	+500	+500
Zone K	0	0	0	0	0	0	+500	+500	+500	+500	+500

Generation Expansion

- New generation proposed for Zones J & K, after January 1, 2005, are delayed due to the current economic climate
- Projects are assumed to be delayed 2X of current proposed installation date

Table 4.3. Generation Expansion

Generation Expansion	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Zone J	0	-660	-1660	-2740	-2740	-2740	-2080	-2080	-1080	-1080	0
Zone K	0	0	-250	-810	-810	-810	-810	-810	-560	-560	0

Retirement of Existing Generation

- Assumptions for retiring a unit were based on following criteria:
  - Selecting the largest plant in each Zone
  - Not allowing Reserve Margins to drop below the 18 % requirement during the study period
- Transmission Owner Plans
- Assumed not to deviate from the Base Case over the Study Period

Table 4.4. Retirement of Existing Generation

Retirement of Existing Generation	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Zone A											
Coal	0	0	0	-722	-722	-722	-722	-722	-722	-722	-722
Zone B											
Coal	0	0	0	-247	-247	-247	-247	-247	-247	-247	-247
Zone C											
Oil	0	0	0	-1681	-1681	-1681	-1681	-1681	-1681	-1681	-1681
Zone G											
Oil	0	0	0	-1170	-1170	-1170	-1170	-1170	-1170	-1170	-1170
Zone H											
Nuclear	0	0	0	-1975	-1975	-1975	-1975	-1975	-1975	-1975	-1975
Oil	0	0	0	-47	-47	-47	-47	-47	-47	-47	-47

Existing Transmission Infrastructure Aging

- Assumed not to cause any deviation from the Base Case over the Study Period

Environmental Compliance

- Coal Plants in NY State without Emission Control Technology would retire due to more stringent environmental rules proposed for 2007
- Hudson River cooling water units would need to build cooling towers and retire due to the additional economic burden

Table 4.5. Environmental Compliance

Environmental Compliance	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Zone C											
Coal	0	0	0	-159	-159	-159	-159	-159	-159	-159	-159
Zone G											
Coal	0	0	0	-494	-494	-494	-494	-494	-494	-494	-494
Zone H											
Nuclear	0	0	0	-1975	-1975	-1975	-1975	-1975	-1975	-1975	-1975

Fuel Availability/Diversity

- Proposed Natural Gas pipelines to built into Zone K during the study period are delayed
- New natural gas fueled generation proposed for Zones J & K after January 1, 2005 are delayed due to natural gas shortages
- Projects are assumed to be delayed 2X of current proposed installation date

Table 4.6. Fuel Availability/Diversity

Fuel Availability/ Diversity	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Zone J	0	-660	-1660	-2740	-2740	-2740	-2080	-2080	-1080	-1080	0
Zone K	0	0	-250	-810	-810	-810	-810	-810	-560	-560	0

Impact of New Technologies

- Due to the uncertainty of new technologies becoming available during the study period, they are assumed to not to cause any deviation form the Base Case

Load Forecast Uncertainty

- The current projected load growth is assumed to increase from 1.1% to 2% for the study period

Table 4.7. Load Forecast Uncertainty

Load Forecast Uncertainty	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
NYCA Demand	0	+230	+513	+799	+1078	+1411	+1728	+2059	+2394	+2774	+3160

Neighboring System Plans

- Assumed not to deviate from the Base Case over the Study Period. Plans are incorporated in normal update procedures.

Demand Response Programs

- Additional demand response programs are initiated, raising current levels 2X

Table 4.8. Demand Response Programs

Threats to Base Case…
Issues Driving Future Scenarios

Demand Response Programs	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Demand Response Programs	0	+500	+500	+500	+500	+500	+500	+500	+500	+500	+500

5 Scenario Definition

Following analysis of the Base Case, test cases which combine variations in installed generation, load forecasts, transmission system transfer capabilities, and available assistance from neighboring systems will be simulated to determine their impact on the reliability of the NYCA system and hence the adequacy of the transmission system.

Suggested potential scenarios for consideration include:

1. DC Transmission Expansion
    a. As described in impact 2.2.
    b. Only identified scenario that primarily involves transmission change. Will not be done if high load forecast is reliable.
2. Upstate generation reduction
    a. As described in impact 2.5
    b. Fully covers environmental compliance impact 2.7
3. Downstate generation reduction
    a. As described in impact 2.4
    b. Fully covers fuel availability/diversity impact 2.8
4. Load Forecast Uncertainty
    a. As described in impact 2.10, or using the high load forecast from the LFWG
    b. Load growth distributed as an equal percentage increase in all regions

Issues not specifically covered by the above scenarios include:

1. Wind/Renewable Additions (issue 2.3) – being covered in a separate study sponsored by NYSERDA and NYISO.
2. Infrastructure Aging – assumed to have no effect over the study period
3. New Technologies – insufficiently defined to include as any different identifiable impact
4. Neighboring System Plans – not assumed to change, but may merit additional investigation if dependence on external support is shown to increase significantly under any of the scenarios.
5. Demand response systems – effectively decreases load. Will likely be accompanied by some form of generation reduction that drives the need. Thus, this could be viewed as a minor variation on either upstate or downstate, generation reduction scenarios.

6 Scenario Adequacy Analysis

6.1 Reliability Analysis

MARS analysis will be performed for years 2008 and 2013 for each scenario replicating the Base Case analysis, as described in Section 3.

6.2 Transmission System Screening Analysis

Similarly, power flow analysis will be performed for 2013 for each scenario replicating the Base Case analysis, as described in Section 3.

6.3 Short Circuit Analysis

Unless a scenario with a higher generation than the Base Case is defined, no additional short circuit analysis is required.

7 Final Report/Review Process

All assumptions, analyses, and results will be documented in a Final Report. This report will include recommendations for additional assessments