CONSOLIDATED EDISON COMPANY OF NEW YORK

Electric System Long Range Plan: Appendices

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1.0 APPENDIX A – DEMAND AND ENERGY FORECASTS

1.1 OVERVIEW

To ensure the long range plan is robust, CECONY considers a 20-year planning horizon that includes a range of electric peak demand forecasts to help plan for the future while accounting for uncertainties such as potentially disruptive technology and regulatory change. Peak demand drives infrastructure investment because CECONY must build its T&D infrastructure to support the maximum MW demand, even if it is a relatively rare occurrence. For the CECONY electric system, peak demand occurs in the summer when air conditioning loads are the highest. CECONY currently develops 10-year peak demand forecasts to ensure that T&D infrastructure is adequate to support the economic growth of New York City and Westchester County. To develop the 20 year peak demand and energy forecasts for the long range plan, the Company extended the existing forecasts based on a number of key drivers for different cases.

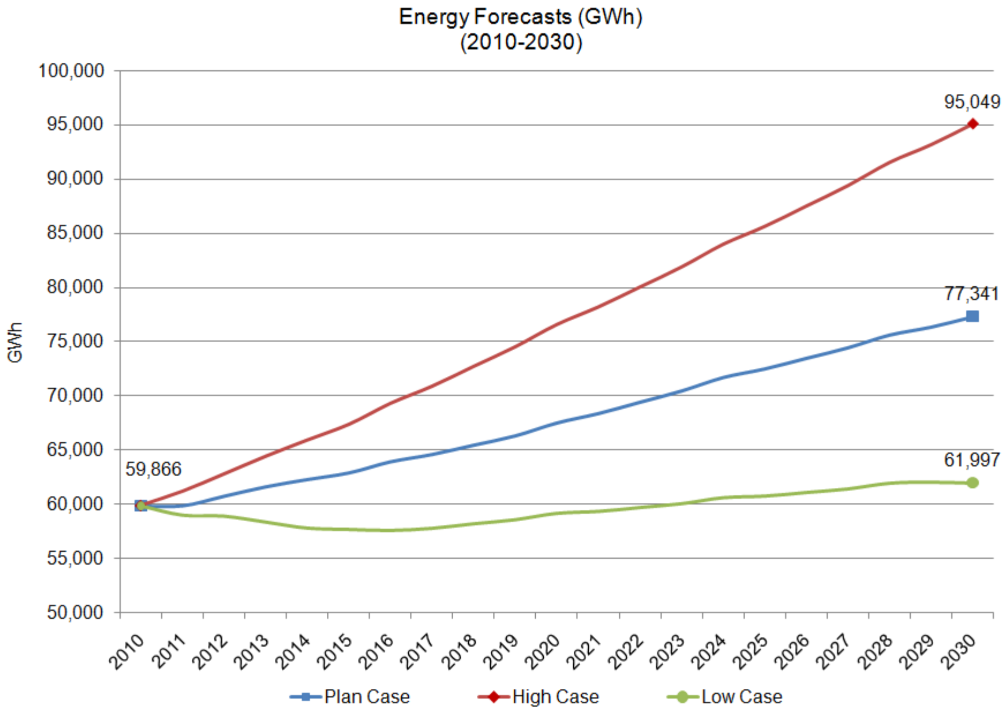
In addition to the peak demand forecast, CECONY also develops an energy forecast, which is a projection of electricity consumed throughout the year, measured in Gigawatt hours (GWh). The peak demand forecast is a projection of the maximum electricity requirements that CECONY's customers will demand at a single point in time, measured in megawatts (MW).

The primary drivers of energy need are population growth and overall economic growth, which affects employment and net change in customer growth in our service territory. These drivers are used to develop the energy forecast detailing the expected annual energy requirements of our customers. From a peak demand perspective, population growth and economic growth are also primary drivers. The methodologies used to translate the drivers into the forecasts will not be discussed here. In addition to the drivers, the forecasts also include the impact of energy efficiency, demand responses, and electric vehicles, which are detailed in this appendix.

To facilitate the development of the ELRP, we developed a "plan case" and two alternate bounding cases. We use the alternate cases to identify signposts that signal revisions to plan investments.

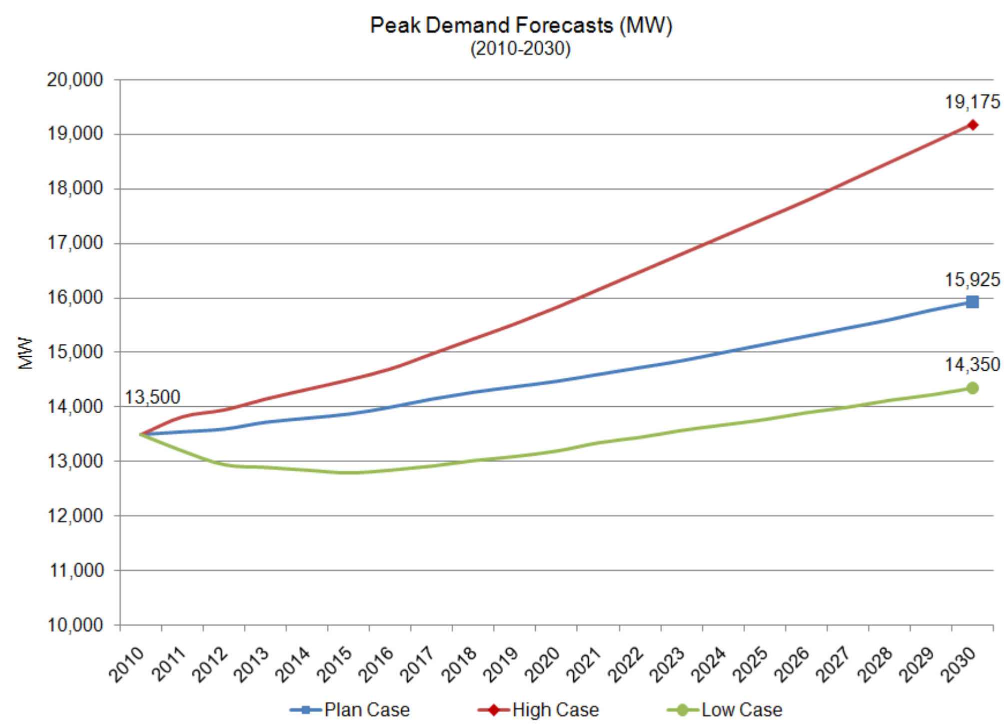
- **Plan case**—the most likely demand trajectory and is based on gradual economic recovery from today's recession, with minimal load growth in 2010 followed by consistent annual energy growth of 1.13% and annual demand growth of 0.76%. The plan case is the basis for all initiatives and assumptions discussed in the ELRP. This case incorporates demand side management consistent with the NYISO's expectations which assumes that approximately one-third of New York State's goal of 15% reduction in energy by 2015 will be achieved.
- **High case**—rapid economic recovery, leading to near-term load growth starting in 2010 and reaching a 20-year compound annual growth rate (CAGR) of 2.12% for energy and 1.66% for demand. This is consistent with historical growth rates over the last 30 years.
- **Low case**—reduced demand due to successful demand side management. This case is based on the plan case demand forecast, but includes 100% of the energy reduction necessary meet the New York State target of 15% energy reduction by 2015. The resultant net 20-year CAGR is 0.05% for energy and 0.26% for demand.

Figure 1-1. Energy Forecasts



CAGR (2010-2030) **1.13%** **2.12%** **0.05%**

Figure 1-2. Demand Forecasts



CAGR (2010-2030) **0.76%** **1.66%** **0.26%**

1.2 PLAN CASE

1.2.1 Gross Energy and Demand Forecasts

As previously mentioned, a primary driver affecting both the gross energy and demand forecasts is expectations regarding growth in the overall economy. The current global economic recession has stunted both energy and demand growth of our customers over the last few years and slow growth is expected to continue through 2010. Under current projections, the Company forecasts economic turnaround to begin in 2011 and last through 2013 with higher than normal growth followed by a return to the stable long term growth trend of 1% demand growth through the end of the ELRP time horizon in 2030.

Table 1-1. Plan Case Annual Gross Energy and Demand Growth Rates

Year	Demand Growth %	Sendout Energy Growth %	Reason
2010	0.1	0.5	Minimal growth due to the current economic recession
2011	1.6	1.4	Strong economic growth out of recession
2012	1.5	2.4	Strong economic growth out of recession
2013	1.5	1.6	Strong economic growth out of recession
2014	1.0	1.6	Economy stabilizes at normal long term growth rate of 1%
2015-2030	0.8 - 1.1	0.9-1.6	Consistency with long term trend of near 1% per year

1.2.2 Electric Vehicles

Normally all expected energy and demand needs of customers will be included in the gross demand forecast; however, given the uncertain nature of the Plug-in hybrid electric vehicle (PHEV) and electric vehicle (EV) market, forecasts for the adoption of this technology were done separate from the gross forecasts. The expectation is that there will be more refinement needed to EV forecasts than to the normal gross forecast, and by separating them out, it will be easy for the Company to make adjustments as necessary.

PHEVs and EVs, which do not have internal combustion engines (both are generally referred to as plug-in electric vehicles, or PEVs) could have a near-term impact on electric utilities and the demand for power. Nearly every major auto manufacturer is preparing a PEV for introduction to the consumer market. With increased collaboration among auto manufacturers, utilities, government and businesses, EVs appear to be a promising solution to internal combustion engine vehicles. As more research and development is completed, designs will likely become more effective, energy efficient, and inexpensive. In the interim, PHEVs will likely serve as a technology bridge to fully electric vehicles and a largely electrified transportation sector. Currently, dedicated electric vehicles are viable for niche applications such as limited commercial delivery. If battery technology evolves and production increases, they will likely become useful in other transportation applications

There are a number of different forecasts available in the marketplace for the adoption of electric vehicles. Many of these forecasts use similar logic as to what we have developed to model electric vehicle adoption in our service territory. Our forecast is based on background studies obtained from the Department of Energy and the Department of Transportation as well as data obtained from EPRI, the U.S. Census and vehicle manufacturers. Using income and driving patterns as the primary factors influencing adoption, we have developed a plan case forecast of 380,000 thousand residential vehicles adopted in New York City by the year 2030. This represents approximately 10.7% of the current vehicle registration. EV adoption for Westchester County is also incorporated into the estimates in Figure 1-3 and Figure 1-4.

Figure 1-4 shows the peak demand impact in MWs of each of these cases. This demand impact assumes that 15% of vehicles will be charged at the system peak every other day. The remaining vehicles will be charged either at off peak hours, or use smart charging equipment to charge at times predefined by the owner of the vehicle. In environments with time-based pricing, it is expected that many drivers will charge overnight to take advantage of lower cost of energy.

Figure 1-3. Plan Case Peak Energy Forecast for EVs

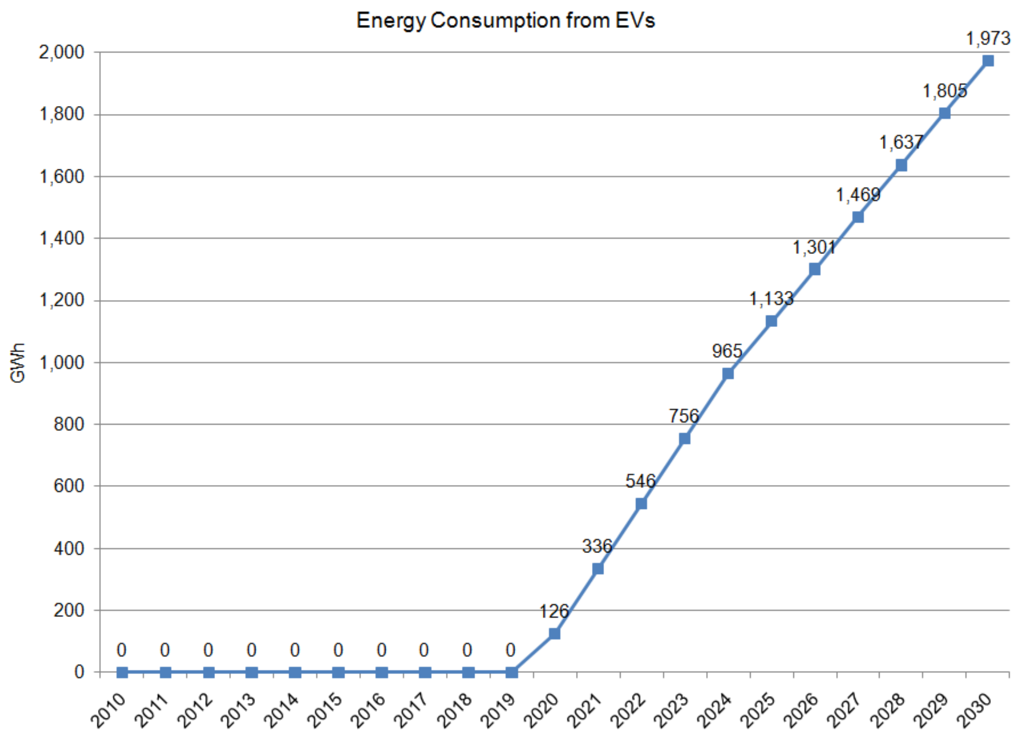
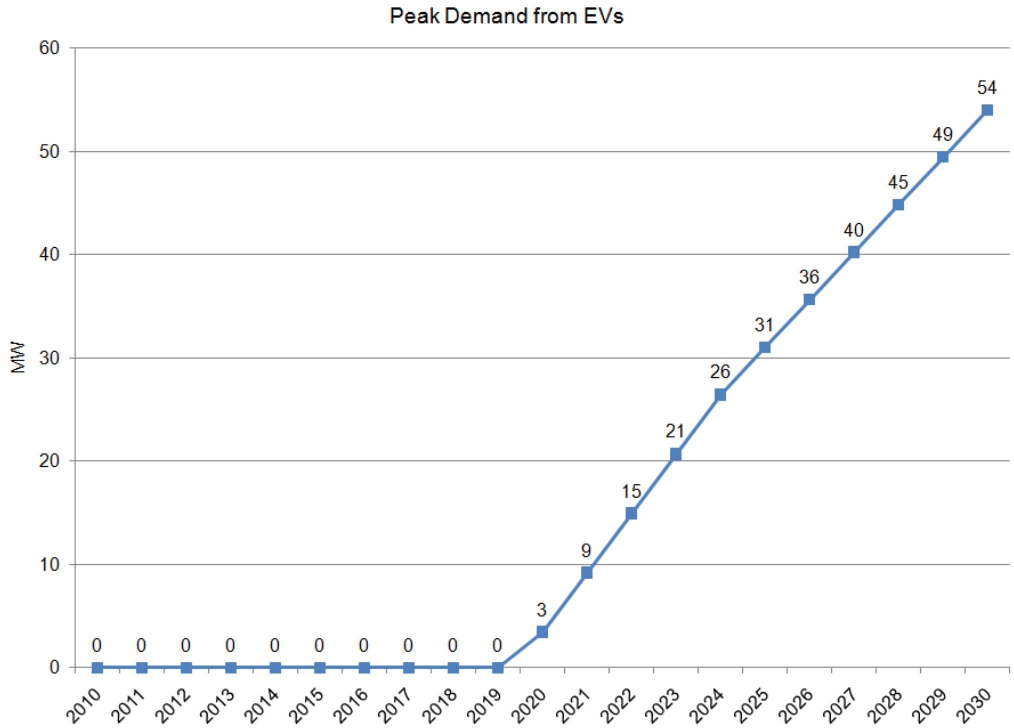


Figure 1-4. Plan Case Peak Demand Forecast for EVs



1.2.3 Demand-side Management (DSM)

Demand-side management includes all demand and energy savings attributable to energy efficiency and demand response programs. Energy efficiency savings currently comes from two sources, which are from programs administered by CECONY and from programs attributable to third party organizations such as NYSERDA.

1.2.3.1 Energy Efficiency

This energy efficiency plan has been designed by leveraging CECONY's experience with energy efficiency, continued dialog with the PSC staff, as well as data provided by industry experts such as the Electric Power Research Institute (EPRI). As shown in Figures 1-5 and 1-6 CECONY's energy efficiency programs are expected to deliver energy savings of 1.7 million MWh annually in 2030 and 452 MW of peak demand. Savings between 2010 and 2015 are based on current targets as defined during energy efficiency portfolio standard (EEPS) proceedings. The Company aspires to reach savings levels on par with top quartile performance of utilities with mature programs by 2016 and will continue to expand program offerings as long as they remain cost effective.

Figure 1-5. Plan Case Energy Savings from EE Programs

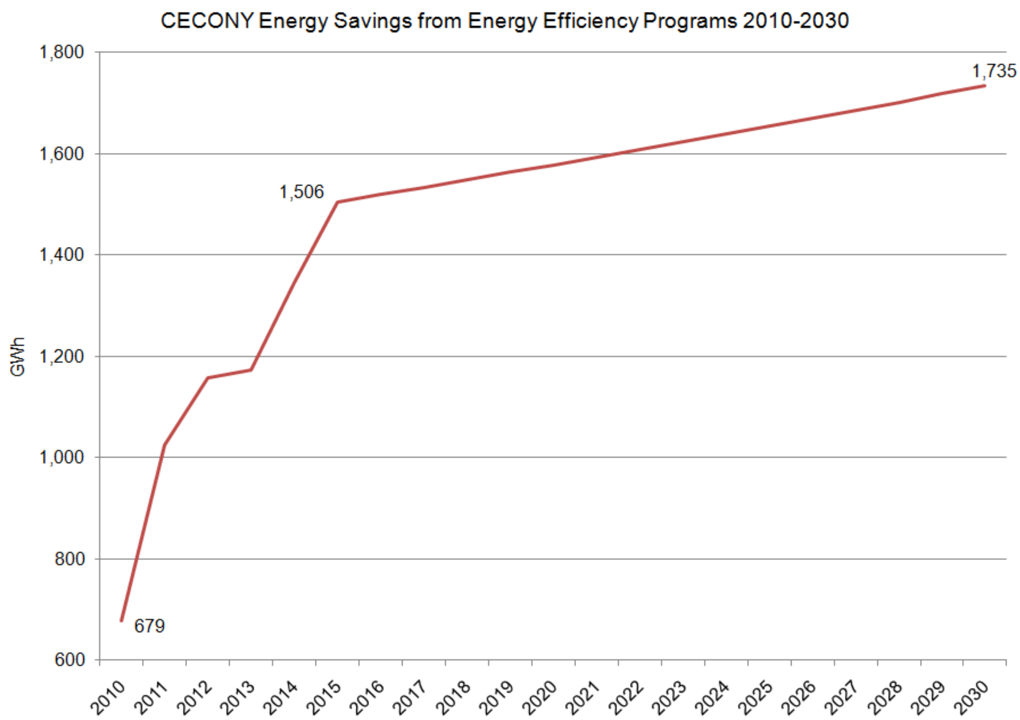
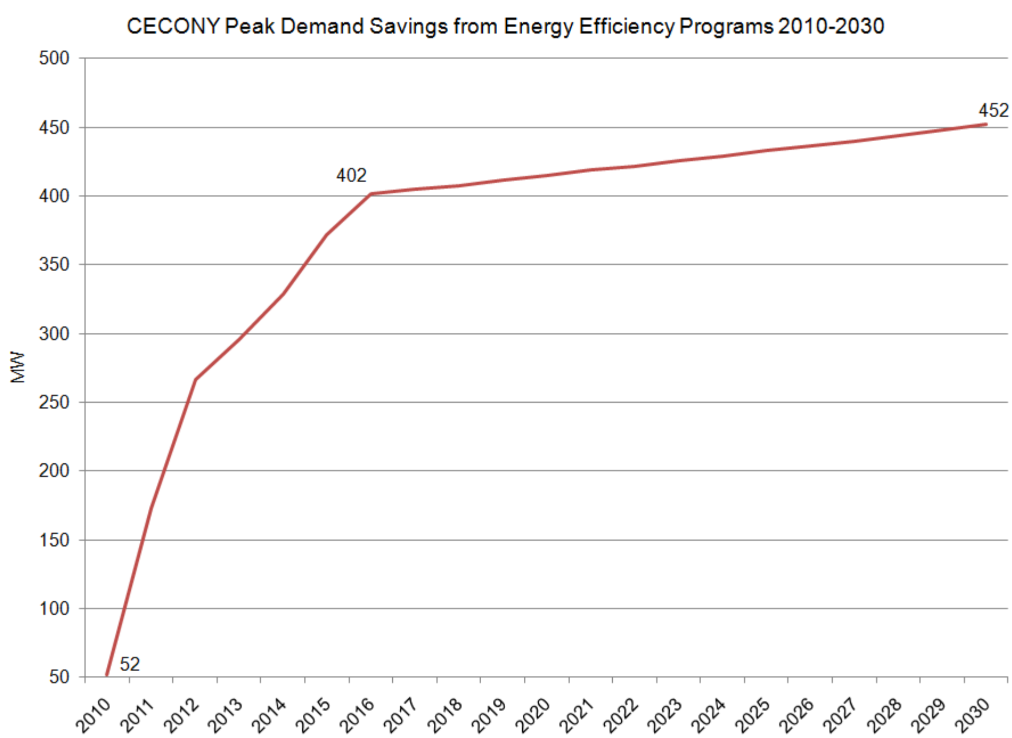


Figure 1-6. Plan Case Demand Savings from EE Programs



In addition to energy efficiency programs managed by CECONY, energy efficiency reductions are also expected from external agencies such as NYSERDA.

Figure 1-7. Plan Case Energy Savings from Other DSM Programs

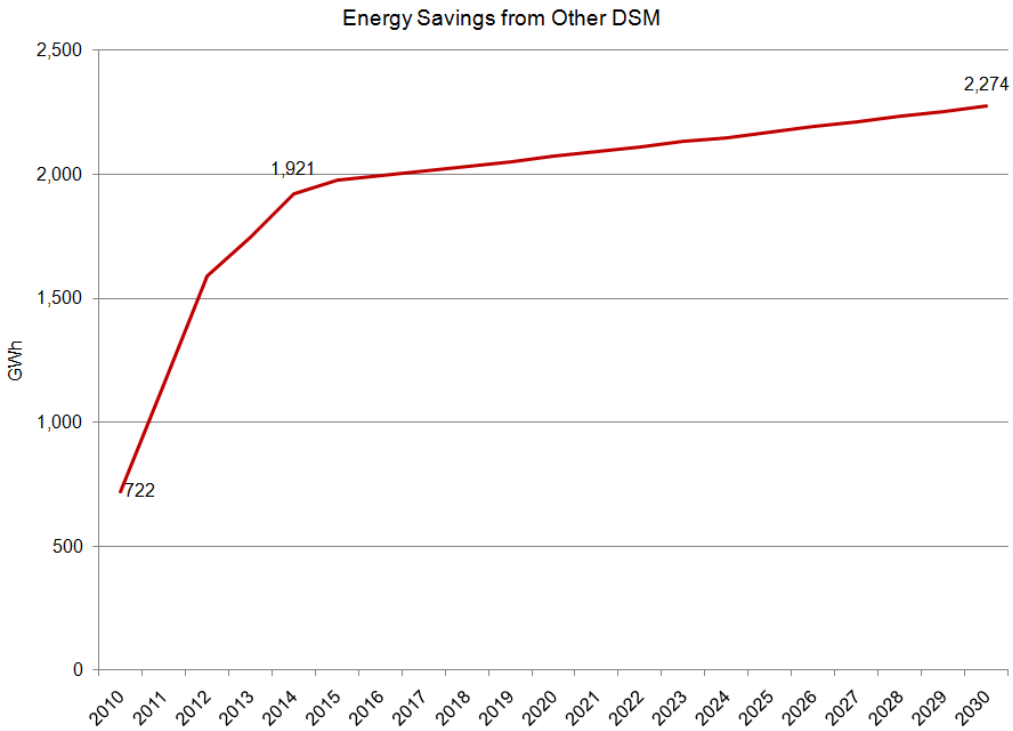
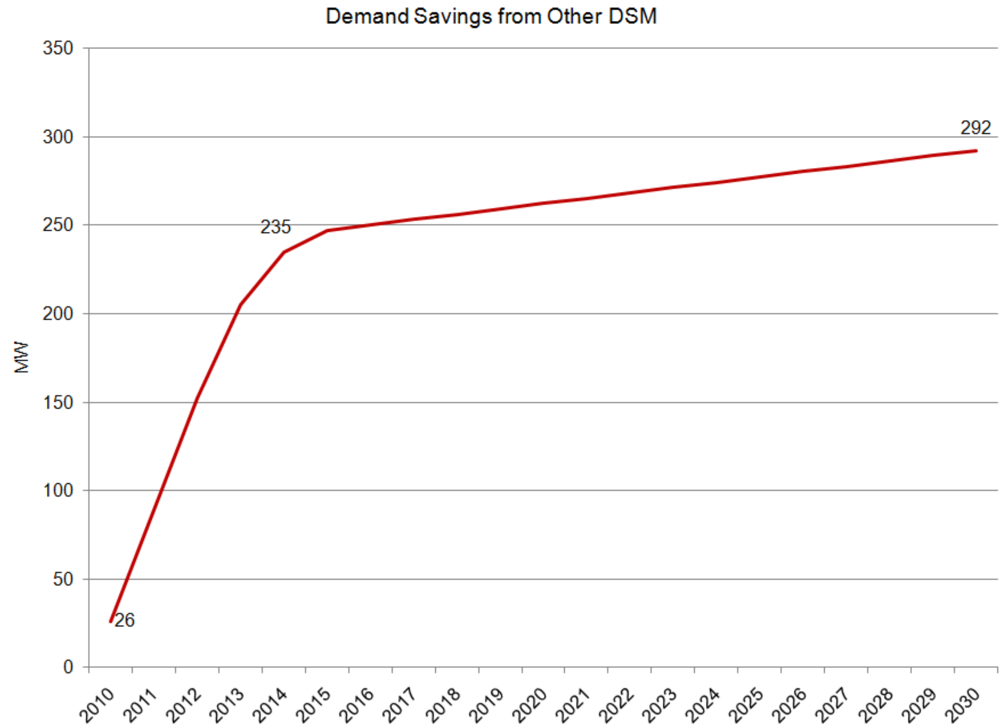


Figure 1-8. Plan Case Demand Savings from Other DSM Programs



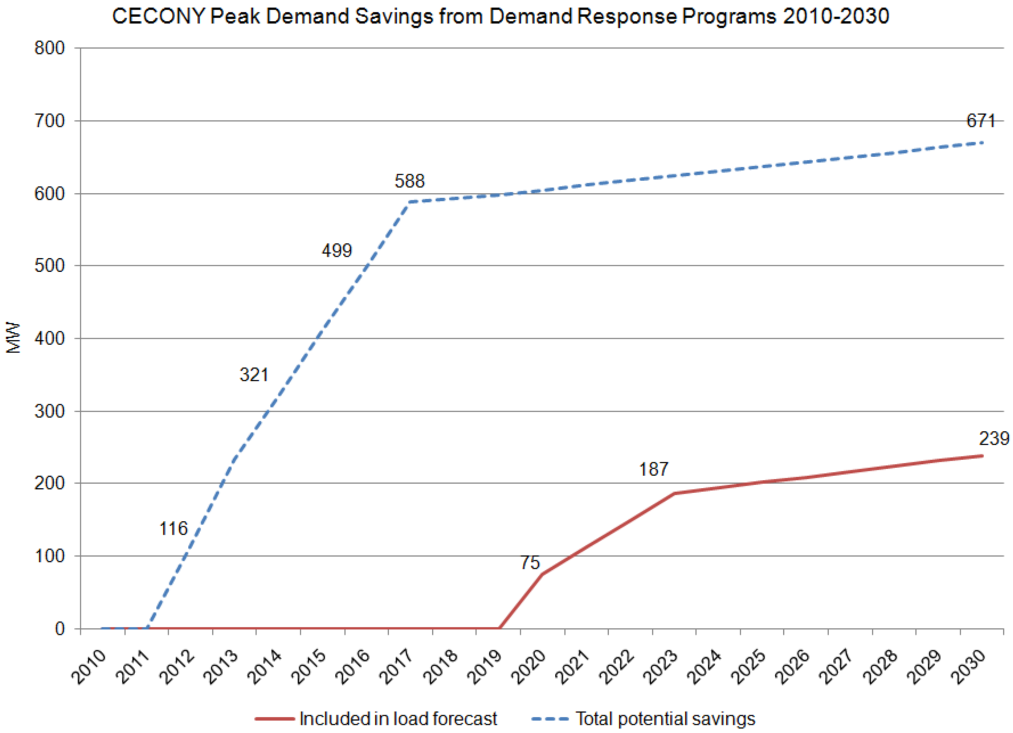
1.2.3.2 Demand Response

CECONY's demand response (DR) programs are deployed to meet system-wide and area-specific load shape objectives. The plan has been designed by leveraging CECONY's experience with demand response, continued dialog with the PSC staff, as well as data from industry experts such as the Electric Power Research Institute (EPRI).

The solid line in Figure 1-9 shows that CECONY's demand response programs are expected to lessen the demand forecast by 239 MW by 2030. As several of these programs are not triggered unless certain conditions, such as peak forecast or emergency situations, are present we do not expect to realize 100% of the potential demand reduction from our programs. The dashed line in Figure 1-9 illustrates the theoretical potential from all programs. On an ongoing basis we will re-evaluate our projections for how much of the potential load reduction is achievable, and thus should be included in our demand forecasts.

Since DR events are relatively short in duration, one to two hours, and occur during times of peak usage, the energy savings is minimal; therefore, CECONY does not include energy savings from demand response programs in its forecasting.

Figure 1-9. Plan Case Demand Savings from DR Programs



1.2.4 Net Energy and Demand Forecast

The net forecasts for energy and demand result from including the impact of electric vehicles and demand-side management programs. The peak load of the net forecast is what ultimately drives infrastructure investment and planning in the Company; therefore demand-side management programs are extremely important as they are the main tool used by CECONY to manage the size of this peak. The difference between the gross and net energy and demand forecasts can be seen in Figures 1-10 and 1-11. These charts show that CECONY would be able to reduce annual energy consumption and peak demand by 2.8% and 5.5% respectively by 2030 based on the current assumptions. Actual annual values for the gross forecasts and all adjustments made to derive the net forecasts can be found in Figure 1-12.

Figure 1-10. Plan Case Gross and Net Energy Forecast

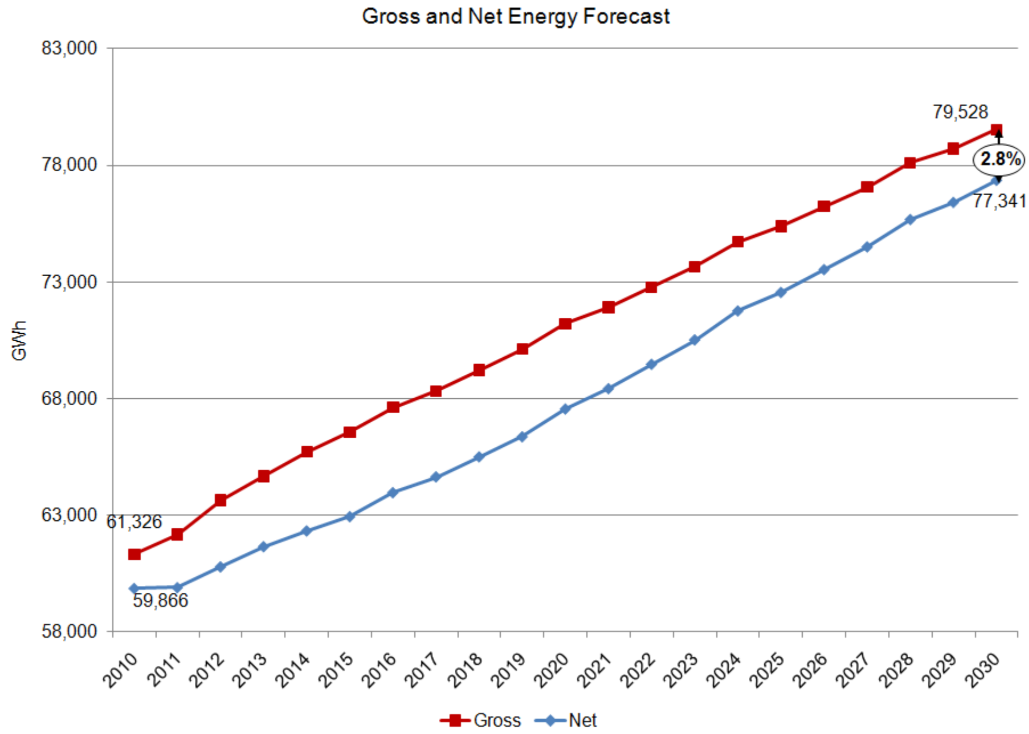


Figure 1-11. Plan Case Gross and Net Demand Forecast

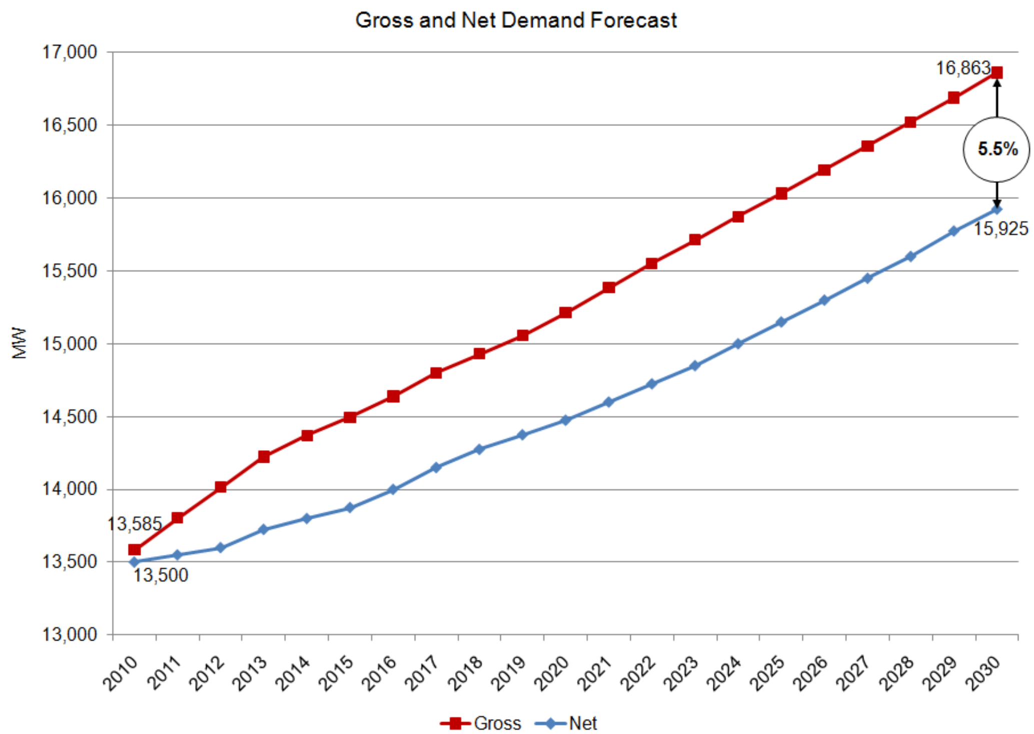


Figure 1-12. Plan Case Demand and Energy Forecasts[1]

DEMAND (MW)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
System Demand Forecast (Before DSM and EV)	13,575	13,585	13,805	14,015	14,225	14,370	14,495	14,640	14,800	14,930	15,055	15,212	15,385	15,552	15,715	15,872	16,031	16,193	16,357	16,522	16,690	16,863
MW Demand Growth:	-125	10	220	210	210	145	125	145	160	130	125	157	173	168	163	157	159	162	164	164	168	173
% Growth:	-0.9%	0.1%	1.6%	1.5%	1.5%	1.0%	0.9%	1.0%	1.1%	0.9%	0.8%	1.0%	1.1%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Additional Load from Electric Vehicles (Westchester)	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	3	4	5	5	6	6	7
Additional Load from Electric Vehicles (NYC)[1]:	0	0	0	0	0	0	0	0	0	0	0	3	8	13	18	23	27	31	35	39	43	47
Total EV	0	0	0	0	0	0	0	0	0	0	0	3	9	15	21	26	31	36	40	45	49	54
System Demand Forecast (Before DSM but with EV):	13,575	13,585	13,805	14,015	14,225	14,370	14,495	14,640	14,800	14,930	15,055	15,215	15,394	15,567	15,736	15,899	16,062	16,229	16,397	16,566	16,739	16,917
Con Edison Targeted DSM:		9	24	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Con Edison Non-Targeted DSM:		44	149	221	251	284	326	357	360	363	367	370	374	377	381	384	388	392	395	399	403	407
Other DSM:		26	89	152	205	235	247	250	253	256	259	262	265	268	271	274	277	280	283	286	289	292
Con Edison DR[2]:				0	0	0	0	0	0	0	0	75	112	149	187	194	202	209	217	224	232	239
Total Demand Reduction:		78	262	419	501	564	619	652	658	664	671	752	796	840	884	898	912	926	940	954	969	983
System Demand Forecast (Net of DSM, DR and EV):	**13,575**	**13,507**	**13,543**	**13,596**	**13,724**	**13,806**	**13,876**	**13,988**	**14,142**	**14,266**	**14,384**	**14,463**	**14,597**	**14,727**	**14,852**	**15,001**	**15,150**	**15,302**	**15,457**	**15,612**	**15,770**	**15,933**
System Demand Forecast (rounded off to nearest 25):	13,575	13,500	13,550	13,600	13,725	13,800	13,875	14,000	14,150	14,275	14,375	14,475	14,600	14,725	14,850	15,000	15,150	15,300	15,450	15,600	15,775	15,925
MW Demand Growth:	-125	-75	50	50	125	75	75	125	150	125	100	100	125	125	125	150	150	150	150	150	175	150
% Growth:	-0.9%	-0.6%	0.4%	0.4%	0.9%	0.5%	0.5%	0.9%	1.1%	0.9%	0.7%	0.7%	0.9%	0.9%	0.8%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%	1.0%

SENDOUT (GWh)	2005 Actual	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
System Sendout Forecast (Before DSM)	61,608	61,021	61,326	62,172	63,644	64,678	65,715	66,559	67,617	68,329	69,221	70,113	71,214	71,909	72,781	73,651	74,714	75,377	76,225	77,067	78,108	78,713	79,528
GWh Sendout Growth:			305	846	1,472	1,034	1,037	844	1,058	712	892	892	1,101	695	872	870	1,063	663	848	842	1,041	605	815
% Growth:			0.5%	1.4%	2.4%	1.6%	1.6%	1.3%	1.6%	1.1%	1.3%	1.3%	1.6%	1.0%	1.2%	1.2%	1.4%	0.9%	1.1%	1.1%	1.4%	0.8%	1.0%
Additional Load from Electric Vehicles (Westchester)			0	0	0	0	0	0	0	0	0	0	16	44	71	99	126	148	170	192	214	235	257
Additional Load from Electric Vehicles (NYC)[1]:			0	0	0	0	0	0	0	0	0	0	110	292	475	657	840	986	1,132	1,278	1,424	1,570	1,716
Total EV			0	0	0	0	0	0	0	0	0	0	126	336	546	756	965	1,133	1,301	1,469	1,637	1,805	1,973
System Sendout Forecast (Before DSM but with EV):		61,021	61,326	62,172	63,644	64,678	65,715	66,559	67,617	68,329	69,221	70,113	71,340	72,245	73,327	74,407	75,679	76,510	77,526	78,536	79,745	80,518	81,501
Con Edison and Other DSM:		78	1,460	2,268	2,850	3,021	3,384	3,615	3,648	3,683	3,717	3,751	3,788	3,822	3,860	3,897	3,931	3,970	4,008	4,045	4,083	4,123	4,160
Con Edison DSM:		0	738	1,114	1,258	1,275	1,463	1,637	1,652	1,668	1,684	1,700	1,716	1,732	1,749	1,765	1,782	1,799	1,816	1,833	1,851	1,868	1,886
Other DSM:		78	722	1,154	1,592	1,746	1,921	1,978	1,996	2,015	2,033	2,051	2,072	2,090	2,111	2,132	2,149	2,171	2,192	2,212	2,232	2,255	2,274
Con Edison DR[3]:					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Demand Reduction:		78	1,460	2,268	2,850	3,021	3,384	3,615	3,648	3,683	3,717	3,751	3,788	3,822	3,860	3,897	3,931	3,970	4,008	4,045	4,083	4,123	4,160
System Sendout Forecast (Net of DSM, DR and EV):	**61,608**	**60,943**	**59,866**	**59,904**	**60,794**	**61,657**	**62,331**	**62,944**	**63,969**	**64,646**	**65,504**	**66,362**	**67,552**	**68,423**	**69,467**	**70,510**	**71,748**	**72,540**	**73,518**	**74,491**	**75,662**	**76,395**	**77,341**
GWh Sendout Growth:		-1,119	-1,077	38	890	863	674	613	1,025	677	858	858	1,190	871	1,044	1,043	1,239	792	978	973	1,171	733	946
% Growth:		-1.8%	-1.8%	0.1%	1.5%	1.4%	1.1%	1.0%	1.6%	1.1%	1.3%	1.3%	1.8%	1.3%	1.5%	1.5%	1.8%	1.1%	1.3%	1.3%	1.6%	1.0%	1.2%
Energy Reduction from "Before DSM":		0.1%	2.4%	3.6%	4.5%	4.7%	5.1%	5.4%	5.4%	5.4%	5.4%	5.3%	5.3%	5.3%	5.3%	5.2%	5.2%	5.2%	5.2%	5.2%	5.1%	5.1%	5.1%
Con Edison DSM Load Factor			1.61	0.74	0.54	0.49	0.51	0.50	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.48	0.48	0.48	0.48

[1] Demand and sendout for years prior to 2010 are actual weather-adjusted amounts

1.3 HIGH CASE

1.3.1 Gross Energy and Demand Forecast

The high case depicts the Company's view of the world in a highly electric world with strong economic growth. In this case the assumption is that the current global economic recession turns into a "V-shaped recovery" with significant economic growth occurring as soon as late 2010. Gains in productivity and process improvement, learned through the recession, are then applied on a growing economy which results in larger than normal growth in 2011 through 2014. Beyond 2014, strong economic growth continues, but now electric proliferation of devices has taken hold which causes both forecasted demand and energy to continue to grow at a higher than historically normal pace.

Table 1-2. High Case Annual Gross Energy and Demand Growth Rates

Year	Demand Growth %	Sendout Energy Growth %	Reason
2010	1.1	1.5	Strong growth as current economic recession ends
2011	2.6	2.4	Robust economic expansion fueled by productivity improvements earned during the recession
2012	2.5	3.4	
2013	2.5	2.6	
2014	2.0	2.6	Economy growth stabilizes but still continues to grow
2015-2030	1.8-2.0	1.6-2.5	Long term growth is higher than historic norms as electric proliferation of devices throughout the home and workplace take hold

1.3.2 Electric Vehicles

The assumption is that in a highly electric world, consumers and businesses will be quicker to give up standard automobiles and adopt electric vehicles. In this case measurable demand from electric vehicles will be seen as early as 2011. Under these assumptions, the Company has a projected forecast for 570,000 electric vehicles in NYC by 2030, with an additional 25,000 to 30,000 vehicles expected in Westchester county. Under this scenario, the CECONY grid will be called upon to supply an extra 2,980 GWh of energy, and need to be able to support a peak demand increase of 82 MW, by 2030. These forecasts, seen in Figures 1-13 and 1-14, represent the major effects a technology such as electric vehicles can have on the electric system.

As with the plan case, this demand impact assumes that 15% of vehicles will be charged at peak.[2] The remaining vehicles will be charged either at off peak hours, or use smart charging equipment to charge at times predefined by the owner of the vehicle.

[2] Based on PHEV Infrastructure Report – November 2008

Figure 1-13. High Case Peak Energy Forecast for EVs

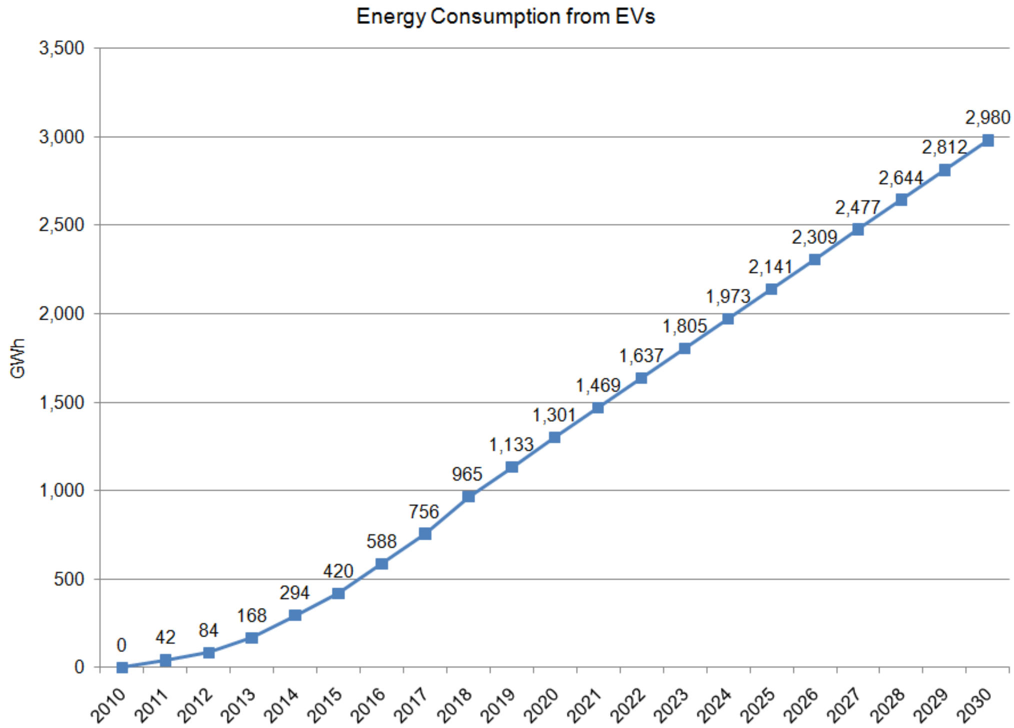
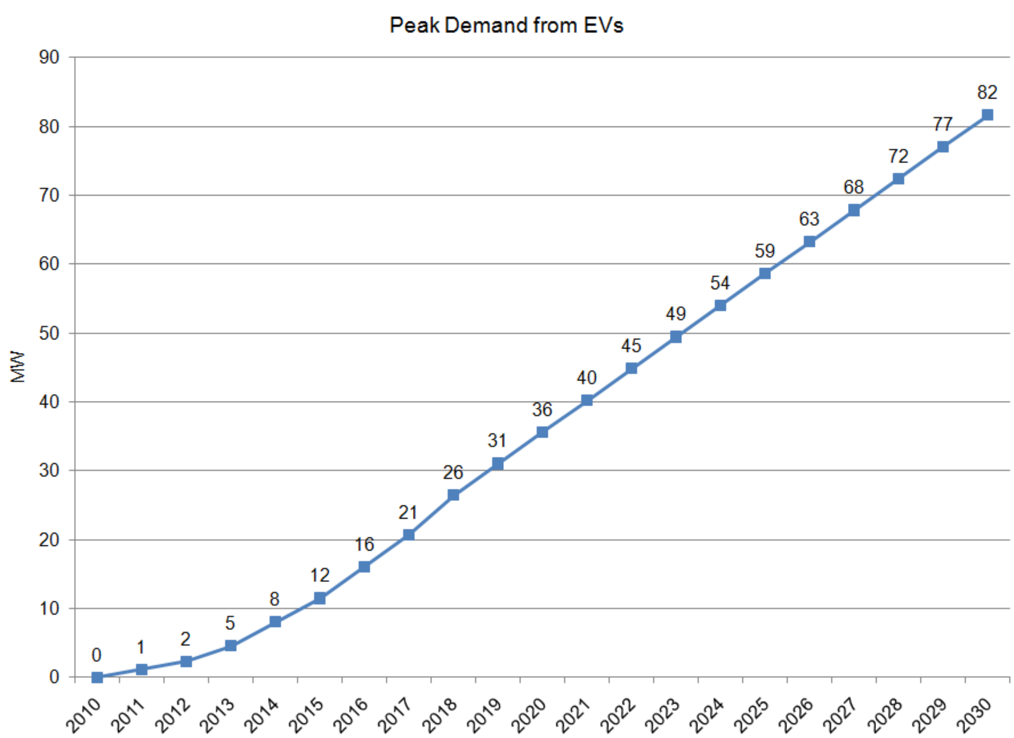


Figure 1-14. High Case Peak Demand Forecast for EVs



1.3.3 Demand-side Management (DSM)

Demand-side management includes all demand and energy savings attributable to energy efficiency and demand response programs. Energy efficiency savings currently comes from two sources, which are from programs administered by CECONY and from programs attributable to third party organizations such as NYSERDA.

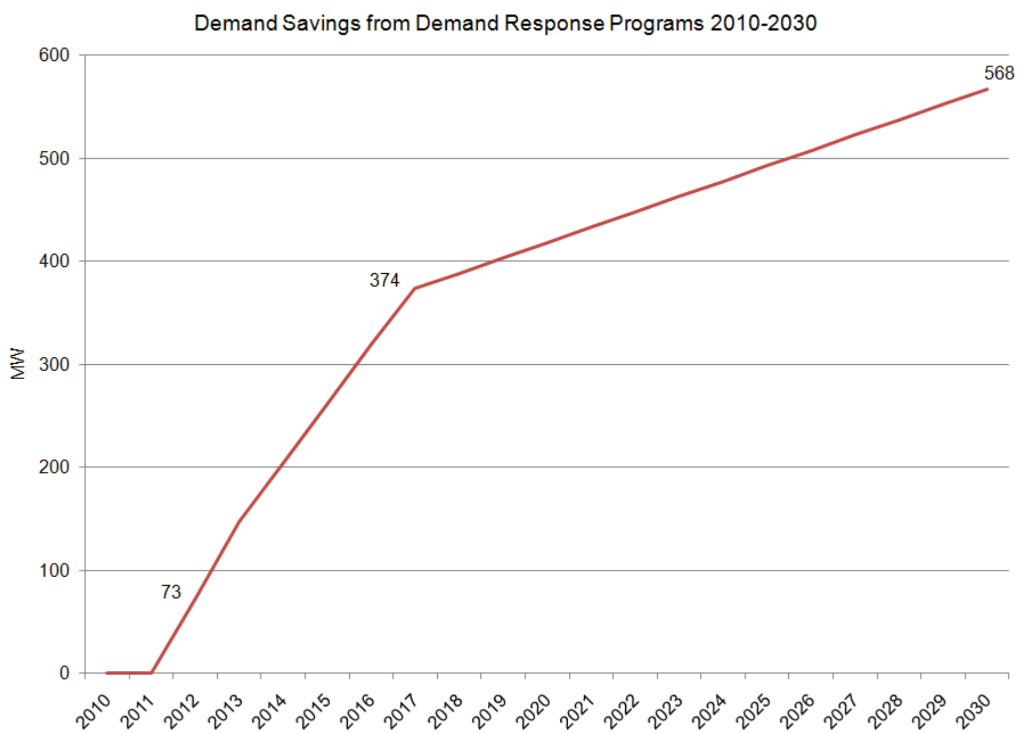
1.3.3.1 Energy Efficiency

The energy efficiency forecasts for high case are the same as those included in the plan case as these estimates represent the maximum amount of energy savings the Company feels is possible under its current plans. For specific values of savings, please refer to Figures 1-5 and 1-6. In addition the energy efficiency targets for external programs are also the same as in the plan case. These can be seen in Figures 1-7 and 1-8.

1.3.3.2 Demand Response

Due to the deployable nature of demand response, the Company expects to make use of this tool to a greater extent should forecasted demand follow the high case trajectory. Under this case, CECONY expects to see measurable demand savings from DR in 2011, with increasing amounts each year thereafter. By 2030, over 500 MW could be relieved from the system annually.

Figure 1-15. High Case Demand Savings from DR Programs



1.3.4 Net Energy and Demand Forecast

Given the same energy reductions from energy efficiency are expected under the high case as in the plan case, but applied to a larger initial gross forecast and a larger expected consumption from electric vehicles, the overall reduction from the gross to the net energy forecast is only 1.2%. (See Figure 1-16.) The inclusion of a larger forecast for demand savings from DR programs reduces the net demand forecast by 6.0%. (See Figure 1-17.) Annual values for all initiatives for the high case can be seen in Figure 1-18.

Figure 1-16. High Case Gross and Net Energy Forecast

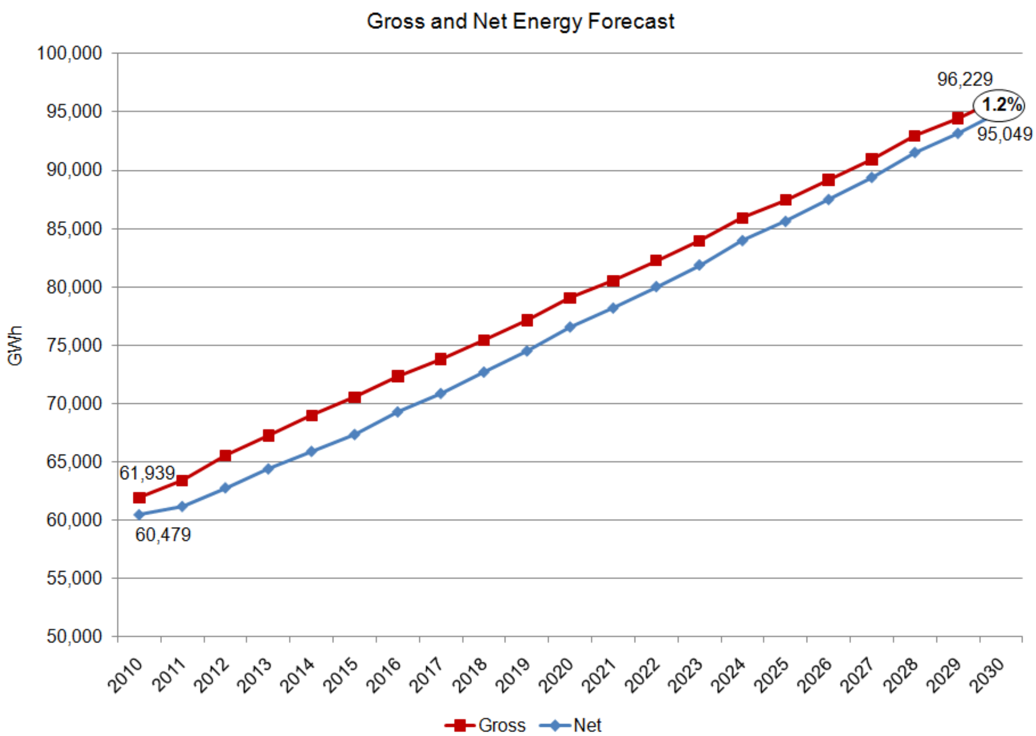


Figure 1-17. High Case Gross and Net Demand Forecast

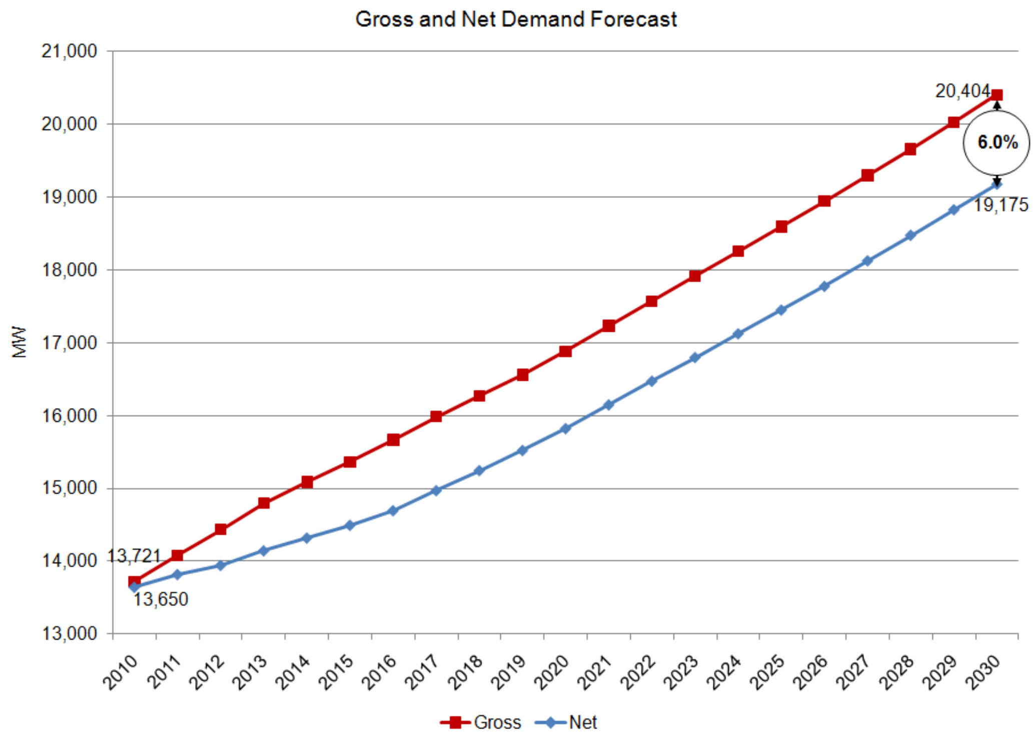


Figure 1-18. High Case Demand and Energy Forecasts[3]

DEMAND (MW)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
System Demand Forecast (Before DSM and EV)	13,575	13,721	14,081	14,435	14,794	15,089	15,365	15,665	15,984	16,274	16,561	16,885	17,231	17,574	17,915	18,253	18,596	18,946	19,301	19,661	20,028	20,404
MW Demand Growth:	-125	146	360	354	359	295	276	300	319	290	287	324	346	343	341	338	343	350	356	359	367	376
% Growth:	-0.9%	1.1%	2.6%	2.5%	2.5%	2.0%	1.8%	2.0%	2.0%	1.8%	1.8%	2.0%	2.0%	2.0%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Additional Load from Electric Vehicles (Westchester)		0	0	0	1	1	2	2	3	3	4	5	5	6	6	7	8	8	9	9	10	11
Additional Load from Electric Vehicles (NYC)[1]:		0	1	2	4	7	10	14	18	23	27	31	35	39	43	47	51	55	59	63	67	71
Total EV		0	1	2	5	8	12	16	21	26	31	36	40	45	49	54	59	63	68	72	77	82
System Demand Forecast (Before DSM but with EV):	13,575	13,721	14,082	14,438	14,799	15,097	15,376	15,681	16,005	16,300	16,592	16,921	17,271	17,619	17,964	18,307	18,654	19,009	19,369	19,733	20,105	20,486
Con Edison Targeted DSM:		9	24	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Con Edison Non-Targeted DSM:		44	149	221	251	284	326	357	360	363	367	370	374	377	381	384	388	392	395	399	403	407
Total Con Edison DSM		52	173	267	296	329	372	402	405	408	412	415	419	422	426	429	433	437	440	444	448	452
Other DSM:		26	89	152	205	235	247	250	253	256	259	262	265	268	271	274	277	280	283	286	289	292
Con Edison DR[2]:		0	0	73	148	205	261	320	374	388	403	418	433	448	463	478	493	508	523	538	553	568
Total Demand Reduction:		78	262	492	649	768	880	972	1,032	1,053	1,075	1,096	1,118	1,139	1,160	1,181	1,203	1,225	1,246	1,268	1,290	1,312
System Demand Forecast (Net of DSM, DR and EV):	**13,575**	**13,642**	**13,821**	**13,946**	**14,150**	**14,328**	**14,497**	**14,709**	**14,973**	**15,247**	**15,517**	**15,825**	**16,153**	**16,480**	**16,804**	**17,126**	**17,451**	**17,784**	**18,123**	**18,465**	**18,815**	**19,174**
System Demand Forecast (rounded off to nearest 25):	13,575	13,650	13,825	13,950	14,150	14,325	14,500	14,700	14,975	15,250	15,525	15,825	16,150	16,475	16,800	17,125	17,450	17,775	18,125	18,475	18,825	19,175
MW Demand Growth:	-125	75	175	125	200	175	175	200	275	275	275	300	325	325	325	325	325	325	350	350	350	350
% Growth:	-0.9%	0.6%	1.3%	0.9%	1.4%	1.2%	1.2%	1.4%	1.9%	1.8%	1.8%	1.9%	2.1%	2.0%	2.0%	1.9%	1.9%	1.9%	2.0%	1.9%	1.9%	1.9%

SENDOUT (GWh)	2005 Actual	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
System Sendout Forecast (Before DSM)	61,608	61,021	61,939	63,415	65,553	67,265	69,001	70,553	72,350	73,795	75,451	77,124	79,048	80,538	82,243	83,962	85,921	87,437	89,183	90,939	92,949	94,456	96,229
GWh Sendout Growth:			918	1,476	2,138	1,712	1,736	1,552	1,798	1,445	1,656	1,673	1,923	1,491	1,704	1,720	1,959	1,516	1,746	1,756	2,009	1,507	1,773
% Growth:			1.5%	2.4%	3.4%	2.6%	2.6%	2.2%	2.5%	2.0%	2.2%	2.2%	2.5%	1.9%	2.1%	2.1%	2.3%	1.8%	2.0%	2.0%	2.2%	1.6%	1.9%
Additional Load from Electric Vehicles (Westchester)			0	5	11	22	38	55	77	99	126	148	170	192	214	235	257	279	301	323	345	367	389
Additional Load from Electric Vehicles (EV):			0	37	73	146	256	365	511	657	840	986	1,132	1,278	1,424	1,570	1,716	1,862	2,008	2,154	2,300	2,446	2,592
Total EV			0	42	84	168	294	420	588	756	965	1,133	1,301	1,469	1,637	1,805	1,973	2,141	2,309	2,477	2,644	2,812	2,980
System Sendout Forecast (Before DSM but with EV):		61,021	61,939	63,457	65,637	67,433	69,295	70,972	72,938	74,551	76,416	78,258	80,349	82,007	83,880	85,767	87,894	89,578	91,492	93,416	95,593	97,268	99,209
Con Edison and Other DSM:		78	1,460	2,268	2,850	3,021	3,384	3,615	3,648	3,683	3,717	3,751	3,788	3,822	3,860	3,897	3,931	3,970	4,008	4,045	4,083	4,123	4,160
Con Edison Targeted DSM:			738	1,114	1,258	1,275	1,463	1,637	1,652	1,668	1,684	1,700	1,716	1,732	1,749	1,765	1,782	1,799	1,816	1,833	1,851	1,868	1,886
Other DSM:		78	722	1,154	1,592	1,746	1,921	1,978	1,996	2,015	2,033	2,051	2,072	2,090	2,111	2,132	2,149	2,171	2,192	2,212	2,232	2,255	2,274
Con Edison DR[3]:			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Demand Reduction:		78	1,460	2,268	2,850	3,021	3,384	3,615	3,648	3,683	3,717	3,751	3,788	3,822	3,860	3,897	3,931	3,970	4,008	4,045	4,083	4,123	4,160
System Sendout Forecast (Net of DSM, DR and EV):	**61,608**	**60,943**	**60,479**	**61,189**	**62,787**	**64,412**	**65,911**	**67,357**	**69,290**	**70,868**	**72,699**	**74,507**	**76,561**	**78,185**	**80,020**	**81,870**	**83,963**	**85,608**	**87,484**	**89,371**	**91,510**	**93,145**	**95,049**
GWh Sendout Growth:		-1,119	-464	710	1,598	1,625	1,499	1,447	1,933	1,578	1,831	1,807	2,054	1,624	1,834	1,851	2,093	1,645	1,876	1,887	2,139	1,635	1,904
% Growth:		-1.8%	-0.8%	1.2%	2.6%	2.6%	2.3%	2.2%	2.9%	2.3%	2.6%	2.5%	2.8%	2.1%	2.3%	2.3%	2.6%	2.0%	2.2%	2.2%	2.4%	1.8%	2.0%
Energy Reduction from "Before DSM":		0.1%	2.4%	3.6%	4.3%	4.5%	4.9%	5.1%	5.0%	4.9%	4.9%	4.8%	4.7%	4.7%	4.6%	4.5%	4.5%	4.4%	4.4%	4.3%	4.3%	4.2%	4.2%

[3] Demand and sendout for years prior to 2010 are actual weather-adjusted amounts

1.4 LOW CASE

1.4.1 Gross Energy and Demand Forecast

The low case represents the same gross forecast as the plan case, detailing the Company's best estimate of customer needs through 2030. The difference in this case is in the net forecast, and the amount of demand-side management reductions included in the forecast. The low case includes all of the DSM necessary to reach the city environmental targets described in plaNYC and the state's "15x15" target described in the New York State Energy Plan.

Table 1-3. Low Case Annual Gross Energy and Demand Growth Rates

Year	Demand Growth %	Sendout Energy Growth %	Reason
2010	0.1	0.5	Minimal growth due to the current economic recession
2011	1.6	1.4	Strong economic growth out of recession
2012	1.5	2.4	
2013	1.5	1.6	
2014	1.0	1.6	Economy stabilizes at normal long term growth rate of 1%
2015-2030	0.8 - 1.1	0.9-1.6	Consistency with long term trend of near 1% per year

1.4.2 Electric Vehicles

The Company's forecast for electric vehicle adoption in the low case is the same as was described for the high case, and can be seen in Figures 1-13 and 1-14. In the high case, the guiding assumption is that the world is highly electrified which spurs adoption of EVs. In the low case the assumption is that the world continues to focus on green initiatives and reducing emissions. This may be due to personal tastes or regulatory or legislative actions, but regardless of the cause the effect is the same.

1.4.3 Demand-side Management (DSM)

Demand-side management includes all demand and energy savings attributable to energy efficiency and demand response programs. Energy efficiency savings currently comes from two sources, which are from programs administered by CECONY and from programs attributable to third party organizations such as NYSERDA. The major difference in the low case is the inclusion of energy and demand savings due to improvements in building codes and design standards for new buildings and new electric equipment, such as washer-dryers, dishwashers, etc, sold to consumers.

1.4.3.1 Energy Efficiency

As previously stated the CECONY energy efficiency forecasts in the plan and high cases represents the maximum amount of savings the Company feels is possible under its current programs. The low case represents a slight increase in CECONY's energy efficiency expectations averaging out to an additional 10 GWh per year through 2030. Nothing fundamentally about the CECONY programs has changed, and this increase represents nominal increased participation by customers interested in green initiatives. (See Figures 1-19 and 1-20.)

Figure 1-19. Low Case Energy Savings from EE Programs

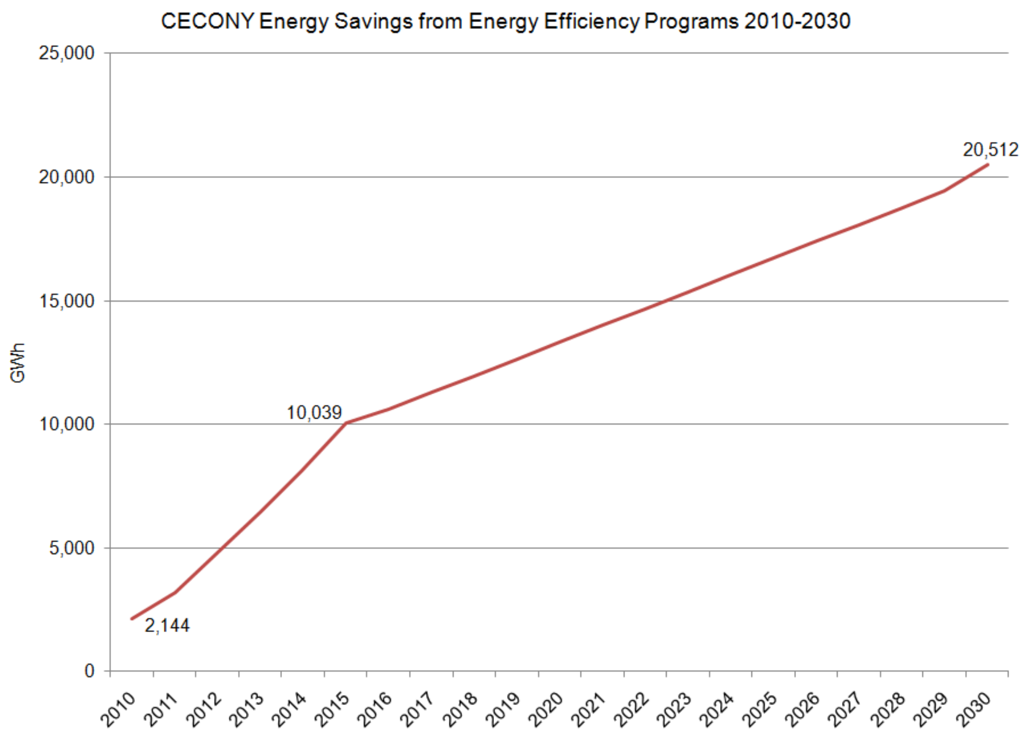
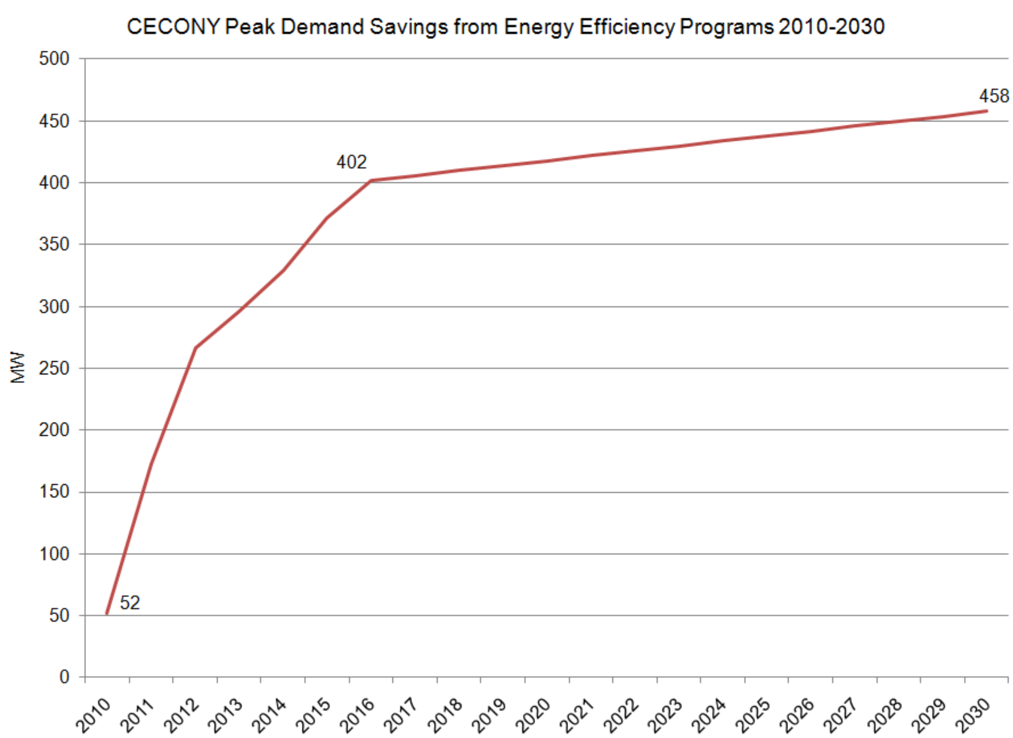


Figure 1-20. Low Case Demand Savings from EE Programs



The expected energy efficiency savings from external sources in the low case is expected to be on the order of 5 times what is included in both the plan and high cases. The additional amount is due primarily to NYPA DSM programs along with new building codes and design standards and reflects the fact that in order to reach city and state targets, strict design standards must be enacted. Forecasts for energy and demand savings from external entities can be seen in Figures 1-21 and 1-22.

Figure 1-21. Low Case Energy Savings from Other DSM Programs

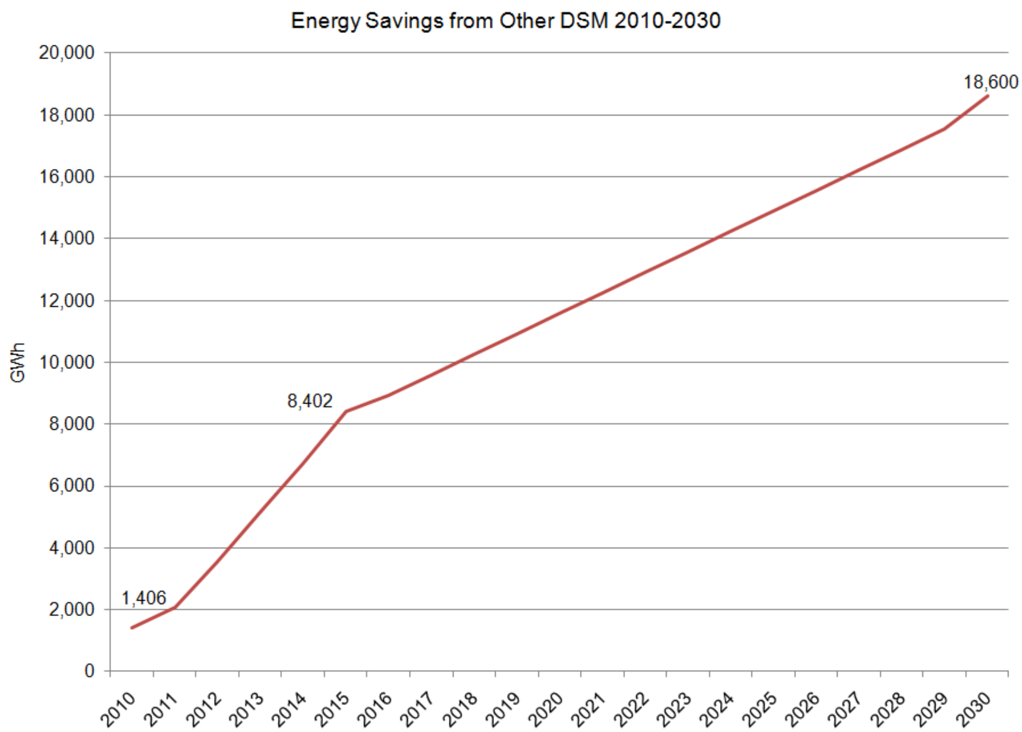
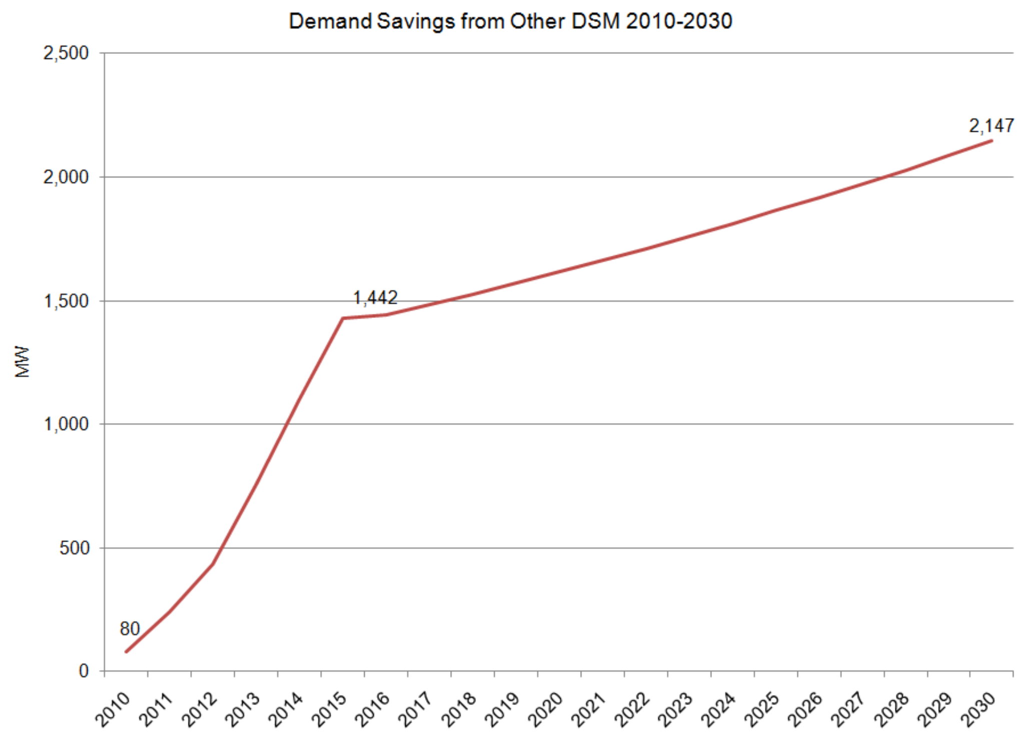


Figure 1-22. Low Case Demand Savings from Other DSM Programs



1.4.3.2 Demand Response

Due to the reduced demand expectations in the low case, it is not expected that the Company will need to utilize demand response to curtain peak usage on a regular basis. Therefore in this case demand response savings is forecasted to be zero; however, the Company will maintain its portfolio of DR programs and will utilize DR events for those rare days where peak demand curtailment might be required.

1.4.4 Net Energy and Demand Forecast

The reductions from the gross forecast to the net forecast, required to meet the city and state targets, under the low case provide by far the largest reduction of any of the three cases. Under this case energy and demand reductions are 22% and 15% respectively, see Figures 1-23 and 1-24. Much of these reductions are due to savings outside of CECONY's control, such as from building codes and standards, but this reflects the fact that meeting city and state targets cannot fall on one entity alone, and must be a partnership between the Company and all the various agencies, developers, etc that play an important role in the electrification of our service territory.

Figure 1-23. Low Case Gross and Net Energy Forecast

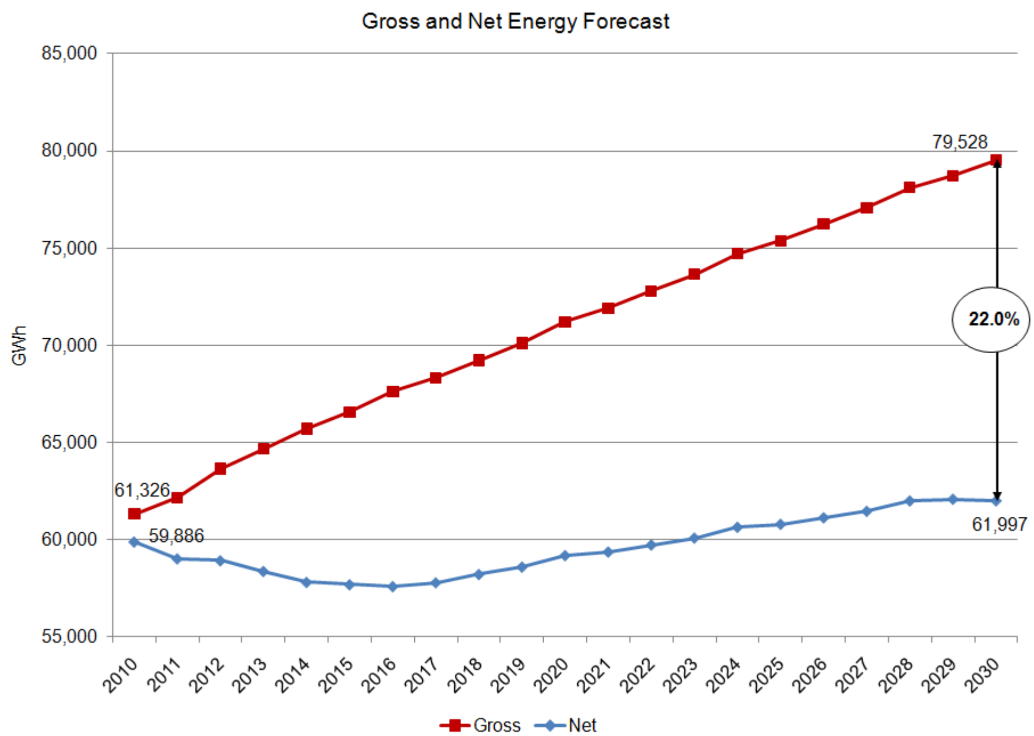


Figure 1-24. Low Case Gross and Net Demand Forecast

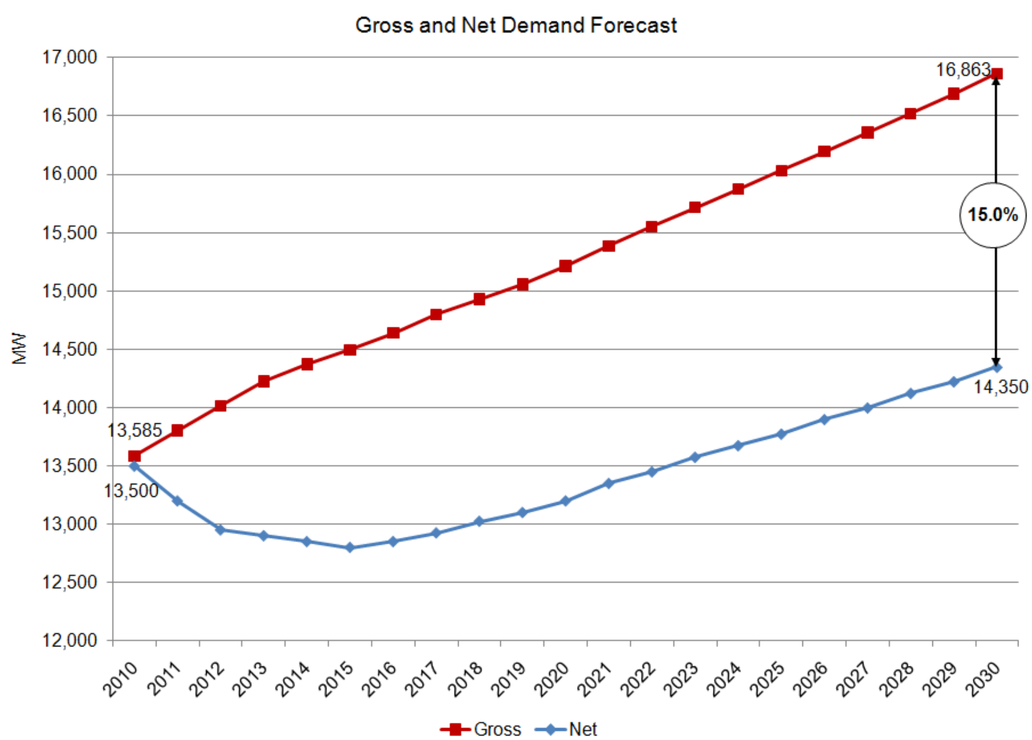


Figure 1-25. Low Case Demand and Energy Forecasts[4]

DEMAND (MW)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
System Demand Forecast (Before DSM and EV)	13,575	13,585	13,805	14,015	14,225	14,370	14,495	14,640	14,800	14,930	15,055	15,212	15,385	15,552	15,715	15,872	16,031	16,193	16,357	16,522	16,690	16,863
MW Demand Growth:	-125	10	220	210	210	145	125	145	160	130	125	157	173	168	163	157	159	162	164	164	168	173
% Growth:	-0.9%	0.1%	1.6%	1.5%	1.5%	1.0%	0.9%	1.0%	1.1%	0.9%	0.8%	1.0%	1.1%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Additional Load from Electric Vehicles (Westchester)		0	0	0	1	1	2	2	3	3	4	5	5	6	6	7	8	8	9	9	10	11
Additional Load from Electric Vehicles (NYC)[1]:		0	1	2	4	7	10	14	18	23	27	31	35	39	43	47	51	55	59	63	67	71
Total EV		0	1	2	5	8	12	16	21	26	31	36	40	45	49	54	59	63	68	72	77	82
System Demand Forecast (Before DSM but with EV):	13,575	13,585	13,806	14,017	14,230	14,378	14,507	14,656	14,821	14,956	15,086	15,247	15,425	15,597	15,764	15,926	16,089	16,256	16,425	16,594	16,767	16,944
Con Edison Targeted DSM:		9	24	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Con Edison Non-Targeted DSM:		44	149	221	251	284	320	357	361	365	369	373	377	381	385	389	393	397	401	405	409	413
Total Con Edison DSM	0	52	173	267	296	329	372	402	406	410	414	418	422	426	430	434	438	442	446	450	454	458
Other DSM:		80	242	434	758	1,103	1,428	1,442	1,484	1,527	1,572	1,617	1,664	1,712	1,762	1,813	1,865	1,918	1,973	2,030	2,088	2,147
Con Edison DR[2]:				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Demand Reduction:	0	132	415	701	1,054	1,432	1,800	1,844	1,890	1,937	1,986	2,035	2,086	2,138	2,192	2,247	2,303	2,360	2,419	2,480	2,542	2,605
System Demand Forecast (Net of DSM, DR and EV):	**13,575**	**13,453**	**13,392**	**13,317**	**13,176**	**12,946**	**12,707**	**12,812**	**12,931**	**13,020**	**13,100**	**13,212**	**13,339**	**13,459**	**13,572**	**13,679**	**13,787**	**13,896**	**14,006**	**14,114**	**14,225**	**14,339**
System Demand Forecast (rounded off to nearest 25):	13,575	13,450	13,400	13,325	13,175	12,950	12,700	12,800	12,925	13,025	13,100	13,200	13,350	13,450	13,575	13,675	13,775	13,900	14,000	14,125	14,225	14,350
MW Demand Growth:	-125	-125	-50	-75	-150	-225	-250	100	125	100	75	100	150	100	125	100	100	125	100	125	100	125
% Growth:	-0.9%	-0.9%	-0.4%	-0.6%	-1.1%	-1.7%	-1.9%	0.8%	1.0%	0.8%	0.6%	0.8%	1.1%	0.7%	0.9%	0.7%	0.7%	0.9%	0.7%	0.9%	0.7%	0.9%
		13300	13000	12950	12900	12850	12800	12850	12925													

SENDOUT (GWh)	2005 Actual	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
System Sendout Forecast (Before DSM)	61,608	61,021	61,326	62,172	63,644	64,678	65,715	66,559	67,617	68,329	69,221	70,113	71,214	71,909	72,781	73,651	74,714	75,377	76,225	77,067	78,108	78,713	79,528
GWh Sendout Growth:			305	846	1,472	1,034	1,037	844	1,058	712	892	892	1,101	695	872	870	1,063	663	848	842	1,041	605	815
% Growth:			0.5%	1.4%	2.4%	1.6%	1.6%	1.3%	1.6%	1.1%	1.3%	1.3%	1.6%	1.0%	1.2%	1.2%	1.4%	0.9%	1.1%	1.1%	1.4%	0.8%	1.0%
Additional Load from Electric Vehicles (Westchester)			0	5	11	22	38	55	77	99	126	148	170	192	214	235	257	279	301	323	345	367	389
Additional Load from Electric Vehicles (EV):			0	37	73	146	256	365	511	657	840	986	1,132	1,278	1,424	1,570	1,716	1,862	2,008	2,154	2,300	2,446	2,592
Total EV			0	42	84	168	294	420	588	756	965	1,133	1,301	1,469	1,637	1,805	1,973	2,141	2,309	2,477	2,644	2,812	2,980
System Sendout Forecast (Before DSM but with EV):		61,021	61,326	62,214	63,728	64,846	66,009	66,979	68,205	69,085	70,186	71,246	72,515	73,378	74,418	75,456	76,687	77,518	78,534	79,544	80,752	81,525	82,508
Con Edison and Other DSM:		78	2,144	3,188	4,800	6,463	8,187	10,039	10,601	11,282	11,960	12,641	13,321	14,002	14,682	15,363	16,042	16,722	17,404	18,083	18,763	19,445	20,512
Con Edison DSM:		0	738	1,114	1,258	1,275	1,463	1,637	1,652	1,672	1,692	1,708	1,728	1,745	1,765	1,782	1,803	1,820	1,837	1,858	1,876	1,893	1,911
Other DSM:		78	1,406	2,074	3,542	5,188	6,724	8,402	8,949	9,610	10,268	10,933	11,593	12,257	12,917	13,581	14,239	14,902	15,567	16,225	16,887	17,552	18,600
Con Edison DR[3]:		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Demand Reduction:		78	2,144	3,188	4,800	6,463	8,187	10,039	10,601	11,282	11,960	12,641	13,321	14,002	14,682	15,363	16,042	16,722	17,404	18,083	18,763	19,445	20,512
System Sendout Forecast (Net of DSM, DR and EV):	**61,608**	**60,943**	**59,182**	**59,026**	**58,928**	**58,383**	**57,822**	**56,940**	**57,604**	**57,803**	**58,226**	**58,605**	**59,194**	**59,376**	**59,736**	**60,093**	**60,645**	**60,796**	**61,130**	**61,461**	**61,989**	**62,080**	**61,997**
GWh Sendout Growth:		-1,119	-1,761	-156	-98	-545	-561	-882	663	199	424	379	589	182	360	357	552	151	334	331	529	91	-84
% Growth:		-1.8%	-2.9%	-0.3%	-0.2%	-0.9%	-1.0%	-1.5%	1.2%	0.3%	0.7%	0.7%	1.0%	0.3%	0.6%	0.6%	0.9%	0.2%	0.5%	0.5%	0.9%	0.1%	-0.1%
Energy Reduction from "Before DSM":		0.1%	3.5%	5.1%	7.5%	10.0%	12.4%	15.0%	15.5%	16.3%	17.0%	17.7%	18.4%	19.1%	19.7%	20.4%	20.9%	21.6%	22.2%	22.7%	23.2%	23.9%	24.9%

4 Demand and sendout for years prior to 2010 are actual weather-adjusted amounts

Appendix B: Electric Supply Outlook

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Appendix B: Supply Outlook

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1.0 APPENDIX B – SUPPLY OUTLOOK

1.1 OVERVIEW

Con Edison will make every effort to keep transmission and distribution rates down; however, it is important to convey that market forces and public policy will impact our customers' bills. In particular, the composition, availability, and affordability of electricity supply may experience dramatic change over the 20-year planning horizon. Even assuming that fees and taxes remain consistent with 2011 estimates[5], we expect supply costs to rise steadily through 2030.

While we do not own significant sources of electric power generation, we do procure energy for our full service customers, whose energy consumption in 2008 represented approximately 42% of all of our delivered energy. Con Edison works diligently to achieve the lowest reasonable supply costs for these customers. We accomplish this first by making informed and strategic purchase decisions, selecting a cost effective mix of power plants, long-term contracts, and direct purchases from the energy market. Second, we use financial hedging products to mitigate the volatility of our energy purchases with the objective of shielding our customers from supply market volatility.

We take an even more proactive role in managing supply costs by leveraging energy efficiency and demand response programs to reduce electric demand which in turn reduces supply purchases, particularly when the region is experiencing peak conditions and the cost of supply is at its highest (See Chapter 3 of the Electric System Long Range Plan). We are also facilitating the integration of distributed generation assets into the grid thus allowing our customers to identify additional cost-effective means of meeting their energy requirements, and further diversifying our overall supply portfolio.

While we will continue to actively manage the supply costs for our customers, we still foresee that supply costs will rise over the 20-year planning horizon. For the Plan Case, our analysis suggests that the cost of supply will grow on a real 2009 dollar basis from 9.4 cents per kWh in 2010 to 14.6 cents per kWh by 2030, representing an average annual growth rate of 2.2%.

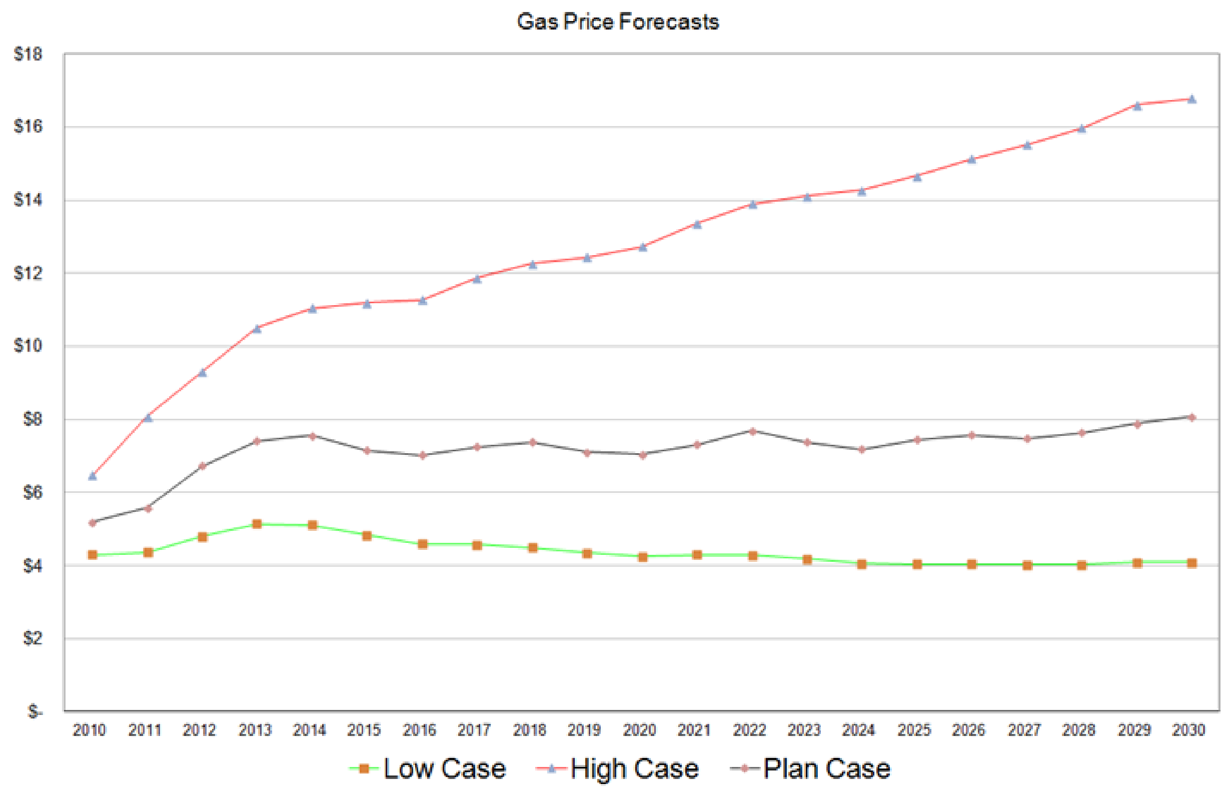
For Con Edison customers, the primary driver of the cost of electricity is the price of natural gas used to generate that electricity by facilities in and around the service territory. The market price for electricity is determined by a market which is administered by the New York Independent System Operator (NYISO). NYISO gathers information from power plants and other resources in and around the Con Edison service territory to help match customer electricity demand to the lowest cost supply. At any point in time, the market price for energy is set by the highest marginal cost generation unit dispatched to meet demand. And for Con Edison customers, that is usually a natural gas fired unit. Over the 20-year life of this plan, it will likely continue to be a gas-fired plant, as expiring non utility generation (NUG) contract supplies will be replaced by power from the New York Independent System Operator energy market. With gas-fired plant technology, since labor costs are low and it has low emissions compared to other fossil sources, most of the cost of running a unit is based simply on the input price of the natural gas burned. As the Company studies a number of longer term demand forecasts, the number of hours the marginal unit being a gas-fired unit may differ in each case, but in general, gas-fired units will set the energy market

[5] Con Edison does not expect tax rates to remain constant over the planning horizon. We have made this simplifying assumption for the purposes of the Electric System Long Range Plan.

price most of the time. Many gas-fired units are in the market, and more are proposed for development over the 20 years of this plan.

Figure 1-1 summarizes our projections for natural gas prices under a high, plan, and low electricity demand forecast (demand forecast detail provided in Appendix A). Under the plan case, which is the foundation for the investments discussed in the Electric System Long Range Plan, we expect the price of natural gas to remain below $8/dt. In the high case, in a market in which national demand for electricity is buoyed by a strong economic recovery, gas prices are expected to be in excess of $16/dt by 2030. In the case where demand for electricity is tempered by strict New York State and Federal environmental legislation and consequent breakthroughs in utility- and third party-sponsored energy efficiency programs and dramatic improvements in building stock and appliance energy efficiency via aggressive codes and standards, we expect natural gas prices to hover around $4/dt.

Figure 1-26. Gas Price Forecasts (2009$/dt)[6]



Con Edison customers also pay the cost of maintaining adequate generation supply through the New York Independent System Operator market. These capacity costs are a function of the market prices for capacity. Because the marginal generator (and that would be a new generator when capacity is needed) covers its costs from selling both capacity and energy into the market, capacity prices are expected to be low when energy prices are high and vice versa. Therefore, even though the capacity costs can be a

[6] Plan Case based on forecasts provided by Wood Mackenzie in December 2009. Chart shows NYC Citygate gas prices in constant year 2009 dollars per dekatherm.

significant portion of the electric supply cost, they do tend to offset the cost increases associated with a rising natural gas scenario.

Legislation and regulation are also significant drivers of supply cost increases.[7] Proposed legislation includes a national Renewable Portfolio Standard and CO_2 cap and trade program. A Regional Greenhouse Gas Initiative (RGGI) is already in place for our region. Combined, RGGI and a Federal CO_2 program will increase the unit cost of electricity for customers by applying a cost to CO_2 emissions associated with our supply portfolio. Also a driver of supply cost growth is the cost associated with the additional transmission required to deliver the energy produced by additional renewable generation – both land based and offshore – to our service area.

1.2 METHODOLOGY

Our supply outlook is based on six components of electricity supply costs:

1. Energy Costs
2. Capacity Costs
3. Ancillary Costs
4. Carbon Costs
5. Renewable Portfolio Standards (RPS) Costs
6. RPS Transmission Costs

1. Energy Costs

Energy cost projections are based on the natural gas market and technology drivers. The estimates for the plan case were provided by Wood Mackenzie. Projections incorporate a GDP deflator out to 2030 which starts at 1.4% and grows to 2.1 % from 2016 on.

Electric price forecasts are based on the historical market heat rate (MMBTU/MWh) multiplied by the price for natural gas. The heat rate is held at 10 across all three cases.

Total energy costs are calculated using electric price forecasts and sendout scenarios (see Appendix A) for the Con Edison service territory. In addition the analysis incorporates Non-Utility Generation (NUG) contract commitments.

No carbon costs are incorporated into the energy cost analysis as they are incorporated separately (see component 4).

[7] Driving usage down as seen in the Low Case.

2. Capacity Costs

Projected capacity costs are linked to demand requirements for the New York Control Area and New York City. We assume that net CONE (cost of new entry net of its energy market and ancillary services revenues[8]) sets the pricing for capacity. NUG capacity prices are also included for the duration of existing contracts.

3. Ancillary Costs

Ancillary costs[9] are assumed to be fixed at 10% of energy to reflect all New York Independent System Operator (NYISO) charges other than capacity and energy.

4. Carbon Costs

A cost of complying with regional and Federal carbon mitigation policies is built into our electricity price forecasts. Projected carbon costs are based on Regional Greenhouse Gas Initiative (RGGI), in which Con Edison is required to participate as owners of electric generators larger than 25 MW, through 2014 and estimates for pending Federal Policy based on analysis of the most recently proposed Climate Bill Waxman-Markey, for 2015 through 2030.[10]

During the near term, through 2015 we assume the higher carbon costs associated with RGGI will increase the cost of generation; whereas after 2014 we assume that the increase in carbon costs will drive the achievement of a sustainable resource mix and associated lower CO_2 emissions.

We use the New York Control Area resource mix to determine CO_2 emissions and the associated carbon exposure costs. Effectively 38% of New York State emissions are assigned to Con Edison customers based on energy consumption.

5. Renewable Portfolio Standards (RPS) Costs

Currently in the CECONY service territory, supply comes from six sources: gas, nuclear, coal, oil, renewables, and other (e.g., pumped storage and imports). From 2010's approximate 18% renewable composition, in the Plan Case we expect the share of renewables to grow by 2030 to almost a quarter of total supply. The power bill will increase as renewable generation is added because the total cost of renewable generation exceeds the current cost of conventional supply.[11]

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[8] The NYISO assigns a value to net CONE based on the estimated cost of building, owning and operating a new gas-fired generating unit net of its estimated energy market and ancillary services revenues. Currently, the NYISO every three years reviews and updates the net CONE.

[9] Ancillary services support the reliable operation of the transmission system as it moves electricity from generating sources to retail customers. NYISO currently operates two markets for ancillary services: (1) Synchronized Reserve supplies electricity if the grid has an unexpected need for more power on short notice. (2) Regulation is a service that corrects for short-term changes in electricity use that might affect the stability of the power system.

[10] $2 to $6 per ton based on RGGI through 2014 and $13 in 2015 growing to $75 per ton in 2030 based on assumptions around a Federal carbon marketplace.

[11] We expect the premium required to induce construction of new renewable capacity will come from the systems benefit charge (SBC), Renewable Energy Credits, and term contracts.

Consistent with the demand forecast, the Low Case for supply assumes the most stringent policy standards are achieved, which in this case means New York State's target of 30% renewables[12] statewide by 2015. In the High case we assume similar amounts of renewables as in the Plan Case.

In order to understand the bill implication of RPS costs Con Edison estimated the 2010 levelized cost of each renewable resource based on research from Cambridge Energy Research Associates (CERA) and the National Renewable Energy Lab (NREL), and then projected manufacturing and installation cost reductions from 2011-2030. Figure 1-2 presents estimates for levelized costs by resource for 2010 and Figure 1-3 depicts our projections for LCOE from 2010 to 2030.

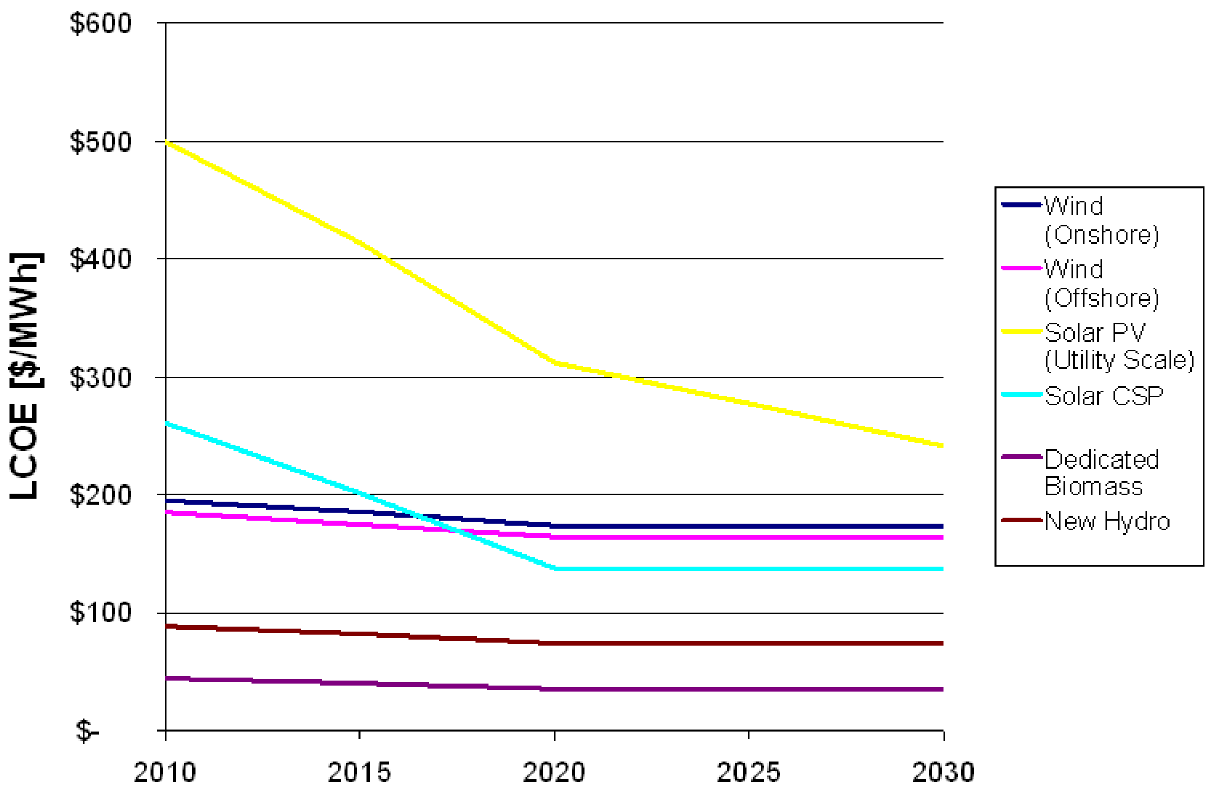
Figure 1-27. Levelized Cost of Energy for Renewable Sources for 2010[13]

	Capacity factor	**2010 Capital cost** [$/kW]	**2010 LCOE** [$/MWh]	**2010 Interconnection cost** [$/MWh]	**2010 Back up Generation cost** [$/MWh]	**LCOE Total Cost** [$/MWh]
On-shore wind	29-32%	$2,000 - 2,200	$120 - 130	$5 – 35	$20 – 30	$145 – 195
Off-shore wind	40%	$2,700 - 5,000	$125 - 205	$20 – 40	$15 – 20	$140 – 225
Solar PV (Utility scale)	17-20%	$4,800 - 6,200	$370 - 565	NA	$30 – 45	$400 – 610
Hydro	42%	$1,200 - 2,100	$40-90	NA	NA	$40 – 90
Biomass	95%	$3,000 - 11,500	$45-170	NA	NA	$45 – 170

[12] An additional 15% from energy efficiency resources and existing hydro for a total of 45% from renewables or EE by 2015.

[13] Sources: CERA , NREL, SEP and Navigant capital costs, CERA fixed O&M, property tax & insurance, 50% debt, 12% cost of equity, 8% cost of debt, 35% tax rate, 20 year asset life, capacity factors based on SEP and CERA. *NYISO wind integration study shows that the system can accommodate 3.3 GW and indicates 8GW is feasible.

Figure 1-28. Levelized Cost of Energy Projections[14]



6. RPS Transmission (RPS) Costs

In order to incorporate new sources of renewable supply into our portfolio we will need to, in some cases, build new transmission to interconnect those sources to our customers. These costs are incorporated into the total bill impact in each case. In the case of off shore wind, the transmission costs would include costs of the off shore substation, submarine cables to landfall and additional land based transmission and substation upgrade required to interconnect to the grid and deliver the wind power to New York City and Long Island. In the case of land based wind which will be located predominantly in northern and western New York, the transmission costs would include interconnection costs and any system upgrade necessary to ensure delivery to our service area.

[14] Calculated based on CERA, SEP, and NOAA data

1.3 PLAN CASE

Figure 1-29. Plan Case Supply Cost per MWh

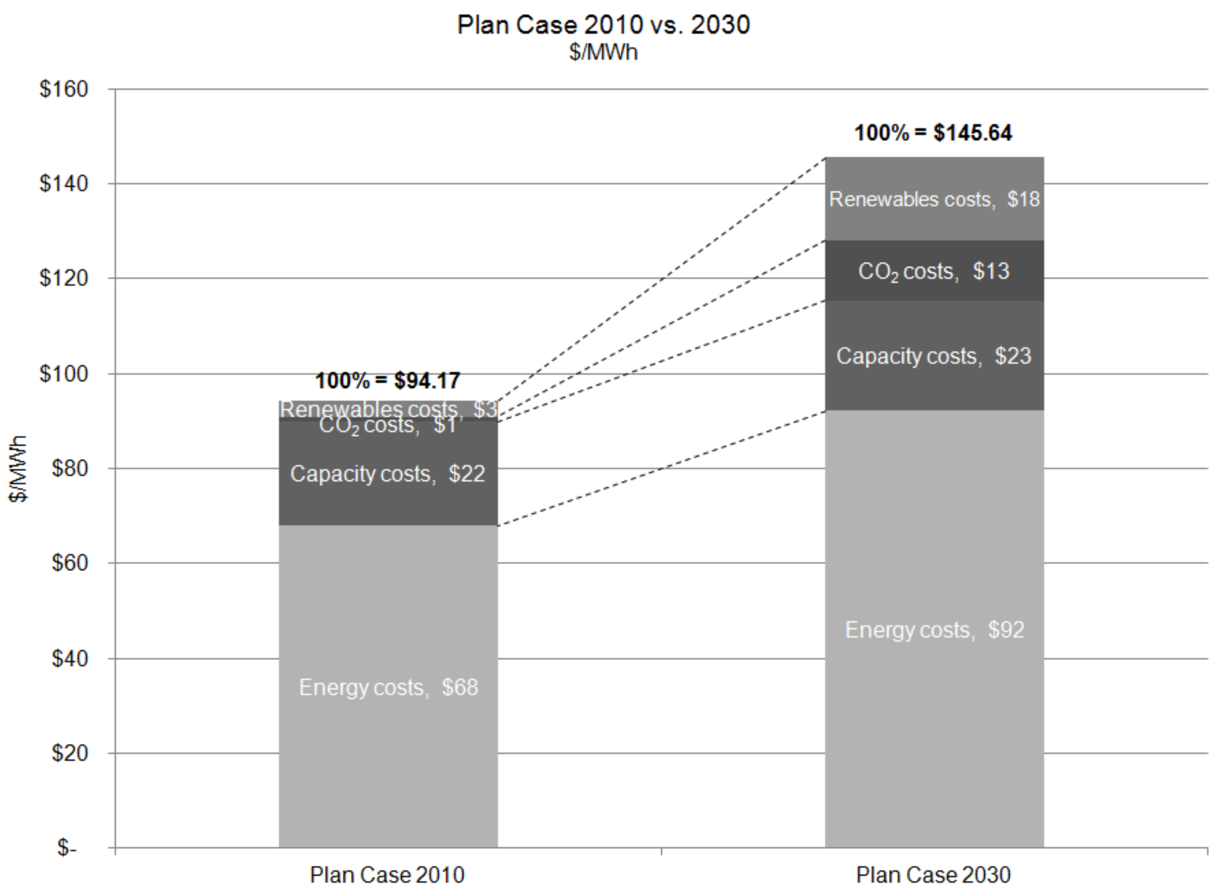


Figure 1-30. Plan Case Sources of Supply

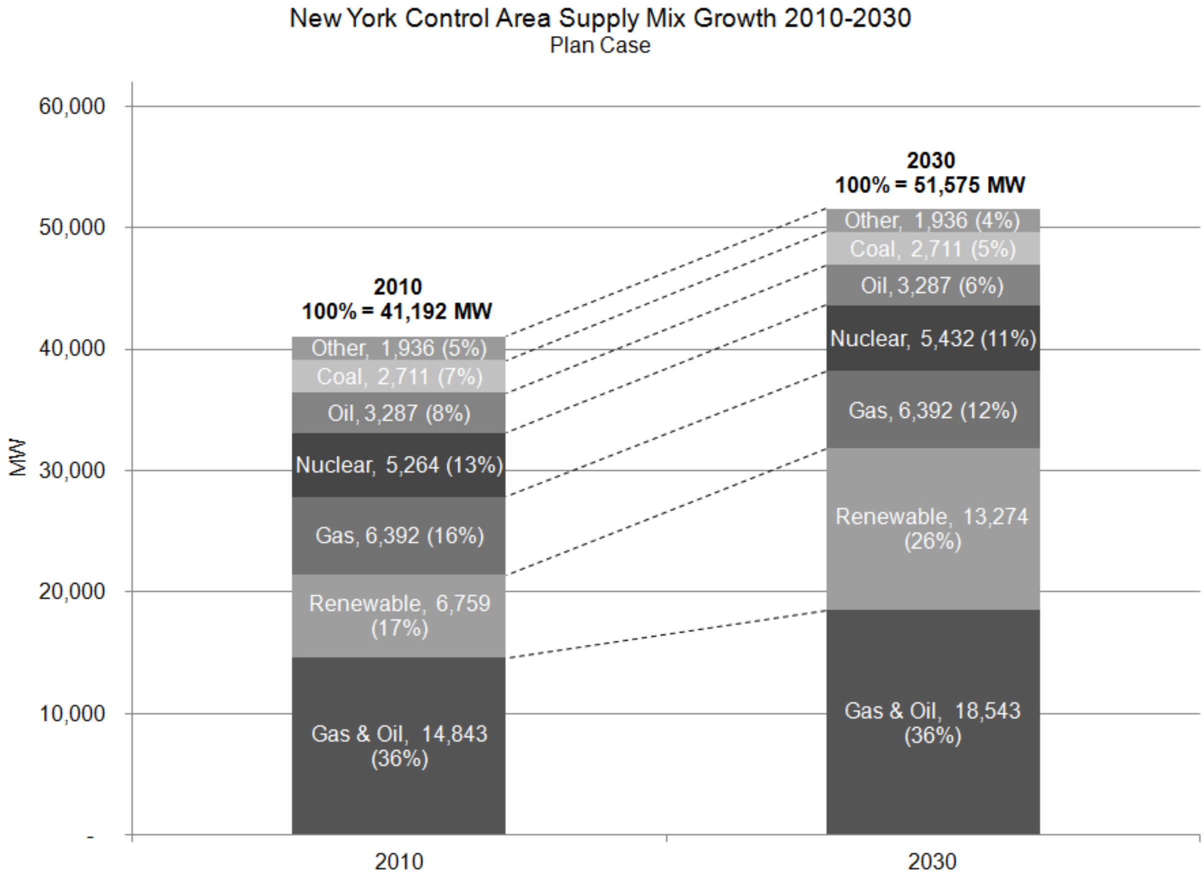


Figure 1-31. Plan Case Supply Outlook

Plan Case		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity costs		$1,313	$1,519	$1,303	$1,277	$1,388	$1,331	$1,418	$1,502	$1,594	$1,656	$1,717	$1,771	$1,787	$1,778	$1,773	$1,745	$1,745	$1,747	$1,767	$1,775	$1,789
Energy costs		3,699	3,916	4,480	4,857	5,012	4,971	5,002	5,023	5,108	4,931	4,963	5,226	5,569	5,421	5,365	5,610	5,780	5,782	5,993	6,244	6,461
Ancillary costs		370	392	448	486	501	497	500	502	511	493	496	523	557	542	536	561	578	578	599	624	646
RGGI allowance costs		64	69	76	84	92	541	563	585	609	632	659	685	714	743	774	804	837	870	905	940	977
RPS costs		$192	$391	$335	$260	$318	$367	$387	$363	$348	$380	$390	$388	$403	$441	$481	$492	$512	$542	$561	$571	$585
RPS Transmission costs		$0	$0	$39	$78	$153	$192	$231	$269	$307	$346	$386	$422	$461	$499	$540	$576	$615	$653	$694	$730	$768
Total costs		**$5,638**	**$6,287**	**$6,681**	**$7,042**	**$7,464**	**$7,900**	**$8,101**	**$8,243**	**$8,476**	**$8,437**	**$8,611**	**$9,015**	**$9,489**	**$9,424**	**$9,469**	**$9,788**	**$10,067**	**$10,172**	**$10,519**	**$10,885**	**$11,227**
Capacity supplied (MW)		17,355	17,313	17,427	17,613	17,806	17,981	18,274	18,467	18,712	18,988	19,324	19,544	19,816	20,091	20,425	20,639	20,913	21,184	21,517	21,722	21,990
Energy supplied (GWh)		59,866	59,904	60,794	61,657	62,331	62,944	63,969	64,646	65,504	66,362	67,536	68,379	69,396	70,411	71,623	72,393	73,349	74,300	75,449	76,160	77,084
Total portfolio	($/MWh)	$94.17	$104.95	$109.90	$114.21	$119.75	$125.51	$126.64	$127.51	$129.40	$127.14	$127.50	$131.84	$136.74	$133.84	$132.20	$135.21	$137.24	$136.91	$139.42	$142.92	**$145.64**

1.4 HIGH CASE

Figure 1-32. High Case Supply Cost per MWh

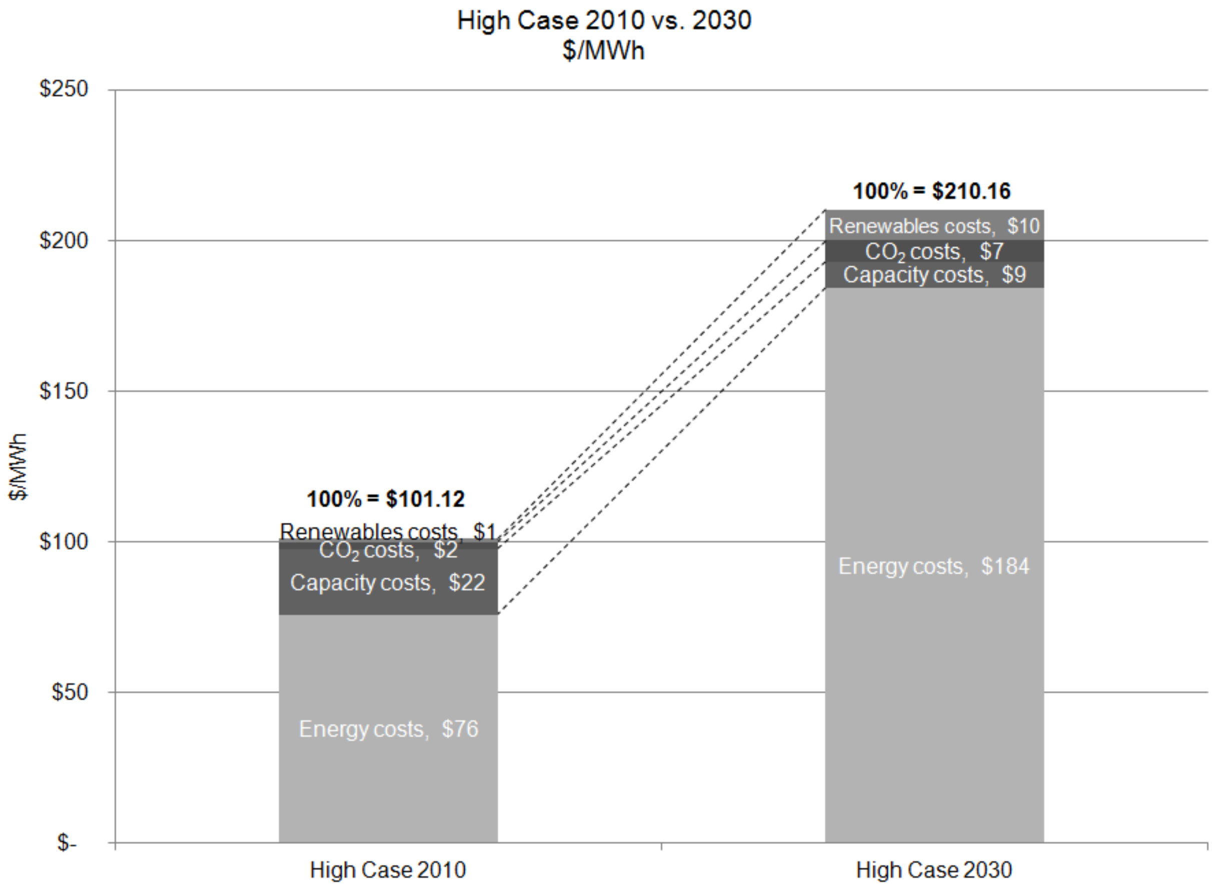


Figure 1-33. High Case Sources of Supply

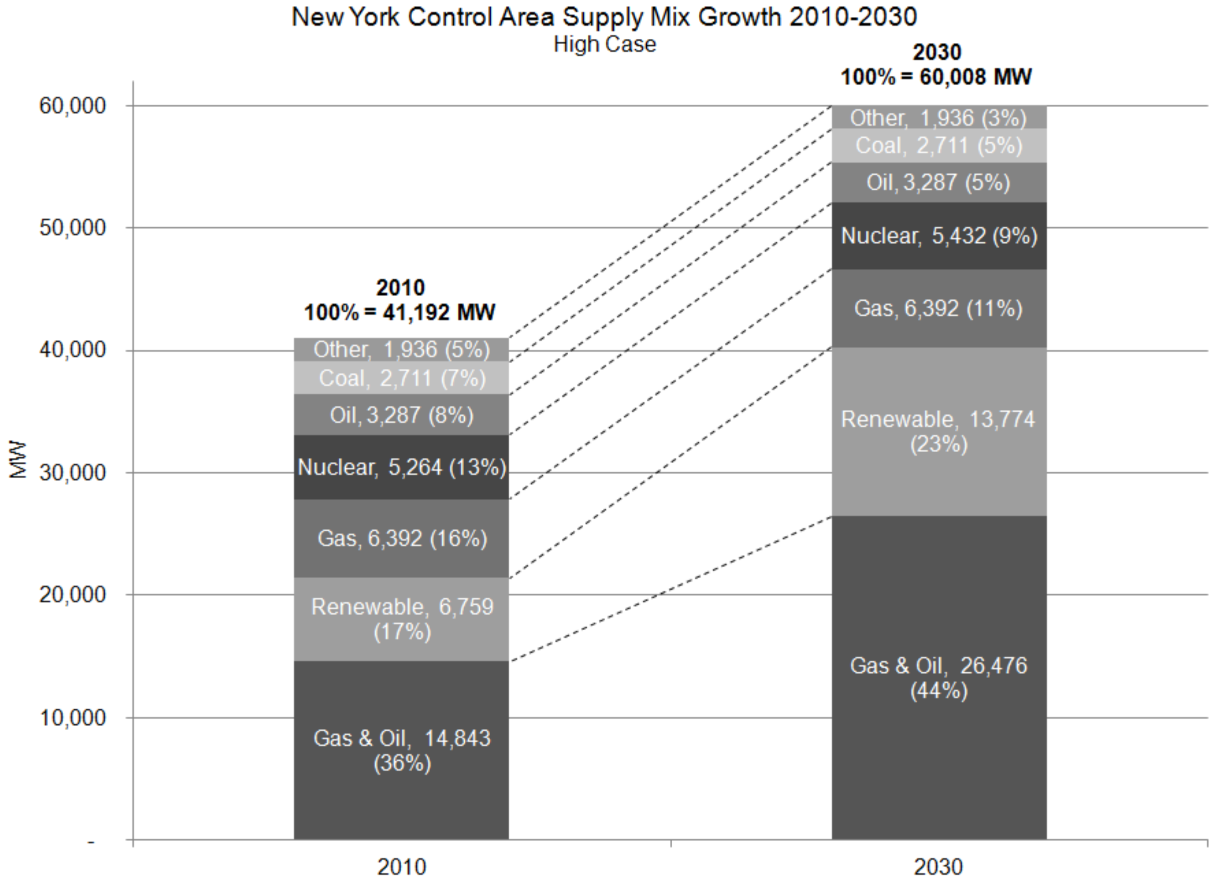


Figure 1-34. High Case Supply Outlook

High Case		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity costs		$1,323	$1,555	$1,361	$1,346	$1,482	$1,452	$1,507	$1,519	$1,539	$1,496	$1,430	$1,351	$1,235	$1,116	$994	$911	$885	$864	$857	$844	$832
Energy costs		4,169	4,948	5,697	6,406	6,851	7,200	7,524	7,998	8,431	9,226	9,700	10,396	11,059	11,484	11,919	12,484	13,164	13,782	14,528	15,374	15,855
Ancillary costs		417	495	570	641	685	720	752	800	843	923	970	1,040	1,106	1,148	1,192	1,248	1,316	1,378	1,453	1,537	1,586
RGGI allowance costs		129	141	156	175	192	286	303	320	339	360	380	400	422	446	471	497	525	555	586	619	653
RPS costs		$77	$159	$111	$109	$172	$186	$202	$202	$204	$212	$215	$216	$220	$232	$246	$245	$238	$232	$223	$202	$200
RPS Transmission costs		$0	$0	$39	$78	$153	$192	$231	$269	$307	$346	$386	$422	$461	$499	$540	$576	$615	$653	$694	$730	$768
Total costs		**$6,116**	**$7,297**	**$7,934**	**$8,753**	**$9,536**	**$10,037**	**$10,521**	**$11,109**	**$11,665**	**$12,562**	**$13,080**	**$13,826**	**$14,502**	**$14,927**	**$15,362**	**$15,962**	**$16,743**	**$17,464**	**$18,341**	**$19,305**	**$19,894**
Capacity supplied (MW)		17,533	17,683	17,995	18,394	18,817	19,226	19,772	20,216	20,732	21,037	21,409	21,654	21,955	22,259	22,630	22,866	23,170	23,471	23,839	24,066	24,364
Energy supplied (GWh)		60,479	61,184	62,776	64,390	65,872	67,303	69,213	70,769	72,573	74,359	76,391	77,994	79,806	81,635	83,706	85,329	87,183	89,048	91,165	92,778	94,660
Total portfolio	($/MWh)	$101.12	$119.26	$126.39	$135.94	$144.77	$149.13	$152.00	$156.98	$160.73	$168.94	$171.23	$177.27	$181.72	$182.85	$183.52	$187.07	$192.04	$196.12	$201.19	$208.07	**$210.16**

1.5 LOW CASE

Figure 1-35. Low Case Supply Cost per MWh

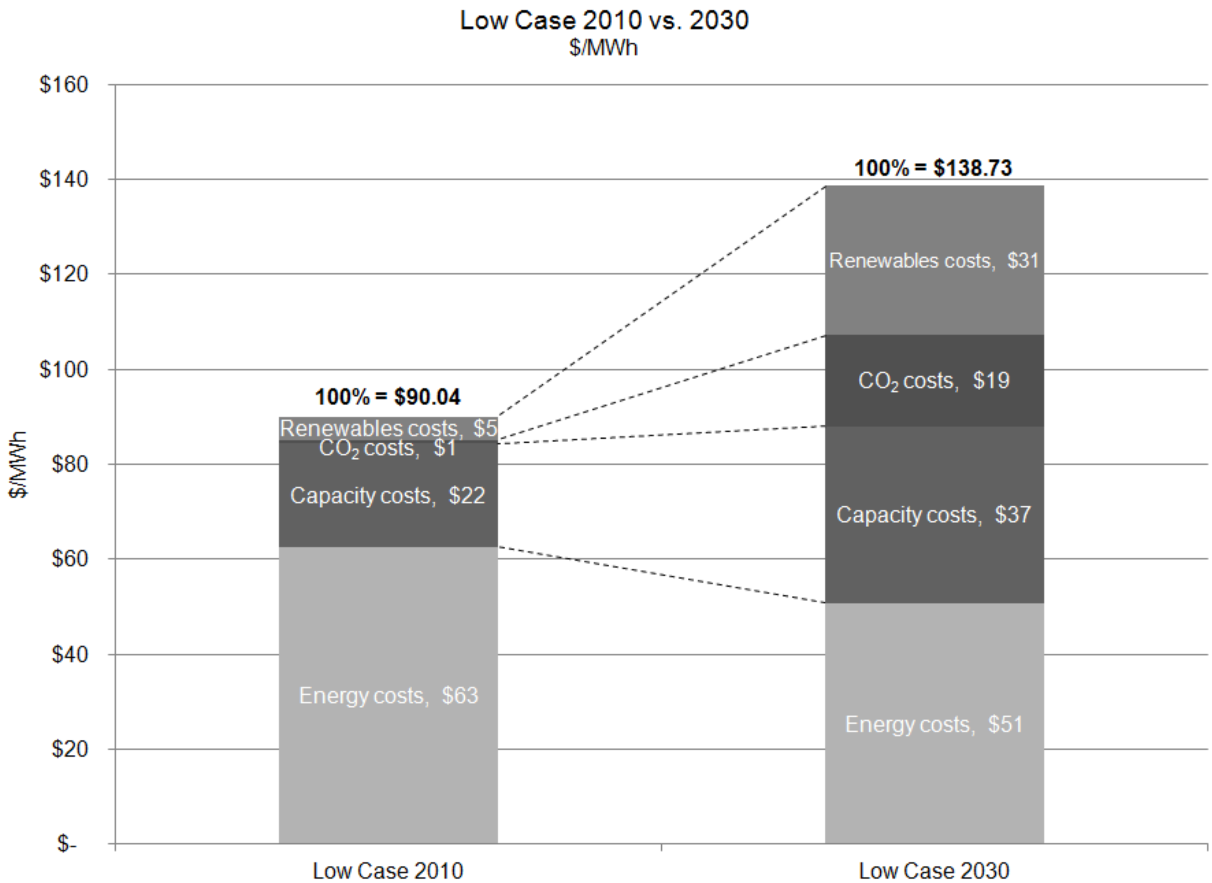


Figure 1-36. Low Case Sources of Supply

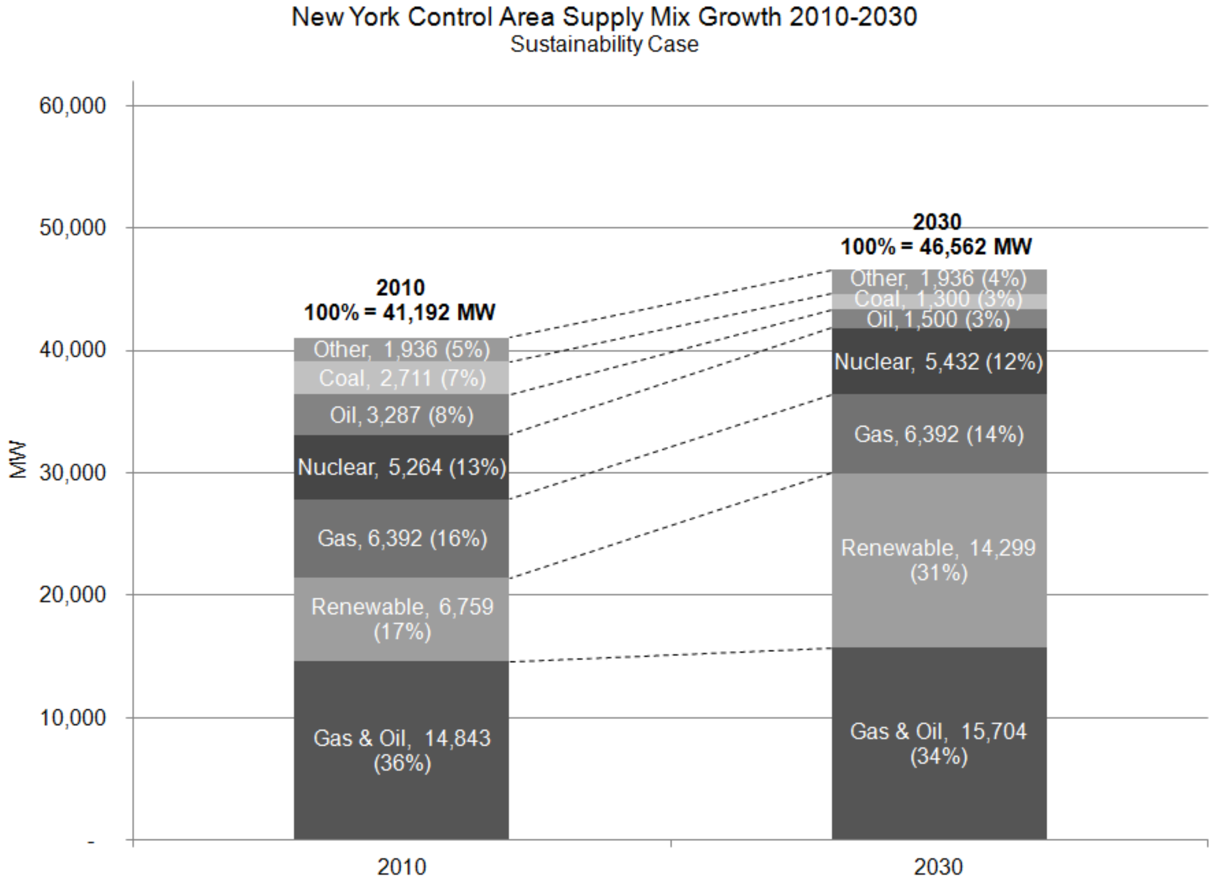


Figure 1-37. Low Case Supply Outlook

Low Case		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity costs		$1,292	$1,476	$1,249	$1,201	$1,278	$1,180	$1,255	$1,327	$1,406	$1,523	$1,672	$1,811	$1,929	$2,034	$2,146	$2,221	$2,257	$2,262	$2,286	$2,294	$2,295
Energy costs		3,367	3,424	3,604	3,748	3,730	3,643	3,558	3,351	3,257	2,893	2,852	2,885	2,890	2,838	2,780	2,769	2,778	2,780	2,807	2,851	2,843
Ancillary costs		337	342	360	375	373	364	356	335	326	289	285	288	289	284	278	277	278	278	281	285	284
RGGI allowance costs		46	44	39	40	41	677	695	718	740	762	781	817	853	890	925	967	1,008	1,050	1,091	1,140	1,188
RPS costs		$287	$543	$698	$835	$1,079	$1,231	$1,235	$1,195	$1,170	$1,145	$1,116	$1,094	$1,084	$1,086	$1,094	$1,083	$1,085	$1,087	$1,089	$1,077	$1,077
RPS Transmission costs		$0	$0	$232	$524	$714	$859	$862	$859	$859	$859	$862	$859	$859	$859	$862	$859	$859	$859	$862	$859	$859
Total costs		**$5,329**	**$5,830**	**$6,183**	**$6,723**	**$7,216**	**$7,955**	**$7,961**	**$7,786**	**$7,758**	**$7,472**	**$7,570**	**$7,755**	**$7,905**	**$7,991**	**$8,086**	**$8,177**	**$8,264**	**$8,316**	**$8,417**	**$8,507**	**$8,547**
Capacity supplied (MW)		17,157	17,058	16,889	16,672	16,507	16,250	16,433	16,484	16,597	16,842	17,140	17,335	17,577	17,820	18,117	18,306	18,549	18,790	19,085	19,267	19,505
Energy supplied (GWh)		59,182	59,021	58,917	58,361	57,784	56,885	57,527	57,704	58,101	58,458	59,025	59,185	59,523	59,858	60,388	60,517	60,829	61,138	61,645	61,714	61,608
Total portfolio	($/MWh)	$90.04	$98.77	$104.94	$115.19	$124.88	$139.84	$138.39	$134.92	$133.52	$127.82	$128.24	$131.03	$132.80	$133.49	$133.90	$135.12	$135.87	$136.03	$136.54	$137.84	**$138.73**

Appendix C: Asset Management

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Appendix C: Asset Management

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1.0 APPENDIX C – EFFICIENT PORTFOLIO OPTIMIZATION

1.1 OVERVIEW

Con Edison is committed to continually searching for ways to optimize the use of capital and the useful lives of assets. Part of this optimization effort involves measuring the cost benefit relationship of investment programs as this provides an effective means of gauging program effectiveness across varying levels of spend. These relationships can indicate levels of maximum benefit per dollar spent together with levels of spending at which diminishing returns for the investment program begin to appear.

In support of the 2010 Capital Budget Process twenty one electric distribution capital reliability programs have been targeted for the development of cost-benefit analyses. These programs total approximately $264 million and represent over 75% of the total 2010 system relief and reliability budget request of $351 million. In addition to representing a significant proportion of the 2010 budget these programs were selected based on their anticipated positive impact on system performance. The twenty one programs together with their associated budget request appear in Table 1-1.

Table 1-1. Cost Benefit Programs

Program	Base Capital Plan ($000)	Completed
Cable Crossing	$7,000	No
Osmose (C Truss)	$1,252	No
Autoloop Reliability	$3,859	Yes
Aerial Cable Replacement	$1,009	Yes
#4, #6 Self Supporting Wire	$1,669	No
OH Feeder Sectionalizing	$1,500	Yes
Secondary Open Mains	$140,595	Yes
PILC Replacement	$18,085	Yes
Vented Manhole Cover	$0 (completed)	Yes
Vented Service Box Cover	$8,375	No
4 kV UG Reliability	$111	No
UG Secondary Reliability Program	$40,956	Yes
RMS 3rd Generation	$7,850	Yes
PTO Sensors/DGOA (2 programs)	$2,559	Yes
Sectionalizing Switches	$3,562	Yes
Shunt Reactors	$1,761	No
Coastal Storm Risk Mitigation	$1,000	Yes
Network Reliability	$16,323	Yes
ATS Installation at USS	$1,450	Yes
Streetlight Service Reliability (ISOs)	$4,809	No

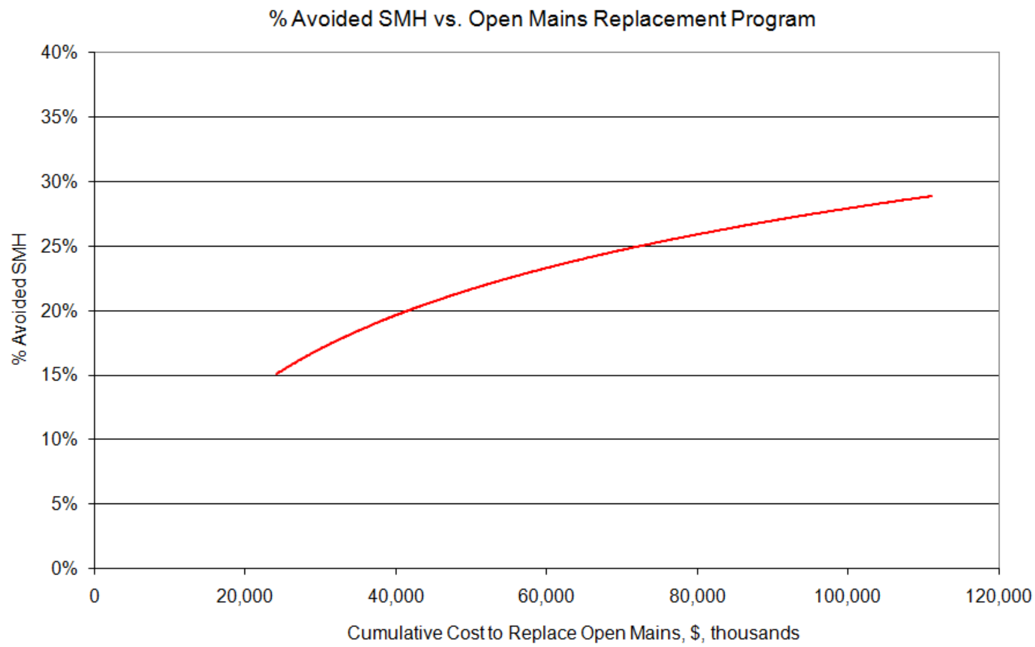
Of the twenty-one electric distribution reliability programs, the Company has thus far been able to use historical data to construct quantitative cost-benefit curves for nine of the programs. These cost-benefit curves measure one or more specific benefit metrics associated with each program and the realizable amount of benefit the Company can achieve for every dollar spent on the program.

1.2 PROGRAM DESCRIPTION

1.2.1 Secondary Open Mains

Through historical analysis, the Company has witnessed a correlation between secondary open mains and smoking manholes (SMH). In this case the Company narrowed the benefit to smoking manholes, as opposed to explosions or fires, as improvements to these conditions are being measured in the vented manhole cover program and the Company wanted to ensure double counting did not occur. Using historical smoking manhole occurrences coupled with open mains expenditures, the Company was able to derive a relationship between these two variables. Figure 1-1 shows the diminishing returns relationship that occurs from expenditures on open mains. Based on this relationship, the Company developed a targeted replacement and repair program to prioritize the most risky structures to be repaired first.

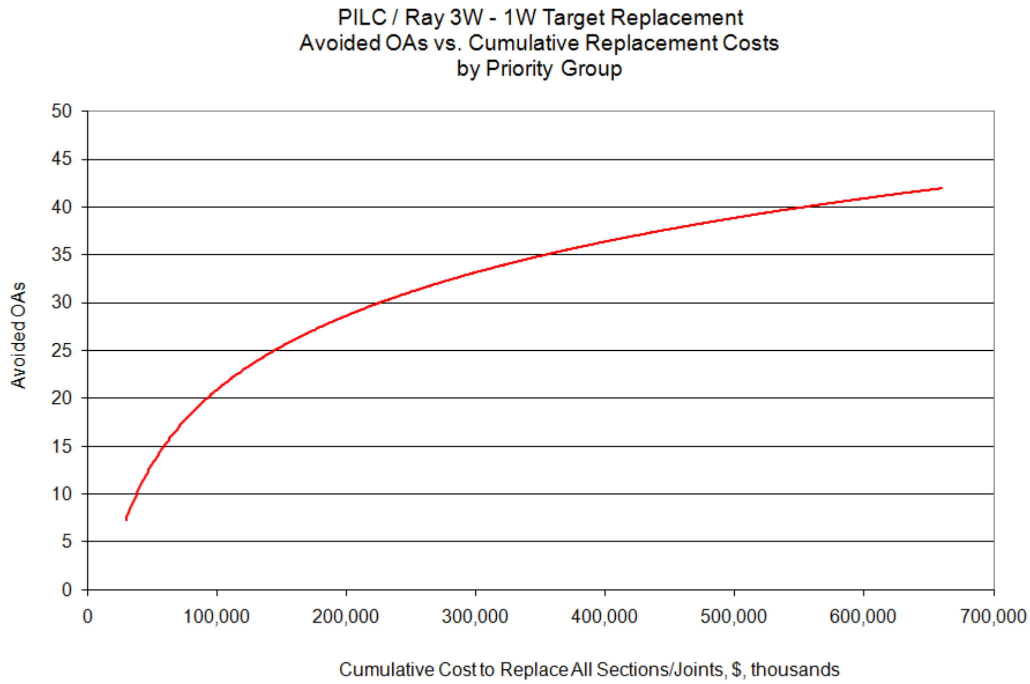
Figure 1-1. Secondary Open Mains Expenditure versus Smoking Manholes



1.2.2 PILC and Associated 3 Way / 1 Way Stop Joint Targeted Replacement

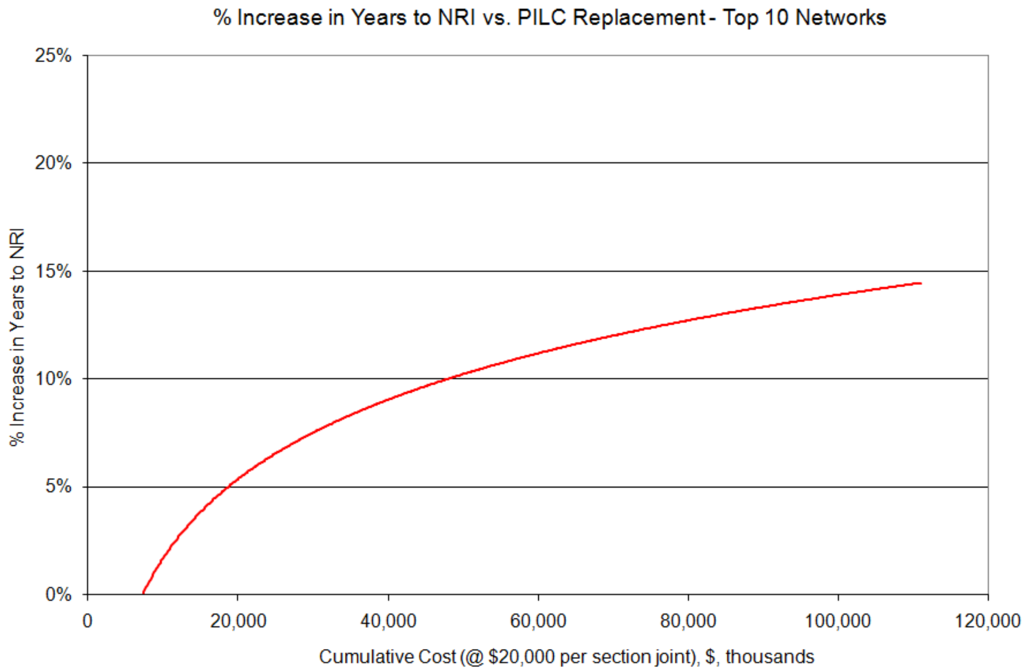
Through historical data collection, the Company recognized that PILC cable along with the associated 3 way/1 way stop joints experienced higher levels of outages during summer peak periods. This data, along with the mandate for the company to replace PILC cable drove the measurement of recognizable benefits from this program. From this relationship, the Company was able to measure the cost of avoidance of an OA versus the cost to replace all sections of cable and associated joints.

Figure 1-2. PILC and Stop Joint Avoided OAs



In addition, the replacement of PILC with solid cable sections and joints offers a benefit to network reliability as measured by NRI. The benefit in this case is the increase in years to an NRI state. Again, this relationship shows a diminishing returns trend, and given the amount of PILC cable already replaced by the Company, it may make sense to target expenditures toward other programs with larger recognizable benefits.

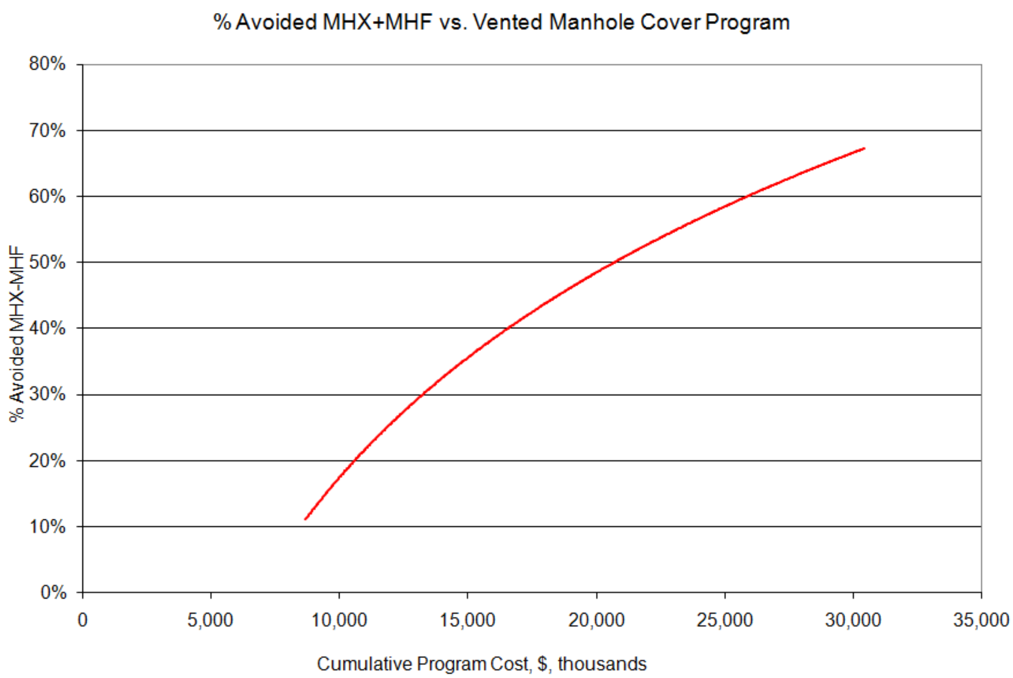
Figure 1-3. PILC NRI Improvement per Dollar



1.2.3 Vented Manhole Cover Program

It was noticed that enclosing a manhole with a solid cover increases the occurrence of both explosions (MHX) and fires (MHF) within the structure. To alleviate these conditions, the Company started the vented manhole cover program which replaces the solid metal manhole covers with fiberglass covers with vents allowing airflow into and out of the manhole. The Company has developed models to identify the most risky manholes based on factors such as population density, load, etc. and developed a program to target these structures first. Of the more than 62,000 manholes in the electric system, the Company has currently replaced close to 52,000 and has now reached a point of diminishing returns given the remaining 10,000 are thought to be low risk. Figure 1-4 shows the cost benefit relationship of replacing manhole covers.

Figure 1-4. Vented Manhole Cover Avoided Explosions and Fires

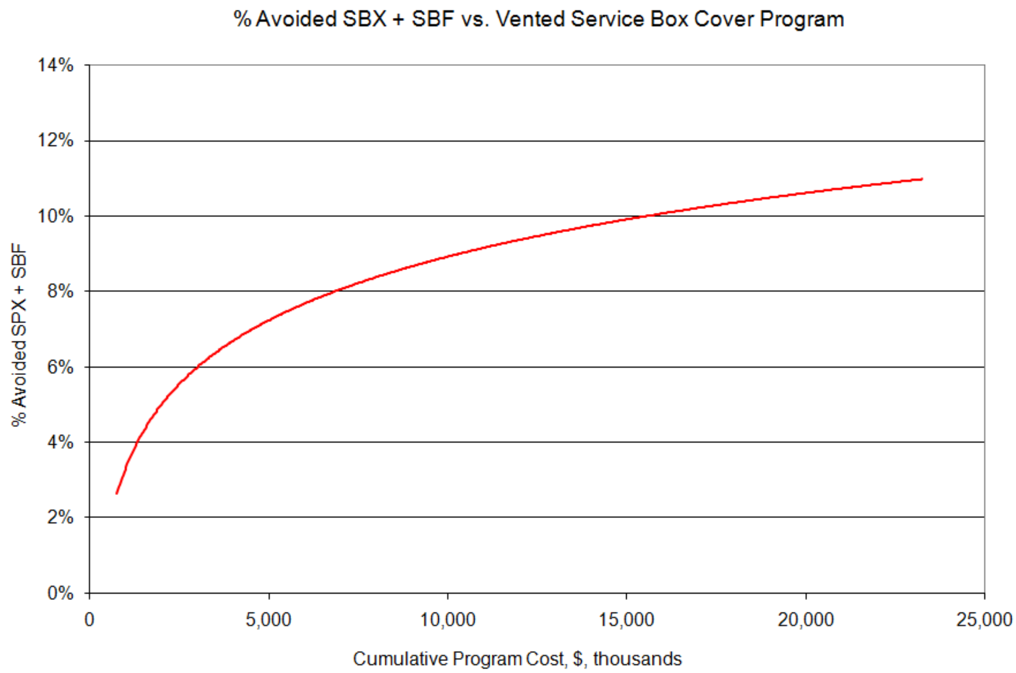


1.2.4 Vented Service Box Cover Program

Currently the vented service box cover program is in the earliest stages of its rollout for the 200,000 manhole service boxes and sufficient data to calculate expected benefits is not available. In a preliminary effort to develop a cost-benefit relationship that might provide direction to program implementation, a cost benefit analysis has been completed for this program using certain assumptions and the results of the more mature vented manhole cover program detailed previously.

A comparative historical analysis of manhole explosions (MHX) and manhole fires (MHF) for both solid and vented manholes quantified the degree of reduction in these incidents through the installation of vented manhole covers. Based on the relative dimensions of service boxes and manholes, it was assumed that the potential reduction in service box explosions (SBX) and service box fires (SBF) through the installation of vented service box covers would be proportionally smaller than that realized in the vented manhole cover program based on a volume scaling factor.

Figure 1-5. Vented Service Box Avoided Explosions and Fires

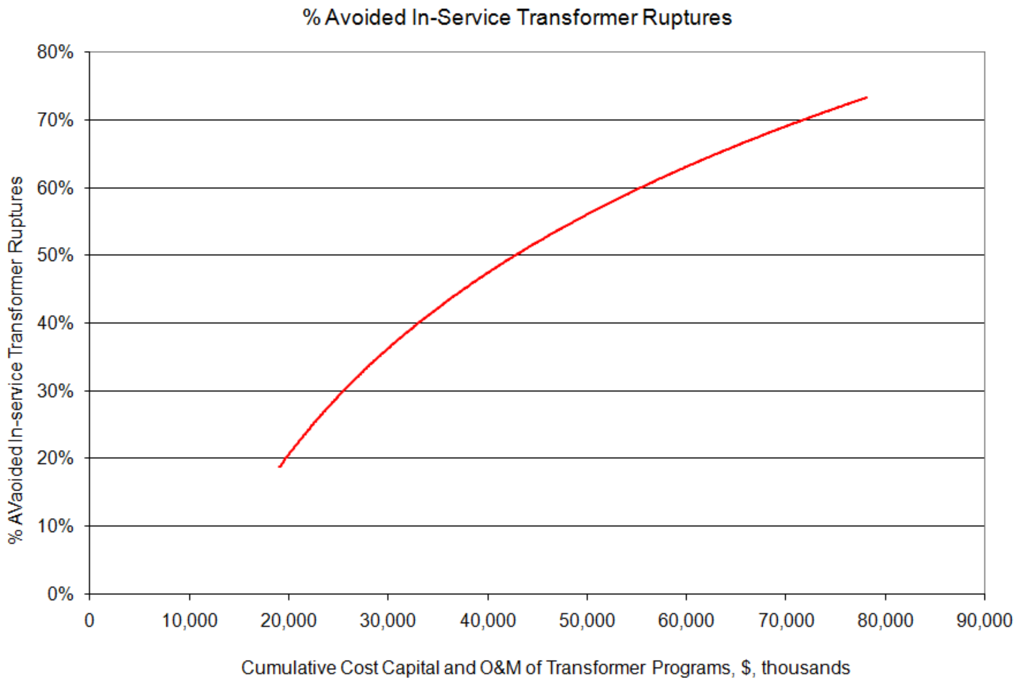


1.2.5 Network Transformer Programs

Three distinct but interrelated programs have been developed to mitigate the likelihood of in-service transformer failures on network transformers. These programs are: a) 3rd Generation RMS (information transmitters on state of transformer); b) Pressure Temperature & Oil (PTO) Sensors; and c) Dissolved Gas and Oil Analysis (DGOA). Because these three programs have been implemented concurrently a single cost-benefit relationship has been developed in order to gauge their collective system impact.

Using historical data a relationship between the number of network transformers de-energized based on indications provided by these programs and the associated decrease in in-service network transformer ruptures was developed. A direct comparison of annual program costs to the total number of in-service transformer ruptures resulted in the requisite cost-benefit relationship for these three programs. This relationship can be seen in Figure 1-6.

Figure 1-6. Avoided Transformer Ruptures

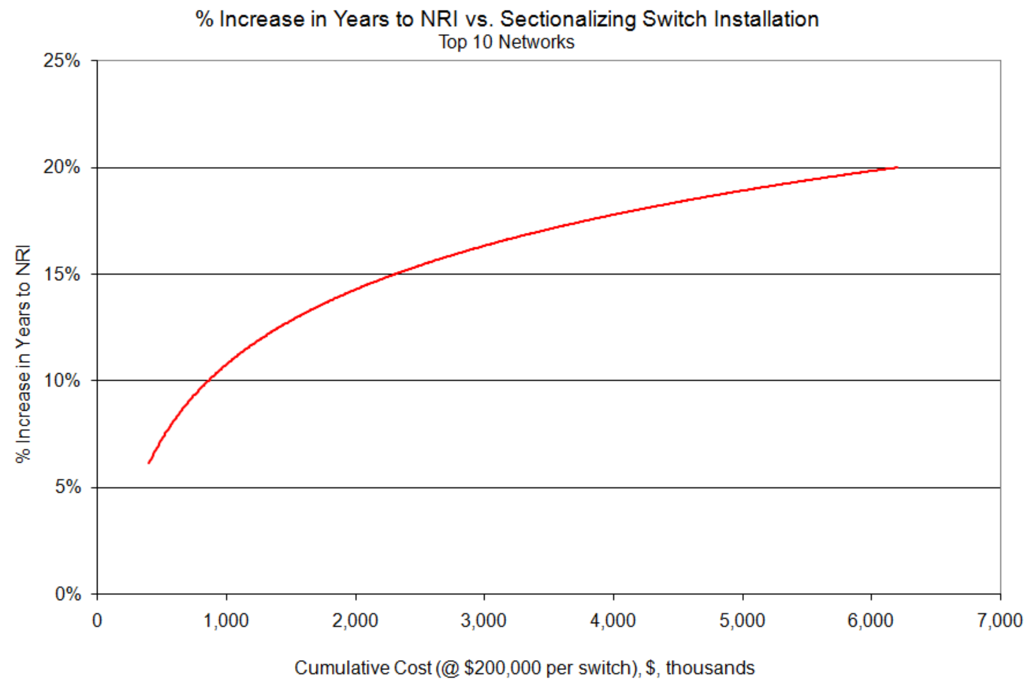


1.2.6 Sectionalizing Switches

Engineering studies have indicated that the targeted placement of primary feeder switches within selected networks improves the performance of the network via the partial de-loading of in-service feeders during outage events. For primary feeder faults occurring downstream of the switch location, the faulted feeder section can be isolated by the switch and the upstream section returned to service while repairs are being completed. The upstream section continues to support the network's load requirement decreasing the magnitude of load shifted to remaining feeders during an outage thereby enhancing network reliability.

Using the NRI model primary feeder switches were strategically placed on targeted feeders within the worst 10 networks. The NRI models were then re-run to quantify the effect of the switch placement on the networks' years to an NRI state event. This increase in years to the NRI state was then compared to those network reliability values in the absence of switch placement and the increase in years to an NRI state event noted. Association of the resulting NRI improvement with the associated switch costs provided the cost-benefit relationship for this program.

Figure 1-7.Sectionalizing Switches NRI Improvement

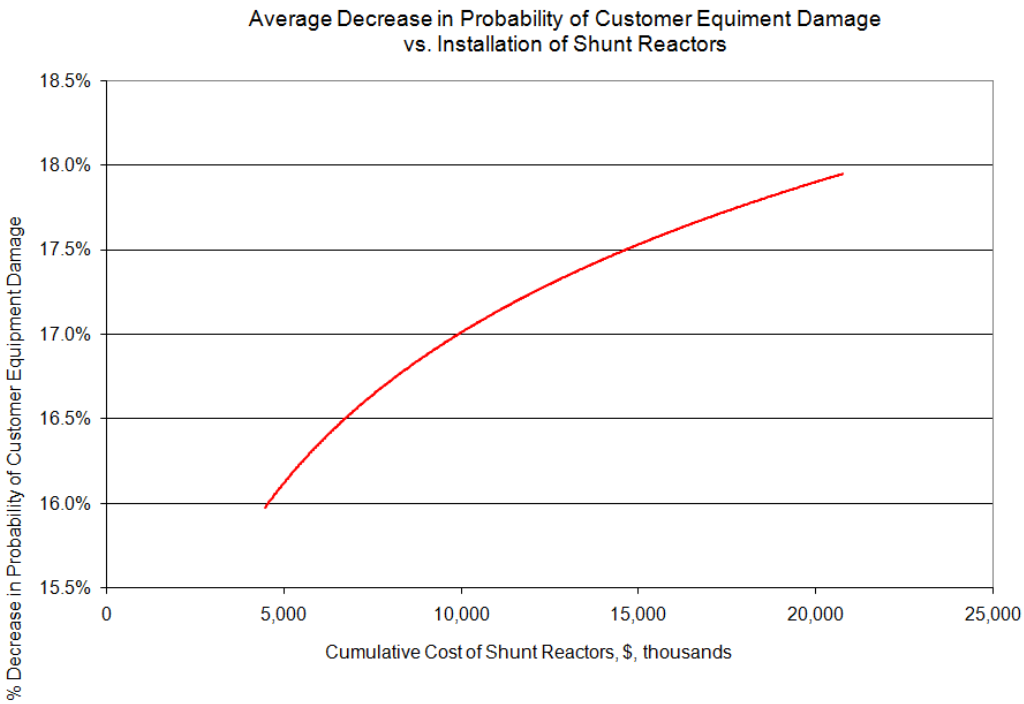


1.2.7 Shunt Reactors

Depending on the magnitude of fault current and localized distribution of customer electronic equipment, primary feeder faults can cause customer equipment damage due to momentary over-voltages. The degree of damage is a function of the over-voltage and can be estimated through the use of CBEMA (Computer and Business Equipment Manufacturers Association) curves. The prioritized placement of shunt reactors on targeted feeders increases localized impedance under fault conditions, lowers the magnitude of associated over-voltages, and helps to mitigate damage to customer's equipment.

A "VARS Compensation Study" carried out by network engineering identified those network feeders which would benefit the most from the addition of shunt reactors of specific sizes. This compensation study also prioritized the installation of the shunt reactors thereby providing for the optimal installation of shunt reactors on the network system. This optimal installation resulted in the largest decrease in customer equipment damage probability for the cost of the reactors. Association of probability reduction and shunt reactor cost resulted in the cost-benefit curve for the program.

Figure 1-8. Shunt Reactor Decrease in Customer Equipment Damage

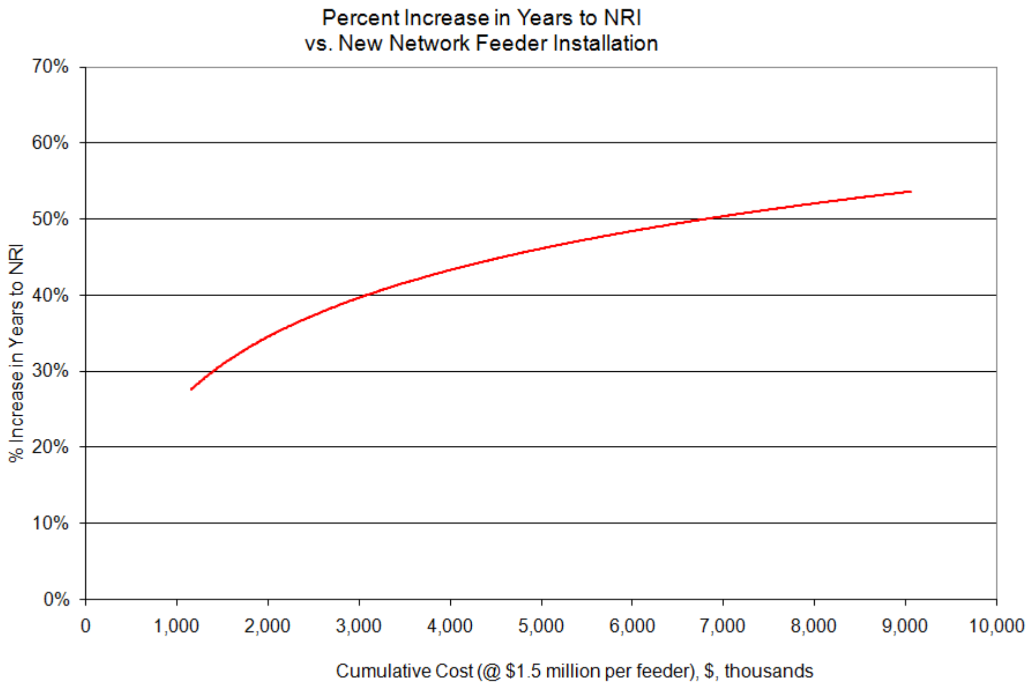


1.2.8 Network Reliability

The Network Reliability Program represents the addition of new feeders and/or the de-bifurcation of existing feeders in selected networks. Although ultimately limited by the existing availability of substation cubicle locations and the ability to construct new ones, the addition to and/or de-bifurcation of feeders in a network helps support overall network performance during peak load conditions and helps to relieve localized overloading. The addition of new feeders contributes to the additional “back-boning” of distribution areas within a network.

Similar to the installation of network switches, based on the NRI model additional primary feeders were strategically placed within selected networks. The NRI models were then re-run to quantify the effect of the additional feeders on the networks’ years to an NRI state event. This increase in years to the NRI state was then compared to those network reliability values in the absence of additional feeders and the increase in years to an NRI state event noted. Association of the resulting NRI improvement with the associated feeder costs provided the cost-benefit relationship for the program.

Figure 1-9. NRI Improvement from Additional Feeder Installation

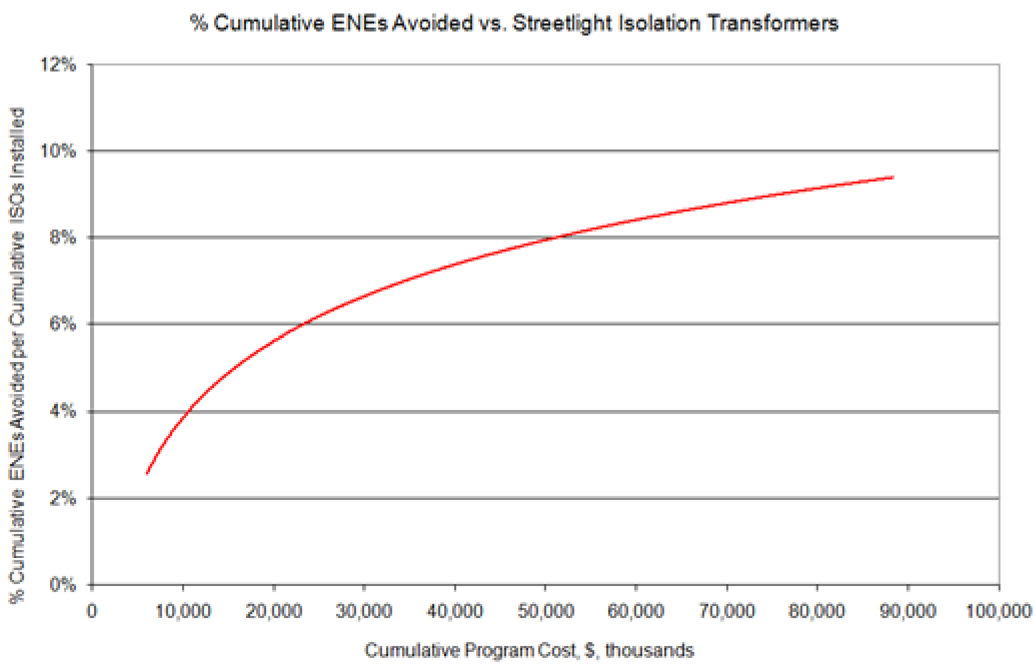


1.2.9 Streetlight Service Reliability (ISOs)

Isolation transformers create an isolated ungrounded circuit for each streetlight, a double-contingency design. This protects workers and the public against electric hazards due to cable failure, poor neutral connections or ineffective grounding which are responsible for the large numbers of stray voltage conditions found each year on streetlights. Because the circuit is ungrounded, current will not seek ground through any alternate path.

Historical data used to estimate the number of streetlight energized network events (ENEs) avoided through the installation of ISO transformers. The cost for transformer installation was then associated with the total number of streetlight ENEs avoided providing the resulting cost-benefit relationship.

Figure 1-10. Streetlight Isolation Transformers ENE Avoided per Dollar



Appendix D: Summary and Implementation Plan

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Appendix D: Summary and Implementation Plan

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1.0 APPENDIX D – SUMMARY AND IMPLEMENTATION PLAN

1.1 SUMMARY

Figures 1-1 and 1-2 summarize the quantifiable benefits and costs of the Plan Case.

Figure 1-1. Benefits of the Electric System Long Range Plan

Long Range Plan Benefits

Environmental

	Units	2009	2030	Change
Direct CO_2 Reduction	Mtons CO_2	0	659	659
Indirect CO_2 Reduction	Mtons CO_2	0	2,064	2,064

Capacity Savings

	Units	2009	2030	Change	% Improvement
Energy Efficiency	MW	52	452	400	765%
Other (External) Energy Efficiency	MW	26	292	266	1018%
Demand Response	MW	0	239	239	
Distributed Generation	MW	299	800	501	167%
Total Capacity Savings	**MW**	**378**	**1,783**	**1,405**	**372%**

Energy Savings

	Units	2009	2030	Change	% Improvement
Energy Efficiency	GWh	738	1,886	1,148	156%
Other (External) Energy Efficiency	GWh	722	2,274	1,552	215%
Total Energy Savings	**GWh**	**1,460**	**4,160**	**2,700**	**185%**

Service Improvement

		2009 Con Edison			2009		
	Units	Overhead	Network	Overall	National Average	New York State w/o Con Edison	2030
Customer Interruptions per 1000 Customers	#	420	17	130	1,250	880	130
Customer Average Interruption Duration Index (CAIDI)	hours	1.83	6.28	2.27	1.8	1.89	2.27

Network Risk Reduction: We estimate a 58% improvement across our highest risk networks from 2010 to 2015.

Figure 1-2. Electric System Long Range Plan Costs and Outcomes

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Long Range Plan Expenditures																						
Capital Expenditures – Program Expenditures																						
Area Stations (net of new stations)	$M	157	171	210	242	203	184	186	188	207	203	152	157	187	215	150	133	118	118	135	120	113
Network Distribution	$M	726	775	770	788	753	681	674	666	654	630	597	617	609	611	603	603	624	591	585	577	567
Transmission (net of new stations)	$M	31	36	56	84	75	65	73	61	47	44	49	53	49	46	74	71	44	39	38	39	37
Generation	$M	40	36	39	38	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Overhead Distribution	$M	124	125	125	126	126	123	123	123	123	121	121	121	121	121	121	121	121	121	121	121	121
IT (net of large system improvements)	$M	45	44	46	31	17	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
IT - Large System Improvements	$M	30	28	29	17	0	0	0	50	75	150	25	0	0	0	0	0	0	0	0	0	0
AMI	$M	0	0	0	33	51	92	54	41	77	49	3	1	0	0	0	0	0	0	0	0	0
Common Capital	$M	249	264	184	152	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141
Federal Stimulus	$M	51	77	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capital Expenditures – New/Refurbished Stations																						
Newtown	$M	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elmsford	$M	37	33	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Academy	$M	107	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
York (3G)	$M	0	0	0	0	0	0	0	0	0	20	118	118	39	0	0	0	0	0	0	0	0
Hudson Yards (3G)	$M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	50	94	180	80	0
Westside S/S (3G)	$M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	245	294	75	0	0
Nevins (3G)	$M	0	0	0	0	0	0	0	0	0	0	0	0	0	36	36	0	0	0	0	15	55
Gateway Park (3G)	$M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	68	0	0	0
Gowanus S/S (3G)	$M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	120	191
Total Capital Expenditures	**$M**	**1,643**	**1,635**	**1,507**	**1,510**	**1,400**	**1,333**	**1,298**	**1,317**	**1,372**	**1,404**	**1,253**	**1,256**	**1,194**	**1,217**	**1,172**	**1,256**	**1,459**	**1,513**	**1,342**	**1,261**	**1,273**
O&M Expenditures																						
T&D Programs	$M	486	487	489	482	485	485	488	491	483	489	491	495	498	489	493	492	494	498	488	492	492
Corporate Allocation	$M	550	573	580	551	495	466	437	414	393	368	368	368	368	368	368	368	368	368	368	368	368
Energy Efficiency	$M	278	141	54	7	76	70	8	8	8	9	10	10	11	11	12	13	13	14	15	16	17
Demand Response	$M	0	0	30	40	46	57	68	79	79	79	79	79	79	79	79	79	79	79	79	79	79
Distributed Generation	$M	26	34	49	49	65	79	84	93	99	105	131	147	163	179	195	210	226	242	258	273	289
AMI	$M	0	0	0	4	4	5	2	2	4	2	4	4	4	4	4	4	4	4	4	4	4
Work Mgmt Savings	$M	0	0	0	0	0	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21
Total O&M Expenditures	**$M**	**1,340**	**1,235**	**1,203**	**1,132**	**1,171**	**1,141**	**1,066**	**1,067**	**1,047**	**1,033**	**1,062**	**1,082**	**1,102**	**1,109**	**1,129**	**1,145**	**1,164**	**1,184**	**1,191**	**1,212**	**1,228**

	Units	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity and Energy Forecast with EV																						
Load Forecast	MW	13,585	13,805	14,015	14,225	14,370	14,495	14,640	14,800	14,930	15,055	15,215	15,394	15,567	15,736	15,899	16,062	16,229	16,397	16,566	16,739	16,917
Sendout Forecast	GWh	61,326	62,172	63,644	64,678	65,715	66,559	67,617	68,329	69,221	70,113	71,340	72,245	73,327	74,407	75,679	76,510	77,526	78,536	79,745	80,518	81,501
Capacity Savings																						
Energy Efficiency	MW	52	173	267	296	329	372	402	405	408	412	415	419	422	426	429	433	437	440	444	448	452
Other (External) Energy Efficiency	MW	26	89	152	205	235	247	250	253	256	259	262	265	268	271	274	277	280	283	286	289	292
Demand Response	MW	0	0	0	0	0	0	0	0	0	0	75	112	149	187	194	202	209	217	224	232	239
Distributed Generation	MW	299	314	342	343	374	400	410	427	438	450	500	530	560	590	620	650	680	710	740	770	800
Total Capacity Savings	**MW**	**378**	**576**	**761**	**844**	**938**	**1,019**	**1,062**	**1,085**	**1,103**	**1,122**	**1,252**	**1,326**	**1,400**	**1,474**	**1,518**	**1,562**	**1,606**	**1,650**	**1,694**	**1,739**	**1,783**
Energy Savings																						
Energy Efficiency	GWh	738	1,114	1,258	1,275	1,463	1,637	1,652	1,668	1,684	1,700	1,716	1,732	1,749	1,765	1,782	1,799	1,816	1,833	1,851	1,868	1,886
Other (External) Energy Efficiency	GWh	722	1,154	1,592	1,746	1,921	1,978	1,996	2,015	2,033	2,051	2,072	2,090	2,111	2,132	2,149	2,171	2,192	2,212	2,232	2,255	2,274
Total Energy Savings	**GWh**	**1,460**	**2,268**	**2,850**	**3,021**	**3,384**	**3,615**	**3,648**	**3,683**	**3,717**	**3,751**	**3,788**	**3,822**	**3,860**	**3,897**	**3,931**	**3,970**	**4,008**	**4,045**	**4,083**	**4,123**	**4,160**
Additional Plan Components																						
AMI Meter Deployment	meters					131,277	276,358	327,558	193,529	145,042	259,933	161,994										
Electric Vehicle Adoption (NYC + WC)	cars	0	0	0	0	0	0	0	0	0	0	28,000	74,000	121,000	167,000	214,000	251,000	288,000	325,000	363,000	400,000	437,000
Supply Cost	$/MWH	108.86	116.21	112.41	115.11	120.36	128.48	131.44	131.24	132.55	133.38	134.99	136.77	137.81	138.43	139.20	139.89	140.92	142.05	142.98	145.26	146.74
Residential Impact																						
Average Usage	kWh	292	288	285	285	283	282	283	283	283	283	283	283	284	284	284	284	284	284	285	285	285
Rate	$/kWh	0.29	0.31	0.32	0.32	0.36	0.37	0.37	0.37	0.37	0.37	0.38	0.39	0.40	0.39	0.39	0.40	0.41	0.41	0.41	0.42	0.43
Monthly Bill	$	83.43	88.52	90.06	92.58	101.14	104.15	103.46	104.53	106.06	105.89	107.16	109.76	112.53	111.96	112.04	113.70	115.22	115.86	117.72	120.13	121.66

1.2 IMPLEMENTATION PLAN

This Electric System Long Range Plan includes a number of initiatives that are already underway, and others that will develop and mature over the plan time horizon. We will continue to pilot technologies and seek out opportunities to manage our assets more efficiently, while maintaining our world class reliability. One of the greatest challenges of carrying out this plan is the uncertainty surrounding many of the signposts and their impact on our ability to achieve the goals set forth. This implementation plan provides a road map for us to measure our progress in phases over the 20-year plan period. While it is by no means set in stone, it will focus our efforts on accomplishing the initiatives contained in this plan.

Figure 1-3 provides a summary of our implementation plan.

Figure 1-3. Implementation Plan

MANAGING DEMAND, SUPPLY, AND ENVIRONMENTAL PROFILE

INITIATIVES	Phase I: 1 - 5 years	Phase II: 5 - 10 years	Phase III: 10 - 20 years	Signposts
Energy Efficiency				
Actively work with customers to promote energy conservation and to develop, offer, and continually refine a suite of programs that drive efficient end-use technologies to provide permanent energy reduction.	Expand offering and test new programs	Drive penetration, better integrate with other demand and supply-side resources, and enhance automation	Continue to drive penetration in key segments, expand linkage with "Smart Grid," and move away from incentive models	Energy efficiency programs, expected expenditures and savings may need to be adjusted based on demand growth, pending legislation, achievable energy reductions, and regulatory developments.
Cumulative Capacity Savings (MW)	329	412	452	
Cumulative Energy Savings (GWh)	1,463	1,700	1,886	
Demand Response				
Expand targeted deployment of verifiable and measurable demand response and introduce the next generation of demand response tools and incentives to our customers.	Expand offering, test new programs, and lay groundwork for dispatchable, verifiable demand resources.	Drive penetration of transparent, market-based pricing, automated dispatch, and integration with other demand and supply resources.	Continue to drive penetration in key segments, expand linkage with "Smart Grid," and explore new business models.	The demand response program portfolio require adjustment as changes in technology innovations, load growth, and legislation occur.
Capacity Savings (MW)	0	0	239	
Distributed Generation (DG)				
Continue to drive towards using DG as a future tool in managing both supply and demand in certain load areas, under specific conditions.	Interconnection and concept piloting, including the Long Island City Smart Grid Pilot, Grid Support Pilot, DG Collaborative, and Solar Program.	Drive penetration in target load areas and/or segments	Implement transformational opportunities through policy and infrastructure enablers	Strategy will be adjusted based on economic recovery, technology innovations, environmental regulation and legislation. Natural gas prices and supporting infrastructure will drive pace of adoption.
Electric Vehicles				
Facilitate and manage the integration of PEVs in the grid.	Monitor the development of PEV technology and early vehicle adoption.	As PEV penetration levels become clearer, prepare for integration of PEV's into the grid.		The overall pace of electric vehicle penetration will be influenced by driving range of the vehicles, interoperability with fuel charging, communications and billing capabilities, and government support.
Advanced Metering Infrastructure (AMI)				
Deploy an AMI pilot in a representative sample of the system. Once the pilot deployment is completed deploy across the system in a targeted fashion.		Begin targeted deployment of AMI meters.	Complete targeted deployment of AMI meters.	Key areas to monitor that will impact the Company's implementation of AMI include demand growth, regulatory guidance, and technology advances.
New Transmission				
Continue to study opportunities to build new transmission to integrate bulk renewables into the overall generation mix.	Continue to support advantageous projects for customers	Identify opportunities to interconnect additional renewable generation	Focus on transformational opportunities through policy and technology enablers	Conditions that may result in strategic adjustments include renewable legislation, migration away from central procurement, supply availability, storage technologies.

Figure 1-3. Implementation Plan (Continued)

	INITIATIVES	Phase I: 1 - 5 years	Phase II: 5 - 10 years	Phase III: 10 - 20 years	Signposts
INTEGRATING INNOVATIVE SYSTEM DESIGN	**Tailored Solution Approach**				
	Continue to develop and improve our integrated and tailored approach to meeting customer demand.	Move the Company beyond traditional electric capacity expansion methods to create tailored solutions to each specific need, incorporating more use of targeted energy efficiency and demand response.			Two significant areas to monitor that will trigger adjustments to our design strategy are growth in electricity demand and technology innovation. Both of which can alter the scope and pace of our 3G implementation.
	Increasing Asset Utilization				
	Meet our service reliability objectives in less asset intensive ways through the implementation of innovative third generation (3G) designs.			Implement 3G designs for new planned substations.	
	Design Standards				
	Continue to develop designs that mitigate the risk of a prolonged, large-scale network outage, while also seeking out engineering and economic solutions that may allow us to migrate away from our secondary grid design.	Utilize the NRI reliability and risk metric to enhance the Company's design and planning criteria to ensure that infrastructure investments minimize the level of risk for all networks.	Complete analysis on a long-term (20- to 50-year) system design strategy focusing on the continued use and viability of the Company's secondary networks.		

Figure 1-3. Implementation Plan (Continued)

IMPROVING ASSET MANAGEMENT & CONTROL

INITIATIVES	Phase I: 1 - 5 years	Phase II: 5 - 10 years	Phase III: 10 - 20 years	Signposts
Optimization Strategy				
Continue to analyze the incremental benefit and cost of each replacement program and identify the most efficient investment across a mix of reliability programs.	Complete all remaining cost benefit curves for selected capital programs.			The overall asset management strategy will be influenced over time by the efficiency gains and NRI improvements realized, asset lives and failure rates, regulatory approval, and access to external funding.
Low Voltage Network Cables				
Deploy effective secondary models that help us more efficiently plan for our secondary network grid systems and continue reviewing the potential to migrate away from secondary networks while maintaining comparable levels of reliability.	Develop a secondary risk model that coupled with advanced monitoring technology, optimizes our efforts to improve underground secondary performance.	Install "spot networks" for large customers at lower demand thresholds.		
Network Transformers				
Continue to drive down transformer failure rates with the use of RMS, PTO transmitters, and other technologies.		Complete installation of PTO transmitters on all network transformers.		
Primary Distribution Cables				
Continue to drive down primary distribution cable failure rates with the use of improved modeling and cable design.	Develop a more refined network model that provides more accurate representation of load flow.	Develop better designs for medium and low voltage cables through our work with our principal supplier and EPRI.		
Overhead Distribution System				
Continue to implement capital and maintenance programs needed to maintain reliability employing our asset management strategy.				
Substation Asset Management				
Continue to use condition-based maintenance to provide for better allocation of maintenance resources directed at the major asset classes.		Complete an assessment of the health of the overall substation transmformer fleet.		
Transmission Asset Management				
Continue to drive down dielectric system leaks and cable failures through the use of better technology, dynamic feeder ratings, and the expanded use of solid dielectric cables.	Evaluate the feasibility of re-using existing piping as conduits for new solid dielectric cable, and existing manholes to house their splices.			
Enhancing Monitoring and Control of the Grid				
Improve how we model, monitor and control our electric system through the use of AMI and Smart Grid technologies.		Improve modeling capabilities in the low voltage networks by utilizing existing modeling programs, map records and new data validation methods.		
Secure Interoperable Open Smart Grid Demonstration Project				
Implement our Secure Interoperable Open Smart Grid Demonstration Project Initiative to develop a smarter grid.	Develop and evaluate monitoring, control, modeling, and visualization technologies	Establish widespread system control and automation under AMI and the Secure Interoperable Open Smart Grid Demonstration Project.	Integrate innovative technologies to enhance end use and minimize T&D investments	

Figure 1-3. Implementation Plan (Continued)

	INITIATIVES	Phase I: 1 - 5 years	Phase II: 5 - 10 years	Phase III: 10 - 20 years	Signposts
ENHANCING CUSTOMER EXPERIENCE	**Customer Experience**				
	Make it easier for customers to do business with us through use of technology improvements, and provide customers with information and tools to manage their energy bills.	Improve customers' experience interacting with CECONY and become energy advisors	Upgrade back-office systems to support new capabilities, including new pricing structures and the capture and management of interval usage data.	Enable sustained behavior changes by supporting the bi-directional flow of rich information and other next-generation energy management applications such as smart home devices and automated controls.	Changes in customer needs over time, adoption of new technologies, and the growth of new media, will all influence how the Company adjusts its plan to be responsive to customers.
IMPROVING PROCESSES AND SKILLS	**Long Range Planning Process**				
	Strengthen linkages and integration across the Company to better track internal and external information that is critical to short- and long-term planning.	Better link electric T&D planning and investments to the Company's corporate strategy through leveraging the Electric Long Range Plan and Capital Optimization process.			Closely monitoring our business environment through established information platforms will influence shifts in our planning.
	Capital Optimization				
	Evaluate projects system wide, making tradeoffs across operating units through standardized analytical methods and guidelines that align with corporate strategic objectives.	Centralize the prioritization of investments and evaluate projects system wide to enable the Company to make trade-offs across operating units through standardized analytical tools and methods.			
	Cost Management				
	Provide our employees with the skills and and tools necessary to effectively track and manage costs.	Strengthen our financial analysis capabilities, improve the project estimating process, enhance cost awareness in our culture, and standardize our use of project management techniques and functions.			
	Enhancing Organizational Skills				
	Develop and train our employees to acquire the necessary analytical skills, and utilize strategic workforce planning, in order to successfully execute the Electric System Long Range Plan.	Identify key skill gaps and develop a strategy to fill them, while monitoring the relationship between industry trends, the Company's strategic direction, and internal capabilities.			The Company will need to monitor and identify potential skill gaps that can be addressed through training, knowledge management, career management, and hiring.

Appendix E: Glossary

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4kV unit substation grid

Feeders are connected to a series of distribution transformers that step down power to supply residential customers with house (or low voltage) service of 120/208V or 120/240V. 4kV primary grid feeders are tied together, allowing for continued service in the event one of the feeders is out of service.

A

Advanced Metering Infrastructure (AMI)

System which deploys end-use devices designed to communicate with the utility and with a robust meter data management system.

Aerial cable

Insulated cable installed on poles via a steel messenger cable for the purpose of delivering power at distribution voltage levels.

Area Substation

Substation that reduces voltage from transmission levels to distribution levels (e.g., from 138,000 volts to 13,000 volts).

Asset intensity

Level of assets per customer.

Asset Sharing

Refers to our 3G design in which spare power transformers in distribution area substations are shared among multiple substations.

Autoloop

Overhead distribution system comprised of wire, transformers, switches, and vacuum reclosers installed on poles. An auto-loop will automatically isolate a fault on open wire, reducing the amount of customers interrupted.

Automatic Call Distribution (ACD)

A telephony system that intelligently distributes inbound customer calls to Agent phone consoles or other call answering devices defined by discrete skill groups.

Automatic Transfer Switch (ATS)

An automatic transfer switch is a device that automatically transfers load from one supply (e.g., the preferred supply) to another supply (e.g., a stable alternative supply in the event of the failure of the preferred supply) with a break before make operating sequence. Also, it must be capable of manually returning the load to the preferred supply, after the preferred supply has been restored and has become stable. An ATS must also be capable of manual operation if its automatic operation malfunctions.

C

Cable

Insulated conductor that can be installed either overhead or underground

Capacitor

Device which helps to improve the efficiency of transmission and distribution circuits by reducing power losses.

Capacity

The load for which a generating unit, generating station, or other electrical apparatus is rated

Cathodic protection

A corrosion control system in which the metal to be protected is made to serve as a cathode, either by the deliberate establishment of a galvanic cell or by impressed current.

Circuit Breaker

Switch that automatically disconnects power to a circuit in the event of an electrical fault condition. May also be operated manually to disconnect power.

Carbon Dioxide Equivalent (CO_2e)

Concentration of CO_2 that would cause the same level of radiative forcing as a given type and concentration of greenhouse gas.

Conductor

Wire, cable, or bus that serves as a path for current to flow.

Customer Average Interruption Duration Index (CAIDI)

Equal to the customer hours divided by the number of customers interrupted.

Customer Service System (CSS)

Con Edison customer billing and account system.

D

Delivery rate

Represents the cost of transporting energy from the point of supply to the Con Edison system to the customer and constitutes percentage of an average customer bill. This rate covers costs to build and maintain our transmission, substation, and distribution assets as well as to maintain and operate the customer billing and other operations platforms to service customers.

Demand Response (DR)

Control over the load shape by shaving the peak.

Demand Side Management (DSM)

The term for all activities or programs undertaken by a Load-Serving Entity or its customers to influence the amount or timing of electricity they use.

Direct Current (DC)

Fixed polarity power supply with a positive and negative terminal that remains constant.

Distributed Generation (DG)

Electricity generating apparatus sited with a customer as opposed to a centralized station. DG is designed to serve some or all of the electricity needs of a customer by leveraging fuel sources ranging from natural gas, to waste water, to renewable fuels such as solar and wind.

Distribution

System used to deliver power from a substation to the customer's premises. The Con Edison distribution system is comprised of 4kV, 13kV, 27kV and 33kV.

Drain-bonds

A metallic connection between a subsurface structure, such as a feeder pipe, and the source of stray currents; the installation of which prevents corrosion on said subsurface structure.

E

Electric Power Research Institute (EPRI)

An independent, non-profit company performing research, development and design in the electricity sector for the benefit of the public.

Electric Shock Report (ESR)

Report that occurs when an employee or member of the public reports detecting a "shock" from stray voltage in the Con Edison service territory.

Energized Equipment (ENE) Incidents

Report of energized piece of equipment.

Energy Efficiency (EE)

Actions or technologies that provide reductions in energy consumption at the customer level, while maintaining equal or greater quality of service.

Energy efficiency portfolio standard (EEPS)

In May 2007, the EEPS proceeding was initiated by the New York State Public Service Commission (PSC) as part of the overall effort to reduce New York's electricity use by 15 percent from forecasted 2015 levels. Subsequently, the PSC established and approved efficiency targets for the State's investor-owned electric utilities and NYSERDA.

Enterprise Risk Management (ERM)

A process by which the Company identifies, monitors and mitigates risks. Our risk management program has three primary objectives: 1) systematic risk mitigation; 2) proper allocation of resources; and 3) enhanced communication and transparency.

F

Feeder

Circuit used to deliver power from a generating station or switching station to the distribution area substation (transmission); circuit used to deliver power from a breaker position at a substation to the transformers or switching devices at the load area (distribution).

First contingency (N-1)

Loss of a single facility that occurs independent of any other event.

Furan analysis

Furans are chemical compounds that are released into the oil from the transformer insulating paper. There are 5 Furanic compounds that are typically measured in a transformer. Furanic compound analysis can be used to diagnose the condition of the insulating paper. This technology still requires additional work to be able to directly correlate Furan levels to the condition (age) of the paper.

G

Gigawatt hours (GWh)

Unit of energy equal to that expended in one hour at a rate of one billion watts. One GWh equals 1,000 megawatt-hours.

Green house gas (GHG)

Gases in the atmosphere that absorb and emit radiation within the thermal infrared range. The main greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide and ozone.

H

Home Area Network (HAN)

Network contained within a user's home that connects a person's digital devices, from multiple computers and their peripheral devices to telephones, televisions, home security systems, "smart" appliances and other digital devices that are wired into the network.

I

Interactive voice response (IVR)

A system that enables self-service automation via phone. Customers interact with the IVR system using touch-tone and speech technology to service their inquiries.

Interval usage data

Time-based data typically obtained from an interval meter. This data can be used for time-based pricing and demand response programs.

Isolator surge protectors

A device that protects lines and equipment against voltage surges caused by lightning or abnormal system conditions that can damage cable or equipment insulation. It is connected from the line to ground to provide a conducting path. This limits the voltage on lines or equipment and dissipates excess energy harmlessly.

J

Joint

Joining or splicing of conductors for the purpose of continuity of cable sections.

K

Key Performance Indicators (KPI)

Set of indicators used to ensure safe and reliable performance which is a benefit to Con Edison's customers and to align management employee salaries to the Company's performance. The periodic monitoring of these indicators helps the Company make mid-course corrections, as necessary.

L

Levelized cost of energy (LCOE)

Determination of the average price a customer would have to pay each year, over the life of the energy supply asset, to install and operate a specific technology.

Load

The power consumed by customers and equipment.

Load area

An individual substation supply area.

Load forecast

Predicted demand for electric power. A load forecast may be short-term (e.g., 15 minutes) for system operation purposes, long-term (e.g., 5 to 20 years) for generation planning purposes, or for any range in between. Load forecasts may include peak demand (MW), energy (MWh), reactive power (MVAR), and/or load profile.

Load pocket

An area on the electrical system that, because of transmission limitations, must have internal generation resources available because the area cannot be served entirely by external sources.

Load relief

Work performed to relieve capacity constraints in an area due to customer demand or to address an overloaded condition on a component such as a feeder or transformer.

Load Shaving

A reduction of peak demand through the use of demand response.

Load Shedding

Process of disconnecting load from the system for the purpose of protecting the integrity of the system.

Load Shifting

Involves shifting load from peak to off-peak periods.

M

Main

A secondary cable conductor section. A secondary main ranges from one hundred to several hundred feet in length. Together, 450,000 of these interconnected mains make up the Con Edison low voltage network grid.

Megawatt (MW)

Unit of power equal to one million watts.

Meter data management system (MDMS)

A system that stores meter information for billing and includes capabilities for metering, time-based pricing, reactive power, and a variety of other rates and options.

N

N-2 design standard

At various stages of electric delivery, the system is designed to withstand the loss or failure of any two parallel devices.

Net distribution plant

Net plant is defined as the historic gross additions to plant accounts, net of accumulated depreciation.

Net metering

A utility metering practice in which utilities measure and bill for the net electricity consumption or generation of their customers with small generators. Net metering can be accomplished through two means: (1) A single, bi-directional electric meter that turns backward when the customer's generator is producing energy in excess of his demand and forward when the customer's demand exceeds the energy generated or (2) By separately metering the flows of electricity into and out of the customer's facility. Net metering provisions vary by state and utility.

Network

A system of transmission or distribution lines so cross-connected and operated as to permit multiple power supply to any principal point on it.

Network Reliability Index (NRI)

Calculated based on failure rates for cable sections, joints, transformers, and other equipment based on their age, temperature range, voltage, and loading conditions to model specific network performance under various scenarios. An NRI value of 0.001 indicates that the network will experience simultaneous feeder failure once in a thousand years (1/.001 =1000).

Non-network

Non-network distribution systems can be either radial, overhead autoloop systems, underground residential distribution (URD) systems, or 4 kV supply.

NYSERDA

New York State Energy Research and Development Authority is a public benefit corporation created in 1975. Currently, NYSERDA is primarily funded by New York State rate payers through the System Benefits Charge (SBC). These funds are allocated towards energy efficiency, programs, research and development initiatives, low-income energy programs, and other activities. In addition, NYSERDA is involved in energy efficiency through the energy efficiency portfolio standard proceedings, and through a Request for Proposals process, is the central procurement administrator for renewable energy sources in New York State.

O

Open main

Secondary mains that are removed from live service and they correspondingly increase the loading on nearby mains.

OSHA incidence rate

"The main performance metric in the area of employee safety is the OSHA incidence rate. The incidence rate is a normalizing indicator that captures the number of recordable injuries/illnesses per standard unit of 100 full-time equivalent employees (each working 2,000 hours per year). It is dependent upon the number of recordable injuries/illnesses experienced and the number of productive hours worked, which includes all straight time, compensable overtime, training hours, and restricted duty hours for both weekly and management employees.

The formula for calculating the incidence rate is: Number of Recordable Incidences x 100 x 2000 / Total Number of Productive Hours Worked."

P

Paper insulated lead covered cable (PILC)

A cable type that is lead jacketed and uses oil-impregnated paper as its insulating medium. It is no longer installed on the Con Edison system.

Peak Demand

(1) The highest hourly integrated Net Energy For Load within a Balancing Authority Area occurring within a given period (e.g., day, month, season, or year). (2) The highest instantaneous demand within the Balancing Authority Area.

Plug-in Electric Vehicle (PEV)

Includes Plug-in Hybrid Electric Vehicles (PHEVs) and Electric Vehicles (EVs), both of which do not have internal combustion engines.

Power quality

The characteristics of electricity that determine its usefulness. Quality electricity is alternating current electricity that is synchronized, 60 Hertz frequency, at the proper voltage required at its point of use.

Pressure, Temperature and Oil (PTO) transmitter

Installed on network transformers to report pressure, temperature and oil-level readings. Such data will enable transition from a time-based to a condition-based transformer protocol for managing our transformer population.

Protective relay

The purpose of protective relays is to minimize damage and isolate problems. System reliability should not be affected outside the immediate problem area. An important point to remember is that protective relays do not prevent trouble. Relays response to trouble and minimize further damage. Relays work quickly, usually in a few cycles, to isolate the source of trouble and avoid further damage. In judging relay performance: selectivity, sensitivity, and reliability all play a large role.

R

Radial network

Distribution system with one source of supply only. Also referred to as non-network.

Rectifier

Converts alternating current (AC) to direct current (DC).

Remote Monitoring System (RMS)

System that provides information about the health of the transformer and enables preventive replacement before failure.

Renewable Portfolio Standard (RPS)

A mandate, or goal, set to require or promote the use of renewable resources for electric generation. The Standard generally states that a certain percentage of a retail electric provider's overall or new generating capacity or energy sales must be derived from renewable resources, with the percentage increasing gradually over time. An RPS most commonly refers to electric sales measured in megawatt hours, as opposed to electric capacity measured in megawatts. Most Standards also contain a secondary market in tradable renewable credits, allowing the electricity providers to use the least-cost method to achieve the set goals.

Risk Priority Number (RPN)

Quantifies the relative priority of risks across the Company. For each identified enterprise risk an assessment is performed of the severity, likelihood and controllability through assigning a value from 2 - 10 for each component. These component factors are then multiplied to produce a risk priority number.

S

SAIFI

System Average Interruption Frequency Index (Interruption Rate) = (Customers Interrupted / Customers Served) X 1000.

Second contingency

see N-2 design standard

Secondary network

System of distribution feeders connected on their secondary side (120/208V). This system allows for a multiple power supply to any given point connected to the secondary grid.

Secondary system

Approximately 70,000 miles of underground low-voltage cable serving the secondary networks through almost a half million secondary conductor sections, or "mains".

Sectionalizing switch

Switches typically installed either very near the area substation on two separate parallel outbound cables, which essentially creates two feeders out of one, or midway along the single feeder path, which provides quicker restoration of half of the feeder when a component fails.

Smart Grid

Integrates information and communication technology into electricity generation, delivery, and consumption, making systems cleaner, safer, and more reliable and efficient.

Solid dielectric

Cross-linked polyethylene (XLPE) or ethylene-propylene rubber (EPR) used as insulation for distribution and transmission cables. This type of insulation is used in place of oil impregnated paper type insulation or similar insulations.

Spot network

Electrically isolated high voltage service that feeds directly from the Company's primary system to a customer. Voltage is transformed at the customer site to provide low voltage (120/208V).

Stray voltage

Result of insulation breakdown on the low voltage cables or from defective neutral connections in streetlights and overhead wires. Some can inadvertently energize publicly accessible structures, although few are significant enough to cause bodily injury.

Sulfur-hexafluoride (SF6)

Dielectric to extinguish the circuit breaker arc and as an insulating medium in different pieces of equipment such as in enclosed bus arrangement.

Supply rate

Electric rates reflecting the cost to procure electricity for full service customers.

T

Tap changer

A device used to continuously regulate the voltage output of a transmission system transformer.

Third-generation design (3G)

Design that can be used for system expansion, without sacrificing reliability, while also increasing operational flexibility and asset utilization. 3G design concepts to address system expansion include: asset sharing, transferrable feeder groups and virtual substations.

Time-based pricing

Electric rates designed to encourage customers to reduce electricity use during peak hours. Customers are charged for electricity depending on when they use it.

Transferable Feeder Group

Ties feeders across two substations with an advanced, automated, normally open switch to enable power supply to the primary circuits from two locations.

Transformer

Electrical device used for converting voltage or current levels by either stepping up or down the level.

Transmission

An interconnected group of lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed or delivery to customers or is delivered to other electric systems.

Transmission Feeder

The circuit used to deliver power from a generating station or transmission station to the distribution area substation.

Transmission Substation

A substation that reduces voltage from transmission levels to sub-transmission levels (e.g., from 345,000 volts to 138,000 volts).

U

Underground Residential Distribution (URD)

An underground radial system that is supplied from a 4 kV overhead radial system.

Unit Substation

Comprises a large step-down transformer that transforms voltage levels from 33kV, 27kV, or 13kV to the 4kV level for the purpose of distribution on primarily overhead wires to supply mostly residential load at the 120/28V or 120/240V level.

V

Vacuum recloser

Pole mounted automatic switch used in auto-loops for the purpose of isolating and restoring power due to a feeder outage or overhead wire fault.

Vehicle-to-grid (V2G)

Ability for PEV owners to plug their vehicle into a charging station and sell the electricity back to the grid.

Virtual substation

Innovative, responsive capacity expansion process that can be used to better match investment with load requirements. New substation is constructed with the switchgear and protection equipment but without power transformers. It is supplied via distribution feeders from two nearby substations. Once load growth is sufficient to properly utilize substation transformers, power transformers are installed and the virtual substation becomes a traditional substation. This approach lowers the overall size and cost of incremental capacity expansion, thereby lowering customer costs and improving asset utilization.

W

Watt (W)

The electrical unit of real power or rate of doing work. The rate of energy transfer equivalent to one ampere flowing due to an electrical pressure of one volt at unity power factor. One watt is equivalent to approximately 1/746 horsepower, or one joule per second.