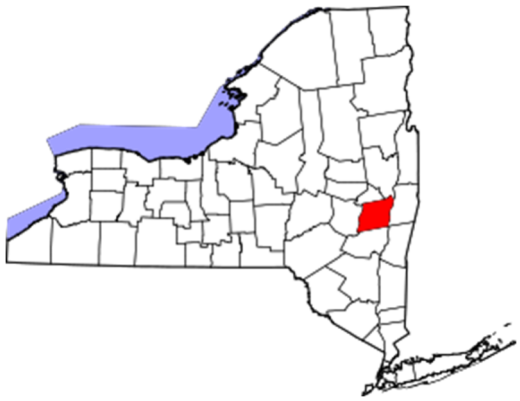
Clean Energy Master Plan

For

CITY OF ALBANY
NEW YORK



New York State Energy Research and Development Authority
17 Columbia Circle
Albany, New York 12203-6399

Date: March 17, 2023

For questions regarding this report, please contact FlexTech@nyserda.ny.gov.

We hope the findings of this report will assist you in making decisions about energy efficiency improvements in your facility. Thank you for your participation in this program.

NOTICE

State of New York
Kathy Hochul, Governor

New York State Energy Research and Development Authority

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EXECUTIVE SUMMARY

The City of Albany has engaged Wendel to audit their facilities to identify and evaluate energy savings opportunities that the City can consider incorporating into future capital improvement projects. Discussions and preliminary reviews with the City helped focus on essential improvements for the them while also making a positive impact on the environment. Below is a brief overview of the measures analyzed as part of the scope in this study.

- LED Lighting Upgrades
- DHW Heater Replacements – Gas to Electric
- Building Controls
    - Temperature Setback
    - City-Wide EMS
- Building Envelope Improvements
- HVAC Upgrades
    - Air Handling Unit Replacement
    - Roof Top Unit Replacement
    - Window A/C to Split Systems
    - Economizers
    - Unit Heater Replacement
- Boiler Replacement
    - In-Kind Boiler Replacement
    - Steam to Hot Water Conversion
- Variable Frequency Drives / ECM Motors
- Vending Machine Controls
- Ventilation Upgrades
    - Destratification Fans
- Heat Recovery Air Handling Units
- Retro-Commissioning
- Building Electrification

On site investigations were conducted to document existing conditions and identify energy savings opportunities at each facility. This data was used along with existing mechanical and electrical systems drawings to develop energy savings modeling calculations for each ECM. Wendel also utilized internal estimates based on past construction projects to produce estimates for construction costs.

ECMs are broken down into a 3-phase approach. Phase 1 ECMs are normal measures that would typically be recommend for energy savings with a lens of what will we potentially recommend for electrification. Phase 2 ECMs are upgrades that will aide or prepare buildings for the implementation of electrified solutions, such as converting steam systems to hot water systems. Phase 2 ECMs also include lower cost electrification measures, such as upgrading natural gas fired domestic hot water heaters to electric domestic hot water heaters. Phase 3 ECMs outline electrification options.

The below Total Project Summary sheet (table 1-1) was developed to offer an overview of project economics and energy cost savings of each measure listed above.

NYPA City of Albany CEMP
TOTAL PROJECT SUMMARY
3/22/2023
Comprehensive Project

(Y)es (N)o (O)ption	Line No.	Facility	ECM No.	CEMP Phase	Energy Conservation Measure	Annual Electric Savings (kWh)	Annual Demand Savings (kW)	Annual Fuel Savings (mmBtu)	Annual O&M Savings ($)	Annual Electric Savings ($)	Annual Fuel Savings ($)	Total Annual Savings ($)	Simple Payback Period [2]	Total Measure Cost ($)	Emissions Reduction (lbs of CO_2)	Estimated Utility Electrification Incentives (20%)	Estimated Inflation Reuction Act Incentive (15%)	Estimated Total Incentive [3]
Y	1	Bleecker Stadium Administration Building	1	1	LED Lighting Upgrades	6,880	25.0	0	$592	$974	-$3	$1,564	26.2	$40,982.65	1,710	$0	$8,341	$8,341
Y	2	Boat House	1	1	LED Lighting Upgrades	2,165	0.0	0	$415	$0	$0	$415	22.0	$9,125.24	548	$0	$1,857	$1,857
Y	3	Boxing Gym	1	1	LED Lighting Upgrades	3,021	31.7	0	$35	$799	-$1	$833	16.0	$13,307.27	745	$0	$2,708	$2,708
N	4	Ridgefield Park	1	1	LED Lighting Upgrades	400	8.4	0	$7	$160	$0	$167	36.0	$6,005.08	99	$0	$1,222	$1,222
Y	5	Engine No. 1	1	1	LED Lighting Upgrades	922	3.3	0	-$6	$126	-$1	$119	16.8	$2,007.59	227	$0	$409	$409
N	6	Lincoln Park Bath House	1	1	LED Lighting Upgrades	6,392	55.7	0	$359	$1,381	-$2	$1,738	38.8	$67,429.60	1,594	$0	$13,724	$13,724
Y	7	Swinburne Park Skating Rink	1	1	LED Lighting Upgrades	4,140	0.3	0	$504	$334	$0	$838	12.3	$10,269.36	1,048	$0	$2,090	$2,090
O	8	Arbor Hill Fire House	2	2	DHW Heater Replacements - Gas to Electric	-19,272	-12.0	112	$0	-$1,864	$1,060	-$804	N/A	$2,948.00	8,271	$400	$600	$1,000
O	10	Boxing Gym	2	2	DHW Heater Replacements - Gas to Electric	-9,167	-12.1	53	$0	-$1,260	$420	-$840	N/A	$6,441.38	3,934	$874	$1,311	$2,185
O	11	Department of General Services	2	2	DHW Heater Replacements - Gas to Electric	-35,042	-12.1	166	$0	-$3,284	$1,433	-$1,851	N/A	$7,919.07	10,556	$1,075	$1,612	$2,686
O	12	Engine No. 1	2	2	DHW Heater Replacements - Gas to Electric	-8,445	-12.0	49	$0	-$906	$477	-$428	N/A	$5,100.04	3,624	$692	$1,038	$1,730
O	13	Engine No. 10	2	2	DHW Heater Replacements - Gas to Electric	-11,693	-12.1	68	$0	-$1,173	$629	-$544	N/A	$7,919.07	5,018	$1,075	$1,612	$2,686
O	14	Engine No. 11	2	2	DHW Heater Replacements - Gas to Electric	-10,610	-12.0	62	$0	-$1,129	$595	-$534	N/A	$5,100.04	4,554	$692	$1,038	$1,730
O	15	Engine No. 7	2	2	DHW Heater Replacements - Gas to Electric	-6,280	-12.0	37	$0	-$724	$356	-$368	N/A	$5,100.04	2,695	$692	$1,038	$1,730
O	16	Engine No. 9 / Ladder No. 4	2	2	DHW Heater Replacements - Gas to Electric	-12,776	-12.1	75	$0	-$1,314	$693	-$621	N/A	$6,441.38	5,483	$874	$1,311	$2,185
O	17	Golf Course Club House	2	2	DHW Heater Replacements - Gas to Electric	-7,139	-12.1	42	$0	-$788	$378	-$410	N/A	$7,919.07	3,064	$1,075	$1,612	$2,686
O	18	Recreation Department Administration Building	2	2	DHW Heater Replacements - Gas to Electric	-6,530	-12.0	38	$0	-$759	$360	-$399	N/A	$5,100.04	2,802	$692	$1,038	$1,730
O	19	Ridgefield Park	2	2	DHW Heater Replacements - Gas to Electric	-342	-12.0	2	$0	-$204	$18	-$185	N/A	$5,100.04	147	$692	$1,038	$1,730
O	20	South End Fire House	2	2	DHW Heater Replacements - Gas to Electric	-18,189	-12.1	106	$0	-$1,801	$984	-$817	N/A	$14,069.33	7,806	$1,909	$2,864	$4,773
O	21	West Station / Engine No. 4	2	2	DHW Heater Replacements - Gas to Electric	-6,280	-12.1	37	$0	-$803	$346	-$457	N/A	$6,441.38	2,695	$874	$1,311	$2,185
O	22	Albany Police Department HQ	3.1	1	Building Controls - Temperature Setbacks	1,238	0.5	5	$0	$117	$51	$168	25.5	$4,279.09	938	$0	$0	$0
Y	23	Boxing Gym	3.1	1	Building Controls - Temperature Setbacks	0	0.0	15	$0	$0	$118	$118	14.7	$1,726.69	1,756	$0	$0	$0
N	24	Engine No. 1	3.1	1	Building Controls - Temperature Setbacks	0	0.0	6	$0	$0	$60	$60	71.4	$4,316.71	729	$0	$0	$0
N	25	Engine No. 10	3.1	1	Building Controls - Temperature Setbacks	0	0.0	11	$0	$0	$100	$100	43.2	$4,316.71	1,268	$0	$0	$0
N	26	Engine No. 11	3.1	1	Building Controls - Temperature Setbacks	0	0.0	10	$0	$0	$96	$96	44.9	$4,316.71	1,170	$0	$0	$0
N	27	Engine No. 7	3.1	1	Building Controls - Temperature Setbacks	0	0.0	5	$0	$0	$50	$50	86.7	$4,316.71	599	$0	$0	$0
N	28	Engine No. 9 / Ladder No. 4	3.1	1	Building Controls - Temperature Setbacks	0	0.0	14	$0	$0	$129	$129	40.2	$5,180.06	1,619	$0	$0	$0
O	29	Golf Course Club House	3.1	1	Building Controls - Temperature Setbacks	976	0.0	32	$0	$85	$290	$375	4.6	$1,726.69	3,988	$0	$0	$0
O	30	Justice Building & South Station	3.1	1	Building Controls - Temperature Setbacks	8,119	2.3	6	$0	$737	$60	$798	4.5	$3,565.90	2,786	$0	$0	$0
Y	31	Landfill	3.1	1	Building Controls - Temperature Setbacks	0	0.0	21	$0	$0	$199	$199	7.2	$1,426.36	2,491	$0	$0	$0
Y	32	Recreation Department Administration Building	3.1	1	Building Controls - Temperature Setbacks	0	0.0	36	$0	$0	$339	$339	5.1	$1,726.69	4,194	$0	$0	$0
O	33	South End Fire House	3.1	1	Building Controls - Temperature Setbacks	8,250	1.0	34	$0	$754	$316	$1,070	3.3	$3,565.90	6,075	$0	$0	$0
O	34	West Station / Engine No. 4	3.1	1	Building Controls - Temperature Setbacks	0	0.0	4	$0	$0	$37	$37	118.1	$4,316.71	452	$0	$0	$0
Y	35	Albany Fire Department Repair Shop	3.1	1	Building Controls - Temperature Setbacks	0	0.0	14	$0	$0	$134	$134	12.8	$1,726.69	1,624	$0	$0	$0
Y	36	Bleecker Stadium Administration Building	3.1	1	Building Controls - Temperature Setbacks	0	0.0	52	$0	$0	$490	$490	8.7	$4,279.09	6,111	$0	$0	$0
O	37	City Hall	3.1	1	Building Controls - Temperature Setbacks	94	0.1	108	$0	$10	$961	$971	4.4	$4,279.09	12,603	$0	$0	$0
O	38	Department of General Services	3.1	1	Building Controls - Temperature Setbacks	0	0.0	175	$0	$0	$1,513	$1,513	37.9	$57,388.72	20,509	$0	$0	$0
Y	39	Lincoln Park Bath House	3.1	1	Building Controls - Temperature Setbacks	0	0.0	37	$0	$0	$345	$345	12.5	$4,316.71	4,303	$0	$0	$0
Y	40	Albany Police Department HQ	3.2	1	City-Wide EMS	1,238	0.5	5	$0	$117	$51	$168	409.4	$68,623.54	938	$0	$13,967	$13,967
Y	41	Arbor Hill Fire House	3.2	1	City-Wide EMS	166	0.2	2	$0	$18	$16	$34	154.7	$5,306.40	244	$0	$1,080	$1,080
Y	42	City Hall	3.2	1	City-Wide EMS	94	0.1	108	$0	$10	$961	$971	169.5	$164,501.35	12,603	$0	$33,481	$33,481
Y	43	Justice Building & South Station	3.2	1	City-Wide EMS	8,119	2.3	6	$0	$737	$60	$798	228.2	$182,009.52	2,786	$0	$37,044	$37,044
Y	44	South End Fire House	3.2	1	City-Wide EMS	8,250	0.9	34	$0	$752	$316	$1,068	38.5	$41,124.60	6,075	$0	$8,370	$8,370
Y	45	West Station / Engine No. 4	3.2	1	City-Wide EMS	0	0.0	4	$0	$0	$37	$37	875.0	$31,974.01	452	$0	$6,508	$6,508
Y	46	Golf Course Club House	3.2	1	City-Wide EMS	976	0.0	32	$0	$85	$290	$375	77.8	$29,149.82	3,988	$0	$5,933	$5,933
Y	47	Department of General Services	3.2	1	City-Wide EMS	0	0.0	175	$0	$0	$1,513	$1,513	175.3	$265,320.00	20,509	$0	$54,000	$54,000
Y	48	City Wide	3.2	1	City-Wide EMS - Front End Costs	0	0.0	0	$0	$0	$0	$0	N/A	$191,620.00	0	$0	$0	$0
N	49	Bleecker Stadium Administration Building	4	1	Building Envelope Improvements	0	0.0	60	$0	$0	$564	$564	382.9	$215,819.15	7,032	$0	$43,925	$43,925
N	50	Department of General Services	4	1	Building Envelope Improvements	0	0.0	252	$0	$0	$2,179	$2,179	61.9	$134,800.25	29,527	$0	$27,436	$27,436
N	51	Albany Police Department HQ	5	1	HVAC Upgrades - RTU Replacement	8,768	3.1	74	$0	$820	$703	$1,522	813.5	$1,238,307.40	10,822	$0	$252,030	$252,030
N	52	Arbor Hill Fire House	5	1	HVAC Upgrades - RTU Replacement	7,392	4.2	63	$0	$709	$594	$1,303	49.8	$64,856.00	9,242	$0	$13,200	$13,200
N	53	Center Station	5	1	HVAC Upgrades - Window A/C to Split Systems	4,511	3.5	0	$0	$465	$0	$465	111.8	$51,984.97	1,142	$0	$10,580	$10,580
N	54	City Hall	5	2	HVAC Upgrades - Ducted System	-18,149	29.7	547	$0	-$1,171	$4,885	$3,714	99.2	$368,500.00	59,352	$0	$75,000	$75,000
N	55	City Hall	5	1	HVAC Upgrades - 4th Floor AHU Replacement	1,095	0.6	0	$0	$109	$0	$109	471.7	$51,590.00	277	$0	$10,500	$10,500
N	56	Department of General Services	5	1	HVAC Upgrades - MAU Replacement	4,810	14.4	530	$0	$617	$4,577	$5,195	39.7	$206,360.00	63,243	$0	$42,000	$42,000
N	57	Engine No. 1	5	1	HVAC Upgrades - Window A/C to Split Systems	3,010	3.5	0	$0	$313	$0	$313	39.3	$12,296.09	762	$0	$2,503	$2,503
N	58	Engine No. 11	5	1	HVAC Upgrades - Window A/C to Split Systems	2,284	3.5	0	$0	$257	$0	$257	93.3	$23,937.73	578	$0	$4,872	$4,872
N	59	Engine No. 7	5	1	HVAC Upgrades - Window A/C to Split Systems	1,357	3.5	0	$0	$170	$0	$170	145.1	$24,645.25	343	$0	$5,016	$5,016
Y	60	Justice Building & South Station	5	1	HVAC Upgrades - Economizers	40,412	0.0	0	$0	$3,518	$0	$3,518	3.6	$12,723.57	10,228	$0	$2,590	$2,590
N	61	Landfill	5	1	HVAC Upgrades - UH Replacement	0	0.0	37	$0	$0	$351	$351	67.3	$23,584.00	4,381	$0	$4,800	$4,800
N	62	Recreation Department Administration Building	5	1	HVAC Upgrades - Window A/C to Split Systems	3,010	3.5	0	$0	$322	$0	$322	65.1	$20,944.30	762	$0	$4,263	$4,263
O	63	City Hall	6	2	Replace Boilers & Radiators - Steam to HW	-2,834	-12.8	1,011	$0	-$462	$9,037	$8,575	229.1	$1,964,648.91	117,585	$266,574	$399,861	$666,435
O	64	Bleecker Stadium Administration Building	6	2	Replace Boilers & Radiators - Steam to HW	-352	-2.7	310	$0	-$70	$2,908	$2,838	296.1	$840,486.59	36,192	$114,042	$171,062	$285,104
N	65	Communications Building	6	1	Replace Boilers - In-Kind HW Boiler	0	0.0	33	$0	$0	$332	$332	142.0	$47,094.30	3,858	$0	$9,585	$9,585
N	66	Department of General Services	6	1	Replace Boilers - In-Kind HW Boiler	0	0.0	144	$0	$0	$1,239	$1,239	918.5	$1,138,290.29	16,794	$0	$231,674	$231,674
O	67	Engine No. 1	6	2	Replace Boilers & Radiators - Steam to HW	-455	-1.3	135	$0	-$59	$1,307	$1,248	255.5	$319,005.00	15,656	$43,284	$64,926	$108,211
O	68	Engine No. 11	6	2	Replace Boilers & Radiators - Steam to HW	-455	-1.3	299	$0	-$60	$2,870	$2,810	135.3	$380,131.04	34,818	$51,578	$77,367	$128,945
O	69	Engine No. 7	6	2	Replace Boilers & Radiators - Steam to HW	-455	-1.3	82	$0	-$59	$799	$740	401.1	$296,819.38	9,503	$40,274	$60,411	$100,685

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O	70	Engine No. 9 / Ladder No. 4	6	2	Replace Boilers & Radiators - Steam to HW	-526	-2.0	297	$0	-$75	$2,762	$2,686	232.5	$624,556.20	34,578	$84,743	$127,115	$211,858
O	71	Lincoln Park Bath House	6	2	Replace Boilers & Radiators - Steam to HW	-613	-3.4	736	$0	-$104	$6,906	$6,802	80.1	$544,854.67	85,941	$73,929	$110,893	$184,822
N	72	Swinburne Park Skating Rink	6	1	Replace Boilers - In-Kind HW Boiler	0	0.0	91	$0	$0	$860	$860	100.9	$86,818.60	10,612	$0	$17,670	$17,670
N	73	Justice Building & South Station	9	1	Variable Frequency Drives / ECM Motors	15,607	4.0	0	$0	$1,412	$0	$1,412	78.7	$111,080.64	3,950	$0	$22,608	$22,608
N	74	South End Fire House	9	1	Variable Frequency Drives / ECM Motors	1,162	0.3	0	$0	$109	$0	$109	70.5	$7,666.91	294	$0	$1,560	$1,560
Y	75	Albany Police Department HQ	10	1	Vending Machines Controls	1,949	0.0	0	$0	$173	$0	$173	2.9	$493.73	493	$0	$100	$100
Y	76	Center Station	10	1	Vending Machines Controls	978	0.0	0	$0	$90	$0	$90	5.5	$493.73	248	$0	$100	$100
Y	77	City Hall	10	1	Vending Machines Controls	12,461	0.0	0	$0	$1,132	$0	$1,132	1.7	$1,974.95	3,154	$0	$402	$402
Y	78	Department of General Services	10	1	Vending Machines Controls	11,490	0.0	0	$0	$1,025	$0	$1,025	1.9	$1,974.95	2,908	$0	$402	$402
Y	79	West Station / Engine No. 4	10	1	Vending Machines Controls	978	0.0	0	$0	$99	$0	$99	5.0	$493.73	248	$0	$100	$100
N	80	Department of General Services	11	1	Ventilation Upgrades - Destratification Fans	-15,144	-45.3	445	$0	-$1,944	$3,844	$1,900	66.8	$126,911.40	48,261	$0	$25,830	$25,830
N	81	Albany Police Department HQ	12	1	Heat Recovery AHU	1,294	0.0	110	$0	$115	$1,054	$1,169	168.8	$197,294.90	13,237	$0	$40,155	$40,155
N	82	South End Fire House	12	1	Heat Recovery AHU	0	0.0	120	$0	$0	$1,113	$1,113	123.7	$137,671.60	14,043	$0	$28,020	$28,020
Y	83	Arbor Hill Fire House	13	1	Retro-Commissioning	9,521	0.0	74	$0	$838	$693	$1,531	18.4	$28,155.60	11,014	$0	$5,730	$5,730
N	84	Boxing Gym	13	1	Retro-Commissioning	0	0.0	0	$0	$0	$0	$0	N/A	$10,526.62	0	$0	$0	$0
N	85	Albany Fire Department Repair Shop	14	3	Building Electrification - UH Replacement with Minisplits	-87,802	0.0	300	$0	$0	$2,900	$2,900	13.8	$40,025.29	12,821	$5,431	$8,146	$13,577
N	86	Swinburne Park Skating Rink	14	3	Building Electrification - UH Replacement with Minisplits	-26,962	0.0	92	$0	-$2,148	$873	-$1,276	N/A	$13,341.76	3,937	$1,810	$2,715	$4,526
N	87	Albany Police Department HQ	14	3	Building Electrification - VRF System	-45,276	0.0	483	$0	-$4,008	$4,613	$604	811.4	$490,496.18	45,012	$66,553	$99,830	$166,383
N	88	Arbor Hill Fire House	14	3	Building Electrification - VRF System	-86,231	0.0	919	$0	-$7,585	$8,667	$1,082	408.7	$442,236.40	85,728	$60,005	$90,007	$150,012
N	89	Department of General Services	14.1	3	Building Electrification - VRF System	-679,442	0.0	7,245	$0	-$60,600	$62,538	$1,937	1793.6	$3,474,331.38	675,480	$471,415	$707,123	$1,178,538
N	90	Golf Course Club House	14	3	Building Electrification - VRF System	-88,552	0.0	944	$0	-$7,665	$8,562	$897	626.9	$562,353.68	88,036	$76,303	$114,455	$190,758
N	91	Landfill	14	3	Building Electrification - VRF System	-54,138	0.0	577	$0	-$4,796	$5,402	$607	1652.7	$1,002,487.46	53,822	$136,023	$204,034	$340,057
N	92	Ridgefield Park	14	3	Building Electrification - VRF System	-5,993	0.0	64	$0	-$626	$578	-$48	N/A	$53,522.98	5,958	$7,262	$10,893	$18,156
N	93	Boxing Gym	14	3	Building Electrification - Air-to-Water Multistack	-40,330	0.0	430	$0	-$4,805	$3,374	-$1,431	N/A	$196,389.51	40,095	$26,647	$39,971	$66,618
N	94	Center Station	14	3	Building Electrification - Air-to-Water Multistack	-54,460	0.0	581	$0	-$5,012	$5,532	$521	409.2	$213,107.97	54,142	$28,916	$43,373	$72,289
N	95	Communications Building	14	3	Building Electrification - Air-to-Water Multistack	-14,560	0.0	155	$0	-$1,281	$1,561	$281	290.8	$81,636.02	14,475	$11,077	$16,615	$27,692
N	96	Engine No. 10	14	3	Building Electrification - Air-to-Water Multistack	-79,242	0.0	845	$0	-$6,797	$7,788	$991	282.9	$280,402.06	78,780	$38,046	$57,070	$95,116
N	97	Justice Building & South Station	14	3	Building Electrification - Air-to-Water Multistack	-222,996	0.0	2,378	$0	-$19,411	$22,946	$3,534	625.6	$2,211,000.00	221,696	$300,000	$450,000	$750,000
N	98	Recreation Department Administration Building	14	3	Building Electrification - Air-to-Water Multistack	-143,585	0.0	862	$0	-$12,968	$8,150	-$4,818	N/A	$305,365.63	64,474	$41,434	$62,150	$103,584
N	99	Washington Park Lake House	14	3	Building Electrification - Air-to-Water Multistack	-41,292	0.0	440	$0	-$3,360	$4,213	$853	216.4	$184,576.70	41,052	$25,044	$37,566	$62,611
N	100	West Station / Engine No. 4	14	3	Building Electrification - Air-to-Water Multistack	-103,163	0.0	1,100	$0	-$10,391	$10,394	$3	122716.8	$348,554.94	102,562	$47,294	$70,941	$118,234
N	101	Bleecker Stadium Administration Building	14	3	Building Electrification - Air-to-Water Multistack w/ Steam Conversion	-94,410	0.0	1,007	$0	-$8,569	$9,438	$869	431.7	$375,131.73	93,860	$50,900	$76,350	$127,250
N	102	City Hall	14	3	Building Electrification - Air-to-Water Multistack w/ Steam Conversion	-396,683	0.0	4,230	$0	-$36,036	$37,796	$1,760	989.8	$1,741,996.70	394,369	$236,363	$354,545	$590,908
N	103	Engine No. 1	14	3	Building Electrification - Air-to-Water Multistack w/ Steam Conversion	-46,880	0.0	500	$0	-$4,092	$4,845	$754	161.0	$121,338.65	46,607	$16,464	$24,696	$41,160
N	104	Engine No. 11	14	3	Building Electrification - Air-to-Water Multistack w/ Steam Conversion	-60,267	0.0	643	$0	-$5,451	$6,176	$725	190.0	$137,642.12	59,916	$18,676	$28,014	$46,690
N	105	Engine No. 7	14	3	Building Electrification - Air-to-Water Multistack w/ Steam Conversion	-40,963	0.0	437	$0	-$3,624	$4,245	$620	160.6	$99,671.88	40,724	$13,524	$20,286	$33,810
N	106	Engine No. 9 / Ladder No. 4	14	3	Building Electrification - Air-to-Water Multistack w/ Steam Conversion	-90,435	0.0	964	$0	-$8,098	$8,974	$876	307.6	$269,303.93	89,907	$36,541	$54,811	$91,351
N	107	Lincoln Park Bath House	14	3	Building Electrification - Geothermal System	-112,360	0.0	1,227	$0	-$10,458	$11,512	$1,054	890.4	$938,396.44	115,068	$127,327	$190,990	$318,316
N	108	South End Fire House	14	3	Building Electrification - Air-to-Water Multistack w/ Steam Conversion	-122,847	0.0	1,310	$0	-$11,013	$12,145	$1,132	522.2	$590,911.86	122,131	$80,178	$120,267	$200,445
N	109	Department of General Services	14.2	3	Building Electrification - Geothermal System	-586,476	0.0	6,770	$0	-$52,309	$58,437	$6,129	695.3	$4,261,504.28	643,449	$578,223	$867,335	$1,445,558
					PROGRAM TOTALS - Recommended Measures	113,760	64.2	614	$1,541	$10,825	$5,559	$17,925	62.3	$1,116,834	100,644	$0	$185,213	$185,213
					PROGRAM TOTALS - Electrification Measures (ALL)	-3,325,350	0	34,500	0	-291,104	311,659	20,555	896.9	18,435,726	3,194,104	$400	$256,054	$256,454
					PROGRAM TOTALS - All Measures	-3,322,567	-20	41,748	1,907	-291,631	377,512	87,788	331.3	29,084,644	4,042,613	$2,501,455	$4,825,568	$7,327,024

NOTES:

1. TOTAL MEASURE COST includes direct construction costs (subcontractor material and labor) and DOES include fees for services described below: Energy, Electrical and Mechanical engineering, Construction documents, Financing assistance services, Subcontractor coordination and administration.
2. SIMPLE PAYBACK periods DO NOT include incentives. Payback is given by the total measure cost divided by total annual savings.
3. ESTIMATED TOTAL INCENTIVE is currently estimated assuming 30% from the Inflation Reduction Act and an additional 20% for any project that is a direct fossil fuel replacement. This is not included in the Total Measure Cost.

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Section 2

Facility Descriptions

FACILITY DESCRIPTION

The City of Albany is located in eastern New York and consists of various facilities within the City limits. The (27) facilities included in the scope are detailed below. The table below summarizes information about each of the buildings included in the scope of this study.

No.	Building Name	Square Feet
1	Albany Fire Department Repair Shop	4,606
2	Albany Police Department HQ	23,278
3	Arbor Hill Community Center[1]	8,220
4	Arbor Hill Fire House	13,641
5	Bleecker Stadium Administration Building	22,582
6	Boat House	3,600
7	Boxing Gym	5,100
8	Center Station	8,980
9	City Hall	55,801
10	Communications Building	3,440
11	Department of General Services	90,000
12	Engine No. 1	5,113
13	Engine No. 7	4,200
14	Engine No. 10	8,887
15	Engine No. 11	5,808
16	Engine No. 9 / Ladder No. 4	11,348
17	Golf Course Club House	9,888
18	Justice Building	61,740
19	Landfill	3,609
20	Lincoln Park Bath House	12,736
21	Recreation Department Administration Building	9,168
22	Ridgefield Park	2,608
23	South End Fire House	13,950
24	South Station	2,700
25	Swinburne Park Skating Rink	1,768
26	Washington Park Lake House	8,930
27	West Station / Engine No. 4	10,846
	Total	**412,547**

1. Through discussion with City personnel, Arbor Hill Community Center was removed from the scope, as the building is changing ownership from the City to a third party.

Albany Fire Department Repair Shop – 20 Erie Street, Albany, NY

The Albany Fire Department (ADF) Repair Shop is a 4,606 square foot brick building that is used by the City to repair their fire trucks. The exterior of the building has two large garage doors as well as windows that cover roughly 15% of the sides of the building. The flat roof provides the building with an area to store the HVAC equipment used on site. The building is typically occupied from 7:00 AM to 5:00 PM throughout the week. Most of the interior lighting has been converted to LED lamps and are controlled by manual switches. Exterior lighting is a mix between LED flood lights and HID wall packs and are on from dusk to dawn. Heating is provided by gas fired unit heaters located above the shop area and is controlled by local thermostats. There is a small office that is cooled by a small wall air conditioner unit, while the shop area does not have cooling.

Albany Police Department HQ - 165 Henry Johnson Boulevard, Albany, NY

The City of Albany Police Department (APD) Head Quarters is a two-story brick building mainly comprised of offices. The first floor includes an open office area, private offices, locker rooms, and storage. The second floor is predominantly private offices, as well as a data room and kitchen. The building is occupied 10 to 12 hours a day on weekdays throughout the year. The building was originally designed to be an open floor plan call center. When the City acquired the building, ceiling height walls were constructed to partition off the open offices. The interior lighting consists of LED lamps and are controlled by a combination of manual switches and occupancy sensors. Heating is provided by natural gas fired roof top units (RTUs). These RTUs also provide cooling to the building.

Arbor Hill Fire House - 700 North Manning Boulevard, Albany, NY

The firehouse is a large one-story building used by the fire department for offices and fire truck parking. The exterior of the building is mainly brick with a handful of smaller windows on the northeast and northwest side as well as large garage doors on the southwest side. Most of the facility is garage space used for parking vehicles, and the northern part of the building is used for offices and lounge areas. The firehouse is occupied 24 hours a day, 7 days a week. Interior lighting consists of LED Linear lamps. Heat is

provided by natural gas fired roof top units, with ducted air heating in the offices and lounge rooms and radiant heaters in the garage bays. Cooling is also provided by these roof top units.

Bleecker Stadium Administration Building - 775 Clinton Ave, Albany, NY

The ground floor of this historic building includes bathroom, shower, and locker room facilities, as well as several maintenance staff offices. Ceilings on the first floor are high, (approximately 15'). The basement area is predominantly used for storage and houses the building mechanical systems. The building is intermittently staffed by a small maintenance crew 40 hours a week during the winter, and it is generally not used by the public. In the summertime, the building is predominantly used by the public, and it is open for extended hours (closes at 10 pm). Interior lighting consists of decorative pendant fixtures containing screw in incandescent and compact fluorescent lamps. Basement lighting consists of fluorescent T8 linear lamps. Exterior lighting utilizes HID flood lights. Lighting is controlled by a combination of local switches and breakers. Heating is provided by a natural gas fired steam boiler and controlled by non-programmable thermostats. Cooling throughout the building is limited, provided by a handful of window air conditioning units.

Boat House - 3 Broadway Street, Albany, NY

The boathouse is a 3,600 square-foot facility used for boat storage. The building has a windowless metal exterior and a slightly pitched roof. The south side of the structure has two large garage doors used for entrances for large vehicles.

Boxing Gym - 91 Quail Street, Albany, NY

The boxing gym is a 5,100 square-foot facility on the corner of Quail St and Elk St. The building is a one-story stone facility with small windows scattered around the exterior. It has a flat roof that holds HVAC equipment for the building. The building is typically occupied from 3:00 PM to 9:00 PM. Interior lighting primarily consists of fluorescent T8 linear lamps controlled by switches, while exterior lighting utilizes LED luminaires. Heating is provided by a natural gas fired hot water boiler and controlled by a non-programmable thermostat. Cooling is provided by split units in the lifting portion of the gym, but these have been turned off due to leaking issues.

Center Station - 1123 Madison Ave, Albany, NY

This multi-story building is used mainly as office space by the Police Department. It has a brick exterior and pitched roof, and roughly 30% of the side of the building is covered with windows. The adjacent building provides partial shading from sunlight on the southeast side. The majority of the interior lighting has been updated to LED linear lamps, controlled by a mix of occupancy sensors and switches. Exterior lighting is a mix of HID and LED luminaries. Heating is provided by a hot water boiler located in the adjacent building and controlled by local thermostats. Cooling is provided by window A/C units.

City Hall - 23 Eagle Street, Albany, NY

The building has four main floors which house general offices for the City. The building mechanical systems are located in the basement. On the first floor, an old restaurant area exists which is currently vacant. The dining area is currently used as a lunchroom. The attic space is an open area with large skylights above. The top floor glass ceiling and suspended ceiling make up the attic floor. A bell tower rises above the building in the southwest corner. The building is occupied during normal business hours throughout the year. The building office area is divided into different departments. Each department has a small kitchen area. Lighting consists of LED luminaires controlled by a combination of occupancy sensors and manual controls. Heating is provided by steam furnaces. Cooling on the first floor is provided by a small central unit located outside, the fourth floor is cooled by a central air unit located in a back storage/mechanical room, and the rest of the building is cooled by window A/C units.

Communications Building - 170 Henry Johnson Boulevard, Albany, NY

This one-story building is located on the corner of Henry Johnson Boulevard & Second Street. It has a pitched roof and a brick siding with small windows covering roughly 20% of the exterior. The southwest facing side is partially shaded by trees. Lighting consists of mostly LED lamps and luminaires that are typically turned off during the day. Heating is provided by a natural gas fired boiler and an air handling unit. The air handling unit also provides cooling to the building.

Department of General Services - 1 Richard J Conners Blvd, Albany, NY

The Department of General Services (DGS) is comprised of 16,000 SF of general office space in the front. Adjacent to this space is a 50,000 SF maintenance garage area used for equipment parking and storage. In 1996, a second-floor mezzanine area for additional offices and a central maintenance small engine bay was added, totaling 8,000 SF and 16,000 SF, respectively. The office areas are regularly staffed during normal business hours throughout the year. The garage areas are used 24/7 during the winter for snow removal equipment. Lighting consists of LED lamps and luminaires controlled by a combination of occupancy sensors and local switches. Heating for the office space is provided by a natural gas fired boiler, while the garage space is heated by large make up air units. Cooling is provided by a chiller and roof top units. Heating in the offices is controlled by local thermostats, while cooling is controlled by JD Warren off site.

Engine No. 1 - 324 Washington Ave, Albany, NY

Engine No. 1 is located on the corner of Western Ave and Washington Ave. The stone exterior is covered by roughly 30% windows as well as a large garage door for fire department vehicles. HVAC equipment for the facility is located on the northern side of the building on the ground. Lighting consists of a of linear LED lamps in the garage bay, and biax and compact fluorescent lamps in the dorm space. Lights are controlled by local switches. Heating is provided by a steam boiler controlled locally, and cooling is provided by window A/C units.

Engine No. 7 - 670 Clinton Ave, Albany, NY

This 4,200 square-foot building is used by the fire department for offices and fire truck parking. It is located on the corner of Ontario St and Clinton Ave. The building has a brick exterior with a large garage door and a handful of windows and doors. The building is staffed 24/7, typically staffed by 4 occupants. Lighting consists of LED lamps, controlled by a combination of occupancy sensors and local switches. Heating is provided by a steam boiler controlled locally, and cooling is provided by window A/C units.

Engine No. 10 - 130 Brevator Street, Albany, NY

This 8,887 square-foot building is used by the fire department for offices and fire truck parking. It has a stone exterior with three large garage doors and several smaller windows and doors. The southern side of the building is partially shaded by tree. The flat roof provides a storage area for the facilities HVAC equipment. Lighting consists of LED lamps and luminaires, controlled by a combination of occupancy sensors and local switches. Heating is provided by two small hot water boilers in the office/living space and radiant unit heaters in the truck bay area. Cooling is provided by air handling units. Heating and cooling are controlled by thermostats.

Engine No. 11 - 441 New Scotland Ave, Albany, NY

This 5,808 square-foot building is used by the fire department for offices and fire truck parking. It is located on the corner of Maplewood Street and New Scotland Ave. The building has a brick exterior with two large garage doors and a handful of small windows. The majority of the building has a pitched roof, so the HVAC equipment is stored on the ground on the northwest side of the building. Lighting consists of linear LED lamps, controlled by a combination of occupancy sensors and local switches.

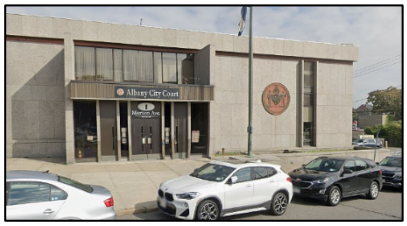
Engine No. 9 / Ladder No. 4 - 360 Delaware Ave, Albany, NY

The first floor of the building includes the engine bays and living quarters. The second floor includes sleeping quarters, and the basement houses the mechanical systems. Above the living and sleeping quarters are unconditioned attic spaces. The building is staffed 24/7 by four shifts of a maximum of 10 people. Call volume is eight to nine calls a day, with doors manually opened and closed for each call. Lighting consists of LED lamps, controlled by a combination of occupancy sensors and local switches. Heating is provided by a steam boiler controlled locally, and cooling is provided by window A/C units.

Golf Course Club House - 65 O'Neil Rd, Albany, NY

The facility is comprised of a clubhouse, maintenance building, and several storage sheds. The club house houses the kitchen, restaurant, locker rooms, and pro shop. The maintenance building and storage sheds are primarily used for facility storage and maintenance activities. The restaurant is open throughout the year, approximately 12 hours a day, six days a week in the winter and 15 hours a day, seven days a week in the summer. The golf course facilities are only open during golfing season, and they are closed to the public during the off- season. During the late summer, a Futures and LGPA tournament is held, which increases traffic to the facilities considerably. Trailer hookups, including a 50 A electrical feed, are available during this time. With the exception of the locker room, lights are LED lamps and luminaries. Heating and cooling is provided by multiple furnaces, controlled by local thermostats.

Justice Building - 1 Morton Ave, Albany, NY



The Justice Building is home to the Albany City Court. The back side of this two-story stone complex is connected to the South Station Police Department. The building has large windows covering roughly 25% of the exterior. The south-facing side of the building has no natural shading from the sun. The flat roof on the facility provides the housing space for the building's HVAC equipment. Interior lighting primarily consists of LED linear lamps controlled by a combination of occupancy sensors and local switches. Heating is provided by hot water boilers located in the basement, and cooling is provided by a chiller on the roof and air handling units. Heating and cooling is controlled by local thermostats.

Landfill - 525A Rapp Road, Albany, NY

This site is divided into five main areas: office, maintenance garage (two bays), scale house, and two pump houses. The office area includes several offices, common area, and locker rooms. Attached to this building is a maintenance garage with two bays and an adjacent storage area. The scale house is a standalone structure with one office. The pump houses are each 40-foot watertight block structures set 30 feet into the ground. These two buildings house industrial pumps for landfill processes. Facilities are staffed during normal business hours year-round. Lighting consists of LED lamps and luminaires, controlled by a combination of occupancy sensors and local switches. Heat is

provided by natural gas fired unit heaters, with a supplemental heater located outside. Cooling in the office space is provided by a split unit, controlled by a local thermostat.

Lincoln Park Bath House - 164 Delaware Ave, Albany, NY

This is a two-story brick building located adjacent to the Lincoln Park Pool. The building has a brick exterior and a pitched asphalt roof. The exterior has small windows that cover roughly 15% of the building. Trees on the southwest and southeast sides of the building provide natural shading from the sun. interior lighting consists of a mix of incandescent lamps, HID high bays, compact fluorescent lamps, and fluorescent T8 linear lamps, controlled by a breaker. Exterior lighting consists of HID flood lights and incandescent pendant and sconce fixture's. Heating is provided by a steam boiler located in the basement, locally controlled at the radiators.

Recreation Department Administration Building - 21 Hoffman Ave, Albany, NY

The Recreation Department Administration Building is a two-story facility located on the premises of Hoffman Park. The building has a brick exterior with a handful of smaller windows covering roughly 15% of its exterior. There are trees on the west facing side of the building which provide minimal shading from the sun in the evenings. The roof of the building is flat which allows for some HVAC equipment to be stored there. Lighting consists of LED lamps and luminaires controlled by a combination of occupancy sensors and local switches. Heating is provided by a natural gas fired boiler controlled by local thermostats, and the gymnasium space utilizes unit heaters. Cooling is provided by approximately 4 window A/C units.

Ridgefield Park - 316 Partridge St, Albany, NY

The Ridgefield Park complex is a two-story building adjacent to Ridgefield Park's tennis courts. The facility has a pitched, asphalt roof, and vinyl siding. The south facing sides of the building are partially shaded by trees, but the majority of these sides are exposed to sunlight. The building is typically used as garage/storage space with an unoccupied apartment on the second floor. Lighting consists of a mix of LED fixtures and

florescent T8 lamps controlled by local switches. Heating is provided by a furnace controlled by local thermostats. There is no cooling in this building.

South End Fire House - 289 South Pearl St, Albany, NY

This building is used by the fire department for offices and fire truck parking. It is located on the corner of NYS Route 32 and Morton Ave. The building has a brick exterior with three large garage doors and a handful of small windows. The majority of the building has a flat roof where the buildings HVAC equipment is stored. Interior lighting primarily consists of LED linear lamps controlled by a combination of occupancy sensors and local switches. Heating is provided by natural gas fired boilers. DX cooling is provided two (2) air handling units and two (2) roof top units. Heating and cooling is controlled by local thermostats.

South Station - 126 Arch Street, Albany, NY

The South Station facility is a two-story brick building used by the Albany City Police. The south side of this two-story stone complex is connected to the City's Justice Department, and therefore there is minimal direct sunlight hitting the building. The flat roof on the facility provides the housing space for the building's HVAC equipment. Interior lighting primarily consists of LED linear lamps controlled by a combination of occupancy sensors and local switches. Heating is provided by hot water boilers located in the basement, and cooling is provided by a chiller on the roof and air handling units. Heating and cooling is controlled by local thermostats.

Swinburne Park Skating Rink - 809 Clinton Ave, Albany, NY

The site is divided into two main buildings: the maintenance building and adjacent rink building. The maintenance building houses an equipment garage with the ice rink chiller, vacant maintenance office, public bathrooms, and ice skate sharpening area. The rink building includes offices, a rental/locker area and Zamboni garage. Adjacent to the rink building is a covered and lit, open air ice rink pavilion. The maintenance building is primarily used for storage, with the office almost never used. The rink building and public bathrooms are open for public use from late November to

early March. Skating is typically held until 10pm and is open approximately 56 hours a week. Lighting primarily consists of LED lamps and luminaires, controlled by the breaker. Heating is provided by a gas fired hot water boiler, and unit heaters in the rest rooms and lobby area controlled manually. The chiller is unutilized for the ice rink only, and there is no space cooling in the facility.

Washington Park Lake House - 35 Willett St, Albany, NY

This facility is a large brick building with large interior rooms. It is located right next to Washington Park Lake, and it is utilized for festivals and performances. The exterior of the building has large windows on all sides, and minimal natural shading from the sun. Lighting consists of LED lamps and luminaires, controlled by local switches. Heating is provided by a gas fired hot water boiler. There is no cooling in this building.

West Station / Engine No. 4 - 223 Washington Ave Ext, Albany, NY

This building is broken up into two main areas: the firehouse facility and police training facility. The east portion houses the firehouse area, and includes engine bays, living quarters, and sleeping quarters on the first floor. The basement includes an exercise room and the mechanical rooms. The west portion houses the police training facility. This single floor structure includes locker rooms, offices, training room, and storage. The training room was originally a garage bay, but it was later converted by constructing a wall in place of the garage doors. The firehouse facility is staffed by three on-duty personnel 24/7. The police training facility is staffed Monday through Friday during regular business hours only. Building utilities are shared and are located in the basement. Lighting primarily consists of LED lamps and luminaire controlled by local switches. Heating is provided by natural gas fired boilers, and controlled by thermostats. Cooling is provided by air handling units with heating and cooling coils, controlled by thermostats.

Section 3
Utility Description