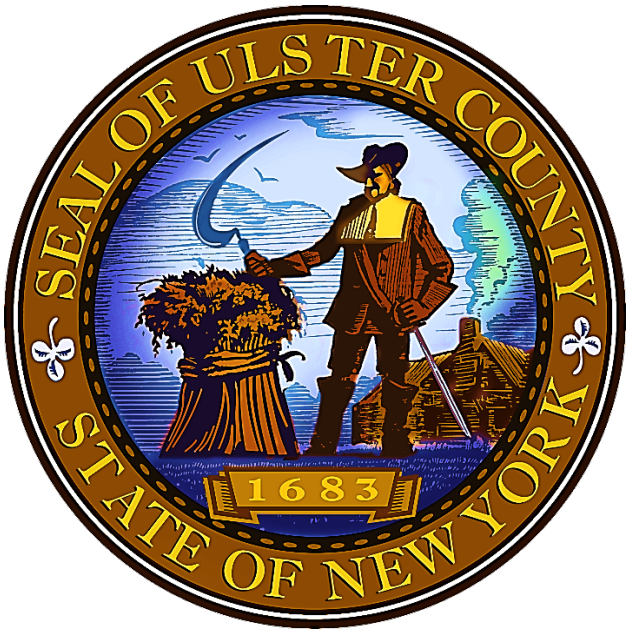


2020
BUILDING ENERGY BENCHMARKING REPORT

1. Introduction

Background

Executive Order Number 1 of 2019 commits Ulster County to decreasing greenhouse gas emissions associated with its operations (through conservation, efficiency, and on-site renewable generation) by 25% by 2025 and 80% by 2050 using the County's 2012 greenhouse gas emission inventory as a baseline. A baseline greenhouse gas (GHG) inventory conducted in 2012 for Ulster County government operations evaluated the energy use and emissions associated with the county vehicle fleet, employee commuting to and from the workplace, and the operations of county owned or occupied facilities. That inventory showed that the buildings & facilities sector alone accounted for 43% of all greenhouse gas emissions, totaling 5,804 metric tons of CO_2e.[1] Ulster County's building portfolio consists of 38 properties with gross floor area totaling nearly 875,000 square feet.

Building energy use benchmarking is critical to the achievement of greenhouse gas emissions goals. First, it allows the comparison of weather-normalized energy metrics across time periods to assess the impact of building efficiency improvements. Second, it allows comparison to a national standard (EPA ENERGY STAR®) and average commercial building performance across the United States—helping to identify outlier properties within the Ulster County portfolio, communicate the opportunity for energy efficiency, and focus energy management attention. One of the main goals of this benchmarking report is to consistently track and monitor the energy use and emissions associated with the County's building inventory in order to better inform both operations and planning activities to improve efficiency and reduce costs as possible.

Reporting Requirements

Resolution No. 447 of 2016 established a policy for annual public reporting of building energy consumption for Ulster County-owned or occupied buildings with a gross floor area equal to or greater than 1,000 square feet. This policy requires public reporting of the following building performance metrics no later than September 1st each year:

- Energy Use Intensity (EUI)
- Weather Normalized Source EUI
- Annual Greenhouse Gas emissions
- Energy performance score (when available)

[1] Reference Ulster County Greenhouse Gas Emissions Report, VHB, 2012. Available here: http://ulstercountyny.gov/environment/energy-sustainability

Methodology

Ulster County benchmarks building energy using the EPA's ENERGY STAR Portfolio Manager application, an online tool that tracks energy, water, and waste consumption and calculates a variety of energy performance metrics as well as greenhouse gas emissions. The Portfolio Manager application also calculates weather normalized metrics, a way to remove the impacts of climate differences in year-to-year comparisons. Energy use and emissions data from 2012 has been used as a baseline value for benchmarking purposes, to show progress toward Ulster County's GHG reduction goals.

Electric Vehicle (EV) Charging Stations: Several Ulster County properties have EV charging stations installed on site and configured to draw energy from the building electrical panel. Without any adjustments, this energy would be included in the building energy use metrics and would indicate excess usage as the energy is used to power vehicles and not the building systems. However, using data from the ChargePoint® EV charging station reporting system, this electricity usage can be deducted from the building usage to report an accurate building use total. The portion of this electricity used for fleet vehicles is reported in the Ulster County Green Fleet report annually.

Fixed Usage Area Lighting: Ten Ulster County properties are billed monthly for utility-provided outdoor area lighting, which is reflected as "*Flat Charge"* usage on the utility invoice for the account and is billed by Central Hudson according to Service Classification Number 5 rates. This usage is included in the metrics for each property with lighting installed. The cost includes fees for the rental of the lighting equipment from Central Hudson. Where applicable, a property use-type of parking and parking area estimate are input in the Portfolio Manager system for improved accuracy in calculating energy use metrics.

Factors and Conversions: The EPA Portfolio Manager application converts all fuel types to a common energy unit—thousands of British thermal units (kBtu)—to allow for aggregation to calculate whole-building energy use. To do so, the Portfolio Manager application applies the thermal conversion factors contained in Table 1 below. This conversion allows the comparison of relative magnitudes of energy use across fuel types as shown in Chart 1.

Table 1: Conversion Factors[2]

Fuel Type	Input Unit	Conversion Factor
Electricity (Grid Purchase)	kWh	3.412 kBtu/kWh
Natural Gas	CCF	102.6 kBtu/CCF
Propane	Gallons	92 kBtu/gal
Fuel Oil (No. 2)	Gallons	138 kBtu/gal
Diesel	Gallons	138 kBtu/gal
Wood	Tons (US)	17,480 kBtu/ton

[2] Retrieved from: https://portfoliomanager.energystar.gov/pdf/reference/Thermal%20Conversions.pdf

2. Building Energy Use

Ulster County uses the following energy sources shown in table 2 for heating, cooling, and powering its buildings. Usage and cost data is obtained from the vendor through web applications or data requests.

Table 2: Energy Types and Data Sources - 2020

Energy Type	Supplier and Data Source
Electricity	Delivery: Central Hudson (web access) NYSEG (web access & customer service) Supply: Constellation NewEnergy, Inc. (web access via Central Hudson)
Natural Gas	Delivery: Central Hudson (web access) Supply: Agera Energy, LLC (customer service request) Family Energy, Inc. (web access via Central Hudson)
Fuel Oil	HOP Energy, LLC (customer service request)
Propane	Paraco Gas Corp (web access)
Diesel Fuel (for generators)	HOP Energy, LLC (customer service request)

Currently, energy-use metrics for benchmarking are not calculated for properties where Ulster County leases office space in facilities without sub-metering. In these cases, energy use data for the leased spaces cannot be separated from whole building energy use. Table 3 contains a listing of these spaces as of December 31st, 2020.

Table 3: Leased Space without Metered Energy Use Data - 2020

Property	Address	UC Leased Space (sq. ft.)	Total Building Space (sq. ft.)
Board of Elections	284 Wall Street, Kingston, NY	3,566	27,137
Public Defender	280 Wall Street, Kingston, NY	4,050	27,137
Department of Health - W.I.C.	230 Aaron Court, Kingston, NY	2,917	9,000
Probation Department	124 Main Street, New Paltz, NY	1,308	4,920
Office of Employment and Training	521 Boice's Lane, Kingston, NY	10,287	98,464
Sheriff's Substation Wallkill	1500 Rt. 208, Wallkill, NY	711	3,840
Sheriff's Substation Mt. Tremper	146-152 Mt. Pleasant Rd, Mt. Tremper, NY	2,004	N/A
Sheriff's Substation Shandaken	Town Hall, Rt. 28	N/A	N/A
Sheriff's Substation Port Ewen	Esopus Town Hall, Salem St.	N/A	N/A

Chart 1 shows the relative proportions of total energy contributed by each of the energy types used in Ulster County buildings in 2020.

Chart 1: 2020 Total Building Energy Usage by Type (kBtu)

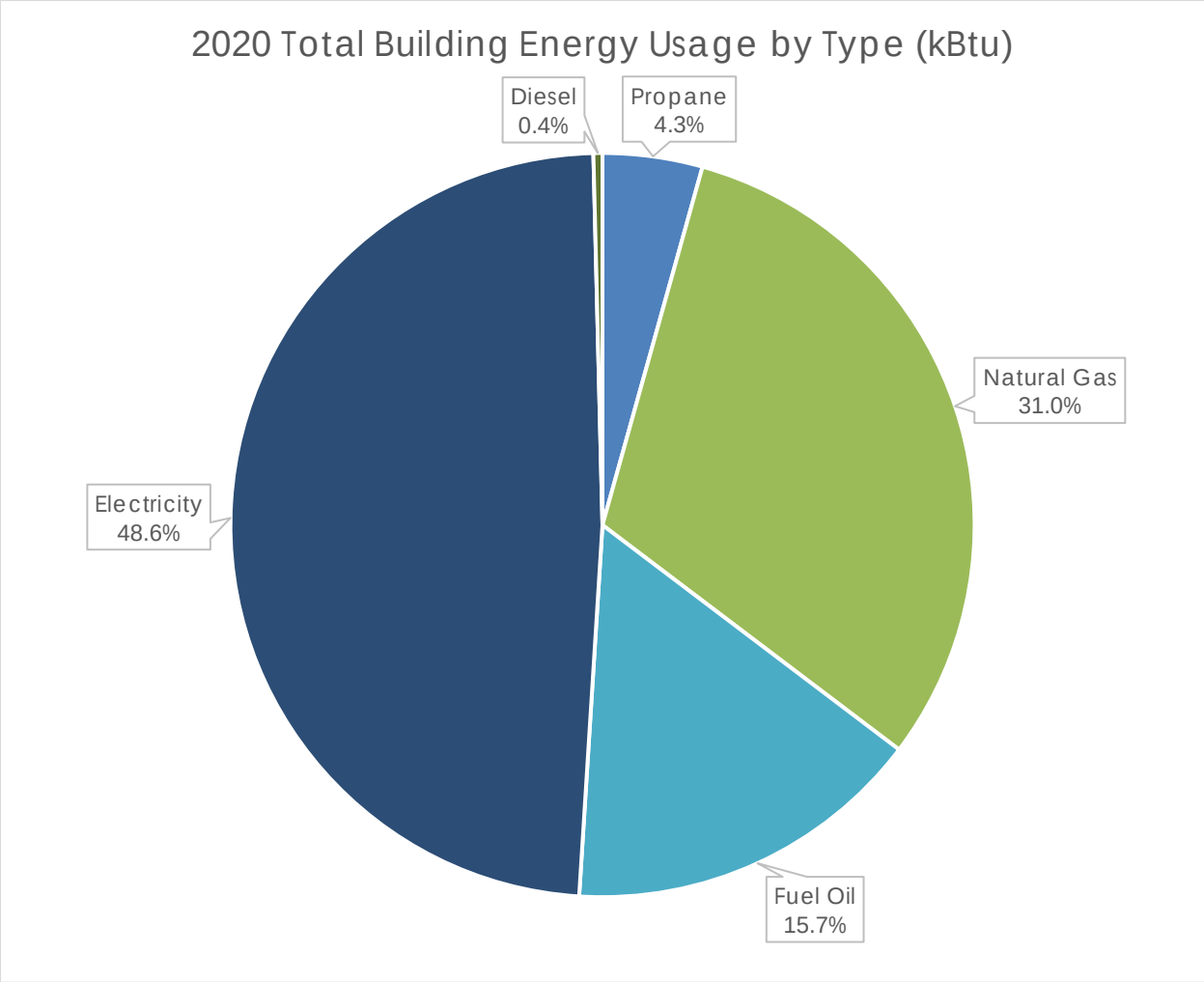


Table 4 shows the quantity of each energy type purchased in 2020 for use in building operations.

Table 4: 2020 Energy Purchased and Cost by Type

Energy Source	**Usage Units**	**Usage (kBtu)**
Diesel	2,143 gallons	295,693
Electricity	10,774,904 kWh	36,763,973
Fuel Oil	85,981 gallons	11,865,406
Natural Gas	228,337 CCF	23,427,379
Propane	35,643 gallons	3,279,156
Total		**75,631,606**

Table 5 shows the purchased energy at each of the Ulster County properties reported. Energy purchased has been converted to the common unit of kBtu for comparison.

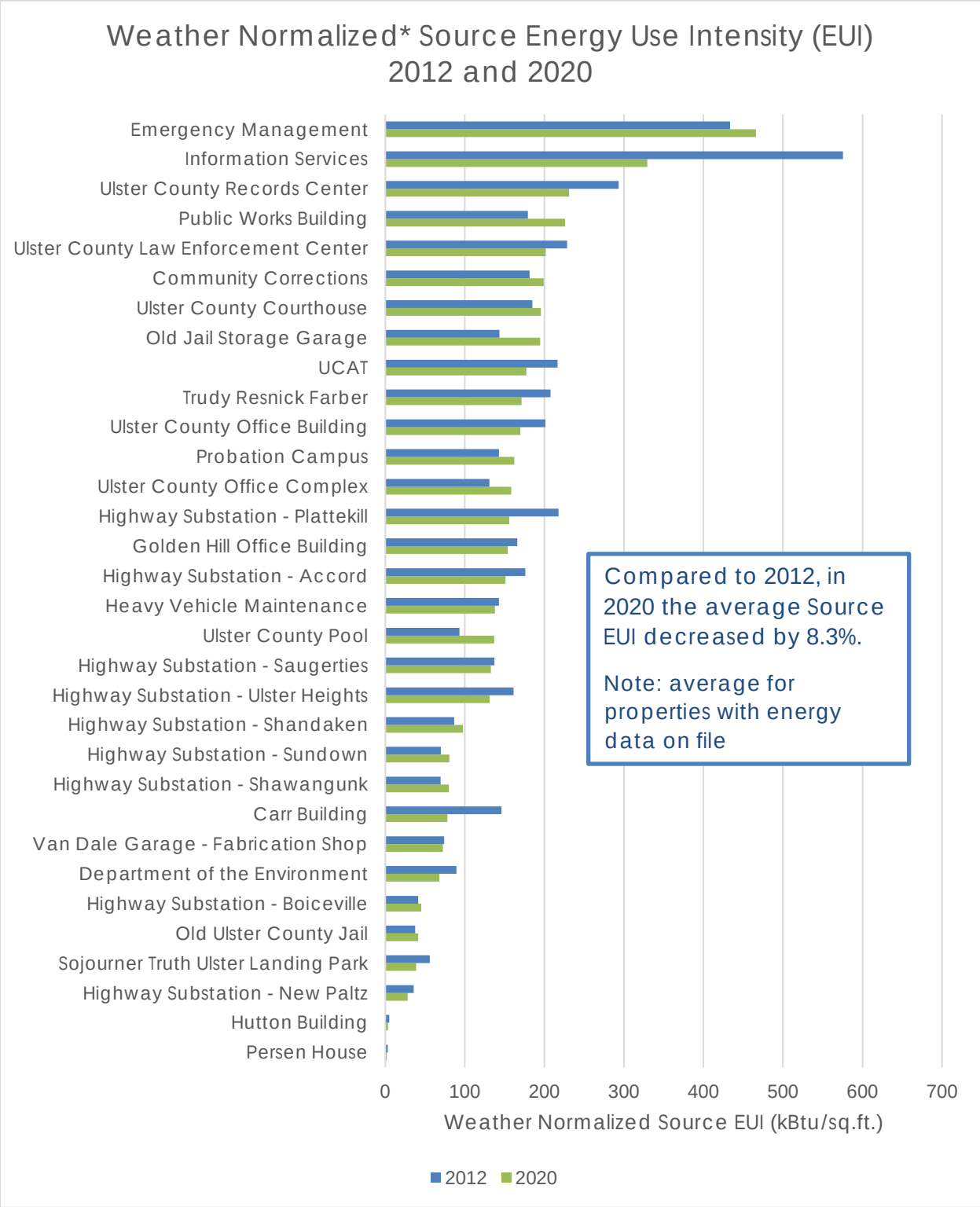
Table 5: 2020 Energy Consumption and Performance Ulster County Buildings

Property	Gross Floor Area (sq. ft.)	Source Energy Use (kBtu)	Source EUI (kBtu/ft²)
Carr Building	5,438	424,857	78.1
Community Corrections	7,700	1,534,558	199.3
Department of the Environment	4,229	255,082	60.3
Emergency Management	3,537	1,648,031	465.9
Golden Hill Office Building	39,600	6,088,786	153.8
Heavy Vehicle Maintenance	35,000	4,279,654	122.3
Highway Substation - Accord	2,324	314,517	135.3
Highway Substation - Boiceville	13,690	529,966	38.7
Highway Substation - New Paltz	13,697	285,828	20.9
Highway Substation - Plattekill	2,265	299,381	132.2
Highway Substation - Saugerties	3,552	412,890	116.2
Highway Substation - Shandaken	5,364	402,738	75.1
Highway Substation - Shawangunk	4,433	272,356	61.4
Highway Substation - Sundown	4,984	374,760	75.2
Highway Substation - Ulster Heights	3,545	429,110	121
Hutton Building	3,386	11,361	3.4
Information Services	13,174	4,260,406	323.4
Old Jail Storage Garage	5,000	974,143	194.8
Old Ulster County Jail	53,391	2,048,314	38.4
Persen House	6,405	12,145	1.9
Probation Campus	20,724	3,224,437	155.6
Public Safety Training Center	6,804	263,853	38.8
Public Works Building	10,740	2,427,464	226
Sheriff's Substation - Warwarsing	1,534	188,353	122.8
Sojourner Truth Ulster Landing Park	3,198	124,185	38.8
Trudy Resnick Farber	20,732	3,548,561	171.2
UCAT	23,413	4,150,194	177.3
Ulster County Courthouse	43,650	8,540,580	195.7
Ulster County Law Enforcement Center	277,000	56,484,003	203.9
Ulster County Office Building	62,396	10,210,091	163.6
Ulster County Office Complex	117,977	17,914,447	151.8
Ulster County Pool	7,126	1,050,702	147.4
Ulster County Records Center	22,550	5,212,066	231.1
Van Dale Garage - Fabrication Shop	15,146	1,001,827	66.1
Veterans Transitional Housing Facility	6,656	406,882	61.1
Total	**870,360**	**139,606,525**	**130.5 average**

Chart 2 compares the energy use intensity in 2020 to that from the County's greenhouse gas inventory baseline year of 2012. Closed properties and properties that do not have 2012 data available were excluded. The use of the weather normalized EUI

metric allows for building energy performance comparisons across years with varying weather conditions.

Chart 2: Weather Normalized Source EUI for Ulster County Properties, 2012 and 2020



*Note: Due to anomalies in electricity meter reading in 2020, weather normalized metrics could not be calculated for many Ulster County properties. In these cases, non-weather normalized values have been substituted. See Appendix D for detail on which properties do not have weather normalized metrics available for 2020.

3. Greenhouse Gas Emissions

Greenhouse gas emission estimates were calculated using the following conversion factors in table 6. These factors were applied to the site energy consumption values to calculate annual emissions.

Table 6: GHG Emissions Conversion Factors[3]

Fuel Type	Conversion Factor (kg CO2e/mmBtu)
Diesel Fuel	74.21
Electricity (eGRID Region: NYUP)	39.34
Natural Gas	53.11
Heating Oil (No. 2)	74.21
Propane	64.25

Ulster County offsets 100% of its Scope 1 and 2 emissions through the purchase of Climate Action Reserve carbon credits and Green-e certified renewable energy credits (RECs). To measure progress toward GHG reduction goals and to quantify annual offset credit purchase requirements, this report assumes the absence of emissions offsets. However, it does include reductions achieved through locally generated power purchases that are also offset with the purchase of RECs.

In 2020, the operation of Ulster County buildings generated 3,545.6 metric tons of CO2e.

This number differs from the emissions total from the Buildings & Other Facilities sector in the Ulster County Greenhouse Gas inventory due to: 1) the exclusion of "Other Facilities" from this report which do not have a gross floor area greater than 1,000 square feet 2) differences in emissions factors between the EPA national standard and Ulster County's methodology.

[3] Retrieved from: https://portfoliomanager.energystar.gov/pdf/reference/Emissions.pdf

Chart 3 shows the emissions contribution of each energy type used by Ulster County in its buildings.

Chart 3: 2020 GHG Emissions by Energy Source

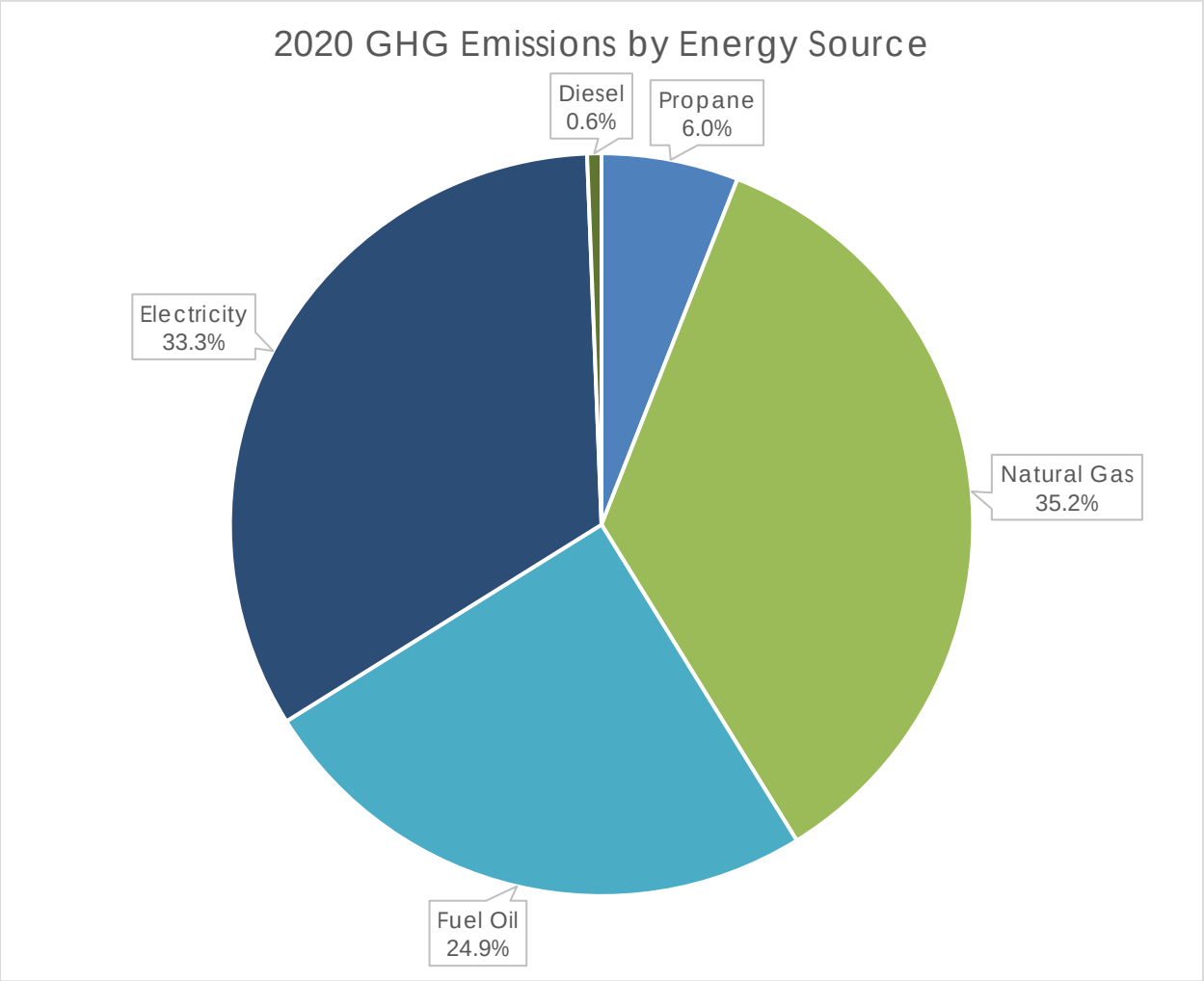


Chart 4 shows the total mass of GHG emissions produced by each building in 2020.

Chart 4: 2020 GHG Emissions by Building

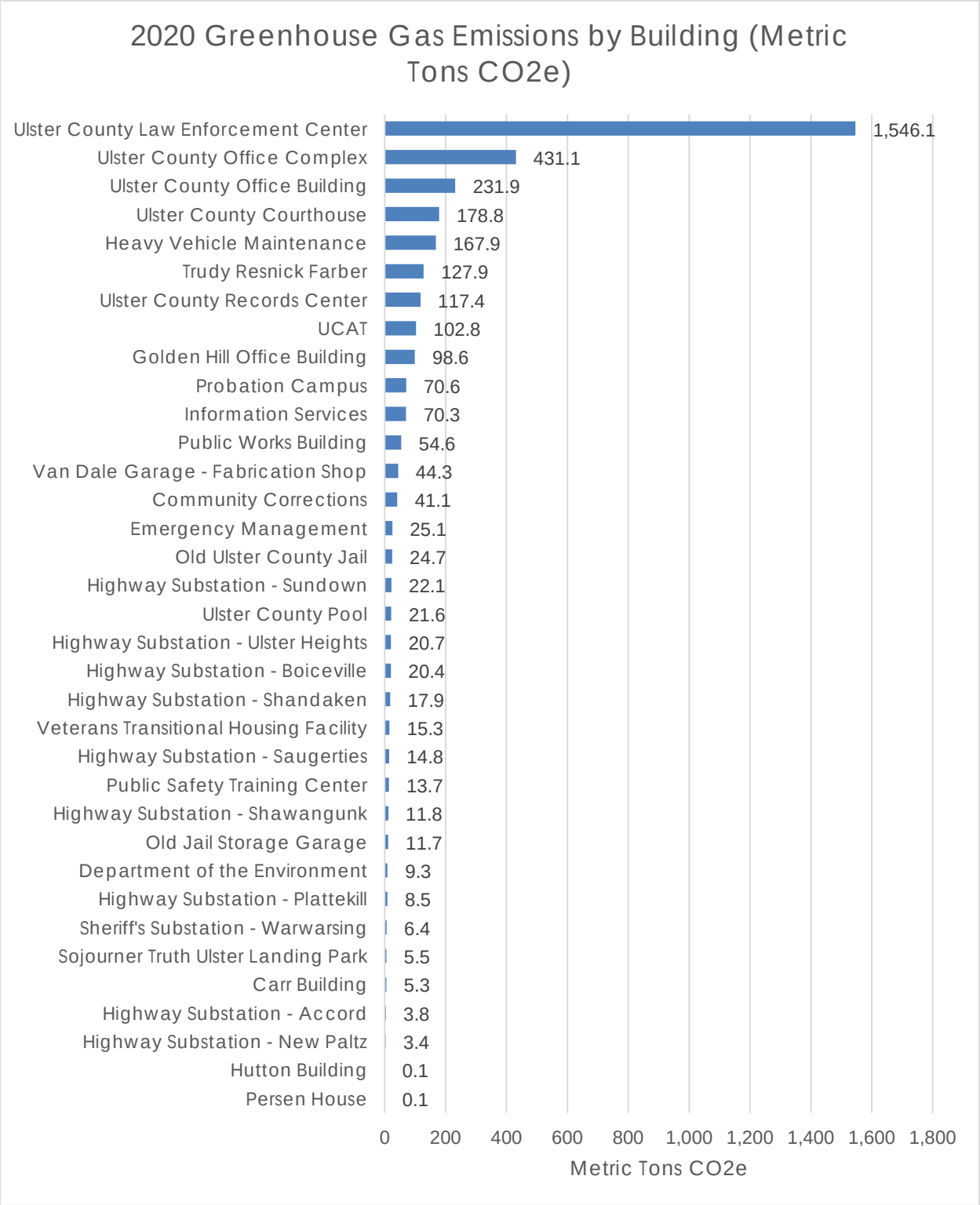
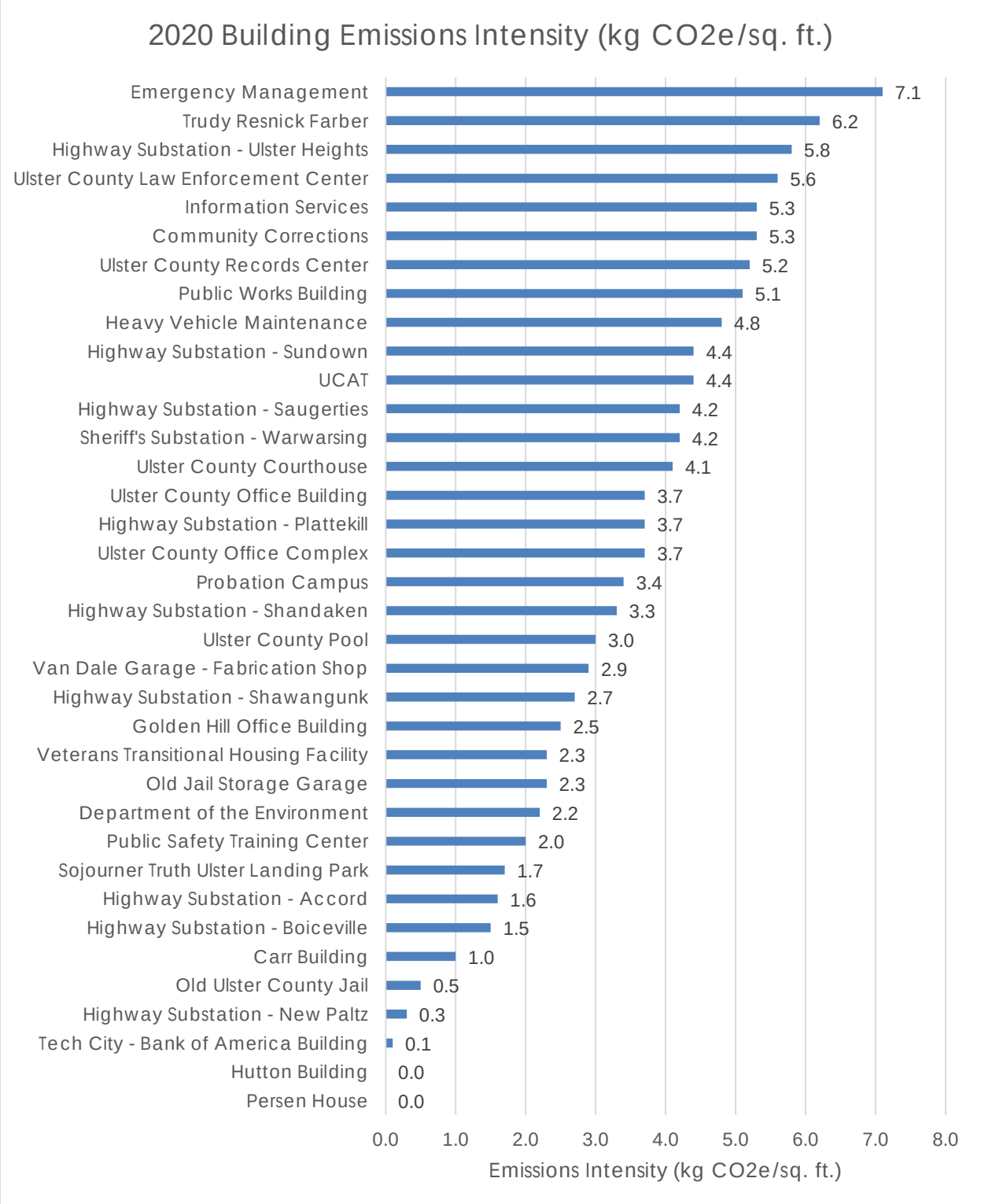


Chart 5 shows the emissions intensity for Ulster County buildings in 2020.

Chart 5: 2020 GHG Emissions Intensity



Appendices

Appendix A: Energy Performance Metrics

Energy Use Intensity: Energy Use Intensity (EUI) is the primary energy performance metric used by the EPA's ENERGY STAR program. EUI is the energy use per square foot at a property (kBtu/square foot) and is used to compare buildings of different sizes.

GHG Emissions Intensity: Emissions Intensity is the mass of greenhouse gases (CO2 equivalent) emitted per square foot per year for a given property (kg CO2e/sq. ft.).

Greenhouse gas emissions intensity is a useful metric for building energy benchmarking as building performance changes with relation to this metric are directly related to achievement of our policy goal for greenhouse gas reduction. This metric captures the true climate cost of various technologies and energy sources by converting the impact to a common ratio. The emissions intensity ratio accounts for the carbon intensity of the local electricity generation mix when compared with other energy sources used in buildings (i.e. fossil fuels for direct combustion).

Site and Source Energy: The EPA ENERGY STAR® program distinguishes between **site** and **source energy**. **Site energy** is the usage as measured exclusively from the building, which is the quantity recorded in utility bills. **Source energy** accounts for the additional energy expenditures associated with production, transmission, and delivery of the fuel. The source energy metric allows the energy efficiencies of buildings to be compared without imparting a bias based on the type of fuel they consume. National average ratios are used within the EPA ENERGY STAR scoring system to prevent any individual building from being penalized or credited due to the relative efficiency of its energy provider.

Table 7: National Average Source-Site Ratios used in Portfolio Manager:[4]

Fuel Type	Source-Site Ratio
Electricity (Grid Purchase)	2.80
Electricity (On-site Solar)	1.00
Natural Gas	1.05
Heating Oil (No. 2)	1.01
Propane	1.01
Diesel	1.01

Weather Normalized Energy:[5] Weather normalized energy is the energy a property would have used under average conditions (also referred to as climate normals). In a given year, the weather may be warmer or colder than the building's normal climate; weather normalized energy accounts for this difference. This allows for a better

[4] Retrieved from: https://portfoliomanager.energystar.gov/pdf/reference/Source%20Energy.pdf
[5] More detail available here: https://portfoliomanager.energystar.gov/pdf/reference/Climate%20and%20Weather.pdf

comparison of building performance over time by removing the effect of annual weather variations.

National Median Source EUI:[6] The National Median is a median reference point based on the 2012 Commercial Building Energy Consumption Survey (CBECS) published by the U.S. Energy Information Administration, without any normalization for either weather or operation. The national median is a recommended benchmark for comparison of relative energy performance: 50% of properties perform below the median, and 50% perform above the median. The exact way the median is determined depends on the property use and size.

EPA 1-100 ENERGY STAR score: Some buildings can also receive a 1 – 100 ENERGY STAR score. This percentile score, calculated by Portfolio Manager, compares a building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means the building performs better than 75 percent of all similar buildings nationwide — and may be eligible for ENERGY STAR certification**.**

[6] Technical reference here: https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf

Appendix B: Weather Normalized Energy Usage Trends (Source EUI)

Source EUI Change from 2012 Baseline

Property	2012	2020	% Change
Carr Building*	146	78.1	-47%
Community Corrections*	181.4	199.3	10%
Department of the Environment	89.5	67.9	-24%
Emergency Management*	433.6	465.9	7%
Golden Hill Office Building*	165.9	153.8	-7%
Heavy Vehicle Maintenance	142.9	137.8	-4%
Highway Substation - Accord	176.2	151.2	-14%
Highway Substation - Boiceville	41.5	45.3	9%
Highway Substation - New Paltz	35.8	28.2	-21%
Highway Substation - Plattekill	217.7	155.8	-28%
Highway Substation - Saugerties	137.3	132.8	-3%
Highway Substation - Shandaken	86.5	97.6	13%
Highway Substation - Shawangunk	69.4	79.9	15%
Highway Substation - Sundown	69.8	80.5	15%
Highway Substation - Ulster Heights	161.1	131.1	-19%
Hutton Building	4.9	3.4	-31%
Information Services	575.4	329.5	-43%
Old Jail Storage Garage*	143.6	194.8	36%
Old Ulster County Jail	37.6	41.3	10%
Persen House	3	1.9	-37%
Probation Campus	142.9	162.1	13%
Public Safety Training Center*	0	39.0	N/A
Public Works Building*	179.2	226.0	26%
Sojourner Truth Ulster Landing Park*	55.9	38.8	-31%
Trudy Resnick Farber*	207.6	171.2	-18%
UCAT*	216.5	177.3	-18%
Ulster County Courthouse*	184.9	195.7	6%
Ulster County Law Enforcement Center	228.6	201.7	-12%
Ulster County Office Building	201.4	169.6	-16%
Ulster County Office Complex	131	158.4	21%
Ulster County Pool	93.2	136.7	47%
Ulster County Records Center*	293.3	231.1	-21%
Van Dale Garage - Fabrication Shop	74	72.5	-2%
Veterans Transitional Housing Facility*	0	67.5	N/A

*Indicates that the weather normalized source energy use metric was not available in 2020. In these cases, the non-weather normalized metric was substituted in the table. In these cases, the comparison between the baseline year and present will be less accurate.

Appendix C: GHG Emissions Trends

GHG Emissions Change from 2012 Baseline

Property	**2012**	**2020**	% Change
Carr Building	21.8	5.3	-76%
Community Corrections	29.6	41.1	39%
Department of the Environment	11.6	9.3	-20%
Emergency Management	20.3	25.1	24%
Golden Hill Office Building	100.5	98.6	-2%
Heavy Vehicle Maintenance	183.5	167.9	-9%
Highway Substation - Accord	4.2	3.8	-10%
Highway Substation - Boiceville	18.7	20.4	9%
Highway Substation - New Paltz	9	3.4	-62%
Highway Substation - Plattekill	17.8	8.5	-52%
Highway Substation - Saugerties	18.9	14.8	-22%
Highway Substation - Shandaken	24.9	17.9	-28%
Highway Substation - Shawangunk	15.2	11.8	-22%
Highway Substation - Sundown	22.2	22.1	0%
Highway Substation - Ulster Heights	23.6	20.7	-12%
Hutton Building	0.2	0.1	-50%
Information Services	108.5	70.3	-35%
Old Jail Storage Garage	7.1	11.7	65%
Old Ulster County Jail	19	24.7	30%
Persen House	0.2	0.1	-50%
Probation Campus	61.8	70.6	14%
Public Safety Training Center	0	13.7	N/A
Public Works Building	30.8	54.6	77%
Sheriff's Substation - Warwarsing	0	6.4	N/A
Sojourner Truth Ulster Landing Park	5.9	5.5	-7%
Trudy Resnick Farber	149.3	127.9	-14%
UCAT	111.2	102.8	-8%
Ulster County Courthouse	138.6	178.8	29%
Ulster County Law Enforcement Center	1763.8	1546.1	-12%
Ulster County Office Building	248.1	231.9	-7%
Ulster County Office Complex	266	431.1	62%
Ulster County Pool	14.9	21.6	45%
Ulster County Records Center	126.9	117.4	-7%
Van Dale Garage - Fabrication Shop	41.7	44.3	6%
Veterans Transitional Housing Facility	0	15.3	N/A

Note: GHG trends shown only for buildings with continuous energy data from 2012 through present. N/A indicates that 2012 data is unavailable or incomplete.

Appendix D: Energy Use Data – Baseline and Recent Reporting Years[7]

Weather Normalized Source Energy Use (kBtu) – Baseline and Recent Reporting Years

Property	*2012 Baseline*[8]	2017	2018	2019	2020
Carr Building*	793,948	921,498	914,306	991,702	424,857
Central Auto Garage*	622,261	675,781	783,653	704,050	Closed
Community Corrections*	1,397,025	1,115,904	1,395,563	1,618,230	1,534,558
Department of the Environment	378,299	371,050	339,530	279,725	287,329
Emergency Management*	1,533,710	1,484,481	1,668,463	1,710,099	1,648,031
Golden Hill Office Building*	6,569,980	6,376,018	6,829,420	6,358,417	6,088,786
Heavy Vehicle Maintenance	4,895,561	5,462,003	5,270,250	5,207,236	4,821,969
Heritage Center for Tourism	212,827	278,494	291,357	304,073	Closed
Highway Substation - Accord	409,385	449,672	372,005	370,811	351,467
Highway Substation - Boiceville	567,815	532,877	657,517	517,511	620,137
Highway Substation - New Paltz	583,524	473,323	465,233	428,929	386,362
Highway Substation - Plattekill	493,220	351,803	411,569	368,262	352,982
Highway Substation - Saugerties	487,501	549,759	441,985	539,383	471,559
Highway Substation - Shandaken	463,754	428,045	525,445	580,242	523,571
Highway Substation - Shawangunk	307,765	395,363	370,955	408,859	354,263
Highway Substation - Sundown	346,775	508,753	532,840	443,577	401,215
Highway Substation - Ulster Heights	618,636	439,270	536,779	448,239	464,643
Hutton Building	16,546	9,686	12,552	11,205	11,361
Information Services	7,579,899	6,025,395	5,777,320	4,827,372	4,341,361
Old Jail Storage Garage*	717,795	954,688	1,066,831	1,086,266	974,143
Old Ulster County Jail	2,008,808	2,079,353	2,623,515	2,851,982	2,205,890
Persen House	19,307	18,154	23,137	24,077	12,145
Probation Campus	2,961,486	2,621,810	2,946,927	3,254,380	3,360,052
Public Safety Training Center*	-	-	-	123,690	263,853
Public Works Building	1,924,894	1,953,036	2,006,439	2,369,864	2,427,464
Sheriff's Substation - Warwarsing	-	199,305	239,125	223,888	191,102

[7] Values for Source Energy Use differ from values contained in previous reports due to an update of Source-Site ratios by the EPA in 2018.

[8] The baseline has not been adjusted in this report to include properties that have been sold or otherwise divested prior to the start of benchmarking reporting in 2016. However, this baseline has been adjusted in the Ulster County Greenhouse Gas Inventory.

Sojourner Truth Ulster Landing Park*	178,935	127,592	125,577	128,016	124,185
Trudy Resnick Farber*	4,305,235	3,630,282	3,377,795	3,594,403	3,548,561
UCAT*	5,069,899	5,161,428	4,681,529	4,011,045	4,150,194
Ulster County Courthouse*	8,070,234	8,076,359	8,808,123	9,463,419	8,540,580
Ulster County Law Enforcement Center	63,329,711	61,543,266	60,450,044	55,617,169	55,861,274
Ulster County Office Building	12,566,818	11,884,151	11,868,747	11,546,474	10,583,907
Ulster County Office Complex	15,460,040	16,811,625	16,161,575	19,402,116	18,690,383
Ulster County Pool	683,227	808,429	876,315	825,920	973,877
Ulster County Records Center	6,613,088	5,591,747	5,718,292	5,503,917	5,212,066
Van Dale Garage - Fabrication Shop	1,120,657	1,196,837	1,168,375	1,266,744	1,097,443
Veterans Transitional Housing Facility	-	488,884	551,922	489,480	448,999

*Indicates that the weather normalized source energy use metric was not available in 2020. In these cases, the non-weather normalized metric was substituted in the table.