



2019
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 CO₂e.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 below.

Table 1: Conversion Factors²

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 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 - 2019

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

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, 2019.

Table 3: Leased Space without Metered Energy Use Data - 2019

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 Walkill	1500 Rt. 208, Walkill, 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

The following Chart 1 shows the relative proportions of total energy contributed by each of the energy types used in Ulster County buildings in 2019.

Chart 1: 2019 Total Building Energy Usage by Type (kBtu)

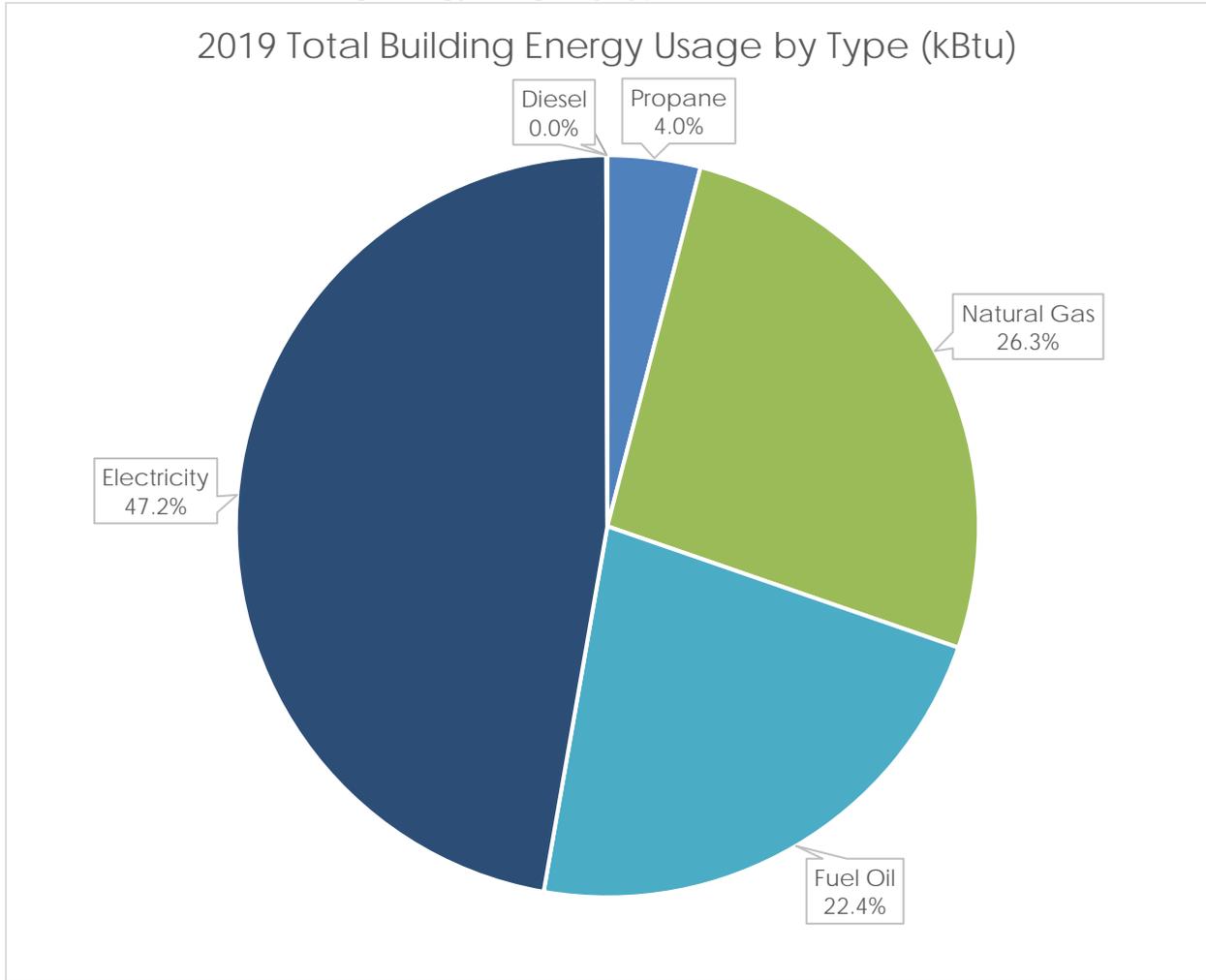


Table 4 shows the quantity of each energy type purchased in 2019 for use in building operations.

Table 4: 2019 Energy Purchased and Cost by Type

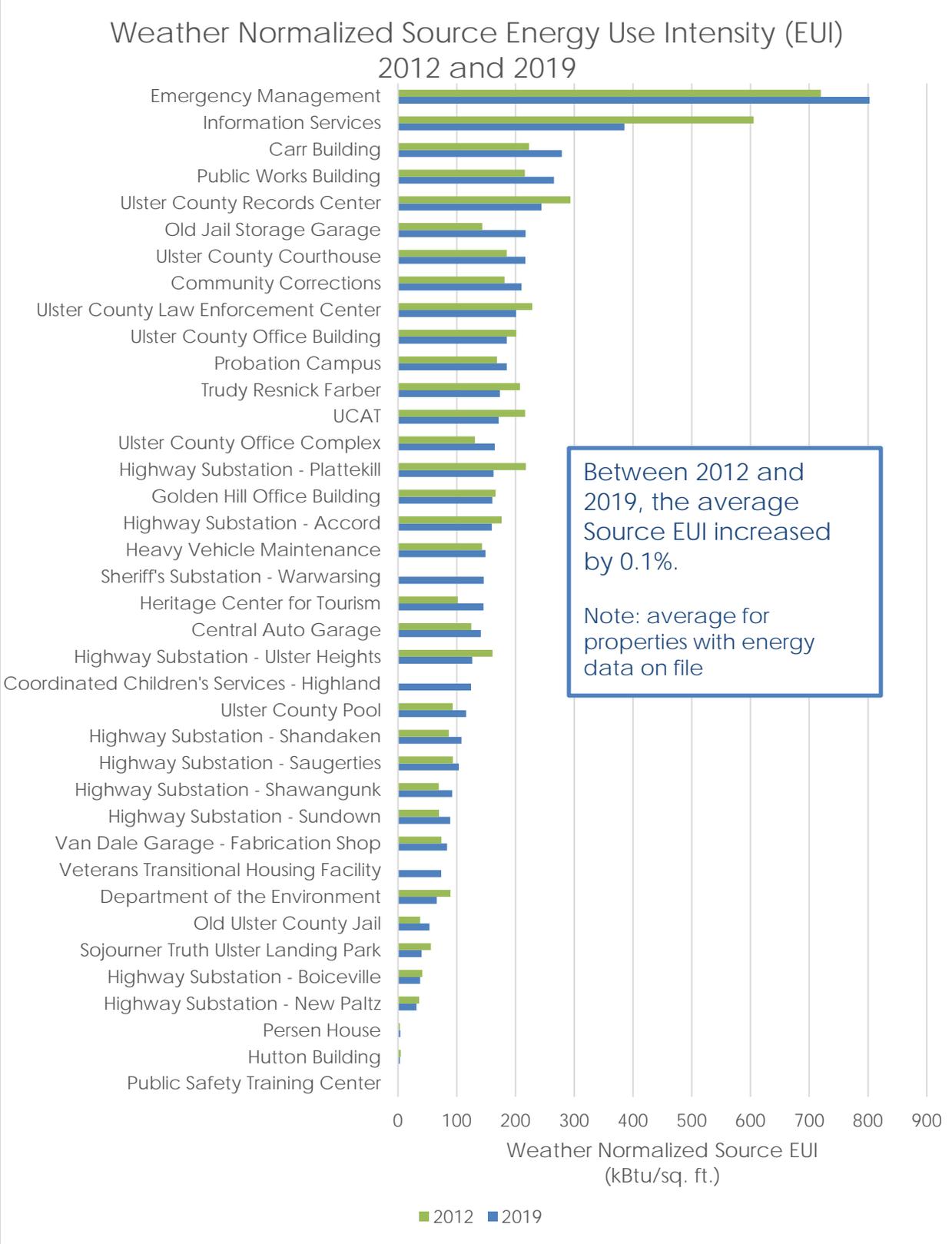
Energy Type	Purchased Energy	Purchased Energy (kBtu)
Diesel	270 gallons	37,191
Electricity	10,906,112 kWh	37,211,653
Fuel Oil	128,188 gallons	17,689,930
Natural Gas	201,760 CCF	20,700,554
Propane	34,608 gallons	3,183,918
Totals		78,823,246

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: 2019 Energy Consumption and Performance Ulster County Buildings

Property	Gross Floor Area (sq. ft.)	Source Energy Use (kBtu)	Source EUI (kBtu/sq. ft.)
Carr Building	3,560	961,484	270.1
Central Auto Garage	5,000	705,419	141.1
Community Corrections	7,700	1,594,254	207
Coordinated Children's Services - Highland	1,100	133,040	120.9
Department of the Environment	4,229	268,157	63.4
Emergency Management	2,130	1,706,445	801.1
Golden Hill Office Building	39,600	6,373,496	160.9
Heavy Vehicle Maintenance	35,000	5,012,206	143.2
Heritage Center for Tourism	2,087	295,065	141.4
Highway Substation - Accord	2,324	368,198	158.4
Highway Substation - Boiceville	13,690	495,011	36.2
Highway Substation - New Paltz	13,697	402,473	29.4
Highway Substation - Plattekill	2,265	364,899	161.1
Highway Substation - Saugerties	5,223	531,280	101.7
Highway Substation - Shandaken	5,364	570,221	106.3
Highway Substation - Shawangunk	4,433	387,082	87.3
Highway Substation - Sundown	4,984	440,939	88.5
Highway Substation - Ulster Heights	3,545	448,761	126.6
Hutton Building	3,386	11,205	3.3
Information Services	12,525	4,808,086	383.9
Old Jail Storage Garage	5,000	1,040,618	208.1
Old Ulster County Jail	53,391	2,753,352	51.6
Persen House	6,405	24,659	3.8
Probation Campus	17,594	3,208,033	182.3
Public Safety Training Center	6,804	123,690	18.2
Public Works Building	8,925	2,369,864	265.5
Sheriff's Substation - Warwarsing	1,534	224,086	146.1
Sojourner Truth Ulster Landing Park	3,198	128,016	40
Trudy Resnick Farber	20,732	3,623,603	174.8
UCAT	23,413	3,926,872	167.7
Ulster County Courthouse	43,650	9,421,925	215.9
Ulster County Law Enforcement Center	277,000	55,742,898	201.2
Ulster County Office Building	62,396	11,531,653	184.8
Ulster County Office Complex	117,977	19,111,838	162
Ulster County Pool	7,126	875,204	122.8
Ulster County Records Center	22,550	5,425,183	240.6
Van Dale Garage - Fabrication Shop	15,146	1,220,177	80.6
Veterans Transitional Housing Facility	6,656	470,518	70.7
Total	871,339	147,099,907	168.8 average

Chart 2: Weather Normalized Source EUI for Ulster County Properties, 2012 and 2019



3. Greenhouse Gas Emissions

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

Table 8: GHG Emissions Conversion Factors³

Fuel Type	Conversion Factor (kg CO ₂ e/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 2019, the operation of Ulster County buildings generated 3,879.8 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: 2019 GHG Emissions by Energy Source

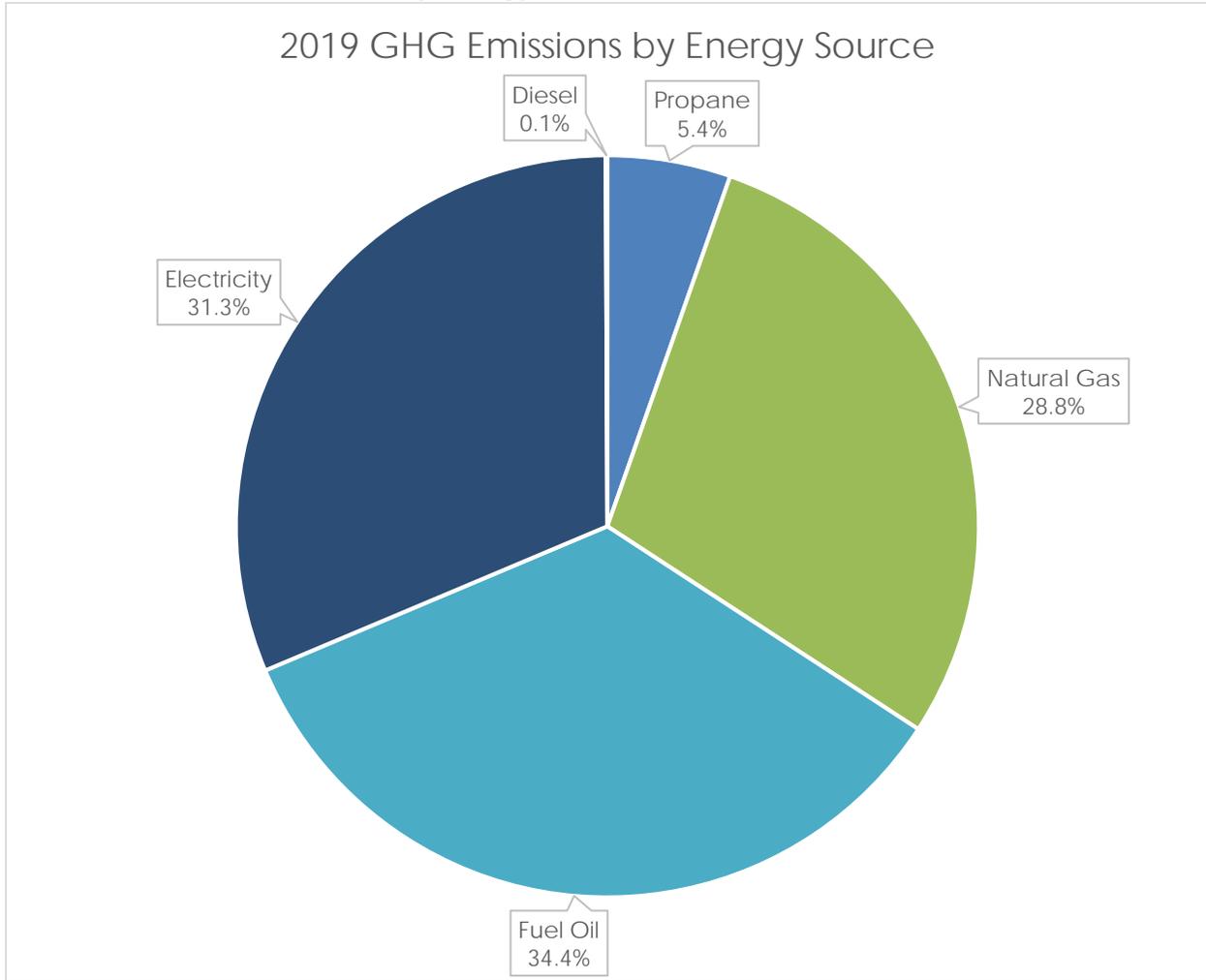


Chart 4 below shows the mass of GHG emissions produced by each building in 2019.

Chart 4: 2019 GHG Emissions by Building

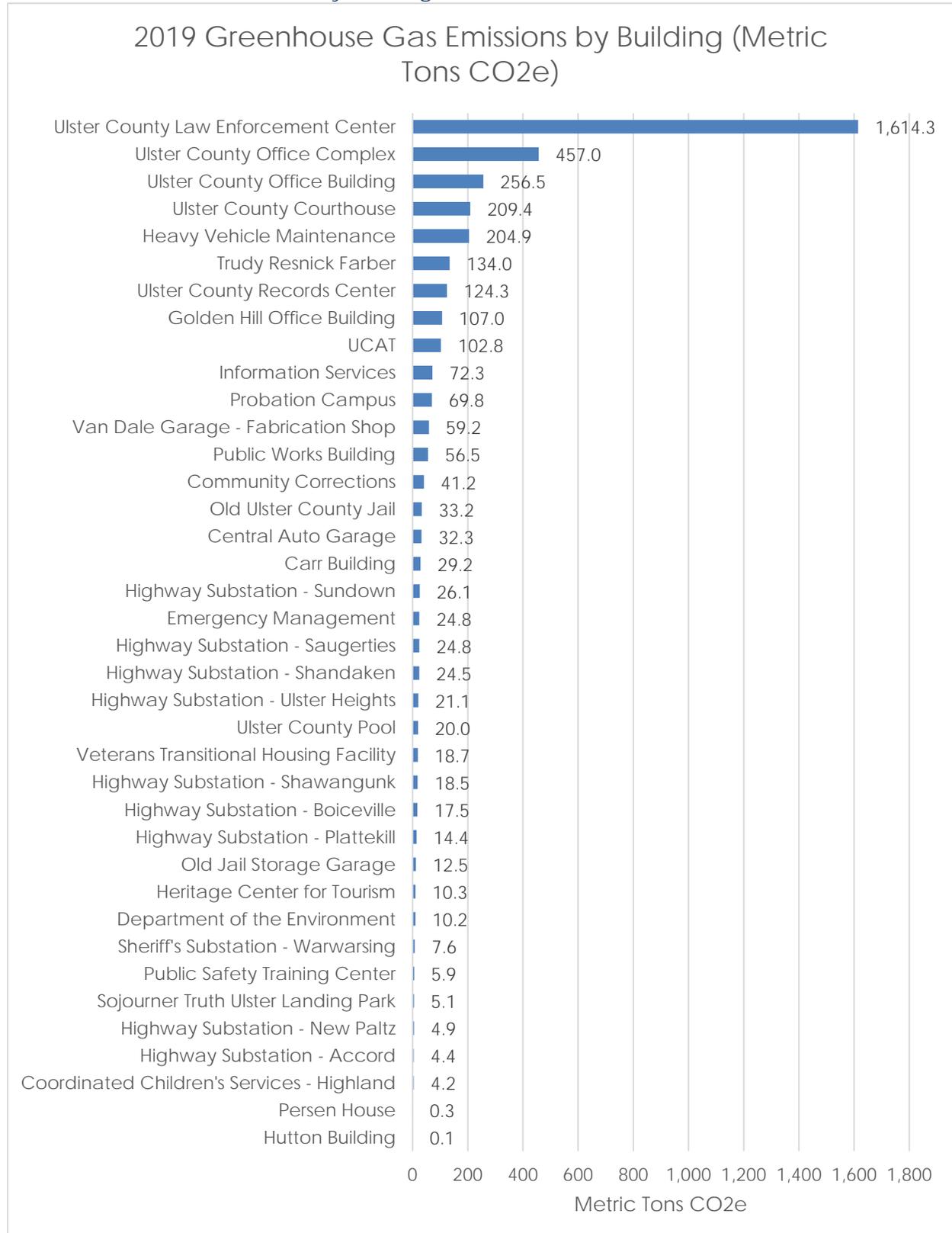
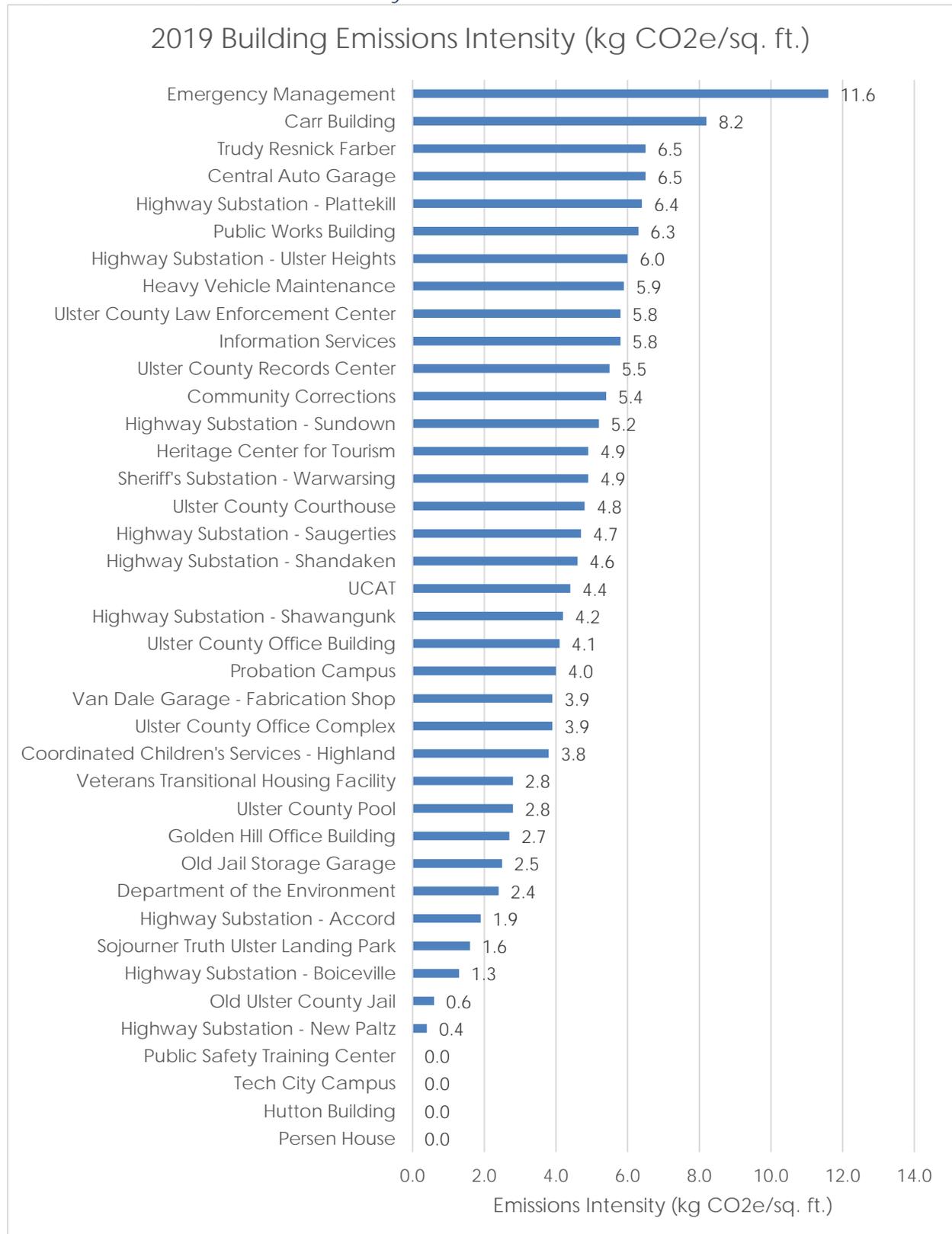


Chart 5 below shows the emissions intensity for Ulster County buildings in 2019.

Chart 5: 2019 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.

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 Source EUI ⁷ (kBtu/Sq. Ft)	2019 Source EUI (kBtu/Sq. Ft)	% Change
Carr Building	223	278.6	25%
Central Auto Garage	124.5	140.8	13%
Community Corrections	181.4	210.2	16%
Coordinated Children's Services - Highland	N/A	124.3	N/A
Department of the Environment	89.5	66.1	-26%
Emergency Management	720	802.9	12%
Golden Hill Office Building	165.9	160.6	-3%
Heavy Vehicle Maintenance	142.9	148.8	4%
Heritage Center for Tourism	102	145.7	43%
Highway Substation - Accord	176.2	159.6	-9%
Highway Substation - Boiceville	41.5	37.8	-9%
Highway Substation - New Paltz	35.8	31.3	-13%
Highway Substation - Plattekill	217.7	162.6	-25%
Highway Substation - Saugerties	93.3	103.3	11%
Highway Substation - Shandaken	86.5	108.2	25%
Highway Substation - Shawangunk	69.4	92.2	33%
Highway Substation - Sundown	69.8	89	28%
Highway Substation - Ulster Heights	161.1	126.4	-22%
Hutton Building	4.9	3.3	-33%
Information Services	605.2	385.4	-36%
Old Jail Storage Garage	143.6	217.3	51%
Old Ulster County Jail	37.6	53.4	42%
Persen House	3	3.8	27%
Probation Campus	168.3	185	10%
Public Safety Training Center	N/A	N/A	N/A
Public Works Building	215.7	265.5	23%
Sheriff's Substation - Warwarsing	N/A	146	N/A
Sojourner Truth Ulster Landing Park	55.9	40	-28%
Trudy Resnick Farber	207.6	173.4	-16%
UCAT	216.5	171.3	-21%
Ulster County Courthouse	184.9	216.8	17%
Ulster County Law Enforcement Center	228.6	200.8	-12%
Ulster County Office Building	201.4	185.1	-8%
Ulster County Office Complex	131	164.5	26%
Ulster County Pool	93.2	115.9	24%
Ulster County Records Center	293.3	244.1	-17%
Van Dale Garage - Fabrication Shop	74	83.6	13%
Veterans Transitional Housing Facility	N/A	73.5	N/A

⁷ 2012 values for Source EUI differ from previous reporting due to an update of Source-Site ratios by the EPA in 2018.

Appendix C: GHG Emissions Trends

GHG Emissions Change from 2012 Baseline

Property	2012 Baseline GHG Emissions (MT CO ₂ e)	2019 GHG Emissions (MT CO ₂ e)	% Change
Carr Building	21.8	29.2	34%
Central Auto Garage	24.5	32.3	32%
Community Corrections	29.6	41.2	39%
Coordinated Children's Services - Highland	0	4.2	N/A
Department of the Environment	11.6	10.2	-12%
Emergency Management	20.3	24.8	22%
Golden Hill Office Building	100.5	107	6%
Heavy Vehicle Maintenance	183.5	204.9	12%
Heritage Center for Tourism	5.1	10.3	102%
Highway Substation - Accord	4.2	4.4	5%
Highway Substation - Boiceville	18.7	17.5	-6%
Highway Substation - New Paltz	9	4.9	-46%
Highway Substation - Plattekill	17.8	14.4	-19%
Highway Substation - Saugerties	18.9	24.8	31%
Highway Substation - Shandaken	24.9	24.5	-2%
Highway Substation - Shawangunk	15.2	18.5	22%
Highway Substation - Sundown	22.2	26.1	18%
Highway Substation - Ulster Heights	23.6	21.1	-11%
Hutton Building	0.2	0.1	-50%
Information Services	108.5	72.3	-33%
Old Jail Storage Garage	7.1	12.5	76%
Old Ulster County Jail	19	33.2	75%
Persen House	0.2	0.3	50%
Probation Campus	61.8	69.8	13%
Public Safety Training Center	0	5.9	N/A
Public Works Building	30.8	56.5	83%
Sheriff's Substation - Warwarsing	0	7.6	N/A
Sojourner Truth Ulster Landing Park	5.9	5.1	-14%
Trudy Resnick Farber	149.3	134	-10%
UCAT	111.2	102.8	-8%
Ulster County Courthouse	138.6	209.4	51%
Ulster County Law Enforcement Center	1763.8	1614.3	-8%
Ulster County Office Building	248.1	256.5	3%
Ulster County Office Complex	266	457	72%
Ulster County Pool	14.9	20	34%
Ulster County Records Center	126.9	124.3	-2%
Van Dale Garage - Fabrication Shop	41.7	59.2	42%
Veterans Transitional Housing Facility	0	18.7	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 – All Reporting Years⁸

Weather Normalized Source Energy Use (kBtu) – All Reporting Years

Property	2012 Baseline ⁹	2016	2017	2018	2019
Carr Building	793,948	892,958	921,498	914,306	991,702
Central Auto Garage	622,261	731,854	675,781	783,653	704,050
Community Corrections	1,397,025	1,156,548	1,115,904	1,395,563	1,618,230
Coord. Children's Services - Highland	-	101,408	127,139	121,362	136,693
Department of the Environment	378,299	354,724	371,050	339,530	279,725
Emergency Management	1,533,710	1,569,759	1,484,481	1,668,463	1,710,099
Golden Hill Office Building	6,569,980	6,158,284	6,376,018	6,829,420	6,358,417
Heavy Vehicle Maintenance	4,895,561	4,828,208	5,462,003	5,270,250	5,207,236
Heritage Center for Tourism	212,827	296,053	278,494	291,357	304,073
Highway Substation - Accord	409,385	410,572	449,672	372,005	370,811
Highway Substation - Boiceville	567,815	499,256	532,877	657,517	517,511
Highway Substation - New Paltz	583,524	506,428	473,323	465,233	428,929
Highway Substation - Plattekill	493,220	347,214	351,803	411,569	368,262
Highway Substation - Saugerties	487,501	463,738	549,759	441,985	539,383
Highway Substation - Shandaken	463,754	472,815	428,045	525,445	580,242
Highway Substation - Shawangunk	307,765	369,174	395,363	370,955	408,859
Highway Substation - Sundown	346,775	427,426	508,753	532,840	443,577
Highway Substation - Ulster Heights	618,636	447,740	439,270	536,779	448,239
Hutton Building	16,546	8,743	9,686	12,552	11,205
Information Services	7,579,899	7,099,011	6,025,395	5,777,320	4,827,372
Old Jail Storage Garage	717,795	896,980	954,688	1,066,831	1,086,266
Old Ulster County Jail	2,008,808	1,827,867	2,079,353	2,623,515	2,851,982
Persen House	19,307	15,736	18,154	23,137	24,077
Probation Campus	2,961,486	2,659,728	2,621,810	2,946,927	3,254,380
Public Safety Training Center	-	-	-	-	N/A ¹⁰

⁸ 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.

⁹ 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.

¹⁰ N/A indicates that the Weather Normalized metric cannot be calculated due to fewer than 12 months of usage data.

Public Works Building	1,924,894	1,664,244	1,953,036	2,006,439	2,369,864
Sheriff's Substation - Warwarsing	-	188,281	199,305	239,125	223,888
Sojourner Truth Ulster Landing Park	178,935	123,003	127,592	125,577	128,016
Trudy Resnick Farber	4,305,235	3,634,911	3,630,282	3,377,795	3,594,403
UCAT	5,069,899	4,957,539	5,161,428	4,681,529	4,011,045
Ulster County Courthouse	8,070,234	7,821,103	8,076,359	8,808,123	9,463,419
Ulster County Law Enforcement Center	63,329,711	66,259,855	61,543,266	60,450,044	55,617,169
Ulster County Office Building	12,566,818	11,988,512	11,884,151	11,868,747	11,546,474
Ulster County Office Complex	15,460,040	17,667,435	16,811,625	16,161,575	19,402,116
Ulster County Pool	683,227	739,836	808,429	876,315	825,920
Ulster County Records Center	6,613,088	6,486,499	5,591,747	5,718,292	5,503,917
Van Dale Garage - Fabrication Shop	1,120,657	917,770	1,196,837	1,168,375	1,266,744
Veterans Transitional Housing Facility	-	495,748	488,884	551,922	489,480