

Sullivan County Climate Action Plan Report and Update March 2022

In 2014, the Sullivan County Legislature made a strong commitment to climate resiliency in government operations and throughout the community. The County's continuous efforts to address climate change include improving energy efficiency and reducing fossil fuel use at County facilities, reducing waste, transitioning to zero-emissions vehicles where appropriate and improving fuel economy throughout the County fleet, developing public transportation options for County residents, and planning infrastructure and systems that support long term economic development and help the County and its residents withstand changes that cannot be mitigated.

With passage of The Climate Act (Climate Leadership and Community Protection Act) in 2019, the NYS Legislature set ambitious goals for a carbon-free electricity system statewide by 2040 and an economy-wide reduction of greenhouse gas emissions 85% below 1990 levels by 2050. In January 2022, working groups released their Draft Scoping Plan, outlining specific strategies in the sectors of transportation, buildings, electricity, industry, agriculture and forestry, and waste, as well as detailed policies to ensure a just transition and climate justice for disadvantaged communities. In March 2022, the Climate Justice Working Group released draft criteria for identifying Disadvantaged Communities for the purposes of Climate Act implementation, designating eight census tracts in Sullivan County as disadvantaged, based upon 45 indicators that assess environmental burdens, climate change risks, socioeconomic factors and health vulnerabilities. Sullivan County welcomes the opportunity to deliver significant investments in climate resiliency, renewable energy, healthier homes and green economic development to these communities and to the County as a whole.



August 2017: Luis Alvarez, Chair of the Sullivan County Legislature, County Manager Josh Potosek and Sustainability Coordinator Heather Brown are joined by County Legislators, Assemblywoman Aileen Gunther, DEC Regional Director Kelly Turturro and Bradford Tito, NYSERDA Program Manager, Communities & Local Governments, who presented the County with its official certification as the 15th Climate Smart Community in New York State, and designation as a Clean Energy Community.

**Sullivan County Climate Action Plan
Report and Update March 2022**

Contents

Part I: Overview and Report 2014-2020 3

 Renewable Energy Development in Sullivan County 6

 Updated Table of 2014 Priority Projects – progress to date 8

Part II. Updating the Sullivan County Climate Action Plan 9

 Identifying Key Climate Projections and Vulnerable Communities 9

 Table of Priority Projects 2021-2025 12

Appendix 1 – Case Study: Energy Retrofit at the Government Center 15

Appendix 2 – County Benchmarking Reports 2016-2020 18

Appendix 3 - Timeline of key actions 2014-to date 41

Sullivan County Climate Action Plan

Supplemental Report and Update March 2022

Part I: Overview and Report 2014-2020

Sullivan County's original CAP was developed in 2012-2013 and approved by the County Legislature in February 2014. The Plan set out goals and strategies for County operations relating to resiliency, energy efficiency, reduction of GHG emissions, transition to renewable energy and energy cost savings in Energy (Buildings), Transportation, Materials Management, Land and Water Use, Public Health and Emergency Planning.

The implementation plan for the SC CAP included formation of an Interdepartmental Sustainability Working Group to develop grant-ready projects and initiatives. The main participants in the working group are the Division of Planning and Community Development, the Division of Public Works, the Department of Emergency Planning, the Department of Purchasing and Central Services, the Department of Public Health, the Department of Grants Administration, and the Sullivan County Office of Sustainable Energy. County dissemination of the Climate Action Plan began with a series of community presentations including town board meetings, the SC Association of Town Supervisors, the Upper Delaware Round Table, a Climate Change Symposium hosted by the Town of Highland; the Senior Legislative Action Committee (SLAC); and an energy conference at SUNY Sullivan.

The Plan laid out a series of priority projects, developed in cooperation with the Sullivan County Division of Public Works, designed to address major opportunities for energy efficiency, energy cost savings, improved building performance and operational cost savings, and the transition to hybrid electric passenger vehicles for the County fleet. All of these projects have been initiated, and some are complete. As energy audits have been updated and technology has evolved, some Energy Efficiency Measures (EEMs) specified in 2014 have been revised or eliminated, and some projects have been consolidated into a comprehensive multi-building initiative that addresses building performance and reduction of GHG emissions in a more cost effective manner. Similarly, the County's 2016 decision to enter into a vehicle lease agreement with Enterprise has expedited the ongoing transition to hybrid electric passenger vehicles for the County fleet where appropriate, as required in the County's Fleet Efficiency Policy, which was approved by the Legislature in 2017. The Fleet Efficiency Policy also calls for reduction of fuel use by right sizing fleet vehicles and procuring the most fuel efficient vehicle in its class. The County's lease arrangement advances these goals by streamlining the vehicle replacement process, reducing capital outlay, providing revenue based on the residual value of Enterprise vehicles at the time they are replaced, and transferring maintenance responsibilities to Enterprise, which frees DPW maintenance staff for other tasks.

Meeting Key Goals

The County's key **GHG goal** in the 2014 Plan was an ambitious overall 50% reduction in GHG emissions in County operations by 2020. The Plan proposed that these projected savings would be distributed over three areas of operation: energy retrofits at County facilities, transitioning to hybrid electric vehicles for a portion of the County's passenger vehicle fleet, and reducing GHG associated with municipal solid waste through environmentally preferable procurement, diversion of food scraps from MSW, and by reducing or eliminating the transport of County MSW to the Seneca Meadows Landfill in Waterloo NY, a distance of 209 miles/418 miles round trip.

The plan also analyzed renewable energy potential at County-owned facilities. Six locations were identified, with a combined potential for 9,051kW (9MW) of solar or wind energy, and a potential GHG reduction of 2,954.7MTCO_{2e}. The analysis identified 7MW of potential ground-mounted solar projects at 5 County facilities – the Adult Care Center in Liberty (now the Care Center at Sunset Lake); Government Center in Monticello; the Maplewood Public Works facility in Mongaup Valley; the Sullivan County Airport and 911 Call Center in Bethel; and Lake Superior Park in Bethel – and 2MW of potential wind development at the Health and Community Services campus in Liberty.

How did we do?

Buildings: Comparison of baseline year 2016 with 2020 benchmarking data shows a net reduction of 417.5MTCO_{2e} per year from County buildings. (Calculated using 2016 baseline year for Portfolio Manager, instead of less precise estimates used in the 2014 CAP GHG Inventory.)

Between the baseline year of 2016 and 2021, Site Energy Use Intensity (Site EUI) was reduced by an average of nearly 6% across the County’s building portfolio (reduced from a score of 80.4 to 75.6). Improved performance across the County’s portfolio of benchmarked buildings can also be seen in reduced Site Energy Use Intensity (EUI). Site Energy Use indicates the annual amount of all the energy a property consumes onsite, as reported on utility bills. Total annual energy consumption at a selected facility, divided by the total square footage of the building, yields a number that represents Site Energy Use Intensity (Site EUI), which allows building managers to analyze the overall energy efficiency of the building from year to year.

Key factors:

- Comprehensive retrofit at the Government Center in Monticello, completed in 2018
- Power Purchase Agreement with Tesla for 2.4MW solar array at the SC Health and Human Services campus in Liberty

Transportation: By 2021, the County achieved a GHG reduction of 116.64 MTCO_{2e} per year, an 8.29% reduction. (2021 data was used since 2020 fuel use data was artificially low due to COVID-related reduction in travel/reduced VMT during the pandemic.)

Key measures:

- Replaced 9 passenger vehicles with hybrids in the County passenger fleet
- Reduced the number of passenger vehicles by right-sizing the passenger fleet
- Increased fuel economy of gas-powered passenger vehicles fleet-wide.
- Adopted a Fleet Efficiency Policy in 2017
- Developed a Coordinated Transportation Services Plan for the County, a rural strategy for public transit completed in 2015 by LSC Transportation Consultants. The Plan is based on a comprehensive inventory of existing conditions and needs analysis. Subsequently, the County has launched several bus routes to connect population centers and facilitate access to work, shopping, and essential services at the SC Government Center.

Renewable energy is a GHG reduction game changer for Sullivan County. Our efforts have been expedited by the approval of Remote Net Metering; the advent of community scale solar projects (with restrictions re opportunity zones lifted in 2016); and the ramping up of Power Purchase Agreements (PPAs) as a cost effective way for municipalities to acquire renewable energy and retain the renewable energy credits (“attributes”) without the capital investment and ownership. PPAs for large scale projects have proven more cost effective than smaller projects at multiple sites for Sullivan County.

When our 2.4MW solar array on County property in Liberty went online, we achieved a 52% reduction in GHG emissions for County buildings through a PPA. The Tesla array provides fixed cost renewable energy to the Care Center at Sunset Lake, Gladys Olmstead Public Health facility and six other County Facilities. With two solar arrays in service at the Liberty campus, the County's Health and Human Services campus sourced 64.72 % of its electricity from on-site renewables in 2020. This is a 62.8% increase over the baseline year of 2016, when only the 49.92kW system at Travis was in operation. Net GHG emissions at the Liberty campus, measured in metric tons of carbon dioxide equivalent (MTCO_{2e}), went from 669.3 MTCO_{2e} in 2016 to 129.8 MTCO_{2e} in 2020.

Discrepancies between GHG savings at individual buildings and the County's "net" overall reduction in GHG emissions: Benchmarking of County buildings demonstrates that GHG data are complex and mutable. Energy savings may vary year to year due to variations in the number of Heating Degree Days and Cooling Degree Days, changes in building use (see COVID discussion in the 2020 Benchmarking Report); and the addition of new buildings to the County's portfolio. Aggregated GHG emissions, along with Energy Use Intensity and other indicators can vary in alignment with these factors.

Similarly, cost savings are uneven year-to-year due to the volatility of fuel prices. Retrofit costs vary related to influences such as supply chain problems associated with COVID or other disruptions. While for some projects the cost of delay is real, for others there can be a benefit to delay as technologies mature and new technologies are introduced. Most importantly, GHG reductions at one facility, achieved through energy retrofits and beneficial electrification, may be offset by increases in GHG emissions related to buildings that have not yet been retrofitted. One cost constant is the renewable electricity purchased at a fixed cost through our PPA at the Liberty campus. As we work through the County's building inventory and achieve reductions in electricity demand through energy retrofits, the electricity we purchase through the PPA is distributed to additional buildings, spreading the GHG benefits of our renewable energy purchase.

Progress on Other 2014 Goals

Materials Management

- In 2021 the County began a feasibility study for diversion of edible food and compostable food scraps from the waste stream, including development of a facility at the closed Sullivan County landfill in Monticello. We hope to initiate a pilot project in 2023. (Materials Management Goal 2)
- In 2021, environmentally preferable procurement guidelines were drafted for the County Department of Purchasing's updated County Purchasing Policy, scheduled for adoption in 2022. The guidelines align with the NYS OGS Green Purchasing policies and product guidelines, and include a preference for recycled/refurbished products, healthy materials, reduced packaging, vendor responsibility for packaging, and avoidance of all single use food ware. (Materials Management Goal 3)
- Education outreach to support NYS policies banning single use plastic bags and Styrofoam™ single use food ware. (Materials Management Goal 2)

Land and Water Use

- OSE, through its participation in NASA's Earth to Sky Climate Communication program, is developing a publication that will inform the public about the importance of preserving contiguous forested land and adopting best practices for forest management. (Land and Water Use Goal 1)
- The County Division of Planning engages in numerous ongoing efforts to preserve agricultural lands, promote sustainable farming and advocate for smart growth principles in local planning and zoning. (Land and Water Use Goal 2)

Public Health

- OSE has researched and provided guidance for healthy systems and materials in retrofits of County facilities. (Public Health Goal 1)

- OSE will work with SC Public Health Services to identify climate-related health impacts and implement innovative strategies to address and improve conditions in our communities, homes and commercial buildings that contribute to poor health outcomes and align with specific health focus areas that have been prioritized by the SCPHS. (Public Health Goal 2)

Emergency Planning

- The SC Division of Planning secured NYS funding for a Countywide Climate Resiliency Plan and has issued an RFP for a consultant to initiate work. The Plan will incorporate best available knowledge and practices for handling the anticipated impacts of climate change on the County, including increased frequency and severity of storms and high heat days. (Emergency Planning Goal 2)

Renewable Energy Development in Sullivan County

County Facilities

In addition to our successful PPA for 2.4MW of solar energy on County-owned property in Liberty, the County entered into discussions with Gravity Renewables for the purchase of electricity from a refurbished 2MW hydroelectric plant in upstate New York. We anticipate that this project will come online in 2022.

Renewable Energy for County Operations	Ownership	Nameplate Capacity/Annual Output	Estimated GHG Avoided
Mobility Management facility, Bethel	County-owned	14.96kW 8,615.33kWh/year	5.077MTCO _{2e} /year
Travis Building/Health & Human Services campus, Liberty	County Owned	49.92kW Average output 54,994.18kWh/year	32.410MTCO _{2e} /year
Health & Human Services campus, Liberty	PPA/Tesla	2.4MW Average output 2,822,037.2kWh/year	1,663.129MTCO _{2e} /year
TOTAL		2,885,646.71kWh/year	1,700.617MTCO_{2e}/year

Solar Development in the Community

The County has championed the development of solar projects in the community, through support for residential and small commercial installations through NY Sun, through educational outreach and presentations to municipal governments to support adoption of the Unified Solar Permit and planning and zoning for community scale solar, and advocacy through the Sullivan County IDA for development of a Solar Uniform Tax Exemption Policy to foster CDG projects. Sullivan County has a robust record of solar development, as evidenced by the data found at NYSERDA’s NYSun Solar Data Maps (<https://www.nyserda.ny.gov/All-Programs/NY-Sun/Solar-Data-Maps/NYSERDA-Supported-Solar-Projects>) These projects have delivered significant GHG reductions and provided County residents with the opportunity to lower their electricity costs.

Solar Energy Development in Sullivan County – NY Sun database of NYSERDA Supported Projects (as of 12/31/2021)				
Type of Project	Number of Projects	Nameplate Capacity	Annual Output	Estimated GHG Avoided/year
Residential	585	5.2MW	50,000kWh	2,946.6827MTCO _{2e}
Small Commercial	43	1.1MW	10,000kWh	589.336MTCO _{2e}
Commercial/Industrial	16	40.3MW	47,000,000kWh	27,688.813MTCO _{2e}
TOTAL	644	46.7MW	53,000,000kWh	31,234.831MTCO_{2e}

Updated Table of 2014 Priority Projects – progress to date

Project	Status/Results
<p>Replace HVAC rooftop units at Government Center in Monticello with right-sized Air Source Heat Pump (ASHP) heating and cooling units. (Replacement with high efficiency rooftop HVAC was preferred in order to minimize disruption of ongoing County Operations)</p>	<p>Completed 2018. Comprehensive Government Center energy retrofit accomplished through NYPA contracting and financing. Measures include:</p> <ul style="list-style-type: none"> • High efficiency RT HVAC units • Building Management System • Replaced 2 boilers • Reworked hydronic heating system with new energy-efficient variable speed drive pumps • LED interior and exterior lighting
<p>Repair or replace the atrium skylight at Government Center, including possible PV array, which would help offset electricity costs at the GC. (PV installation proved technologically unfeasible. The existing skylight was repaired.)</p>	<p>RESULTS GHG emissions intensity reduced by 27.6%, from 5.8 kgCO₂e/sf to 4.2 kgCO₂e/sf in 2018. Site EUI reduced 31%</p>
<p>Change-out of interior and exterior lighting from fluorescent to LED lighting at Government Center.</p>	<p>Site energy use reduced 31.3% Annual fuel oil use reduced by 8,000 gal. Annual electricity use reduced by 480,680 kWh Energy Star rating rose from 36 in 2016 to 73 in 2018, more than 100% improvement in performance. Total cost savings 2018 over 2016: \$86,792.99.</p>
<p>Replace PTAC HVAC units at the Adult Care Center in Liberty with more energy efficient PTHP units. NOTE: Adult Care Center is now The Care Center at Sunset Lake (CCASL)</p>	<p>Project postponed, now anticipated for completion: Early 2023. CCASL project was included in a 4-facilities retrofit initiative contracted and financed through NYPA.</p>
<p>Commission a Space Study for all County facilities and operations, to study existing utilization of space and energy, engage occupants in guided needs assessment</p>	<p>Facilities Master Plan Project in County Capital Plan for 2022 County issued RFP in August 2019, selected a contractor and planned to start project early 2020. Project delayed due to pandemic and limited access to facilities/reinstated January 2022.</p>
<p>Conduct a feasibility study for the County Health Complex in Liberty to plan a deep energy retrofit, a synergistic approach that configures building envelope, lighting and HVAC using energy savings in each component to maximize energy and cost savings for the overall operations.</p>	<p>Complete. Project was included in a 4-facilities retrofit initiative contracted and financed through NYPA. Shared Health Clinic retrofit completed 2022. LED lighting, chiller replacement, Building controls, heat pump replacement for hydronic heating system.</p>
<p>Phase-In hybrid electric vehicles for County fleet. Replace conventional vehicles for selected uses with right-sized electric or hybrid vehicles per the vehicle replacement schedule. Pilot project: test suitable hybrid vehicles (1 each) for Public Health, Sheriff's Department and general government use (DPW).</p>	<p>Ongoing. In 2016, County entered lease arrangement with Enterprise for all fleet passenger vehicles. The County reduced the number of fleet passenger vehicles, and is phasing in hybrids as well as pursuing improved fuel economy across the entire vehicle inventory.</p>
<p>Support the hybrid electric vehicle phase-in with Electric Vehicle (EV) Charging Stations at SCGC and Liberty Health Campus.</p>	<p>Ongoing. County installed EVSE at Government Center for use by County employees and the public.</p>

Part II. Updating the Sullivan County Climate Action Plan

County analysis of climate-related risks and opportunities remains aligned with the original 2014 Plan, and we remain committed to actions in the categories of Energy (Buildings), Transportation, Materials Management, Land and Water Use, Public Health and Emergency Planning. Our updated table of 2021-2026 Priority Projects reflects a new round of building retrofits as well as new initiatives that will advance the County’s goals in other critical sectors. The Office of Sustainable Energy benchmarks County owned or leased buildings larger than 1,000 square feet that use energy to heat or cool the occupied space, using Portfolio Manager. This systematic benchmarking has yielded refined and comprehensive data on the energy performance and GHG footprint of County facilities, which guided the development of a new docket of priority projects that will improve energy efficiency, reduce GHG emissions and improve occupant comfort and productivity.

Identifying Key Climate Projections and Vulnerable Communities

New York State’s ClimAID projections for Region 2 include increases in the annual number of days over 90°F (from a historical baseline of 12 days/year at present to as many as 75 days/year by the 2080s) and days over 95°F (from a historical baseline of 2 days/year to as many as 39 days/year by the 2080s), as well as an increase in the annual number of heat waves, defined as 3 or more consecutive days with temperatures above 90°F. The number of heat waves each year is expected to increase from 2 to as many as 5 by the end of the present decade, as many as 7 by the 2050s, and as many as 10 by the 2080s. Heat waves are also projected to increase in duration from an average of 4 days in the 2020s to as many as 8 days in the 2080s. Increases in heat also contribute to stagnant air events and the incidence of high ozone days.

The effects of prolonged heat and extreme heat episodes on human health are well documented. The ClimAID Public Health chapter, which draws upon numerous public health studies, confirms that the elderly, young children, and pregnant women are particularly vulnerable, although anyone can suffer serious illness or death from extreme heat, including athletes, military personnel, and anyone who works outdoors in extreme heat. Rising average temperatures are projected to exacerbate the allergic (such as pollen) and non-allergic (such as air pollution) triggers for asthma. Rising temperatures worsen the health risks associated with cardio-vascular disease both directly, by interfering with the body’s ability to regulate temperature, and indirectly through an associated increase in air pollution. Rising temperatures also contribute to the spread of vector borne infectious diseases such as Lyme, Zika and the West Nile virus.

Region 2 (ClimAID Chapter 1: Climate Risks, page 29)

Baseline = 1970s to 2000

Air Temperature

Baseline	2020s	2050s	2080s
48°F	+1.5 to 3.0°F	+3.0 to 5.0°F	+4.0 to 8.0°F

Precipitation

Baseline	2020s	2050s	2080s
48"	0 to +5%	+0 to 10%	+5% to 10%

Annual Days over 90°F

Baseline	2020s	2050s	2080s
12	12-13 (14 to 24) 34	16 (22 to 40) 53	21 (28 to 65) 75

Annual Days over 95°F

Baseline	2020s	2050s	2080s
2	2 (2 to 5) 10	3 (5 to 12) 20	4 (7 to 28) 39

Number of heat waves per year

Baseline	2020s	2050s	2080s
2	2 (2 to 3) 5	2 (3 to 5) 7	3 (4 to 9) 10

Average duration of heat waves

Baseline	2020s	2050s	2080s
4 days	4 (4 to 5) 5	5 (5 to 5) 6	5 (5 to 6) 8

Intense Precipitation**Number of days per year with rainfall exceeding 1"**

Baseline	2020s	2050s	2080s
12	10 (11 to 13) 14	10 (12 to 14) 14	10 (12 to 14) 15

Number of days per year with rainfall exceeding 2"

Baseline	2020s	2050s	2080s
2	1 (2 to 2) 3	1 (2 to 3) 3	1 (2 to 3) 3

Factors contributing to heat vulnerability include low income, limited mobility and limited social contact, lack of air conditioning and generally poor quality of housing, and pre-existing medical conditions including cardio-vascular disease, and respiratory conditions such as asthma and COPD. Inferior public infrastructure in poorer neighborhoods may contribute to increased heat vulnerability. Increased temperatures combined with higher rates of precipitation and poor quality housing may also lead to greater exposures to mold in the home, which exacerbates respiratory conditions like allergies and asthma that contribute to heat vulnerability. Environmental justice issues include lack of access to quality healthcare and healthy, nutritious food in poorer communities and communities of color.

The NYS Department of Health's Heat Vulnerability Index uses a range of factors, including language, socio-economic, environmental and age (elderly isolation, for example) to identify heat vulnerable populations in each county. The Heat Vulnerability Index for Sullivan County identifies census tracts in the villages of Monticello and Liberty as particularly vulnerable.

In March 2022, the Climate Justice Working Group released its draft criteria for identifying disadvantaged communities for the purposes of Climate Act implementation. Eight Sullivan County census tracts were designated as disadvantaged, based upon 45 indicators that assess environmental burdens, climate change risks, socioeconomic factors and health vulnerabilities. The Sullivan County census tracts identified as disadvantaged on the draft list are: 36105950900 South Fallsburg CDP; 36105951000 South Fallsburg CDP; 36105951100 Mountain Dale CDP; 36105951200 Village of Wurtsboro; 36105951500 Kiamesha Lake CDP; 36105951600 Mongaup Valley CDP; 36105951800 Village of Monticello; and 36105951900 Mongaup Valley CDP.

2021-2025 Priority Projects

Sullivan County OSE has developed priority projects in collaboration with the Division of Public Works, the Division of Planning and Community Development, and the Department of Public Health Services. These projects can all be undertaken, and some can be completed, within the next five years.

Two of these priority Projects – a Facilities Master Plan and a Countywide Resiliency Plan – will be instrumental in the analysis of future staffing and infrastructure needs using a systems approach that integrates climate resiliency, energy efficiency, beneficial electrification, and efficient patterns of occupancy at and transport between County facilities into the County’s long term planning. These overarching plans will inform future projects and initiatives.

The 2021-2025 priority projects already in process are:

- Building energy retrofits at County Courthouse, Government Center Annex, Shared Health Clinic, Care Center at Sunset Lake, and SUNY Sullivan.
- Replace County-owned streetlights with LEDs.
- Develop a Facilities Master Plan for all County facilities that anticipates future needs based on anticipated staff, programs, and target populations as well as associated energy needs and potential for buildout/procurement of renewable energy resources.
- Complete an Organics Composting feasibility study and a comprehensive Organics Management Plan for collecting and composting organic waste.
- Complete a flood mitigation project in the hamlet of Kohlertown to eliminate flooding of Callicoon Creek.
- Develop a Countywide Resiliency Plan that incorporates best available knowledge and practices for handling the anticipated impacts of climate change.
- Work with the SC Department of Public Health to identify climate-related health impacts and implement innovative strategies to improve conditions that contribute to the poor health outcomes and align with specific health focus areas that have been prioritized by the SCPHS.

Potential GHG reductions have been calculated for the energy retrofits, streetlight conversion and organics diversion and composting projects:

Project	Estimated GHG Reduction
Energy Retrofits at 4 facilities	1,933.51MTCO _{2e} /year
Energy Retrofits at SUNY Sullivan	622.3MTCO _{2e} /year
Streetlights changed to LEDs	16.2MTCO _{2e} /year
Organics Diversion and Composting	308MTCO _{2e} /year
TOTAL	2,880.01MTCO_{2e}/year

Table of Priority Projects 2021-2025

	Project	Benefits/Cost Savings	Costs/Potential Funding or Financing	Multipliers	Estimated GHG Reduction
Energy & Buildings	<p>EEMS at 4 major County Facilities</p> <p>A. County Courthouse</p> <ol style="list-style-type: none"> Cooling tower replacement Automation system controls. Replace heat pumps with high efficiency units. Upgrade to LED throughout. <p>B. Annex at the Government Center in Monticello</p> <ol style="list-style-type: none"> Cooling tower replacement Automation system controls Replace heat pumps with high efficiency units. Upgrade to LED throughout. <p>C. Shared Health Clinic in Liberty</p> <ol style="list-style-type: none"> Cooling tower replacement Automation system controls Replace heat pumps with high efficiency units. Upgrade to LED throughout. <p>D. Care Center at Sunset Lake</p> <ol style="list-style-type: none"> Automation system controls Replace rooftop units (AHUs/ RTUs) with high efficiency units Replace 128 PTACs with PTHPs. Upgrade to LED throughout. <p>Separate from NYPA project:</p> <ol style="list-style-type: none"> Replace conventional DHW with ASHP DHW and Ozone system at the CCASL 	<p>Aggregated annual cost savings for 4 County facilities: Courthouse, Annex at GC, Shared Health Clinic and Care Center at Sunset Lake (CCASL)</p> <p>Estimated Annual cost savings: \$149,713</p> <p>Annual energy savings equivalent to 1,137,301kWh 364,574MBtu</p> <p>Projected 25% average reduction in EUI at these 4 facilities.</p> <p>Water savings: 370,445 gallons/year = \$2,454/year</p> <p>Maintenance savings: \$41,499/year</p> <p>Energy cost savings: \$35,571.77/year Propane: 2,458.08MMBtu/year</p>	<p>Total project cost for ECMs at 4 County facilities: Courthouse, Annex at GC, Shared Health Clinic and CCASL \$3,219,615</p> <p>Financing through NYPA</p> <p>Grants: \$150,000 grant NYSERDA Clean Energy Communities for heat pumps for SCCCASL/DHW</p>	<p>Avoid equipment failure – some equipment is beyond end of life</p> <p>Demonstrate heat pump hot water for institutional application at CCASL plus ozone generation in laundry to reduce/eliminate hot water for laundry.</p> <p>Liberty campus buildings (Shared Health Clinic and Care Center at Sunset Lake) are powered with solar energy from the County’s 2.4MW solar array (PPA through Tesla).</p>	<p>Aggregated annual GHG reduction for 4 County facilities: Courthouse, Annex at GC, Shared Health Clinic and Care Center at Sunset Lake</p> <p>NYPA project measures: 1,910MTCO_{2e}/year</p> <p>GHG reduction from DHW and ozone measures: 23.51MTCO_{2e}/year</p> <p>----- Total CO_{2e} reduction: 1,933.51MTCO_{2e}/year</p>

	<p>SUNY Sullivan 9 major energy conservation measures (ECMs): replacement boilers and heat pumps, controls upgrade, ERVs, EVSE, lighting upgrades, classroom windows replacement, culinary exhaust controls, heat pump DHW</p>	<p>Energy cost savings, O&M savings, improved indoor air quality, conserve the structures Annual savings: Energy cost savings: \$139,673/yr. Maintenance savings: \$42,153/yr. Est. total annual savings: \$181,826/yr.</p>	<p>Project cost for 9 ECMs: \$9,788,558 Financed through NYPA Total cost with 10- year financing: \$11,892,527 50% cost from DASNY</p>	<p>Existing boilers and heat pumps are beyond life expectancy – avoid facility shutdown due to failure; Healthy indoor air with ERVs and culinary exhaust management</p>	<p>622.3MTCO_{2e}/year</p>
	<p>Streetlighting Retrofit LED replacement/30 County-owned streetlights</p>	<p>Energy cost savings: \$2,314/yr Maintenance cost savings: \$7,760/yr Total annual savings \$10,094</p>	<p>Financed through NYPA, aggregated with 3 SC towns Total cost: 51, 373 NYPA Grant: \$20,000 Total cost to SC: \$31,373 5 year simple payback</p>	<p>Improved visibility and safety; dark sky technology reduces light pollution</p>	<p>16.2MTCO_{2e}/yr 98.7MMBtus/yr</p>
	<p>Facilities Master Plan Space and Energy Study for all County facilities Study existing utilization of space and energy, engage occupants in guided needs assessment.</p>	<p>Identify long term needs/solutions Formulate comprehensive use plan; Maximize efficient use of space; Identify opportunities to reduce energy demand and implement appropriate cost-saving energy retrofits and potential for renewable energy.</p>	<p>Cost: Staff time plus outside contractor. County would be asked to provide plans/drawings Funding: Potentially eligible for NYSERDA Flex tech Feasibility Study</p>	<p>Increase productivity by providing staff with more efficient and comfortable use of space. Identify opportunities for renewable energy, energy districts to maximize cost savings in conjunction with the solar projects at Liberty Health Complex.</p>	<p>N/A</p>
Materials Management	<p>Organics Management Plan Develop an organics composting feasibility and siting study as part of updated Solid Waste Management Plan for SC.</p>	<p>Analyze siting and logistics for a County-wide program and facility to handle composting of food scraps and benefits of diversion from landfill.</p>	<p>Cost: \$148,000 Grant from Climate Smart Communities: \$74,000 County Share: \$74,000 includes in-kind/staff time</p>	<p>Knowledge of current volumes of organic waste that could be diverted/ potential cost savings and GHG reduction.</p>	<p>N/A</p>
	<p>Organics Pilot Program In cooperation with Ulster County 2-year pilot for residential food waste drop off at Transfer Stations with +/- 400 families. Staff training Educational outreach Pave the way for Phase 2 rollout.</p>	<p>Develop metrics/outreach strategies. Address cultural needs of diverse SC communities. Reduce GHG from organic waste. Improve soil health, erosion control, long term storage of carbon. Potential revenue from sale of compost.</p>	<p>\$30,000 for Pilot Includes in-kind staff time.</p>	<p>Anticipated benefits for the full-scale program: 20% reduction in organic waste sent to landfill at \$80/ton; divert 4,800 tons of organic waste/yr. Avoided tipping fees = \$384,000/year Reduce VMT associated with hauling.</p>	<p>308MTCO₂/year Potential GHG reduction for diversion of 7,200 Tons of food waste per year with full rollout. Avoided transport of 206 loads 90,514 miles Eliminates 30,171.42 gal diesel fuel/yr</p>

	Project	Benefits/Cost Savings	Costs/Potential Funding or Financing	Multipliers	Estimated GHG Reduction
Emergency Planning/Public Safety	Kohlertown Flood Mitigation Overflow pipeline and overflow weir to eliminate flooding of Callicoon Creek in the hamlet of Kohlertown. This solution has been carefully studied and recommended by the 2011 Kohlertown Flood Study.	Relief of chronic flooding in a hamlet area designated for future residential and business growth in the Town's Comprehensive Plan. Multiple floods in the area have caused loss of homes, businesses and contents; loss of vehicles; business closures.	Project cost: \$2,336,000 Grants (CSC): \$934,084 County Match: (50%) \$1,009,085 Sources of Local Match: \$150,000 from SC Right-of-Way Acquisition fund \$200,000 in-kind engineering design and inspection services provided by SC Department of Engineering \$659,085 appropriated by the County from available funds or bonding.	Address high priority hazard per SC 2012 Hazard Mitigation Plan. Protect arterial road critical to delivery of goods & emergency services. Conserve property values. Protect water quality: prevent contaminated floodwaters from reaching the Delaware River. Incorporate Smart Growth tenets and nature-based flood control.	N/A
	Resilient Sullivan Plan Development of a county-wide action plan for making Sullivan County resilient to anticipated impacts associated with climate change, particularly those related to the increase in frequency and severity of storm, precipitation and extreme weather events.	Improve County resiliency to anticipated impacts of climate change.	\$250,000 grant from NYS Department of State	Address climate resiliency in tandem with equity. Extensive public participation provides an opportunity for climate change education and consensus building.	N/A
Public Health	Develop Collaboration with SCPHS for climate-related health initiatives Build upon best practices (CDC, BRACE Framework, NACCHO) to address public health impacts of CC in SC. Use climate projections and current health outcomes to identify the vulnerable and develop a holistic approach to improve and protect health of SC residents.	Correlate climate projections and public health data to set priorities Identify and develop effective interventions for most vulnerable populations. Develop pathways for "healthy home" interventions/home energy audits/remediation to correct unhealthy and unsafe conditions in the home.	TBD: costs include staff time/training, educational materials. Strategies: Correlate climate projections and public health data to set priorities; develop effective interventions for the most vulnerable; develop pathways for "healthy home" energy audits/remediation to correct unhealthy and unsafe conditions in the home.	Incorporate health considerations in all County planning and infrastructure projects. Address sub-standard housing in SC. Develop grant-ready analysis, strategies and program descriptions to help SCPHS secure funding for priority projects.	N/A except indirectly through promotion of home energy audits and EEMs to increase energy efficiency, support beneficial electrification/elimination of fossil fuels in the home.

Appendix 1 – Case Study: Energy Retrofit at the Government Center

Energy Retrofit at the Sullivan County Government Center

Reducing Energy Costs and Improving Comfort at the County's Largest Office Facility

Summary

In 2014, the Sullivan County Legislature approved an ambitious Climate Action Plan that called for significant reductions in GHG emissions from County operations, improved energy efficiency and reduced reliance on fossil fuels to condition building spaces, and increased renewable energy installations to power County operations. The plan laid out priority projects for much needed retrofits to aging County facilities, including the Government Center in Monticello, which houses numerous County departments as well as the County Legislative meeting chamber and legislators' offices. In 2016, the County contracted with the New York Power Authority (NYPA) to conduct a feasibility study for a major energy retrofit at the Government Center, which included energy modelling to determine the most effective energy efficiency measures, and subsequently to carry out the work. Completed in late 2017, the energy efficiency measures have resulted in significant energy savings, GHG reduction and energy cost savings at the Government Center while delivering improved indoor air quality at the facility.

Overview of Building Characteristics

Located at 100 North Street in Monticello NY, the 89,400sqft Sullivan County Government Center was completed in 1975. It houses numerous County offices and agencies that serve the public, including County legislative offices and hearing chamber, the County Manager and other administrative offices; the divisions of Public Works, Planning and Community Development, Management and Budget, Risk Management and Insurance, Personnel, Audit and Control, Purchasing, Grants, the County Attorney's Office, the Office of Sustainable Energy, the County Treasurer, Real Property Tax Services, the Veterans Service Agency, Office for the Aging, Parks and Recreation, the Youth Bureau, the Department of Motor Vehicles, the Board of Elections, Legal Services for the Department of Family Services, and the County Clerk.

The building is Type 1 construction and is a sealed envelope building. It is occupied ten hours per day, five days per week. At the start of the project, a thorough audit found building systems such as HVAC, system controls, boilers, and interior and exterior lighting that were well beyond their life expectancy, requiring frequent repairs and using far more energy than up-to-date systems would require.

Performance Contracting for Municipal Buildings

The County entered into an energy services agreement with the New York Power Authority (NYPA) to perform a feasibility study under the auspices of the agency's Energy Efficiency Program and Build Smart NY, the state's program for rehabilitating municipally-owned buildings. A public benefit corporation established in 1931, NYPA works with municipal clients to design, install, commission and provide low-cost financing for energy efficiency projects like the County's Government Center retrofit. The feasibility study evaluated existing systems and analyzed potential cost and energy savings that could be realized through energy upgrades. From the start, Sullivan County emphasized its desire to reduce the use of fossil fuels where possible and to reduce GHG emissions from County operations, as expressed in numerous County resolutions as well as the County's participation in the Climate Smart Communities Program and as specified in the County's Climate Action Plan, adopted in 2014, which includes GHG reduction goals for County operations.

The County's Goals

- Achieve significant improvement in energy efficiency and associated operational costs
- Reduce or eliminate fossil fuels as feasible
- Bring the building into the 21st century with computerized building management controls

Scope of Work

In 2016, NYPA contracted with PRES Engineering to perform a feasibility study and recommend energy efficiency measures (EEMs) that would yield significant energy savings and achieve increased comfort and enhanced indoor air quality. The feasibility study identified and modelled energy savings for key energy efficiency measures, including:

- Replace 17-year-old HVAC rooftop units with new high efficiency rooftop units that provide more efficient cooling and improved control of outdoor ventilation air, lower the annual electrical consumption and reduce service and maintenance costs.
- Add a Building Management System (BMS) to facilitate full control of all HVAC systems. The BMS allows optimization of the building HVAC system operation, including an unoccupied setback setting, enhance occupant comfort and reducing electrical and fuel oil use.
- Replace two 21-year-old cast iron oil fired boilers that are past their expected useful life, and rework the hydronic hot water system to increase heating efficiency and enhance the control of the hydronic heating system. Add controls to enhance operation and increase equipment life and efficiency. New hot water system distribution pumps with variable speed drives will reduce electricity consumption.
- Replace assorted interior fluorescent light fixtures (2'x4' ceiling troffer fixtures and Compact Fluorescent Lamps), which are at the end of their useful life, with LED light fixtures. Add occupancy sensors in select areas.
- Replace existing exterior parking lot fixtures, consisting of High Pressure Sodium lamps, with new LED fixtures. These new lower wattage fixtures reduce annual electrical consumption and maintenance costs.
- Insulate existing supply air ductwork to meet current energy code. Insulating the ductwork allows more conditioned air to reach the space and not be transferred to the plenum. Reducing the short cycling of the roof top distribution system will increase the system efficiency.

Energy Savings/Cost Savings

The County's 2018 benchmarking data demonstrates the outstanding results of this retrofit. The Government Center achieved significant reductions in electricity use and fuel use and site energy use intensity (EUI) over its 2017 performance and the baseline year data for 2016. Our energy efficiency Improvements at the Government Center resulted in measurably lower energy costs and GHG emissions compared to previous years.

Energy Use Intensity

One metric used to measure building performance is energy use intensity (EUI), which measures energy use for all forms of energy (fuel oil, electricity, etc.) in proportion to the square footage of the building, and is expressed in thousands of British thermal units or kBtu per square foot.

- Site EUI at the Government Center was 107.8 kBtu/square foot in 2016 (before the start of the NYPA retrofit), and dropped to 74.1 kBtu/square foot in 2018, a 31% improvement in energy use intensity.

GHG Emissions Intensity

GHG emissions are measured in kilograms of carbon dioxide equivalent (CO₂e).

- Total GHG emissions intensity for the Government Center was 5.8 kgCO₂e/square foot in the baseline year of 2016; that metric dropped to 4.2 kgCO₂e/square foot in 2018, a 27.6% improvement in GHG emissions.

Site Energy Use

- Site energy use dropped from 12,204,734.1 kBtu in 2016 to 8,389,333.9 in 2018, a 31.3% reduction in site energy use.

Energy Cost Savings

- The County reduced annual fuel oil use by 8,000 gallons, resulting in a cost savings of \$6,168.80 in 2018.
- Annual electricity use, measured in kilowatt hours (kWh), was reduced by 480,680 kWh, for a cost savings of \$67,606.90 in 2018.
- This reduction in electricity use resulted in additional savings of \$13,017.29 due to the reduction in annual demand charges related to the building's electricity consumption.
- Total cost savings 2018 over 2016: \$86,792.99.

Energy Star Rating

The US Department of Energy's Energy Star rating system measures an individual building's energy performance against buildings of comparable size and use across the country.

- The Sullivan County Government Center's Energy Star rating rose from 36 in 2016 to 73 in 2018, a more than 100% improvement in overall energy performance in 2018 over the baseline year.

12/2021

Appendix 2 – County Benchmarking Reports 2016-2020

Sullivan County’s benchmarking reports are published annually online at <https://sullivanny.us/Departments/SustainableEnergy/BenchmarkingData>

Sullivan County Greenhouse Gas Emissions Benchmarking Report 2016

The County chose 2016 as its baseline data year, and elected to benchmark the 19 County owned or leased buildings that are larger than 1,000 square feet and use energy to heat or cool the occupied space.

The 2016 baseline data includes 74,163 kWh of electricity generated from small-scale solar arrays at the Transportation Facility in Bethel and the Human Services Complex in Liberty and used on-site.

The 2016 baseline process identified three County-owned buildings as qualifying for an Energy Star rating, which is based on 150 separate metrics such as each building's size, location, the number of occupants, number of computers, and other characteristics. The Sullivan County Transportation Facility in White Lake is an Energy Star rated building and achieved a score of 99 (1 being the worst, 100 being the most efficient). The Sullivan County Courthouse and the Sullivan County Government Center are also Energy Star rated buildings, and currently score at 46 and 40 respectively.

Looking ahead, we anticipate completing the collection of 12 months of data on the County's 2.5MW solar array at the Care Center at Sunset Lake (formerly the Adult Care Center) in Liberty in time to include that on-site renewable energy generation in the 2018 benchmarking report. The County will also have a full year of data relative to the HVAC and lighting retrofit at the Sullivan County Government Center. Compared to the baseline 2016 data, this new information will help us measure our progress in improving energy efficiency, deploying renewable energy resources, reducing GHG emissions, and reducing energy costs in County facilities.

Energy Data Glossary

GHG (as measured in MTCO₂e): There are a number of greenhouse gases (GHG), including carbon dioxide, methane, nitrous oxide and ozone. CO₂ equivalent or CO₂e, is a unit of measure that allows us to express the impact of each different GHG in terms of the amount of CO₂ that would create the same amount of warming. CO₂e allows us to express a carbon footprint consisting of different GHGs as a single, consistent number.

Btu: A British thermal unit (Btu) is a standard unit of energy, defined as the amount of heat needed to raise the temperature of one pound of water by one degree Fahrenheit. In tracking building energy use, the Btu provides a single unit of measure that allows us to analyze the efficiency of systems that use a variety of fuels.

EUI: Energy Use Intensity (EUI) expresses a building's energy use as a function of its size and other characteristics. For most property types in Portfolio Manager, the EUI is expressed as energy per square foot per year. It is calculated by dividing the total energy consumed by the building in one year (measured in thousands of British thermal units or kBtu) by the total gross floor area of the building. In general, a low EUI signifies good energy performance. EUI can be calculated on site energy use or source energy use, as explained in the following glossary entries.

Site Energy Use: Site Energy Use is the annual amount of all the energy a property consumes onsite, as reported on utility bills.

Site EUI: The Site Energy total for one year, as reflected in the building's energy bills, divided by the total square footage of the building, yields a number that represents Site Energy Use Intensity (Site EUI). Site EUI helps building managers understand how the energy use for an individual building changes over time.

Source Energy Use: Source Energy Use represents the total amount of raw fuel that is required to operate the building. It incorporates all production, transmission, delivery, storage, and transport losses for all fuel types. Source Energy Use is the basis for ENERGY STAR's rating system, which converts the consumption of each type of energy into a single common unit (kBtu) and expresses it as a score of 1-100, so that the energy performance of diverse buildings can be compared equitably.

Source EUI: The source energy use total for one year, divided by the total square footage of the building, yields a Source Energy Use Intensity (Source EUI) that provides the most comprehensive measure of a building's energy performance. By taking all energy use into account, the score provides a complete assessment of energy efficiency in a building.

Sullivan County Benchmarking Data 2016																		
Property Name	Property GFA - Self-Reported (ft ²)	Number of Buildings	Year Built	Electricity Use - Grid Purchase & Onsite Renewable Systems (kWh)	Electricity Use - Grid Purchase & Onsite Renewable Systems (kBtu)	Electricity Use - from Onsite Renewable Systems and Used Onsite (kWh)	Propane Use (kBtu)	Fuel Oil #2 Use (kBtu)	Site Energy Use (kBtu)	Source Energy Use (kBtu)	Site EUI (kBtu/ft ²)	Source EUI (kBtu/ft ²)	Total GHG Emissions (Metric Tons CO2e)	Direct GHG Emissions (Metric Tons CO2e)	Indirect GHG Emissions (Metric Tons CO2e)	National Median Total GHG Emissions (Metric Tons CO2e)	% Difference from National Median Site EUI	% Difference from National Median Source EUI
Sullivan County Government	113178	1	1975	2,283,941.0	7,176,142.6	-	-	4,939,834.2	12,204,734.3	27,801,018.8	107.8	245.6	721.6	366.6	355.0	689.2	4.7	4.7
Emergency Services Training	10515	1	2010	52,061.6	177,634.2	-	339,719.2	-	517,353.4	900,887.8	49.2	85.7	30.5	21.8	8.7	50.4	(39.4)	(39.4)
Transportation Facility	11387	1	2009	32,092.4	109,499.2	11,100.9	506,570.4	-	616,069.6	774,408.3	54.1	68.0	36.0	32.5	3.5	69.0	(47.7)	(47.7)
Sullivan County Courthouse	32454	1	1909	445,739.7	1,520,863.9	-	-	947,756.4	2,468,620.1	5,732,745.9	76.1	176.6	144.7	70.3	74.3	141.8	2.0	2.0
Human Services Complex (Liberty) Barryville	174025	10	1916-2002	3,307,965.0	11,286,776.6	63,062.2	1,995,001.6	3,139,481.6	16,421,259.8	40,626,306.7	94.4	233.5	912.8	361.2	551.6	578.9	57.7	57.7
Maintenance Calliocon Storm Station - RT. 97	26624	5	1930-2000	161,672.9	551,627.9	-	280,692.0	1,083,566.2	1,915,886.3	3,110,013.0	72.0	116.8	125.4	98.4	27.0	107.8	16.4	16.4
DPW Maplewood Facility	6440	1	1955	20,455.5	69,794.2	-	-	41,855.4	111,649.6	261,427.6	17.3	40.6	6.5	3.1	3.4	19.8	(67.0)	(67.0)
Livingston Manor Storm Station	47663	2	1987-2005	376,125.0	1,181,784.8	-	1,154,866.9	-	3,246,617.9	5,905,345.1	68.1	123.9	198.2	137.9	60.3	196.9	0.6	0.6
Sullivan County International	2102	1	1960	37,147.9	126,748.6	-	-	142,774.8	269,523.4	542,193.0	128.2	257.9	16.8	10.6	6.2	8.0	109.5	109.5
Landfill	64295	9	1970-2012	465,943.4	1,589,798.9	-	-	745,269.0	2,636,859.5	6,049,499.4	41.0	94.1	152.4	74.7	77.7	137.8	10.6	10.6
Rockland Transfer Station	71729	7	1984-2011	379,926.9	1,296,310.6	-	-	-	3,662,739.7	6,460,508.8	51.1	90.1	215.4	152.0	63.4	294.4	(26.8)	(26.8)
Ferndale Transfer Station	1680	1	1985	26,570.9	90,659.8	-	-	-	90,659.8	284,671.8	54.0	169.4	4.4	-	4.4	3.2	37.6	37.6
Highland Transfer Station	7225	1	1987	30,805.2	105,107.4	-	-	-	105,107.4	330,037.2	14.5	45.7	5.1	-	5.1	13.8	(62.9)	(62.9)
Mamakating Transfer Station	3850	1	1990	46,360.3	158,181.4	-	-	-	158,181.4	496,689.5	41.1	129.0	7.7	-	7.7	7.4	4.8	4.8
D&H Linear Park Museum	5050	1	1991	36,777.7	125,485.6	-	-	-	125,485.6	394,024.9	24.8	78.0	6.1	-	6.1	9.7	(36.6)	(36.6)
Hurleyville Cultural Center	2560	1	2004	3,718.5	12,687.4	-	-	-	59,786.3	87,408.2	23.4	34.1	3.6	3.0	0.6	9.1	(59.9)	(59.9)
Plaza Drive Building (leased)	16200	1	1912	153,217.7	522,778.8	-	-	-	522,778.8	1,641,525.4	32.3	101.3	25.5	-	25.5	21.5	19.1	19.1
1909 Jail	20000	1	1980	35,075.2	119,676.5	-	526,378.9	-	646,055.4	907,426.8	32.3	45.4	39.7	33.8	5.8	107.6	(63.1)	(63.1)
	58998	1	1909	802,470.0	2,738,027.6	-	-	4,400,240.3	7,138,267.8	13,041,649.1	121.0	221.1	460.4	326.5	133.8	353.8	30.1	30.1
				8,698,066.8	28,959,586.0	74,163.1	4,803,229.0	15,440,777.9	52,917,636.1	115,347,787.3	1,102.7	2,356.8	3,112.8	1,692.4	1,420.1	2,820.1		

Sullivan County Greenhouse Gas Emissions Benchmarking Report 2017

In 2017, the County continued to benchmark the 19 County owned or leased buildings that are larger than 1,000 square feet and use energy to heat or cool the occupied space. This information helps us measure our progress in improving energy efficiency, deploying renewable energy resources, reducing GHG emissions, and reducing energy costs in County facilities.

The 2017 report includes 12 months of data on the County's 2.5MW solar array at the Care Center at Sunset Lake (formerly the Adult Care Center) in Liberty. This energy is net metered to the Care Center and to other buildings owned by the County. In addition, the 2017 report includes 64,229kWh of electricity from smaller scale solar installations at the SC Transportation Facility in White Lake and the Human Services Complex in Liberty; energy from these arrays is used on-site.

Elevated source EUI was a trend at all County facilities in 2017. This reflects increased fuel use due to the increased number of Heating Degree Days (HDD) and increased number of Cooling Degree days. The colder the outdoor air temperature, the more energy it takes to heat a building; the warmer the outdoor air temperature, the more energy it takes to cool the building. The exception to this trend in elevated EUI was the Sullivan County Government Center, which improved its energy performance due to an energy retrofit that featured new heating and air conditioning systems (HVAC) including boilers, rooftop units and building management controls, as well as indoor and outdoor LED lighting. Three County facilities, the SC Transportation Facility, the SC Courthouse, and SC Government Center, received Energy Star ratings. The EPA revised this metric in 2018, which resulted in lower ratings in comparison to comparable buildings nationwide. The Sullivan County Transportation Facility in White Lake achieved a score of 99 in 2016, but the revised calibration awards the Facility a score of 60. The Sullivan County Courthouse's 2016 score of 46 was revised downward to 13. As a result of installation of new heating and air conditioning systems (HVAC) and LED lighting at the Sullivan County Government Center, the facility would have raised its score from 40 in 2016 to 46 for 2017; however, in the revised system, the building's energy score remained at 40, compared to other comparable buildings nationwide. This may change in 2018, when the County will have a full 12 months of energy data since completion of the Government Center retrofit; 2017 data reflects only one quarter in which the retrofit was complete.

Energy Data Glossary

Btu: A British thermal unit (Btu) is a standard unit of energy, defined as the amount of heat needed to raise the temperature of one pound of water by one degree Fahrenheit. In tracking building energy use, the Btu provides a single unit of measure that allows us to analyze the efficiency of systems that use a variety of fuels.

Energy Star: ENERGY STAR is a U.S. Environmental Protection Agency voluntary program that helps businesses and individuals achieve superior energy efficiency. Energy Star building ratings are based upon 150 separate metrics such as each building's size, location, the number of occupants, number of computers, and other characteristics, 1 being the worst, 100 being the most efficient.

EUI: Energy Use Intensity (EUI) expresses a building's energy use as a function of its size and other characteristics. For most property types in Portfolio Manager, the EUI is expressed as energy per square foot per year. It is calculated by dividing the total energy consumed by the building in one year (measured in thousands of British thermal units or kBtu) by the total gross floor area of the building. In general, a low EUI signifies good energy performance. EUI can be calculated on site energy use or source energy use, as explained in the following glossary entries.

GHG (as measured in MTCO₂e): There are a number of greenhouse gases (GHG), including carbon dioxide, methane, nitrous oxide and ozone. CO₂ equivalent or CO₂e, is a unit of measure that allows us to express the impact of each different GHG in terms of the amount of CO₂ that would create the same amount of warming. CO₂e allows us to express a carbon footprint consisting of different GHGs as a single, consistent number.

Heating and Cooling Degree Days: Degree days measure the amount of heating or cooling necessary at a given property. Degree days are measured relative to a base of 65°F. Above 65°F, it is assumed that the building will need to have cooling, and below 65°F it is assumed that the building will need to have heating. Heating Degree Days (HDD) are calculated based upon the number of days a building would have to be heated by 1 degree to accommodate the heating requirement. For example, on a day on which the

temperature is 55°F degrees, that day is worth 10 Heating Degree Days because it is 10 degrees below 65°F. HDD is calculated in this way for each day of the year and summed up to get the total annual HDD. Cooling Degree Days (CDD) are calculated based upon the number of days a building would have to be cooled by 1 degree to accommodate the cooling requirement. For example, on a day on which the temperature is 80°F degrees, that day is worth 15 Cooling Degree Days because it is 15 degrees above 65°F. CDD is calculated in this way for each day of the year and summed up to get the total annual CDD.

Site Energy Use: Site Energy Use is the annual amount of all the energy a property consumes onsite, as reported on utility bills.

Site EUI: The Site Energy total for one year, as reflected in the building's energy bills, divided by the total square footage of the building, yields a number that represents Site Energy Use Intensity (Site EUI). Site EUI helps building managers understand how the energy use for an individual building changes over time.

Source Energy Use: Source Energy Use represents the total amount of raw fuel that is required to operate the building. It incorporates all production, transmission, delivery, storage, and transport losses for all fuel types. Source Energy Use is the basis for ENERGY STAR's rating system, which converts the consumption of each type of energy into a single common unit (kBtu) and expresses it as a score of 1-100, so that the energy performance of diverse buildings can be compared equitably.

Source EUI: The source energy use total for one year, divided by the total square footage of the building, yields a Source Energy Use Intensity (Source EUI) that provides the most comprehensive measure of a building's energy performance. By taking all energy use into account, the score provides a complete assessment of energy efficiency in a building.

Sullivan County Benchmarking Data 2017

Property Name	Property GFA - Self-Reported (ft²)	Number of Buildings	Year Built	Electricity Use - Grid Purchase & Onsite Renewable Systems (kWh)	Electricity Use - Grid Purchase & Onsite Renewable Systems (kBtu)	Electricity Use - from Onsite Renewable Systems and Used Onsite (kWh)	Electricity Use - Generated from Onsite Renewable Systems and Used Onsite (kBtu)	Propane Use (kBtu)	Fuel Oil #2 Use (kBtu)	Site Energy Use (kBtu)	Source Energy Use (kBtu)	Site EUI (kBtu/ft²)	Source EUI (kBtu/ft²)	Total GHG Emissions (Metric Tons CO2e)	Direct GHG Emissions (Metric Tons CO2e)	Indirect GHG Emissions (Metric Tons CO2e)	National Median Total GHG Emissions (Metric Tons CO2e)	% Difference from National Median Site EUI	% Difference from National Median Source EUI	
Sullivan County Government Center	113178	1	1975	1736928	5926398.3	0	0	0	4835754.6	10762152.8	21478027.2	95.1	189.8	592	358.9	233.2	530.6	11.6	11.6	
Emergency Services Training Facility	10515	1	2010	52507	179153.9	0	0	239209.2	0	418363.1	743232.2	39.8	70.7	22.4	15.4	7	35	-35.9	-35.9	
Transportation Facility	11387	1	2009	32507.9	110916.9	8380.7	28595	632849.6	0	743766.5	898274.4	65.3	78.9	43.9	40.7	3.2	47.2	-6.9	-6.9	
Sullivan County Courthouse	32454	1	1090	465598.9	1588623.4	0	0	0	1090117.2	2678740.6	5549163.8	82.5	171	143.4	80.9	62.5	89.9	59.4	59.4	
Human Services Complex (Liberty)	174025	10	1916	3804206.5	12979952.4	55848.5	190554.9	2429618.9	3497804.6	18907376	41987565.8	108.6	241.3	918.8	415.7	503.1	443.2	107.3	107.3	
Barryville Maintenance Shops	26624	5	1930	173595.6	592308.2	0	0	140520.8	1196556.6	1929385.6	3008911.2	72.5	113	121.1	97.8	23.3	103.8	16.6	16.6	
Callicoon Storm Station - RT. 97	6440	1	1955	24986	85252.2	0	0	0	159666	244918.2	399968.9	38	62.1	15.2	11.8	3.4	21.9	-30.4	-30.4	
DPW Maplewood Facility	47663	2	1987	391507.4	1335823.2	0	0	1075700.7	944016.6	3355540.4	5780219.1	70.4	121.3	191.7	139.2	52.6	141.1	35.8	35.8	
Livingston Manor Storm Station	2102	1	1960	52932.6	180606.2	0	0	0	79598.4	260204.6	586091.6	123.8	278.8	13	5.9	7.1	4.2	212.3	212.3	
Sullivan County International Airport	64295	9	1970	599500.9	2045497.1	0	0	374868.1	780238.2	3200603.4	6894049.1	49.8	107.2	162.5	82	80.5	169.7	-4.3	-4.3	
Landfill	71729	7	1984	312933	1067727.4	0	0	2224863.6	0	3292590.8	5236748.5	45.9	73	184.9	142.9	42	226.2	-18.2	-18.2	
Rockland Transfer Station	1680	1	1985	30887	105386.4	0	0	0	0	105386.4	295082	62.7	175.6	4.1	0	4.1	2.1	96.7	96.7	
Ferndale Transfer Station	7225	1	1987	28242.5	96363.4	0	0	0	0	96363.4	269817.4	13.3	37.3	3.8	0	3.8	9.1	-58.2	-58.2	
Highland Transfer Station	3850	1	1990	44292.6	151126.4	0	0	0	0	151126.4	423153.9	39.3	109.9	5.9	0	5.9	4.8	23.1	23.1	
Mamakating Transfer Station	5050	1	1991	38836.3	132509.5	0	0	0	0	132509.5	371026.6	26.2	73.5	5.2	0	5.2	6.3	-17.7	-17.7	
D&H Linear Park Museum Interpretive	2560	1	2004	1704.8	5816.7	0	0	38262.8	0	44079.5	54932.2	17.2	21.5	2.7	2.5	0.2	14	-80.8	-80.8	
Hurleyville Cultural Center	16200	1	1912	183410.7	625797.3	0	0	0	0	625797.4	1752232.6	38.6	108.2	24.6	0	24.6	25.5	-3.4	-3.4	
Plaza Drive Building (Leased)	20000	1	1980	31599.1	107816.1	0	0	692484	0	800300.2	1001294	40	50.1	48.7	44.5	4.2	86.9	-43.9	-43.9	
1909 Jail	58998	1	1909	835750.6	2851581	0	0	0	4263482.4	7115063.4	12290544.1	120.6	208.3	428.6	316.4	112.2	321.7	33.2	33.2	
				8841927.4	30168656	64229.2	219149.9	7848377.7	16847234.6	54864268.2	109020334.6	1149.6	2291.5	2932.5	1754.6	1178.1				

Sullivan County Greenhouse Gas Emissions Benchmarking Report 2018

Sullivan County continued to benchmark the 19 County owned or leased buildings that are larger than 1,000 square feet and use energy to heat or cool the occupied space. This information helps us measure our progress in improving energy efficiency, deploying renewable energy resources, reducing GHG emissions, and reducing energy costs in County facilities.

2018 data includes a full 12 months of energy data for the Government Center in Monticello, which reflect the complete energy retrofit at this facility. Elements of the retrofit include the installation of new heating and air conditioning systems (HVAC), building management controls, and LED lighting throughout the building and parking areas. The 2018 data shows reductions in electricity use, fuel use and site energy use intensity (EUI) over the 2016 baseline data as well as 2017 performance at the Government Center. The Energy Star rating for this building rose from 36 in 2016 and 40 in 2017 to 73 in 2018, a more than 100% improvement in overall energy performance over the baseline year. Site EUI was 107.8 in 2016, and dropped to 74.1 in 2018, a 31% improvement. Total GHG emissions intensity for the Government Center was 5.8 kgCO₂e/square foot in the baseline year of 2016; that dropped to 4.2 kg CO₂e/sf in 2018, a change of 27.6%. Site energy use dropped from 12,204,734.1 kBtu in 2016 to 8,389,333.9 in 2018, a 31.3% reduction in site energy use. Source EUI (measured in kBtu/sf) was 223.8 in 2016; it dropped 142.5 in 2018, a 36.3% improvement. In terms of energy costs, the retrofit reduced annual fuel oil use by 8,000 gallons at the Government Center, resulting in a cost savings of \$6,168.80 in 2018. Annual electricity use, measured in kilowatt hours (kWh), was reduced by 876,171.5 kWh over the baseline year and yielded a savings of \$67,606.90 in 2018. This reduction in electricity use resulted in additional annual savings of \$13,017.29 due to the reduction in monthly demand charges related to the building's electricity consumption. Total cost savings for all fuels was \$86,792.99.

Elevated source EUI continued to be a trend across all County facilities, driven by the increased number of heating degree days (HDD) and cooling degree days (CDD). There were 6,016 HDD in 2018 compared to 5,657 in 2017, an increase of 6.34%. There were 894 CDD in 2018 compared to 671 in 2017, an increase of 33.23%. The colder the outdoor air temperature, the more energy it takes to heat a building; the warmer the outdoor air temperature, the more energy it takes to cool the building. The impact of increased cooling degree days is felt across all County buildings that are occupied space. Increased heating degree days have the most impact at facilities that are electrically heated using older technology.

Energy use intensity at the Sullivan County Emergency Services Training Facility and Emergency Operations Center decreased even with EOC operations during two prolonged storms in March and May 2018.

The 2018 data is shown in 3 tables that compare 2017 and 2018 data:

Table 1: Energy Performance

Table 2: Emissions Performance

Table 3: Fuel Performance

Energy Data Glossary

Btu: A British thermal unit (Btu) is a standard unit of energy, defined as the amount of heat needed to raise the temperature of one pound of water by one degree Fahrenheit. In tracking building energy use, the Btu provides a single unit of measure that allows us to analyze the efficiency of systems that use a variety of fuels.

Energy Star: ENERGY STAR is a U.S. Environmental Protection Agency voluntary program that helps businesses and individuals achieve superior energy efficiency. Energy Star building ratings are based upon 150 separate metrics such as each building's size, location, the number of occupants, number of computers, and other characteristics, 1 being the worst, 100 being the most efficient.

EUI: Energy Use Intensity (EUI) expresses a building's energy use as a function of its size and other characteristics. For most property types in Portfolio Manager, the EUI is expressed as energy per square foot per year. It is calculated by dividing the total energy consumed by the building in one year (measured in thousands of British thermal units or kBtu) by the total gross floor area of the building. In general, a low EUI signifies good energy performance. EUI can be calculated on site energy use or source energy use, as explained in the following glossary entries.

GHG (as measured in MTCO₂e): There are a number of greenhouse gases (GHG), including carbon dioxide, methane, nitrous oxide and ozone. CO₂ equivalent or CO₂e, is a unit of measure that allows us to express the impact of each different GHG in terms of the amount of CO₂ that would create the same amount of warming. CO₂e allows us to express a carbon footprint consisting of different GHGs as a single, consistent number.

Heating and Cooling Degree Days: Degree days measure the amount of heating or cooling necessary at a given property. Degree days are measured relative to a base of 65°F. Above 65°F, it is assumed that the building will need to have cooling, and below 65°F it is assumed that the building will need to have heating. **Heating Degree Days (HDD)** are calculated based upon the number of days a building would have to be heated by 1 degree to accommodate the heating requirement. For example, on a day on which the temperature is 55°F degrees, that day is worth 10 Heating Degree Days because it is 10 degrees below 65°F. HDD is calculated in this way for each day of the year and summed up to get the total annual HDD. **Cooling Degree Days (CDD)** are calculated based upon the number of days a building would have to be cooled by 1 degree to accommodate the cooling requirement. For example, on a day on which the temperature is 80°F degrees, that day is worth 15 Cooling Degree Days because it is 15 degrees above 65°F. CDD is calculated in this way for each day of the year and summed up to get the total annual CDD.

Site Energy Use: Site Energy Use is the annual amount of all the energy a property consumes onsite, as reported on utility bills.

Site EUI: The Site Energy total for one year, as reflected in the building's energy bills, divided by the total square footage of the building, yields a number that represents Site Energy Use Intensity (Site EUI). Site EUI helps building managers understand how the energy use for an individual building changes over time.

Source Energy Use: Source Energy Use represents the total amount of raw fuel that is required to operate the building. It incorporates all production, transmission, delivery, storage, and transport losses for all fuel types. Source Energy Use is the basis for ENERGY STAR's rating system, which converts the consumption of each type of energy into a single common unit (kBtu) and expresses it as a score of 1-100, so that the energy performance of diverse buildings can be compared equitably.

Source EUI: The source energy use total for one year, divided by the total square footage of the building, yields a Source Energy Use Intensity (Source EUI) that provides the most comprehensive measure of a building's energy performance. By taking all energy use into account, the score provides a complete assessment of energy efficiency in a building.

Weather-normalized: Weather normalized metrics are adjusted to account for the actual weather in a given area, such as a hotter than usual summer or a colder than usual winter.

Table 1: Energy Performance 2018

Energy Performance									
Date Downloaded: 10/28/2019 02:21 PM EDT									
Date Generated: 10/28/2019 10:47 AM EDT									
Number of properties in report: 19									
Comparing Year Ending: 12/2017 with 12/2018									
Property Name	Site EUI (kBtu/ft ²) Change	Source EUI (kBtu/ft ²) Change	Weather Normalized Site EUI (kBtu/ft ²) Change	Weather Normalized Source EUI (kBtu/ft ²) Change	Site EUI - Adjusted to Current Year (kBtu/ft ²) Change	Source EUI - Adjusted to Current Year (kBtu/ft ²) Change	National Median Site EUI (kBtu/ft ²) Change	National Median Source EUI (kBtu/ft ²) Change	% Difference from National Median Source EUI Change
Sullivan County Government Center	-21	-47.3	-17.9	-42.9	-22.3	-50	5	2.6	-26
Emergency Services Training Facility	6.6	4.9	Not Applicable	Not Applicable	Not Applicable	Not Applicable	5.7	0	4.4
Transportation Facility	-1	1.9	-4.4	-1.5	-2.6	0	-1.7	2.1	0.3
Sullivan County Courthouse	-4.9	-1.2	-6.3	-4.9	-6.8	-5.1	-2.1	2.5	-3.6
Human Services Complex (Liberty)	-4	-17.3	-4.3	-18.3	Not Applicable	Not Applicable	1.9	0	-14.8
Barryville Maintenance Shops	10.8	10	Not Applicable	Not Applicable	Not Applicable	Not Applicable	3.5	0	10.3
Callicoon Storm Station - RT. 97	13.6	15.3	Not Applicable	Not Applicable	Not Applicable	Not Applicable	4.8	0	17.2
DPW Maplewood Facility	58	56.6	55.9	52.6	Not Applicable	Not Applicable	12.6	0	63.5
Livingston Manor Storm Station	-1.5	-18.4	Not Applicable	Not Applicable	Not Applicable	Not Applicable	2.3	0	-20.6
Sullivan County International Airport	-1.1	3.6	-1.5	1.8	Not Applicable	Not Applicable	-3.2	0	3.2
Landfill	-1.5	-1.1	-4	-4	Not Applicable	Not Applicable	-0.9	0	-1.3
Rockland Transfer Station	-7.6	-21.3	-9	-25.5	Not Applicable	Not Applicable	0	0	-23.8
Ferndale Transfer Station	0.3	0.8	-0.4	-1.2	Not Applicable	Not Applicable	0	0	0.9
Highland Transfer Station	-0.8	-2.2	-1.9	-5.2	Not Applicable	Not Applicable	0	0	-2.5
Mamakating Transfer Station	-0.3	-0.9	-1.3	-3.7	Not Applicable	Not Applicable	0	0	-1
D&H Linear Park Museum Interpretive	3.6	3.8	3.3	3.1	Not Applicable	Not Applicable	1.9	0	3.4
Hurleyville Cultural Center	3.9	10.8	1.3	3.6	Not Applicable	Not Applicable	0	0	9.6
Plaza Drive Building (leased)	-12.2	-18.4	-12.1	-17.9	Not Applicable	Not Applicable	7	0	-20.6
1909 Jail	18.6	19.7	17.5	16.5	Not Applicable	Not Applicable	5	0	12.6

Table 2: Emissions Performance 2018

Emissions Performance					
Date Downloaded: 10/28/2019 10:42 AM EDT					
Date Generated: 10/24/2019 03:24 PM EDT					
Number of properties in report: 19					
Comparing Year Ending: 12/2017 with 12/2018					
Property Name	Indirect GHG Emissions (Metric Tons CO2e) Change	Direct GHG Emissions (Metric Tons CO2e) Change	Total GHG Emissions (Metric Tons CO2e) Change	Avoided Emissions - Onsite and Offsite Green Power (Metric Tons CO2e) Change	Net Emissions (Metric Tons CO2e) Change
Sullivan County Government Center	-65	-53.6	-118.5	0	-118.5
Emergency Services Training Facility	-0.4	5.1	4.8	0	4.8
Transportation Facility	0.8	-1.9	-1.1	-0.3	-1.1
Sullivan County Courthouse	2.7	-17.1	-14.4	0	-14.4
Human Services Complex (Liberty)	-50.9	38.9	-12	-60.4	45.8
Barryville Maintenance Shops	-0.5	21.6	21.1	0	21.1
Callicoon Storm Station - RT. 97	0.3	6.1	6.3	-1.4	7.8
DPW Maplewood Facility	-2.1	182.7	180.8	0	180.8
Livingston Manor Storm Station	-0.8	1.3	0.5	0	0.5
Sullivan County International Airport	6.5	-15.8	-9.3	-15.1	5.8
Landfill	0.5	-7.6	-7	0	-7
Rockland Transfer Station	-0.5	0	-0.5	0	-0.5
Ferndale Transfer Station	0.1	0	0.1	0	0.1
Highland Transfer Station	-0.1	0	-0.1	0	-0.1
Mamakating Transfer Station	-0.1	0	-0.1	0	-0.1
D&H Linear Park Museum Interpretive	0	0.5	0.6	0	0.6
Hurleyville Cultural Center	2.5	0	2.5	0	2.5
Plaza Drive Building (leased)	-2.6	-11.3	-13.9	0	-13.9
1909 Jail	1.2	79.1	80.3	-2.1	82.4

Table 3: Fuel Performance 2018

Fuel Performance								
Date Downloaded: 10/28/2019 10:49 AM EDT								
Date Generated: 10/28/2019 10:42 AM EDT								
Number of properties in report: 19								
Comparing Year Ending: 12/2017 with 12/2018								
Property Name	Site Energy Use (kBtu) Change	Energy Cost (\$) Change	Electricity Use - Grid Purchase (kWh) Change	Electricity (Grid Purchase) Cost (\$) Change	Fuel Oil #2 Use (kBtu) Change	Fuel Oil (No. 2) Cost (\$) Change	Propane Use (kBtu) Change	Propane Cost (\$) Change
Sullivan County Government Center	-2372818.9	-63905.71	-483879.2	-66277.77	-721822.9	2372.06	Not Applicable	Not Applicable
Emergency Services Training Facility	69736	5065.31	-3103.5	2704.21	Not Applicable	Not Applicable	80325.2	2361.1
Transportation Facility	-11526.4	2192.42	5526.9	1282.7	Not Applicable	Not Applicable	-28225.6	909.73
Sullivan County Courthouse	-161295.4	14876.43	20307.4	15882.5	-230584.2	-1006.07	Not Applicable	Not Applicable
Human Services Complex (Liberty) Barryville	-691024.2	Not Applicable	-379600	Not Applicable	-113546.3	6154.61	736874	17218.51
Maintenance Shops	287165.3	15562.22	-4052.3	6532.67	228734.9	7514.83	72256.8	1514.72
Callicoon Storm Station - RT. 97	87679.4	2137.16	1684.8	282.34	81930.6	1854.82	Not Applicable	Not Applicable
DPW Maplewood Facility	2764526.6	55255.59	-15098.3	12654.14	184271.4	5128.63	2631770.4	37472.82
Livingston Manor Storm Station	-3035	1791.08	-5844	1188.94	16905	602.14	Not Applicable	Not Applicable
Sullivan County International Airport	-66875	Not Applicable	48329.7	Not Applicable	-92225.4	-430.03	-139550.5	-1534.39
Landfill	-105033.7	20038.33	3918.6	17448.07	Not Applicable	Not Applicable	-118404	2590.26
Rockland Transfer Station	-12787.6	834.42	-3747.8	834.42	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Ferndale Transfer Station	1922.3	1098.57	563.4	1098.57	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Highland Transfer Station	-3078	2132.08	-902.1	2132.08	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Mamakating Transfer Station	-1621.7	-1293.65	-475.3	-1293.65	Not Applicable	Not Applicable	Not Applicable	Not Applicable
D&H Linear Park Museum Interpretive	9061.5	263.69	121.2	26.43	Not Applicable	Not Applicable	8648	237.26
Hurleyville Cultural Center	62624.5	8466.56	18354.2	8466.56	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Plaza Drive Building (leased)	-243581	-77.02	-19888.9	-1768.6	Not Applicable	Not Applicable	-175720	1691.58
1909 Jail	1095966.5	58598.34	8735.7	27574.76	1066160.4	31023.58	Not Applicable	Not Applicable

Sullivan County Greenhouse Gas Emissions Benchmarking Report 2019

Benchmarking helps the County measure our progress in improving energy efficiency, deploying renewable energy resources, reducing GHG emissions, and reducing energy costs in County facilities. For 2019, Sullivan County benchmarked 18 County owned or leased buildings that are larger than 1,000 square feet and use energy to heat or cool the occupied space, using the EPA's Portfolio Manager benchmarking software. The Plaza Drive Building was eliminated from the County's benchmarking protocol in 2019 because this facility is leased to another entity, and its hours of operation, occupancy, climate controls and equipment use are not controlled by the County.

The 2019 data on energy use, emissions and fuel use highlight changes in energy use and energy intensity relating to the number of cooling degree days (CDD) and heating degree days (HDD) compared to 2018; changes in building use; and quantifications affected by the timing of bulk fuel deliveries.

Cooling Degree Days (CDD) and Heating Degree Days (HDD) affect energy use and energy intensity. There were fewer CDD overall from May through October 2019 compared to 2018. July 2019 had the highest number of CDD in 2019, 210, which was an increase of 42 CDD over July 2018. CDD in July used more energy to condition the indoor spaces than CDD in other months because the temperature difference between the temperature set point of the building and the outdoor temperature was greater.

There were also more heating degree days (HDD) in 2019 than in 2018. Seven of the months in 2019 had more heating degree days than in 2018. Four months, May, June, August, and September recorded a higher monthly total of HDD in 2019 than in 2018.

Some buildings, like the Transportation Facility, experienced an increase in fuel use which is attributed to an expanded use of the facility due to the MOVE Sullivan initiative.

Other buildings saw expanded use as well, but showed a decrease in energy use in 2019 over 2018. For example, the Emergency Service Training Center (ESTC) saw an increase in the number of training classes and students over 2018, but achieved a decrease in energy use. That decrease is attributable to two prime causes, one involving building technology, and one focusing on the behavior of the building's occupants:

- In 2019, the facility's interior lights throughout the classrooms and offices were changed from fluorescent to LED; and
- In 2019, more attention was given to temperature set points including lowering the building temperature at night and weekends.

Another factor that has emerged is the timing of deliveries of bulk fuel such as #2 oil or propane, which affects calculations of site energy use and GHG emissions for some larger buildings as reflected in the benchmarking numbers. This is due to Portfolio Manager's convention of attributing consumption of bulk fuel to the month in which the fuel was delivered. For example, on December 21st 2018 the County's Maplewood Facility received a delivery of 10,002 gallons of propane. The next propane delivery at this facility occurred on March 7, 2019, in the amount of 10,001 gallons. Effectively, the first 60 days' propane consumption in 2019 was attributed to the 2018 calendar year, along with the energy use and GHG emissions footprint associated with that fuel. This interval varies depending on the exact timing of deliveries that occur near the end of one calendar year and the beginning of the following year.

In the fall of 2021, we anticipate producing a 5-year benchmarking report that we hope will provide a clearer picture of our overall progress in reducing energy use, EUI and GHG emissions for County facilities.

The 2019 data is shown in 3 tables that compare 2018 and 2019 data:

Table 1: Energy Performance

Table 2: Emissions Performance

Table 3: Fuel Performance

Energy Data Glossary

Btu: A British thermal unit (Btu) is a standard unit of energy, defined as the amount of heat needed to raise the temperature of one pound of water by one degree Fahrenheit. In tracking building energy use, the Btu provides a single unit of measure that allows us to analyze the efficiency of systems that use a variety of fuels.

Energy Star: ENERGY STAR is a U.S. Environmental Protection Agency voluntary program that helps businesses and individuals achieve superior energy efficiency. Energy Star building ratings are based upon 150 separate metrics such as each building's size, location, the number of occupants, number of computers, and other characteristics, 1 being the worst, 100 being the most efficient.

EUI: Energy Use Intensity (EUI) expresses a building's energy use as a function of its size and other characteristics. For most property types in Portfolio Manager, the EUI is expressed as energy per square foot per year. It is calculated by dividing the total energy consumed by the building in one year (measured in thousands of British thermal units or kBtu) by the total gross floor area of the building. In general, a low EUI signifies good energy performance. EUI can be calculated on site energy use or source energy use, as explained in the following glossary entries.

GHG (as measured in MTCO₂e): There are a number of greenhouse gases (GHG), including carbon dioxide, methane, nitrous oxide and ozone. CO₂ equivalent or CO₂e, is a unit of measure that allows us to express the impact of each different GHG in terms of the amount of CO₂ that would create the same amount of warming. CO₂e allows us to express a carbon footprint consisting of different GHGs as a single, consistent number.

Heating and Cooling Degree Days: Degree days measure the amount of heating or cooling necessary at a given property. Degree days are measured relative to a base of 65°F. Above 65°F, it is assumed that the building will need to have cooling, and below 65°F it is assumed that the building will need to have heating. **Heating Degree Days (HDD)** are calculated based upon the number of days a building would have to be heated by 1 degree to accommodate the heating requirement. For example, on a day on which the temperature is 55°F degrees, that day is worth 10 Heating Degree Days because it is 10 degrees below 65°F. HDD is calculated in this way for each day of the year and summed up to get the total annual HDD. **Cooling Degree Days (CDD)** are calculated based upon the number of days a building would have to be cooled by 1 degree to accommodate the cooling requirement. For example, on a day on which the temperature is 80°F degrees, that day is worth 15 Cooling Degree Days because it is 15 degrees above 65°F. CDD is calculated in this way for each day of the year and summed up to get the total annual CDD.

Site Energy Use: Site Energy Use is the annual amount of all the energy a property consumes onsite, as reported on utility bills.

Site EUI: The Site Energy total for one year, as reflected in the building's energy bills, divided by the total square footage of the building, yields a number that represents Site Energy Use Intensity (Site EUI). Site EUI helps building managers understand how the energy use for an individual building changes over time.

Source Energy Use: Source Energy Use represents the total amount of raw fuel that is required to operate the building. It incorporates all production, transmission, delivery, storage, and transport losses for all fuel types. Source Energy Use is the basis for ENERGY STAR's rating system, which converts the consumption of each type of energy into a single common unit (kBtu) and expresses it as a score of 1-100, so that the energy performance of diverse buildings can be compared equitably.

Source EUI: The source energy use total for one year, divided by the total square footage of the building, yields a Source Energy Use Intensity (Source EUI) that provides the most comprehensive measure of a building's energy performance. By taking all energy use into account, the score provides a complete assessment of energy efficiency in a building.

Weather-normalized: Weather normalized metrics are adjusted to account for the actual weather in a given area, such as a hotter than usual summer or a colder than usual winter.

Table 1: Energy Performance 2019

Energy Performance/Baseline									
Date Downloaded: 03/03/2021 01:15 PM EST									
Date Generated: 03/03/2021 11:39 AM EST									
Number of properties in report: 18									
Comparing Year Ending: 12/2018 with 12/2019									
Property Name	Site EUI (kBtu/ft ²) Change	Source EUI (kBtu/ft ²) Change	Weather Normalized Site EUI (kBtu/ft ²) Change	Weather Normalized Source EUI (kBtu/ft ²) Change	Site EUI - Adjusted to Current Year (kBtu/ft ²) Change	Source EUI - Adjusted to Current Year (kBtu/ft ²) Change	National Median Site EUI (kBtu/ft ²) Change	National Median Source EUI (kBtu/ft ²) Change	% Difference from National Median Source EUI Change
Sullivan County Government Center	11.4	13.7	9.1	11.8	11.6	14.2	4.8	-0.7	7.5
Emergency Services Training Facility	0.2	4.9	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-4	0	4.5
Transportation Facility	7.1	5.8	Not Applicable	Not Applicable	6.5	5.1	4.5	1.7	4.1
Sullivan County Courthouse	5.4	1.1	6.3	3.1	5.8	2.2	3.3	-0.7	1.6
Human Services Complex (Liberty)	-0.2	-3.6	-1.2	-6.3	Not Applicable	Not Applicable	0.8	0	-3.1
Barryville Maintenance Shops	4.1	1.9	Not Applicable	Not Applicable	Not Applicable	Not Applicable	2.2	0	2
Callicoon Storm Station - RT. 97	-10.4	-22.4	Not Applicable	Not Applicable	Not Applicable	Not Applicable	7.1	0	-25.1
DPW Maplewood Facility	-41.7	-49.7	-43.4	-52.2	Not Applicable	Not Applicable	-4	0	-55.7
Livingston Manor Storm Station	8	-8.4	Not Applicable	Not Applicable	Not Applicable	Not Applicable	4.2	0	-9.4
Sullivan County International Airport	7.6	7.6	6.8	7.2	Not Applicable	Not Applicable	4.4	0	6.8
Landfill	0.4	-0.5	-1.3	-2.7	Not Applicable	Not Applicable	0.8	0	-0.5
Rockland Transfer Station	1.2	3.3	-0.9	-2.5	Not Applicable	Not Applicable	0	0	3.6
Ferndale Transfer Station	1.8	5.1	1.6	4.6	Not Applicable	Not Applicable	0	0	5.7
Highland Transfer Station	-0.5	-1.2	-1.6	-4.5	Not Applicable	Not Applicable	0	0	-1.3
Mamakating Transfer Station	1.9	5.6	1.3	3.6	Not Applicable	Not Applicable	0	0	6.2
D&H Linear Park Museum Interpretive Center	0.7	2	1	2.6	Not Applicable	Not Applicable	-3.5	0	1.8
Hurleyville Cultural Center	-2.7	-7.7	-3.6	-10	Not Applicable	Not Applicable	0	0	-6.8
1909 Jail	-35.1	-34.2	-34.9	-33.6	Not Applicable	Not Applicable	-10	0	-21.9

Table 2: Emissions Performance 2019

Number of properties in report: 18

Comparing Year Ending: 12/2018 with 12/2019

Property Name	Indirect GHG Emissions (Metric Tons CO2e) Change	Direct GHG Emissions (Metric Tons CO2e) Change	Total GHG Emissions (Metric Tons CO2e) Change	Avoided Emissions - Onsite Green Power (Metric Tons CO2e) Change	Net Emissions (Metric Tons CO2e) Change
Sullivan County Government Center	4.8	84.6	89.4	0	89.4
Emergency Services Training Facility	0.9	-1.7	-0.7	0	-0.7
Transportation Facility	-0.3	5.4	5	0.7	5
Sullivan County Courthouse	-2.7	18.8	16.2	0	16.2
Human Services Complex (Liberty)	-10.9	22.3	11.4	1.7	11.4
Barryville Maintenance Shops	-1.1	10.5	9.3	0	9.3
Callicoon Storm Station - RT. 97	-1.4	-1.8	-3.3	0	-3.3
DPW Maplewood Facility	-6.8	-113.6	-120.5	0	-120.5
Livingston Manor Storm Station	-0.6	2.6	2	0	2
Sullivan County International Airport	0	34.3	34.3	0	34.3
Landfill	-1.1	3.5	2.4	0	2.4
Rockland Transfer Station	0.1	0	0.1	0	0.1
Ferndale Transfer Station	0.5	0	0.5	0	0.5
Highland Transfer Station	-0.1	0	-0.1	0	-0.1
Mamakating Transfer Station	0.3	0	0.3	0	0.3
D&H Linear Park Museum Interpretive	0.1	0	0.1	0	0.1
Hurleyville Cultural Center	-1.5	0	-1.5	0	-1.5
1909 Jail	1.4	-156.9	-155.4	0	-155.4

Table 3: Fuel Performance 2019

Fuel Consumption								
Date Downloaded: 03/03/2021 03:01 PM EST								
Date Generated: 03/03/2021 11:48 AM EST								
Number of properties in report: 18								
Comparing Year Ending: 12/2018 with 12/2019								
Property Name	Site Energy Use (kBtu) Change	Energy Cost (\$) Change	Electricity Use - Grid Purchase (kWh) Change	Electricity (Grid Purchase) Cost (\$) Change	Fuel Oil #2 Use (kBtu) Change	Fuel Oil (No. 2) Cost (\$) Change	Propane Use (kBtu) Change	Propane Cost (\$) Change
Sullivan County Government Center	1282222.2	6627.62	41762.5	-9042.53	1139728.3	15670.14	Not Applicable	Not Applicable
Emergency Services Training Facility	1899.4	-1722.11	8244	-221.35	Not Applicable	Not Applicable	-26229.2	-1500.76
Transportation Facility	80459.1	-1584.02	-2593.2	-1370.79	Not Applicable	Not Applicable	83628	-213.24
Sullivan County Courthouse	175415.3	-1862.84	-23069.1	-5363.83	254127	3500.99	Not Applicable	Not Applicable
Human Services Complex (Liberty)	-34300.2	Not Applicable	-94728.6	Not Applicable	471132	1821.91	-196456.7	-10213.95
Barryville Maintenance Shops	109734.5	Not Applicable	-9826.5	-2949.99	124586.6	Not Applicable	18676	-443.33
Callicoon Storm Station - RT. 97	-67214	-1217.72	-12508.1	-689.52	-24536.4	-528.2	Not Applicable	Not Applicable
DPW Maplewood Facility	-1986948.5	Not Applicable	-59365	Not Applicable	101292.1	903.08	-1885687	-31407.14
Livingston Manor Storm Station	16625.7	-437.82	-5631	-691.88	35838.6	254.06	Not Applicable	Not Applicable
Sullivan County International Airport	484628.4	Not Applicable	-245.4	Not Applicable	316075.2	4704	169390.4	1536.94
Landfill	22388.7	-10535.65	-9150	-7007.49	Not Applicable	Not Applicable	53608.4	-3528.16
Rockland Transfer Station	1951.4	-146.35	571.9	-146.35	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Ferndale Transfer Station	13204.2	52.12	3869.9	52.12	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Highland Transfer Station	-1621	-456.04	-475.1	-456.04	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Mamakating Transfer Station	10054.8	749.3	2946.9	749.3	Not Applicable	Not Applicable	Not Applicable	Not Applicable
D&H Linear Park Museum Interpretive	2022.3	-134.81	509.1	-2.37	Not Applicable	Not Applicable	285.2	-132.44
Hurleyville Cultural Center	-44361.3	-1339.7	-13001.6	-1339.7	Not Applicable	Not Applicable	Not Applicable	Not Applicable
1909 Jail	-2072632.4	Not Applicable	12073.9	Not Applicable	-2113828.7	-34670.76	Not Applicable	Not Applicable

Sullivan County Greenhouse Gas Emissions Benchmarking Report 2020

Benchmarking helps the County measure our progress in improving energy efficiency, deploying renewable energy resources, reducing GHG emissions, and reducing energy costs in County facilities. For 2020, Sullivan County benchmarked 18 County owned or leased buildings that are larger than 1,000 square feet and use energy to heat or cool the occupied space, using the EPA's Portfolio Manager benchmarking software. Unless otherwise noted, the County uses benchmarking data from 2016 as the baseline year against which year-to-year changes in energy use and GHG emissions are measured.

Changes in building use from 2019

For 2020, we have for the first time a full 12-months of energy use data for the County's new Public Safety Facility located at 58 Old Route 17 in Monticello. This facility replaced the old 1909 County Jail, and also incorporates the offices of the Sullivan County Sheriff, the Patrol Division and the Civil Division. We have produced a special supplemental report highlighting the energy performance of the new facility. As some allied offices were still transitioning from the old jail location in 2020, data for the old jail is still included in the 2020 benchmarking report.

Similarly, 2020 marked the first full year that the Office of the Sullivan County District Attorney occupied new offices at 26 Hamilton Avenue in Monticello; 2020 will be the baseline data year for this facility.

Impact of the COVID-19 pandemic on building energy performance, energy use and GHG emissions

Direct, indirect and total greenhouse gas emissions (GHG) for County operations fell during 2020, as would be expected for operations in a pandemic. With the exception of essential services and public safety, staffing levels at County facilities were affected from mid-March 2020 through the end of the year as the County took action to reduce the number of employees working onsite at County facilities at any given time. While the heating and cooling of occupied buildings was maintained at pre-pandemic levels, work from home arrangements affected the number of computers in use on a day-to-day basis. The only observed exception was the Barryville Maintenance Shops, which showed an increase across all three sectors of GHG emissions. A closer analysis of fuel deliveries at this location showed that an early December propane delivery was made after the propane deliveries were changed from "will call" to automatic delivery. Under the "will call" protocol, the December 2020 delivery would have been called for in January 2021. When that December delivery was factored out of 2020 and put into 2021, the fuel use at the Barryville Shops was consistent with its historical annual use.

CDD and HDD had less impact in 2020

We can often explain increases in building energy use from year to year by looking at heating and cooling degree days. This does not appear to be significant in the comparison of baseline and 2020 data. The Binghamton data region registered 6,703 heating degree days in 2016 and 6,653 in 2020. Cooling degrees were registered at 555 for both the baseline year of 2016 and for 2020.

The 2020 data is shown in 3 tables that compare 2019 and 2020 data:

Table 1: Energy Performance

Table 2: Emissions Performance

Table 3: Fuel Performance

Highlights of 5 Years of Benchmarking Data

At the five-year mark from the County's baseline benchmarking year of 2016, our efforts have yielded valuable information about effective strategies for reducing GHG emissions from County operations and the associated energy costs. The County's building inventory varies widely in terms of the age and size of individual buildings. For example, the Bushnell Building, which until recently housed the Sheriff's Patrol Unit, was built in 1890, and the Aircraft Rescue and Fire Fighting Facility and Offices at the Sullivan County International Airport was built in 2012. The smallest occupied building is the Scale House at the County Landfill, which totals 1,056 square feet; the largest facility included in the full five years of this benchmarking report is the Government Center, at 89,400 square feet.

Over the past five years, we have had the opportunity to see how a modern, code compliant building in the County compares with a national standard, how a poorly performing building was able to reduce its energy consumption through a major heating and cooling system (HVAC) and lighting retrofit, and how a Power Purchase Agreement (PPA) of electricity from a photovoltaic system built on County property has reduced operating emissions at the Human Services Complex in Liberty.

Government Center energy retrofit continues to deliver energy savings and GHG reductions

In 2013, the County engaged the New York Power Authority (NYPA) to do an energy audit of the Sullivan County Government Center in Monticello and propose measures to save energy. The work of replacing the roof top heating and cooling units (RTU) and replacing all interior and exterior lighting with LED technology was implemented in 2017 and completed in 2018. The retrofit has reduced the site energy use by 28.6% from the baseline year, reduced greenhouse gas emissions by 17.30% and improved the building's Energy Star rating by 105.6%, from 36 to 74.

When we compare 2020 data with the baseline year of 2016, the Government Center outperforms all other County buildings in reductions across all performance metrics – electricity use (both kWh and kBtu), fuel oil use, site and source energy use, site and source energy use intensity, and total greenhouse gas emissions (MtCO_{2e}). This performance is directly related to the energy retrofit of HVAC, controls and lighting that was completed in 2018. Cost savings are tied to the unit price of the fuels used at the facility (electricity and fuel oil).

Solar-sourced energy provides an increasing share of the County's electricity use at the Human Services Complex in Liberty

In 2012, the County commissioned a 49.9kW solar array at the Travis Building on the Liberty campus. The County-owned Travis array provides about 7% of the electricity consumed at Travis, the Community Services Building and the Operations and Housekeeping Office at the Liberty campus. The County entered into a Power Purchase Agreement (PPA) with Solar City/Tesla in 2015 through a New York Sun solicitation for solar photovoltaic electricity. The 2.4 MW Solar City/Tesla array, built on County property in Liberty, NY provides fixed cost renewable energy to the Care Center at Sunset Lake, Gladys Olmstead Public Health facility and six other County Facilities. With two solar arrays in service at the Liberty campus, the County's Human Services Complex sourced 64.72 % of its electricity from on-site renewables in 2020. This is a 62.8% increase over the baseline year of 2016, when only the 49.92kW system at Travis was in operation. Net GHG emissions at the Liberty campus, measured in metric tons of carbon dioxide equivalent (MtCO_{2e}), went from 669.3 in 2016 to -129.8 in 2020, which resulted in avoided emissions of 821.8 MtCO_{2e}. After some initial confusion about the correct project category ("tariff") for the Solar City/Tesla 2.4MW array, the County is now able to move forward with accurate calculations of the full value of GHG reductions and energy cost savings achieved by this on-site solar generation.

Energy Star Performance Ratings highlight County facilities that are performing well

Our five years of benchmarking data also provide an opportunity to see how a modern, code compliant building in the County compares with a national standard for a building of similar size and function. The County Transportation Facility, built in 2009, has an Energy Star performance rating of 96, which is an increase of six points from the baseline year. The building's source and site energy use intensity has decreased by 13.40% and 17.9% respectively, and the site energy use has decreased by 18.0% from the baseline year. These improvements are likely due to the conversion to LED interior lighting. Increased building occupancy may also be a factor, since higher occupancy during the winter months may reduce the amount of propane required for heating. Propane use in 2020 was 25% less than in the 2016 baseline year. The onsite 14.96 kW demonstration solar array provides 26% of the annual average electricity use of the facility. According to the EPA Portfolio Manager benchmarking program, this facility's energy use intensity is 49.87% lower than the national median of similar use and size buildings.

Energy Data Glossary

Btu: A British thermal unit (Btu) is a standard unit of energy, defined as the amount of heat needed to raise the temperature of one pound of water by one degree Fahrenheit. In tracking building energy use, the Btu provides a single unit of measure that allows us to analyze the efficiency of systems that use a variety of fuels.

Energy Star: ENERGY STAR is a U.S. Environmental Protection Agency voluntary program that helps businesses and individuals achieve superior energy efficiency. Energy Star building ratings are based upon 150 separate metrics such as each building's size, location, the number of occupants, number of computers, and other characteristics, 1 being the worst, 100 being the most efficient.

EUI: Energy Use Intensity (EUI) expresses a building's energy use as a function of its size and other characteristics. For most property types in Portfolio Manager, the EUI is expressed as energy per square foot per year. It is calculated by dividing the total energy consumed by the building in one year (measured in thousands of British thermal units or kBtu) by the total gross floor area of the building. In general, a low EUI signifies good energy performance. EUI can be calculated on site energy use or source energy use, as explained in the following glossary entries.

GHG (as measured in MTCO₂e): There are a number of greenhouse gases (GHG), including carbon dioxide, methane, nitrous oxide and ozone. CO₂ equivalent or CO₂e, is a unit of measure that allows us to express the impact of each different GHG in terms of the amount of CO₂ that would create the same amount of warming. CO₂e allows us to express a carbon footprint consisting of different GHGs as a single, consistent number.

Heating and Cooling Degree Days: Degree days measure the amount of heating or cooling necessary at a given property. Degree days are measured relative to a base of 65°F. Above 65°F, it is assumed that the building will need to have cooling, and below 65°F it is assumed that the building will need to have heating. **Heating Degree Days (HDD)** are calculated based upon the number of days a building would have to be heated by 1 degree to accommodate the heating requirement. For example, on a day on which the temperature is 55°F degrees, that day is worth 10 Heating Degree Days because it is 10 degrees below 65°F. HDD is calculated in this way for each day of the year and summed up to get the total annual HDD. **Cooling Degree Days (CDD)** are calculated based upon the number of days a building would have to be cooled by 1 degree to accommodate the cooling requirement. For example, on a day on which the temperature is 80°F degrees, that day is worth 15 Cooling Degree Days because it is 15 degrees above 65°F. CDD is calculated in this way for each day of the year and summed up to get the total annual CDD.

Site Energy Use: Site Energy Use is the annual amount of all the energy a property consumes onsite, as reported on utility bills.

Site EUI: The Site Energy total for one year, as reflected in the building's energy bills, divided by the total square footage of the building, yields a number that represents Site Energy Use Intensity (Site EUI). Site EUI helps building managers understand how the energy use for an individual building changes over time.

Source Energy Use: Source Energy Use represents the total amount of raw fuel that is required to operate the building. It incorporates all production, transmission, delivery, storage, and transport losses for all fuel types. Source Energy Use is the basis for ENERGY STAR's rating system, which converts the consumption of each type of energy into a single common unit (kBtu) and expresses it as a score of 1-100, so that the energy performance of diverse buildings can be compared equitably.

Source EUI: The source energy use total for one year, divided by the total square footage of the building, yields a Source Energy Use Intensity (Source EUI) that provides the most comprehensive measure of a building's energy performance. By taking all energy use into account, the score provides a complete assessment of energy efficiency in a building.

Weather-normalized: Weather normalized metrics are adjusted to account for the actual weather in a given area, such as a hotter than usual summer or a colder than usual winter.

Table 1: Energy Performance 2020

Energy Performance									
Date Downloaded: 10/07/2021 01:57 PM EDT									
Date Generated: 10/07/2021 09:53 AM EDT									
Number of properties in report: 19									
Comparing Year Ending: 12/2019 with 12/2020									
Property Name	Site EUI (kBtu/ft ²) Change	Source EUI (kBtu/ft ²) Change	Weather Normalized Site EUI (kBtu/ft ²) Change	Weather Normalized Source EUI (kBtu/ft ²) Change	National Median Site EUI (kBtu/ft ²) Change	National Median Source EUI (kBtu/ft ²) Change	% Difference from National Median Source EUI Change	Site EUI - Adjusted to Current Year (kBtu/ft ²) Change	Source EUI - Adjusted to Current Year (kBtu/ft ²) Change
Sullivan County Government Center	-8.5	-18.7	-8.6	-19.2	2	-0.8	-9.5	-8.1	-18
Emergency Services Training Facility	-1.6	-1	Not Applicable	Not Applicable	-1.3	0	-0.9	Not Applicable	Not Applicable
Transportation Facility	-27	-29.5	Not Applicable	Not Applicable	-8.6	-4.4	-25	-25.7	-27.8
Sullivan County Courthouse	1	11.2	2.6	12.8	-3.4	-0.7	9.6	1.6	12.3
Human Services Complex (Liberty)	-12.5	-19	-12.1	-17.8	-2.1	0	-16.4	Not Applicable	Not Applicable
Barryville Maintenance Shops	14	22.8	Not Applicable	Not Applicable	-1.3	0	23.5	Not Applicable	Not Applicable
Callicoon Storm Station - RT. 97	7	27.2	8.7	30.6	-14.2	0	30.5	Not Applicable	Not Applicable
DPW Maplewood Facility	-7.7	-11.5	Not Applicable	Not Applicable	0.1	0	-12.9	Not Applicable	Not Applicable
Livingston Manor Storm Station	-27.6	-52.8	Not Applicable	Not Applicable	-0.1	0	-59.1	Not Applicable	Not Applicable
Sullivan County International Airport	-5.3	-8.7	-5.3	-8.7	-1.2	0	-7.8	Not Applicable	Not Applicable
Landfill	-8.3	-10.2	-6.2	-7.4	-2.8	0	-11.5	Not Applicable	Not Applicable
Rockland Transfer Station	-13.3	-37.1	-11.6	-32.3	0	0	-41.6	Not Applicable	Not Applicable
Ferndale Transfer Station	-1.7	-5	Not Applicable	Not Applicable	0	0	-5.6	Not Applicable	Not Applicable
Highland Transfer Station	-6.6	-18.6	-5	-14	0	0	-20.8	Not Applicable	Not Applicable
Mamakating Transfer Station	-1.2	-3.4	2.3	6.4	0	0	-3.8	Not Applicable	Not Applicable
D&H Linear Park Museum Interpretive	2	-1	2	-0.9	11.6	0	-0.9	Not Applicable	Not Applicable
Hurleyville Cultural Center	-12.8	-35.7	-10.2	-28.7	0	0	-31.9	Not Applicable	Not Applicable
1909 Jail	-34.8	-30.4	Not Applicable	Not Applicable	-15.1	0	-19.5	Not Applicable	Not Applicable
Sullivan County District Attorney	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table 2: Emissions Performance 2020

Emissions Performance1					
Date Downloaded: 10/07/2021 11:59 AM EDT					
Date Generated: 10/07/2021 09:49 AM EDT					
Number of properties in report: 19					
Comparing Year Ending: 12/2019 with 12/2020					
Property Name	Total GHG Emissions (Metric Tons CO2e) Change	Direct GHG Emissions (Metric Tons CO2e) Change	Indirect GHG Emissions (Metric Tons CO2e) Change	Avoided Emissions - Onsite Green Power (Metric Tons CO2e) Change	Net Emissions (Metric Tons CO2e) Change
Sullivan County Government Center	-43.4	-23.6	-19.9	Not Applicable	-43.4
Emergency Services Training Facility	-1.1	-1.2	0.1	Not Applicable	-1.1
Transportation Facility	-19.1	-18.6	-0.5	-0.5	-15.9
Sullivan County Courthouse	-5.4	-11.1	5.7	Not Applicable	-5.4
Human Services Complex (Liberty)	-123	-103.6	-19.4	-3.5	-84.5
Barryville Maintenance Shops	21.4	17.5	4	Not Applicable	21.4
Callicoon Storm Station - RT. 97	0.2	-2	2.2	Not Applicable	0.2
DPW Maplewood Facility	-22.8	-19.7	-3.1	Not Applicable	-22.8
Livingston Manor Storm Station	-3	-2.1	-0.9	Not Applicable	-3
Sullivan County International Airport	-20.5	-16.8	-3.6	Not Applicable	-11.2
Landfill	-35.8	-33.6	-2.2	Not Applicable	-35.8
Rockland Transfer Station	-0.7	0	-0.7	Not Applicable	-0.7
Ferndale Transfer Station	-0.4	0	-0.4	Not Applicable	-0.4
Highland Transfer Station	-0.8	0	-0.8	Not Applicable	-0.8
Mamakating Transfer Station	-0.2	0	-0.2	Not Applicable	-0.2
D&H Linear Park Museum Interpretive	0.4	0.6	-0.1	Not Applicable	0.4
Hurleyville Cultural Center	-6.5	0	-6.5	Not Applicable	-6.5
1909 Jail	-159.5	Not Applicable	4.9	Not Applicable	-158.4
Sullivan County District Attorney	Not Applicable	Not Applicable	Not Applicable	Not Applicable	39.4

Table 3: Fuel Performance 2020

Fuel Performance									
Date Downloaded: 10/07/2021 11:06 AM EDT									
Date Generated: 10/07/2021 09:45 AM EDT									
Number of properties in report: 19									
Comparing Year Ending: 12/2019 with 12/2020									
Property Name	Site Energy Use (kBtu) Change	Energy Cost (\$) Change	Energy Cost Intensity (\$/ft ²) Change	Electricity Use - Grid Purchase (kWh) Change	Electricity (Grid Purchase) Cost (\$) Change	Fuel Oil #2 Use (kBtu) Change	Fuel Oil (No. 2) Cost (\$) Change	Propane Use (kBtu) Change	Propane Cost (\$) Change
Sullivan County Government Center	-959461.6	-45488.96	-0.4	-188096.5	-15622.37	-317676.1	-29866.58	Not Applicable	Not Applicable
Emergency Services Training Facility	-16655.3	-1394.23	-0.14	994	-470.47	Not Applicable	Not Applicable	-20046.8	-923.76
Transportation Facility	-307663.9	Not Applicable	Not Applicable	-4090.2	69.47	Not Applicable	Not Applicable	-289524	-4407.34
Sullivan County Courthouse	34397.7	Not Applicable	Not Applicable	53924.3	Not Applicable	-149592	-6663.91	Not Applicable	Not Applicable
Human Services Complex (Liberty)	-2177173.1	Not Applicable	Not Applicable	-183256	Not Applicable	-578192.6	-21937.45	-944371.1	-13762.59
Barryville Maintenance Shops	374258.6	Not Applicable	Not Applicable	37555.7	5478.19	166427.9	Not Applicable	79690.4	744.32
Callicoon Storm Station - RT. 97	44851	-67.41	-0.01	21246.4	1249.44	-27641.4	-1316.85	Not Applicable	Not Applicable
DPW Maplewood Facility	-366108.5	Not Applicable	Not Applicable	-29590.9	Not Applicable	-265512.1	-7526.55	367.9	-1003.42
Livingston Manor Storm Station	-57884.7	-1325.23	-0.63	-8592.8	-635.84	-28566	-689.39	Not Applicable	Not Applicable
Sullivan County International Airport	-342127.3	Not Applicable	Not Applicable	-34386.1	Not Applicable	-242742	-7749.19	17940	-217.82
Landfill	-595340.1	Not Applicable	Not Applicable	-21465.4	Not Applicable	Not Applicable	Not Applicable	-522100	-9558.81
Rockland Transfer Station	-22275	-724.16	-0.43	-6528.4	-724.16	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Ferndale Transfer Station	-12831.3	-455.44	-0.07	-3760.6	-455.44	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Highland Transfer Station	-25555.1	-634.68	-0.16	-7489.7	-634.68	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Mamakating Transfer Station	-6143.9	134.99	0.03	-1800.7	134.99	Not Applicable	Not Applicable	Not Applicable	Not Applicable
D&H Linear Park Museum Interpretive	4884.7	Not Applicable	Not Applicable	-1237.8	Not Applicable	Not Applicable	Not Applicable	9108	74.21
Hurleyville Cultural Center	-206942.1	-6320.13	-0.39	-60651.2	-6320.13	Not Applicable	Not Applicable	Not Applicable	Not Applicable
1909 Jail	-2056992.6	Not Applicable	Not Applicable	46280	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Sullivan County District Attorney	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Sullivan County 2020 Benchmarking Report - Supplemental

Comparing Site Energy Use and Site Energy Use Intensity at the old (1909) Jail and the 2019 Public Safety Facility

In 2019, the County completed construction of a new Public Safety Facility. The new jail complex replaced the 1909 jail located adjacent to the Sullivan County Courthouse, which was up until 2019 the oldest continuously operating county jail in New York State. The benchmarking year 2020 provides the first opportunity to document a full 12 months of energy use data at the new facility, and to analyze the energy use improvements delivered by the new facility. Since some allied County offices were still transitioning to the new Public Safety Facility during 2020, the 2020 benchmarking report still included energy use data for the old 1909 County Jail.

Two metrics help us understand energy use and energy efficiency in the context of the huge difference in size of the 2 facilities. **Site Energy Use (Site EU)** is the annual amount of all the energy (electricity, propane, fuel oil) a property consumes onsite, as reported on utility bills. **Energy Use Intensity (EUI)** expresses a building's energy use as a function of its size (square footage) and other characteristics. For most property types in Portfolio Manager, the EUI is expressed as energy per square foot per year. All fuel sources utilized in the operation of the buildings are calculated and then converted to a uniform measure of energy, the British thermal unit (Btu). EUI is calculated by dividing the total energy consumed by the building in one year (measured in thousands of British thermal units or kBtu), by the total gross floor area of the building. In general, a low EUI signifies good energy performance. Site EU and Site EUI can also allow a look at how new construction and better energy codes can influence the performance of a building.

Portfolio Manager also allows us to compare the energy performance of each county building with buildings of similar size and use across the country (the "national median") and to calculate the percentage difference in a building's energy performance from the national median.

At 58,998 square feet, the old 1909 jail's Site EUI (kBtu per square foot) was 120.4, 31.28% higher than the median Site EUI for a comparable building. The new Public Safety Facility, more than 2.5 times the size of the old facility, has a Site EUI of 105.45, roughly 15.24% above the median.

Building	Conditioned space (square feet)	Site EUI(kBtu/sq.ft)	Site EUI% higher than median
1909 Jail	58,998	120.4	31.28
2019 Public Safety Facility	154,000	105.45	15.24

Even though the new facility is a larger space, and the HVAC system is heating, cooling and providing controlled, mechanical ventilation to the space, the Site EUI has been significantly reduced when compared to the 1909 facility. Additionally, the new facility is performing, overall, at a much higher level of energy efficiency than the 1909 Jail compared to the national median Site EUI.

Appendix 3 - Timeline of key actions 2014-to date

2014

Solar energy. The County signed an agreement with Solar City to develop a 2MW solar installation through a Power Purchase Agreement (PPA) at the County's Public Health and Community Services campus in Liberty.

2015

Major energy retrofit at the Government Center. County identified NYPA (New York Power Authority) as a source for contracting and financing for a major energy efficiency retrofit of the SC Government Center in Monticello. The project is projected to result in a 33% annual reduction in electricity use and a reduction of 4,559 gallons of fuel oil/year. NYPA financing guarantees positive cash flow from year 1.

Outreach to municipalities. OSE assists efforts in the towns of Bethel, Delaware, Highland and Tusten to fulfill their commitments as Climate Smart Communities and develop energy efficiency, climate resiliency and renewable energy projects.

2016

Small hydro. The County entered into an operational agreement with Gravity Renewables to purchase 4,500,000 kWh per year from a small hydroelectric plant in upstate NY.

Transition to renewable energy. With completion of the 2MW solar array in Liberty and the implementation of the operational agreement with Gravity Renewables, the County is on track to achieve 70% of electricity for government operations from renewable energy sources, surpassing the goal set in the 2014 SC Climate Action Plan (50% by 2020).

Outreach to municipalities. OSE continued work with SC towns that have joined the Climate Smart Communities Program, including presentations on solar permitting and zoning for larger projects, and helped the Town of Highland secure a \$489,000 grant through the Climate Smart Communities program to fund relocation of the town garage from a flood prone location.

Public outreach on solar development. OSE partnered with the County Division of Planning, Real Property Tax Services, and Cornell Cooperative Extension to provide SC property owners with vital information about leasing their land for large scale solar development.

2017

Reorganization of OSE. OSE officially reorganized under the direction of a Sustainability Coordinator, with in-house staff consisting of 2 Sustainability Analysts.

Climate Smart Communities. Sullivan County achieved Bronze certification as a Climate Smart Community by the NYS Department of Environmental Conservation by completing 29 significant climate actions. Sullivan is the sixth County and the 15th municipality in New York State to achieve certification.

Clean Energy Communities. Sullivan County officially designated a Clean Energy Community by the NYS Energy Research and Development Authority (NYSERDA) in recognition of the completion of four High Impact Actions which include partnering with a local non-profit to run a community-based solarize campaign, establishing an Energize NY finance program for commercial and non-profit facilities, and enacting a benchmarking policy for county buildings.

2.4MW Liberty solar array commissioned. Solar City (now Tesla) completed a 2.4MW PV system at the County's Public Health and Human Services campus in Liberty. Through the County's power purchase agreement, the project powers the all-electric SC Care Center at Sunset Lake and several other County facilities.

Infrastructure for electric vehicles. The County initiated the Electric Vehicle Infrastructure Reimbursement Program, a grant program to help County municipalities install publicly accessible electric vehicle service equipment (EVSE) on municipal property. Two grants were awarded in 2017: The Town of Thompson installed EVSE at the Town Hall, located in a busy commercial district; the Town of Bethel installed EVSE in a municipal parking area adjacent to town facilities and a busy Main Street district. The program ended in 2019 as NYS and NYPA incentive programs for municipal EVSE were established.

County Fleet Efficiency Policy. Resolution 100-17 establishes a County Fleet Efficiency Policy, which standardizes the process by which the cost of vehicles is calculated (purchase price and fuel costs over the life of the vehicle) to include reduction of fuel use by right sizing the vehicles, procuring the most fuel efficient vehicle in its class, applying safety guidelines as a marker for replacement, and adding electric vehicles to departmental fleets where appropriate.

County Benchmarking Policy. Resolution 101-17 requires the County to collect, analyze, report and publish energy benchmarking data on County-owned buildings 1,000 sf or larger. With 2016 as the baseline year, annual benchmarking reports are published on the County website.

Organic waste diversion. The County secured funding from the Climate Smart Communities Program for an organics composting feasibility and siting study as part of updated Solid Waste Management Plan for SC.

Resiliency Plan. The County applied for \$250,000 from the NYS Department of State to support the development of a Countywide Resiliency Plan

2018

LED lighting retrofit at the Government Center (GC). NYPA completes comprehensive lighting retrofit at the Government Center, including illumination of the parking lot.

Benchmarking results of the Government Center retrofit. GC benchmarking data for 2018 shows significant reductions in electricity use, fuel use and site energy use intensity (EUI) over the 2016 baseline data as well as 2017 performance. The Energy Star rating for this building rose from 36 in 2016 and 40 in 2017 to 73 in 2018, a more than 100% improvement in overall energy performance over the baseline year. Site EUI improved 31%; total GHG emissions intensity improved 27.6%; site energy use was reduced by 31.3%. Source EUI (measured in kBtu/sf) improved by 36.3% improvement. The retrofit reduced annual fuel oil use at the GC by 8,000 gallons, for a cost savings of \$6,168.80 in 2018. The reduction in annual electricity use yielded a savings of \$67,606.90 in 2018, and yielded additional annual savings of \$13,017.29 due to the reduction in monthly demand charges related to the building's electricity consumption. Total cost savings in 2018 for all fuels at the Government Center was \$86,792.99.

Community outreach. OSE publishes *Powering Sullivan: Smart Energy Choices for Your Home, Business and Town*, a directory of energy efficiency and renewable energy resources and climate smart planning for towns and villages. Printed booklet is distributed to town and village halls; online version is available on the County website.

2019

New Public Safety campus in Monticello. Construction is completed on the new Sullivan County Jail and Public Safety Campus in Monticello. This facility replaced the old 1909 County Jail, and also incorporates the offices of the Sullivan County Sherriff, the Patrol Division and the Civil Division.

Organics management feasibility study. SCS Engineers of New York, PC (SCS) delivers an organics management feasibility study, the first step in development of a comprehensive organics management plan. The study considers diversion of organics from residential, commercial and institutional generators, examines best practices nationwide, and includes a technology review for capture/collection and processing of organics.

Energy improvement financing for businesses and non-profits. Sullivan County adopts a local law to join the Energize NY Open C-PACE Financing Program, which provides commercial and non-profit building owners with financing to make energy upgrades to their buildings or build new construction to higher energy standards.

Participation in a national climate change initiative. OSE staff participated in NASA’s Earth to Sky Regional Leaders training in climate change communications at the NASA-Goddard Space Flight Center in Greenbelt, Maryland.

SolSmart “Silver” award in recognition of County efforts to advance solar development

2020

Organics management plan. SCS Engineers of New York, PC (SCS) delivers a draft Organics Management Plan commissioned by the DC DPW with funding from the Climate Smart Communities Program. SCS’s work includes a Feasibility Study, proposed site, conceptual compost facility, marketing plan, public outreach and education, and next steps.

2021

New round of energy retrofits at County facilities. The County enters into agreements for energy retrofits at the Sullivan County Courthouse, Care Center at Sunset Lake, Shared Health Clinic, Government Center Annex, and SUNY Sullivan.

Environmentally-preferred purchasing policy: As part of its periodic updates of the County’s purchasing policy, the SC Department of Purchasing and Central Services implemented specific green purchasing guidelines that align with the NYS OGS Green Purchasing policies and product guidelines.

Informational outreach and collaboration with a national program. OSE staff organized a Sullivan County Earth to Sky team and participated in the Upper Delaware River Watershed Earth to Sky training led by the Upper Delaware River Watershed Regional Leaders.

Reaching a broader audience. OSE Sustainability Coordinator Heather Brown organizes a seminar on climate change, with NASA oceanographer Dr. Bridget Seeger as the plenary speaker, for the annual conference of the New York State Association of Counties (NYSAC), made possible by OSE’s participation in the Earth to Sky program.

2022

OSE is integrated into the SC Division of Planning and Community Development, providing additional resources that will be invaluable in advancing the County’s sustainability goals The OSE Sustainability Coordinator is promoted to Deputy Commissioner of Planning and Community Management.