



Standard Operating Procedures

Effective Date: 2019

**EMPIRE STATE**  
REALTY TRUST



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## INTRODUCTION & CONTEXT

Buildings presently consume 70% of electricity in the US and account for almost 40% of Greenhouse Gas (GHG) emissions. Empire State Realty Trust has been at the forefront of sustainability with industry leading energy efficiency and sustainability approach and initiatives, and it is critical for our organization to integrate sustainability throughout our organization and at all of our assets.

The management and ongoing operations of our assets represents an opportunity for Empire State Realty Trust to optimize energy efficiency, reduce waste, promote sustainability and indoor air quality across our portfolio and demonstrate our innovation and leadership in the industry. By establishing portfolio level goals and priorities, asset level standards and requirements, resources, and responsibilities, these guidelines will help ensure that asset operations and functions are an active part of ESRT's commitment to providing top tier workplaces for our tenants, and the communities we live and work in.

### Objectives

The Sustainability Guidelines are intended to accomplish the following goals:

1. Formalize Empire State Realty Trust's (ESRT) environmental strategy and focal points across all standing asset operations
2. Define clear sustainability goals at both the Portfolio and Asset levels, with associated timelines and responsibilities
3. Provide a reference document of standards and best practices for Property Managers and Building Operations Staff
4. Drive asset-level action towards the achievement of ESRT'S portfolio-wide sustainability goals
5. Improve the environmental performance and reduce the operational costs of standing assets

### Scope and Requirements

The Sustainability Guidelines address ESRT's operational targets at both the portfolio and asset levels. At the portfolio level, it outlines the near- and long-term goals associated with each policy topic, as well as the actions and tracking items required to evaluate progress. At the asset-level, it provides property managers with set standards and requirements for implementing each policy topic, recommends best practices and establishes documentation and timelines for demonstrating compliance.

The objective of this document is to establish criteria and methodology specific to ESRT's overall sustainability objectives, which should be adopted universally across the portfolio and may be customized as needed as applicable to individual assets. The Sustainable Guidelines shall be implemented for all standing assets whose operations are under control of Empire State Realty Trust. All applicable asset-level strategies and operational best practices under each policy topic shall be implemented to best of each property team's ability.

### Roles and Responsibilities

Driving change and achieving material gains in real estate environmental performance requires close collaboration and a continuity of effort among all links in the chain – from executives to property managers, building engineers, maintenance staff, vendors and tenants. ESRT's SVP and Director of Energy and Sustainability shall be primarily responsible for administering the Sustainability O&M Guidelines on a programmatic level, including:

- Ensuring property management teams are informed of and trained on the policies
- Tracking progress towards portfolio-level goals
- Communicating progress and achievements internally
- Performing periodic updates and communicating updates to property managers and other parties



It is the responsibility of all ESRT property management teams to demonstrate a working knowledge of the Sustainability Guidelines. Property Managers should be responsible for implementing the asset-level strategies as described per policy, including:

- Adhering to standards specified
- Ensuring staff execution of policy
- Ensuring any contracted vendors are informed of and adhere to policy procedures
- Maintaining tracking documentation as specified in the policies
- Utilizing best practices

Building and site walk-throughs may be completed routinely by ESRT personnel to ensure policy adoptions and proper application.



## Empire State Realty Trust Sustainability Matrix

ESRT has developed a customized approach to comprehensive energy efficiency and sustainability at our properties and is summarized in our ESRT Portfolio Sustainability Matrix which highlights the measures implemented across the portfolio. These measures align with the overall approach outlined in the Sustainability Guidelines.

### SUSTAINABILITY MATRIX

|                                                                                  | Empire State Building | One Grand Central Place | 1400 Broadway        | 111 West 33rd Street | 250 West 57th Street |
|----------------------------------------------------------------------------------|-----------------------|-------------------------|----------------------|----------------------|----------------------|
| Whole Building Energy Retrofit Analysis (Replicate ESB Model)                    | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Whole Building Energy Retrofit Implementation                                    | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Low-e window retrofit                                                            | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| High Performance Design and Tenant Installation Required per Lease               | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Submetering of All New Tenant Spaces                                             | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Utilities Billed by Submetering (as installed)                                   | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Building Management System (BMS) Status                                          |                       |                         |                      |                      |                      |
| (i) BMS In place                                                                 | ✓                     |                         | ✓                    | ✓                    | ✓                    |
| (ii) No BMS In place                                                             |                       |                         |                      |                      |                      |
| (iii) Partial BMS In place                                                       |                       | ✓<br>No central HVAC    | ✓<br>No central HVAC |                      |                      |
| Energy Star Certification                                                        | ✓                     | ✓                       |                      |                      |                      |
| Energy Star Tenant Spaces Certified Tenants                                      | ✓                     |                         |                      | ✓                    | ✓                    |
| Indoor Environmental Quality Focus                                               |                       |                         |                      |                      |                      |
| (i) Low/No VOC offgassing materials                                              | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| (ii) Regular IEQ Testing and Reporting                                           | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| (iii) Enhanced filtration and/or air purification                                | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| (iv) Demand Controlled Ventilation and CO2 management standard for tenant spaces | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Water Conservation Initiatives                                                   |                       |                         |                      |                      |                      |
| (i) Ultra low flow fixtures                                                      | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| (ii) Meter and reduce process/HVAC water usage                                   | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Waste Management/Recycling                                                       |                       |                         |                      |                      |                      |
| (i) Construction waste diversion target 90%                                      | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| (ii) Tenant waste education, engagement, audits                                  | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| (iii) Separate electronics and bulb                                              | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| (iv) Dual stream recycling for whole building                                    | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Green Cleaning Products and Practices                                            | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Green Pest Management Products and Practices                                     | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Demand Response/Peak Load Shaving                                                | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Sustainability Committee and Tenant Engagement                                   | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Annual & Long Term Sustainability Targets and Tracking                           | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |
| Leadership & Sharing                                                             | ✓                     | ✓                       | ✓                    | ✓                    | ✓                    |

| 1333 Broadway        | 1350 Broadway | 1359 Broadway   | 501 Seventh Avenue   | First Stamford Place | MerrittView | 10 Bank Street | 500 Mamaroneck | Metro Center |
|----------------------|---------------|-----------------|----------------------|----------------------|-------------|----------------|----------------|--------------|
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | Pending              | Pending     | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    |                      |             |                |                |              |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
|                      |               |                 |                      |                      |             |                |                |              |
| Pending              | ✓             | Pending         |                      | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓<br>No central HVAC |               | No central HVAC |                      |                      |             |                |                |              |
| ✓                    |               | No central HVAC | ✓<br>No central HVAC |                      |             |                |                |              |
|                      | ✓             | ✓               |                      |                      | ✓           |                | ✓              | ✓            |
|                      |               |                 |                      |                      |             |                |                |              |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
|                      |               |                 |                      |                      |             |                |                |              |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |
| ✓                    | ✓             | ✓               | ✓                    | ✓                    | ✓           | ✓              | ✓              | ✓            |



# ENERGY & GREENHOUSE GAS MANAGEMENT POLICY

## Context

Buildings account for approximately two-thirds of New York City's total GHG emissions. Owners and managers of commercial properties have a large role to play in meeting New York's carbon reduction goals as part of the overall goal to mitigate the impacts of climate change. Ensuring that building operations are energy efficient not only reduces emissions but also decreases building operational costs.

Empire State Realty Trust is dedicated to reducing the energy and carbon footprints of its properties wherever feasible. New York City established a goal to reduce greenhouse gas emissions 40% by 2030 and 80% by 2050. Through participation in NYC's Green Code Task Force, 80X50 Technical Working Group, NYC Mayor's Carbon Challenge and the Climate Mobilization Act Local Law 97 Advisory Board, among other initiatives beginning in 2007, ESRT has committed to adopting and supporting the goals set forth by the city.

## Objectives

| Frequency | Goal                                                                                                                                                               | Portfolio Manager | Property Manager | Building Engineer |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|-------------------|
| Ongoing   | Ensure all property managers have access to and are familiar with their building's profile in ENERGY STAR Portfolio Manager                                        | ✓                 | ✓                |                   |
| One-Time  | Standardize energy and GHG emission metrics and reporting cycle across all assets                                                                                  | ✓                 | ✓                |                   |
| Annual    | Evaluate compliance of all assets with the 2024 targets set by 2019 NYC Carbon Emission Limits Law (LL97/2019) and develop strategy to comply with future targets. | ✓                 | ✓                |                   |
|           | Maintain up-to-date and accurate ENERGY STAR profiles annually across the portfolio                                                                                | ✓                 | ✓                | ✓                 |
|           | Pursue the ENERGY STAR designation for all buildings with scores above a 75                                                                                        |                   | ✓                |                   |
|           | Strive to ensure that whole building energy and GHG emissions is equal to or less than the GHG emissions from the prior year.                                      |                   | ✓                | ✓                 |
| Quarterly | Report whole building energy and GHG emissions usage on a quarterly basis in ENERGY STAR Portfolio Manager at all assets                                           |                   | ✓                | ✓                 |
| Ongoing   | Review and report on tenant submetered electricity data on a regular basis.                                                                                        | ✓                 | ✓                |                   |
| Ongoing   | Ensure demand response protocols are implemented at all facilities                                                                                                 |                   |                  |                   |
| Ongoing   | Prioritize underperforming assets for further engineering studies and upgrades.                                                                                    | ✓                 | ✓                |                   |

## Responsibility

It is the responsibility of **Portfolio Managers, Property Managers, Tenant Services Coordinators**, and the **Engineering Managers** to be aware of best practices and guidelines in this plan and implement where possible for all assets under Empire State Realty Trusts' control. The **Portfolio Manager** will request updated Demand Response Plans from managers quarterly and will post same to Demand Management System (DMS).

## Asset-Level Requirements

### Part I: Baseline

To implement the Energy and Greenhouse Gas Management Policy, it is necessary to first understand what current factors impact energy consumption and GHG emissions. ESRT utilizes the EPA's ENERGY STAR Portfolio Manager tool across all assets to track and report energy consumption and corresponding greenhouse gas emissions.



The following best practices will help to assess current conditions and identify opportunities for improvements:

## ENERGY

- **Tracking:** Ensure that the asset has an ENERGY STAR Portfolio Manager profile set up, including:
  - Current usage, occupancy, floor area and schedule data
  - Complete and up-to-date whole-building energy and water values
- **Building Energy Audit:** Conduct an energy audit that meets both the requirements of the ASHRAE preliminary energy use analysis and an ASHRAE Level 2 energy survey and analysis identified in the ASHRAE Procedures for Commercial Building Energy Audits or equivalent. ASHRAE Level 2 Audits evaluate building energy consumption by end use and identify areas with the greatest opportunities for improved efficiency. Additionally, pursuing an ASHRAE Level 2 Audit is part of the requirements of NYC's LL87, which requires an energy audit and retro-commissioning every ten years, based on the block and lot number of the property. Before pursuing an ASHRAE Level 2 audit, confer with your portfolio manager and the SVP and Director of Energy and Sustainability to determine the appropriate approach to pursuing an energy audit.
- **CFR & OMP.** Prepare and maintain a current facilities requirements (CFR) and operations and maintenance plan (OMP) that contains the information necessary to operate the building efficiently. The plan must include the following:
  - a systems narrative describing the mechanical and electrical systems and equipment in the building;
  - a current sequence of operations for all equipment described in the systems narrative;
  - the building occupancy schedule;
  - equipment run-time schedules;
  - setpoints for all HVAC equipment;
  - setpoints for lighting levels throughout the building;
  - minimum outside air requirements;
  - any changes in schedules or setpoints for different seasons, days of the week, or times of day; and
  - a preventive maintenance plan for all building equipment described in the systems narrative.
- **Refrigerant Management.** Document complete schedule of existing mechanical cooling and refrigeration equipment, including equipment type, refrigerant used, installation date and manufacturer.
  - Identify if any refrigerants with high Global Warming Potential (greater than 2,500 GWP) and Ozone Depletion Potential are in use. (i.e. any CFC-based refrigerants, which are currently banned by the Montreal Protocol, such as R-22, R-11).
  - All CFC-based refrigerants were phased out of manufacturing by 2005
  - HCFC-based refrigerants will be phased out of manufacturing in the coming years. However, existing supplies may still be available after the phase-out date. See below for phase-out dates for commonly used HCFC-based refrigerants.

| Phase Out Date  | Refrigerants                                                             |
|-----------------|--------------------------------------------------------------------------|
| January 1, 2020 | R-22, 401A, 402A, 408A, 409A, 414B, 502A, 508A                           |
| January 1, 2030 | R-123, 134A, 236FA, 402B, 404A, 407A<br>407C, 407D, 410A, 507/507A, 508B |

## GREENHOUSE GAS EMISSIONS

- **Standardize GHG tracking:** Standardize tracking in accordance with the Greenhouse Gas Protocol Corporate Standard to track Scope 1 (Direct Emissions), Scope 2 (Indirect Emissions) and Scope 3 (Tenant Emissions)
  - Utilize the [Corporate Accounting and Reporting Standard](#) for a step-by-step guide to quantifying portfolio-wide GHG emissions
- **Identify GHG risks:** Identify risks associated with potential carbon performance legislation (i.e. local law compliance)
- **Identifying cost effective reduction opportunities:** Review GHG emissions per asset and identify any top and low performers to conduct a more in-depth analysis to prioritize and identify cost effective reduction opportunities.
- **Set GHG reduction targets:** Begin setting GHG targets, measuring and reporting progress. Consider aligning targets with local carbon reduction goals, including NYC target of 80% reduction by 2050.



- **Participate in NYC Carbon Challenge:** At the asset level, consider formally participating in the NYC Carbon Challenge. This program is a voluntary leadership initiative where organizations and buildings commit to reduce greenhouse gas emissions 30% or more over 10 years. Participation in the NYC demonstrates an organization and building's commitment to supporting NYC's energy and greenhouse gas reduction goals. More information on the program can be found in the Resources section.

## **Part II: Performance**

The steps below outline the strategies for the Property Managers, Engineers, and on-site building staff to improve asset energy and emissions performance.

- **Set and Track towards Performance Goals:** Utilize ENERGY STAR Portfolio Manager (ESPM) to benchmark and track whole-building energy and GHG emission data on a quarterly basis. If a building is eligible for an ENERGY STAR label designation and has a score  $\geq 75$ , it should be pursued each year.
- **Identify the largest source of GHG emissions** from each asset and focus on energy savings measures related to reducing the usage from this energy source.
- **Ensure Energy Conservation Best Practices are in place.** See Strategies and Guidance section below for more information.
- **Refrigerant Phase-Out Plan:** Develop and implement a plan to phase-out, within ten years, any assets with refrigerants with high Global Warming Potential (greater than 2,500 GWP) and Ozone Depletion Potential (i.e. replace any CFC-based refrigerants with legal and nonhazardous alternatives, such as R-410A).
- **Perform HVAC system maintenance** at regular intervals as recommended by the equipment manufacturers. Develop a building-specific comprehensive system maintenance manual and schedule-based checklist for engineering and maintenance staff. Track to ensure all maintenance tasks have been completed and follow-up to remediate anomalies discovered during routine maintenance.
- **Provide Training:** Provide energy efficiency training and education materials to superintendents and building maintenance staff responsible for servicing building equipment. Consider integrating into existing ESRT University Training Programs
- **Evaluate Progress and Form Energy Management Plan:** Review tracking results on a biannual basis to identify performance trends. Identify specific action plan to improve performance. Solicit feedback from the property's maintenance team and the ESRT team to identify any internal or external factors that may necessitate revisions to the action plan (Please see [Appendix H- for a template Energy Management Plan](#)).
- When considering capital investments and implementing major Energy Conservation Measures (ECMs), engage with third party consultants for further guidance on project implementation and management.
- **Educate tenants:** Provide guidelines or one-pagers to building tenants on energy-saving tips. Hold bi-annual or annual open educational trainings for all building occupants on energy conservation, combined with overall sustainability education and outreach including water, waste, IEQ and productivity/wellness programs and requirements.
- **Renewable Energy:** Consider the purchase of electrical power supply generated by renewable energy sources instead of directly from utilities to help meet GHG emission reductions goals and to encourage additive renewable energy development.

## **Strategies and Guidance**

### **Energy and Emissions Tracking**

Identify all sources of energy consumption at the building, including all tenant energy sources wherever possible. Collect and track whole-building energy data using ENERGY STAR Portfolio Manager, for all buildings within the portfolio. It is a best practice to review data within this tool on a quarterly basis, to create a habit of knowing and understanding a building's energy consumption patterns throughout the year.

The building characteristic and details (occupancy, operating schedule, square footage per use type, etc.) should be updated annually at a minimum. The building should report, at a minimum, its energy use intensity, GHG emissions intensity and ENERGY STAR score after each data update in comparison to the prior reporting period.

Annually, each building should pursue ENERGY STAR Certification if its score is a 75 or higher. Whenever required, buildings shall ensure that compliance with any energy-related regulations are adhered to (including, but not limited to NYC LL84, NYC LL85, NYC LL87, NYC LL88, NYC LL92, NYC LL94, NYC LL96/33, NYC LL97, etc.)



## NYC Local Law Overview

| NYC ENERGY LEGISLATION                                              | DESCRIPTION                                                                                                                                                                                                                                                                   | COMPLIANCE PERIOD/DEADLINE                                                     |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <b><u>LL84: BENCHMARKING</u></b>                                    | Requires annual energy benchmarking in ENERGY STAR Portfolio Manager                                                                                                                                                                                                          | Annual – May 1                                                                 |
| <b><u>LL85: NEW YORK CITY ENERGY CONSERVATION CODE (NYCECC)</u></b> | Requires buildings to meet the most current energy code for any renovation or alteration project.                                                                                                                                                                             |                                                                                |
| <b><u>LL87: ENERGY AUDITS AND RCX</u></b>                           | Requires building to undergo a periodic energy audit and retro-commissioning study to inform building owners on building performance                                                                                                                                          | Every 10 years based on tax block and lot number                               |
| <b><u>LL88: LIGHTING UPGRADES AND SUBMETERING</u></b>               | Submeters: Requires installation of electrical submeters for tenant spaces greater than 5,000 square feet and provide monthly energy statements.<br><br>Lighting: Requires upgrade of lighting to meet current NYC Energy Conservation Codes                                  | Deadline is 2025                                                               |
| <b><u>LL92, 94: GREEN ROOFS AND SOLAR PV</u></b>                    | All new buildings and alterations of existing buildings where the entire existing roof deck is being replaced must provide a sustainable roofing zone covering 100% of the roof (must include a solar PV system at least 4kW, a green roof system, or combination of the two. | All projects approved after November 15, 2019                                  |
| <b><u>LL95: BUILDING ENERGY EFFICIENCY GRADES</u></b>               | Requires buildings to post an energy grade on the exterior of the building that corresponds with the ENERGY STAR Score. Refer to the table in the table below for ENERGY STAR Score and corresponding letter grade.                                                           | 2020<br>(based on 2019 ENERGY STAR Score submitted to the city on May 1, 2020) |
| <b><u>LL96: PACE</u></b>                                            | PACE establishes long-term, low interest Property Assessed Clean Energy (PACE) financing to fund upgrades to building energy and water efficiency                                                                                                                             | Financing available in early 2020                                              |
| <b><u>LL97 CARBON PERFORMANCE MANDATE</u></b>                       | The most ambitious performance-based climate legislation that establishes carbon emissions intensity limits for buildings. Buildings will be subject to fines over two compliance periods.                                                                                    | Requirements for two compliance periods:<br><br>2024-2029<br>2030-2034         |

### LL95: NYC Building Energy Grades

| Energy Grade | ENERGY STAR Score              |
|--------------|--------------------------------|
| A            | 85-100                         |
| B            | 70-84                          |
| C            | 55-69                          |
| D            | 1-54                           |
| F            | Non-Compliant                  |
| N            | No ENERGY STAR Score or Exempt |



## Energy Conservation: Operational Best Practices

ESRT prioritizes ROI-Driven Energy Conservation Measure development and implementation.

To reduce energy consumption and the associated emissions, the following best practices are recommended:

- Track energy usage monthly and be alert for abnormalities or spikes. Compare to prior years' usage to identify the magnitude of usage that is "abnormal" for your building. Investigate abnormalities to identify the cause and potential remediation (if abnormality is due to factors within building management's control)
- Verify that HVAC equipment and lighting schedules are set to turn off or turn down when not in use or areas are unoccupied.
- When replacing light fixtures and bulbs or appliance in base building spaces, select ENERGY STAR rated LED fixtures and bulbs and ENERGY STAR rated appliances:
  - [https://www.energystar.gov/products/lighting\\_fans](https://www.energystar.gov/products/lighting_fans)
  - <https://www.energystar.gov/products/appliances>
- Make sure the building temperature is comfortable—not overheated or overcooled. The thermostat should be programmed for night setbacks to provide less heating (or cooling) at night.
- Make full use of automatic and programmable controls to optimize efficient operation.
- Refer to [Appendix I for Energy Conservation Project Tracking Log](#).

## Energy Management Plan & Capital Upgrades

Identify opportunities to improve energy efficiency and reduce consumption through institutional building operational knowledge of property managers and engineering staff supported by third-party technical studies (e.g. energy audit, retro-commissioning study, energy scavenger hunt). Create an Energy Management Plan to enact the projects and operational changes required to engage the identified energy conservation measures (ECMs). This building Energy Management Plan should contain an estimated timeline, budget (including projected savings) and specific action items with associated personnel responsibilities. Any performance targets set by local regulations or by ESRT's portfolio-wide goals should be considered in the Energy Management Plan as well. Please see [Appendix H for a template Energy Management Plan](#).

The development of an asset-level Energy Management Plan involves synthesizing all acquired baseline and performance data into a sophisticated action plan. It should be developed with input from all relevant stakeholders and should be used as a living document to plan and chart the asset's ongoing performance goals.

## Measurement & Verification (M&V):

Measurement & Verification refers to tracking energy usage over a long period of time to understand building energy performance over time, which is supported by Real-Time Energy Monitoring (RTEM) at ESRT properties. ESRT performs ongoing M&V of energy efficiency measures within tenant spaces. Additionally, our team of experts conducts M&V audits and Tenant Energy Management (TEM) analytics. We perform quarterly M&V on energy projects that have been implemented at select properties across the portfolio.

## DEMAND RESPONSE PROTOCOL

As part of ESRT's ongoing sustainability efforts, Empire State Realty Trust has partnered with ConEdison and NYISO to participate in an energy saving and grid reliability program, referred to as Demand Response (DR). Refer to [Appendix J for Demand Response Enrollments by Property](#). Each property has installed a real-time market (RTM) tool, EnerTrac, to collect energy data and designed to integrate with IP-based applications including demand response programs.

## Scope

This plan addresses the comprehensive action plan to curtail energy usage at all ESRT properties during demand response events. Curtailment refers to the action of interrupting electricity demand with respect to your current or baseline demand. The information outlined below describes the procedures and curtailment plan to interrupt (Reduce) electric demand when asked to do so temporarily.

The following procedures are aimed at keeping our DR efforts coordinated to ensure the highest performance is achieved and our local electric grid receives the requested relief during stressful grid load times.



## Procedure

When the grid is under stress, or when test events are scheduled, NuEnergy will notify ESRT of the upcoming event either 2 or 21 hours prior. After confirming the event or test has been called, follow the steps outlined below:

1. ESRT and NuEnergy will communicate with Engineering and Property Management staff to confirm the specific hours, reduction targets and load management measures requested for curtailment
2. The property team will log into EnerTrac to track performance against the targeted electric load for the duration of the event or test.
3. Property Tenant Service Coordinator (TSC) or Admin to distribute the building tenant DR brochure to ensure tenants and all building occupants are aware of the event and its intent (Refer to [Appendix K for Demand Response Brochure](#)).
4. Property Tenant Service Coordinator (TSC) or Admin to distribute DR notification to all tenants. Refer to [Appendix L for Tenant Demand Response Notification E-Mail Template and Sample](#)
5. During the morning of the event, activate Captivate Screens to remind tenants and encourage participation.
6. Review specific curtailment actions and make adjustments if necessary.
7. Pre-cool your building leading up to the event to take advantage of the building's residual thermal storage.
8. DO NOT begin reducing the electric load until 30 minutes to 1 hour before the start of the event or test
9. Begin curtailment 45-60 minutes prior to the event to ensure your building has achieved its target reduction by the time the event begins
10. During event or tests, monitor building's performance through EnerTrac
11. Slowly ramp-up post event.
12. Remove signage once event is over and building has resumed normal operation.
13. Due to the time sensitive nature of DR events, please direct any DR questions directly to NuEnergy representative.

## TENANT DEMAND RESPONSE STRATEGIES & BEST PRACTICES

Tenants can participate in the Demand Response event through pursuing the following strategies outlined below. Refer to [Appendix K for Tenant Demand Response Brochure](#) for resources to distribute to tenants before and during a Demand Response Event.

- **Tenant Controlled A/C Units:** Turn up thermostats two degrees at the time indicated and every half-hour thereafter. Note: Ramping up/down suddenly may actually cause the A/C unit to draw more power.
- **Lighting:** Switch off as many lights in the office and break rooms as reasonably possible.
- **Office Equipment:** Switch off extra printers, copiers, monitors, coffee machines, microwaves, toasters, and instant hot water dispensers, water coolers, fans, heaters, unused computers, video displays, vending machines, and other non-essential loads (or use battery power for laptops)

## TENANT ENERGY EFFICIENCY STRATEGIES

Tenants' energy use impacts our overall building performance. ESRT partners with our tenants to drive return-on-investment based energy efficiency by monitoring our reduction in energy consumption for our buildings and tenants. Our energy efficiency practices not only help reduce operational costs to tenants through reduced direct utility costs but also create healthy workplace environments. ESRT has developed High Performance Design and Construction Guidelines that include stringent requirements to drive performance during the design and construction phase and optimize energy efficiency and sustainability in tenant spaces. Refer to [Appendix F High-Performance Design and Construction Guidelines](#).

### Tenant Energy Efficiency Programs

**NYSERDA Commercial Tenant Program (CTP):** The CTP helps to cover the costs of engaging qualified consultants to perform an energy audit to identify energy savings opportunities and plan the implementation of energy efficiency measures in tenant spaces. Tenants can engage consultants during any phase of the lease, including design or renovations, or during occupancy to help identify measures to reduce energy costs and help improve occupant wellness and comfort.



**Energy Star for Tenant Spaces:** Energy Star for Tenant Spaces is a program that demonstrates tenants' commitment to energy efficiency through estimating energy use, meter energy use, light efficiently, use efficient equipment and share data.

**ULI Tenant Energy Optimization Program:** The Tenant Energy Optimization Program integrates energy efficiency into tenant space design and construction and delivers financial returns through energy conservation.

## TENANT FIT OUT ALIGNMENT

This policy is in alignment with ESRT's High Performance Design and Construction Guidelines. For information regarding energy efficiency requirements in tenant spaces, see [Appendix F High-Performance Design and Construction Guidelines](#).

## Ongoing Monitoring and Evaluation

The following metrics shall be tracked and reported on a quarterly, bi-annual, or annual basis to ensure compliance with the Energy and Greenhouse Gas Emissions Management Plan:

- Energy Consumption Metrics:
  - Total building energy consumption (electricity, fuel, district steam, natural gas)
  - Tenant direct energy consumption
  - Tenant sub-metered energy consumption (if available)
- Greenhouse Gas Emissions: Scope 1 and Scope 2
  - Total energy use intensity (energy use/sq. ft)
  - Energy and GHG Emissions Performance over time (% change against previous year)
- Energy Conservation Measures (Refer to Appendix I for Energy Conservation Project Tracking Log.
- Establish criteria to prioritize assets for further investigation.

## Resources

### ENERGY STAR

- ENERGY STAR Portfolio Manager: <https://portfoliomanager.energystar.gov/pm/home.html>
- ENERGY STAR Certification: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/learn-benefits/value-energy-star-certification>
- ENERGY STAR For Tenants: [https://www.energystar.gov/buildings/tenants/about\\_tenant\\_space](https://www.energystar.gov/buildings/tenants/about_tenant_space)
- ENERGY STAR Guide to Energy Management: [https://www.energystar.gov/sites/default/files/buildings/tools/Guidelines%20for%20Energy%20Management%206\\_2013.pdf](https://www.energystar.gov/sites/default/files/buildings/tools/Guidelines%20for%20Energy%20Management%206_2013.pdf)

### Capital Upgrade & Retrofit Financial Incentives:

- ConEd: <https://www.coned.com/en/save-money/rebates-incentives-tax-credits/rebates-incentives-tax-credits-for-commercial-industrial-buildings-customers/save-with-energy-efficiency-upgrades>
- NYSEDA: <https://www.nyserda.ny.gov/All-Programs>

### Renewable Energy Supply & Local Laws

- New York State Power to Choose program – Search by zip code, then look for suppliers with a “Green Offer.” <http://documents.dps.ny.gov/PTC/home>
- Con Edison Solutions Renewable Energy Information Page <https://www.conedsolutions.com/renewable-energy/renewable-energysolutions/>
- NYSEDA Clean Energy Standard – Renewable Energy Credit (REC) and Zero Energy Credit (ZEC) Purchases <https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard/REC-and-ZEC-Purchasers>
- Green-e – a third party certifier recommended by the US Department of Energy, verifying that renewable energy and carbon offset products offered by suppliers meet their carbon reduction claims <https://www.green-e.org/certified-resources>
- NYC GHG Emissions Inventory: [https://www.dec.ny.gov/docs/administration\\_pdf/nycghg.pdf](https://www.dec.ny.gov/docs/administration_pdf/nycghg.pdf)
- NYC Carbon Challenge: <http://home2.nyc.gov/html/gbee/html/challenge/nyc-carbon-challenge.shtml>



- Tenant Resources
  - ULI Tenant Energy Optimization Program: <https://tenantenergy.uli.org/>
  - NYSDERDA Commercial Tenant Program: <https://www.nysderda.ny.gov/AllPrograms/Programs/Commercial-Tenant-Program>
  - Energy Star for Tenants: [https://www.energystar.gov/buildings/tenants/about\\_tenant\\_space](https://www.energystar.gov/buildings/tenants/about_tenant_space)
- [NYC Climate Mobilization Act](#)
- [NYC Local Law 95: Building Energy Efficiency Grades](#)



## WATER MANAGEMENT POLICY

### Context

Water is a valuable natural resource. Reducing water consumption in buildings reduces energy consumption, drives operational cost savings, and reduces risks from potential fluctuations in water supply.

Empire State Realty Trust strives to reduce water usage and promote conservation efforts by implementing water conservation initiatives including installing ultra-low flow plumbing fixtures and utilizing efficient cleaning and landscaping practices. This policy applies to all existing assets.

### Objectives

| Frequency | Goal                                                                                                                             | Portfolio Manager | Property Manager | Building Engineer |
|-----------|----------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|-------------------|
| Ongoing   | Standardize water usage metrics and reporting cycle across all assets                                                            | ✓                 |                  |                   |
|           | Baseline water usage by leveraging meter data, Wint and other resources to inform water usage performance targets for all assets | ✓                 | ✓                | ✓                 |
| Annual    | Comply with local and national regulatory requirements                                                                           |                   | ✓                | ✓                 |
|           | Report whole-building water usage across all assets monthly and in real time with Wint.                                          |                   | ✓                | ✓                 |
|           | Ensure whole-building water usage is equal to or less than the water usage from the prior year.                                  |                   | ✓                | ✓                 |

### Responsibility

It is the responsibility of **Portfolio Managers, Property Managers and Building Engineers** to be familiar with the procedures and strategies in this policy and, where feasible, implement necessary improvements.

### Asset-Level Requirements

#### Part I: Baseline

To implement the Water Management Policy, it is first necessary to understand the factors contributing to asset water usage performance.

- Obtain readily available water usage information:
  - Identify all current sources and end uses of potable water at the building, including municipally supplied potable water and any reclaimed stormwater.
  - Obtain basic information about water bills, account numbers, water meter numbers, and metering location.
  - Ensure whole-building water usage is being entered into the asset's ENERGY STAR Portfolio Manager (ESPM) profile.
  - Identify any data coverage gaps (e.g., tenant has their own account)
  - Use [Wint](#), the Water Intelligence tool to identify potential leaks, monitor water use, analyze water use trends, and identify abnormal consumption trend in real time.
- Inventory Fixtures: Complete an inventory of all currently installed water fixtures, equipment, and portable water using systems, including flow/flush rates, to help identify opportunities for savings. Identify any recent upgrades.
  - Sources may include as-built drawings, renovation records and maintenance receipts. Flow rates of undocumented fixtures may need to be calculated in field.

#### Part II: Performance

- Set and track towards performance goals:** Utilize ENERGY STAR Portfolio Manager to benchmark and track whole-building water usage data on a quarterly basis. Leverage Wint (as installed) and ENERGY STAR Portfolio



Manager to identify for high water use locations and any trends to help identify potential leaks or water conservation opportunities.

- **Keep ENERGY STAR Portfolio Manager profile updated:** Ensure the profile for the building is up to date with current usage, occupancy, floor area and schedule data.
- **Fix identified leaks:** Reduce water losses by addressing any identified drips or leaks and valves which may not be 100% tightly closed.
- **Install high efficiency low-flow fixtures or retrofit low-flow aerators/fixtures where appropriate and feasible.** See *low flow plumbing fixture specifications in the Strategies and Guidance section below.*
  - Retrofit projects will require additional study to determine feasibility, payback, etc.
- **Ensure water conservation best practices are in place.** See *Strategies and Guidance section below.*
- **Evaluate progress and form water management plan:** Review tracking results to identify performance trends. Establish and revise an action plan to improve performance and implement.
- **Engage and educate tenants:** Provide guidelines, fact sheets, or emails to building tenants to share water-saving tips. Hold bi-annual or annual open educational trainings for all building occupants on water conservation. This can easily be combined with energy and/or waste tenant education. Include informational signage on elevator screens with fun facts and tips to promote water conservation.

## Strategies and Guidance

### Water Conservation Best Practices

To reduce potable water consumption, the following actions are recommended:

#### COMPLIANCE

- Exceed local and national regulations as applicable including but not limited to:
  - United States Energy Policy Act of 1992 (EPA 1992): Established uniform standards for water fixtures to promote conservation by residential and commercial water consumers.
  - Local water conservation regulations: See Resources section below for information on NYC and state specific water regulations.
  - ESRT requirements exceed code requirements with a target of over 40% better than code and WaterSense fixtures.

#### METERING

- Read water meters monthly. Compare the results to the same month of the previous year. This will help to both identify leaks as they occur and to monitor conservation efforts.
- Install submeters for key water-using systems (e.g. domestic hot water, irrigation system, cooling tower, boiler makeup, etc.) where feasible
  - Water submeters monitor and measure water consumption by end use and can help identify areas for targeted reductions, track progress from water-efficiency upgrades, identify leaks in specific systems and more easily identify opportunities to increase water efficiency.
- If the property has an automated building management system (BMS or BAS), ensure all water meters and submeters are integrated with the system. Doing so will make it easy to track usage and implement a water management plan. BMS systems can store data from meters and submeters, reporting hourly, daily, monthly, and annual water use. They can also trigger alerts when leaks or other operational anomalies are detected.

#### LEAKS

- Check for leaks. Survey tenants to identify units with potentially faulty or leaky plumbing fixtures.
  - A leaking toilet or dripping faucet or showerhead can waste up to 1,000 gallons of water per week.

#### SITE MAINTENANCE

- Discontinue or minimize using potable water to clean paved areas. Instead of hosing down entrances, sidewalks, parking lots and loading docks, sweep or use a blower to clean these areas.
- Review landscaping and irrigation system practices for opportunities to conserve water.
- Detect and repair all leaks in irrigation systems. Make sure the installed system is watering the intended landscaping only—not the street or sidewalk.
- Water landscaping during the coolest part of the day to reduce evaporation.
- Program irrigation systems to automatically shut off when it's raining.
- Switch to a low-water intensity irrigation and landscaping system where feasible (e.g. drip irrigation, rainwater harvesting, xeriscaping). This may require additional study to assess feasibility, cost, etc.



## RETROFITS/RENOVATIONS

- When replacing or installing new plumbing fixtures in both common areas and tenant spaces, ensure fixtures meet the more stringent of ESRT High Performance Design and Construction Guidelines and NYC Plumbing Code requirements; additionally, ensure all showerheads, private lavatory faucets and urinals are EPA WaterSense labeled.
- When replacing or installing new common area or tenant space dishwashers, select ENERGY STAR rated appliances.

## LOW-FLOW WATER FIXTURE SPECIFICATIONS

Ensure the following minimum performance requirements are met when upgrading/replacing the following indoor plumbing fixtures and fittings:

- Common Area, Amenity Area, and Tenant fit-out plumbing fixtures: In accordance with the High-Performance Design and Construction Guidelines, the maximum flush/flow rates for all new or upgraded fixtures within dwelling units shall not exceed the following:
  - Specify WaterSense fixtures for all toilets, urinals, private lavatory, faucets and showerheads
  - Water closet rate: 1.0 gallons per flush (gpf)
  - Urinal flow rate: 0.125 gpf
  - Pantry sink flow rate: 1.0 gallons per minute (gpm) and include specification for an aerator
  - Lavatory faucet flow rate: 0.25 gpm
  - Shower flow rate: 1.5 gpm

## Ongoing Monitoring & Evaluation

Water performance should be evaluated on an ongoing basis to ensure year-over-year water consumption is decreasing.

Key Performance Metrics:

- Water consumption (gallons, kgal)
- Water use intensity (kgal/ft<sup>2</sup>)
- Water performance over time (% change against previous year)

## Resources

- WaterSense:
  - [WaterSense at Work: Best Management Practices for Commercial & Institutional Facilities](#)
  - [WaterSense Labeled Products](#)
- Water Usage Regulations:
  - New York City Plumbing Code – Water Supply rates (See table 604.4 on page 4): [https://www1.nyc.gov/assets/buildings/apps/pdf\\_viewer/viewer.html?file=2014CC\\_PC\\_Chapter6\\_Water\\_Supply\\_and\\_Distribution.pdf&section=conscode\\_2014](https://www1.nyc.gov/assets/buildings/apps/pdf_viewer/viewer.html?file=2014CC_PC_Chapter6_Water_Supply_and_Distribution.pdf&section=conscode_2014)
  - [National Efficiency Standards for Residential & Commercial Water Fixtures](#)
  - [State Specific Water Regulation Updates](#)
- Water Artificial Intelligence Tool: Wint: <https://wint.ai/>



## SUSTAINABLE WASTE MANAGEMENT POLICY

### Context

According to the U.S. Environmental Protection Agency (EPA), the average person produces around 4.5 pounds of landfill waste per day. When waste is not disposed of properly, waste can be sent to landfills, which results in increased greenhouse gas emissions, and contaminates natural resources. In New York City, the commercial sector is comprised of 250,000 businesses and that generates 9,000 tons of waste daily.<sup>1</sup>

New York City has established a stringent zero waste target to reduce waste by 90% by 2030. In order to achieve this goal, the NY Department of Sanitation (DSNY) has implemented waste and recycling regulations for commercial properties to help minimize waste and increase recycling rates.

Empire State Realty Trust is committed to minimizing the impact of the waste we generate through recycling and composting at our properties and recycling tenant waste and construction debris throughout our portfolio.

### Objectives

| Frequency | Goal                                                                                                                               | Portfolio Manager | Property Manager | Custodial Staff or Contractor |
|-----------|------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|-------------------------------|
| Annual    | Ensure compliance with DSNY Waste & Recycling Regulations or other local recycling regulations as applicable.                      | ✓                 | ✓                | ✓                             |
|           | Reduce the amount of waste generated at each asset                                                                                 |                   | ✓                | ✓                             |
|           | Collect and divert recyclables from the landfill                                                                                   |                   | ✓                | ✓                             |
|           | Collect and divert 75-90% of construction waste from the landfill                                                                  |                   | ✓                | ✓                             |
|           | Collect and divert organics material where feasible                                                                                |                   | ✓                | ✓                             |
|           | Track and report waste metrics at all assets.                                                                                      | ✓                 | ✓                | ✓                             |
|           | Perform waste audits at select lower-performing properties to characterize waste stream and identify opportunities for improvement |                   | ✓                | ✓                             |
|           | Educate and engage tenants on proper waste and recycling practices                                                                 |                   | ✓                | ✓                             |

### Responsibility

It is the responsibility of Property Managers, Tenant Services Coordinators, Custodial Teams and Contractors to be aware of best practices and guidelines in this plan and implement wherever possible. Property Managers and Tenant Services Coordinators should make this policy and resources available to Tenants to ensure tenant compliance with the policy.

### Asset-Level Requirements

To implement the Sustainable Waste Management Policy, the steps below outline the requirements for the Property Managers, Custodial Staff, Tenants and any third-party waste vendors to improve waste diversion:

<sup>1</sup> "About DSNY." About DSNY. <http://www1.nyc.gov/assets/dsny/about/inside-dsny.shtml>.



- Comply with all local waste and recycling regulations
- Provide clearly labelled bins for trash, paper, plastic/metal/glass recycling bins
- Provide clearly labelled bins in the loading dock for trash, paper, plastic/metal/glass recycling bins
- Install educational signage to identify appropriate items for each waste stream
- For NYC properties, install waste decal from the Business Integrity Commission (BIC) to identify single stream or source separated recycling methodology.
- Educate and engage tenants on proper waste and recycling practices that align with the building's overall recycling collection methodology.

#### **Part I: Baseline**

1. Review at a minimum 12 months of waste reports showing total weight generated and diversion percentage for each waste stream.
2. Conduct a waste stream audit to establish current waste generation, diversion and contamination rates.

#### **Part II: Performance**

1. Conduct a Walkthrough: Survey existing building waste storage and collection process to identify opportunities to increase efficiency, improve waste diversion rates, and reduce contamination. Refer to [Appendix N for the Waste Walkthrough Checklist](#).
  - a. Ensure bins are correctly colored, easily accessible and adequately sized to meet the building's needs.
  - b. Install updated bin labels and signage in all waste and recycling collection rooms.
  - c. Establish a collection area for e-waste and hazardous waste, as well as a management plan for proper disposal to ensure these materials do not contaminate the trash or recycling streams.
  - d. Ensure any tenants participating in compost programs have the appropriate bins and signage
  - e. See *Resources section below for DSNY recycling and organics signage, as well as e-waste and hazardous waste information.*
2. Ensure building is enrolled in relevant local waste diversion programs including:
  - a. DSNY Organics Collection Program
  - b. Re-Fashion NYC (for textile recycling for applicable tenants as necessary)
  - c. Lamp (bulb) recycling program
  - d. Electronic Waste
  - e. Furniture Donation
  - f. Refer Resources section below for additional information and enrollment forms.
3. At least annually, evaluate current waste and recycling program and operations. Implement changes where necessary to increase waste diversion.
4. Conduct a waste audit at minimum of every 1-2 years. Compare results against previous audit and historical trends to identify any issues and develop corrective actions.
5. Educate employees, property management teams and custodial staff:
  - a. Provide training on Sustainable Waste Management policy
  - b. Host annual trainings and leverage ESRT University to provide information on waste and recycling strategies and best practices for all ESRT employees and property management teams.
  - c. Train custodial staff on proper waste and recycling procedures.
6. Educate tenants:
  - a. Provide guidelines or one-pagers to tenants on waste reduction and recycling tips
  - b. Host annual trainings during Tenant Town Halls for all tenants on waste, recycling and composting.
  - c. Include digital signage on Captivate Screens highlighting the benefits of recycling and best practices

### **Strategies and Guidance**

Refer to the below for Strategies and Guidance to promote sustainable waste management practices.

#### **WASTE STREAM TYPES**

**Ongoing Consumables:** Ongoing consumables refer to low cost-per-unit materials that are regularly used and replaced throughout the daily course of business and include at a minimum paper, toner cartridges, binders, notebooks, envelopes, batteries, desk accessories, etc.



- Properties shall aim to reuse/recycle or compost at least 50% of weight of total ongoing consumables waste wherever feasible.
- Properties should divert 100% of discarded batteries and toner cartridges from entering landfills wherever feasible.

**Durable Goods:** In addition to ongoing consumables waste management, ESRT require that properties dispose of durable goods, including furniture and appliances in a sustainable manner, including donation and other available local waste diversion programs as applicable. For any ESRT properties that would like to donate abandoned furniture and appliances instead of disposing them, property teams should complete the following steps:

- **Step # 1** – The Property Manager or her\his designee will email the attached inventory form to the Volunteer Committee ([community@empirestaterealtytrust.com](mailto:community@empirestaterealtytrust.com)) including photos of all of the items that are being donated.
- **Step # 2** – Once the request has been received by the volunteer committee, the volunteer committee will then assign a committee member to review and find a charitable organization for this donation.
- **Step # 3** - The assigned committee member will then follow up with the Property Manager or her/his designee 5-10 business days from the requested date and introduce the Property Manager or her/his designee to the charitable organizations point of contact that our committee has chosen for that donation to coordinate the donation pick up
- **Step # 4** – The Property Manager or her/his designee will partner directly with the partner charitable organization's point of contact in respect to logistics, COI, date/time of pick up and etc.
- **Step # 5** – On the day of the scheduled pick up, the chosen charitable organization will then provide the Property Manager or her\his designee a Donor's Official Receipt. It is up to the Property Manager or her\his designee responsibility to make sure they receive the receipt.
- **Step # 6** - Once the Property Manager or her\his designee receives the receipt from the charitable organization, the Property Manager or her\his designee is then asked to scan/email this receipt to Mark Labell (Accounting Department) and Bart Goldstein (Legal department) and to the Volunteer Committee ([community@empirestaterealtytrust.com](mailto:community@empirestaterealtytrust.com)).

**Electronic Waste:** Electronic Waste (E-Waste) must be collected and disposed separately from trash and recycling. If donation is not an option, the building should contract an approved electronic waste recycler. When choosing a recycler, look for e-stewards or R2 certification to help ensure that your electronics are recycled responsibly. Refer to the Resources Section for the NYS Department of Environmental Conservation for a list of registered recyclers.

**Organics Waste:** Organic waste can be diverted from the landfill through compost, where possible. Encourage tenants to participate in organics collection program if current infrastructure exists to support compost collection at the building. Appropriate signage and bins should be installed and provided as necessary. Compost is the decomposition of organic materials into soil or fertilizer. Organic material includes fruits, vegetables, pasta, bread, meat, and even some paper products, which break down and enrich soil, reduce erosion, and help reduce greenhouse gas emissions.

### **COLLECTION METHODOLOGY:**

Determine the collection methodology for your building, whether it is source-separated with (3) bins one for trash, one for plastic/metal/glass, and one for paper. Alternatively, if you have single stream recycling, you have (2) bins, one for trash, and one for plastic/metal/glass/paper. Refer to [Appendix P for NYC Waste & Recycling Collection Methodologies](#)

### **BINS & SIGNAGE**

#### **BASE BUILDING:**

- Wherever there is a trash bin, there should be a paper recycling bin, a plastics/metals/glass recycling bin, and where applicable, a compost bin. These should be present on all tenant floors and in tenant spaces where ESRT manages waste and recycling.
- Educational signage and bins should be color coordinated for each waste stream. It is recommended that bins follow the colors used by the local municipal waste authority/regulator.
- Educational signage should be placed near all bins. Refer to [Appendix M for sample waste and recycling](#)



signage.

- Each bin should have an identified schedule for custodial staff to check the bin, empty it, and document the activity and any notes. If bins are frequently overflowing when custodial staff check it, then either a larger bin may be needed or the frequency in which custodial staff check the bin may need to increase. If bins are frequently not full when custodial staff check it, then a smaller bin may be needed, or the bin may not be necessary, or the frequency in which custodial staff check the bin may need to decrease.
- A decal from the NYC Business Integrity Commission (BIC) should be displayed on the exterior of the building that indicates the days of pickup for recycling and trash and maintain a written recycling agreement with your hauler(s) for separate collection of recyclables.

**LOADING DOCK:**

- The loading dock should have appropriate space for bins that correspond to the building waste collection stream, either source separated or single stream recycling. There should be a dumpster/bin for each waste stream and a label on each bin.
- There should be appropriate educational signage located above the bins to indicate which bin is for each waste stream.

**WASTE AUDITS**

- Conduct a waste audit annually. The findings of a waste audit may identify key improvement opportunities to increase diversion rates, reduce contamination rates, and reduce waste generated at the source.
- Based on waste audit findings, reevaluate the existing waste and recycling program of the office and implement changes to the program where necessary.
- Waste audits can either be conducted internally, by the waste hauler, or by another third-party waste auditor.

**TENANT STRATEGIES & BEST PRACTICES**

All tenants are required to recycle. Refer to the following Checklist to implement a recycling program.

- You must source separate paper, plastic/metal/glass containers, and cardboard. If you generate a large amount of fabric or construction materials, refer to the Resources section for further guidance.
- Install bins for trash, plastic/metal/glass and paper. Provide sufficient number of containers to satisfy waste and recycling needs.
- Install appropriate labels/bin decals on each bin and corresponding signage to indicate which material should go in each bin. Signage should be prominently placed in all common areas such as pantries, copy rooms, and meeting rooms. Refer to [Appendix M for Waste & Recycling Signage](#).
- If you employ your own custodial staff, ensure recyclables are placed in clear bags.
- If you contract your own waste hauler or have a street level business, you must prominently display a hauler decal from the New York Business Integrity Commission (BIC) that indicates the days of pickup for recycling and trash and maintain a written recycling agreement with your hauler(s) for separate collection of recyclable.
- All of the following materials should NOT be placed in the trash including. However, if you need to dispose of these materials contact the Property Management Team for more information.
  - Electronic
  - Bulk Metal
  - Universal Waste: Bulbs, Batteries, Ballasts
  - Hazardous Waste
  - Textiles

**BIN SETUP**

- Consider eliminating individual bins at each desk to minimize the number of bins required for collection. By providing centralized waste and recycling collection locations within your space, this limits the number of bins for collection by janitorial staff, and also encourages occupants to be more mindful of waste and recycling practices. A single desk side system provides a disincentive to generate trash.



- Ensure recycling bins are always installed adjacent to trash bins.
- Ensure bins are strategically placed in areas where occupants frequent on a consistent basis, including pantry, open office spaces, copy rooms, meeting rooms, etc.
- Install bins and signage consistently across your office. Utilizing the same bins, labels, and signage streamlines the process and reduces confusion.

## BAGS

- If you provide you own bags to cleaning staff please ensure:
  - Recycling must be in clear bags so that the contents can be seen and recovered
  - Trash must be in opaque or black bags to facilitate differentiation between trash and recycling
  - Organics must be placed in green/compostable bags or placed loose in the receptacle (hauler dependent)
  - Consider purchasing eco-friendly trash and recycling bags for your space, that are made of recycled content. Refer to Resources for more information on specific bags to purchase.

## TENANT FIT-OUT ALIGNMENT

This policy is in alignment with ESRT's High Performance Design and Construction Guidelines. For information regarding waste and recycling requirements in tenant spaces, see [Appendix F High-Performance Design and Construction Guidelines](#).

## Waste Reduction Best Practices for Buildings & Tenants

The strategies below are aimed at two objectives: first, to decrease unnecessary waste from being generated, and second, to increase the amount of waste that is successfully recycled.

- Use strategic purchasing decisions to reduce waste generation and environmental impact.
  - Purchase non-perishable ongoing consumables in bulk to reduce excess packaging.
  - Purchase products that are recyclable, rather than products that do not contain recyclable materials
  - Purchase products made from recycled content, rather than products made from new materials (e.g., recycled paper over virgin paper)
  - Purchase products that are reusable, rather than single-use products
  - Purchase electronic products and batteries that are rechargeable, rather than disposable batteries.
  - Purchase and use reusable cloths, rather than paper towels.
  - Print double-sided to reduce paper and energy consumption
  - Do not purchase Styrofoam
  - Provide reusable cups, plates, and silverware to reduce the use of single-use plastics.
  - Bring a reusable bag to pick up lunch
  - Bring a reusable cup to purchase coffee and other beverages outside the building

## Ongoing Monitoring & Evaluation

- **Waste Audits:** Perform waste audits annually at each asset. Collect and review report from waste audit vendor.
- **Engagement**
  - Perform annual trainings through ESRT Sustainability University for property management teams to be aware of policy and best practices as outlined in this policy.
  - Perform annual trainings for Tenants at Tenant Town Halls to promote education and awareness in recycling efforts and to help increase recycling rates at each asset.
  - Engage third-party vendors and waste haulers to ensure waste reports are provided on a regular basis.
- **Key Performance Metrics:** The following key performance metrics should be tracked and reported on a quarterly or annual basis to ensure compliance with the Sustainable Waste Management Policy. Metrics to be provided by Great Forest and/or waste hauler. Refer to [Appendix O for a Sample Waste & Recycling Tracking Spreadsheet](#)
  - Weight of landfill waste at each asset



- Weight of diverted waste per asset. Diverted waste must be reported by waste type wherever feasible and align with the waste collection method at the building.
  - Paper
  - Cardboard
  - Plastic/Metal/Glass
  - Organics
  - Electronics/Appliances (E-Waste)
  - Furniture and other Durable Goods

$$\text{diversion rate (\%)} = \frac{(\text{weight of recycling}) - (\text{weight of contamination in recycling})}{\text{total weight of waste}}$$

## Resources

1. DSNY Recycling Regulations and Guidelines <https://www1.nyc.gov/assets/dsny/site/resources/recycling-and-garbage-laws/recycling-laws-for-residents>
2. DSNY Organics Collection Application: <https://www1.nyc.gov/assets/dsny/site/contact/organics-collection-application>
3. NYS Department of Environmental Conservation Registered Electronic Recyclers List: <http://www.dec.ny.gov/chemical/73670.html>
4. DSNY “What to Recycle” List: <https://www1.nyc.gov/assets/dsny/site/services/recycling/what-to-recycle>
5. NYC Official Recycling Signage and Materials (PDFs can be downloaded for free): <https://materials.bwpronline.org/home>
6. Re-Fashion NYC Program Overview: <https://www.housingworks.org/donate/re-fashionnyc>
7. Re-Fashion NYC Application: <https://www1.nyc.gov/assets/dsny/site/services/donate-goods/refashion-nyc>
8. NYC Harmful Product Recycling Guidance (Includes Fluorescent Bulbs, Batteries, etc.): <https://www1.nyc.gov/assets/dsny/site/services/harmful-products/businesses-harmful>
9. NYC Bulk Collection Program (including furniture): <https://www1.nyc.gov/assets/dsny/site/contact/collection-request-for-large-items>
10. Bags with Sustainability Criteria
  - Pitt Plastics (LEED-Specified) : <http://www.pittplastics.com/>
  - Aluf Plastics (LEED-Specified): <https://www.alufplastics.com/>
  - BioBag: <http://biobagusa.com/>



# INDOOR ENVIRONMENTAL QUALITY POLICY

## Context

Empire State Realty Trust is committed to enhancing health and wellness of our building occupants through the implementation of proper, cost-effective indoor environmental quality (IEQ) practices and procedures. This includes managing our facilities in a way that protects human health and the surrounding environment and improves economic returns through the most effective, least-risk option. This policy applies to all existing ESRT assets.

## Objectives

| Frequency | Goal                                                                                                                                                                                                              | Portfolio Manager | Property Manager | Property Maintenance |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|----------------------|
| Ongoing   | Achieve minimum ventilation requirements at all facilities                                                                                                                                                        | ✓                 | ✓                | ✓                    |
|           | Implement Integrated Pest Management (IPM) practices at all facilities                                                                                                                                            | ✓                 | ✓                |                      |
|           | Implement a smoke-free environment standards and procedures at all facilities                                                                                                                                     | ✓                 | ✓                |                      |
|           | Implement green cleaning standards and procedures at all facilities                                                                                                                                               | ✓                 | ✓                |                      |
|           | Conduct annual Indoor Air Quality Surveys that test for: Carbon Dioxide (CO <sub>2</sub> ), Carbon Monoxide (CO), Airborne Particulates, Temperature/Relative Humidity, Total Volatile Organic Compounds (TVOCs). |                   | ✓                |                      |
| As needed | Ensure tenant fit-outs meet ESRT High Performance Design and Construction Guidelines                                                                                                                              |                   | ✓                | ✓                    |
|           | Ensure all maintenance and project activities utilize no or low-VOC products                                                                                                                                      |                   | ✓                | ✓                    |
|           | Install particulate matter filters or air cleaners with a minimum efficiency reporting value (MERV) of not less than 13 at all facilities                                                                         |                   | ✓                | ✓                    |
|           | Install CO <sub>2</sub> – based demand control ventilation (DCV) sensors at all facilities                                                                                                                        |                   | ✓                | ✓                    |

## Responsibility

Portfolio Managers, Property Managers, Director of Custodial and Custodial Staff, Tenant Services Coordinator, Pest Management Vendors and On-Site Staff shall ensure that the procedures and strategies are implemented at each property.

## Asset-Level Requirements

### Part I: Minimum Ventilation Requirements

- Ensure the ventilation system equipment and associated components are regularly serviced and maintained as per Table 8.2 of ASHRAE 62.1-2016 (See [Appendix A for ASHRAE Ventilation System Maintenance Checklist](#)).
  - Collect and review existing equipment records – including system-specific operating documents, and check HVAC maintenance records against equipment lists. Ensure the filter maintenance and cleaning schedule is being followed for all common area air handling units
- Measure the total quantity of outdoor air delivered and verify the results for all spaces comply with the rates outlined in Table 6.2.2.1 of ASHRAE 62.1-2016 (See [Appendix B for ASHRAE Minimum Ventilation Rates in Breathing Zone](#)) or Table 403.3 in New York City Mechanical Code (See [Appendix C for New York City Minimum](#)



Ventilation Rates), whichever is more applicable and more stringent. Conduct inspections and testing on all HVAC equipment and rooftop units that supply outdoor air to common areas to ensure that they continue to provide their design ventilation airflow rates and these rates meet or exceed the minimum required as per ASHRAE 62.1-2016, Sections 4-7

- When appropriate, retrofit the building management system (BMS) damper and demand-controlled ventilation (DVC) system to manage the building's overall outside air intake, balancing IEQ with energy efficiency. This energy conservation measure (ECM) should be implemented if the building is already meeting the ASHRAE 62.1 standard or New York City Minimum Ventilation Rates
- Conduct annual indoor air quality testing for carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), airborne particulates, volatile organic compounds (VOCs), temperature/relative humidity, and a visual inspection of each location. This can be completed by the building engineer or through a third-party air quality testing vendor. The purpose of annual testing is to:
  - Establish a baseline for air quality performance, if one has not been established
  - Ensure indoor air quality conditions are assessed for all representative locations
  - Immediately address any potential IEQ concerns

## Part II: Pollutant Control

- Implement environmental tobacco smoke (ETS) restrictions and ensure compliance of building staff, tenants and visitors to minimize the effects of ETS to building occupants
  - See Strategies and Guidance for ETS protocols
- Implement an integrated pest management (IPM) plan and ensure compliance of pest management vendors and building staff. Utilize a pest management contractor that is certified by GreenPro, EcoWise, GreenShield, or local equivalent
  - See Strategies and Guidance for IPM protocols
- Implement green cleaning program and ensure compliance of cleaning vendors and custodial staff
  - See Strategies and Guidance for Green Cleaning protocols
- Utilize low-VOC products when performing maintenance or painting touch-ups
  - See Strategies and Guidance for the emission limits and requirements for various product types
- Ensure tenant fit-outs meet or exceed High Performance and Design Construction Guidelines as outlined in the ESRT Guidelines
- Install particulate matter filters or air cleaners with a minimum efficiency reporting value (MERV) of not less than 13
- Install CO<sub>2</sub> – based demand control ventilation (DCV) sensors

## **Strategies and Guidance**

### **INDOOR AIR QUALITY MONITORING**

As part of ESRT's overall commitment to ensuring good Indoor Air Quality is implemented across the portfolio, ESRT requires that all properties conduct an annual Indoor Air Quality Survey conducted by a third-party vendor that tests for Carbon Dioxide (CO<sub>2</sub>), Carbon Monoxide (CO), Airborne Particulates, Temperature/Relative Humidity and, Total Volatile Organic Compounds (TVOCs). Testing should occur in sample representative locations. IAQ tests should be conducted at a minimum once annually. IAQ tests should be provided to Property Manager and Portfolio Managers upon completion from third-party vendor. If corrective action is needed, employ the pollutant control measures outlined in Part II: Pollutant Control.

#### Demand Control Ventilation

CO<sub>2</sub>-based demand-controlled ventilation refers to the practice of using carbon dioxide concentrations as an indicator for the per-person ventilation rate. CO<sub>2</sub> sensors are to be placed in:

- densely occupied areas: monitors shall be between 3 and 6 feet above the floor in open office areas
- return air stream to the Air Handling Unit serving the space: monitors shall tie into controls including an air-side economizer and automatic modulating control of the outdoor air damper



## Particulate Matter Filtration

Particulate matter filters or air cleaners having a minimum efficiency reporting value (MERV) of not less than 13 when rated are to be used upstream of all cooling coils or other devices through which air is supplied to an occupiable space.

## Indoor Air Quality Control During Construction

The construction process is traditionally an indoor air polluting activity and often results in the contamination of buildings during construction as well as continued contamination after the building is occupied. The HVAC systems are especially prone to contamination from construction particulate matter that contains dust, VOCs, microorganisms and other contaminants. These contaminants can remain in the HVAC systems for years after occupancy. To minimize indoor air quality problems related to construction activities a Construction Indoor Air Quality Management Plan shall be implemented during performance of work and prior to occupancy to minimize the presence and spread of air pollutants. At a minimum, Construction Indoor Air Quality Management Plans should cover:

- HVAC Protection
  - Avoid using permanently installed HVAC systems if possible. Use temporary systems where possible
  - If permanently installed air handlers are used during construction, filtration media must be used at each return air grille. Filtration must have a minimum efficiency of 30% or an arrestance of greater than 90%. Replace all filtration media immediately prior to occupancy
  - Store equipment in a clean, dry location. Protect ducts and equipment by sealing openings with plastic
  - Clean air plenums before use
- Source Control
  - Avoid finish materials with high VOC and formaldehyde levels
  - Recover, isolate and ventilate as appropriate when using any toxic materials or creating exhaust fumes
  - Protect stored on-site and installed absorptive materials from moisture damage. Do not install moisture-damaged materials unless they have been properly dried.
  - Implement measures to avoid the tracking of pollutants into work area and occupied portions of the building.
- Pathway Interruption
  - Isolate areas to prevent contamination of clean or occupied spaces using physical separation and depressurization
- Housekeeping
  - Implement practices to ensure a clean job site to control potential contaminants such as dirt, dust and debris
  - Clean up spills and keep work areas dry
- Scheduling
  - Coordinate construction activities to minimize disruption of occupied spaces
  - Carefully sequence construction activities to minimize IAQ issues
- Monitoring
  - Assign responsibility for monitoring of the IAQ Plan
  - Designate recurring site coordination meetings to ensure the appropriate components of the IAQ Management Plan are reviewed and followed
- Flush-out and/or Testing
  - At the owner's discretion, the finished space may be flushed-out to remove remaining contaminants, and/or tested to ensure satisfactory indoor air quality.

## TOBACCO-FREE AND SMOKE-FREE ENVIRONMENT

The following protocols shall be enforced to minimize the effect of tobacco and smoke to building occupants:

- The use of tobacco, cannabis and controlled substances is prohibited in the building by all building occupants. This includes:
  - Cigarettes, cigars
  - Pipes, hookahs, water pipes
  - Electronic cigarettes and vaping devices
  - Smokeless Tobacco including chewing, dipping, or any other use of tobacco products



- The use of tobacco, cannabis and controlled substances is prohibited in all outdoor areas, rooftops, and parking areas within the building site
- Designated smoking areas are prohibited on the building site

Notifications: Communication of the no-smoking policy to occupants shall be demonstrated. Possible communication strategies include:

- No-smoking signage in and/or around facilities
- No-smoking section in lease agreements
- Email communication
- Verbal communication
- Memo to all building occupants
- Captivate screen messaging

Enforcement: Enforcement of the policy is expected to occur on a regular basis for all occupants and on an as-needed basis for any occupant found to be in violation of the policy with special focus within a radius of all property entryways.

## LOW-EMITTING MATERIALS

On-site products shall meet stringent requirements for no or low levels of VOCs, for the health of the installers and others who are exposed to these products. To demonstrate compliance, a product or layer shall meet the following requirements, as applicable. Disclosure of VOC content must be made by the manufacturer. Any testing must follow the test method specified in the applicable regulation. On-site products shall not contain the worst in class materials noted on the [Living Building Challenge Red List](#). Red List Building Materials contain chemicals that have been designated as harmful to living creatures, including humans, or the environment.

## Furniture

Sustainable purchases are those that meet one or more of the following criteria:

- GreenScreen v1.2 Benchmark. Products with fully inventoried chemical ingredients to 100 ppm with no Benchmark 1 hazards.
- Cradle to Cradle certified. Products purchased have earned Cradle to Cradle certification of any level, Version 3 or newer.
- EPD Optimization path: Products with Environmental Product Declarations (EPDs) that are third-party certified and demonstrate impact reduction below industry average in at least three of the following categories:
  - global warming potential (greenhouse gases), in CO<sub>2</sub>e;
  - depletion of the stratospheric ozone layer, in kg CFC-11;
  - acidification of land and water sources, in moles H<sup>+</sup> or kg SO<sub>2</sub>;
  - eutrophication, in kg nitrogen or kg phosphate;
  - formation of tropospheric ozone, in kg NO<sub>x</sub>, kg O<sub>3</sub> eq, or kg ethene; and
  - depletion of nonrenewable energy resources, in MJ.
- Product Manufacturer Supply Chain Optimization: Purchase products meeting any of the following supply chain optimization criteria:
  - Are sourced from product manufacturers who engage in validated and robust safety, health, hazard, and risk programs which at a minimum document at least 99% (by weight) of the ingredients used to make the building product or building material, and
  - Are sourced from product manufacturers with independent third-party verification of their supply chain that at a minimum verifies:
    - Processes are in place to communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation
    - Processes are in place to identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients
    - Processes are in place to implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients.
    - Processes are in place to optimize health, safety and environmental impacts when designing and improving chemical ingredients.



- Processes are in place to communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain. Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain

### Paints, Coatings, Adhesives and Sealants

Sustainable purchases are those that meet one or more of the following criteria:

- Use products with a GreenGuard Gold certificate where possible (see Resources section below for example GreenGuard label).
- If GreenGuard Gold certified products are not available for a particular application, ensure that products used do not exceed VOC content limits.
  - All paints and coatings applied on site shall meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011. See Resources section below for more information. Some common product VOC limits are:
    - Flat and Non-Flat Paints: 50 g/L
    - Primers: 100 g/L
    - Stains: 100 g/L
    - Waterproofing Sealers: 100 g/L
    - Wood Coatings (such as varnish, lacquer): 275 g/L
  - All adhesives and sealants wet-applied on site shall meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168. See Resources section below for more information. Some common product VOC limits are:
    - Carpet Pad Adhesive: 50 g/L
    - Ceramic Glass, Porcelain, & Stone Tile Adhesive: 65 g/L
    - Drywall & Panel Adhesive: 50 g/L
    - Multi-Purpose Adhesives: 70 g/L
    - VCT Tile Adhesive: 50 g/L
    - Wood Flooring Adhesive: 100 g/L

### Other Products

This applies only to building elements permanently or semi-permanently attached to the building itself. Examples include, but are not limited to, building components and structures (wall studs, insulation, doors, windows); panels; attached finishing's (drywall, trim, ceiling panels); carpet and other flooring material; adhesives; sealants; paints and coatings. Furniture and mechanical, electrical and plumbing components and specialty items such as elevators are excluded. Sustainable purchases are those that meet one or more of the following criteria:

- Health Product Declaration (HPD). The end use product has a published, complete HPD with full disclosure of known hazards in compliance with the HPD Open Standard.
- Cradle to Cradle Certified. Products purchased have earned Cradle to Cradle certification of any level, Version 3 or newer.
- Declare. The Declare label must indicate that all ingredients have been evaluated and disclosed down to 1000 ppm.
- ANSI/BIFMA e3 Furniture Sustainability Standard: Documentation from the assessor or scorecard from BIFMA must demonstrate the product earned at least 3 points under 7.5.1.3 Advanced Level in e3-2014 or 3 points under 7.4.1.3 Advanced Level in e3-2012.
- Product Lens certification
- Facts - NSF/ANSI 336. Sustainability Assessment for Commercial Furnishings Fabric at any certification level
- Environmental Product Declaration (EPD): Products having an environmental product declaration that conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope. The EPD can be either industry-wide (generic) EPD or product specific Type III EPD with third party external verification in which the manufacturer is explicitly recognized as the participant by the program operator.



- GreenScreen v1.2 Benchmark. Products with fully inventoried chemical ingredients to 100 ppm with no Benchmark 1 hazards.
- Cradle to Cradle certified. Products purchased have earned Cradle to Cradle certification of any level, Version 3 or newer.
- EPD Optimization path: Products with Environmental Product Declarations (EPDs) that are third-party certified and demonstrate impact reduction below industry average in at least three of the following categories:
  - global warming potential (greenhouse gases), in CO<sub>2</sub>e;
  - depletion of the stratospheric ozone layer, in kg CFC-11;
  - acidification of land and water sources, in moles H<sup>+</sup> or kg SO<sub>2</sub>;
  - eutrophication, in kg nitrogen or kg phosphate;
  - formation of tropospheric ozone, in kg NO<sub>x</sub>, kg O<sub>3</sub> eq, or kg ethene; and
  - depletion of nonrenewable energy resources, in MJ.
- Product Manufacturer Supply Chain Optimization: Purchase products meeting any of the following supply chain optimization criteria:
  - Are sourced from product manufacturers who engage in validated and robust safety, health, hazard, and risk programs which at a minimum document at least 99% (by weight) of the ingredients used to make the building product or building material, and
  - Are sourced from product manufacturers with independent third-party verification of their supply chain that at a minimum verifies:
    - Processes are in place to communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation
    - Processes are in place to identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients
    - Processes are in place to implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients.
    - Processes are in place to optimize health, safety and environmental impacts when designing and improving chemical ingredients.
    - Processes are in place to communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain. Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain

## GREEN CLEANING

The appearance of the property is the cornerstone of ESRT's service to the tenants. Strict adherence to the Property Cleaning Policy should be maintained at all times. Where differences occur between properties a supplement to this document is to be published.

The property manager has complete responsibility to prepare for and supervise the compliance of Property Cleaning. This policy document provides guidelines for fulfilling that responsibility.

The implementation of a green cleaning program is imperative to reduce levels of chemical, biological and particulate contaminants which can compromise human health and building operations. The green cleaning program will also reduce the environmental effects of cleaning products. All areas of the building and site shall utilize green cleaning techniques. Building staff and/or 3<sup>rd</sup>-party vendors shall use the following techniques in the building's managed facilities as appropriate:

- Monitoring and Reporting: Property inspections are to be conducted quarterly with the Property Manager, Portfolio Manager and SVP of Property Management. Bi-Weekly inspections with the cleaning consultant are to be scheduled on a property basis or more frequently as necessitated by the property.
- Notifications: The cleaning supervisor should always keep the property management office apprised of any issues via written and verbal communication. Should the cleaning of areas be delayed for any reason PM should be made aware immediately. Similarly, if any changes to daily cleaning due to construction or tenant activity should occur the cleaning manager should be made aware post-haste.
- Documentation: All Material Safety Data Sheets (MSDS) shall be updated and made available at all times

### Green Cleaning Strategies



- Assess all current cleaning products and equipment
- Request regular logs of cleaning purchases and equipment to ensure they meet sustainability criteria
- Consider conducting a custodial effectiveness audit in accordance with APPA Leadership in Educational Facilities Custodial Staffing Guidelines, or local equivalent to ensure the building is operating in accordance with the Green Cleaning Program and assess the overall cleanliness.

#### **Green Cleaning Standards Overview**

- Green Seal: Green Seal provides science-based environmental certification standards that are credible, transparent and essential to helping manufacturers, purchasers and consumers make responsible choices that positively impact business behavior and improve quality of life
- UL Ecologo: Certification is based on multi-attribute, lifecycle-based standard that assesses a products environmental performance
- Design for Environment (DfE): Labelling program that identifies cleaning products demonstrated to be less damaging to human health and the environment, and applies to all purpose cleaners, dish soaps, hand soaps, odor removers, degreasers, metal cleaners and polishes, and bathroom cleaners
- Forest Stewardship Council (FSC): Labelling program that identifies wood products grown and harvested with responsible forest management practices

#### Sustainable Cleaning Product Purchasing Guidelines

Supplies are to be procured from the ESRT designated janitorial supplier as specified through the competitive bid process. Each property should designate a supply storage area(s) and select a staff member to restock and inventory the supplies as necessary. All applicable and eligible products utilized in building maintenance shall meet one or more of the following standards:

#### **Green Cleaning Products**

- Green Seal GS-40 for industrial and institutional floor-care products
- Green Seal GS-37 for general purpose, bathroom, glass, and carpet cleaners used for industrial and institutional purposes
- UL Ecologo 2792 for cleaning and degreasing compounds
- UL Ecologo 2759 for hard surface cleaners
- UL Ecologo 2795 for carpet and upholstery care
- UL Ecologo 2777 for hard floor care

#### **Disposable Paper Products & Trash Bags**

- US EPA Comprehensive Procurement Guidelines for janitorial paper and plastic trash can liners – requiring plastic trash bags have 10% - 100% postconsumer recycled content.
- California integrated waste management requirements, for plastic trash can liners
- Green Seal GS-09 for paper towels and napkins
- Green Seal GS-01 for tissue paper, paper towels and napkins
- UL Ecologo 175 for toilet tissue and hand towels
- Janitorial paper products derived from rapidly renewable resources or made from tree-free fibers
- FSC Certification for fiber procurement

#### **Hand Soaps**

- No antimicrobial agents (other than as a preservative) except where required by health codes and other regulations (e.g., food service and health care requirements)
- Green Seal GS-41
- UL Ecologo 2784 for hand cleaners and hand soaps
- UL Ecologo 2783 for hand sanitizers
- EPA Safer Choice Standard

#### Disease Spread Control

The U.S. Food and Drug Administration issued a final rule in September 2016 that 19 ingredients in common [“antibacterial” soaps, were no more effective than non-antibacterial soap](#) and water. This rule does not affect hand sanitizers, wipes, or antibacterial products used in healthcare settings. The Centers for Disease Control and Prevention



recommends [using a hand sanitizer with at least 60% alcohol](#) to help you avoid getting sick and spreading germs to others. As such, it is the recommendation of ESRT to utilize the above-mentioned hand soaps to prevent disease spread. Additionally, educational materials for tenants and building occupants is an effective way to reduce the spread of disease. The resources below are designed to help raise awareness about the importance of handwashing at key times in public settings.

- [Print Materials](#)
- [Fact Sheets](#)
- [Social Media Posts and Graphics](#)
- [Sample Newsletter/email Announcement For Office Employees](#)

#### **Disinfectants, metal polish, or other products not addressed by the above standards**

- UL EcoLogo 2798 for digestion additives for cleaning and odor control
- UL EcoLogo 2791 for drain or grease trap additives
- UL EcoLogo 2796 for odor control additives
- Green Seal GS-52/53, for specialty cleaning products
- California Code of Regulations maximum allowable VOC levels for the specific product category
- EPA Safer Choice Standard
- Cleaning devices that use only ionized water or electrolyzed water and have third-party-verified performance data equivalent to the other standards mentioned above (if the device is marketed for antimicrobial cleaning, performance data must demonstrate antimicrobial performance comparable to EPA Office of Pollution Prevention and Toxics and Design for the Environment requirements, as appropriate for use patterns and marketing claims)

#### **Sustainable Cleaning Equipment**

- Vacuums: Certified by the Carpet & Rug Institute (CRI) Green Label program
- Carpet Extractors: Certified by CRI Seal of Approval program
- Propane Powered Floor Equipment: Equipped with catalytic converter that meets California Air Resources Board (CARB) and EPA standards for specific engine sides

### **INTEGRATED PEST MANAGEMENT (IPM)**

All areas of the building and site shall utilize IPM techniques. Building staff and/or 3<sup>rd</sup>-party vendors shall use the following techniques in the building's managed facilities as appropriate:

- **Monitoring and Reporting:** The IPM team shall use an IPM tracking tool to record pest instantiation, action(s) taken and occupant notification method. For a sample IPM Tracking Tool see [Appendix D](#)
- **Notifications:** If an emergency situation arises that requires the use of a chemical, non-least toxic pesticide, a universal building notification shall be issued
  - Emergency situation is defined as when an imminent threat to health or property occurs
  - Tenants, occupants, and building staff shall be given at least 72 hours' notice by building management prior to the application of a pesticide under normal circumstances and no more than 24 hours after emergency has occurred
    - Post notification in the building as well as provide written notice to the building
    - The building management shall contact directly the building occupants located in the treated area
    - Notifications about pest control chemical applications shall include product name, active ingredient, product label signal word, time and location of application, and contact information for more details
  - In extreme conditions, if a pest and/or insect problem poses an immediate threat to human health and no viable alternative exists, the IPM plan may deviate from the notification provisions, adhering to any applicable state or local regulations. In such instances, occupants shall be notified no more 24 hours after pesticide application
- **Environmental Control:** Establish and maintain a sanitary environment in order to reduce pest's accessibility to food, water and shelter. While environmental control is a powerful prevention technique, if an area is already



infested, other techniques may be needed to rid the area of the pests. See Standard Procedures and Implementation Strategies for more information

- Documentation:
  - Pest Management Vendor
    - All Material Safety Data Sheets (MSDS) shall be provided by the pest management vendor
    - Logbooks
    - Quarterly sanitation reports of food service areas to address any problems from leaky pipes, floor drains and food debris under workstations.

#### Pest Control Strategies

##### **Mechanical Controls**

- Mechanical controls are directed at destroying a pest and/or its habitat with trapping devices, removal of nests and/or webs, and sealing off cracks or crevices where insects and/or rodents may enter

##### **Chemical Controls**

- Chemical Controls refer to pesticides that are used to kill infesting pests and is the last resort for pest control in the building's managed facilities
- Organic Chemical Controls are derived from an organic compound such as tree bark or flowers and comes in the forms of oils or dusts and can be highly effective in pest control

##### **Least Toxic Products**

- Least toxic products apply to a pesticide product that, other than rodent bait, is applied in a self-contained, enclosed bait station placed in an inaccessible location, or applied in a gel that is neither visible nor accessible
- Contains active ingredients and known inert ingredients that meet the least toxic [Tier 3 hazard ingredient under the City and County of San Francisco's hazard screening protocol](#).

#### Preventative Pest Management Best Practices

##### **Housekeeping**

- Store food in insect-proof containers
- Ensure water drainage where mosquitoes might flourish
- Frequent waste collection at all collection locations and/or waste hauler loading zones
- Maintain and inspect indoor plants

##### **Landscape Management**

- Landscape with native, adaptive and insect/disease resistant and indigenous plants
- Mechanical removal of landscape bed weeds
- Use organic and natural materials whenever feasible
- Use slow-release formulations if synthetic fertilizers must be used allowing for less frequent applications
- Avoid any applications prior to periods of heavy rainfall
- Treat pest infestations found to be above threshold limits via targeted spray instead of blanket applications
- Leave an 18-inch buffer between building and landscaping to block direct access into the building
- Maintain landscape routinely to make plants less susceptible to pest infestations and weed growth

#### Standard Procedures and Implementation Strategies

##### **Rodent Control**

- Trapping Devices:
  - Trapping devices are to be used in regular treatment scenarios on a weekly basis
  - All trapping devices shall be in protected areas and concealed from plain view so as not to be affected by foot traffic, routine cleaning or other operations, including the basement and common areas to maintain a protective rodent barrier throughout the interior of the facility.



- Dispose all trapped rodents and rodent carcasses in a safe and humane manner
- **Rodenticides:**
  - All rodenticides, regardless of packaging, shall be placed in an EPA-approved tamper-resistant bait box or a secure location; a secure location is inaccessible to children, pets, wildlife, and domestic animals
  - Rodenticides shall only be used outside the building
- **Rodent Baits**
  - Rodent baits may not be considered least-toxic and always require that universal notification be issued
  - Rodent baits shall only be used if they are solid blocks placed in locked outdoor dispenser
  - No second-generation or single-feed rodent baits shall be used if the building is adjacent to parkland, wild areas, or other spaces where wildlife may be affected
- **Bait Boxes:**
  - All bait boxes shall be maintained in accordance with EPA regulations, with an emphasis on the safety of non-target organisms
  - All bait boxes shall be placed out of the general view, in locations where they will not be disturbed by routine operations
  - The lids of all bait boxes shall be securely locked or fastened shut
  - All bait boxes shall be securely attached or anchored to floor, ground, wall, or other immovable surface.
  - Bait shall be secured in the feeding chamber of the box instead of the runway or entryways of the box
  - All bait boxes shall be labeled on the inside with the address, dated at the time of installation and each servicing; and name of the vendor's business, if used
  - Bait boxes shall only be used outside the building
- **Pesticides**
  - Apply all pesticides according to the product instructions All pesticides must be registered with the U.S. Environmental Protection Agency (EPA), state and/or local jurisdiction
  - Approved Products: Only least toxic chemical pesticides shall be used without direct approval from the building
  - Pesticide Storage: Pesticide products shall not be stored in the building without the building's consent or instruction. All chemical application and disposal practices will align with manufacturer recommendations and requirements of GreenShield Certification
  - Application:
    - Application shall be on an as-needed basis
    - The application of pesticides in any area should not occur until pest-specific action thresholds (see below) are met and confirmed with monitoring and inspection
    - Action thresholds can be modified when pests have not met thresholds but are nuisance or disruptive to occupants
    - Written approval must be granted by the building prior to any pesticide application as a preventative measure
    - Routine pest control visits must not disrupt tenant productivity nor pose a threat to tenant health or wellbeing
    - If pest control visits must occur during the hours of building occupancy, ensure minimal disruption
    - Observe all federal, state, and local safety and health requirements at all times. Where there is a conflict between applicable regulations, the most stringent will apply

## **Insect Control**

- **Non-Pesticide Methods:**
  - Employ non-chemical methods of control whenever possible.
    - Non-chemical methods may include the use of trapping devices and vacuums rather than pesticide sprays as a means to cleanout insect infestations
- **Monitoring:** Sticky traps shall be used to monitor and evaluate indoor insect control
- **Cracks and Crevices:** Apply all insecticides as "crack and crevice" treatments only, meaning the insecticide is concentrated and applied to the cracks and crevices only
- **Bait Methods:**
  - Bait application shall be the building's standard pesticide technology for cockroach and ant control
  - Use bait as a method of insect control in all cases unless some circumstance calls for alternative forms of control in which case the building's approval is required



- Insecticides:
  - Application of insecticides to exposed surfaces or as space sprays is, in general, an unacceptable method of treatment. If used, building management approval is necessary
  - No surface application or space spray shall be made while tenants or occupants are in the building
  - In the case of such an application, the building team shall take all necessary precautions to ensure tenant and employee safety, and the containment of the pesticide to the site of application

#### **Minimization of Risk:**

- When pesticide and/or insecticide use is necessary, apply the least hazardous material and use precise application techniques in order to use a minimal quantity of product.
- A least toxic chemical product is any product for which all active ingredients and known inert ingredients meet the least toxic Tier III Hazard criteria under the City and Country of San Francisco hazard screening protocol.
  - The official San Francisco Pesticide Hazard Screening List is available at:  
<http://www.sfenvironment.org/article/pest-management/least-toxic-pesticides-for-green-buildings>
- Least toxic also applies to any pesticide product, other than rodent bait that is applied in a self-contained, enclosed bait station placed in an inaccessible location.
- Under extreme conditions, use of pesticides or insecticides that do not meet the definition of least toxic may be used when necessary.
- Extreme Conditions
  - Conditions are considered extreme (thus requiring an emergency pesticide application) in the case of an imminent threat to human health or the structural integrity of the building due to pests
  - Discuss with building representative prior to its use giving a full description of the pesticides use - where, when and how it will be used
  - MSDS and Labels shall be sent to building office and also placed within the site logbook, prior to its use
  - Only be used if approved by the appropriate building representative, preferably the building manager
- Pesticide Handling: Transport, handling, and use of all pesticides shall be in strict accordance with the manufacturer's label instructions and all applicable Federal, state, and local laws and regulations.
- Cautionary Labeling for Pesticides
  - Law requires that precautionary statements and signal words be included on all pesticide labels. This does not apply to non-toxic or "natural" materials. If none of the following warnings are provided, do not use the pesticide.
    - DANGER - A taste to a teaspoonful taken by mouth could kill an average-sized adult
    - WARNING - A teaspoonful to an ounce taken by mouth could kill an average-sized adult
    - CAUTION - An ounce to over a pint taken by mouth could kill an average-sized adult

#### **TENANT FIT-OUT ALIGNMENT**

This policy is in alignment with ESRT's High Performance Design and Construction Guidelines. For information regarding IEQ requirements in tenant spaces, see [Appendix F High-Performance Design and Construction Guidelines](#).

#### **Ongoing Monitoring & Evaluation**

IEQ evaluations shall occur on an ongoing basis to ensure strategies are being implemented where applicable. IEQ evaluations shall be performed by the property manager and responsible vendor or service provider.

#### **Integrated Pest Management**

- Track and report metrics including:
  - Date and Time
  - Vendor
  - Pesticide Applied
  - Toxicity (Tier 1, 2,3)
  - Location in Building
  - Observed Pet Type
  - Prevention Measures



- Method of Notification
- Refer to [Appendix D for Sample IPM Tracking Tool](#) to document compliance with policy.

#### Green Cleaning

- Track and report metrics including:
  - Product
  - Cost
  - Sustainability Criteria
- Refer to [Appendix E for Sample Green Cleaning Tracking Tool](#) to document compliance with policy.

#### Resources

- Green Cleaning:
  - <https://www.greenseal.org/products-services/>
  - [EPA Green Cleaning Standards and Product Recommendations](#)
  - [EPA Design for Environment \(Dfe\)](#)
  - [EU Ecolabel Product Catalogue](#)
- Integrated Pest Management:
  - <https://www1.nyc.gov/assets/doh/downloads/pdf/pesticide/ipm-toolkit.pdf>
  - [Official San Francisco Pesticide Hazard Screening List](#)
  - <http://www.greenshieldcertified.org/find-a-provider/>
- Low-Emitting Material Criteria:
  - [http://greenguard.org/en/CertificationPrograms/CertificationPrograms\\_childrenSchools.aspx](http://greenguard.org/en/CertificationPrograms/CertificationPrograms_childrenSchools.aspx)
  - <http://www.aqmd.gov/home/rules-compliance/compliance/vocs/architectural-coatings/tos>
  - <https://www.aqmd.gov/home/rules-compliance/compliance/vocs/adhesive-and-sealants#>



## SUSTAINABLE PROCUREMENT POLICY

### Context

Empire State Realty Trust recognizes that the procurement of products and services have potential environmental, social and governance impacts in the communities in which we operate. We are committed to working with vendors who operate in a responsible and sustainable manner and will help us maintain and promote our high standards regarding environmental practices and sustainability. ESRT will ensure these guidelines are implemented across our portfolio.

### Objectives

| Frequency | Goal                                                                                                                                                          | Portfolio Manager | Property Manager | Custodial Staff. |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|------------------|
| Annual    | Implement the environmentally preferred purchasing policy                                                                                                     | ✓                 | ✓                | ✓                |
|           | Increase the sustainability of future purchases of ongoing consumables, durable goods, facility alteration and additions, reduced mercury in lamps, and food. |                   | ✓                | ✓                |
|           | Lamp Purchases: 100% of lamps have 60 picograms of mercury per lumen-hr. or less (performance measurement is by number of lamps)                              |                   | ✓                |                  |
|           | Ongoing Consumables: At least 75% of total purchases meet sustainability criteria (performance measurement is by cost)                                        |                   | ✓                |                  |
|           | Durable Goods & Electric Powered Equipment: 90% meet sustainability criteria (performance measurement is by cost)                                             |                   | ✓                |                  |
|           | Food: 25% meet sustainability criteria (performance measurement is by cost)                                                                                   |                   | ✓                |                  |
|           | Provide this policy to all suppliers/vendors to ensure they are aware and comply with policy.                                                                 |                   | ✓                | ✓                |
|           | Track purchases to ensure they meet environmentally preferred purchasing criteria.                                                                            |                   | ✓                | ✓                |
|           | Educate and engage tenants on sustainable procurement practices.                                                                                              |                   | ✓                | ✓                |

### Responsibility

It is the responsibility of all ESRT employees who purchase goods on behalf of ESRT including **Property Managers, Tenant Service Coordinators (TSCs), Custodial Staff**, and relevant vendors to understand these guidelines and implement wherever feasible.

### Asset Level Requirements

**Scope:** This policy refers to all purchasing for the following types of products. Ongoing consumables: Ongoing consumables refer to low cost-per-unit materials that are regularly used and replaced throughout the daily course of business. These materials include at a minimum, those listed below. Requirements for each type of product are outlined in more detail within this document.

- Ongoing Consumables: Ongoing consumables refer to low cost-per-unit materials that are regularly used and replaced throughout the daily course of business
  - Paper, toner cartridges, binders, notebooks, envelopes, batteries, desk accessories



- **Durable goods:** Durable goods have a useful life of two years or more and are replaced infrequently or may require capital program outlays. Examples include the following:
  - All office equipment, appliances, and audiovisual equipment
  - Other electric powered equipment
- **Lamps:** All lamps purchased should have reduced mercury content, to avoid the potential adverse health effects of mercury.
- **Food:** Environmentally preferred purchasing criteria for food helps to encourage purchasing locally sourced, organic food which is better for the environment.

**Ongoing Consumables: Purchases shall meet the following criteria:**

- **Paper:** All office white copy paper shall be at least 75% post-consumer recycled content paper. All other paper shall at least meet minimum EPA guidelines for recycled content.
  - 2-Sided (Double Sided) printing shall be standard at all printing stations
- **Postconsumer recycled content.** The content of purchases must meet or exceed the levels listed in the U.S. Environmental Protection Agency Comprehensive Procurement Guidelines. Products not covered by the Guidelines can get credit for their recycled content with no minimum.  
(<http://www.epa.gov/epawaste/conserve/tools/cpg/>)
- **Extended use.** Batteries must be rechargeable. Toner cartridges for laser printers must be remanufactured.
- **Bio-based materials.** Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.
- **Paper and wood products.** Paper and wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent.

**Durable Goods: Purchases shall meet the following criteria:**

- **EPEAT rating.** The equipment must have a silver Electronic Product Environmental Assessment Tool (EPEAT) Silver rating or better.
- **ENERGY STAR rating.** If the equipment does not yet fall under the EPEAT rating systems, it must be ENERGY STAR® qualified or performance equivalent for projects outside the U.S.

**Reduced Mercury in Lamps:** In order to reduce mercury content in lamps, all vendors shall provide information on energy efficiency and lamps that have low mercury counts. As applicable, all lamps purchased should comply with the minimum level of mercury content specified below. 100% of lamps (performance measured by the number of lamps) will contain:

- 60 picograms of mercury per lumen-hour or less

**Food:** Where applicable, vendors are selected that provide environmentally preferred purchasing of foods. This includes food purchased for the office staff as well as food provided by outside catering services that are directly related to Agency meetings or events. A target goal of 25% of total combined food and beverage purchases (performance measured by cost) shall meet one or more of the following criteria:

- **Sustainable Agriculture:** Food and beverages labeled USDA Organic, Food Alliance Certified, Rainforest Alliance Certified, Protected Harvest Certified, Fair Trade or Marine Stewardship Council's Blue Eco-Label
- **Local Sourcing of Food & Beverages:** Food or beverage must contain raw materials harvested and produced within 100 miles of the site
- **Service ware and Packing:** Should be reusable, have recycled content, be readily recyclable or compostable. Plastic film wrap, single-use serving trays, and other single use supplies are strongly discouraged.
- When developing a menu, consider following the nutrition guidelines in the Fitwel Meetings and Events Catering Standard

**Facility Alterations & Additions:**



Criteria for solid waste management and indoor air quality best management practices during facility alterations and additions are located in the High-Performance Design and Construction Guidelines. Ensure all building materials purchased for renovations are low/no VOC and are formaldehyde free.

**Vendor Contracts:** ESRT places a priority on environmentally preferable purchasing by integrating sustainability requirements as part of the evaluation criteria for contracting services.

Each bid received during solicitation will require the company to describe their environmental stewardship as well as answer questions regarding the sustainable aspect of the products they use. This includes the following, where applicable:

- Recycled Content of Product (allocated by pre- and post- consumer where feasible)
- Energy and Water Savings
- Chemicals Used in the Product's Manufacturing
- Packaging of the Product
- Transportation and Disposal Programs
- Environmentally preferable purchasing policy of the company

### Ongoing Monitoring & Evaluation

- Track and report the following metrics on a quarterly/bi-annual or annual basis to evaluate progress towards the goals set forth in this policy.
  - Ongoing Consumables Purchases: Product, Cost, Sustainability Criteria. For a template log to track ongoing consumables, refer to [Appendix Q: Sustainable Procurement Ongoing Consumables Tracking Log](#)
  - Durable Goods Purchases: Product, Cost, Sustainability Criteria
  - Mercury Content in Lamps: Product, Mercury Content
  - Food: Event, Product, Cost, Sustainability Criteria
- For vendor contracts, maintain RFP responses that outline sustainability criteria and ensure compliance with the policy.

### Resources:

1. ENERGY STAR Product Finder: <https://www.energystar.gov/productfinder/>
2. EPEAT Product Registry (Sustainable Electronics): <https://www.epeat.net/>
3. Fitwel Meetings & Events Catering Standard: <https://www.fitwel.org/wp-content/uploads/2020/01/Fitwel-Meetings-and-Events-Catering-Standard-2020.pdf>



# CLIMATE CHANGE ADAPTATION & RESILIENCE POLICY

## Context

Climate change poses a risk to the real estate sector, as buildings and their construction and operation together account for up to 36% of global annual greenhouse gas (GHG) emissions. The ability to assess and respond to potential climate change impacts is material to Empire State Realty Trust's overall value as a company, as well as its ability to serve its tenants, employees, investors and other stakeholders. Climate change has contributed to an increase in the frequency and severity of natural disasters and extreme weather events. Resilience as it relates to climate change involves adapting to and/or recovering from impacts associated with increasing occurrences of extreme weather events and natural hazards.

Identifying the risks that climate change poses positions ESRT to more effectively manage and minimize risks through mitigation strategies, and to provide a return on investment by reducing the economic impacts of climate change. ESRT is committed to improvement in the environmental performance of every asset in its portfolio and supports sustainable development. This policy applies to existing assets as well as potential acquisitions.

## Objectives

| Frequency | Goal                                                                                                                                                        | Portfolio Manager | Property Manager |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|
| One-Time  | Incorporate climate change risk assessments into the Acquisition Due Diligence process                                                                      | ✓                 | ✓                |
|           | Conduct climate change risk assessments at all existing assets                                                                                              | ✓                 | ✓                |
|           | Develop a short-term implementation plan for mitigating risk at assets with the highest risk; develop a long-term implementation plan for all other assets. | ✓                 | ✓                |
| Annual    | Implement identified climate change risk mitigation strategies                                                                                              | ✓                 | ✓                |
|           | Attend disaster recovery readiness/emergency preparedness training                                                                                          | ✓                 | ✓                |

## Responsibility

It is the responsibility of **Portfolio Managers** and **Property Managers** to be familiar with this plan, perform risk assessments and implement necessary improvements.

## Asset-Level Requirements

### Part I: Baseline

To implement the *Climate Change Adaptation & Resilience Policy*, it is first necessary to identify and understand an asset's exposure and vulnerability to climate-related threats. The following requirements will help property managers to assess current conditions:

- **Identify relevant climate change risks:** Utilizing the [Climate Change Risk Assessment Checklist in Appendix G](#), identify what assessments have been performed and what relevant climate change risks have been identified.
- **Analyze climate change risks and potential impact:** Conduct an asset-level risk assessment to identify the potential impact of climate change risks.
  - See the *Strategies and Guidance* section for tools and resources to inform risk assessments

### Part II: Performance

Once an asset's exposure and vulnerability to climate-related threats is understood, property managers can develop an operational response plan and implement improvement measures that will increase resilience and mitigate risk.



- Develop and implement an operational plan for mitigating and responding to climate risks identified and analyzed in the baseline studies.
  - See the *Strategies and Guidance* section for tools and resources to inform risk mitigation strategies.

Each property team is to participate in disaster recovery readiness/emergency preparedness training annually. Property-specific training is held once per year and portfolio-wide training is held twice per year. Teams will be notified when training is occurring. These trainings should be utilized to help inform a property's bespoke emergency action plan.

## Strategies and Guidance

### Identify Relevant Climate Change Risks

The first step that the portfolio manager or a property manager should take towards mitigating risks of their managed asset is to identify the most relevant climate change risks at the asset. For example, assets in New York City and Stamford may need to focus on mitigation strategies for storm surges, wind damage and heat waves, while assets in California may need to focus on mitigation strategies for droughts, earthquakes and wildfires.

Below are some of the impacts that are currently relevant for the Northeast region where ESRT's properties are located. These impacts will continue to worsen and affect this region, according to the [Fourth National Climate Assessment Report](#), released by the [U.S. Global Change Research Program](#). This list can provide a starting point for initiating risk assessments:

#### Environmental Hazards, US, Northeast Region

- Heat waves and higher average annual temperatures
- Heavy rain events and increased annual precipitation
- Hurricane/coastal windstorms
- Storm surge and sea level rise
- Severe winter storms and freeze

Property managers should utilize the [Climate Change Risk Assessment Checklist in Appendix G](#) as a starting point for assessing their assets. The expected outcome of this step is to have a baseline understanding of what risk assessments have already been performed and the types of climate change risks that have been identified at each asset.

### Analyze Climate Change Risks & Potential Impact

A risk assessment involves evaluating assets that may be vulnerable to natural hazards, extreme weather, and other climate change-related impacts. The purpose of conducting a risk assessment is to help property managers to understand the exposure and vulnerability associated with an asset and to make informed decisions to mitigate these factors. Performing a risk assessment on a portfolio will also provide guidance on how to prioritize assets for implementing mitigation strategies. Risk assessments should be conducted for any previously unaddressed topics as discovered through the Climate Change Risk Assessment Checklist.

To conduct a comprehensive risk assessment, many resources should be considered. The [U.S. Climate Resilience Toolkit](#) offers an extensive list of climate change-related tools and resources that provides access to the data needed to conduct the risk assessment. Use tools and resources that are relevant for the assets that are being assessed. The following hazard resources should be reviewed (as applicable), including:

- Flooding, storm surge and sea level rise:
  - NYC Flood Zone mapper: <https://www1.nyc.gov/site/planning/data-maps/flood-hazard-mapper.page>
  - FEMA inland flood maps: <https://msc.fema.gov/portal/search>
  - NOAA coastal flooding / sea level rise maps: <https://coast.noaa.gov/floodexposure/#/map>
- Hurricane:
  - NOAA historical hurricane tracks: <https://coast.noaa.gov/hurricanes/>

The above resources will enable the identification of general at-risk areas but are not able to provide a complete assessment of risk exposure for any individual asset. The most recent asset-specific documents should also be reviewed (as available), including:

- Property Condition Assessment (PCA)
- Roof Report
- Phase I Environmental Site Assessment



- Seismic Study

When performing the risk assessment, utilize the tools provided by the [Department of Homeland Security's Ready Risk Assessment](#) webpage to record the findings. Using the following tools in the risk assessment process will allow the portfolio manager to compare assets within the ESRT portfolio to prioritize the most vulnerable assets for implementing mitigation strategies:

- [Risk Assessment Table](#)
- [Business Impact Analysis Worksheet](#)

### Identify & Implement Strategies to Mitigate Climate Change Risks

The risk assessment may result in the identification of areas where assets are vulnerable to climate change-related impacts (e.g. an asset located in a 100-year flood zone). The next step is to determine potential mitigation strategies. While solutions will need to be tailored to the individual asset, they will generally consist of operational strategies and/or capital strategies,

- Operational strategies involve the development of tools for use before, during, and after an emergency event. These can include a checklist of preparations to be completed by building staff and a building occupant communication and evacuation plan.
- Capital strategies include investment-driven responses such as installing flood barriers, making roof improvements, installing backup generators, etc. Capital strategies will require additional study to determine feasibility, payback, etc.

### Operational Plan Development

The following resources developed by FEMA and FM Global can provide an effective starting point for developing asset-specific mitigation and response strategies to various climate threats. Property Managers should download these tools and use them as the framework for building and implementing their asset-level plan.

- Flood
  - FM Global NatHaz Toolkit: Flood
  - <https://www.fmglobal.com/research-and-resources/tools-and-resources/nathaz-toolkit/flood>
    - *Understanding the Hazard: Flood*
    - *Flood Emergency Response Plan*
    - *Flood Checklist*
- Windstorm/Hurricane
  - FM Global NatHaz Toolkit: Windstorm
  - <https://www.fmglobal.com/research-and-resources/tools-and-resources/nathaz-toolkit/windstorm>
    - *Understanding the Hazard: Wind from Tropical Storms*
    - *Understanding the Hazard: Exterior Wall Assemblies*
    - *Protecting Your Facility Against Major Windstorms*
    - *Protecting Roofing Systems Against Windstorm Damage*
    - *Wind Checklist*
- Freeze/Winter Storm
  - FM Global NatHaz Toolkit: Freeze
  - <https://www.fmglobal.com/research-and-resources/tools-and-resources/nathaz-toolkit/freeze>
    - *Understanding the Hazard: Freeze*
    - *Protecting Your Facilities from Winter Storms*
    - *Freeze-Up Checklist*
- Emergency Response Plan
  - Ready.gov
  - <https://www.ready.gov/business/implementation/emergency>

### Documentation

The property manager is to provide the following baseline documentation:

- Climate Change Risk Assessment Checklist

The property manager is to provide the following performance documentation:

- Operational plan for mitigating and responding to climate change risks



## Ongoing Monitoring & Evaluation

Climate Change Risk Assessment Checklists should be completed on an ongoing basis to identify climate change risk mitigation strategies and assess portfolio-wide risk to identified hazards.

## Resources

1. [Third National Climate Assessment Report](#): Provides an in-depth look at climate change impacts on the U.S. and details the ways climate change is already affecting and will increasingly affect the lives of Americans.
2. [U.S. Global Change Research Program](#): Comprises 13 Federal agencies that conduct or use research on global change and its impacts on society, in support of the Nation's response to global change.
3. [U.S. Climate Resilience Toolkit](#): Designed to help people find and use tools, information, and subject matter expertise to build climate resilience. The Toolkit offers information from across the U.S. federal government in one easy-to-use location.
4. [U.S. Geological Survey](#): Provides science about the natural hazards that threaten lives and livelihoods, water, energy, minerals, and other natural resources, the health of ecosystems and environment, and the impacts of climate and land-use change.
  - o [U.S. Geological Survey's One-Year 2017 Seismic Hazard Forecast](#)
5. [NYC Flood Hazard Mapper](#): Flood zone visualization tool for New York City.
6. [NOAA's Sea Level Rise Viewer](#): A tool used to view potential sea level rise scenarios and impact on the area.
7. [Department of Homeland Security's Ready Risk Assessment](#): Resources for performing a risk assessment.
  - o [Risk Assessment Table](#)
  - o [Business Impact Analysis Worksheet](#)
8. [World Resources Institute \(WRI\) Aqueduct Tool](#): Enables users to identify exposure to water-related risks, including flood occurrences and drought severity.
9. [Returns on Resilience: The Business Case](#): Identifies real estate projects designed to perform well in the face of climate change-related threats and identify ways in which investments in resiliency strategies can provide financial and other returns.
10. [Natural Disasters Association](#): Educational resource on natural hazards and disaster management.



## APPENDIX: RESOURCES & TEMPLATES



## APPENDIX: GLOSSARY

- **100-Year Flood:** A 100-year flood is a flood event that has a 1% probability of occurring in any given year.
- **Climate Change:** Changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changing risk of certain types of severe weather events, and changes to other variables in the climate system.
- **Climate Risk:** The chance that investments can be affected by the physical impacts of climate change. Risks are evaluated as a product of the likelihood of occurrence (probability) and the damages that would result if they did occur (consequences).
- **Climate Resilience:** The ability to prepare for and adapt to changing conditions; and withstand, respond to, and recover rapidly from disruptions (HUD).
- **Climate Adaptation:** Adjusting natural or human systems in a new or changing environment that reduces negative effects and takes advantage of opportunities (HUD)f
- **Commissioning:** The process of verifying and documenting that a building and all its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements.
- **CO:** Carbon Monoxide, a colorless, odorless, and tasteless gas that greatly affects indoor air quality. Because it is impossible to see, taste, or smell the toxic fumes, CO can kill before there is awareness that it is in the home. At lower levels of exposure, CO causes mild effects that are often mistaken for flu. These symptoms include headaches, dizziness, disorientation, nausea, and fatigue.
- **Drought:** A prolonged period of abnormally low rainfall, leading to a shortage of water.
- **Energy Audit:** A building or campus-level assessment of major energy consuming systems, for the purposes of identifying opportunities for energy conservation.
- **Energy Benchmarking:** Ongoing review of energy performance to determine if a building is improving or declining performance in comparison to its previous performance, other buildings within a portfolio, or similar buildings.
- **ENERGY STAR score** is a measure of how well your property is performing relative to similar properties, when normalized for climate and operational characteristics (1- 100).
- **Erosion:** The process of gradually wearing away soil, rock and land by wind, water, or other natural agents.
- **ETS:** Environmental Tobacco Smoke. Environmental tobacco smoke (ETS) refers to exposure to tobacco smoke – not from directly smoking, but from being exposed to someone else's cigarette, cigar, or pipe smoke. ETS can also be described as the material in indoor air that originates from tobacco smoke. Breathing in ETS is known as passive smoking, second-hand smoke, or involuntary smoking.
- **Extreme Weather Event:** A weather event that has a low probability of occurring at a particular place and time of year, including, for example, heat waves, cold waves, heavy rains, periods of drought and flooding, and severe storms
- **Flash Flood:** A rapid flooding of low-lying areas: washes, rivers, dry lakes, and basins.
- **General Emissions Criteria:** CDPH Standard Method v1.1: California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.1–2010, for the emissions testing and requirements of products and materials.
- **Greenhouse Gas Emissions:** Gases including carbon dioxide, methane, nitrous oxide and fluorinated gases that trap heat in the atmosphere and contribute to climate change.
- **GREENGUARD Gold Certification:** Indoor air quality certification standard for low-emitting products. Formerly known as GREENGUARD Children & Schools Certification.
- **Heat Wave:** A period of excessively hot weather, which may be accompanied by high humidity.
- **IAQ:** Indoor Air Quality.
- **Indoor Air Quality (IAQ) Management Plan:** Plan developed by the Contractor to provide a healthy indoor environment for workers and building occupants during construction. Plan must meet or exceed the recommendations of the



Sheet Metal and Air Conditioning Contractors National Association (SMACNA) "IAQ Guidelines for Occupied Buildings Under Construction."

- LED (Light-Emitting Diode): Energy-efficient lights that produce less initial heat per lumen, consume less energy, and last longer than conventional incandescent and fluorescent lights.
- MERV: Minimum Efficiency Reporting Value. A value determined by the ASHRAE 62.2 Standard which corresponds to the efficiency and target particle size of air filters for mechanical systems. MERV values range from 1 to 16. The higher the MERV value, the smaller the particles that the filter will trap and the more efficient the filter will be at eliminating airborne contaminants.
- Mitigation: The effort to reduce loss of life and property by lessening the impact of disasters.
- Natural Hazard: Naturally occurring physical phenomena caused either by rapid or slow onset events which can be geophysical (earthquakes, landslides, tsunamis, and volcanic activity), hydrological (avalanches and floods), climatological (extreme temperatures, drought, and wildfires), or meteorological (cyclones and storm/wave surges).
- NYCECC: New York City Energy Conservation Code
- Ocean Acidity: A term used to describe significant changes to the chemistry of the ocean. It occurs when carbon dioxide gas (or CO<sub>2</sub>) is absorbed by the ocean and reacts with seawater to produce acid.
- Recycled Content: Recycled content is the sum of post-consumer recycled content plus one-half the pre-consumer recycled content, based on cost.
- Retro-commissioning: The application of the commissioning process to an existing building to ensure that building equipment and systems function as designed, considering both the original design and past major system alterations.
- Storm Surge: An abnormal rise of water generated by a storm, over and above the predicted astronomical tides.
- Source Energy Use Intensity (Source EUI) - The total amount of all the raw fuel required to operate your property, including losses that take place during generation, transmission, and distribution of the energy divided by the building's square footage.
- TVOC: Total Volatile Organic Compound: sum of volatile organic compounds [see VOC], sampled on detected with a flame ionization detector (TVOC-FID) or mass spectrometric detector (TVOC-MS).
- VOC (Volatile Organic Compound): Carbon compounds that participate in atmospheric photochemical reactions (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate). The compounds vaporize (become gas) at normal room temperatures.
- WaterSense: U.S. Environmental Protection Agency's independent product labelling program which certifies high-performing, water-efficient water fixtures.



## APPENDIX A: ASHRAE 62.1 Ventilation System Maintenance Checklist

**TABLE 8.2 Minimum Maintenance Activity and Frequency for Ventilation System Equipment and Associated Components**

| Inspection/Maintenance Task                                                                                                                                                                                                                                                                                                                                                                                                                              | Frequency*   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| a. Investigate system for water intrusion or accumulation. Rectify as necessary.                                                                                                                                                                                                                                                                                                                                                                         | As necessary |
| b. Verify that the space provided for routine maintenance and inspection of open cooling tower water systems, closed cooling tower water systems, and evaporative condensers is unobstructed.                                                                                                                                                                                                                                                            | Monthly      |
| c. Open cooling tower water systems, closed cooling tower water systems, and evaporative condensers shall be treated to limit the growth of microbiological contaminants, including <i>legionella sp.</i>                                                                                                                                                                                                                                                | Monthly      |
| d. Verify that the space provided for routine maintenance and inspection of equipment and components is unobstructed.                                                                                                                                                                                                                                                                                                                                    | Quarterly    |
| e. Check pressure drop and scheduled replacement date of filters and air-cleaning devices. Clean or replace as necessary to ensure proper operation.                                                                                                                                                                                                                                                                                                     | Quarterly    |
| f. Check ultraviolet lamp. Clean or replace as needed to ensure proper operation.                                                                                                                                                                                                                                                                                                                                                                        | Quarterly    |
| g. Visually inspect dehumidification and humidification devices. Clean and maintain to limit fouling and microbial growth. Measure relative humidity and adjust system controls as necessary.                                                                                                                                                                                                                                                            | Quarterly    |
| h. Maintain floor drains and trap primer located in air plenums or rooms that serve as air plenums to prevent transport of contaminants from the floor drain to the plenum.                                                                                                                                                                                                                                                                              | Semiannually |
| i. Check ventilation and indoor air quality related control systems and devices for proper operation. Clean, lubricate, repair, adjust, or replace as needed to ensure proper operation.                                                                                                                                                                                                                                                                 | Semiannually |
| j. Check P-traps in floor drains located in plenums or rooms that serve as air plenums. Prime as needed to ensure proper operation.                                                                                                                                                                                                                                                                                                                      | Semiannually |
| k. Check fan belt tension. Check for belt wear and replace if necessary to ensure proper operation. Check sheaves for evidence of improper alignment or evidence of wear and correct as needed.                                                                                                                                                                                                                                                          | Semiannually |
| l. Check variable-frequency drive for proper operation. Correct as needed.                                                                                                                                                                                                                                                                                                                                                                               | Semiannually |
| m. Check for proper operation of cooling or heating coil for damage or evidence of leaks. Clean, restore, or replace as required.                                                                                                                                                                                                                                                                                                                        | Semiannually |
| n. Visually inspect outdoor air intake louvers, bird screens, mist eliminators, and adjacent areas for cleanliness and integrity; clean as needed; remove all visible debris or visible biological material observed and repair physical damage to louvers, screens, or mist eliminators if such damage impairs the item from providing the required outdoor air entry.                                                                                  | Semiannually |
| o. Visually inspect natural ventilation openings and adjacent areas for cleanliness and integrity; clean as needed. Remove all visible debris or visible biological material observed and repair physical damage to louvers, and screens if such damage impairs the item from providing the required outdoor air entry. Manual and/or automatic opening apparatus shall be physically tested for proper operation and repaired or replaced as necessary. | Semiannually |
| p. Verify the operation of the outdoor air ventilation system and any dynamic minimum outdoor air controls.                                                                                                                                                                                                                                                                                                                                              | Annually     |
| q. Check air filter fit and housing seal integrity. Correct as needed.                                                                                                                                                                                                                                                                                                                                                                                   | Annually     |
| r. Check control box for dirt, debris, and/or loose terminations. Clean and tighten as needed.                                                                                                                                                                                                                                                                                                                                                           | Annually     |
| s. Check motor contactor for pitting or other signs of damage. Repair or replace as needed.                                                                                                                                                                                                                                                                                                                                                              | Annually     |
| t. Check fan blades and fan housing. Clean, repair, or replace as needed to ensure proper operation.                                                                                                                                                                                                                                                                                                                                                     | Annually     |
| u. Check integrity of all panels on equipment. Replace fasteners as needed to ensure proper integrity and fit/finish of equipment.                                                                                                                                                                                                                                                                                                                       | Annually     |
| v. Assess field serviceable bearings. Lubricate if necessary.                                                                                                                                                                                                                                                                                                                                                                                            | Annually     |
| w. Check drain pans, drain lines, and coils for biological growth. Check adjacent areas for evidence of unintended wetting. Repair and clean as needed.                                                                                                                                                                                                                                                                                                  | Annually     |
| x. Check for evidence of buildup or fouling on heat exchange surfaces. Restore as needed to ensure proper operation.                                                                                                                                                                                                                                                                                                                                     | Annually     |

\* Minimum frequencies may be increased or decreased if indicated in the O&M manual.

\*\* National Institute of Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD.



**TABLE 8.2 Minimum Maintenance Activity and Frequency for Ventilation System Equipment and Associated Components (Continued)**

| Inspection/Maintenance Task                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Frequency* |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| y. Inspect unit for evidence of moisture carryover from cooling coils beyond the drain pan. Make corrections or repairs as necessary.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Annually   |
| z. Check for proper damper operation. Clean, lubricate, repair, replace, or adjust as needed to ensure proper operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Annually   |
| aa. Visually inspect areas of moisture accumulation for biological growth. If present, clean or disinfect as needed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Annually   |
| ab. Check condensate pump. Clean or replace as needed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Annually   |
| ac. Visually inspect exposed ductwork and external piping for insulation and vapor barrier for integrity. Correct as needed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Annually   |
| ad. Verify the accuracy of permanently mounted sensors whose primary function is outdoor air delivery monitoring, outdoor air delivery verification, or dynamic minimum outdoor air control, such as flow stations at an air handler and those used for demand-control ventilation. A sensor failing to meet the accuracy specified in the O&M manual shall be recalibrated or replaced. Performance verification shall include output comparison to a measurement reference standard consistent with those specified for similar devices in ASHRAE Standard 41.2 or ASHRAE Standard 111 <sup>15</sup> .                                                                              | 5 years    |
| ae. Verify the total quantity of outdoor air delivered by air handlers set to minimum outdoor air mode. If measured minimum airflow rates are less than the design minimum rate documented in the O&M manual, $\pm$ a 10% balancing tolerance, (1) confirm the measured rate does not conform with the provisions of this standard and (2) adjust or modify the air-handler components to correct the airflow deficiency. Ventilation systems shall be balanced in accordance with ASHRAE Standard 111 <sup>15</sup> or its equivalent, at least to the extent necessary to verify conformance with the total outdoor airflow and space supply airflow requirements of this standard. | 5 years    |
| <b>Exception:</b> Units under 2000 cfm (1000 L/s) of supply air are exempt from this requirement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |

\* Minimum frequencies may be increased or decreased if indicated in the O&M manual.

\*\* National Institute of Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD.



## APPENDIX B: ASHRAE 62.1 Minimum Ventilation Rates in Breathing Zone

**TABLE 6.2.2.1 Minimum Ventilation Rates in Breathing Zone**

(Table 6.2.2.1 shall be used in conjunction with the accompanying notes.)

| Occupancy Category              | People Outdoor<br>Air Rate<br>$R_p$ |                | Area Outdoor<br>Air Rate<br>$R_a$ |                    | Notes | Default Values                                    |                                           |                |              |
|---------------------------------|-------------------------------------|----------------|-----------------------------------|--------------------|-------|---------------------------------------------------|-------------------------------------------|----------------|--------------|
|                                 | cfm/<br>person                      | L/s-<br>person | cfm/ft <sup>2</sup>               | L/s·m <sup>2</sup> |       | Occupant Density<br>(see Note 4)                  | Combined Outdoor<br>Air Rate (see Note 5) |                | Air<br>Class |
|                                 |                                     |                |                                   |                    |       | #/1000 ft <sup>2</sup><br>or #/100 m <sup>2</sup> | cfm/<br>person                            | L/s-<br>person |              |
| Correctional Facilities         |                                     |                |                                   |                    |       |                                                   |                                           |                |              |
| Cell                            | 5                                   | 2.5            | 0.12                              | 0.6                |       | 25                                                | 10                                        | 4.9            | 2            |
| Dayroom                         | 5                                   | 2.5            | 0.06                              | 0.3                |       | 30                                                | 7                                         | 3.5            | 1            |
| Guard stations                  | 5                                   | 2.5            | 0.06                              | 0.3                |       | 15                                                | 9                                         | 4.5            | 1            |
| Booking/waiting                 | 7.5                                 | 3.8            | 0.06                              | 0.3                |       | 50                                                | 9                                         | 4.4            | 2            |
| Educational Facilities          |                                     |                |                                   |                    |       |                                                   |                                           |                |              |
| Daycare (through age 4)         | 10                                  | 5              | 0.18                              | 0.9                |       | 25                                                | 17                                        | 8.6            | 2            |
| Daycare sickroom                | 10                                  | 5              | 0.18                              | 0.9                |       | 25                                                | 17                                        | 8.6            | 3            |
| Classrooms (ages 5–8)           | 10                                  | 5              | 0.12                              | 0.6                |       | 25                                                | 15                                        | 7.4            | 1            |
| Classrooms (age 9 plus)         | 10                                  | 5              | 0.12                              | 0.6                |       | 35                                                | 13                                        | 6.7            | 1            |
| Lecture classroom               | 7.5                                 | 3.8            | 0.06                              | 0.3                | H     | 65                                                | 8                                         | 4.3            | 1            |
| Lecture hall (fixed seats)      | 7.5                                 | 3.8            | 0.06                              | 0.3                | H     | 150                                               | 8                                         | 4.0            | 1            |
| Art classroom                   | 10                                  | 5              | 0.18                              | 0.9                |       | 20                                                | 19                                        | 9.5            | 2            |
| Science laboratories            | 10                                  | 5              | 0.18                              | 0.9                |       | 25                                                | 17                                        | 8.6            | 2            |
| University/college laboratories | 10                                  | 5              | 0.18                              | 0.9                |       | 25                                                | 17                                        | 8.6            | 2            |
| Wood/metal shop                 | 10                                  | 5              | 0.18                              | 0.9                |       | 20                                                | 19                                        | 9.5            | 2            |
| Computer lab                    | 10                                  | 5              | 0.12                              | 0.6                |       | 25                                                | 15                                        | 7.4            | 1            |
| Media center                    | 10                                  | 5              | 0.12                              | 0.6                | A     | 25                                                | 15                                        | 7.4            | 1            |
| Music/theater/dance             | 10                                  | 5              | 0.06                              | 0.3                | H     | 35                                                | 12                                        | 5.9            | 1            |
| Multiuse assembly               | 7.5                                 | 3.8            | 0.06                              | 0.3                | H     | 100                                               | 8                                         | 4.1            | 1            |
| Food and Beverage Service       |                                     |                |                                   |                    |       |                                                   |                                           |                |              |
| Restaurant dining rooms         | 7.5                                 | 3.8            | 0.18                              | 0.9                |       | 70                                                | 10                                        | 5.1            | 2            |
| Cafeteria/fast-food dining      | 7.5                                 | 3.8            | 0.18                              | 0.9                |       | 100                                               | 9                                         | 4.7            | 2            |
| Bars, cocktail lounges          | 7.5                                 | 3.8            | 0.18                              | 0.9                |       | 100                                               | 9                                         | 4.7            | 2            |
| Kitchen (cooking)               | 7.5                                 | 3.8            | 0.12                              | 0.6                |       | 20                                                | 14                                        | 7.0            | 2            |



|                                                                                 |     |     |      |     |   |     |    |      |   |
|---------------------------------------------------------------------------------|-----|-----|------|-----|---|-----|----|------|---|
| <b>General</b>                                                                  |     |     |      |     |   |     |    |      |   |
| Break rooms                                                                     | 5   | 2.5 | 0.06 | 0.3 | H | 25  | 7  | 3.5  | 1 |
| Coffee stations                                                                 | 5   | 2.5 | 0.06 | 0.3 | H | 20  | 8  | 4    | 1 |
| Conference/meeting                                                              | 5   | 2.5 | 0.06 | 0.3 | H | 50  | 6  | 3.1  | 1 |
| Corridors                                                                       | —   | —   | 0.06 | 0.3 | H | —   |    |      | 1 |
| Occupiable storage rooms for liquids or gels                                    | 5   | 2.5 | 0.12 | 0.6 | B | 2   | 65 | 32.5 | 2 |
| <b>Hotels, Motels, Resorts, Dormitories</b>                                     |     |     |      |     |   |     |    |      |   |
| Bedroom/living room                                                             | 5   | 2.5 | 0.06 | 0.3 | H | 10  | 11 | 5.5  | 1 |
| Barracks sleeping areas                                                         | 5   | 2.5 | 0.06 | 0.3 | H | 20  | 8  | 4.0  | 1 |
| Laundry rooms, central                                                          | 5   | 2.5 | 0.12 | 0.6 |   | 10  | 17 | 8.5  | 2 |
| Laundry rooms within dwelling units                                             | 5   | 2.5 | 0.12 | 0.6 |   | 10  | 17 | 8.5  | 1 |
| Lobbies/prefunction                                                             | 7.5 | 3.8 | 0.06 | 0.3 | H | 30  | 10 | 4.8  | 1 |
| Multipurpose assembly                                                           | 5   | 2.5 | 0.06 | 0.3 | H | 120 | 6  | 2.8  | 1 |
| <b>Office Buildings</b>                                                         |     |     |      |     |   |     |    |      |   |
| Breakrooms                                                                      | 5   | 2.5 | 0.12 | 0.6 |   | 50  | 7  | 3.5  | 1 |
| Main entry lobbies                                                              | 5   | 2.5 | 0.06 | 0.3 | H | 10  | 11 | 5.5  | 1 |
| Occupiable storage rooms for dry materials                                      | 5   | 2.5 | 0.06 | 0.3 |   | 2   | 35 | 17.5 | 1 |
| Office space                                                                    | 5   | 2.5 | 0.06 | 0.3 | H | 5   | 17 | 8.5  | 1 |
| Reception areas                                                                 | 5   | 2.5 | 0.06 | 0.3 | H | 30  | 7  | 3.5  | 1 |
| Telephone/data entry                                                            | 5   | 2.5 | 0.06 | 0.3 | H | 60  | 6  | 3.0  | 1 |
| <b>Miscellaneous Spaces</b>                                                     |     |     |      |     |   |     |    |      |   |
| Bank vaults/safe deposit                                                        | 5   | 2.5 | 0.06 | 0.3 | H | 5   | 17 | 8.5  | 2 |
| Banks or bank lobbies                                                           | 7.5 | 3.8 | 0.06 | 0.3 | H | 15  | 12 | 6.0  | 1 |
| Computer (not printing)                                                         | 5   | 2.5 | 0.06 | 0.3 | H | 4   | 20 | 10.0 | 1 |
| Freezer and refrigerated spaces (<50°F)                                         | 10  | 5   | 0    | 0   | E | 0   | 0  | 0    | 2 |
| General manufacturing (excludes heavy industrial and processes using chemicals) | 10  | 5.0 | 0.18 | 0.9 |   | 7   | 36 | 18   | 3 |
| Pharmacy (prep. area)                                                           | 5   | 2.5 | 0.18 | 0.9 |   | 10  | 23 | 11.5 | 2 |
| Photo studios                                                                   | 5   | 2.5 | 0.12 | 0.6 |   | 10  | 17 | 8.5  | 1 |
| Shipping/receiving                                                              | 10  | 5   | 0.12 | 0.6 | B | 2   | 70 | 35   | 2 |
| Sorting, packing, light assembly                                                | 7.5 | 3.8 | 0.12 | 0.6 |   | 7   | 25 | 12.5 | 2 |
| Telephone closets                                                               | —   | —   | 0.00 | 0.0 |   | —   |    |      | 1 |
| Transportation waiting                                                          | 7.5 | 3.8 | 0.06 | 0.3 | H | 100 | 8  | 4.1  | 1 |
| Warehouses                                                                      | 10  | 5   | 0.06 | 0.3 | B | —   |    |      | 2 |



|                                 |     |     |      |     |        |     |    |      |   |
|---------------------------------|-----|-----|------|-----|--------|-----|----|------|---|
| <b>Public Assembly Spaces</b>   |     |     |      |     |        |     |    |      |   |
| Auditorium seating area         | 5   | 2.5 | 0.06 | 0.3 | H      | 150 | 5  | 2.7  | 1 |
| Places of religious worship     | 5   | 2.5 | 0.06 | 0.3 | H      | 120 | 6  | 2.8  | 1 |
| Courtrooms                      | 5   | 2.5 | 0.06 | 0.3 | H      | 70  | 6  | 2.9  | 1 |
| Legislative chambers            | 5   | 2.5 | 0.06 | 0.3 | H      | 50  | 6  | 3.1  | 1 |
| Libraries                       | 5   | 2.5 | 0.12 | 0.6 |        | 10  | 17 | 8.5  | 1 |
| Lobbies                         | 5   | 2.5 | 0.06 | 0.3 | H      | 150 | 5  | 2.7  | 1 |
| Museums (children's)            | 7.5 | 3.8 | 0.12 | 0.6 |        | 40  | 11 | 5.3  | 1 |
| Museums/galleries               | 7.5 | 3.8 | 0.06 | 0.3 | H      | 40  | 9  | 4.6  | 1 |
| <b>Residential</b>              |     |     |      |     |        |     |    |      |   |
| Dwelling unit                   | 5   | 2.5 | 0.06 | 0.3 | F,G, H | F   |    |      | 1 |
| Common corridors                | —   | —   | 0.06 | 0.3 | H      |     |    |      | 1 |
| <b>Retail</b>                   |     |     |      |     |        |     |    |      |   |
| Sales (except as below)         | 7.5 | 3.8 | 0.12 | 0.6 |        | 15  | 16 | 7.8  | 2 |
| Mall common areas               | 7.5 | 3.8 | 0.06 | 0.3 | H      | 40  | 9  | 4.6  | 1 |
| Barbershop                      | 7.5 | 3.8 | 0.06 | 0.3 | H      | 25  | 10 | 5.0  | 2 |
| Beauty and nail salons          | 20  | 10  | 0.12 | 0.6 |        | 25  | 25 | 12.4 | 2 |
| Pet shops (animal areas)        | 7.5 | 3.8 | 0.18 | 0.9 |        | 10  | 26 | 12.8 | 2 |
| Supermarket                     | 7.5 | 3.8 | 0.06 | 0.3 | H      | 8   | 15 | 7.6  | 1 |
| Coin-operated laundries         | 7.5 | 3.8 | 0.12 | 0.6 |        | 20  | 14 | 7.0  | 2 |
| <b>Sports and Entertainment</b> |     |     |      |     |        |     |    |      |   |
| Gym, sports arena (play area)   | 20  | 10  | 0.18 | 0.9 | E      | 7   | 45 | 23   | 2 |
| Spectator areas                 | 7.5 | 3.8 | 0.06 | 0.3 | H      | 150 | 8  | 4.0  | 1 |
| Swimming (pool & deck)          | —   | —   | 0.48 | 2.4 | C      | —   |    |      | 2 |
| Disco/dance floors              | 20  | 10  | 0.06 | 0.3 | H      | 100 | 21 | 10.3 | 2 |
| Health club/aerobics room       | 20  | 10  | 0.06 | 0.3 |        | 40  | 22 | 10.8 | 2 |
| Health club/weight rooms        | 20  | 10  | 0.06 | 0.3 |        | 10  | 26 | 13.0 | 2 |
| Bowling alley (seating)         | 10  | 5   | 0.12 | 0.6 |        | 40  | 13 | 6.5  | 1 |
| Gambling casinos                | 7.5 | 3.8 | 0.18 | 0.9 |        | 120 | 9  | 4.6  | 1 |
| Game arcades                    | 7.5 | 3.8 | 0.18 | 0.9 |        | 20  | 17 | 8.3  | 1 |
| Stages, studios                 | 10  | 5   | 0.06 | 0.3 | D, H   | 70  | 11 | 5.4  | 1 |

**GENERAL NOTES FOR TABLE 6.2.2.1**

- 1 Related requirements: The rates in this table are based on all other applicable requirements of this standard being met.
- 2 Environmental Tobacco Smoke: This table applies to ETS-free areas. Refer to Section 5.17 for requirements for buildings containing ETS areas and ETS-free areas.
- 3 Air density: Volumetric airflow rates are based on dry air density of 0.075 lb<sub>air</sub>/ft<sup>3</sup> (1.2 kg<sub>air</sub>/m<sup>3</sup>) at a barometric pressure of 1 atm (101.3 kPa) and an air temperature of 70°F (21°C). Rates shall be permitted to be adjusted for actual density.
- 4 Default occupant density: The default occupant density shall be used where the actual occupant density is not known.
- 5 Default combined outdoor air rate (per person): Rate is based on the default occupant density.
- 6 Unlisted occupancies: Where the occupancy category for a proposed space or zone is not listed, the requirements for the listed occupancy category that is most similar in terms of occupant density, activities, and building construction shall be used.

**ITEM-SPECIFIC NOTES FOR TABLE 6.2.2.1**

- A For high-school and college libraries, the values shown for "Public Assembly Spaces—Libraries" shall be used.
- B Rate may not be sufficient where stored materials include those having potentially harmful emissions.
- C Rate does not allow for humidity control. "Deck area" refers to the area surrounding the pool that is capable of being wetted during pool use or when the pool is occupied. Deck area that is not expected to be wetted shall be designated as an occupancy category.
- D Rate does not include special exhaust for stage effects such as dry ice vapors and smoke.
- E Where combustion equipment is intended to be used on the playing surface or in the space, additional dilution ventilation, source control, or both shall be provided.
- F Default occupancy for dwelling units shall be two persons for studio and one-bedroom units, with one additional person for each additional bedroom.
- G Air from one residential dwelling shall not be recirculated or transferred to any other space outside of that dwelling.
- H Ventilation air for this occupancy category shall be permitted to be reduced to zero when the space is in occupied-standby mode.



## APPENDIX C: New York City Minimum Ventilation Rate Requirements

**TABLE 403.3  
MINIMUM VENTILATION RATES**

| OCCUPANCY CLASSIFICATION                         | PEOPLE OUTDOOR<br>AIRFLOW RATE IN<br>BREATHING ZONE<br>CFM/PERSON | AREA OUTDOOR<br>AIRFLOW RATE IN<br>BREATHING ZONE $R_p$<br>CFM/FT <sup>2a</sup> | DEFAULT OCCUPANT<br>DENSITY #/1000 FT <sup>2a</sup> | EXHAUST AIRFLOW<br>RATE CFM/FT <sup>2a</sup> |
|--------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------|
| <b>Correctional facilities</b>                   |                                                                   |                                                                                 |                                                     |                                              |
| Cells                                            | 5                                                                 | 0.12                                                                            | 25                                                  | —                                            |
| without plumbing fixtures                        |                                                                   |                                                                                 |                                                     |                                              |
| with plumbing fixtures <sup>g</sup>              | 5                                                                 | 0.12                                                                            | 25                                                  | 1.0                                          |
| Dining halls                                     | —                                                                 | —                                                                               | —                                                   | —                                            |
| (see food and beverage service)                  |                                                                   |                                                                                 |                                                     |                                              |
| Guard stations                                   | 5                                                                 | 0.06                                                                            | 15                                                  | —                                            |
| Day room                                         | 5                                                                 | 0.06                                                                            | 30                                                  | —                                            |
| Booking/waiting                                  | 7.5                                                               | 0.06                                                                            | 50                                                  | —                                            |
| <b>Dry cleaners, laundries</b>                   |                                                                   |                                                                                 |                                                     |                                              |
| Coin-operated dry cleaner                        | 15                                                                | —                                                                               | 20                                                  | —                                            |
| Coin-operated laundries                          | 7.5                                                               | 0.06                                                                            | 20                                                  | —                                            |
| Commercial dry cleaner <sup>l</sup>              | 30                                                                | —                                                                               | 30                                                  | —                                            |
| Commercial laundry                               | 25                                                                | —                                                                               | 10                                                  | —                                            |
| Storage, pick up                                 | 7.5                                                               | 0.12                                                                            | 30                                                  | —                                            |
| <b>Education</b>                                 |                                                                   |                                                                                 |                                                     |                                              |
| Auditoriums                                      | 5                                                                 | 0.06                                                                            | 150                                                 | —                                            |
| Corridors (see public spaces)                    | —                                                                 | —                                                                               | —                                                   | —                                            |
| Media center                                     | 10                                                                | 0.12                                                                            | 25                                                  | —                                            |
| Sports locker rooms <sup>g</sup>                 | —                                                                 | —                                                                               | —                                                   | 0.5                                          |
| Music/theater/dance                              | 10                                                                | 0.06                                                                            | 35                                                  | —                                            |
| Smoking lounges <sup>b</sup>                     | 60                                                                | —                                                                               | 70                                                  | —                                            |
| Day care (through age 4)                         | 10                                                                | 0.18                                                                            | 25                                                  | —                                            |
| Classrooms (ages 5-8)                            | 10                                                                | 0.12                                                                            | 25                                                  | —                                            |
| Classrooms (age 9 plus)                          | 10                                                                | 0.12                                                                            | 35                                                  | —                                            |
| Lecture classroom                                | 7.5                                                               | 0.06                                                                            | 65                                                  | —                                            |
| Lecture hall (fixed seats)                       | 7.5                                                               | 0.06                                                                            | 150                                                 | —                                            |
| Art classroom                                    | 10                                                                | 0.18                                                                            | 20                                                  | 0.7                                          |
| Science laboratories <sup>g, k</sup>             | 10                                                                | 0.18                                                                            | 25                                                  | 1.0                                          |
| Wood/metal shops <sup>g</sup>                    | 10                                                                | 0.18                                                                            | 20                                                  | 0.5                                          |
| Computer lab                                     | 10                                                                | 0.12                                                                            | 25                                                  | —                                            |
| Multiuse assembly                                | 7.5                                                               | 0.06                                                                            | 100                                                 | —                                            |
| Locker/dressing rooms <sup>g</sup>               | —                                                                 | —                                                                               | —                                                   | 0.25                                         |
| <b>Food and beverage service</b>                 |                                                                   |                                                                                 |                                                     |                                              |
| Bars, cocktail lounges                           | 7.5                                                               | 0.18                                                                            | 100                                                 | —                                            |
| Cafeteria, fast food                             | 7.5                                                               | 0.18                                                                            | 100                                                 | —                                            |
| Dining rooms                                     | 7.5                                                               | 0.18                                                                            | 70                                                  | —                                            |
| Kitchens (cooking) <sup>b</sup>                  | —                                                                 | —                                                                               | —                                                   | 0.7                                          |
| <b>Hospitals, nursing and convalescent homes</b> |                                                                   |                                                                                 |                                                     |                                              |
| Autopsy rooms <sup>b</sup>                       | —                                                                 | —                                                                               | —                                                   | 0.5                                          |
| Medical procedure rooms                          | 15                                                                | —                                                                               | 20                                                  | —                                            |
| Operating rooms                                  | 30                                                                | —                                                                               | 20                                                  | —                                            |
| Patient rooms                                    | 25                                                                | —                                                                               | 10                                                  | —                                            |
| Physical therapy                                 | 15                                                                | —                                                                               | 20                                                  | —                                            |
| Recovery and ICU                                 | 15                                                                | —                                                                               | 20                                                  | —                                            |
| <b>Hotels, motels, resorts and dormitories</b>   |                                                                   |                                                                                 |                                                     |                                              |
| Multipurpose assembly                            | 5                                                                 | 0.06                                                                            | 120                                                 | —                                            |
| Bathrooms/toilet—private <sup>g</sup>            | —                                                                 | —                                                                               | —                                                   | 25/50 <sup>f</sup>                           |
| Bedroom/living room                              | 5                                                                 | 0.06                                                                            | 10                                                  | —                                            |
| Conference/meeting                               | 5                                                                 | 0.06                                                                            | 50                                                  | —                                            |
| Dormitory sleeping areas                         | 5                                                                 | 0.06                                                                            | 20                                                  | —                                            |
| Gambling casinos                                 | 7.5                                                               | 0.18                                                                            | 120                                                 | —                                            |



|                                                        |                                          |      |                                                                             |                     |
|--------------------------------------------------------|------------------------------------------|------|-----------------------------------------------------------------------------|---------------------|
| Lobbies/prefunction                                    | 7.5                                      | 0.06 | 30                                                                          | —                   |
| <b>Laboratories<sup>j</sup></b>                        |                                          |      |                                                                             |                     |
| Biological                                             | —                                        | 1.0  | —                                                                           | 1.0                 |
| Chemical                                               | —                                        | 1.0  | —                                                                           | 1.0                 |
| Industrial and nonteaching                             | —                                        | 1.0  | —                                                                           | 1.0                 |
| Nonproduction chemical labs                            | —                                        | 1.0  | —                                                                           | 1.0                 |
| <b>Offices</b>                                         |                                          |      |                                                                             |                     |
| Conference rooms                                       | 5                                        | 0.06 | 50                                                                          | —                   |
| Office spaces                                          | 5                                        | 0.06 | 5                                                                           | —                   |
| Reception areas                                        | 5                                        | 0.06 | 30                                                                          | —                   |
| Telephone/data entry                                   | 5                                        | 0.06 | 60                                                                          | —                   |
| Main entry lobbies                                     | 5                                        | 0.06 | 10                                                                          | —                   |
| <b>Private dwellings, single and multiple</b>          |                                          |      |                                                                             |                     |
| Garages, common for multiple units <sup>b</sup>        | —                                        | —    | —                                                                           | 0.75                |
| Garages, separate for each dwelling <sup>b</sup>       | —                                        | —    | —                                                                           | 100 cfm per car     |
| Kitchens <sup>a</sup>                                  | —                                        | —    | —                                                                           | 25/100 <sup>f</sup> |
| Living areas <sup>c,i</sup>                            | 0.35 ACH but not less than 15 cfm/person | —    | Based upon number of bedrooms. First bedroom, 2; each additional bedroom, 1 | —                   |
| Toilet rooms and bathrooms <sup>e</sup>                | —                                        | —    | —                                                                           | 20/50 <sup>f</sup>  |
| <b>Public spaces</b>                                   |                                          |      |                                                                             |                     |
| Corridors                                              | —                                        | 0.06 | —                                                                           | —                   |
| Elevator car                                           | —                                        | —    | —                                                                           | 1.0                 |
| Shower room (per shower head) <sup>g</sup>             | —                                        | —    | —                                                                           | 50/20 <sup>f</sup>  |
| Smoking lounges <sup>b</sup>                           | 60                                       | —    | 70                                                                          | —                   |
| Toilet rooms – public <sup>e</sup>                     | —                                        | —    | —                                                                           | 50/70 <sup>g</sup>  |
| Places of religious worship                            | 5                                        | 0.06 | 120                                                                         | —                   |
| Courtrooms                                             | 5                                        | 0.06 | 70                                                                          | —                   |
| Legislative chambers                                   | 5                                        | 0.06 | 50                                                                          | —                   |
| Libraries                                              | 5                                        | 0.12 | 10                                                                          | —                   |
| Museums (children's)                                   | 7.5                                      | 0.12 | 40                                                                          | —                   |
| Museums/galleries                                      | 7.5                                      | 0.06 | 40                                                                          | —                   |
| <b>Retail stores, sales floors and showroom floors</b> |                                          |      |                                                                             |                     |
| Sales (except as below)                                | 7.5                                      | 0.12 | 15                                                                          | —                   |
| Dressing rooms                                         | —                                        | —    | —                                                                           | 0.25                |
| Mall common areas                                      | 7.5                                      | 0.06 | 40                                                                          | —                   |
| Shipping and receiving                                 | —                                        | 0.12 | —                                                                           | —                   |
| Smoking lounges <sup>b</sup>                           | 60                                       | —    | 70                                                                          | —                   |
| Storage rooms                                          | —                                        | 0.12 | —                                                                           | —                   |
| Warehouses (see storage)                               | —                                        | —    | —                                                                           | —                   |
| <b>Specialty shops</b>                                 |                                          |      |                                                                             |                     |
| Automotive motor-fuel dispensing stations <sup>b</sup> | —                                        | —    | —                                                                           | 1.5                 |
| Barber                                                 | 7.5                                      | 0.06 | 25                                                                          | 0.5                 |
| Beauty and nail salons <sup>b, h</sup>                 | 20                                       | 0.12 | 25                                                                          | 0.6                 |
| Embalming room <sup>b</sup>                            | —                                        | —    | —                                                                           | 2.0                 |
| Pet shops (animal areas) <sup>b</sup>                  | 7.5                                      | 0.18 | 10                                                                          | 0.9                 |
| Supermarkets                                           | 7.5                                      | 0.06 | 8                                                                           | —                   |
| <b>Sports and amusement</b>                            |                                          |      |                                                                             |                     |
| Disco/dance floors                                     | 20                                       | 0.06 | 100                                                                         | —                   |
| Bowling alleys (seating areas)                         | 10                                       | 0.12 | 40                                                                          | —                   |
| Game arcades                                           | 7.5                                      | 0.18 | 20                                                                          | —                   |



|                                                          |     |      |     |      |
|----------------------------------------------------------|-----|------|-----|------|
| <b>Storage</b>                                           |     |      |     |      |
| Repair garages, enclosed parking garages <sup>b, d</sup> | —   | —    | —   | 0.75 |
| Warehouses                                               | —   | 0.06 | —   | —    |
| <b>Theaters</b>                                          |     |      |     |      |
| Auditoriums (see education)                              | —   | —    | —   | —    |
| Lobbies                                                  | 5   | 0.06 | 150 | —    |
| Stages, studios                                          | 10  | 0.06 | 70  | —    |
| Ticket booths                                            | 5   | 0.06 | 60  | —    |
| <b>Transportation</b>                                    |     |      |     |      |
| Platforms                                                | 7.5 | 0.06 | 100 | —    |
| Transportation waiting                                   | 7.5 | 0.06 | 100 | —    |
| <b>Workrooms</b>                                         |     |      |     |      |
| Bank vaults/safe deposit                                 | 5   | 0.06 | 5   | —    |
| Darkrooms                                                | —   | —    | —   | 1.0  |
| Copy, printing rooms                                     | 5   | 0.06 | 4   | 0.5  |
| Meat processing <sup>c</sup>                             | 15  | —    | 10  | —    |
| Pharmacy (prep. area)                                    | 5   | 0.18 | 10  | —    |
| Photo studios                                            | 5   | 0.12 | 10  | —    |
| Computer (without printing)                              | 5   | 0.06 | 4   | —    |

For SI: 1 cubic foot per minute = 0.0004719 m<sup>3</sup>/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508m<sup>3</sup>/(s m<sup>2</sup>), °C = ((°F) -32) /1.8, 1 square foot = 0.0929 m<sup>2</sup>.

a. Based upon net occupiable floor area.

b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited (see Section 403.2.1, Item 4).

c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.

d. Ventilation systems in enclosed parking garages shall comply with Section 404.

e. Rates are per water closet or urinal. The higher rate shall be provided where periods of heavy use are expected to occur, such as toilets in theaters, schools and sports facilities. The lower rate shall be permitted where periods of heavy use are not expected.

f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted where the exhaust system is designed to operate continuously during normal hours of use.

g. Mechanical exhaust is required and recirculation is prohibited.

h. For nail salons, the required exhaust shall include ventilation tables or other systems that capture the contaminants and odors at their source and are capable of exhausting a minimum of 50 cfm/ft<sup>2</sup> per station.

i. For R-2 buildings less than 125 feet in height, outdoor ventilation air provided by mechanical means serving dwelling units designed to exceed 100 cfm per dwelling unit, whether intermittent or continuous, shall be required. For buildings 125 feet and greater, outdoor ventilation air shall be provided by mechanical means when the sum of the exhaust designed to exceed 75 cfm, whether continuous or intermittent, per dwelling unit. Manually operated openable exterior wall openings shall not be used to provide outside ventilation air except where calculations are submitted showing that such openings are located at or below the lowest calculated neutral pressure plane (calculated at the winter outdoor design temperature, and taking into account a composite mass flow air balance of the building including all mechanical systems).

j. During unoccupied hours the ventilation rate and exhaust rates may be reduced to 0.5 cfm/ft<sup>2</sup>.

k. When an educational science laboratory is occupied and hoods are not in use and hazardous materials are not present, then ventilation rates shall be consistent with actual use of the space, but not less than 0.5 cfm/ft<sup>2</sup>.

l. See Section 502.6 for additional requirements.



## APPENDIX D: Sample IPM Tracking Tool

| DATE | RESPONSIBLE PARTY | LOCATION IN BUILDING | ACTIVITY PERFORMED (monitoring / observation, sanitation, application, etc.) | OBSERVED PEST TYPE | OBSERVED PEST DENSITY | PREVENTION MEASURES TAKEN PREVIOUSLY | PRODUCT APPLIED (name and active ingredients) | TOXICITY TIER (Tier 1, 2, or 3) | DATE & TIME OF PRODUCT APPLICATION | DATE & TIME OF OCCUPANT NOTIFICATION (required for Tier 1 or 2 products) | METHOD OF OCCUPANT NOTIFICATION (required for Tier 1 or 2 products) | EMERGENCY APPLICATION? (If yes, describe how the pest emergency threatened occupants or the building) |
|------|-------------------|----------------------|------------------------------------------------------------------------------|--------------------|-----------------------|--------------------------------------|-----------------------------------------------|---------------------------------|------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |
|      |                   |                      |                                                                              |                    |                       |                                      |                                               |                                 |                                    |                                                                          |                                                                     |                                                                                                       |



## APPENDIX E: Sample Green Cleaning Tracking Tool

| DATE | PURCHASING PARTY | Vendor | Invoice # | Product Type | Product Name/Manufacturer | Quantity | Cost Per Item (\$) | Total Cost (\$) | Sustainability Criteria? (YES/NO) | Sustainability Attribute | Material Cost with Sustainable Attribute |
|------|------------------|--------|-----------|--------------|---------------------------|----------|--------------------|-----------------|-----------------------------------|--------------------------|------------------------------------------|
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |
|      |                  |        |           |              |                           |          |                    |                 |                                   |                          |                                          |

|                                                       |    |
|-------------------------------------------------------|----|
| A. Total Materials and Products                       | \$ |
| B. Total Sustainable Materials and Products           | \$ |
| Percentage Sustainable Materials and Products = (B/A) | %  |



## APPENDIX F: ESRT HIGH PERFORMANCE DESIGN AND CONSTRUCTION GUIDELINES



### EXHIBIT A

#### ESRT HIGH PERFORMANCE DESIGN AND CONSTRUCTION GUIDELINES

##### **Energy Efficiency:**

Exceed ASHRAE 90.1-2016 and IECC 2018 standards, meeting or exceeding NYStretch Energy Code 2020.

##### Lighting:

Target LPD of 0.5W/SF or less. This can be achieved in most cases through efficient lighting design, use of low wattage fixtures and lamps and reflective surfaces as well as LED task lights.

Implement continuous dimming throughout.

Implement lighting controls, including daylight dimming controls for all daylit areas and vacancy/occupancy sensors for all of connected lighting load. Daylight-responsive controls shall be provided to control lighting within 15 feet of windows and under skylights.

Vacancy sensor controls shall be installed to control lights in enclosed offices, training rooms, conference/meeting/multipurpose rooms, copy/print rooms, lounges, employee lunch and break rooms, storage rooms, closets, other spaces enclosed by floor-to-ceiling height partitions.

Occupancy sensor (dual technology) controls shall be installed to control lights in open plan office areas and restrooms.

All lights in the space are to be tied into occupancy sensor-based controls to ensure all lights are turned off following 15 minutes of all occupants leaving the space.

Tie in lighting controls to base building BMS for energy data reporting and monitoring.

##### HVAC:

All HVAC systems exceed ASHRAE 90.1-2016 or IECC 2018, meet or exceed NYStretch Energy Code 2020.

Air or waterside economizer to be included in all applicable work.

Motorized outside air dampers must be designed, installed, tied into BMS and commissioned.

Tie in radiators or perimeter heating/cooling system to VAV box controls and BMS. Program to eliminate simultaneous heating and cooling.

Where a zone has a separate heating and a separate cooling thermostatic control, a limit switch, mechanical stop, or direct digital control system with software programming shall be provided to prevent the heating set point from exceeding the cooling set point and to maintain a deadband.



Multiple-zone VAV systems shall have automatic controls configured to reduce outdoor air intake flow below design rates in response to changes in system ventilation efficiency (Ev).

Implement Demand Controlled Ventilation for the space through the use of CO2 sensors in densely occupied areas, throughout the space (CO2 monitors must be between 3 and 6 feet above the floor in open office areas) and in the return air stream to the Air Handling Unit serving the space and tie in to controls including an air-side economizer and automatic modulating control of the outdoor air damper.

Right size equipment based on efficient lighting and plug loads (As stated in the plug load section below target lighting and plug load of 2.0-2.5 Watts per square foot or less of demand load).

Static pressure sensors used to control VAV fans shall be located such that the controller set points is not greater than 1.2 inches w.c. (200 Pa). Not less than one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

Specify CFC and HCFC-free refrigerants. Montreal Protocol called for a complete phase-out of CFC-based refrigerants by 1995 and HCFCs by 2030. Do not use CFC-based refrigerants in new HVAC&R systems.

Install local instantaneous hot water heaters. Hot water storage tanks must be separately called out along with an explanation for their requirement versus instantaneous hot water heaters. High efficiency service water heating to be in accordance with IECC 2018 Section C406.7.

Submeter and pay for utilities based on usage. Submeter HVAC, plug loads, and lighting loads separately. Assign circuits for lighting, HVAC, and plug loads (for example, circuits 1-4 lighting, 5-8 HVAC, and 9-12 plug load. Submetering approach shall be detailed on tenant's final Load Letter. Ensure compatibility of submeters for 15 minute interval data reporting and monitoring through base building BMS.

#### Plug Loads:

ESRT's standard Load Letter format shall be utilized and completed for ESRT review prior to CD phase.

Reduce plug loads by specifying equipment and appliances including, without limitation: computers, monitors, printers, refrigerators, dishwashers, water coolers, food service and pantry equipment, copiers, and A/V and IT equipment that meet or exceed Energy Star and California Energy Commission's 2019 appliance standards.

Implement automatically controlled plug load management strategies including occupancy sensors, outlet-based controls, circuited controls, and/or software programs for 50% of all 125 volt 15- and 20-amp receptacles in the space, other than critical server loads, which may be controlled through software-based technology. Controlled receptacles must be visually marked to differentiate from uncontrolled receptacles and uniformly distributed throughout the space.

Enable sleep/hibernate mode on all equipment. Computers are enabled for overnight software updates in this mode.

Target lighting and plug load of 2.0-2.5 Watts per square foot or less average demand during operating hours.

#### Commissioning:

A third party commissioning agent shall perform commissioning of energy systems within the tenant space or installed as part of the tenant's lease agreement including, without limitation, lighting, lighting controls,



HVAC systems, BMS (including, but not limited to, VFD's, CO2 sensor calibration and DCV BMS and OA tie-in, motorized OA damper tied into DCV and BMS, static pressure or discharge air temperature reset, supply and return air setback schedules, air and water side economizers), Testing and Balancing of air and hydronic systems, functional testing of applicable equipment, and electrical to ensure design optimizes performance and systems are constructed and function per efficient design.

Commissioning Report shall be submitted to ESRT for review prior to occupancy of the space and shall include, but not be limited to, all systems listed above.

#### **Water Efficiency**

Specify WaterSense fixtures for any fixture type that is eligible

- Water closet rate 1.0 GPF
- Urinal flow rate is 0.125 GPF
- Pantry sink flow rate is 1.0 GPM and include specification for an aerator
- Lavatory faucet flow rate is 0.25 GPM.
- Shower flow rate is 1.5 GPM.

#### **Materials and Resources**

Provide dedicated clearly labeled areas for the collection and storage of recyclable materials.

Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals. Take appropriate measures for the safe collection, storage, and disposal of batteries, mercury-containing lamps, and electronic waste. All eligible materials must be properly disposed of in receptacles labeled per NYC Department of Sanitation regulations. Post educational signs in common areas routinely visited to educate employees on requirements.

Divert construction waste from landfills through aggressive recycling and donation programs. Develop and implement a construction demolition waste management plan. Include target recycling and diversion percentages (75%) in waste hauler contracts. Monthly records by weight to be provided to ESRT.

Specify recycled content materials whenever possible, which may include, without limitation, gypsum board, acoustical tiles, carpet and carpet backing.

Specify regionally produced and extracted materials (within a 500 mile radius) whenever possible.

Specify rapidly renewable resources whenever possible, such as bamboo, wool, linoleum and cork. Products must meet the Sustainable Agriculture Standard.

Specify and use wood products certified by the Forest Stewardship Council (FSC).

Specify products that have Environmental Product Declarations (EPD) and Health Product Declarations (HPD).

#### **Indoor Environmental Quality**

Monitor delivery of outside air to ensure indoor air quality and outdoor airflow compliance with ASHRAE 62.1-2016 and ASHRAE 55 requirements.

Smoking and vaping shall not be permitted indoors.



Implement Construction Indoor Air Quality Management Plans during performance of work and prior to occupancy to minimize the presence and spread of air pollutants.

Consider conducting indoor air quality testing after construction is complete and prior to occupancy to demonstrate that contaminant maximum concentrations are not exceeded.

Install MERV 13 or better filters.

Specify and install low-emitting (low or no Volatile Organic Compounds) adhesives, sealants, paints, coatings, flooring systems, ceiling systems, composite wood and agrifiber products, systems furniture and seating. Specify and install composite wood and agrifiber products and associated adhesives to contain no added urea-formaldehyde (NAUF).

Do not specify materials listed on the International Living Future Institute Red List.

Design and build to optimize daylight and views for occupants, which may be achieved through a design that includes interior rather than perimeter offices or perimeter offices with glass fronts if perimeter offices are a design requirement.

Lighting calculations to demonstrate alignment with circadian rhythm and electric lights maintain illuminance equivalent melanopic lux of 150-200 at workstations (measured on the vertical plane facing forward four feet above the finished floor to simulate the view of the occupant).

Consider furniture partitions to be 42" or lower in height in order to allow for access to daylight and views. Additional privacy may be achieved through clear partition glass installed above the furniture panels.

Consider installing an air purification system and IEQ monitoring to reduce particles, spores, odors and microorganism levels such as bacteria, mold and viruses. The monitoring system should be designed to measure and track the following parameters: CO<sub>2</sub>, PM<sub>2.5</sub>, TVOC, illumination, noise, temperature, and relative humidity. The monitoring system should ensure no or negligible ozone production.

Design and build to offer occupants control of lighting (task lights at workstations).

Design and build to offer occupants control of temperature balanced with efficiency.

#### General

Tenant shall comply with Energy Star for Tenant Spaces requirements for design, construction and data sharing. Tenant shall cooperate with Landlord to follow and implement the Tenant Energy Optimization Process (TEOP) including development of an energy model during early schematic design and integration of recommended energy measures package into final design and construction.

For the avoidance of any doubt, nothing contained in these ESRT High Performance Design and Construction Guidelines shall be construed to modify the provisions of Article 1 of this Lease or impair any of Landlord's consent rights pursuant to Article 8 of this Lease.



## APPENDIX G: Climate Change Risk Assessment Checklist

Complete the checklist below for each property. For every “No” answer, incorporate missing risk evaluations into the next risk assessment performed for the property and consider incorporating the missing resilience measures in the capital improvement plan for the property.

### Energy Supply

Has the site of the building been assessed to identify any potential increase in energy costs relating to climate change?

☐ Yes      ☐ No      ☐ N/A

Are there any state or local incentives, programs, or initiatives that support on-site renewable energy generation?

☐ Yes      ☐ No      ☐ N/A

Has the site of the building been assessed to identify any potential risk of power loss and/or is the building in an area prone to loss of power?

☐ Yes      ☐ No      ☐ N/A

In the event of unplanned power loss, does the building have access to back-up power to maintain minimum and life-safety operations?

☐ Yes      ☐ No      ☐ N/A

### Flooding (Storm surges, flash flooding, sea level rise)

Has the site of the building been assessed to identify any potential flood risk and/or is the building in a flood zone?

☐ Yes      ☐ No      ☐ N/A

If at risk, have the building and site been assessed to identify potential damage from flooding?

☐ Yes      ☐ No      ☐ N/A

If at risk, do the building and site have measures in place to mitigate the damage from flooding?

☐ Yes      ☐ No      ☐ N/A

If at risk, does the building have mechanical and electrical equipment located in areas that are not at significant risk for flooding, such as on upper floors or on rooftops?

☐ Yes      ☐ No      ☐ N/A

### Heatwaves

Has the site of the building been assessed to identify any potential heatwave risk and/or is the building in an area prone to heatwaves?

☐ Yes      ☐ No      ☐ N/A

If at risk, has the site been assessed to identify potential damage from heatwaves (mechanical equipment, infrastructure, landscape, etc.) and impact on residents?

☐ Yes      ☐ No      ☐ N/A

### Hurricanes



Has the site of the building been assessed to identify any potential hurricane risk and/or is the building in an area prone to hurricanes?

- ☐ Yes      ☐ No      ☐ N/A

If at risk, has the building(s) and site been assessed to identify potential damage from hurricanes?

- ☐ Yes      ☐ No      ☐ N/A

If at risk, is the structural load of the building(s) meeting local building code for hurricanes?

- ☐ Yes      ☐ No      ☐ N/A

If at risk, do the building and site have measures in place to mitigate damage from hurricanes, such as impact-resistant windows, concrete building façades, mature and deep-rooted native trees with minimal leaf coverage (if trees are present), etc.?

- ☐ Yes      ☐ No      ☐ N/A

#### Regulatory

Is the building subject to any regulatory risks, such as mandatory energy/carbon disclosures, carbon tax, extreme volatility in energy due to regulation, new codes (building, site, energy, etc.)?

- ☐ Yes      ☐ No      ☐ N/A

If at risk, has the building met all relevant green local laws and energy/GHG compliance regulations?

- ☐ Yes      ☐ No      ☐ N/A

#### Winter Storms

Has the site of the building been assessed to identify any potential winter storm (blizzards, Nor'easters) risk and/or is the building in an area prone to winter storms?

- ☐ Yes      ☐ No      ☐ N/A

If at risk, have the building and site been assessed to identify potential damage from winter storms?

- ☐ Yes      ☐ No      ☐ N/A

If at risk, is the structural load of the building meeting local building code for winter storms (capacity for snow/ice on roof load, etc.)?

- ☐ Yes      ☐ No      ☐ N/A

If at risk, do the building and site have measures in place to mitigate damage from winter storms, such as snow and ice removal procedures, insulated water piping, etc.?

- ☐ Yes      ☐ No      ☐ N/A



## Appendix H: Energy Management Plan

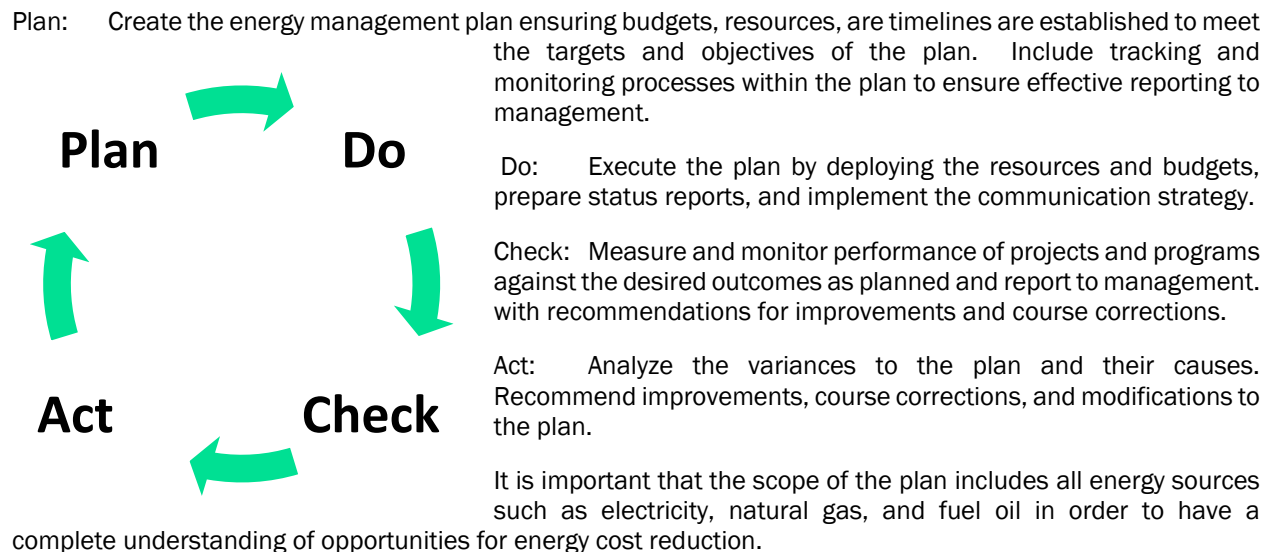
See pages below for a property energy management plan template. The intent of the template is to be used as an overall guidance document; the final plan can be customized with sections added and deleted to best fit the intended audience and the property team's needs.

### PREFACE TO THE ENERGY MANAGEMENT PLAN TEMPLATE:

Environmental concerns and the need to be globally competitive are providing a driving force for local industry to change the way energy use and energy costs are viewed. Rather than being an inevitable cost of doing business, energy is now considered to be a manageable input to the process, much like any raw material or other resource cost.

The first step in managing energy costs is creating an energy management plan. This document contains a template that lays out a logical format for capturing information critical to energy management planning. It formalizes the thought process involved in understanding the relative magnitude of energy costs, the possible ways to reduce energy use, energy targets that are likely to be achievable, and other associated activities that need to occur. While stand-alone energy management projects are satisfying to complete, the energy management plan provides the "big picture" view as an ongoing framework for optimizing overall energy use and achieving success.

Energy management planning is intended to be a process of "continuous improvement". A closed-loop feedback approach is most effective in demonstrating results that will justify further investment in efficiency. The following diagram shows the circular steps that are recommended for adoption into the planning process:



### EXECUTIVE SUMMARY:

*Provide an overview of the plan in a few paragraphs.>*

*Ideas to include:*

*Specification of the energy plan targets and objectives over an appropriate planning time horizon.*

*The baseline energy usage and energy intensity of the property compared to industry average (use national median EUI for property as shown in ENERGY STAR Portfolio Manager), energy flows of the energy use identifying major energy using equipment.*

*Top 3 to 5 high-potential energy conservation capital projects with estimated savings, incentives, capital costs and timelines.*

*A brief outline of medium-term strategic energy management activities planned.*



*Communication strategy and employee awareness programs.*

*Include summary table(s) of relevant numbers for current energy performance, targets, projects etc.>*

**ENERGY PLAN INFORMATION:**

- Date of report
- Author
- Acknowledgement of key staff involved
- Property name and address

**BACKGROUND:**

<Describe the plant operations and factors that affect energy use. Some ideas for inclusion here are:

*Business overview:*

*description of business history and current structure (at parent and local level, ownership, etc.); and*

*review of the industrial sector the business operates in with reference to the NAICS coding system and a summary of key business concerns facing the business and sector.*

*Process descriptions.*

*Physical location and access to resources.*

*List specifics of past conservation projects and successes.*

*Describe any existing metering/monitoring systems.*

*List past energy and feasibility studies.*

*Key challenges and constraints to achieving energy reduction goals (resources, capital, expertise, corporate commitment, data, etc.).>*

**ENERGY MANAGEMENT POLICY & BEST PRACTICES:**

<State your company's energy policy here, if one currently exists. An example energy management policy would be:

"The XYZ Co. will endeavor to reduce energy consumption through all available means so that by 2014 our total energy usage will be 15% less (or, for each unit of material produced) than 2010".

Otherwise, strive to use this plan to generate management acceptance of the importance of energy planning and create a formal energy policy. State a target timeline here for energy policy creation.>

Does the company:

- have broad awareness of the benefits of energy efficiency
- collect and utilize information to manage energy use
- integrate energy management into their overall management structure
- provide leadership on energy management through dedicated staff and a committed energy efficiency policy
- have an energy management plan for the short and long terms



- have a procurement policy that favors energy efficient equipment and materials

#### ENERGY TEAM:

<State here if there is an existing energy manager for the company or the property. If not, name an overall energy champion or one specific to the property. Tabulate all individuals that have an impact on energy use and potential energy projects, identifying whether it is their basic job function or if they are co-champions for this effort (i.e. Dan in purchasing will need to be included in planning conservation projects, Rick in engineering is very interested in contributing to energy conservation projects and is a future energy champion).>

<List all personnel with Knowledge and experience in energy management from operations, maintenance, engineering, etc.>

<The importance of having a senior executive as a regular participant and sponsor of the energy team is highly recommended. This ensures that the executive management team is well informed of ongoing projects and progress toward energy management goals. If this person is or becomes an energy champion, the energy team is well on its way to achieving great success.>

The Energy Team at XYZ Co.

| Name   | Position             | Energy Champion? | Percent of Time on Energy Team |
|--------|----------------------|------------------|--------------------------------|
| Name 1 | Property Manager     | Yes              | 30%                            |
| Name 2 | Portfolio Manager    | Yes              | 5%                             |
| Name 3 | Building Maintenance | No               | 10%                            |

#### ENERGY BASELINE:

<This section requires some basic data gathering and thought about the best way to show how and where energy is used in the plant. The more detail that is presented in this section, the easier it will be to demonstrate success of the plan.>

Fuel source usage breakdown can be shown in a table such as this:

| Fuel, Resource, Productivity | Total Annual Consumption/Production | Total Annual Cost/value | Percentage of Total Plant Energy Cost/production units |
|------------------------------|-------------------------------------|-------------------------|--------------------------------------------------------|
| Electricity                  |                                     |                         |                                                        |
| Natural Gas                  |                                     |                         |                                                        |
| Fuel Oil                     |                                     |                         |                                                        |
| District Steam               |                                     |                         |                                                        |
| Other fuel                   |                                     |                         |                                                        |
| Water                        |                                     |                         |                                                        |

<It is best to slice the energy pie for each fuel source in as many ways as possible that are meaningful to you in order to identify the best approach to improving energy intensity. Two example tables are shown below to illustrate different ways to show the breakdown of electrical energy consumption. Other energy disaggregation methods may be more applicable to your specific situation.>



<It is important to identify the uncertainty associated with this activity and link back to energy information references listed in the Background section above.>

<It may be necessary to construct a table that shows the annual energy use profile by month if the plant operations vary greatly over the course of a year.>

One way of showing electrical energy use breakdown by system type:

| Types of End-Uses | Gas Usage (therms/yr) | Energy Usage (kWh/yr) | Operating Peak kW | % of Total | Uncertainty +/-% | Source of Energy Information |
|-------------------|-----------------------|-----------------------|-------------------|------------|------------------|------------------------------|
| Fans              |                       |                       |                   |            |                  |                              |
| Pumps             |                       |                       |                   |            |                  |                              |
| Space Heating     |                       |                       |                   |            |                  |                              |
| Space Cooling     |                       |                       |                   |            |                  |                              |
| Lighting          |                       |                       |                   |            |                  |                              |
| Plug Loads        |                       |                       |                   |            |                  |                              |
| Process Equipment |                       |                       |                   |            |                  |                              |
| Other             |                       |                       |                   |            |                  |                              |
| Total:            |                       |                       |                   |            |                  |                              |

#### IDENTIFIED CONSERVATION CAPITAL PROJECTS:

<Create a table of known opportunities for energy savings projects involving capital investment. List the systems with identified savings along with their energy consumption, potential for savings, and next steps to achieving the savings. State the source of information for the energy savings potential. Use a separate table for each energy source.>

Electricity Savings Capital Projects:

| System Name     | Annual Energy Consumption | Operating Peak MW | Conservation Measure | Estimated Savings | Estimated Operating Peak MW Reduction | Source of Information | Date of Information |
|-----------------|---------------------------|-------------------|----------------------|-------------------|---------------------------------------|-----------------------|---------------------|
| Boilers         | 40,000 kBtu               |                   | New Burner           | 5,000 kBtu        |                                       | Consultant Study      | Month, Year         |
| Exhaust Fans    | 13,000 kBtu               |                   | Add timers .         | 2,000 kBtu        |                                       | Internal Study        | Month, Year         |
| Hot Water Pumps | 15,000 kBtu               |                   | Install VFDs         | 3,000 kBtu        |                                       | Rough Estimate        | Month, Year         |



<List all known opportunities in the table above even if they are presently considered to be uneconomical or otherwise not currently feasible.>

**OPERATIONAL SAVINGS AND EMPLOYEE AWARENESS PLAN:**

<Opportunities to improve energy intensity and competitiveness through operational and employee awareness programs should not be overlooked.>

<Operational savings are typically achieved through non-capital improvements to control systems. Optimizing the operation of a system from an energy perspective can often produce significant and measurable savings while maintaining or improving the system reliability and throughput.>

<Employee awareness programs identify and target everyday actions that employees can be encouraged to do, with the intent that the actions become second nature in order for the savings to persist well past the initial push for awareness. This type of activity dovetails well with operational savings. System operators will often have ideas for optimizing their system and eliminating wasteful idling or other unnecessary run time but need the environment to encourage the development of these opportunities.>

<Investigate and document opportunities here for operational and employee awareness savings.>

**ENERGY CONSERVATION TARGETS:**

<Using the potential energy savings identified for each fuel source in the previous sections, set annual conservation targets for five years. Include stretch targets in high/medium/low scenarios for estimated savings>.

**ELECTRICITY SAVINGS TARGETS:**

| Year | Savings High (kWh) | Savings Medium (kWh) | Savings Low (kWh) |
|------|--------------------|----------------------|-------------------|
| 1    |                    |                      |                   |
| 2    |                    |                      |                   |
| 3    |                    |                      |                   |
| 4    |                    |                      |                   |
| 5    |                    |                      |                   |

**GAS SAVINGS TARGETS:**

| Year | Savings High (therms) | Savings Medium (therms) | Savings Low (therms) |
|------|-----------------------|-------------------------|----------------------|
| 1    |                       |                         |                      |
| 2    |                       |                         |                      |
| 3    |                       |                         |                      |
| 4    |                       |                         |                      |
| 5    |                       |                         |                      |

<Schedule time annually to update this plan and extend the conservation target for another year. This will produce a rolling 5-year target that when compared to results achieved, should continue to justify investment in conservation for years to come.>



## ACTION PLAN:

<Turn the targets in the previous section into actionable tasks by tabulating projects, timelines, and accountabilities. The attached spreadsheet can be used as an action plan template for prioritization, tracking, and reporting.>

<Identify any barriers to the implementation of each capital project and think about what strategies could eliminate the barriers. Provide an assessment of the ease of implementing each identified project.>

<In addition to identified capital projects, list the approach and strategies to identify further conservation opportunities that may exist including those relating to:

*behavioral; organizational; maintenance; and other.>*

<Resolve to bring the energy project team together on a regular basis to systematically work through approval and implementation of the action plan.>

## OPPORTUNITY IDENTIFICATION & ANALYSIS:

<Potential projects identified by the Energy Manager/Key Account Manager in conducting a general energy assessment of a property. >

Project Economics, Benefits & Risks for Identified Projects:

| Conservation Measure | Feasibility Study Complete? | Estimated Energy Savings (KBtu) | Estimated Operating Peak MW reduction | Estimated Cost (\$) | Available Incentives (\$) | Project Payback (years) | Productivity, quality, or yield savings | Ease of implementation (easy, medium, hard) | Risk |
|----------------------|-----------------------------|---------------------------------|---------------------------------------|---------------------|---------------------------|-------------------------|-----------------------------------------|---------------------------------------------|------|
| Pump VFDs            | Yes                         | 5,000 KBtu                      |                                       | 1,000,000           | 625,000                   | 1                       |                                         |                                             |      |
| Exhaust Fan Timers   | Yes                         | 2,000 KBtu                      |                                       | 800,000             | 460,000                   | 2.3                     |                                         |                                             |      |
| New Boilers          | No                          | 10,000 KBtu                     |                                       | 5,000,000           | 2,300,000                 | 3.6                     |                                         |                                             |      |
| Total:               | N/A                         | 17.00 MBtu                      |                                       | 6.80 M              | 3.385 M                   | 2.0                     |                                         |                                             |      |

## IMPLEMENTATION BUDGET

<This budget should include the cost of the Energy Manager, running the Energy Management team, projects, employee awareness and outreach activities, etc.



## APPENDIX I: Sample Energy Conservation Project Tracking Log

| Energy Conservation Projects Tracking |           |               |                |              |                   |            |                      |                                |
|---------------------------------------|-----------|---------------|----------------|--------------|-------------------|------------|----------------------|--------------------------------|
| Project Description                   | Fuel Type | Project Stage | Energy Savings | Cost Savings | Responsible Party | % Complete | Est. Completion Date | Comments (progress & barriers) |
|                                       |           |               |                |              |                   |            |                      |                                |
|                                       |           |               |                |              |                   |            |                      |                                |
|                                       |           |               |                |              |                   |            |                      |                                |
|                                       |           |               |                |              |                   |            |                      |                                |
|                                       |           |               |                |              |                   |            |                      |                                |



## APPENDIX J: ESRT Demand Response Enrollments

| FACILITY                                 | ACCOUNT #                           | NYISO ZONE             | NYISO<br>SCR kW | ConEd<br>Window | ConEd<br>CSRP kW | ConEd<br>DLRP kW |
|------------------------------------------|-------------------------------------|------------------------|-----------------|-----------------|------------------|------------------|
| 10 Bank Street                           | 590004510000019                     | Zone I (Westchester)   | 250             | 2PM-6PM         | 200              | 200              |
| 112 West 34th Street                     | 494103512700001                     | Zone J (New York City) | 400             | 2PM-6PM         | 350              | 350              |
| 1333 Broadway                            | 494112408600001                     | Zone J (New York City) | 150             | 2PM-6PM         | 100              | 100              |
| 1350 Broadway                            | 494112408700009                     | Zone J (New York City) | 300             | 2PM-6PM         | 250              | 250              |
| 1359 Broadway (Marlboro Building)        | 494113702100011,<br>494121230000009 | Zone J (New York City) | 100             | 2PM-6PM         | 100              | 100              |
| 1400 Broadway                            | 494111006100000                     | Zone J (New York City) | 300             | 2PM-6PM         | 200              | 200              |
| 250 West 57th Street (Fisk Bldg)         | 494161309300005                     | Zone J (New York City) | 250             | 2PM-6PM         | 200              | 200              |
| 350 Fifth Avenue (Empire State Building) | 494202320000008                     | Zone J (New York City) | 1,800           | 2PM-6PM         | 1,600            | 1,600            |
| 500 Mamaroneck Avenue                    | 590013435500011                     | Zone I (Westchester)   | 200             | 2PM-6PM         | 150              | 150              |
| 501 7th Avenue                           | 494113710600002                     | Zone J (New York City) | 250             | 2PM-6PM         | 200              | 200              |
| 60 East 42nd Street (One GCP)            | 494202304300002                     | Zone I (Westchester)   | 300             | 11AM-3PM        | 250              | 250              |



## APPENDIX K: Demand Response Brochure

# NOTICE OF EMERGENCY GRID EVENT



[ DAY], XX/XX/2019

FROM X:00 PM TO X:00 PM

The grid is expected to reach very high levels of electrical load today.

As part of our ongoing commitment to sustainability, we have partnered with ConEdison and the New York Independent Systems Operator to be a part of an energy saving and grid reliability program called Demand Response. Please take part in supporting this effort by temporarily reducing your electricity use as much as possible DURING the hours listed above.

On our part, we will take measures to temporarily curtail our electricity consumption.

During this time, you may notice reduced lighting and slightly increased temperatures in hallways and common areas, as well as some elevators, and non-essential loads turned off.



## DO YOUR PART BY DOING THE FOLLOWING:



**Unplug**  
all high power  
& non-essential  
loads



**Raise**  
temperature  
setpoints in your  
area



**Shut off**  
all non-  
essential & task  
lighting



**Switch**  
laptops  
to battery  
power

---

Please keep a balanced, common-sense approach in mind. You know best how to effectively curtail energy with minimal impact on productivity, health, safety or comfort. Involvement is voluntary, but every action – even small reductions – contributes to the overall success of this community effort!

**THANK YOU FOR YOUR SUSTAINABILITY  
EFFORTS TO SUPPORT GRID RELIABILITY.**



[Empirestaterealtytrust.com](http://Empirestaterealtytrust.com)



## APPENDIX L: Tenant Demand Response Notification E-Mail Template

### Notice of Emergency Grid Event

[ DAY], XX/XX/2019 from X:00 PM to X:00 PM

As part of our ongoing sustainability efforts and green initiatives, we at Empire State Realty Trust have partnered with ConEdison and the New York Independent Systems Operator (NYISO) to be a part of an energy saving and grid reliability program called demand response.

The grid is expected to reach very high levels of electrical load today and we are being requested by our local utility to help ensure system reliability. **Please support this effort by temporarily reducing your electricity use as much as possible DURING the hours listed above.**

**On our part, we will take measures to temporarily curtail our electricity consumption.** During this time, you may notice reduced lighting and slightly increased temperatures in hallways and common areas, as well as some elevators, and non-essential loads turned off.

On your part, here are some suggestions to curtail individual electricity use:

- Turn up thermostats to 75 degrees at the time indicated. Note: Ramping up/down suddenly may actually cause the A/C unit to draw more power.
- Switch off as many lights in the office and break rooms as reasonably possible.
- Switch off extra printers, copiers, monitors, coffee machines, microwaves, toasters, instant hot water dispensers, water coolers, fans, heaters, unused computers, video displays, vending machines and other non-essential loads (or use battery power for laptops)

Please keep a balanced, common-sense approach in mind. You know best how to effectively curtail energy with minimal impact on productivity, health, safety or comfort. **Involvement is voluntary, but every action -- *even small reductions* -- contributes to the overall success of this community effort!**

Thank you for your sustainability efforts to support grid reliability.



## APPENDIX L: Tenant Demand Response Email Notification Sample

During Curtailment, Energy  
Saved is Equivalent to...



796 trees planted



36 homes' monthly  
energy use



73,880 miles driven by  
an average car



3,492 gallons of  
gasoline

### Notice of Emergency Grid Event

[Friday] [07/19/2019], from [2:00 PM] to [6:00 PM]

The grid is expected to reach very high levels of electrical load today and we are being requested by our local utility to help ensure system reliability. Please support this effort by temporarily reducing your electricity use as much as possible DURING the hours listed above.

On our part, we will take measures to temporarily curtail our electricity consumption. During this time, you may notice reduced lighting and increased temperatures in spaces, hallways, and common areas, as well as some elevators, fountains and non-essential loads turned off. Where we control temperature settings we will Turn up settings by two degrees. Please note that following the event, it may take some time for temperatures to return to condition experienced prior to the event.

On your part, here are some suggestions to curtail individual electricity use:

- Tenant controlled A/C units, Turn up thermostats two degrees at the time indicated and every half-hour thereafter Note: Ramping up/down suddenly may actually cause the A/C unit to draw more power.
- Switch off as many lights in the office and break rooms as reasonably possible.
- Switch off extra printers, copiers, monitors, coffee machines, microwaves, toasters, instant hot water dispensers, water coolers, fans, heaters, unused computers, video displays, vending machines and other non-essential loads (or use battery power for laptops)

Please keep a balanced, common-sense approach in mind. You know best how to effectively curtail energy with minimal impact on productivity, health, safety or comfort. Involvement is voluntary, but every action -- *even small reductions* -- contributes to the overall success of this community effort! Thank you for your sustainability efforts to support grid reliability.

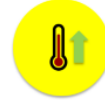
EMPIRE STATE  
REALTY TRUST

conEdison

How You Can  
Contribute



Unplug all high power  
and non-essential loads



Raise temperature setpoints  
in your surrounding space



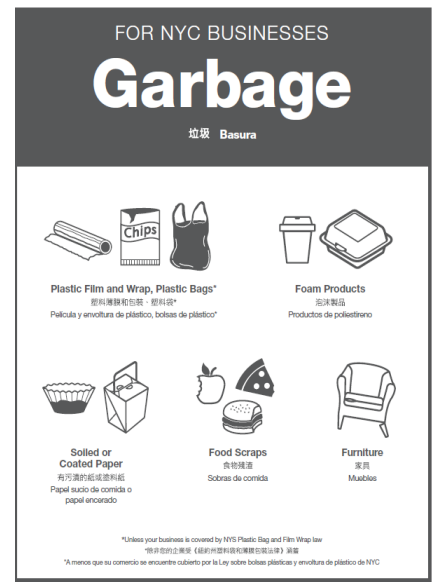
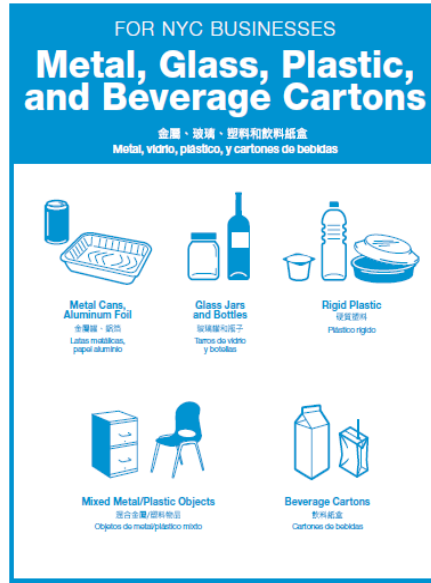
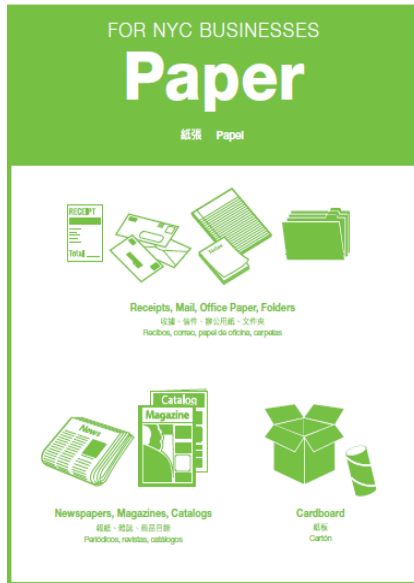
Shut off all non-essential  
and task lighting



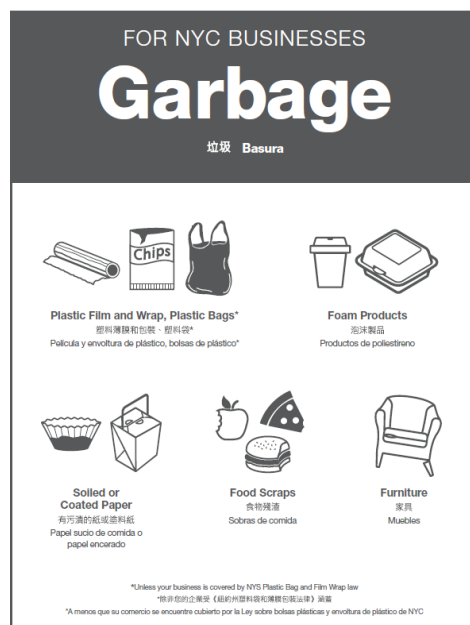
Switch laptops to  
battery power



## APPENDIX M: Waste & Recycling Signage Source Separated Signage:



### Single Stream Signage:



## APPENDIX N: Waste Walkthrough Checklist

### Walkthrough Checklist

#### Materials for Walkthrough

- ✓ Clipboard
- ✓ Pen
- ✓ Checklist
- ✓ Office Floor Plan (if available)
- ✓ Waste & Recycling Policy for Building/Office (if available)

1. Is there evidence of an established recycling program? (i.e. recycling bins, signage, recycling collection area in loading dock, etc.)

- ☐ Yes
- ☐ No
- ☐ If yes, are there bins for recycling collection?
- ☐ If no, is there a reason why there is no recycling program?

2. Is there a waste decal(s) visible from the street?

- ☐ Yes
- ☐ No

3. Which of the following information is present on the waste decal(s)?

- ☐ Name of carter
- ☐ Days/Times of pickup
- ☐ Carting methodology
- ☐ Spaces served

4. Who is the waste and recycling hauler for the building? (If there are separate haulers for waste and recycling, please designate).

- Waste Hauler: \_\_\_\_\_
- Recycling Hauler (if different from waste hauler): \_\_\_\_\_
- Electronic Waste Hauler: \_\_\_\_\_
- Organics Hauler (if applicable): \_\_\_\_\_
- Hazardous Waste Hauler (if applicable) : \_\_\_\_\_

### Back-of-the Building Spaces

5. Is the collection methodology evident in the building, such as source separated or single stream?

- ☐ Yes
- ☐ No
- Notes: \_\_\_\_\_

6. What is the collection methodology?

- ☐ Source Separated: three bins- one for paper, one for plastic/metal/glass, and one for landfill
- ☐ Single Stream: two bins - one bin for landfill and one for paper, plastic, metal, and glass.
- ☐ Other: \_\_\_\_\_

7. Where are recyclables stored prior to waste collection for the haulers?

- ☐ Loading Dock
- ☐ Other: \_\_\_\_\_



8. Are separate containers provided for trash and recyclable materials in the loading dock or other common waste collection location?

- ☐ Yes (trash and recycling containers provided, compost if applicable)  
☐ No (only trash containers provided)

• Notes: \_\_\_\_\_

9. Are there bin labels and signage designating the waste stream? Bin labels refers to label affixed directly on the bin to indicate the intended waste stream, and signage refers to educational information to indicate the types of materials that should go in each bin.

- ☐ Yes, there are bins + signage  
☐ Yes, there are bins labels only  
☐ No bin labels or signage

• Notes: \_\_\_\_\_

### Tenant Spaces

10. Are there separate bins for waste and recycling (one for paper, one for plastic/metal/glass, one for trash for source separated - or one recycling bin for single stream including paper, plastic/metal/glass, and one trash for single stream)?

- ☐ Yes (trash and recycling bins containers provided)  
☐ No (only trash containers provided)

• Notes: \_\_\_\_\_

11. Does the bin setup align with the waste stream as designated by the building? (Ex: are there single stream bins, but the building has source-separated recycling collection?).

- ☐ Yes  
☐ No

• Notes: \_\_\_\_\_

12. Are there bin labels on each of the bins to designate the appropriate waste stream?

- ☐ Yes  
☐ No

• Notes: \_\_\_\_\_

13. Are bins color coded? If yes, indicate the colors for each waste stream. Also indicate if the bin color coding is consistent throughout the space.

- ☐ Yes  
☐ No

• Colors: \_\_\_\_\_

• Consistent: \_\_\_\_\_

14. Is there educational signage located above the bins to inform employees of the appropriate materials to put in the trash and recycling bins?

- ☐ Yes  
☐ No

• Notes: \_\_\_\_\_

15. Through visual observations, does it appear that the contents of the bins contain only the items that are supposed to be in them (i.e. landfill waste is only in the landfill waste bin, plastics are only in the p/m/g bin, etc.)?

- ☐ Yes  
☐ No

• Notes: \_\_\_\_\_

16. Is there a recycling bin located next to every trash bin?

- ☐ Yes



- ☐ No
- Notes: \_\_\_\_\_

17. Is there a location to collect electronic waste?

- ☐ Yes
- ☐ No
- Notes: \_\_\_\_\_

18. Are bins strategically located (are there paper bins located in the copy room, trash and recycling in the kitchen/pantry area)?

- ☐ Yes
- ☐ No
- If no, where should additional bins be placed? \_\_\_\_\_
- Notes: \_\_\_\_\_

19. Are the bins overflowing? This may indicate that there are not enough trash and recycling bins throughout the office.

- ☐ Yes
- ☐ No
- ☐ Notes: \_\_\_\_\_

20. Are there any bins that are empty? This may indicate that there are too many or unnecessary bins in the office.

- ☐ Yes
- ☐ No
- ☐ Notes: \_\_\_\_\_

21. Does every copy and mail room have a paper bin?

- ☐ Yes
- ☐ No
- ☐ Notes: \_\_\_\_\_

22. Does every pantry have at a minimum a landfill waste and plastic/metal/glass bins?

- ☐ Yes
- ☐ No
- ☐ Notes: \_\_\_\_\_

23. Is there compost collection?

- ☐ Yes
- ☐ No
- ☐ Notes: \_\_\_\_\_



## APPENDIX O: Waste & Recycling Tracking Log

| Waste Pick-Up Date | Waste Material | Removal Method | Hauler | Unit | Weight |
|--------------------|----------------|----------------|--------|------|--------|
| 1/1/2019           | Cardboard      | Recycled       | ABC    | Tons | 1.2    |
| 1/1/2019           | Trash          | Landfilled     | ABC    | Tons | 1      |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |
|                    |                |                |        |      |        |

A. Total Waste Collected (Weight)

B. Total Waste Diverted (Weight):

C. Diversion Rate % (B/A):



## APPENDIX P: NYC Waste & Recycling Collection Methodologies Source-Separated

### How To Recycle

**IMPORTANT:** It is illegal to mix recyclables with garbage in the same container or compartment in a truck.



### Single Stream



## Appendix Q: Sustainable Procurement Ongoing Consumables Tracking Log

| Date of Purchase | Purchasing Party | Vendor    | Product Name & Manufacturer                                                        | Quantity | Cost per Unit (\$) | Sustainability Criteria (from dropdown list)                                          |
|------------------|------------------|-----------|------------------------------------------------------------------------------------|----------|--------------------|---------------------------------------------------------------------------------------|
| 1/1/2019         | ABC Building     | ABC Paper | Paper: 11x17 24lb LYNC                                                             | 8000     | \$1,456            | None                                                                                  |
| 1/1/2019         | ABC Building     | ABC Paper | 18x12 66.46M (80) Brilliant White Smooth Finish MOHAWK NAVAJO COVER DIGITAL 10-765 | 24500    | \$2,719.50         | Post-Consumer Recycled Content Levels Exceed EPA Comprehensive Procurement Guidelines |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |
|                  |                  |           |                                                                                    |          |                    |                                                                                       |

|                                                                                                |
|------------------------------------------------------------------------------------------------|
| <b>Reference: Sustainability Criteria</b>                                                      |
| Post-consumer Recycled Content levels exceed EPA Comprehensive Procurement Guidelines          |
| Rechargeable Batteries                                                                         |
| Remanufactured Toner Cartridges                                                                |
| Bio-based Products meet the Sustainable Agriculture Network's Sustainable Agriculture Standard |
| FSC Certified paper/wood products                                                              |
| Other                                                                                          |

