

# Sustainability Roundtable

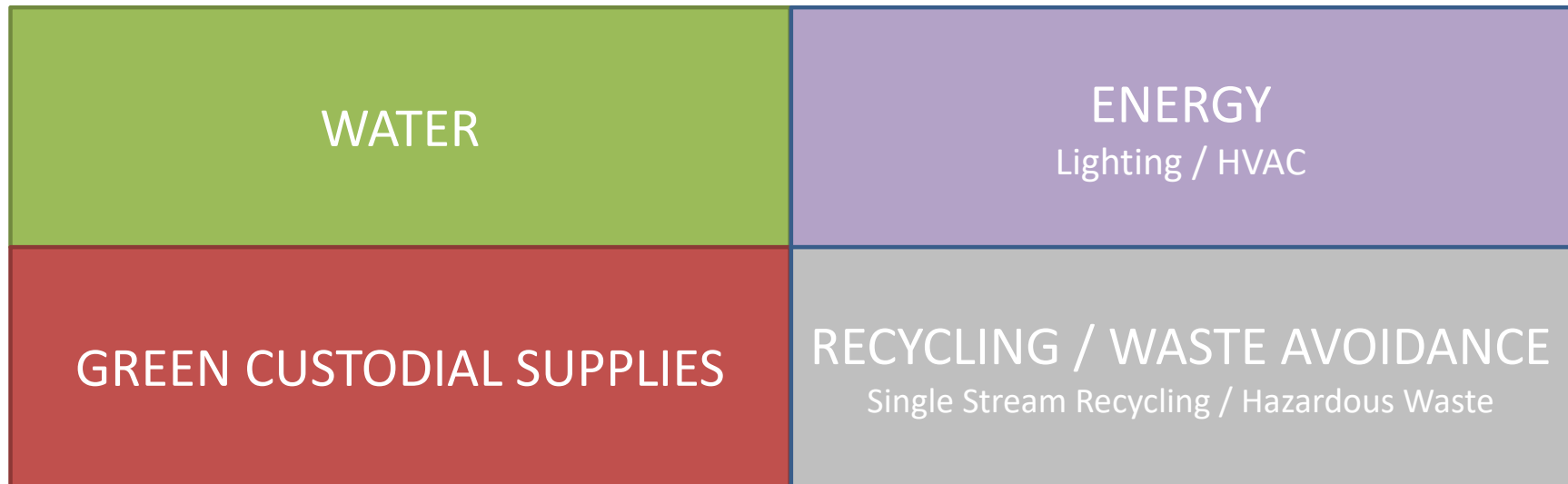
Teachers College Columbia University  
2022 Presentation



# OFFICE OF FACILITIES MANAGEMENT



# SUSTAINABILITY ELEMENTS



# Water - Efficiencies

- All bathroom faucets have been equipped with one or more of the following:
  - Water restrictors
  - Motion activated faucets
  - Metering device faucets that shut off after it delivers a predetermined amount of water.
- Low flow shower heads and shower bodies installed in all renovated apartments
- Low flow toilets and urinals in all academic restrooms, and in Bancroft, Grant, Sarasota and Whittier during renovations
- Bancroft – LEED Certified, All water devices are Low Flow (100%)



# Energy - Lighting

- Teachers College recently implemented a lighting retrofit program by replacing inefficient incandescent and fluorescent lamps with T8/T5 fluorescent and LED lamps in over 9000 light fixtures; this retrofit reduced our electrical lighting load by 38%.
- Fluorescent lights continue to be replaced with LED's
- Motion/infrared sensors have been added to classrooms (26 currently), storerooms and mechanical/back of house areas
- Light sensors and astronomical time clocks have replaced regular time clocks for exterior lighting
- Bancroft – LEED Certified - energy efficient lights



# Energy – HVAC

*(HVAC: Heating, Ventilation, Air-Conditioning)*

- In 2006 Teachers College installed its first central chilled water plant, operates on natural gas in spring, summer, and fall and free cooling plate and frame heat exchanger in winter this has allowed us to convert our older less efficient HVAC systems that use more energy to operate and contain refrigerants that are not environmentally friendly.
- Over the past 5 years we have converted 140 tons of cooling to the central plant.
- High efficiency motors have been installed throughout the campus
- Variable frequency drives (vfd's) have been installed on motors, pumps and fans.



# Boiler Control Upgrade

Partially funded by Con Edison

## TOTAL GAS SAVINGS

Boiler Gas Usage Before Upgrade = 2,790,051 Therms per year

Boiler Gas Usage After Upgrade = 2,686,714 Therms per year

Savings - 103,337 Therms per year

## TOTAL ELECTRIC SAVINGS

Kwh Usage Before Upgrade = 388,672 kwh per year

Kwh Usage After Upgrade = 216,128 kwh per year

Savings - 172,547 kwh per year



# ENERGY - Building Automation (BMS)

- Building Management System (BMS) has contributed to sustainability by:
  - Increasing our energy efficiency
  - Lowering our operating and maintenance cost
  - Improved indoor air quality
  - Improved temperature control
  - Reduced equipment run times with optimizing start/stop times for occupied periods.





# Energy – Events2HVAC

- Automated system that uses scheduling data from Live25 to determine when heating or cooling is required in a classroom.

## Grace Dodge: 177-179

Building: Grace Dodge, Description: Conference Room

### Scheduled Commands

<i>Date</i>	<i>State</i>	<i>Value</i>	<i>Evt Priority</i>
2020-01-15 00:00	Stop	0	16
2020-01-15 08:45	Start	1	16
2020-01-15 14:10	Stop	0	16
2020-01-16 00:00	Stop	0	16
2020-01-16 07:45	Start	1	16
2020-01-16 17:40	Stop	0	16

- Currently there are a total of 34 classrooms on the system



# Chiller / Boiler Plant



# Sustainable Products

## Construction and Renovation

- **Mannington Carpet Tiles and Armstrong Vinyl Flooring**
  - CRI (Carpet and Rug Institute) Green Label – product has been tested and certified by an independent laboratory and has met stringent criteria for low emissions.
  - EPD Verified (Environmental Product Declarations) - a transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle.
  - HPD Verified (Health Product Declaration) - contains standardized, accurate and consistent reporting of product contents and associated health information for products used in the built environment.
  - Mindful Materials© – product library focused on the environmental impacts of building products.



# Future Renovations

Removal of Window and dx Air Conditioning Units

## Grace Dodge 193/197 Project

Removal of 1 window unit and 14 ton dx central units

16 tons of cooling added to the central plant

## Grace Dodge 4<sup>th</sup>/5<sup>th</sup> Floor Classroom Renovation

Removal of 26 Window Units and 2 Central dx Units

40 tons of cooling added to the central plant

## Energy – Events2HVAC

Additional 10 classrooms will be added to the system



# Energy Sustainability - Future

- Additional HVAC Units to be converted to Chilled Water (5)
- Electrical Metering to assist in future energy reduction



# Future Investigations – Seasonal Setpoints

- Months that require cooling are typically those that fall between June and September. The months that require heating are usually between October and May.
- By choosing Ashrae certified optimum temperature set-points, energy is saved in maintaining a consistent comfort temperature.
- Occupied Comfort Heating – 68°F
- Occupied Comfort Cooling – 76°F
- Unoccupied Comfort Heating – 55°F
- Unoccupied Comfort Cooling – 82°F



# SUSTAINABLE CUSTODIAL PRODUCTS



# WASTE AVOIDANCE

## Gateway – R-Spec Liners

### Before:

- Cheap Liners
- Highly Recycled Material
- Inconsistent Performance
- Little testing or quality control
- Buyer not sure of what they were getting
- More Labor Intensive
- Tears, blow-outs and Double Bagging
- Unsanitary for users and customers

### Now:

- Completely re-engineered can liner
- Maximum quality resins
- The highest performing liner on the market
- Arguably the most eco-friendly option today
- The only manufacturer utilizing these resins
- Cost effective
- Rigorous testing and quality control
- Full disclosure and labeling





# Gateway – Liner Strength



<https://buckeyeinternational.wistia.com/medias/cqcz5wfoh6>



# 3M Twist 'n Fill System



- Concentrated chemical bottles minimize packaging materials
- Water is added at job site
- Designed to be used with cold water to reduce energy



# Restroom Supplies

- Sensor driven paper towel dispenser
- TC already uses rolled paper towels
- Touchless reduces transmission of germs
- All restroom paper products are from sustainable sources



# Snow Removal Equipment

- Facilities is procuring electric snow blowers for the 2022-2023 winter season.



# WASTE MANAGEMENT



# Action Carting Single Stream Recycling (Tonnage)

YEAR	Organic Recycling	Glass Recycling	Metal and Aluminum	Plastic	Cardboard and Paper	Total Diverted Tonnage	Residual or Trash Tonnage	% Recycled and Diverted Material
2016	22.80	9.20	9.21	3.65	433.73	<b>479.82</b>	150.74	<b>76.09%</b>
2017	25.19	7.76	7.77	3.07	430.11	<b>473.90</b>	118.75	<b>79.96%</b>
2018	25.19	8.42	8.43	3.34	434.93	<b>480.31</b>	90.51	<b>84.14%</b>
2019	21.43	9.68	9.69	3.84	517.76	<b>562.40</b>	116.28	<b>82.87%*</b>
2020	n/a	n/a	n/a	n/a	n/a	<b>n/a</b>	n/a	<b>n/a</b>
2021	0	8.44	8.45	3.34	271.10	<b>291.33</b>	78.77	<b>78.72%</b>

\*2016 – 2019 6.78% increase in recycled and diverted materials



# Action – Optical Sorting



# PPE RECYCLING

- It's more than just a box. Includes the streamlined VaporShield® container, shipping to a certified recycling center, recycling charges, and a certificate of recycling.
- Holds 45 lbs of safety equipment and protective gear.
- Acceptable items: Ear plugs, beard nets, hair nets, gloves, safety glasses, disposable garments, and masks.
- Unacceptable items: DO NOT send in medical waste. This includes material contaminated with bloody or bodily fluids or any items that may be considered Hazardous Waste.
- Each container comes with the 100% recyclable box tube and two end caps, instructions, and a pre-paid return shipping label.





# WASTE AVOIDANCE

- Water fountains with bottle refilling ports have been installed throughout the campus
- **700k liters** of water (1.3 million 16-ounce plastic bottles) have been dispensed at **33 fountains** throughout the academic and residential buildings since installation in **2014**



# BOTTLE FILLING STATIONS

## Academic Locations

- (4) Grace Dodge – Ground, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>
- (4) Horace Mann – Ground, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>
- (2) Macy Hall – Ground, 2<sup>nd</sup>
- (2) Russell Hall – Ground, 3<sup>rd</sup>
- (2) Thompson Hall – 1<sup>st</sup>, 4<sup>th</sup>
- (10) 528 Bldg –1<sup>st</sup> / 3<sup>rd</sup>-11<sup>th</sup>
- (4) Zankel Hall – Ground, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>

## Residential Locations

- (2) Whittier – 1<sup>st</sup> floor, 10<sup>th</sup> Floor Lounge
- (1) New Residence – Fitness Room
- (1) Bancroft – Basement
- (1) Seth Low - Basement



# Environmental Health and Safety



The Environmental Health & Safety (EH&S) Team as part of the Office of Public Safety offers a broad range of recycling services and actively develops partnerships with faculty and departmental personnel to ensure a safe work environment and compliance with the college's policy and applicable regulations in the most efficient manner possible. As part of their responsibility, the EH&S Team also safely and responsibly manages the campus wastes by recycling and disposing of hazardous and regulated wastes. The EH&S Team oversees the management of the following waste streams:

- ▶ Hazardous Waste
- ▶ Used Oil
- ▶ Universal Waste – (fluorescent Lamps, ballast and lighting components)
- ▶ Batteries
- ▶ Used Cooking Oil



## Hazardous Waste

- EH&S team manages the hazardous waste on campus and ensures compliance and timely reporting in accordance to the Federal Resource Conservation Recovery Act (RCRA). The EH&S Team ensures that hazardous waste generation is kept to a minimum by establishing a point source minimization process by doing the following:
  - Ensures that all chemical orders are reviewed by EH&S to avoid duplicate inventories and ensures that we can safely accommodate and store the chemical on campus.
  - Proposes substitution to a less hazardous chemical when possible.
  - Ensures that the appropriate amount of chemical is ordered so that we do not have excess chemicals to dispose of.
  - Conducts yearly physical inspection of the chemical storage areas to ensure that inventories are rotated accordingly.
- As a result of the waste management practices established by the EH&S team, the TC hazardous waste generator status has now **changed from a Small Quantity Generator (SQG) to a Conditionally Exempt Small Quantity Generator (CESQG)** where we are on track to generate less 200.00 pounds of hazardous waste per year.



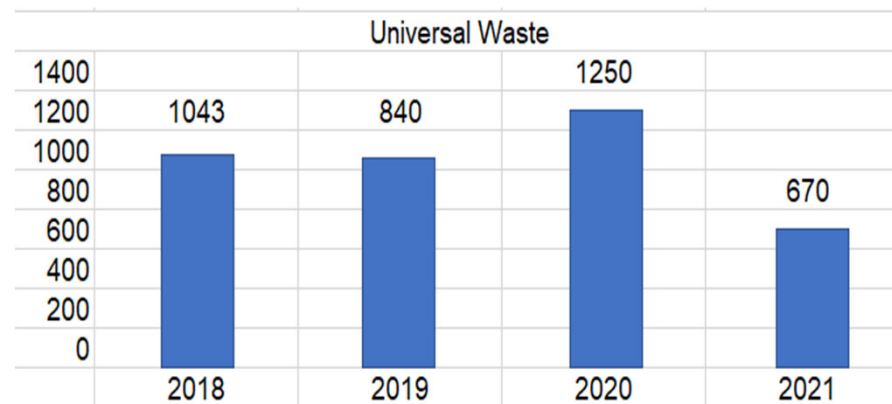
## Used Oil

- ▶ TC generates minimal amount of used oil from different sources ranging from the oil used to operate the campus elevators and numerous small engine equipment that are utilized throughout the campus.
- ▶ The EH&S Team ensures that the vendors provide used oil collection and transportation to several recycling operating facilities in the United States.
- ▶ The EH&S Team's preferred vendors use a sequence of dehydration, gas oil recovery/separation and fractionation to regenerate used engine oil to produce vacuum gas oil (VGO). The VGO will then be used by oil companies to produce new lubricating oils. Other commercial residual products will also be generated, including asphalt and LVGO (light vacuum gas oil), leaving no unrecoverable by-product.
- ▶ In 2017 TC generated 240 pounds of used oil
- ▶ Three years later - In 2020 TC generated the same amount (240 pounds)



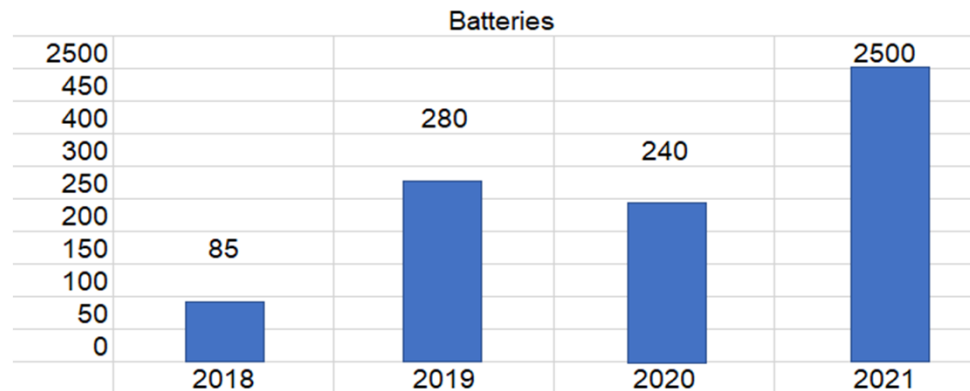
## Universal Waste

- ▶ TC generates Fluorescent Lamps, ballasts and lighting components when changing and upgrading the lighting systems on campus.
- ▶ Fluorescent lamps, ballasts and lighting components usually contain mercury, lead and other heavy metals, polychlorinated biphenyls (PCBs) or other harmful materials, all of which are considered toxic and hazardous. The federal government and all 50 states have enacted rules and regulations for proper management of these materials. Failure to manage these items in accordance with regulations would put TC at risk as well as endangering public health.
- ▶ The EH&S Team utilizes one of the largest commercial recyclers of lamps and ballast in the world and work with a broad range of customers to offer environmentally-compliant recycling coast-to-coast and across North America.



## Batteries – Universal Waste

- ▶ TC generates used batteries from different sources ranging from fire alarm equipment, emergency lights, power tools, small gas engine equipment that are utilized throughout the campus etc.
- ▶ Used batteries may be considered a hazardous waste because they can contain corrosive liquids, toxic heavy metals or reactive metals. Under the Federal Resource Conservation and Recovery Act (RCRA), hazardous waste must be properly identified, stored, transported, treated and disposed of, and generators are financially responsible for cleaning up the effects of improper disposal.
- ▶ In 2021 TC generated 2500 pounds of batteries for recycling. (A large Battery Backup System Rack was decommissioned in 2021)





## Used Cooking Oil

- ▶ The TC used cooking oil is generated by the campus dining services (AVI)
- ▶ In an effort to achieve optimal efficiency for a more sustainable world, the residuals that are collected on campus are used to produce nutritional and customizable fats and proteins and are used in the production of biodiesel and renewable diesel.
- ▶ On an average TC recycles approximately 300 pounds of used cooking oil per year.



# Future Sustainability

Teachers College has engaged the services of SOCOTEC to assist in developing a Sustainability Roadmap



# Q & A

