RUTGERS
Office of the President
TASK FORCE ON CARBON NEUTRALITY AND CLIMATE RESILIENCE

Climate Action Plan Supplemental Report

Report of Working Group on Supply Chain and Waste Management

July 1, 2021

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1. Rutgers' current baseline

1.1. Rutgers' greenhouse gas emissions in Supply Chain and Waste Management

Emissions from the supply chain, waste and food are categorized as Scope 3 emissions. Scope 3 emissions refer to all indirect emissions. In other words, emissions other than Scope 1 (fuel burnt on campus for building heating and fleet transportation) and Scope 2 (emissions from off-

campus sources to produce electricity and steam used on campus). According to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard of the GHG Protocol, Scope 3 is comprised of 15 categories[1].
For the purposes of the Supply Chain and Waste Stream working group the 3 most important categories to consider are:

- Category 1: Purchased goods and services (which includes food)
- Category 2: Capital goods (construction and other real estate assets)
- Category 5: Waste generated in operations.

While calculating emissions from Scope 1 and 2 is relatively straightforward and offers several benefits related to tracking progress and informing decision-making, Scope 3 accounting presents enormous methodological challenges and offers somewhat limited insights to decision- makers.

There are two major barriers to accurate quantification of Scope 3 emissions; first is data availability, and second is boundary-setting, that is decision over which embedded emissions of a particular good or service should be included or excluded from ownership. Very limited data is available on the number and type of goods and services purchased by the University. While it is possible to retrieve high-level costs for classes of expenses, there is no system that allows precise assessment of the quantity and characteristics of all products purchased by every department across the University. With that being said, more detailed data is available for food sourcing and food waste diversion efforts. As for general waste, the tonnage of waste, recyclables, compostable, and donated items is known. However, there is little data available on the number of trips required by the waste management companies to transport the waste from campus to its final point of disposal. Waste composition is unknown.

Even if data on quantity and characteristics of products was available, boundary setting presents a second major barrier. The University must decide how far back into the supply chain emissions related to goods and services used on campus should be calculated and “owned” by the institution. In other words, there needs to be an agreement at the University level with regard to where to set the boundaries. A shared vision on the matter is very important because it determines which emissions the University is responsible for. Moreover, setting boundaries helps to indirectly identify the leverages that the University can use to reduce its emissions. For example, if the University decides to own emissions from deliveries of all goods, then limiting deliveries is one of the tools available to reduce emissions.

While the ultimate goal should be for full environmentally responsible supply chain-to-waste reduction and resilience as an institution, this is neither fiscally nor logistically feasible on an immediate timescale. Instead, a sequential timeline for GHG identification certification of individual supply chains, waste flows, facilities, buildings, and programs should be approved and implemented. In addition to clear feasibility benefits, an advantage of this approach is that certification of individual supply chains, waste flows and sites will spur movement toward

programs such as circular carbon systems or circular economy goals across the University system.

1.2. Ongoing activities to reduce emissions and vulnerabilities

Ongoing activities to reduce emissions and vulnerabilities as related to our working group include further engaging our suppliers to reduce GHG emissions in their business practices. As it relates to waste reduction and reuse, we will follow the U.S. EPA Waste Management Hierarchy (see Figure 4.1), and will look to develop and implement strategies accordingly.

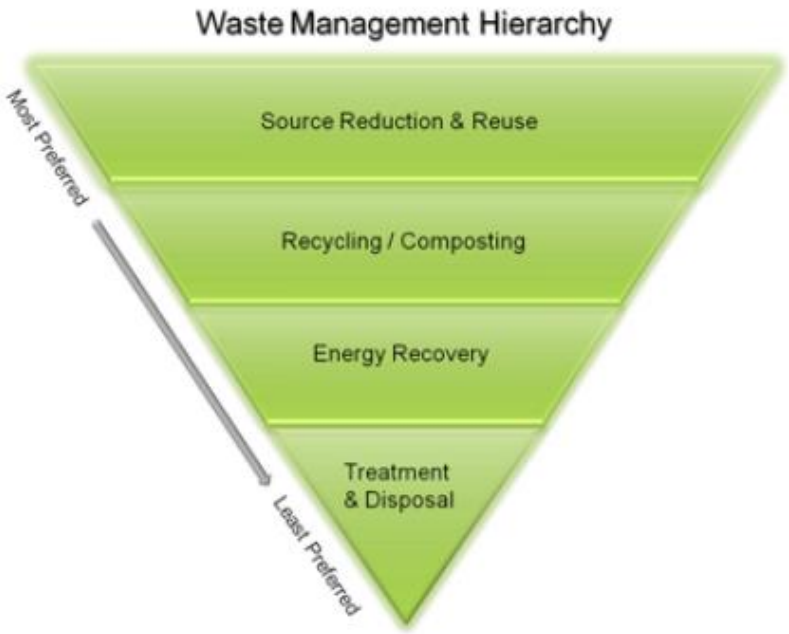


Figure 4.1. USEPA Waste Management Hierarchy

According the U.S. Environmental Protection Agency (USEPA):

Waste prevention and recycling-jointly referred to as waste reduction-help us better manage the solid waste we generate. However, preventing waste and recycling also are potent strategies for reducing greenhouse gases. Together they:

- **Reduce emissions from energy consumption.** Recycling saves energy. That's because making goods from recycled materials typically requires less energy than making goods from virgin materials. And waste prevention is even more effective. Less energy is needed to extract, transport, and process raw materials and to manufacture products when people reuse things or when products are made with less material. The payoff? When energy demand decreases, fewer fossil fuels are burned and less carbon dioxide is emitted to the atmosphere.

- **Reduce emissions from incinerators.** Diverting certain materials from incinerators through waste prevention and recycling reduces greenhouse gas emissions to the atmosphere.
- **Reduce methane emissions from landfills.** Waste prevention and recycling (including composting) divert organic wastes from landfills, reducing the methane released when these materials decompose.
- **Increase storage of carbon in trees.** Forests take large amounts of carbon dioxide out of the atmosphere and store it in wood, in a process called carbon sequestration. Waste prevention and recycling of paper products can leave more trees standing in the forest, continuing to absorb carbon dioxide from the atmosphere.

1.3. Related ongoing educational, research, and service activities

Ongoing educational, research and service activities include conducting a waste audit. Rutgers University's plastic waste generation amount is not known currently. Before setting goals, it is essential to create a reliable baseline data on plastic waste generation. Performing a quick waste audit will enable University decision makers and researchers to understand how much plastic waste we generate, how much of it is recycled and how much plastic waste is mixed with regular MSW and ends up in landfills or incinerators. Then university researchers can suggest technologies to convert waste plastics back into the plastic manufacturing, fuel and materials production.

To note, in January 2021, Professor Kevin Lyons and his Rutgers Business School students launched a research project to link our purchasing and waste management data to Scope 3 emissions. The results of this research was presented to Procurement and IPO Facilities leadership as well as the future Climate Mitigation Office for implementation and use in future emission reporting schemes.

Rutgers Waste Management/Recycling Emissions Data
As it relates to waste management emissions, using EPA formulas, we were able to determine our waste management/recycling emission data. During the last five fiscal years, Rutgers has recycled (on average) over 65% of our waste stream: over 102,147.59 tons of recyclables, and 52,445.48 tons of municipal solid waste. Based on our five-year data, Rutgers saved 321,764.91 metric tons CO2 equivalent by recycling 102,147.59 tons of recyclables (see Appendix A).

The methodology and calculations are further detailed below.

Tons of waste recycled instead of landfilled
To develop the conversion factor for recycling rather than landfilling waste, emission factors from EPA's Waste Reduction Model (WARM) were used (EPA 2014). These emission factors were developed following a life-cycle assessment methodology using estimation techniques developed for national inventories of greenhouse gas emissions. According to WARM, the net emission reduction from recycling mixed recyclables (e.g., paper, metals, and plastics), compared with a baseline in which the materials are landfilled, is 0.86 metric tons of carbon

equivalent per short ton. This factor was then converted to metric tons of carbon dioxide equivalent by multiplying by 44/12, the molecular weight ratio of carbon dioxide to carbon.

Calculation
Note: Due to rounding, performing the calculations given in the equations below may not return the exact results shown.

0.86 metric tons of carbon equivalent/ton × 44 kg CO_2/12 kg C = 3.15 metric tons CO_2 equivalent /ton of waste recycled instead of landfilled. For Rutgers this is 321,764.91 metric tons CO_2

Sources
- EPA (2014). Waste Reduction Model (WARM), Version 13. U.S. Environmental Protection Agency.

Alternative Calculation: Rutgers also has the ability to calculate the CO_2 equivalent per ton of waste hauled by the number of garbage trucks of waste recycled instead of landfilled. This calculation is as follows:

The carbon dioxide equivalent emissions avoided from recycling instead of landfilling 1 ton of waste are 3.15 metric tons CO_2 equivalent per ton, as calculated in the "Tons of waste recycled instead of landfilled" described above.

Carbon dioxide emissions reduced per garbage truck full of waste were determined by multiplying emissions avoided from recycling instead of landfilling 1 ton of waste by the amount of waste in an average garbage truck. The amount of waste in an average garbage truck was assumed to be 7 tons (EPA 2002).

3.15 metric tons CO_2 equivalent /ton of waste recycled instead of landfilled x 7 tons / garbage truck = 22.06 metric tons CO_2E /garbage truck of waste recycled instead of landfilled (using our recycling data of 102,147.59) we avoided 14,593 truckloads or 321,910.83 metric tons CO_2E

Sources
- EPA (2014). Waste Reduction Model (WARM), Version 13. U.S. Environmental Protection Agency.
- EPA (2002). Waste Transfer Stations: A Manual for Decision-Making. U.S. Environmental Protection Agency

2. Overview of potential climate solutions

2.1. Potential solutions

Given the depth, complexity, and absence of data required to determine GHG emissions from the supply chain and waste stream, the working group devised recommendations based on

environmental or sustainability goals that are in the interest of the University to achieve in both the long-term and short-term (less than one year).

Potential solutions identified through research and benchmarking peer institutions:

- **Construction**: Attain LEED Gold Certification for all major new construction and renovation projects on campuses, while diverting at least 90% of construction waste from landfills. A goal regularly achieved on LEED projects at Rutgers.
- **Consumable and durable goods**: Work with current and future suppliers to enhance the sustainability characteristics of current and future consumable products. Develop awareness and engagement programs for employees to manage demand.
- **Food**: Build on strong current efforts on food, including reducing post-consumer waste and increasing sustainability
- **Waste**: Establish a goal of "Zero Waste" (90% diversion of non-hazardous waste from incinerators and landfills)

***Construction**:* LEED (Leadership in Energy and Environmental Design) certification in new construction and renovation of buildings is a common means of addressing GHGs associated with construction. Institutions that have proposed or committed to a minimum level of LEED certification include: MIT (LEED Gold), the University of Pennsylvania (LEED Silver), the University of Maryland (LEED Silver), Duke University (LEED Silver), Cornell (LEED Silver), and Syracuse (LEED Certification). In addition, a number of peer universities have considered supplementing LEED standards with specific energy efficiency targets. Cornell's Climate Action Plan proposes a requirement that all new construction and renovation projects over $5 million achieve LEED Silver certification and a minimum of 50% energy savings over the industry standard baseline (ASHRAE 90.1[2]), while the Climate Action Plans of Duke University and the University of Maryland recommend implementing LEED standards for energy efficiency that go beyond those required for LEED Silver status. Finally, as at Rutgers, some individual construction projects at our peer institutions have far surpassed their respective universities' minimum requirements. Cornell, for instance, has four buildings which are certified as LEED Platinum, and is currently constructing an academic building which is designed for net zero energy usage[3].

Construction waste diversion: Though the Climate Action Plans of several peer institutions acknowledge the role that construction waste plays in their overall campus waste streams, few attach specific numbers to either current or target landfill diversion rates for this category of waste. The University of Pennsylvania, for example, has achieved a diversion rate of over 80% for construction waste, but has not identified a concrete goal for future progress. Thus, establishing a specific, ambitious target on the order of 90% for construction waste diversion would set Rutgers University apart from its peers in this area.

***Consumables**:* Our peer universities' approaches to consumables vary significantly; some do not address this category at all, while others outline detailed strategies for working with vendors and campus communities both to reduce the overall level of consumption, and to ensure that

the products which are consumed are more environmentally sustainable. Current or proposed policies include: requiring ENERGY STAR certification for all pertinent appliance purchases (University of Maryland and Cornell), imposing minimum purchase amounts from office suppliers to reduce the number of deliveries on campus (University of Pennsylvania and Cornell), and incorporating sustainability requirements explicitly into vendor contracts (University of Maryland and University of Pennsylvania). Cornell has been a leader in this area, having either proposed or implemented measures such as: charging a small fee for single-use plastic bags in campus retail outlets, "fast tracking" sustainable products in the University's online procurement system, and coordinating with local vendors to consolidate their campus shipments.

Food: Source reduction initiatives are at the forefront of waste reduction strategies in Higher Education institutions. In fact, Rutgers University's peer institutions have developed robust and model source reduction programs. A number of institutions have implemented reusable to-go containers with the complete removal of disposable containers. In addition to source reduction strategies, Syracuse, Duke, Cornell, University of Pennsylvania and University of Maryland have focused on increasing the composting of organic waste. Composting organic waste helps divert organics from landfills and incinerators, ultimately reducing their impact to the environment. In terms of peer institutions strategic approach to food and beverage procurement, the idea is to bolster and increase local and regional purchases as much as feasibly possible. In order to support local purchasing, peer institutions have implemented on-campus farms and gardens.

Most importantly, the education of the community of students, faculty and staff around sustainable dining has and will play an important role here Rutgers as it has at our peer institutions. For example, programs such as Cornell's "Beyond Ramen" food literacy program and the establishment of the "Water and Food Security Lab" at MIT are breeding grounds for sustainability innovation, engagement and progress. Education about sustainable dining presents a key opportunity for enhancing sustainable practices, driving successful outcomes and ultimately sensitizing the community.

Waste Stream*:* Most of our peer institutions have committed to significantly reducing waste on their campuses through increased recycling and composting, and reduced purchasing of disposable items such as dining ware. Recognizing that a waste audit is the first step in reducing waste, Cornell University, University of Pennsylvania and Syracuse have all engaged in extensive waste audits and assessment of GHGs associated with their waste. For the most part, peer institutions have taken an incremental approach to reducing waste as part of their Climate Action Plans. For example, the University of Pennsylvania's Climate Action Plan seeks to increase their recycling rate from 24%, to 30% by 2019, and continue to reduce overall municipal solid waste. Furthermore, the Office of the President committed to zero waste administrative events, thereby demonstrating feasibility and leadership at their institution. By establishing a Zero Waste goal, Rutgers University would become among the leaders of our peer institutions in waste reduction.

Consumable and Durable Goods: Consumable and durable goods refer to those goods that the university purchases to run its operations and fulfill its education mission. It is a very large category that encompasses a variety of items, such as office supplies, computers and audiovisual items, medical and lab supplies, furniture. Thousands of different products are purchased every semester, each one with different life spans, from different vendors, delivered at different times. No university has tackled this domain yet and Rutgers University has the opportunity to develop a meaningful framework to address the environmental impact from consumable and durable goods. As previously stated, even if data were available, there is no established, recognized method to calculate and account for supply chain emissions of goods in institutions of higher education.

Moreover, while calculating the magnitude of carbon emissions from the supply chain is a useful exercise, it carries limited value in informing future decisions. Ultimately the university needs furnished spaces, computers, medical and scientific supplies, nutritious food, and more to fulfill its education mission and house offices and residences. Thus the overall approach to lower the environmental impact from procurement reflects sustainability goals, for which GHG impact is unknown. Sustainability goals revolve around supply and demand management. On the supply side, the top recommendation is to establish a formal collaboration between Procurement Services and the University Sustainability Committee. The goal is to expand on existing overlap of their missions to coordinate effectively with regard to the engagement of vendors on sustainability issues. Areas of work include a) the evaluation of end-use products, their processes and deliveries b) discussion of sustainability initiatives at each quarterly review and c) addition of a sustainability component as part of each category of sourcing. On the demand side, the recommendation is for the University to design and implement programs to engage the thousands of Rutgers employees who make purchases on a daily basis. A critical key to success is the ability to identify and reward virtuous behaviors that lower overall consumption levels.

For furniture, a policy recommending the reuse and refurbishment of existing items already exists. The recommendation is to reinforce that policy in two ways: make the reuse, refurbishment or the purchase of used furniture the norm while creating a separate, exception process for approving the purchase of new furniture.

Finally, these recommendations provide many opportunities for research and education that can enrich students while informing the University's decisions. The recommendation is to build the analytical and curricular Capacity for embodied carbon, life-cycle and supply-chain analyses.

Where We Are-Supply Chain

Although no policies exist to mandate the purchase of green equipment, there are standards we direct all customers – especially in the printer, copier, PC world where green certifications play a role in the selection process. In fact, Rutgers University purchases energy star copiers, kitchen equipment, and computers. In addition, 90% of Rutgers purchases are qualified for certification under Green Seal, Environmental Choice

certified, or biorenewable cleaning products. Furniture for student residences is made in Vermont, usually last a few decades, and, at the end of their life, are donated. Office furniture, on the other end, are purchased on a per-need basis and are recycled when replaced.

In 2004 Rutgers Procurement& Sourcing launched the Green Purchasing Initiative in an effort to reduce the University's environmental footprint through the products and services in procurement. Actions were taken to choose products and services with a smaller environmental impact, consolidate ordering and deliveries so products arrive in bulk, and reduce supplier packaging material to decrease waste. In addition, Rutgers Procurement Services has developed primary contracts with vendors including Office Depot and VWR who offer alternative products for use in both office and laboratory. Recently, Hewlett Packard was also engaged to discuss low-ink toners and printers.

From a data perspective, there is no centralized system to track any kind of data on consumable goods. The only data available is expenditures on procurement through the Strategic Sourcing Initiative (SSI). In February of 2016, senior leadership engaged a third-party consultant to evaluate Rutgers University's spend data for the calendar year 2015. The goal was to identify actionable and measurable areas of spend through a Strategic Sourcing roadmap so as to achieve cost savings. Eighteen sourcing areas were identified and several projects have been implemented to date. Some of the selected targets for sourcing are commercial print, small parcel, laptop/desktop, IT Peripherals, Scientific Distributors, Servers/Storage, Janitorial Supplies, Mobile Phones and Promotional Products. This is an important effort as sustainability goals can be coupled with savings to the University. An example of the collaboration between Procurement Services and the University Sustainability Committee is the Commercial Print Program. This was a vendor consolidation project (to cut list of suppliers from over a 100 to 11) and the University Sustainability Committee was very engaged in selecting preferred suppliers that have sustainable production processes and use sustainable consumables in their process (like soy-based inks).

Where We Want To Be-Supply Chain

For durable goods, that is dorm and office furniture, it should be the University's standard practice to prioritize reused and refurbished items for small projects within the university. Such policy already exist within the University but it is largely ignored. Thus the recommendation is to give executive sponsorship to the policy with the goal of institutionalizing the use of refurbished or used items. For large projects, that is major renovations and construction of new buildings, the recommendation is for Rutgers Procurement Services to work with vendors in identifying and procuring sustainably-sourced items. Such strong signal would incentivize designers to think more strategically on how to incorporate sustainability in their products and services. Moreover, a third recommendation is to develop furniture guidelines to be included in the appendix of the Project Planning and Delivery document. Finally, a fourth recommendation is to revisit the current platform where administrators view and acquire used items.
Such internal, digital marketplace already exist but it remains a niche tool. Part of the process should include creating visibility for the platform, facilitating access, and raising awareness to administrators and other employees.

For consumable goods (office supplies, medical and scientific equipment, IT devices just to name a few) the effort should focus on both supply and demand. On the supply side, the recommendation is for a closer collaboration between Procurement Services and the University Sustainability Committee. The University should expand on current vendor engagement by:

a) Adding a sustainability and climate change component to each category of sourcing
b) When appropriate, have the University Sustainability Committee representatives attend quarterly meetings with key suppliers
c) As part of the evaluation, establish with vendors a set of sustainability indicators not only for end-products but for processes, packaging and delivery
d) Identify opportunities to purchase products and services that are produced and sold by businesses with strong environmental management standards, policies, and practices
e) Leverage key suppliers to help Procurement Services perform green assessments, given their expertise and insights into best practices across higher education and other industries. For example, Thermo Fisher performed an onsite assessment of Rutgers' campus labs to measure energy output from equipment such as freezers and hoods.

If the supply side of procurement is fairly centralized, the demand for consumable goods is spread out through the various departments of the University. Thus, a critical piece will be the engagement of the community in making informed, sustainable choices. The recommendation is for the University Sustainability Committee and Procurement Services to design awareness and engagement programs to effectively nudge administrators and other employees towards sustainable products and/or lower need of supplies. This can be accomplished through a number of projects. For example, we should consider adding a new feature to the RU Marketplace (purchasing platform), where administrators can filter for sustainable products based on predetermined designations within the catalogs. Once the University Sustainability Committee reviews and verifies the criteria for deeming a product sustainable, the item will be highlighted with the University Sustainability Committee green leaf logo. Other ideas for engagement include trainings and gamification. Competitions can be created across departments based on various sustainability indicators (fewer printed sheets, lowest number of items purchased, highest share of sustainable products purchased and so on). Another idea is to offer monthly seminars to departments covering one set of items each time and presenting sustainable options: for example discussing office supplies in January, kitchen and coffee supplies in February, IT computers and printers in March and so on. Lab supplies should be discussed as part of the combined safety and sustainability training.

How to Get There

2020-2022

1. FURNITURE: Institutionalize policy to prioritize used and refurbished furniture. Develop furniture guidelines to be included in the Project Planning and Delivery document.

2. CONSUMABLE GOODS- SUPPLY SIDE: Rutgers Procurement and the University Sustainability Committee to work with individual vendors to enhance the sustainability characteristics of products and services
3. CONSUMABLE GOODS- DEMAND SIDE: create demand management programs such as awareness and engagement initiatives targeting departments and administrators
4. ANALYTICAL/CURRICULAR CAPACITY BUILDING: Develop the capacity on campus for research and curriculum in life cycle and embodied carbon analysis

Where We Are-Waste Stream

"Becoming a leader doesn't happen overnight. At Rutgers we believe that hard work cultivates success, which, in turn, invites greatness. It is no surprise that Rutgers University has long established itself as the university to emulate—for academics, for research and for recycling.

As early as 1972, Rutgers University began its journey to environmental sustainability by establishing a voluntary recycling program. The movement has continued to grow and evolve through the years into an award-winning recycling program.

The Rutgers recycling program has enjoyed many successes, including in the annual RecycleMania competition, winning the "Total Recycling" category for 11 successive years!

As an academic institution, we believe we have an obligation to strive to be the most environmentally responsible university possible. Our consumption and use of products is inevitable, but it is not inevitable that these activities result in environmental devastation or mountains of waste." Rutgers IPO Facilities (https://ipo.rutgers.edu/leading-recycling)

Waste data is obtained after it is hauled by Rutgers' vendors and is provided in the form of monthly invoices, either through the vendor's direct weighing or through estimates based on a container-to-weight ratio provided by the vendor. While this is accurate and direct in large trash containers, the weight of a portion of Rutgers' waste is estimated based on size of container and its assigned container-to-weight ratio. Given the advanced technology now available for data capture and storage, it is possible to improve data accuracy in real time and enable more robust management of the waste stream.

Over the past decade, initiatives by *the University Sustainability Committee*, Rutgers Dining, and IPO have led to significant progress in the effort to reduce waste.

Where We Want to Be-Waste Stream

At a broad level what is required of the University will be to establish a commitment to implementing an integrated approach to waste minimization and diversion that will improve the University's waste minimization and diversion efforts. The University should develop a more robust infrastructure to accommodate additional recycling and waste bins, as well as a behavioral change program to engage the Rutgers Community. Strategies other institutions

have used to minimize waste and increase recycling rates include combinations of the following:

- Provide collocated recycling and waste receptacles only.
- Policies for online course materials, assignments, and testing to reduce printing.
- Provided paperless tools and workflows. Consider eliminating personal printers and standalone copiers and migrate to multifunction devices that store print images and minimizes printing (ability to cancel print jobs)
- Annual public waste audits as part of community education programs.
- Eliminating disposable to-go containers and tableware.
- Provide floor-by-floor recycling infrastructure to all the large dorms. (pilot)
- Hand dryers in lieu of paper towel dispensers.
- Eliminating one time use plastic bags/containers or charge for them to incentivize low usage.

2.2. Early opportunities for action

The Working Group identified multiple solutions for implementation. The following five solutions that could be achieved in the short-term:

1. **Freshmen Cohort Awareness Building**: Reach out to incoming students early by making sustainability (recycling) information at orientation available and/or as a topic for 1-hr courses (For Freshman)
2. **Universitywide Awareness Program:** Create an awareness campaign for sustainability, waste reduction and recycling for all students, faculty and staff
3. **Source Reduction and Reuse:** Implement a comprehensive University source reduction & reuse policy and program. Connect with Surplus Equipment Management Program
4. **Engage with Supplier Sustainability Programs:** Contract with suppliers that offer end-of-life reuse, recycling, and/or takeback programs. (i.e. pipette's and vials in lab)
5. **Eliminate Plastic Bags:** Eliminate plastic bags in all retail and foodservice establishments in campus facilities

Long-term solutions identified by the Working Group are noted on the Solutions Template.

WG4 Solutions Template.xlsx

For each short term solution recommended in this report, we have provided a specific description of:

- ***who*** at Rutgers needs to do ***what*** to implement the recommendation
- known institutional barriers to implementation and solutions to overcome
- metrics to evaluation
- any available sources of additional funds to support

2.2.1 Freshmen Cohort Awareness Building

Reach out to incoming students early by making sustainability (recycling) information at orientation available and/or as a topic for 1-hr courses

A. Reach out to incoming students early by making sustainability (recycling) information at orientation available and/or as a topic for 1-hr courses

- **Stakeholders involved in implementation:** Student Affairs, Resident Life, Greek Life, Institutional Planning & Operations (IPO)/Housing, Student workgroups, College Deans, Climate Mobilization Office (CMO)
- **Known institutional barriers to implementation and solutions to overcome:** Conflict with established orientation and incoming student programs. The WG4 Team and student workgroup will work with Student Affairs and School representatives to negotiate timeslots for inclusion into orientation programs.
- **Metrics to evaluation:** Post orientation surveys (immediate, semi-annual and annual to measure effectiveness of program)
- **Financial Cost (estimated):** $5K for potential costs for the film, estimate $20k for promotional material at orientation.
- **Available sources of additional funds to support:** University Communications and Marketing and Rutgers University Television Support.

1) Activity: During Spring/Summer 2021, WG4 will work with a targeted small student workgroup comprised of Rutgers School of Environmental and Biological Sciences (SEBS) and Rutgers School of Engineering (SOE) students, Dean's Office representatives, and Student Affairs representatives to create a pilot orientation video. The plan is to create a short 5-8 min intro film for the incoming Rutgers students. Based on the response/feedback we may create more targeted climate impact films. The first film will be a dry run for SEBS and SOE (Spring/Summer 2021).

B. Include sustainability education in New Student Programs, University Housing, University and college ambassadors, and Fraternity and Sorority Life.

- **Stakeholders involved in implementation:** Student Affairs, Resident Life, Greek Life, IPO/Housing, Student workgroups, College Deans, Climate Mobilization Office (CMO)
- **Known institutional barriers to implementation and solutions to overcome:** The ability to coordinate and communicate to various University groups simultaneously and effectively. A solution to overcome this is work with the overarching Office of Student Affairs to integrate all aspects of climate impact and sustainability throughout all communications (verbal, print and web). Also have University Climate Mitigation Office and student leadership present at orientations and major events.

- **Metrics to evaluation:** Surveys will be taken after each scheduled activity and behavioral/performance evaluations will be conducted by IPO.
- **Financial Cost (estimated):** $2K/Yr. for potential costs for marketing and communication materials.
- **Available sources of additional funds to support:** Student Fees and Sustainability Fund Raising Events. Utilize University Communications and Marketing professionals.

Activity Key: **(C)** On-going Communication/Marketing, **(TE)** Targeted Event, **($)** Requires Funding

1) **Activity:** Provide sustainability training to New Student Orientation Leaders **(C, TE).**
2) **Activity:** Encourage new students to continue using the reusable bags and bottles they receive at New Student Orientation **(C).**
3) **Activity:** Promote programs/events that connect sustainability to all University events **(C).**
4) **Activity:** Certify Convocation events as sustainable **(C, TE).**
5) **Activity:** Provide climate impact and sustainability information for RA's to include in their hall meeting in the Fall/Spring **(C, TE).**
6) **Activity:** Present climate impact and sustainability information focused on residence halls to appropriate Residence Hall Committees **(C).**
7) **Activity:** Recognize the Most Sustainable Chapter award winner at Fraternity and Sorority Life's Order for example Omega Awards **(C, TE, $).**
8) **Activity:** Establish Fraternity and Sorority Life's Standards evaluation sheet to include a climate impact and sustainability section **(C).**

2.2.2. University-wide Awareness Program

Create an awareness campaign for sustainability, waste reduction and recycling for all students, faculty and staff

- **Stakeholders involved in implementation:** University Human Resources, All Administrative Offices (IPO, Treasury, etc.), All Chancellor Office's and Units, Student Affairs, Resident Life, Greek Life IPO/Housing, Student workgroups, College Deans, Athletic Department, Procurement, Climate Mobilization Office (CMO)
    - To help with the implementation of this program, it might be advisable to engage a consulting company; they would be able to advise Rutgers on funding solutions along with a variety of projects that have worked for other organizations.
- **Known institutional barriers to implementation and solutions to overcome:** Ability to coordinate and communicate to various University groups simultaneously and effectively (Academic and Administrative).

A solution to overcome this is to:

- Work with the overarching Chancellor Unit Leadership to integrate all aspects of climate impact and sustainability throughout all communications (verbal, print and web).
- Have the University Climate Mitigation Office and student leadership involved in the development and execution of all awareness programs.
- Proactive Realignment with current service providers (Example any outsourced services provider such as Janitorial services, food services etc.) to require recycling as part of the services rendered – separate collection of recyclables and delivery to a central collection points.

- **Metrics to evaluation:** Surveys will be taken after each scheduled activity and behavioral/performance evaluations will be conducted by Climate Mobilization Office (CMO)
  - Also recommended to collect and publish facts and figures of waste generation and recycling by building/unit – establish recycling goals, publish posters showing campus / school /Unit wide progress.
- **Financial Cost (estimated):**
  - Athletic Post game clean up and advertising $25,000
  - Consulting Company $25,000
  - Sign development and distribution $15,000 - $25,000
  - Video production, distribution and management - $5,000 - $10,000
  - Coordinator for activities - $45,000 - $75,000
  - Cost of incorporating recycling into 3rd party services providers (TBD) *e.g., some costs are for marketing and communication materials and student/faculty stipends.*
- **Available sources of additional funds to support: TBD**

- **Additional Information:**
  - Campus community buy-in is essential for waste minimization and recycling efforts to be successful.
  - The biggest opportunity to increase recycling at Rutgers is to increase staff, faculty and student participation in the program. From freshman dorm rooms to the President's office, Rutgers needs to increase the accountability expected from students, faculty, and staff.
  - Every individual on campus needs to participate in recycling for it to reach its potential as a cost-effective and environmentally and socially responsible approach to handling waste.
  - Rutgers students have a positive outlook on recycling, but lack focus or direction on an approach toward how they implement it. In broad terms, this is due to lack of awareness for the full extent of the consequences of actions, externalization of costs, and denial that small habitual actions have the potential for very big impacts.

- There is an assumption that recycling is intuitive, that everyone knows how to do it, but this is not true. Greatly expanding educational efforts around recycling will not only improve the viability of the Rutgers recycling effort, but will help students, staff and faculty be more effective recyclers at home and elsewhere, something that is critical if as a culture Rutgers is ever going to develop a viable, long-term recycling program.
- The overall education program will prioritize educational projects that have the largest impact on reducing waste and increasing recycling, that save money and that change perceptions and behaviors to minimize waste.

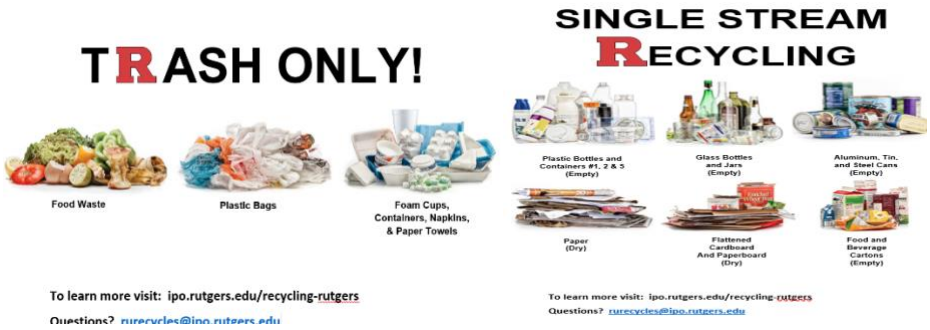
Activity Key: **(C)** On-going Communication/Marketing, **(TE)** Targeted Event, **($)** Requires Funding

1) **Activity:** Recruit and integrate student and faculty volunteers in promoting and communicating recycling on campus **(C).**

2) **Activity:** Develop service-learning activities for classes to participate in **(C, TE, $).**

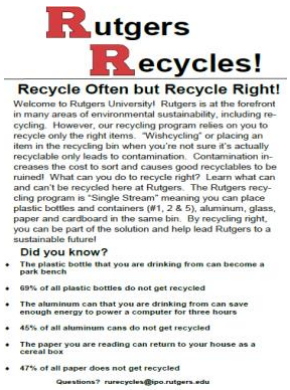
3) **Activity:** Involve students in every aspect of the program possible to increase its effectiveness and to increase experience and skills in the student body around recycling **(C).**

4) **Activity:** Define expectations by setting universal standards across campus **(C, TE, $)**.
    - Acceptable and non-acceptable materials need to be clearly listed, defined, and publicized. It will be necessary to work with students to design the "best" recycling and trash signs and standardize them throughout all of Rutgers. Current signs are below.



5) **Activity:** Produce literature for orientation packets to introduce recycling to new students **(C, $).**

6) **Activity:** Present educational information in multiple places in the orientation process. See below: informational cards given to each resident on campus **(C, $).**



7) **Activity:** In addition, it would be beneficial to create a "module" to serve as a test for student's knowledge of recycling **(C).**

8) **Activity:** Include waste minimization and recycling information and expectations in the new employee orientation **(C, TE).**
    - Make it clear that waste minimization and recycling are part of what is expected by "other duties" in position descriptions.

9) **Activity:** Offer a free waste audit and consulting program to help offices and departments reduce waste **(C, TE).**
    - Part of this program could include waste minimization posters, promotional materials or display kits available to offices at low cost.

10) **Activity:** Use branding to link school pride to waste-conscious behavior. Instead of the generic "campus recycling" we should call the program "RU Recycling." **(C)**

11) **Activity:** Advertise RU recycling at sporting events. This campaign should include Rutgers athletes, university administration, and other leaders from the Rutgers community in advertising and promotions. It will aim to tie good recycling behavior to RU spirit and the campus community. Keep in mind that RU Athletics is very strict about what is promoted and used for specific purposes. Certain promotions involving athletes would have to follow the Big 10 bylaws and other rules. Also, Waste Management is a sponsor of Rutgers Athletics, and any promotion would have to be worked in with them as well **(C, TE, $).**

12) **Activity:** Implement a recycling program with large groups of volunteers at all Rutgers sporting events. Incentivize volunteerism with tickets and other giveaways. There are many examples of successful programs at other universities, which Rutgers can use as a model. However, it is worth mentioning that getting large groups together and on a consistent basis can be challenging. A lot of people love the idea of doing it until they realize what it entails (i.e., picking up and sorting waste and trash) **(C, TE, $).**

13) **Activity:** Regularly announce recycling ideas on the campus radio station **(C)**.

14) **Activity:** Develop short films on public service recycling advertisements for the RUTV station **(C, TE).**

15) **Activity:** One idea is to have a student recycling video competition. Rutgers might be able to offer something desirable like an iPad or iPhone as a prize **(C, TE, $).** Rutgers IPO has a promotional piece that they produced and was running in student and recreation centers on campus pre-covid https://www.youtube.com/watch?v=L6RWfSxAxps
A link to the IPO recycling webpage is also provided. https://ipo.rutgers.edu/recycle-at-rutgers
In addition, two video samples from a Rutgers student are provided (may require downloading). Impact-of-TP.mp4 Sustainable-procurement.mp4

- Key to the success of the effort is explicit support from Senior Leadership/ President's Cabinet, and student groups. Many people at Rutgers will respond to a call by leadership to increase their effort in recycling. The President and Chancellors need to use their positions as a "bully pulpit" to advocate for increased recycling efforts. Examples of specific activities that the President and Chancellor can do to help support this effort include the following **(C, TE):**
  - Model the behavior we want others to adopt. All events arranged by the President's and Chancellor's offices should be zero or minimal waste.
  - Emphasize the importance of the effort periodically, and at large gatherings and venues on campus.
  - Publicly endorse waste minimization goals

16) **Activity:** Have hackathons with students or staff, and award a prize/award on an annual basis to create excitement **(C, TE)**.
17) **Activity:** Develop an app for students to be able to track carbon footprint, and develop a reward system for milestones achieved **(C, TE, $).**
18) **Activity:** Create a social media campaign for Instagram, Twitter and LinkedIn with periodic informative posts about our recycling program and sustainability initiatives to create awareness and educate the students, faculty and staff that follow these accounts. Identify and leverage RU Influencers in Social Media. **(C, TE, $).**
19) **Activity:** Show ads about this initiative as well as tips for students to follow on the screens in computer labs, student centers and libraries **(C, TE).**
20) **Activity:** As an additional item, the University source reduction & reuse policy and program (assignment #3) needs an awareness campaign as well. The items below need some promotion.
    - Formalize and promote the Rutgers assets transfer process. This system is designed to connect those with available campus assets with those who can put the assets to further use **(C, TE).**
    - Formalize and promote Rutgers used furniture inventory program to program to collect, store, and redistribute modular (and other) office furniture for use by University Departments **(C, TE).**

- Create an annual “move out and reduce waste” campaign. It would be an annual campus-wide waste-reduction and recycling program to reduce move-out waste **(C, TE).**

C. Create a sustainability workshop series that contributes toward student leadership development.

1) **Activity:** Student Environmental Groups and their leadership will create and contribute to a NEW annual Rutgers sustainability leadership conference; additional topics via workshops will be made available during the annual conference.

    - **Stakeholders involved in implementation:** Student workgroup
    - **Known institutional barriers to implementation and solutions to overcome:** TBD
    - **Metrics to evaluation:** TBD
    - **Financial Cost (estimated):** $5K for potential costs for the film.
    - **Available sources of additional funds to support:** University Communications and Marketing

2.2.3. Source Reduction and Reuse

Implement a comprehensive University source reduction & reuse policy and program. Connect with Surplus Equipment Management Program

- **Stakeholders involved in implementation:** IPO, Procurement Department, University Contracted Suppliers, Chancellor Units, Student Affairs, Student workgroups, College Deans, Climate Mobilization Office (CMO)
    - Climate Mobilization Office (CMO)
    - Procurement
    - OIT
    - Rutgers Environmental Health & Safety (REHS)
    - IPO- Surplus Material Services
    - IPO – Environmental Service
- **Known institutional barriers to implementation and solutions to overcome:** The key barrier is the lack of a universitywide program. The university operates in a decentralized manner when it comes to purchasing, recycling, and reuse. Decision-making is fragmented. Understanding the behavioral issues of faculty, students and staff to do the right thing; and require contracted suppliers to participate via their contracts. These issues can be overcome with the implementation of a Climate Mitigation Office and a dedicated staff to oversee the source reduction and reuse policy and program.

    - First: Keeping these initiatives under the university policies and involving responsible parties for comment and input.
    - Second getting the information needed on a one source- website (time, effort, person-hours)
    - Storage location(s) for such an initiative.
    - Staffing line and budgets would need to be review for such a process.
    - Cost and change in focus
        - Any new or process changes causes cost increases. These may be reduced over time, but need to be considered before doing anything in a new way.
        - Change in Focus: A sharper focus toward sustainability might produce revisions and rethinking of policies and guidelines.
    - Having and advisory group (with significant input from IPO leadership) to mentor any change might be a good investment.
- **Metrics to evaluation:** Post orientation surveys (immediate, semi-annual and annual to measure effectiveness of program). Produce financial reports from IPO (e.g. Surplus, Facilities, and Procurement to show the impact of policy and programs)
- **Financial Cost (estimated):**
    - For the most part, the budgets for the activities identified above have already been established and are captured by IPO and distributed out to the various campuses via the RCM model.
    - The move out campaign and computer reuse association (if implemented) are roughly estimated at $50,000, with $35,000 for the move out budget and $15,000 for the computer reuse association. (this would be for start-up)
    - $5K/Yr. for potential costs for marketing and communication.
- **Available sources of additional funds to support:**
    - Surplus Materials Services has the knowledge, experience and some of the infrastructure to implement any of the sustainability initiatives. This is most important because Rutgers does not have to start from ground zero when introducing the sustainability initiatives involving reuse, recycling and reduction. Discussions with IP&O leadership would be recommended to see if this could be managed under this experienced group.
    - Financing and sponsorship opportunities need to be identified and harnessed for any long-term infrastructure improvements that might be needed to support the sustainability initiatives.
- **Additional Information:**
    - Rutgers University has already developed several programs aimed to facilitate the reuse, recycle or re-purpose of materials and reduce landfill

waste. These services are offered by Surplus Materials Services. They work well, but the biggest challenges are promoting and encouraging the use of these services and keeping new items or any changes needed within the guidelines and policies of the university.

- Engage with University Communications and Marketing, and Rutgers University Television Support to promote program awareness activities.
- Rutgers must ensure due diligence and cross departmental coordination PRIOR to initiating the intention to share/sell equipment. A checklist should be used to ensure appropriate clearances are obtained.

  Sample Checklist items should include (not limited to the following):
  - Surplus Material Services (Disposal/auctions)
  - Property Management (Accounting/asset tracking) – financial accounting
  - Audit Advisory / Tax office/ Research Finance (Disposition of donated Equipment and materials – ownership rights and permitted usage etc.) examples - Equipment purchased on federal grants may not be transferable or sold without prior approval. Likewise donated equipment may have restrictions that need to be evaluated.
  - Risk Groups such as REHS, OIT (Data/chips), insurance for moving equipment
  - Facilities groups to address logistics and utility hookups etc.

- Students for Environmental & Energy Development (SEED) completed RU Recycle Project (Waste audit) in 2019.
  - Data from waste characterizations (*=residence area)
  - Buildings sampled: Campbell Hall*, Livi Apt B*, Yard*, Quad 1*, Hill Center, Hickman Hall, 33Knightsbridge.
  - **Findings:**
    1. College Ave River dorms had 0% recycling besides boxes.
    2. Hickman Hall had a 73% contamination rate for recycling
    3. The Livingston Apartment B performed the best with waste separation
    4. Hill Center and 33 Knightsbridge had the lowest recycling contamination rate at under 5% and 10% respectively.
    5. On a typical week, Waste Management (WM) rejects one truck worth of recycling from Rutgers due content
    6. Contaminated material (over 10%) results in costs increase by 25-50 % per ton
    7. Most common recyclables found in trash: copy/notebook paper and cans.
    8. Top 5 contaminants in recycling: plastic bags/wrappers, liquids, food containers/plates, utensils, paper cups

- Academic Buildings
  - WM wants Rutgers to move away from bagging recyclables
  - Electronics, appliances, batteries, printer cartridges and mercury projector bulbs found in dumpsters (need a better and easier to use collection system for faculty and instructions for custodians)
  - Custodians are often not given a separate labeled barrel to collect recycling (makes it easy to mix up)
    - Look into using black bags for trash and white/clear bags for recycling to make them easier to distinguish.
  - Mail room areas have piles of boxes and packaging (maybe have a cart for boxes that can be reused)
  - Cafeterias in student centers: Recycling bins are too large& not enough trash cans (only 15% of waste stream is recyclable)

- Residence Halls
  - Many of the halls have 2 grey cans in each room (with vague stickers)
    - Look into buying hang-on blue recycling bins
  - Lack of color coordinated bins and labels
- Apartments (Cook and Busch)
  - Residents take out their own trash/recycling, but many are unaware that recycling cannot be in black bags (ideally no bag)
  - Potential options to test: providing a reusable bag to collect recycling, applying a "No Bagged recyclables" sign on recycling dumpsters
- Stadium
  - Trash signs have recycle symbol on them
  - Common contaminants: foil, wrappers, food cartons, napkins, cups with liquids
  - Solution: Use Recycle Across America "Trash" and "Glass, cans and plastic bottles Only" labels (used by major airports and stadiums- resulted in 90% contaminant reduction) https://labels.recycleacrossamerica.org/category/glass-cans-and-plastic-labels
- SEED Waste Audit Data


SEED Waste Audit Data.xlsx


SEED Waste Audit Data2.xlsx

Activity Key: **(C)** On-going Communication/Marketing, **(TE)** Targeted Event, **($)** Requires Funding

A: Develop a comprehensive University source reduction & reuse policy and program.

1) **Activity:** System for trade and auction

- Rutgers has a system for trade and auction for the distribution of non-capital materials. This needs to be evaluated for large-scale use, upgraded as needed, and promoted across the University. It works well but would be even better if it were more widely promoted. The group assigned to item #1 "create an awareness campaign for sustainability, waste reduction and recycling" will include it as part of its assignment **(C).**

2) **Activity:** System for the Transfer of assets

- Rutgers also has a system for the transfer of assets. This system is for items of any value and designed to connect those with available campus assets with those who can put the assets to further use. These programs should be promoted across units. Surplus Materials Service is also working on an inter-campus auction model. This service should be regularly promoted through the in-house Rutgers information system or the Climate Mobilization Office (CMO). The group assigned to item #1 "create an awareness campaign for sustainability, waste reduction and recycling" will include it as part of its assignment. Also, since the infrastructure and support for this system has already been developed and established, it might be a good idea to reach out to the group in RWJMS working on Rheaply. There might be opportunities to reduce duplication and increase efficiencies. Surplus Materials Services has what Rheaply is missing, and that is experience with Rutgers policies and the ability to manage and support it as another offering for the needs of the lab personnel **(C, TE).**

3) **Activity: Furniture inventory and reuse**

- Rutgers has a used furniture inventory program to collect, store, and redistribute modular (and other) office furniture for use by university departments. It has all of the elements of an asset inventory management program. By managing the active customer inventory, the Rutgers system has created an avenue for less new products to be purchased. It should be noted, that Surplus Materials Services has found that this type of program as many moving parts and that what seems to be a simple exchange and deployment program is not as simple as it appears. The complicating components are collection, breakdown, storage, and delivery. Also, some types of furniture may be specific to a floor design and others might not have parts available due to the manufacturer no longer producing the specific furniture. Offering used furniture for free (except for delivery) would be a great benefit, but the associated costs of all the elements to this program needs to be reviewed and discussed. One final note, used furniture received by Rutgers is often donated at the end of its useful life. The value of recycling is diminished when the product is no longer functional or beyond repair **(C, TE).**

4) Activity: Student move out campaign

- Creating an annual "move out and reduce waste" campaign was discussed. It was envisioned as an annual campus-wide waste-reduction and recycling program to reduce move-out waste. Student and staff volunteers would collect items students might otherwise throw away when leaving campus in May, sort and organize the collected items over the summer, and resell them at a large community sale when students return in August. Environmental Services under the direction of David Dehart has offered this type of program in the past. Surplus Materials Services will reach out to him as it is beyond the scope of surplus for university assets **(C, TE, $).**

5) Activity: Gov.deals.com

- Rutgers partners with and offers surplus items on Gov.deals.com. This is a listing website that provide reuse opportunities for kitchens, medical equipment, eyeglasses, architectural items etc. This website, floods all markets that are specific to the equipment **(C, TE).** In many cases, when a sale is made, a department receives residuals form that sale as outlines in- https://ipo.rutgers.edu/sites/default/files/30.4.3-current%20%2800023630-2xDE114%29.pdf

6) Activity: Computer Reuse Association

- Creating a Rutgers Computer Reuse Association was proposed. The association was envisioned to be a Rutgers student group whose mission is to donate computers and other computer-related technology to humanitarian organizations in the developing world, the local community, and elsewhere. While the vision is noble, it should be noted that many aspects of this would have to be explored further. First, any computer equipment regardless of where it came from needs to have the involvement of OIT. The issue of disposing of hard-drives and chips with sensitive or private information is of greatest concern and should be considered before moving forward with any reuse association. Second, there have been issues in the past with allowing dependents to do as they seem fit. A policy is needed with input from people both inside and outside the organization. Approval processes would also have to be addressed to allow for the safe and secure transfer of these items in a responsible manner **(C, TE, $).**

B: Develop a Sustainable Labs Program

Summary:

- Labs are large consumers of energy on campus and serve as an important opportunity to lessen the campus' overall environmental footprint. A sustainable Labs program can help contribute to the University's goal of reducing building energy use. We propose a study to be conducted to establish a baseline for each building and establish University wide and Building goals for proactively reducing

energy usage. In a typical large research university, labs consume as much as 37% of building emissions. At U. Penn, for example, Labs comprise the largest percentage of emissions on campus.

- Conserving energy is an integral part of Rutgers's *Climate Action Plan*, as decreasing or eliminating consumption is the most direct method of reducing the University's carbon footprint. Labs have high air exchange requirements and use a lot of energy consuming equipment. These factors make them the largest sources of carbon emissions on a large university campus. Reducing waste and purchasing in a more sustainable manner can go a long way toward reaching climate neutrality.

1) **Activity:** First, the labs should be oriented around a goal theme such as **'Reduce, Reuse, Recycle'** to frame lab decisions sustainably **(C, TE, $).**
2) **Activity:** Second, each lab should have a point person for sustainability efforts **(C, TE)**
    - This person can coordinate or help with questions and decisions regarding sustainability in the lab.
3) **Activity:** Third, all labs should be recognized for their sustainability efforts **(C, TE).**
    - Acknowledgement incentivizes cooperation.
        - Increasing the visibility of a sustainable labs program can increase participation and discussion among labs and lab members. Also, increased visibility can improve peer influence for behavioral change and encourage neighboring labs to participate. This can increase buy in and support the sustainable improvements made in the labs.

4) **Activity:** Reduce individual shipments by consolidating orders. For example, go down to bi-weekly or monthly ordering **(C, TE).**

5) **Activity:** Reuse: Share extra chemicals and used equipment with the Rutgers community and neighboring labs to reduce purchases. Post used items for reuse on Rheaply (perhaps to be re-branded as …The RU Lab Recycle and Restore Platform) and search there first when a lab needs new supplies **(C, TE).**

6) **Activity:** Recycle Ensure all Rutgers labs have ample, well labeled, recycling bins and that lab personnel know what can be recycled **(C, TE, $).**

7) **Activity: Recycle traditional recyclables - including pipette trays, gloves**
    - Because of the liquids that scientists' pipette, tips are not recyclable. The racks and packaging, however, are recyclable. Rutgers does not have a clearly identified pipette oriented recycling program. There is a company called "TerraCycle" that has a recycling program for these kinds of items. It provides a complete waste collection, shipment, and recycling solution for used pipet tip boxes. All brands of plastic pipette tip boxes are accepted. The plastic waste is ground, melted, and pelletized through extrusion to create recycled resin. The resin is then combined with other recycled plastics to make park benches and other eco-friendly products. Engaging a company like this might be beneficial **(C, TE).**
    - IPO previously assessed recycling of nitrile gloves. The issue is that we must certify that the gloves are not contaminated. This is difficult to assess and

maintain across the university and thousands of labs. If moving forward we may want to consider bringing together a stakeholder group to determine the best steps to take (i.e. training, separating contaminated from non-contaminated, oversight, and identifying facilities that will accept).

8) **Activity: Recycle printer ink and toner cartridges**
   - Rutgers participates with Ricoh in its ink and toner recycling program **(C, TE).** https://procurementservices.rutgers.edu/diversity-sustainability/ricoh-ink-toner-recycling-program. Instructions on how to recycle are straight forward. This information should be on the lab sustainability website for easy access. Also, there is a company called "Telrose Corporation" that will pick up used printer ink and toner cartridges from any non- Ricoh printers at labs and make sure that they are re-used by the manufacturer. ***Note:*** *supplier names used to reflect information as it exists in 2021; this information and suppliers is subject to change in the future.*
   - Rutgers participates in an ink and toner recycling program offered by Office Depot **(C, TE)**. University Procurement Services manages the University's primary account. Units can be added to the account to print labels by following the instructions here. ***Note:*** *supplier names used to reflect information as it exists in 2021; this information and suppliers is subject to change in the future.*

9) **Activity: Recycle writing instruments**
   - Rutgers does not have a recycling program for writing instruments but, could create one in partnership with Office Depot, and TerraCycle. TerraCycle uses a process known as "upcycling" to create new products from the old and it donates two cents for each item donated **(C, TE).** ***Note:*** *supplier names used to reflect information as it exists in 2021; this information and suppliers is subject to change in the future.*

10) **Activity: Return Styrofoam shipping boxes**
   - Styrofoam shipping boxes can be sent back to the vendor via the postage-paid address label on the container for reuse and recycling. Labs, however, need to be reminded periodically by inter-university or direct communication. At the present time there is no consistent voice to reinforce or reward this behavior. One significant drawback is that Styrofoam is so porous and light, that transporting coolers back to the distributor for reuse can actually have a larger carbon foot print than manufacturing new ones **(C, TE).**

11) **Activity: Recycle cell phones, batteries, and portable electronics**
   - Rutgers could engage in a Big Green Box program to recycle its portable electronics, including cell phones and batteries of all kinds. https://biggreenbox.com/ The Big Green Box is shipped to a university pre-constructed. It is placed in a convenient location to start recycling. Once the box is full, it can be dropped off at any FedEx shipping location to have the contents recycled. Shipping and recycling costs are included in the initial price of the box. It is recommended that OIT be consulted before any of the above is attempted. Electronics, especially phones, have confidential or university specific information that need to be remove or cleared before any sustainable activity

undertaken. All OIT policies on any items containing data have to be reviewed and addressed **(C, TE).**

- Businesses shipping hazardous materials (i.e. batteries) must be shipped by an IATA/DOT trained individual and must be packaged correctly. Need to assess best process and oversight.

12) Activity: Take advantage of vendor recycling and take-back programs

- Vendor take-back is an increasingly common practice whereby a product can be returned to the company that sold it at the end of its useful life. Vendor take-backs have a number of advantages over traditional waste disposal, and have the potential to greatly increase environmental sustainability. For example, vendors of electronics may offer to collect and safely recycle them, preventing them from ending up in landfills. In addition, many vendors will take back packaging materials from their products and reuse them. This reduces waste, and also saves the vendor money and resources. Note, before sending anything back to a vendor, all university policies should be complied with and the items appropriately handled prior to return to vendor (i.e. erasing data on hard drive-OIT, removal of refrigerant from freezers-REHS). In the past, hard drives that contained sensitive information and removing them before disposal was relatively easy and straight forward. In many newer high technology products, especially ones used in labs, the hard drives have been replaced with chips. Sensitive information is often stored on these chips. They can be deeply embedded in the equipment and removing them can be difficult and costly **(C, TE, $).**

13) Activity: Recycle lab equipment

- Recycling of lab equipment that has been used or is potentially contaminated with hazardous or infectious substances must be appropriately decontaminated, cleaned, and any hazard warning labels removed. Equipment used with Radioactive Material requires decontamination and monitoring with an appropriate radiation detector prior to transfer. Any and all equipment that might involve the above substances must be discussed with Rutgers Environmental and Health Safety (REHS) prior to any movement, relocation, or repurpose. In addition, the recycling of all lab equipment should follow all Rutgers surplus policies and guidelines **(C, TE, $).** https://ipo.rutgers.edu/sites/default/files/30.4.3-current%20%2800023630-2xDE114%29.pdf
- Lab equipment, including most items with a plug, can be recycled so their valuable raw materials can be reused. Two companies, Eforce and Element, can handle these. There are also companies like Agilent and Eppendorf that have programs in place to collect worn out lab products. Large equipment pickup may only be offered with the purchase of a replacement product, but pickup is often free for smaller items. Details vary by company, and it is often necessary to arrange for pickup with a local representative **(C, TE, $).**

14) Activity: Rheaply is a new online exchange for surplus Rutgers lab property. This is setup as an easy way to post reusable items for sale or give-away to the Rutgers

research community, or to find items a lab may need. Reuse eliminates the need to buy new products and diverts used products from the landfill. Local reuse has the added benefit of reducing the effects of transportation: smog, congestion, and fuel use. This platform is currently planned to be offered on the Piscataway campus. Before moving forward, however, there needs to be approval from property management, audit, OIT (if data is involved), purchasing and surplus material services. In addition, some of the offerings may be subject to bidding requirements. Considerations for the platform is items should be donated at $0 cost to the community **(C, TE, $).**

15) Activity: Recycle computers and electronics

- Rutgers has an approved RFP vendor that has been vetted by REHS, audit, and purchasing. This vendor also purchases the equipment from Rutgers and offers recycled products back to the university **(C, TE, $).**
- This information needs to be placed on the Rutgers Climate Mobilization Office (CMO) website**(C).**
- Note: any equipment involving data leaving the university without going through OIT first is a violation. In addition, before disposing of any electronics it would be wise to consult with property management and audit and surplus material services **(C, TE).**

16) Activity: Centrifuges and Rotors

- Centrifuges and rotors can be returned and recycled with Beckman Coulter. The company has a relationship with Rutgers and accepts returns from other suppliers as well. It utilizes recycling/returns as trade-in value on a laboratory's next Beckman Coulter centrifuge purchase **(C, TE, $).**
- It should also be noted that Surplus Material Services typically works with the business professional within the department and is able to post this equipment to the gov.deals website. The website creates a market for others looking for equipment **(C, TE, $).** In cases, where a purchase is arranged the department typically receives residuals from the sale. Information can be found- https://ipo.rutgers.edu/sites/default/files/30.4.3-current%20%2800023630-2xDE114%29.pdf

17) Activity: Freezer replacement opportunities

- The use of -80F freezers is a significant source of greenhouse gas emissions on any university campus. According to data compiled on the EPA/DOE Labs 21 Program Energy Efficient Equipment wiki, the direct cost of electricity uses for an individual -80F freezer could be between $1,000 and $1,500 per year (at $0.15/kWh, not including the indirect cost associated with providing additional cooling to dissipate the heat generated by these units). In 2008, Stanford commissioned a study which found that its 2000 -80F freezers were costing the university $5.6 million per year to operate. Rutgers could offer a collaborative freezer recycling program when purchasing a new freezer from Panasonic Healthcare Company of North America. It is a University preferred contract supplier of laboratory equipment and supplies. This program, would have to be

promoted either directly to the lab managers or by some e-mail type internal communication **(C, TE, $).**

- It should be noted that no freezer can be recycled in the university without its Freon being removed. It is considered to be a hazardous material. The steps for removing the Freon are within the authorized surplus forms online. The cost for the process also is charged back to the departments **(C, TE, $).**

18) Activity: Onsite Supply Center

- Waste associated with shipping equipment and reagents to labs is unavoidable, a simple solution might be to develop an Onsite Supply Center. Instead of individually mailing each new order of lab materials, a supply center can be set up onsite to provide campus labs with the materials they need. This system almost eliminates packaging, as items are delivered in bulk to the campus supply center, where they are stored and then picked up as needed by lab personnel. Onsite supply centers have an economic benefit as well because items no longer need to be individually shipped to campus, and vendors may offer discounts for bulk purchases. Rutgers has a warehouse that provides the university community and operations & services with over 3,500 inventoried maintenance, custodial, electrical, plumbing, hardware, safety, locksmith and painting supplies as well as additional categories. IP&O has worked with University Procurement Services to create a process to support ordering supply central items using the requisitioning process in RU Marketplace **(C, TE, $).**
- Rutgers currently offers reagents within the supply center in small volumes. Typically, reagents are a "just in time" type material where the staff orders and receives it typically next day from the vendors. The need to store with such quick turn-around would need to be reviewed in greater detail. The university typically carries high volume items and items that can be scaled in a manner to create standards and be bid. The reagents mentioned above would be in the few and unique categories **(C, TE, $).**
- This is also an area where University Procurement Services can take a more active role by monitoring the spending behavior and pattern. If an item is continuously purchased they can then work to create a bid to carry the item and cut cost **(C, TE).**

19) Activity: Keep track of inventory in the labs

- Keeping an accurate inventory of materials on hand can reduce the amount of new materials needed to be purchased. Having an accurate inventory also assists in emergency response, fire safety compliance, stock rotation, use/disposal of expired or shelf-life chemicals. Properly labeling and storing reagents also ensures that others can use them in the future **(C, TE, $).**
- Perhaps yearly lab materials audits could be conducted to identify where surpluses are available and where more efficient practices are taking place. Maybe a reward system could encourage good behavior **(C, TE, $).**

20) Activity: Exchange mercury thermometers

- Rutgers has a mercury thermometer exchange program. Rutgers Environmental and Health and Safety (REHS) manages a mercury thermometer exchange program. Utilizing this program, researchers can exchange existing mercury thermometers with less hazardous alcohol thermometers, at no cost to the researcher. This information, however, is difficult to find. The lab person has to search for it **(C, TE, $).**
- It is worth noting that mercury thermometers are not something that surplus deals with as it is hazardous and should be discussed with REHS **(C, TE, $).**

21) Activity: Collect waste oils and solvents for reuse

- REHS manages and processes used laboratory oils and solvents. They have a process in place. Refer to website: https://ipo.rutgers.edu/rehs/labwaste-oil This information needs to be readily accessible on the lab sustainable website and is not currently easy to locate - to find it, the lab personnel have to search for it **(C, TE, $).**
- Note, this is not something surplus handles as it is considered hazardous **(C, TE, $).**

22) Activity: Shut down labs on Friday in the Summer

- Rutgers could shut down labs on Friday to reduce air conditioning costs in the summer **(C, TE).**
- Something like this was done at a former workplace. The entire college shut down on Fridays in the summer. Everyone worked a 40-hour work week in 4 days. The air conditioning cost savings were significant. This might be something that Rutgers could do to promote energy reduction **(C, TE)**
- Administration units/buildings could adopt a variation of this concept and incorporate into flexible work schedules, where Friday's could be worked remotely. **(C, TE)**

23) Activity: Purchase products that conserve energy

- Newer, energy saving models can use less than half the energy of older models. Labs should be encouraged to purchase a new appliance that is at minimum 20% more efficient than the current minimum code. By asking for ENERGY STAR and other efficient appliances and instruments, labs can help shift the market demand toward higher efficiency products. Academic labs comprise roughly 40% of the scientific market; this significant market share can have a big effect what on is produced and offered **(C, TE, $).**

24) Activity: Purchase products with reduced packaging or purchase products in bulk

- Bulk purchases and purchasing from services that reduce packaging help reduce the waste associated with distribution. Taking into consideration the need to assess materials handling and ergonomic issues related to handling larger, heavier products **(C, TE, $).**

25) Activity: Purchase products with recycled content and/ or packaging

- Recycled content and/or packaging reduce the raw materials used in the production and distribution of lab products **(C, TE).**

26) Activity: Purchase products with reduced toxic or hazardous chemicals

- Rutgers can reduce the amount of hazardous material that enters a lab by purchasing only the amount needed. The disposal costs of unused chemicals will more than offset the increased initial cost of purchasing a small quantity. Other factors for consideration are substitution, micro scaling, and use of technologies that eliminate or reduce the need for hazardous materials. Alternatively, if another lab on campus already has what is needed they can use **Rheaply** to share. Labs should be encouraged to keep an up-to-date chemical inventory in the lab to reduce redundant ordering and facilitate sharing **(C, TE, $).**
- Rutgers should consider using the MIT Green Chemical Alternatives Purchasing Wizard to help find alternative processes and chemicals for labs. This Wizard is intended as a tool to reduce the hazardous waste profile in research labs, an effort that ultimately saves money while reducing hazard potentials and the burden to the environment **(C, TE, $).**
    - **Stakeholders involved in lab implementation initiatives:**
        - Sustainability Office
        - Research Office (ORED)
        - Procurement
        - IPO – Surplus Materials and Environmental Services
        - REHS
    - **Known institutional barriers to implementation and solutions to overcome:**
        - Offering labs sustainability options that are in compliance with all of the various policies and guidelines within Rutgers, OIT, Procurement, IPO, REHS, etc.
        - Solutions
            - Getting the information needed on a one source- website (time, effort, person-hours)
            - Promoting and sustaining behavior change
            - Maintaining a consistent message and support
    - **Cost, behavior resistance, change in focus**
        - Cost- Initial change in any process causes cost increases. These may be reduced over time, but need to be considered before doing anything in a new way.
        - Behavior Resistance: It is human nature to resist change in some form. This can be overcome by encouraging and rewarding good environmental lab behavior.
        - Change in Focus: A change in focus toward sustainability might be disruptive in the initial change over period.
        - Having mentors in the labs to help might be a good investment.
    - **Metrics to evaluation:** Establish baseline and set targets (TBD)
    - **Financial Cost (estimated)**

- Website for Lab Sustainability Program development: $50,000 to $100,000 with ongoing maintenance of $25,000 per year.
- Market and communication budget: $15,000 to $25,000 per year
- Offsite warehouse: $0 to $500,000 with annual rent. $50,000

- **Available sources of additional funds to support:**
- **Opportunities:** Financing options must be identified and secured (Internal or external funding) for new equipment purchases.

Activity Key: **(C)** On-going Communication/Marketing, **(TE)** Targeted Event, **($)** Requires Funding

C. Develop a baseline for all waste streams to calculate a comprehensive waste diversion rate in order to set a short-term goal.

1) **Activity:** This will involve mapping out a process for streamlined data collection and looking to emerging technology to ensure a robust process to measure and track data **(TE, $).**

D. Complete and communicate a Zero Waste Management Plan that will guide the vision for zero waste management practices, define meaningful targets, and address education and research needs.

1) **Activity:** Identify key campus and industry partners that have direct impact on Zero Waste Management strategies **(C, TE).**
2) **Activity:** Develop a draft zero waste plan (ZWP) for campus input **(C, TE, $)**
3) **Activity:** Finalize plan, publish, communicate, and get support for a Zero Waste Plan **(C, TE, $).**
4) **Activity:** Update and streamline Reuse, Recycling, and Hazardous Waste section of Design & Construction Guidelines **(C, TE).**

E. A Waste Characterization Study should be conducted to develop a baseline, and to develop focused educational and training plans that will reduce the amount of recyclable material from entering the campus waste stream.

1) **Activity:** Develop a Zero Waste Training Module for each department that handles waste that is introduced to all operational staff **(C, TE, $).**

F. Develop a comprehensive reuse program to capture construction, office, departmental supplies, and donations from the campus.

1) **Activity:** Work with University Surplus (Materiel Services) to identify materials currently being sent to the landfill that can be diverted through either of these Surplus entities **(C, TE, $).**
2) **Activity:** Develop a legal agreement between the University and multiple non-profit organizations to allow the disposition of University material that is bound for the landfill **(C, TE).**

3) **Activity:** Establish a program to capture clothing, household items, furniture, appliances, and other items that departing students leave behind. Items are to be collected, clothing and furniture are donated to local nonprofits, recycling systems and other items are cleaned and stored in trailers for sale the following semester **(C, TE, $)**
4) **Activity:** Establish policy of purchasing 100 percent recycled, non-chlorinated paper products, and purchasing those products, as well as food items and cleaning supplies, in bulk to reduce the quantity of packaging material by 2030 **(C, TE, $)**
    - Ban the sale of any drink sold in a plastic bottle by 2030 **(C, TE, $)**
5) **Activity:** Identify strategies to reduce emissions associated with disposal and add to recycling/composting emissions credits. The emissions credit associated with recycling comes from reducing the upstream emissions of future products that are produced from recycled material instead of virgin materials. The composting emissions credit comes from the carbon storage associated with application of compost to soils (C, TE, $).
    - The Rutgers Business School (SCM/PPCP Department), the WG4 Sub-Committee Team and Research Students are currently developing Scope 3 Templates to capture emissions data from the procure-to-waste process.
6) **Activity:** Take a look at findings from baseline GHG inventory- the amount of recyclable materials ending up in the solid waste **(C, TE).** See Activity #5

2.2.4. Engage with Supplier Sustainability Programs

Contract with suppliers that offer end-of-life reuse, recycling, and/or takeback agreement programs. (i.e. pipette's and vials in lab)

- **Stakeholders involved in implementation:** University Procurement Department, Chancellor Academic/Administrative Units (Scientific Labs, etc.), IPO Facilities, Housing, and Material Services, Dining Services
- **Known institutional barriers to implementation and solutions to overcome:** Communicating with all University suppliers and contractors to establish, implement, sustain and performance report on the program. Sometimes requiring suppliers to provide these types of additional sustainable services increases the cost of the products which may be a barrier. The WG4 Team, and the Rutgers Business School will work with University Procurement Services to assist in the development of the guidelines for the program (partially outlined below by the WG4 Team).
- **Metrics to evaluation:** University Procurement and IPO Facilities Benchmark reports at the start of the initiative. Reports will have to be issued each year after to measure the climate impacts (reductions, impacts and costs). Post implementation surveys (immediate, semi-annual and annual to measure effectiveness of program)

- **Financial Cost (estimated):** $5K/Yr. for costs associated with communication, marketing and implementation of program.
- **Available sources of additional funds to support:** Evaluate funding sources including the redirection of savings from waste reduction and avoidance.

Activity Key: **(C)** On-going Communication/Marketing, **(TE)** Targeted Event, **($)** Requires Funding

1) **Activity:** Implement source reduction and environmentally-preferable purchasing program and initiatives to decrease waste before it occurs **(C, TE).**
2) **Activity:** Create a sustainable purchasing initiative with University Procurement and IPO Facilities experts to guide waste diversion and sustainable sourcing **(C, TE).**
3) **Activity:** Instill the values of total cost of ownership and total life cycle cost in purchasing and decision-making **(C, TE).**
4) **Activity:** Develop a system to track and quantify sustainable purchases from RU Marketplace, the university's material management and purchasing system and in large bids and contracts **(C, TE).**
5) **Activity:** Highlight sustainable items on the Marketplace purchasing system **(C, TE).**
6) **Activity:** Develop incentives for making environmentally sound purchases for externally-funded research projects **(C, TE).**
7) **Activity:** Engage contracted suppliers to help support the University waste reduction and other sustainability goals, with particular attention to reducing plastic bottle waste on campus; develop user guidelines for socially and environmentally responsible purchasing **(C, TE, $).**
    - Contracting with suppliers of products (e.g. electronics, furniture, lab consumables) that have established (preferably non-manufacturer specific) end-of-life reuse, recycling, and/or takeback programs at no extra cost to the University, and in compliance with applicable federal, state, and University regulations regarding waste disposal.
    - The University should require that all packaging be compliant with a policy similar to California's Toxics in Packaging Prevention Act (AB 455) and/or set additional criteria to maximize the sustainability of packaging brought on campus in support of the Rutgers Zero Waste goals.
8) **Activity:** Establish and implement a University-wide Environmentally Preferable/Green Purchasing Policy and Program. Institutionalize the selection criteria for new purchasing to provide deliberate and fair consideration when making purchasing decisions. Rutgers should implement explicit criteria that gives weight to environmental and social considerations as we do to price, availability, and performance **(C, TE, $).**
    a. What is Environmentally Preferable/Green Purchasing? We consider environmentally preferable, or "green," products and services those that have a lesser or reduced impact on the environment and climate over their life cycle when compared to competing goods or services. Environmentally preferable/green products and services may (metrics for measuring impact):
        - have reduced packaging

- be easy to re-use, refurbish, remanufacture or recycle at end of life
- have lower greenhouse gas emissions and air contaminants
- use energy or water more efficiency
- use alternative sources of energy or fuels
- support reuse and recycling
- be made of renewable resources
- contain fewer toxins or hazardous substances
- promote practices that support and sustain healthy communities and social structures

b. Cost Analysis Determination: The cost of the product through its useful life depends on:
    - initial cost
    - operating costs
    - maintenance costs
    - reduce energy and water consumption (which can reduce costs)
    - depreciation costs
    - upgrade costs
    - use resources more efficiently
    - disposal costs; reduce waste (which can reduce Rutgers' waste disposal costs)

c. How to Make Green Purchases
    - Rutgers units, staff and faculty can make a positive impact on the environment each time that they make a necessary purchase, and can do so without compromising safety, quality or budget by considering products and services that cause minimal or no environmental damage during normal use or maintenance. These products are those that are:
        - durable, as opposed to single use or disposable items
        - nontoxic or minimally toxic and preferably biodegradable highly energy efficient in production and use manufactured in an environmentally sound, sustainable manner by companies with good environmental track records
        - shipped with minimal packaging (consistent with care of the product), preferably made of recycled or recyclable materials
    - When making purchases, the University will look for:
        - recycled paper and paper products
        - office supplies marked with an environmental sign
        - EPEAT (Electronic Product Environmental Assessment Tool) Silver or Gold registered desktop computers, laptops and monitors
        - Energy Star electric appliances
        - Green Seal™ cleaning products

- energy-saving products
- waste-reduced products
- water-saving products
- locally-produced goods and services (to reduce emissions associated with transport)

Aside from the above standards, University Procurement Services will collaborate with campus stakeholder groups to develop best practices including the purchasing of energy efficient products, supplier collaborations on recycling/take-back programs.

9) **Activity: Establish a comprehensive take-back program via Rutgers Take-Back Agreements**
    a. A take-back agreement is an agreement between manufacturers and their customers that requires a manufacturer to take back a product for recycling at the end of its useful life. The agreement is designed to ensure that manufacturers take responsibility for the recycling or safe disposal of any dangerous or toxic materials in their products. Take-back agreements are becoming increasingly common for products such as electrical or electronic goods **(C, TE).**
    b. Responsibility. Manufacturers who operate take-back programs demonstrate their environmental responsibility. They also benefit customers by removing the problem or cost of disposal. The programs benefit municipalities by lowering their overall waste disposal costs and reducing the burden on landfill sites (C, TE).

2.2.6. Eliminate plastic bags

Eliminate plastic bags in all retail and foodservice establishments in campus facilities

- **Stakeholders involved in implementation:** University Procurement Department, Chancellor Academic/Administrative Units (Scientific Labs, etc.), IPO Facilities, Housing, and Material Services, Dining Services
- **Known institutional barriers to implementation and solutions to overcome:** Collaboration and communicating with all University suppliers, Dining, Campus Center operations and contractors to establish, implement, sustain and performance report on the program. The WG4 Team, and the Rutgers Business School will work with the Procurement Departments, Dining and Campus Operations, to assist in the development of the guidelines for the program (partially outlined below by the WG4 Team).

  Alignment and elimination of plastic bags at all Point of sales conducted on Rutgers premises (Bookstore, concessions stands, stores etc.) by

suppliers/partners that deliver materials and services to the Rutgers Community. This may be covered by new State law. The use of Plastic bags may still be required in some areas such as Trash collection bins etc. – Rutgers should consider mandating the use of biodegradable bags for these types of use.

- **Metrics to evaluation:** University Procurement, Dining, Campus Center Operations, and IPO Facilities Benchmark reports at the start of the initiative. Reports will have to be issued each year after to measure the climate impacts (reductions, impacts and costs). Post implementation surveys (immediate, semi-annual and annual to measure effectiveness of program)
- **Financial Cost (estimated):** $5K/Yr. for costs associated with communication, marketing and implementation of program.
- **Available sources of additional funds to support:** University contracted suppliers and savings from waste reduction and avoidance.

Activity Key: **(C)** On-going Communication/Marketing, **(TE)** Targeted Event, **($)** Requires Funding

1) **Activity:** Examine NJ State Policy on Plastic Bag Ban and commence the process of developing the Rutgers Plastic Bag Ban Policy and Program **(C, TE, $)** (https://www.nj.gov/governor/news/news/562020/20201104a.shtml)

   New Jersey Governor Phil Murphy signed S864, which prohibits the use of single-use plastic and paper bags in all stores and food service businesses statewide. This bill is a significant step to reduce harm and pollution that these products cause to our environment. (11/2020)
   *"Plastic bags are one of the most problematic forms of garbage, leading to millions of discarded bags that stream annually into our landfills, rivers, and oceans," **said Governor Murphy**. "With today's historic bill signing, we are addressing the problem of plastic pollution head-on with solutions that will help mitigate climate change and strengthen our environment for future generations."*

2) **Activity: Initial Phase:** Under NJ law, food service businesses will be allowed to provide single-use plastic straws only upon request starting November 2021. Development of guideline and process leading to the elimination of Rutgers Plastic Bag Ban. The following sample outline and process is recommended:

   I. Introduction
   II. Going Plastic-Free
      A. Welcome
      B. Navigating Your Project
      C. Seven Reasons to Go Plastic-Free
      D. Preparing for Pushback
   III. Know Your Stuff: Campus and Community Infrastructure
      A. Local Laws and Regulations
      B. Existing Campaigns
      C. Existing Ordinances/Bans

D. Existing Campus Policy and Operations
E. University (in)capabilities
F. Collaborating with Departments on Campus

IV. Taking Action
A. Conducting a Plastic Audit
B. Formulating a Plan

V. Next Steps: Alternatives to Single-Use Plastics
A. Education as an Alternative
B. Refusing Single-Use Items or Providing Upon Request
C. Encouraging Reusable Items
D. Alternatives Through Procurement
E. Cross-Disciplinary Alternatives

VI. Education & Outreach
A. Partnerships for Publicity
B. Campaigning
C. Making Plastic-Free a Positive Experience
D. Educating Visitors
E. Maintaining the Importance of Recycling

VII. Resources & Support
A. Sustaining Plastic-Free Projects & Initiatives
B. Partners for the Movement

3) **Activity:** Full Program Implementation in accordance with NJ State S864 **(C, TE, $).** Starting May 2022, both plastic and paper single-use bags, as well as disposable food containers and cups made out of polystyrene foam, will be banned. Paper bags require resources and energy to produce, contributing to pollution. Moving forward, the focus throughout the state will be on using reusable bags. The following products will be exempt for an additional two years after May 2022:

- Disposable, long-handled polystyrene foam soda spoons when required and used for thick drinks;
- Portion cups of two ounces or less, if used for hot foods or foods requiring lids;
- Meat and fish trays for raw or butchered meat, including poultry, or fish that is sold from a refrigerator or similar retail appliance;
- Any food product pre-packaged by the manufacturer with a polystyrene foam food service product; and
- Any other polystyrene foam food service product as determined necessary by Department of Environmental Protection.

2.3. Cross-cutting issues arising in the exploration of potential solutions

Rutgers University's dining halls create approx. 2,000 tons of organic waste per year. Presently, some food service operations aerobically digest the food waste before disposal into the wastewater system. Some portion of the organic food waste is being picked up by a local pig and cattle farmer and utilized as feed for the animals. Rutgers Dining Services has concern that the pig farmer may not continue to receive the waste and this underlines the importance of a sustainable need for a holistic solution to utilize food waste to generate low carbon electricity and produce low- carbon organic fertilizer. In collaboration with Working Group 3 (Food and Water Systems), we believe Rutgers campuses can demonstrate such conversion by utilizing state-of-the-art anaerobic digestion technology that food waste can be converted into low-carbon energy and low-carbon fertilizer as one of the emerging "Circular Carbon Systems."

3. Assessments of potential climate solutions

Below are strategic questions that will require further investigation for each short term proposed solution.

1. What are the emissions reductions and resilience improvements?
2. What are the associated financial costs and savings?
3. What are the associated educational, research, and culture benefits?
4. Other Co-Benefits?
5. Cross-Cutting Opportunity? (with other Working Group)
6. How would the proposed approach be implemented, and on what timescale?
7. How would progress be evaluated? To the extent they are applicable, what quantitative benchmarks should be used?
8. What are the roles associated with University leadership, chancellor-level units, and other key players?
9. Beyond financials, what are the institutional, organizational and cultural challenges associated with implementation, and how might we overcome them?
10. What strategies should be employed to ensure the participation and accountability of the full university community?
11. To what extent would the approach engage Rutgers' external stakeholders and catalyze broader, climate-positive economic development in New Jersey?
12. What equity considerations need to be addressed and managed, how will this be done, and who needs to be involved?

APPENDIX A:

Table A.1. University wide waste

Description	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	Total
Camden Campus						
Recycled Material	187.84	451.26	492.08	194.92	433.45	1,759.56
Municipal Solid Waste	439.87	597.19	581.58	724.91	236.45	2,580.00
Total	**627.71**	**1,048.45**	**1,073.66**	**919.83**	**669.90**	**4,339.56**
New Brunswick Campus						
Recycled Material	18,104.31	18,581.92	12,467.24	18,659.58	15,052.05	82,865.09
Municipal Solid Waste	7,343.12	7,037.62	6,500.82	8,878.22	7,616.96	37,376.75
Total	**25,447.43**	**25,619.54**	**18,968.06**	**27,537.80**	**22,669.01**	**120,241.84**
Newark Campus						
Recycled Material	2,827.27	552.18	4,876.93	3,448.00	613.65	12,318.03
Municipal Solid Waste	840.35	599.72	726.52	292.03	437.71	2,896.33
Total	**3,667.62**	**1,151.90**	**5,603.45**	**3,740.03**	**1,051.35**	**15,214.35**
RBHS - Central						
Recycled Material	318.53	297.83	263.76	408.12	1,416.42	2,704.65
Municipal Solid Waste	550.58	572.10	385.84	423.72	763.82	2,696.06
Total	**869.11**	**869.93**	**649.60**	**831.84**	**2,180.24**	**5,400.71**
RBHS - North						
Recycled Material	701.29	579.42	639.91	251.91	327.73	2,500.26
Municipal Solid Waste	1,762.96	1,761.66	1,836.27	763.94	771.52	6,896.35
Total	**2,464.25**	**2,341.08**	**2,476.18**	**1,015.85**	**1,099.25**	**9,396.61**
Summary of all Units						
Recycled Material	22,139.24	20,462.61	18,739.92	22,962.52	17,843.30	102,147.59
Municipal Solid Waste	10,936.88	10,568.29	10,031.03	11,082.82	9,826.46	52,445.48
Grand Total	**33,076.12**	**31,030.90**	**28,770.95**	**34,045.34**	**27,669.75**	**154,593.07**
Percentage of Solid Waste	33.1%	34.1%	34.9%	32.6%	35.5%	33.9%
Percentage of Recycled Material	66.9%	65.9%	65.1%	67.4%	64.5%	66.1%

Table A.2. New Brunswick Piscataway Summary 2015-2019 waste

	Description	Campus	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	Total
Recycle Material								
1	Anti-Freeze	New Brunswick/ Piscataway	1.07	0.63	0.79	1.58	1.52	5.59
2	Asphalt	New Brunswick/ Piscataway	7,293.96	7,697.99	3,922.50	8,156.21	296.79	27,367.45
3	Ballast, Lighting	New Brunswick/ Piscataway	2.53	4.82	4.82	6.95	6.38	25.51
4	Batteries (Automobile)	New Brunswick/ Piscataway	2.46	3.05	0.93	2.27	0.94	9.65
5	Batteries Dry Cell (household)	New Brunswick/ Piscataway	0.49	0.00	0.65	0.97	5.02	7.13
6	Batteries, Nicad, Lithium, Lead Acid	New Brunswick/ Piscataway	0.56	0.79	4.26	1.60	2.67	9.87
7	C&D	New Brunswick/ Piscataway	0.00	0.00	0.00	0.00	1,148.46	1,148.46
8	Cardboard (Corrugated)	New Brunswick/ Piscataway	0.00	0.00	0.00	0.00	106.75	106.75
9	Cardboard and Mixed Paper	New Brunswick/ Piscataway	28.83	24.56	41.09	80.50		174.98
10	Carpeting	New Brunswick/ Piscataway	0.00	0.45	0.18	0.18	0.00	0.81
11	Ceiling Tiles	New Brunswick/ Piscataway	0.00	0.65	0.21	0.21	0.00	1.07
12	Concrete	New Brunswick/ Piscataway	0.03	0.05	0.04	0.84	4,939.48	4,940.44
13	Electronics (Consumer)	New Brunswick/ Piscataway	145.43	140.95	181.73	199.15	198.49	865.75
14	Food Oil/Grease	New Brunswick/ Piscataway	51.70	50.50	17.50	44.73	30.73	195.16
15	Food Waste	New Brunswick/ Piscataway	2,415.94	2,311.50	2,160.80	1,851.64	1,636.49	10,376.37
16	Furniture	New Brunswick/ Piscataway	0.00	0.00	0.00	0.00	0.00	0.00
17	Glass, Aluminum, Plastic, Steel Containers	New Brunswick/ Piscataway	0.00	2.79	1.02	48.67	1.65	54.13
18	HG Devices (Contain Ag)	New Brunswick/ Piscataway	0.00	0.00	0.00	0.00	0.00	0.00
19	Lab Chemicals	New Brunswick/ Piscataway	0.88	1.55	5.24	4.83	31.95	44.45
20	Lamps, Fluorescent	New Brunswick/ Piscataway	20.77	25.34	21.72	28.13	14.07	110.03
21	Lead	New Brunswick/ Piscataway	0.17	0.14	0.22	0.47	0.28	1.28
22	Leaves	New Brunswick/ Piscataway	120.40	6.00	368.50	368.50	16.18	879.58
23	Metal (Scrap)	New Brunswick/ Piscataway	109.40	118.92	84.74	214.02	217.54	744.62
24	Miscellaneous Electronics/Capacitors	New Brunswick/ Piscataway	0.02	0.04	0.07	0.19	0.00	0.32
25	Oil (Motor)	New Brunswick/ Piscataway	5.27	3.52	4.64	5.95	2.63	22.01
26	Other Plastic	New Brunswick/ Piscataway	18.43	30.20	2.47	0.04	132.83	183.97
27	Paper (Mixed)	New Brunswick/ Piscataway	132.70	429.81	947.06	1,134.26	528.53	3,172.36
28	Polystyrene	New Brunswick/ Piscataway	0.00	0.00	1.00	1.00	0.00	2.00
29	Single Stream Recycling	New Brunswick/ Piscataway	1,949.04	1,939.82	2,146.31	2,158.76	1,652.53	9,846.46
30	Soil	New Brunswick/ Piscataway	5,396.93	4,777.54	1,333.28	3,340.45	3,393.27	18,241.47
31	Solvent Waste (fuel blending & benificial use)	New Brunswick/ Piscataway	5.45	6.41	44.72	39.56	21.77	117.92
32	Textiles	New Brunswick/ Piscataway	0.00	4.10	4.68	5.94	5.30	20.02
33	Tires	New Brunswick/ Piscataway	7.42	5.26	7.10	5.12	6.53	31.43
34	Trees (Beneficial use/ mulch/ firewood)	New Brunswick/ Piscataway	0.00	0.00	0.00	0.00	0.00	0.00
35	Trees (Milled)	New Brunswick/ Piscataway	0.00	0.00	0.00	0.00	0.00	0.00
36	Wallboard (Gypsum)	New Brunswick/ Piscataway	32.91	32.86	122.74	135.78	47.78	372.07
37	White Goods/ Lite Iron (appliances)	New Brunswick/ Piscataway	17.71	125.24	116.13	204.08	252.41	715.57
38	Wood	New Brunswick/ Piscataway	343.81	836.44	920.10	617.00	353.09	3,070.44
39	Waste to Energy	New Brunswick/ Piscataway	0.00	0.00	0.00	0.00	0.00	0.00
	Total		18,104.31	18,581.92	12,467.24	18,659.58	15,052.05	82,865.09
Non Recycle Material								
	Municapal Solid Waste		7,343.12	7,037.62	6,500.82	8,878.22	7,616.96	37,376.75
	Grand Total		**25,447.43**	**25,619.54**	**18,968.06**	**27,537.80**	**22,669.01**	**120,241.84**
	Percentage of Solid Waste		28.9%	27.5%	34.3%	32.2%	33.6%	31.1%
	Percentage of Recycled Material		71.1%	72.5%	65.7%	67.8%	66.4%	68.9%
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table A.3. Camden Summary 2015-2019 waste

	Description	Campus	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	Total
Recycle Material								
1	Anti-Freeze	Camden	0.00	0.00	0.00	0.63	0.28	0.91
2	Asphalt/Concrete Demolition	Camden	2.96	32.35	19.89	0.00	0.00	55.20
3	Ballast, Lighting	Camden	0.31	0.98	0.11	0.11	0.58	2.10
4	Batteries (Automobile)	Camden	0.00	0.00	0.00	0.00	0.00	0.00
5	Batteries, Dry Cell (household)	Camden	0.00	0.00	0.00	0.00	0.00	0.00
6	Batteries, Nicad, Lithium, Lead Acid	Camden	0.00	0.00	0.00	0.00	0.23	0.23
7	C&D	Camden	0.00	80.10	103.90	0.00	11.26	195.26
8	Cardboard (Corrugated)	Camden	0.19	10.48	6.71	0.02	0.00	17.39
9	Cardboard and Mixed Paper	Camden	0.00	0.00	0.00	0.00	0.00	0.00
10	Carpeting	Camden	0.00	0.07	0.00	0.00	0.00	0.07
11	Ceiling Tiles	Camden	0.00	0.00	0.00	0.00	0.00	0.00
12	Computers/ Electronics/ TV's	Camden	0.00	0.00	0.00	0.00	0.00	0.00
13	Electronics (Consumer)	Camden	0.00	0.00	0.00	0.00	0.00	0.00
14	Food Oil/Grease	Camden	0.00	0.00	0.00	0.00	0.00	0.00
15	Food Waste	Camden	18.49	0.00	0.00	0.00	0.00	18.49
16	Furniture	Camden	0.00	0.00	0.00	0.00	0.00	0.00
17	Glass, Aluminum, Plastic, Steel Containers	Camden	0.00	0.00	0.00	0.00	0.00	0.00
18	HG Devices (Contain Ag)	Camden	0.00	0.00	0.00	0.00	0.00	0.00
19	Lab Chemicals	Camden	0.00	0.00	0.00	0.00	3.09	3.09
20	Lamps, Fluorescent	Camden	0.84	1.01	1.00	1.00	1.07	4.91
21	Lead	Camden	0.00	0.00	0.00	0.00	0.00	0.00
22	Leaves	Camden	0.00	0.00	0.00	0.00	1.18	1.18
23	Metal (Scrap)	Camden	2.37	16.23	18.62	0.00	6.02	43.24
24	Miscellaneous Electronics/Capacitors	Camden	0.00	0.00	0.00	0.00	0.00	0.00
25	Oil (Motor)	Camden	0.00	0.00	0.00	1.02	0.00	1.02
26	Other Plastic	Camden	0.12	1.37	1.50	0.02	0.00	3.01
27	Paper (Mixed)	Camden	0.00	0.00	0.00	0.00	167.74	167.74
28	Polystyrene	Camden	0.00	0.00	0.00	0.00	0.00	0.00
29	Single Stream Recycling	Camden	156.90	211.80	223.46	190.68	202.32	985.16
30	Soil	Camden	0.00	0.00	2.67	0.00	0.00	2.67
31	Solvent Waste (fuel blending & beneficial use)	Camden	0.00	0.00	0.00	0.00	0.00	0.00
32	Textiles	Camden	0.00	0.00	1.45	1.45	0.00	2.90
33	Tires	Camden	0.00	0.00	0.00	0.00	0.00	0.00
34	Trees (Beneficial use/ mulch/ firewood)	Camden	0.00	0.00	0.00	0.00	0.00	0.00
35	Trees (Milled)	Camden	0.00	0.00	0.00	0.00	0.00	0.00
36	Wallboard (Gypsum)	Camden	0.00	49.61	43.47	0.00	0.00	93.08
37	White Goods/ Lite Iron (appliances)	Camden	0.00	0.00	0.00	0.00	0.00	0.00
38	Wood	Camden	5.66	47.26	69.31	0.00	39.67	161.90
	Total		187.84	451.26	492.08	194.92	433.45	1,759.56
Non Recycle Material								
	Municapal Solid Waste		439.87	597.19	581.58	724.91	236.45	2,580.00
	Grand Total		**627.71**	**1,048.45**	**1,073.66**	**919.83**	**669.90**	**4,339.56**
	Percentage of Solid Waste		70.1%	57.0%	54.2%	78.8%	35.3%	59.5%
	Percentage of Recycled Material		29.9%	43.0%	45.8%	21.2%	64.7%	40.5%
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table A.4. RBHS Central Summary 2015-2019 Waste

	Description	Campus	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	Total
Recycle Material								
1	Anti-Freeze	Other	0.00	0.00	0.00	0.00	0.00	0.00
2	Asphalt/Concrete Demolition	Other	113.08	0.00	0.00	0.00	207.88	320.96
3	Ballast, Lighting	Other	0.15	2.25	2.09	2.09	1.22	7.81
4	Batteries (Automobile)	Other	0.00	0.00	0.00	0.00	0.00	0.00
5	Batteries, Dry Cell (household)	Other	0.00	0.00	0.00	0.00	0.08	0.08
6	Batteries, Nicad, Lithium, Lead Acid	Other	0.00	0.35	0.23	0.23	0.00	0.82
7	C&D	Other	0.00	84.87	56.16	0.00	0.00	141.03
8	Cardboard (Corrugated)	Other	0.00	0.00	0.23	29.46	0.00	29.70
9	Cardboard and Mixed Paper	Other	171.02	180.56	174.64	283.20	0.00	809.42
10	Carpeting	Other	0.00	0.00	0.00	0.00	0.00	0.00
11	Ceiling Tiles	Other	0.00	0.00	0.00	0.00	0.00	0.00
12	Computers/ Electronics/ TV's	Other	0.00	0.00	0.00	0.00	106.87	106.87
13	Electronics (Consumer)	Other	0.00	0.00	0.71	0.71	0.00	1.42
14	Food Oil/Grease	Other	0.00	0.00	0.00	0.00	0.00	0.00
15	Food Waste	Other	0.00	0.00	0.00	0.00	0.00	0.00
16	Furniture	Other	0.00	0.00	0.00	0.00	0.00	0.00
17	Glass, Aluminum, Plastic, Steel Containers	Other	18.78	20.26	17.31	7.45	0.00	63.80
18	HG Devices (Contain Ag)	Other	0.00	0.00	0.00	0.00	0.00	0.00
19	Lab Chemicals	Other	0.00	0.00	0.00	0.00	0.00	0.00
20	Lamps, Fluorescent	Other	1.70	2.70	2.90	2.90	2.81	13.01
21	Lead	Other	0.00	0.00	0.00	0.00	0.00	0.00
22	Leaves	Other	0.00	0.00	0.00	0.00	0.00	0.00
23	Metal (Scrap)	Other	13.80	6.84	9.47	9.47	6.54	46.12
24	Miscellaneous Electronics/Capacitors	Other	0.00	0.00	0.00	0.00	0.00	0.00
25	Oil (Motor)	Other	0.00	0.00	0.00	0.00	0.00	0.00
26	Other Plastic	Other	0.00	0.00	0.00	0.00	0.00	0.00
27	Paper (Mixed)	Other	0.00	0.00	0.00	17.87	6.11	23.98
28	Polystyrene	Other	0.00	0.00	0.00	0.00	0.00	0.00
29	Single Stream Recycling	Other	0.00	0.00	0.00	54.72	167.24	221.96
30	Soil	Other	0.00	0.00	0.00	0.00	881.97	881.97
31	Solvent Waste (fuel blending & benificial use)	Other	0.00	0.00	0.00	0.00	0.00	0.00
32	Textiles	Other	0.00	0.00	0.00	0.00	0.00	0.00
33	Tires	Other	0.00	0.00	0.00	0.00	0.00	0.00
34	Trees (Beneficial use/ mulch/ firewood)	Other	0.00	0.00	0.00	0.00	0.00	0.00
35	Trees (Milled)	Other	0.00	0.00	0.00	0.00	0.00	0.00
36	Wallboard (Gypsum)	Other	0.00	0.00	0.00	0.00	7.57	7.57
37	White Goods/ Lite Iron (appliances)	Other	0.00	0.00	0.00	0.00	0.00	0.00
38	Wood	Other	0.00	0.00	0.00	0.00	28.13	28.13
	Total		318.53	297.83	263.76	408.12	1,416.42	2,704.65
Non Recycle Material								
	Municapal Solid Waste		550.58	572.10	385.84	423.72	763.82	2,696.06
	Grand Total		**869.11**	**869.93**	**649.60**	**831.84**	**2,180.24**	**5,400.71**
	Percentage of Solid Waste		63.3%	65.8%	59.4%	50.9%	35.03%	49.92%
	Percentage of Recycled Material		36.7%	34.2%	40.6%	49.1%	64.97%	50.08%
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table A.5. Newark Summary 2015-2019 Waste

	Description	Campus	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	Total
Recycle Material								
1	Anti-Freeze	Newark	0.00	0.00	0.00	0.71	0.00	0.71
2	Asphalt	Newark	1,788.41	204.23	4,422.56	602.20	0.00	7,017.40
3	Ballast, Lighting	Newark	0.33	1.30	0.22	0.48	4.60	6.93
4	Batteries (Automobile)	Newark	0.00	0.00	0.00	0.00	0.29	0.29
5	Batteries, Dry Cell (household)	Newark	0.77	0.00	0.00	0.44	0.29	1.50
6	Batteries, Nicad, Lithium, Lead Acid	Newark	0.19	1.61	0.42	0.06	0.00	2.28
7	C&D	Newark	0.00	111.66	73.91	0.00	133.84	319.41
8	Cardboard (Corrugated)	Newark	31.43	45.20	38.92	39.17	87.01	241.73
9	Cardboard and Mixed Paper	Newark	53.90	8.75	7.33	7.68	0.00	77.66
10	Carpeting	Newark	0.00	0.00	0.00	0.00	0.00	0.00
11	Ceiling Tiles	Newark	0.00	0.00	0.00	0.00	0.00	0.00
12	Concrete	Newark	0.00	0.00	0.00	0.00	82.16	82.16
13	Electronics (Consumer)	Newark	0.14	0.00	0.18	0.18	0.00	0.50
14	Food Oil/Grease	Newark	0.00	0.00	0.00	0.00	0.00	0.00
15	Food Waste	Newark	0.00	0.00	0.00	0.00	0.00	0.00
16	Furniture	Newark	0.00	0.00	0.00	0.00	0.00	0.00
17	Glass, Aluminum, Plastic, Steel Containers	Newark	23.09	19.81	15.91	24.91	134.84	218.56
18	HG Devices (Contain Ag)	Newark	0.00	0.00	0.00	0.00	0.00	0.00
19	Lab Chemicals	Newark	0.00	0.00	0.00	0.00	0.00	0.00
20	Lamps, Fluorescent	Newark	4.36	5.33	2.24	1.81	2.94	16.69
21	Lead	Newark	0.00	0.00	0.00	0.00	0.00	0.00
22	Leaves	Newark	0.00	0.00	0.00	0.00	0.00	0.00
23	Metal (Scrap)	Newark	40.47	38.18	55.51	69.50	27.04	230.70
24	Miscellaneous Electronics/Capacitors	Newark	0.00	0.00	0.00	0.00	0.00	0.00
25	Oil (Motor)	Newark	0.00	0.00	0.00	1.06	0.00	1.06
26	Other Plastic	Newark	0.00	0.01	0.03	0.03	0.00	0.07
27	Paper (Mixed)	Newark	77.35	34.13	38.91	39.00	66.56	255.94
28	Polystyrene	Newark	0.00	0.00	0.00	0.00	0.00	0.00
29	Single Stream Recycling	Newark	0.07	44.19	105.01	100.29	0.00	249.56
30	Soil	Newark	215.36	0.00	0.00	2,556.08	0.00	2,771.44
31	Solvent Waste (fuel blending & benificial use)	Newark	0.00	0.00	0.00	0.00	0.00	0.00
32	Textiles	Newark	0.00	0.00	0.00	0.00	0.00	0.00
33	Tires	Newark	0.00	0.00	0.00	0.00	0.00	0.00
34	Trees (Beneficial use/ mulch/ firewood)	Newark	0.00	0.00	0.00	0.00	0.00	0.00
35	Trees (Milled)	Newark	0.00	0.00	0.00	0.00	0.00	0.00
36	Wallboard (Gypsum)	Newark	0.00	0.00	0.00	2.21	1.52	3.73
37	White Goods/ Lite Iron (appliances)	Newark	0.00	0.00	0.00	0.00	50.25	50.25
38	Wood	Newark	591.40	37.78	115.78	2.19	22.31	769.46
39								
	Total		2,827.27	552.18	4,876.93	3,448.00	613.65	12,317.32
Non Recycle Material								
	Municapal Solid Waste		840.35	599.72	726.52	292.03	437.71	2896.33
	Grand Total		**3,667.62**	**1,151.90**	**5,603.45**	**3,740.03**	**1,051.35**	**15,213.64**
	Percentage of Solid Waste		22.9%	52.1%	13.0%	7.8%	41.6%	19.0%
	Percentage of Recycled Material		77.1%	47.9%	87.0%	92.2%	58.4%	81.0%
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table A.6. RBHS North Summary 2015-2019 Waste

	Description	Campus	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	Total
Recycle Material								
1	Anti-Freeze	Other	0.00	0.00	0.00	0.00	0.00	0.00
2	Asphalt	Other	207.63	1.28	3.86	0.00	0.00	212.77
3	Ballast, Lighting	Other	1.28	1.28	0.80	0.95	1.12	5.43
4	Batteries (Automobile)	Other	0.00	0.00	0.00	0.00	0.00	0.00
5	Batteries, Dry Cell (household)	Other	0.96	0.00	0.00	0.00	0.01	0.97
6	Batteries, Nicad, Lithium, Lead Acid	Other	0.00	0.00	1.83	1.83	0.00	3.66
7	C&D	Other	0.00	232.44	178.86	100.38	10.21	521.89
8	Cardboard (Corrugated)	Other	185.93	185.93	186.62	37.17	23.73	619.37
9	Cardboard and Mixed Paper	Other	2.79	1.63	6.73	0.00	0.00	11.15
10	Carpeting	Other	0.00	0.00	0.00	0.00	0.00	0.00
11	Ceiling Tiles	Other	0.00	0.00	0.00	0.00	0.00	0.00
12	Concrete	Other	0.00	0.00	0.00	0.00	40.00	40.00
13	Electronics (Consumer)	Other	0.00	0.00	0.00	0.00	0.00	0.00
14	Food Oil/Grease	Other	0.00	0.00	0.00	0.00	0.00	0.00
15	Food Waste	Other	0.00	0.00	0.00	0.00	0.00	0.00
16	Furniture	Other	0.00	0.00	0.00	0.00	0.00	0.00
17	Glass, Aluminum, Plastic, Steel Containers	Other	3.00	3.40	3.60	3.00	0.00	13.00
18	HG Devices (Contain Ag)	Other	0.00	0.00	0.00	0.00	0.00	0.00
19	Lab Chemicals	Other	0.00	0.00	0.00	0.00	0.00	0.00
20	Lamps, Fluorescent	Other	3.47	3.47	3.10	5.32	7.63	22.99
21	Lead	Other	0.00	0.00	0.00	0.00	0.00	0.00
22	Leaves	Other	0.00	0.00	0.00	0.00	0.00	0.00
23	Metal (Scrap)	Other	137.37	12.96	114.25	77.29	76.19	418.05
24	Miscellaneous Electronics/Capacitors	Other	0.00	0.00	0.00	0.00	0.00	0.00
25	Oil (Motor)	Other	0.00	0.00	0.00	0.00	0.00	0.00
26	Other Plastic	Other	0.00	0.00	0.00	0.00	0.00	0.00
27	Paper (Mixed)	Other	118.96	122.53	120.85	25.98	22.32	410.64
28	Polystyrene	Other	0.00	0.00	0.00	0.00	0.00	0.00
29	Single Stream Recycling	Other	0.00	0.00	0.00	0.00	0.00	0.00
30	Soil	Other	0.00	0.00	0.00	0.00	0.00	0.00
31	Solvent Waste (fuel blending & benificial use)	Other	0.00	0.00	0.00	0.00	0.00	0.00
32	Textiles	Other	0.00	0.00	0.00	0.00	0.00	0.00
33	Tires	Other	0.05	0.00	0.00	0.00	0.00	0.05
34	Trees (Beneficial use/ mulch/ firewood)	Other	0.00	0.00	0.00	0.00	0.00	0.00
35	Trees (Milled)	Other	0.00	0.00	0.00	0.00	0.00	0.00
36	Wallboard (Gypsum)	Other	18.26	6.44	11.86	0.00	0.00	36.56
37	White Goods/ Lite Iron (appliances)	Other	0.00	0.00	0.00	0.00	0.00	0.00
38	Wood	Other	21.59	8.06	7.56	0.00	146.53	183.74
	Total		701.29	579.42	639.91	251.91	327.73	2,500.26
Non Recycle Material								
	Municapal Solid Waste		1,762.96	1,761.66	1,836.27	763.94	771.52	6,896.35
	Grand Total		**2,464.25**	**2,341.08**	**2,476.18**	**1,015.85**	**1,099.25**	**9,396.61**
	Percentage of Solid Waste		71.5%	75.2%	74.2%	75.2%	70.2%	73.4%
	Percentage of Recycled Material		28.5%	24.8%	25.8%	24.8%	29.8%	26.6%
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%