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

Solutions Assessment: Supply Chain and Waste Management

Report of Working Group 4

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Working Group Membership

Kevin Lyons, *Co-Chair*, *Rutgers Business School, Rutgers-Newark and Rutgers-New Brunswick*
Nimish Patel, *Co-Chair*, *University Procurement Services*
Wes Coleman*, Co-Chair, University Procurement Services*

David Dehart, Institutional Planning and Operations
Elizabeth Demaray, *College of Arts and Sciences, Rutgers-Camden*
Serpil Guran, *EcoComplex, New Jersey Agricultural Experiment Station*
David Haines, *Institutional Planning and Operations*
Gary Kovach, *Finance, Rutgers Biomedical and Health Services*
Uta Krogmann, *School of Environmental and Biological Sciences*, *Rutgers-New Brunswick*
Julie Lawson, *Robert Wood Johnson Medical School, Rutgers Biomedical and Health Services*
Jeremy Lessing, *Robert Wood Johnson Medical School, Rutgers Biomedical and Health Services*
Joe Martin, *College of Arts and Sciences, Rutgers-Camden*
Dhavani Mashru, *Rutgers Business School, Rutgers-Newark*
Mark McLane, *Institutional Planning and Operations*
Alma Ortiz, *University Procurement Services*
Marie O'Toole, *School of Nursing, Rutgers-Camden*
Jack Schrum, *Facilities RU Dining, Rutgers-New Brunswick*
Matthew White, *Rutgers Business School, Rutgers-Newark*

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EXECUTIVE SUMMARY

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, for Working Group 4, the three most important categories we are considering 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.

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).

The Working Group identified the following short-list of solutions that could be implemented in the short-term :

1. Create an awareness campaign for sustainability, waste reduction and recycling for all students, faculty and staff
2. 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)
3. Implement a comprehensive University source reduction & reuse policy and program. Connect with Surplus Equipment Management Program
4. 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 in all retail and foodservice establishments in campus facilities

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. Additional statistics are included in the report.

In collaboration with Working Group 3, we share a concern as it relates to organic food waste. 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. This may require the investment in state-of-the-art anaerobic digestion technology.

[1] http://www.ghgprotocol.org/standards/scope-3-standard

4.1. Rutgers' current baseline

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

Background on Indirect Emissions

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. That 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.

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—largely to reduce its waste and environmental footprint—but for which the impact on carbon emissions cannot be quantified.

4.1.2. 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

4.1.3. 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.

4.2. Overview of potential climate solutions

4.2.1. Potential solutions

In brief, our Recommendations are the following:

- **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[3]), 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.

In the following pages, we address the Supply Chain and Waste Stream categories for which recommendations are made. In each of these sections we discuss: the current status of the category at Rutgers or, "Where We Are"; our overall assessment of key goals or, "Where We Want to Be" and a list of explicit recommendations or, "How To Get There".

Consumable and Durable Goods

Introduction and Background

This section of the report addresses strategies to reduce emissions from the supply chain of 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

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 sourcing areas are commercial print, small parcel, laptop/desktop, IT Peripherals, Scientific Distributors, Servers/Storage, Janitorial Supplies, Mobile Phones, 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

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

Waste Stream

Where We Are

"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)

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

Figure 1 Rutgers University's progress in waste reduction and recycling over the past five (5) years. Figure 2 – 6, Rutgers University waste generation by campus

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.

So, what Is the link between solid waste and Climate Change? 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. But 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.

Calculations

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, 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.

Table 4.1. 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 4.2. 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 4.3. 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 & benificial 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 4.4. 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 4.5. 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 4.6. 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 & beneficial 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%

Where We Want to Be

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 as piloted at Warren to all the large dorms.
- Hand dryers in lieu of paper towel dispensers.
- Eliminating one time use plastic bags/containers or charge for them to incentivize low usage.

4.2.2. Early opportunities for action

The Working Group 4 team identified four solutions with low financial costs and institutional barriers that could potentially be completed before the completion of the Climate Action Plan.

	From (years)	From (years)	Solution
Short Term	0	1	Develop Paper Reduction Program, Establish paper specs and reduce options for paper purchasing to meet RU specifications
Short Term	0	1	Create an awareness campaign for sustainability, waste reduction and recycling for all students, faculty and staff
Short Term	0	1	Eliminate plastic bags in all retail and foodservice establishments in campus facilities
Short Term	0	1	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)

4.2.3. 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."

4.3. Assessments of potential climate solutions

Top *5* WG-4 Solutions

The Working Group 4 team developed a comprehensive list of potential solutions that the University could consider as part of the Climate Action Plan (see Appendix 1). The Working Group identified the following short-list of solutions that could be implemented in the short-term:

1. Create an awareness campaign for sustainability, waste reduction and recycling for all students, faculty and staff
2. 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)
3. Implement a comprehensive University source reduction & reuse policy and program. Connect with Surplus Equipment Management Program
4. 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 in all retail and foodservice establishments in campus facilities

We would also recommend that Rutgers evaluate its current organic waste disposal practices and create holistic alternative scenarios to develop economically feasible, environmentally sustainable and socially acceptable solutions. Current organic waste disposal practices are not sustainable and future solutions should support climate change mitigation goals of the University. With these efforts Rutgers has an opportunity to set an example to the surrounding communities and residents of the State of New Jersey. Rutgers can expand its "Town and Gown Partnership" which benefits Rutgers researchers, students and all New Jersey communities.

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

Emissions reductions and resilience improvements: The reduction in waste due to the change in student behavior will lower amounts of waste throughout the University

Financial costs and savings: The program will require pamphlets and posters. There will also need to be some meetings to promote the ideas about waste reductions.

Benefits to the University's educational and research mission and to campus culture: The program will provide important educational benefits in promoting ideas on waste collection and the environment. Especially important will be to introduce the scientific view of climate change.

Other Co-Benefits: The sessions will likely help to change the attitudes of the members of the university community toward environmental problems.

Implementation Plan and Timescale: Starting with the beginning of the academic year, workshops will be held to design posters and pamphlets to address environmental concerns. The posters will be displayed prominently in areas of high student traffic. A series of speakers on the environmental impacts of Rutgers programs.

Needed research and planning: TBD

Evaluation plan: At the end of each presentation, the attendees will be asked to take a evaluative survey, including questions on content and attitudes.

Management roles: The university administration will be asked to provide funding for refreshments at the presentations. Chancellor-level representatives will be asked to make remarks, indicating a high level of support of the program.

Institutional, Organizational and Cultural Challenges to Implementation: A major difficulty will be the need to compete with the large numbers of university clubs. To address this problem, it will be necessary to hold the presentations at various times of the day.

Participation and Accountability: Instructors can make the attendance at the presentations worth extra course credit.

Contribution to Climate-Positive, Equitable, Sustainable Economic Development: TBD

Equity Concerns: TBD

4.3.2. 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)

Emissions reductions and resilience improvements: TBD

Financial costs and savings: TBD

Benefits to the University's educational and research mission and to campus culture: TBD

Other Co-Benefits: TBD

Implementation Plan and Timescale: TBD

Needed research and planning: TBD

Evaluation plan: TBD

Management roles: TBD

Institutional, Organizational and Cultural Challenges to Implementation: TBD

Participation and Accountability: TBD

Contribution to Climate-Positive, Equitable, Sustainable Economic Development: TBD

Equity Concerns: TBD

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

Emissions reductions and resilience improvements: Reduce waste

Financial costs and savings: Cost savings. Limit new purchases by encouraging and facilitating the reuse of surplus property.

Benefits to the University's educational and research mission and to campus culture: Help promote awareness, encouraging the community to reuse assets and diverting waste from landfills.
Other Co-Benefits: TBD

Implementation Plan and Timescale: TBD

Needed research and planning: TBD

Evaluation plan: TBD

Management roles: TBD

Institutional, Organizational and Cultural Challenges to Implementation: TBD

Participation and Accountability: TBD

Contribution to Climate-Positive, Equitable, Sustainable Economic Development: TBD

Equity Concerns: TBD

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

Emissions reductions and resilience improvements: Reduces waste (packaging/plastic)

Financial costs and savings: TBD

Benefits to the University's educational and research mission and to campus culture: TBD

Other Co-Benefits: TBD

Implementation Plan and Timescale: TBD

Needed research and planning: TBD

Evaluation plan: TBD

Management roles: TBD

Institutional, Organizational and Cultural Challenges to Implementation: TBD

Participation and Accountability: TBD

Contribution to Climate-Positive, Equitable, Sustainable Economic Development: TBD

Equity Concerns: TBD

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

Emissions reductions and resilience improvements: Cut down on single-use plastic bags in the waste stream

Financial costs and savings: reduction in cost of purchasing plastic bags

Benefits to the University's educational and research mission and to campus culture: Optics and Visibility of Proactive steps to address Climate change

Other Co-Benefits: reduced litter and waste streams

Implementation Plan and Timescale: TBD

Needed research and planning: TBD

Evaluation plan: Establish baseline of current plastic usage. Future metrics to capture usage patterns by purveyors and internal partner (RU Dining)

Management roles: TBD

Institutional, Organizational and Cultural Challenges to Implementation: Need alternate products to transport purchases (Cardboard, returnable totes etc) - need to address the question of How does the consumer handle the change

Participation and Accountability: PSA, signage

Contribution to Climate-Positive, Equitable, Sustainable Economic Development:

Equity Concerns: TBD

FIGURE 7 – Listing of opportunities