

Sustainable Housekeeping Final Report
Eco Reps 2019-2020
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In Partnership with Penn Housekeeping Staff Joe Gaither, James Allen, and Wendy Sparks With Mentorship from Natalie Walker (Sustainability Manager), and Andrew Nyholm and Richard Ling (Eco-Reps Coordinators).

Abstract

This project, a continuation of a previous Eco Reps and Penn Housekeeping project during the 2018-2019 school year, aimed to educate the entire Penn Housekeeping staff on the basics of sustainability and climate change as well as share information about specific sustainable housekeeping products and practices utilized by Penn Housekeeping.

Initial steps in creating an updated Sustainable Housekeeping presentation included conducting multiple focus groups composed of housekeeping staff members and gathering information about sustainable housekeeping protocol through independent research and meetings with Facilities and Real Estate (FRES) staff members. The content of the sustainable trainings fell into four main categories-- contextual information about the global climate crisis and associated issues such as ocean acidification and species extinction, details about how Penn Housekeeping has incorporated sustainability into its daily cleaning protocols, and takeaways about the importance of sustainability as well as tools for housekeeping to act more sustainably at home. Additionally, the training sessions included an interactive game to further engage the housekeepers and ensure information retention.

Pre- and post-presentation surveys were conducted to measure learning and the impact of these presentations. Data from these surveys shows a significant increase in self-rated knowledge of both sustainability in general and sustainability initiatives at Penn Housekeeping. Although the project was not able to be completed due to the impacts of the COVID-19 pandemic, survey results and in-person feedback show that it would be beneficial to continue these trainings to cover every member of the housekeeping staff.

Introduction

This project was a partnership between Penn Eco Reps, a program of the Sustainability Office, and Penn Housekeeping, a division of the Facilities and Real Estate (FRES) department. The project partners met regularly to discuss the contents of the presentation, coordinate sustainability training scheduling and logistics, and to share takeaways and findings.

Project Overview

The goal of this project was to train and inspire all 472 housekeepers working at the University of Pennsylvania on sustainability. Specifically, the aim was to create content that is the most relevant and impactful to housekeepers, and communicate it in a memorable and interactive way.

With that in mind, an initial step was meeting with the management team, primarily Joe Gaither and James Allen, to gather feedback on last year's presentation. Then, the project team created a draft presentation, showed it to 3 focus groups of current housekeepers, and modified the presentation accordingly.

After research, the next part of the process was creating a presentation tailored to groups of 10-15 housekeepers and with an approximately 45 minute duration; the content was presented in Powerpoint Slides. It focused on defining sustainability, the global and local impact, its relevance to Penn and to housekeepers, and what actions housekeepers can take to contribute towards sustainability. In addition, the presentation included a Family Feud-style game to engage the audience and a pre- and post-presentation survey to measure impacts on learning.

Four presentation sessions occurred every week, and the responsibilities included giving the entire 45-minute presentation as well as facilitating the game and the surveys. Afterwards, the pre- and post- survey data was analyzed to track progress.

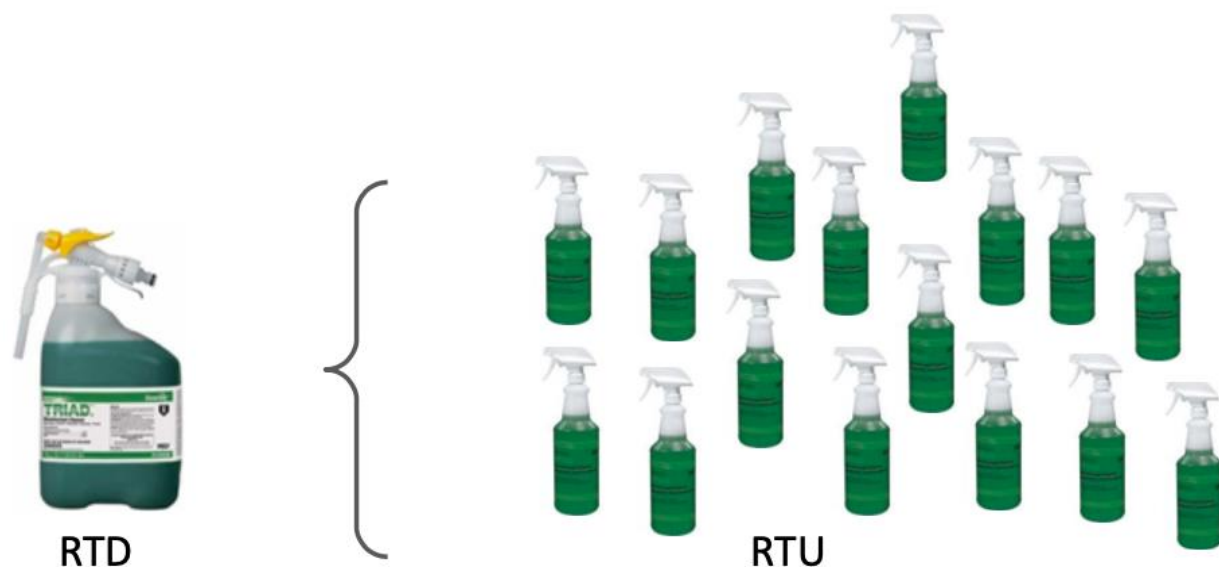
Research Findings

To ensure that the presentation reflected the needs and priorities of the housekeeping staff, focus group questions included asking about housekeepers' recollection of the previous year's sustainability presentation, ideas for which aspects to change, and which sustainability issues they viewed as most critical to learn about. Housekeepers reacted favorably to the previous presentation's emphasis on pictures and visual aids rather than text, as well as its use of economic data to show how sustainable housekeeping solutions could be less costly than traditional methods. Housekeepers also suggested that, in creating a new presentation, it would be beneficial to emphasize the health benefits and illness reduction associated with more sustainable actions in addition to mentioning recent extreme weather events and how these were tied to the larger climate crisis.

Additionally, the idea of adding an interactive game or activity to the presentation was received positively as housekeepers said it would be a welcome way to break up the time. This game was created using the platform Kahoot, and it included several questions about material in the initial sections of the presentation (defining sustainability and Penn's CSAP 3.0) as well as questions that previewed later sections. There was also a prize -- reusable straws -- provided to the winning team.

The first topic included in the background research for the presentation was the basics of climate change. Finding the best way to share information in an easy-to-understand way without oversimplifying was critical, as was ensuring that the explanation of climate change and related issues felt relevant to the housekeepers' everyday lives. To this end, the presentation section on sustainability began with a clip of young climate activist Greta Thunberg's speech at the UN Climate Summit and photos of the 2019 Philadelphia climate strike to emphasize that climate action is very important to young people, such as many of the housekeepers' children or grandchildren. This was a very effective point, as mentioning the impacts of climate change on someone's own family made the issue feel much more relevant. This section of the presentation also included findings from the 2018 Intergovernmental Panel on Climate Change (IPCC) report, which said that there are only 12 (now 10) years to make drastic changes to avoid the worst impacts of climate change.

The core of the presentation was a discussion of sustainable housekeeping practices at Penn Housekeeping. After conducting independent research and speaking with the FRES staff members, the best strategy appeared to be focusing on three housekeeping practices. The first such practice was the switch from a "ready to use" (RTU) chemical dispensing system to a "ready to dispense" (RTD) system.



A visualization of waste reduction in the switch from RTU to RTD.

Instead of requiring housekeepers to dispose of their plastic spray bottles every time they run out of the chemical solution, the RTD system allows these bottles to be filled using a chemical concentrate. This practice saves significant numbers of plastic bottles, as well as greenhouse gas emissions because the bottles need to be shipped to Penn's campus less frequently. The second practice included in the presentation was the switch from traditional trash bags to bags made

100% post consumer recycled content. These bags come from the company Revolution Bag (revolutionbag.com), which uses a closed-loop recycling technique to first manufacture agricultural film and then take this film off of farms to recycle it into trash bags.



An explanation of the Revolution Bag manufacturing process, from revolutionbag.com.

The final sustainable housekeeping practice covered in the presentation was the new resilient floor finish being utilized by the housekeeping department, which does not use corrosive or “stripping” chemicals, requires fewer applications, and only necessitates the use of water for day-to-day cleaning.

Results and Evaluation

To measure effectiveness and collect feedback, the housekeepers filled out surveys both before and after each presentation. The pre-presentation survey had 6 questions (*Appendix Figure 1*) and post-presentation survey had 7 questions (*Appendix Figure 2*). Overall, 278 people answered the pre- survey and 214 people answered the post- survey. They are not necessarily the same people. Names were optional.

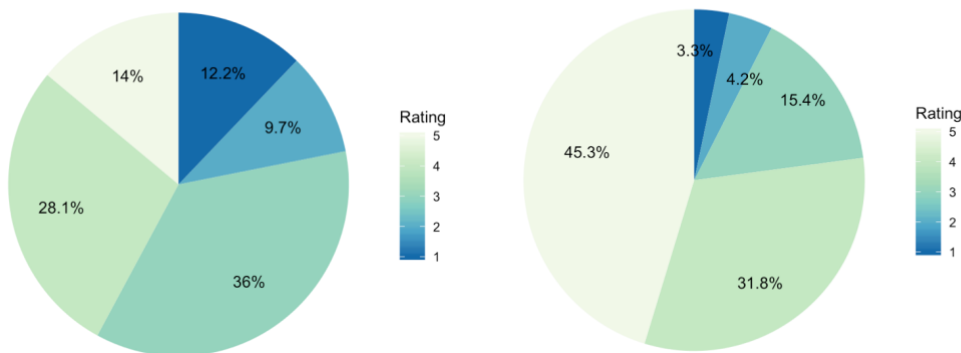
The questions had the following goals: the first 5 were the same for pre- and post-survey to measure improvement in understanding. Housekeepers gave a quantitative rating of 1-5 for Q1-Q3 and qualitative explanation for Q4-5. Q6 and Q7 in the post-presentation survey asked what housekeepers will act on after the presentation, which measured what actionable impact was inspired by the presentation.¹

Quantitative Responses: Understanding

Q1. How much do you know about sustainability in general?

Pre-presentation, most housekeepers rated themselves a 3 (36%) or 4 (28%) on their knowledge. Post-presentation, they felt a lot more confident about their general knowledge. Nearly half (45%) gave themselves a 5, while around one third (32%) gave themselves a 4.

How much do you know about sustainability in general? (pre-presentation) How much do you NOW know about sustainability in general? (post-presentation)



Q2. How much do you know about sustainability in Penn Housekeeping?

Similar to Q1, pre-presentation, majority rated themselves a 3 (34%) or 4 (28%) on their knowledge about Penn Housekeeping specifically. Post-presentation, there is a lift in how much the housekeepers learned about their day-to-day job. Half (50%) rated themselves a 5 and over one-third (35%) gave themselves a 4.

How much do you know about sustainability in Penn Housekeeping? (pre-presentation) How much do you NOW know about sustainability in Penn Housekeeping (post-presentation)

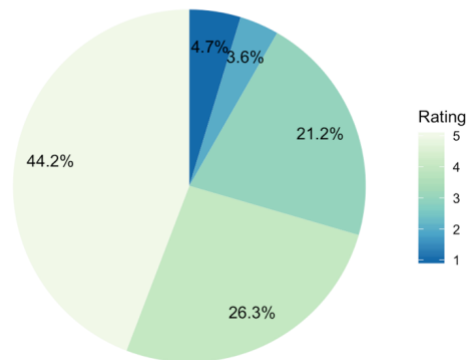


¹ Q6 in the pre-presentation survey is not analyzed here. It asked housekeepers what else they would like to learn, and will be discussed in Conclusion on page 10

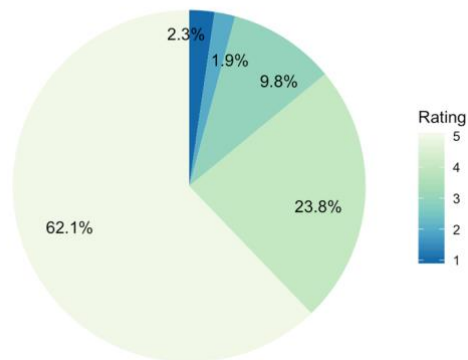
Q3. How much do you care about sustainability?

Pre-presentation, most housekeepers indicated that they care about sustainability, with 70% giving themselves a 4 or 5. After the presentation, this ratio jumped up to 86% that self-rated 4 or 5. This is positively correlated with the improvement from Q1 and Q2, in the housekeepers' knowledge in sustainability generally and about Penn Housekeeping.

How much do you care about sustainability?
(pre-presentation)



How much do you NOW care about sustainability?
(post-presentation)



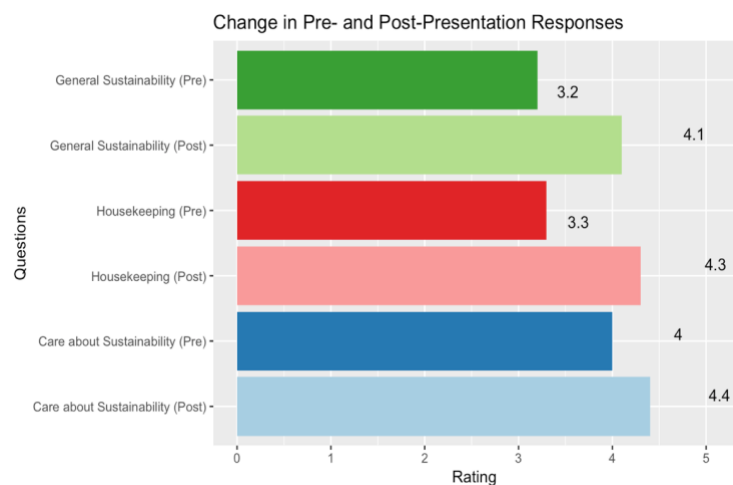
Overall, the quantitative results showed **an increase in the housekeepers' interest and knowledge.** The average rating improved by 28% for general knowledge in sustainability, and by 30% about sustainability in Penn Housekeeping. For how much people care, the rating was already high on average, and it still improved by 10%.

Qualitative Responses: Understanding

While the numbers showed improvements, it is more important to identify the specific content that explains these increases. Using R to text-mine Q5 and Q6, there were clearly changes in the semantics of the housekeepers' answers.

Q5. What is one environmental issue in the world right now?

Pre-presentation, the only issues that stood out to housekeepers were “**pollution**” (appeared in 19% of answers) and “**global warming**” (13% of answers). These two issues are broad, suggesting housekeepers do not know of many specific, contextual issues like forest fires, flooding, water contaminations, respiratory issues.



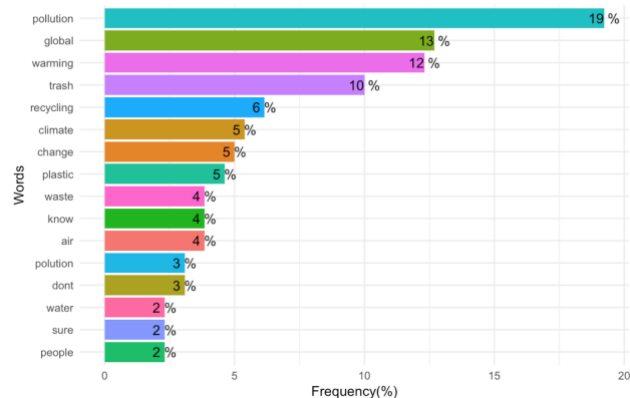
It is noteworthy that many people saw “**trash**” and “**recycling**” (10% and 6%) as a prominent environmental issue. This could be explained by the housekeepers’ day-to-day job, which has a large part to do with waste sorting and management. Previous training has also focused on recycling as a primary duty.

Only a small proportion of people saw bigger implications of environmental issues in their lives, such as “**plastic**”(<5%) and “**air pollution**” (<5%).

Most frequently appeared words in response to
'What is one environmental issue in the world?'(pre-presentation)



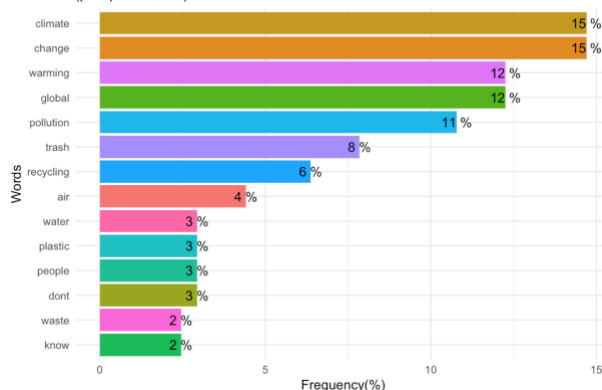
What is one environmental issue in the world?
(pre-presentation)



Post-presentation, the issues identified by housekeepers became heavily focused on “**climate change**” (15% of answers). This shows the effectiveness of the presentation, which emphasized the effect of climate change on ecosystems, recent IPCC report on temperature anomalies, and natural disasters as a result of climate changes. There is also a diversity of other answers: many still identified “**global warming**” as a topical issue (12%), and other responses included keywords like “**air**”, “**water**”, “**people**”, “**plastic**”.

Unfortunately, several people responded “don’t” or “sure”, which are part of answers that said “don’t know” and “not sure” in the survey response. after the presentation (2%). Many of the issues in the presentation did not come up either, like flooding, wildfires, hurricanes, coral bleaching, loss of habitat, threats to the future of children.

What is one environmental issue in the world?
(post-presentation)



Most frequently appeared words in response to
'What is one environmental issue in the world?'(post-presentation)

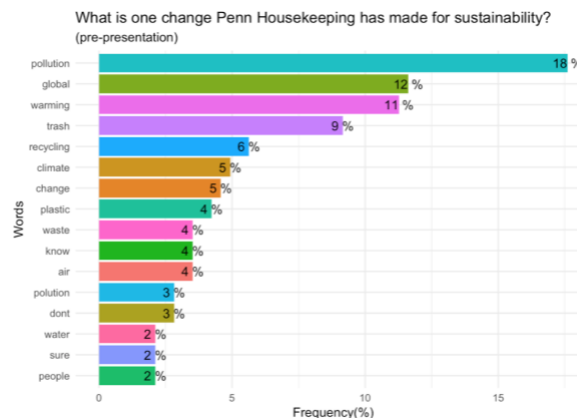


Q6. What is one change Penn Housekeeping has made for sustainability?

Pre-presentation, attendees also had a very vague understanding of their impact as Penn Housekeepers. A majority put reducing “**pollution**” (18%) and improving “**global warming**” (12%). Again, many answered “**trash**” and “**recycling**” (9% and 6%) as their contribution to sustainability, suggesting housekeepers are very aware of this part of their job.

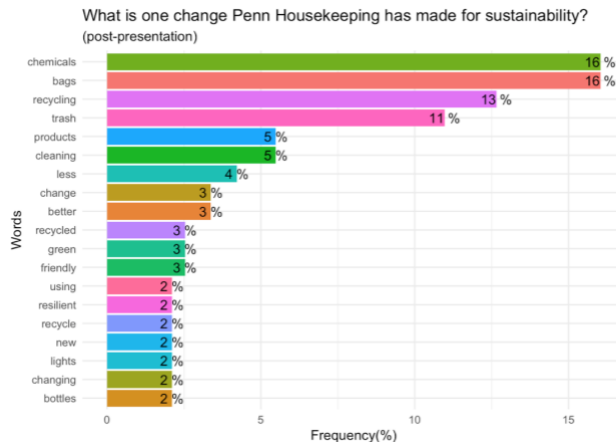
However, the answers lacked specificity. Unlike Q5, Question 6 is about the housekeepers’ daily job. Before the workshop, they did not connect their work to bigger environmental issues.

Most frequently appeared words in response to
‘What is one change Housekeeping has made for sustainability?’ (pre-presentation)



Post-presentation, it is exciting to see housekeepers recognize many of the changes they have created. “**Chemicals**” (16%) , “**products**”(5%), “**cleaning**”(5%), “**resilient**” (2%), eco-
“**friendly**” came up, which were highlighted in the presentation about RTD bottles replacing RTUs, resilient floor finish that require fewer applications. “**Bags**” also came up frequently (16%), which is likely referring to the Revolution Bags that are 100% recycled.

Other words such as “**bottles**”, “**lights**”, “**green**”, “**less**”, “**changing**” came up, all pointing to positive impacts that housekeepers now recognize. Before, housekeepers had been perplexed or unhappy with these changes, which may have disrupted their routines. However, the presentation has informed, and hopefully motivated them, about why their jobs are crucial to sustainability.



Most frequently appeared words in response to "What is one change Housekeeping has made for sustainability?" (post-presentation)



Qualitative Responses: Taking Actions

Post-presentation, two questions were added to prompt housekeepers to take actions. The ideal outcome is that these responses would include the tips and lessons mentioned in the presentation.

Q6 (post). What is one change you will make in your life related to sustainability?

The most popular action is still about “recycling” or “recycle” (36 people, *See Appendix Figure 3*). Housekeepers are also inspired in a wide range of areas. They mentioned the words “lights”, “cleaning”, “products”, “water”, “bags”, “eat”, “meat” a lot. These are referring to switching off the lights in the buildings, using eco-friendly cleaning products as suggested in the presentation, using the website www.ewg.org, using less water at home, and eating more plant-based diet to reduce emission.

Most frequently appeared words in response to "What is one change you will make in your life related to sustainability?"



Q7 (post). What is one thing you'll share with a friend or family member about this presentation?

The most answered word was “**everything**” (17 people, *See Appendix Figure 4*). Though it doesn’t tell us specific takeaways, one possible explanation is that housekeepers found the content informative overall and found many tips and tricks helpful.

Other frequently used words were “**recycling**”, “**cleaning**”, “**products**”, “**energy**”, “**chemicals**”. These can be associated with the housekeepers’ jobs and the actional changes they can make at home. It is likely they will share how their job and their behaviors at home are important with families and friends.

Most frequently appeared words in response to
‘What is one thing you’ll share with a friend or family member’



Words like “**sustainability**”, “**ozone**”, “**future**”, “**climate**”, “**world**”, “**importance**” showed up a lot as well. These words indicate that housekeepers are keen to share stories about the big picture and the future. The presentation defined “sustainability” at the start, talked about fixing the “ozone” hole with group actions, and left questions about the “future” and the “world” as the housekeepers envision the future for their children and grandchildren. Hopefully, these thought-provoking ideas will continue to inspire the housekeepers.

Limitations

- **Biases in results because not all completed the surveys:** The pre- and post-presentation surveys were not always completed by housekeepers. It is likely that housekeepers who opted-in to answer are naturally more interested in sustainability. Thus, the results are subject to self-selection bias, as people who care more and pay more attention have chosen to answer the survey. The overall results may be overly optimistic and not representative of the average housekeeper.
- **Language barrier:** Some housekeepers are not fluent in English, which explains some of the issues a few housekeepers had with understanding the presentation or completing the survey.
- **Timing and randomized groups:** The time of the day and members of each group made some presentations more effective than others. Some workshops took place at 6AM, when housekeepers had just finished an overnight shift and found it hard to focus. Some workshops had members who knew each other less well and were not as enthused to discuss. Due to these constraints, some groups found the presentations more helpful and engaging than others.
- **Disruption due to COVID-19:** Unfortunately, the COVID-19 outbreak meant that only approximately 300 received the training session instead of all 472 housekeepers as planned.

Conclusion

From the results of the pre- and post- surveys as well as feedback from the housekeeping and FRES staff members, it can be concluded that **the sustainability trainings did increase the level of housekeepers' knowledge** about environmental issues and sustainable housekeeping. One limitation of these survey results is that they were taken directly after the training so retention of this new information likely decreased over time. To address this issue, it would be helpful to have housekeepers take another survey to measure their retention after a few weeks.

One further application of this project would be to incorporate some of the content from the presentation into the **Penn Housekeeping onboarding for new employees**. This would ensure that every housekeeper was trained on sustainability as soon as they started working at Penn, and would also establish sustainability as a priority within the housekeeping department. Having a housekeeping staff who all possessed some background knowledge about sustainability would also allow future Eco Reps or similar projects to go more in-depth and bypass the “sustainability basics” content. Furthermore, from the pre-presentation survey responses (Q6), some housekeepers are interested in action-planning, materials in other languages like Spanish, how to finance a sustainable lifestyle, and more. These can be incorporated into future presentations as well.

Once housekeepers have been presented with information on how to act sustainably and how certain housekeeping practices have been changed to be pro-environmental, implementing a **sustainability rewards system** would help to ensure these practices are maintained. A sustainability rewards system could provide housekeepers with some sort of benefit if they show adherence to the housekeeping and/or personal sustainability practices at an exceptional or higher than average level. This would enforce these behaviors at a significantly stronger level than only providing informational campaigns promoting these practices.

It is also necessary to take action to address key concerns raised by housekeepers during this process. By far the most frequent comment received after presentations was about **Penn students not adhering to recycling guidelines**, which makes it very difficult or impossible for housekeepers to actually recycle what was put into recycling bins around campus. To support the work of Penn Housekeeping, it would be extremely beneficial to conduct student-focused education campaigns about how to properly recycle; site-specific and widespread recycling signage would also likely lead to lower contamination rates.

A final recommendation based on the findings from this project is that Penn Housekeeping move from the current “ready to dispense” (RTD) chemicals system to an even **more sustainable option by using cleaning chemicals in the form of tablets** which can be dropped into water, thus eliminating the need for plastic bottles of chemical concentrate. There are a number of

companies currently offering this type of cleaning chemicals. This switch would also lead to further reductions in emissions from shipping and transportation, as the chemical tablets are very small and lightweight. A move to using cleaning chemical tablets offers the opportunity for Penn Housekeeping to make additional gains in the area of sustainability and emissions reduction.

Appendices

Partners in the Facilities and Real Estate Department

1. Joseph Gaither, gaither@upenn.edu
2. James Allen, jgallen@upenn.edu
3. Wendy Sparks, wsparks@upenn.edu

Facilities and Real Estate website: <https://www.facilities.upenn.edu>

View the presentation slides here:

<https://docs.google.com/presentation/d/1oRPzIVX3f8KK71Zp6vEI05UAuzGQ3wuBDmHpEVAAATi8/edit?usp=sharing>

Pre-presentation Survey: bit.ly/pennkhpre

Post- Presentation Survey: bit.ly/pennhkpost

Outside research sources:

- <https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report>
- <https://www.iisd.org/topic/sustainable-development>
- <https://www.theguardian.com/environment/video/2019/sep/23/greta-thunberg-to-world-leaders-how-dare-you-you-have-stolen-my-dreams-and-my-childhood-video>
- <https://www.ipcc.ch/sr15/>
- <https://www.nasa.gov/feature/goddard/2019/2019-ozone-hole-is-the-smallest-on-record-since-its-discovery>
- <https://www.sustainability.upenn.edu/our-commitment/our-plan>
- <https://revolutionbag.com/>
- www.ewg.org
- <https://cms.business-services.upenn.edu/transportation/car-pooling/enterprise-carshare.html>

Housekeeping Sustainability Survey - Pre Presentation

*** Required**

Name (optional)

Your answer _____

How much do you know about sustainability in general? *

1 2 3 4 5

Nothing ☐ ☐ ☐ ☐ ☐ A lot

How much do you know about sustainability in Penn Housekeeping? *

1 2 3 4 5

Nothing ☐ ☐ ☐ ☐ ☐ A lot

How much do you care about sustainability? *

1 2 3 4 5

Not at all ☐ ☐ ☐ ☐ ☐ A lot

What is one environmental problem in the world right now? *

Your answer _____

What is one change that Penn Housekeeping has made because of sustainability? *

Your answer _____

What is something you would like to learn about sustainability? *

Your answer _____

Submit

Figure 1. Pre-presentation survey

Housekeeping Sustainability Survey - Post Presentation

Please fill this survey out honestly based on what you learned during our presentation.

*** Required**

Name (optional)

Your answer _____

How much do you now know about sustainability in general? *

1 2 3 4 5

Nothing ☐ ☐ ☐ ☐ ☐ A lot

How much do you now know about sustainability in Penn Housekeeping? *

1 2 3 4 5

Nothing ☐ ☐ ☐ ☐ ☐ A lot

How much do you now care about sustainability? *

1 2 3 4 5

Not at all ☐ ☐ ☐ ☐ ☐ A lot

What is one environmental problem in the world right now? *

Your answer _____

What is one change that Penn Housekeeping has made because of sustainability? *

Your answer _____

What is one change you will make in your life related to sustainability? *

Your answer _____

What is one thing you will share with a friend or family member about this presentation? *

Your answer _____

Submit

Figure 2. Post-presentation survey

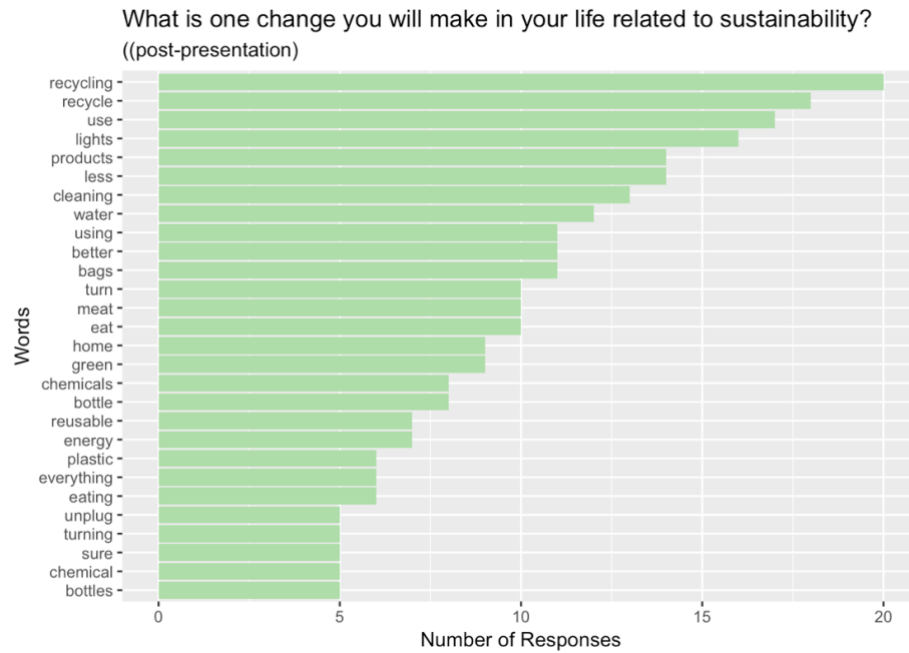


Figure 3. Post-presentation Survey Question 6

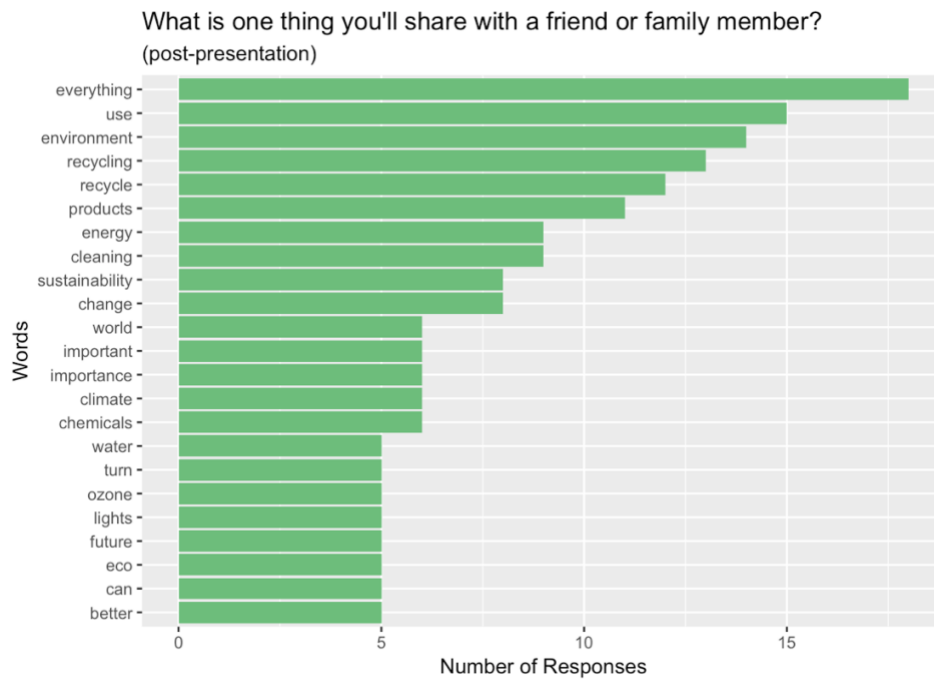


Figure 4. Post-presentation Survey Question 7