

Scope 3 Emissions at University of Pennsylvania

Saffron Livaccari¹, Colleen Reardon²

¹ Penn Sustainability Office, University of Pennsylvania

² Procurement Services, University of Pennsylvania

Published July 2022

Overview

Penn’s Climate and Sustainability Action Plan 3.0 (CSAP 3.0) represents a vision for the University’s sustainable future. One of the primary pillars of this vision is a commitment to carbon neutrality by 2042. To achieve a broader understanding of Penn’s emissions impact, the University set a goal to quantify and communicate the University’s supply chain impact. Supply chain emissions are often the largest contributor to greenhouse gases for an organization, but are not accounted for by many companies (Corkery & Creswell, 2021). This document aims to explore the extent of Penn’s main campus purchased goods and services emissions and identify opportunities for further investigation.

Carbon emissions are typically categorized as scope 1, scope 2, or scope 3. Scope 1 emissions include what a company directly emits from their facilities and production. Examples of scope 1 emissions at Penn include the burning of natural gas and fuel oil, vehicle fuel emissions, and fleet operations. Scope 2 emissions include indirect emissions related to the purchase of energy from outside vendors, such as for heating or cooling from sources such as steam or electricity. Scope 3 emissions include anything outside of these two categories that generate emissions on behalf of the organization. This includes waste, transportation, investments, employee commuting, purchased goods and services, business travel, waste disposal, and University-sponsored air travel. Scope 3 emissions are generally more difficult to trace as they are not tied to direct fuel use or purchased energy.

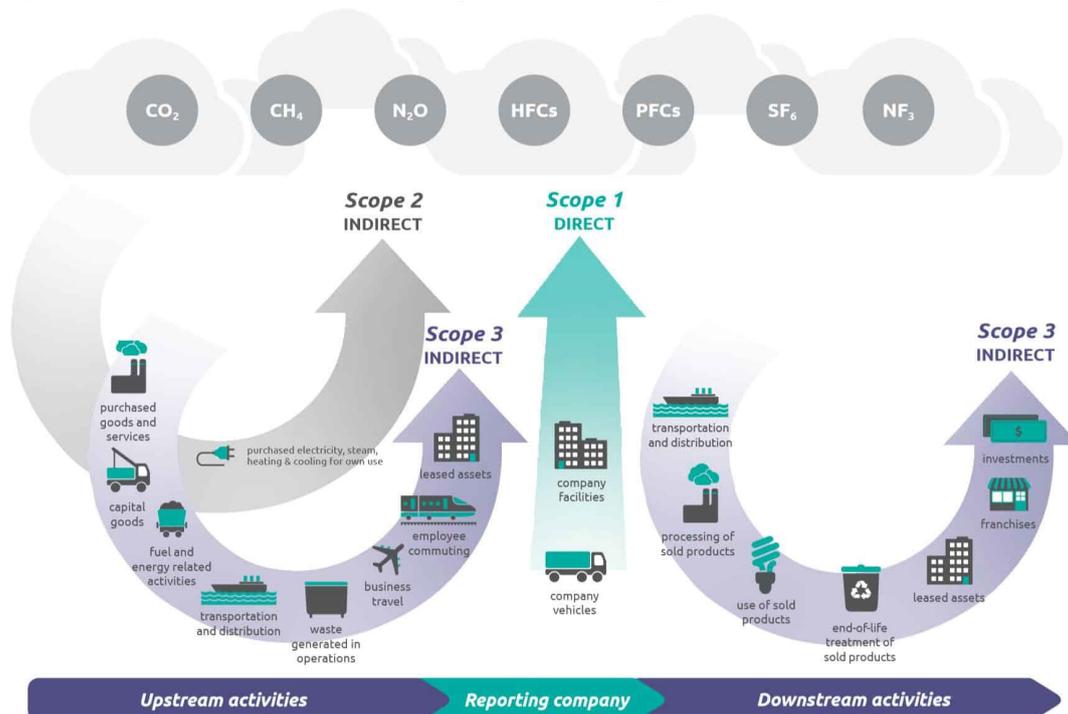


Figure 1: Overview of GHG Protocol Scopes and Emissions Across the Value Chain
 Credit: World Resources Institute and World Business Council for Sustainable Development

1. Carbon Footprinting at Penn

Penn currently tracks scope 1 and 2 emissions and some sources of scope 3 emissions annually. Air travel, employee commuting, and waste are the three scope 3 emissions that Penn currently includes within Penn’s main campus carbon footprint (see Figure 2). The preliminary analysis of Penn’s purchased goods and services emissions analysis is important for better understanding Penn’s supply chain impact and provides an initial understanding of the breadth of scope 3 emissions. Examples of “purchased goods and services,” include computers, food, software, books, laboratory equipment, health services, and other goods. Due to the complexity of goods and services purchased, a software tool is necessary to calculate these emissions since each type of purchased good will have different emissions factors.

In selecting the appropriate software for Penn, scope 3 accounting strategies for our peer institutions were explored. Twelve tools have been used by various schools in the Ivy Plus League, shown in Figure 3. This chart below presents the tools used by institutions in the Ivy+ Consortium to quantify their scope 3 emissions.

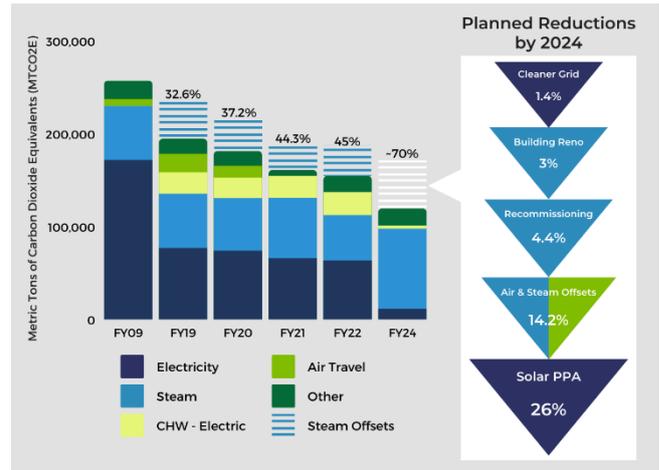


Figure 2: Penn Carbon Emissions Reductions to Date and Planned Reductions

“Quantis” was selected for Penn’s preliminary purchased goods and services analysis as it was one commonly suggested by Ivy+ peers, free, and a simple screening tool that provides a broad overview of scope 3 emissions. Penn’s aim in using this tool was to identify “hot spots” or areas where carbon emissions are estimated to be highest. Quantis utilizes rough spend data, in U.S. dollars (USD), and produces a rough estimation for emissions in each category using global economic input-output information. The tool provides companies with a rough estimate to guide focus for supply chain impacts.

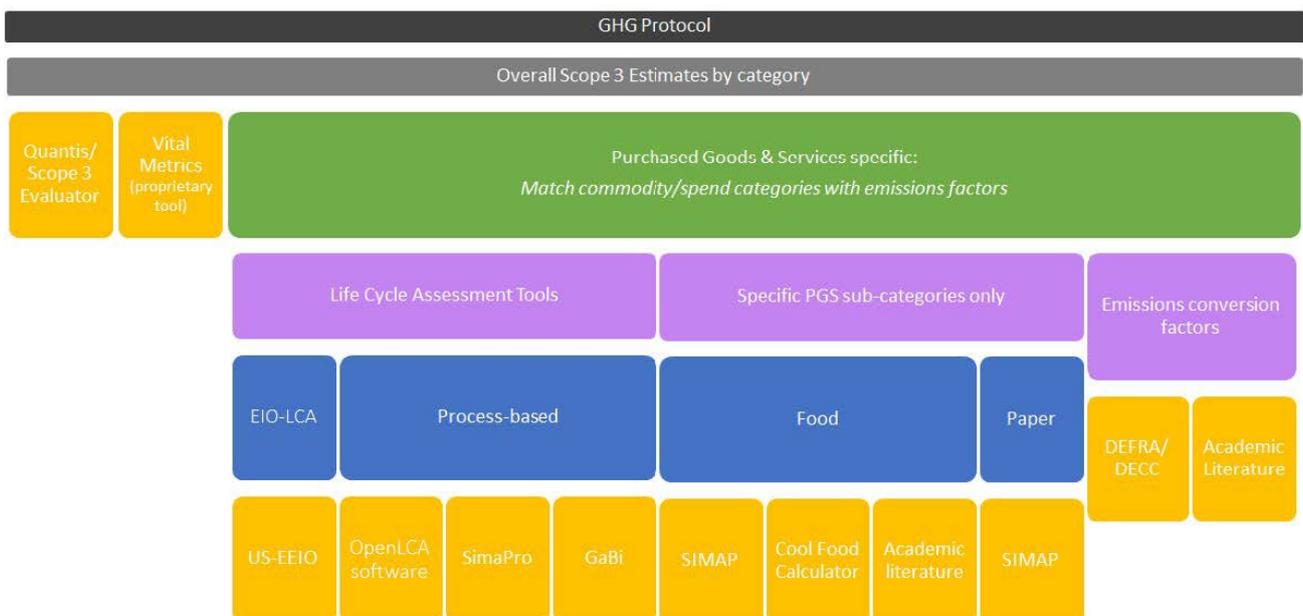


Figure 3: Landscape of Scope 3 Tools

Credit: Ivy+ Sustainability Consortium Data Working Group

2. Methodology and Results

The purchasing data used for this analysis includes anything purchased during the 2019 calendar year through the Penn Marketplace, a supplier-to-purchaser online portal for goods and services. The year 2019 was chosen as a typical purchasing year prior to COVID. Since Quantis has specific categories to input the purchased goods information, the first step taken was to match the existing categories in Penn’s purchasing data to a similar category in Quantis. Next, Penn’s total purchased amount was summed for each assigned Quantis category. This total spend value for each category was input into Quantis. The top 10 category results from Quantis in carbon emissions (kg/year) for each category are shown in Figure 4.

The two slices labeled “Air Travel” and “Commuting” in Figure 4 represent categories for which Penn already calculates the carbon emissions prior to the purchased goods and services analysis. Waste, the third category Penn previously calculated, is not seen here because it is not a top 10 carbon emitting category.

According to this analysis, the top five contributors to Penn’s purchased goods and services emissions are:

- Chemical and Chemical Products;
- Other Community, Social and Personal Services;
- Electrical and Optical Equipment;
- Food, Beverages, and Tobacco; and
- Other

An example of the kinds of relevant goods and services identified within the top five categories is “Lab Supplies” within Chemical and Chemical Products which includes physical products with emissions that may be directly affected by Penn’s purchasing practices.

This study generally demonstrated that the estimated total scope 3 emissions are likely to be more significant than Penn’s scope 1 and 2 emissions, as demonstrated in Figure 5.

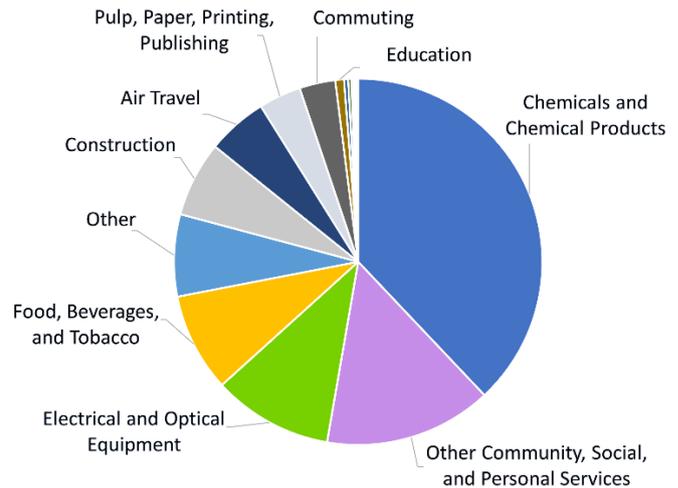


Figure 4: Total Estimated Carbon Emissions by Percentage, Including Emissions Calculated Internally by Penn

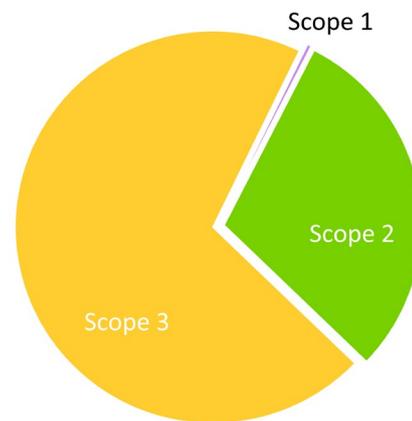


Figure 5: Comparison of the Estimated CO2 Emissions for Scope 1, Scope 2, and Scope 3

3. Limitations

While limitations exist which effect the accuracy and precision of that data within this study, the information herein is still useful as a preliminary analysis for determining focus areas for purchased goods and services and their relative impact. This study can also inform how the University could best undergo any future in-depth analysis revolving around emissions associated with purchased goods and services categories. The various data limitations for this study are outlined below:

- **Overall, the accuracy of the information input into Quantis is dependent on correct, specific details within the purchased goods**

and services data. Due to the challenges outlined above, the accuracy of the emissions associated with each category is understood to be low. However, the information within this study may be used to understand the categories with the highest impact on Penn's carbon emissions from purchased goods and services.

- **This analysis does not take into consideration any efforts that have been taken by Penn to make more sustainable purchases.** For example, 30% of the food purchased for Penn's dining facilities is plant-based and almost 62% of the food purchased is sustainably and ethically produced, according to the most recent Association for the Advancement of Sustainability in Higher Education (AASHE) Sustainability Tracking, Assessment, and Rating System (STARS) standards. Additionally, Penn Procurement Services strategically automatically replaces items within Penn Marketplace with more sustainable options with equal cost. There are multiple examples of more sustainable purchases from Penn that are not considered in this broad analysis.

4. Conclusion

Scope 3 emissions are complex as they are varied in impacts and massive in quantity. The Greenhouse Gas (GHG) Protocol does not expect institutions' scope 3 emissions to be as accurate as scope 1 or 2 since scope 3 emissions are larger and more complicated. Rather, it is recommended that institutions conduct this analysis to understand the extent of the carbon emissions and what is plausible to change. Therefore, although Quantis is not an accurate estimation of Penn's scope 3 emissions, it provides the University with an idea of what categories might be the highest contributors to Penn's carbon emissions, a starting point for more in-depth analyses. In order for Penn to better understand the full scope of the University's carbon emissions, it is important to consider emissions from purchased goods and services. If Penn is able to purchase more

sustainable products and reduce waste within our supply chain, there is opportunity to support other organizations in also maintaining sustainable business. To reach the global warming limit of less than 1.5C change, a world-wide goal set by the Paris Agreement, it is important for organizations to strive to purchase responsibly and work with suppliers to adapt sustainable methods.

Acknowledgements

We thank Procurement Services for providing data and consulting throughout the report. The Center for Environmental Building & Design provided data for Penn's carbon footprint. We also thank Stanford University for sharing their experience with Scope 3 reporting. We thank Penn's Environmental Sustainability Advisory Council's Procurement Subcommittee for sponsoring this project in partnership with the Penn Sustainability Office with support from Facilities and Real Estate Services.

References

- [1]Corkery, M., & Creswell, J. (2021, November 4). *Corporate Climate Pledges Often Ignore a Key Component: Supply Chains*. The New York Times. Retrieved November 20, 2021, from <https://www.nytimes.com/2021/11/02/business/corporate-climate-pledge-supply-chain.html>
- [2]*Corporate Value Chain (Scope 3) Accounting and Reporting Standard: Supplement to the GHG Protocol Corporate Accounting and Reporting Standard*. World Resources Institute and World Business Council for Sustainable Development. (September 2011).
- [3]Ivy+ Sustainability Consortium Data Working Group. (2021, May). *Scope 3 Purchased Goods & Services Emissions at Ivy+*. Ivy+ Sustainability Consortium.