THE OHIO STATE UNIVERSITY

WEXNER MEDICAL CENTER

Scope 3 Sustainability Research Analysis for

the Wexner Medical Center at The Ohio State University

AEDE/ENR 4567 Senior Capstone

Start Date: January 25th, 2022

End Date: April 20th, 2022

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Executive Summary

Our Project Team assisted the Wexner Medical Center (WMC) in achieving The Ohio State University's 2040 Carbon Neutrality goal. Our project focused on two primary objectives to analyze and verify Scope 3 emissions from the use of two sustainable healthcare products: (1) plant-based operating room (OR) trays and (2) recycled blue wrap bedpans.

- **Objective 1: Analyze Waste and Emissions Reductions of NewGen Surgical Plant-Based OR Trays Compared to Conventional Styrofoam OR Trays.**
  - **Results:** In contrast to NewGen results, our research showed bagasse creates more emissions than polystyrene products when taking disposal into consideration.
  - **Recommendations:** We recommend a Life Cycle Assessment of NewGen surgical trays specifically with the following data that was missing from this project:
    - Type and length of transportation for bagasse sourced from Thailand
    - Feasible bagasse disposal methods for WMC and related greenhouse gas (GHG) emissions
    - Energy required to produce un-bleached bagasse
- **Objective 2: Determine and Compare Environmental Impacts of Recycled Blue Wrap Bedpans and Conventional Bedpans.**
  - **Results:** We were able to equate **2,000 lbs** of blue wrap recycled annually to:
    - **810 cubic ft** avoided from the landfill
    - **5,774 kWh*** of electricity saved
    - **685 gals**** of oil saved

*5,744kWh of grid electric energy saved = **5,544.5 lbs of CO_2e** avoided (~2.8 tons).

685 gals of oil saved = **13,421 lbs of CO_2e avoided (~6.7 tons).

One passenger car emits about 4.5 tons of CO_2e *annually (EPA, 2021).*

- **Recommendations:**
    - While we were able to calculate an estimate of Scope 3 emissions avoided based on electricity and oil saved, it was difficult to collect exact data of all contributing factors to Scope 3 emissions due to its complexity. We recommend further study of recycled blue wrap bedpans to include emissions related to disposal.
    - Additionally, if all companies and institutions focused on their Scope 1 and 2 emissions and worked to reduce them, Scope 3 emissions would be significantly reduced as well.

Introduction

The healthcare industry accounts for nearly 10% of all U.S. carbon emissions (Practice Greenhealth) [Figure 2]. The Ohio State University WMC pledges to achieve carbon neutrality by 2040 in recognition and awareness of the consequences of climate change. The university's carbon neutrality goal focuses on the following three scopes:

Scope 1: direct emissions	Onsite energy, fleet vehicles
Scope 2: indirect emissions	Purchased electricity
Scope 3*: not controlled by university *~70% of emissions*	Student/employee commute, waste and disposal methods

*Does not include purchased products

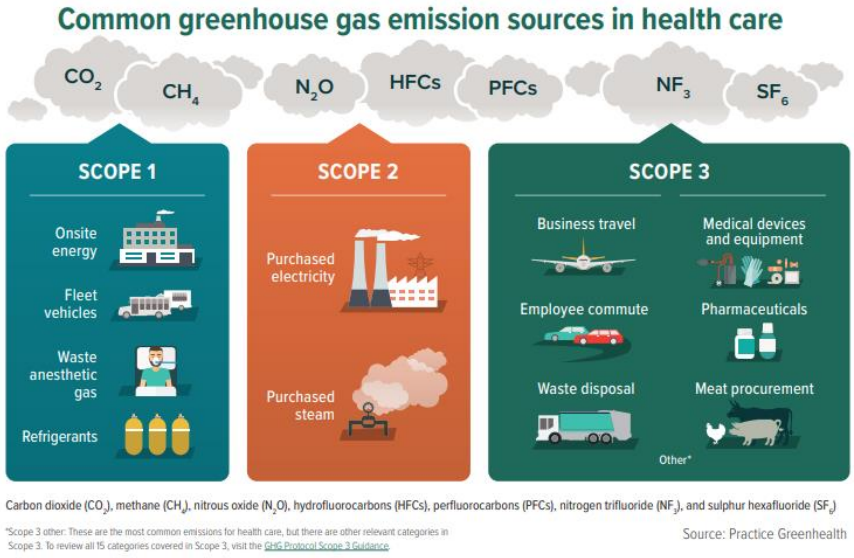

Figure 1: (Above) This figure, provided by Practice Greenhealth, explains the differences in the various emission types (Scope 1, 2, and 3).

Figure 2: (Above) This figure, provided by Practice Greenhealth, shows the importance of getting sustainability right in healthcare.

Overall Research Goal

The carbon neutrality goal captures the majority of Scope 1 and Scope 2 emissions, but only tracks a few Scope 3 category emissions. Our research highlights the importance of also considering additional Scope 3 emissions from the supply chain [Figure 3].

Project Purpose, Motivation, and Goals

Scope 3 emissions arise from activities of assets not owned or controlled by the university (EPA, 2022a). The WMC has the purchasing power to reduce these emissions by purchasing more sustainable healthcare product alternatives. Scope 3 emissions tracking and accounting can be a challenge due to supply chain complexity and variability. However, tracking Scope 3 emissions is becoming more popular as companies and institutions seek to

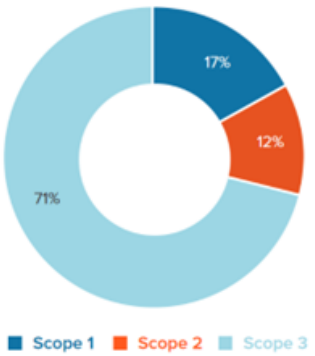

Figure 3: (Above) This figure, provided by Healthcare Without Harm's Climate Footprint Report, shows the global health care footprint based on the three scope emission types. Scope 3 emissions account for 71% of health care emissions globally.

better understand the operational impacts of GHG emissions (EPA, 2022a). Thus, research on Scope 3 emissions is crucial and can be very important.

Another motivation for this research is to verify a third party's claims on a sustainable product alternative. The BlueCON company produces recycled blue wrap bedpans that are considered more sustainable than conventional bedpans [Figure 4]. Our team sought to verify this claim. Blue wrap is the plastic film around medical instruments and tools that keeps the tools sterile for medical and operational uses. This plastic is traditionally not accepted in mechanical recycling. BlueCON has created a recycling process that allows this material to be recycled and turned into a bedpan for hospital use made of 90% recycled blue wrap. WMC uses bedpans daily and there are around **35,000 bedpans** used annually. Our team evaluated whether a recycled alternative is a more sustainable and cost-effective option than the conventional product.

Aside from a carbon neutrality goal, the university also emphasizes Zero Waste, with a goal of Zero Waste by 2025. The university's Zero Waste goal highlights diverting 90% or more of waste from landfills by recycling and composting. The alternative bedpans are made of 90% recycled plastic blue wrap, eliminating the use of virgin plastic for these products. This sustainable product alternative aligns with Wexner's goal to reduce waste and the university's goal of avoiding new projects that do not align with their sustainability goals.

Figure 4: This image, provided by BlueCON, is of the blue wrap bedpan made from recycled sterile blue wrap.

Research Objectives and Recommendations

Objective 1: **Analyze Waste and Emissions Reductions of NewGen Surgical Plant- Based OR Trays Compared to Conventional Styrofoam OR Trays.**

- Recommendations: We recommend a Life Cycle Assessment of NewGen surgical trays specifically with the following data that was missing from this project:
  - Type and length of transportation for bagasse sourced from Thailand
  - Feasible bagasse disposal methods for WMC and related emissions
  - Energy required to produce un-bleached bagasse

Objective 2: **Determine and Compare Environmental Impacts of Recycled Blue Wrap Bedpans and Conventional Bedpans.**

- Recommendations:
  - Due to the lack of data and subsequent findings, we recommend further study of recycled blue wrap bedpans to include emissions from disposal. While we were able to calculate an estimate of Scope 3 emissions avoided based on electricity and oil saved, it was difficult to collect exact data of all contributing factors to Scope 3 emissions due to its complexity.
  - Additionally, if all companies and institutions were accountable for their Scopes 1 and 2 emissions and worked to reduce them, Scope 3 emissions would also be significantly reduced.

Additional Recommendations:

- We recommend that WMC choose transparent suppliers and dealers that practice exceptional due diligence regarding GHG reporting and use the SEC (U.S. Securities & Exchange Commission) proposal for climate disclosures as a leverage point.

- We recommend that WMC focus on Scope 1 and 2 emissions since these factors can be controlled easier to reach carbon neutrality.
- We recommend an additional project to continue our work and to better understand the GHG emissions, economic, and social impacts of the two alternative healthcare products.

Objective 1: Analyze Waste and Emissions Reductions of NewGen Surgical Plant-Based OR Trays Compared to Conventional Styrofoam OR Trays.

Our first objective was to review and verify NewGen Surgical's data, methodology, and claims of 80% emissions reductions. The following research tasks were identified:

1. *Collect Background Information:* Interview Robert Chase, CEO of NewGen Surgical to understand the company and their production process.
2. *Review NewGen Life Cycle Analysis (LCA):* Review NewGen Packaging Trays Summary document to understand data and methodology of their assessment.
3. *Complete Downstream Analysis:* Perform downstream operations analysis of transportation, distribution, and disposal processes.

Methods

Literature Review: We analyzed Bagasse Trays LCA by NewGen to understand their methodology and claims. Additionally, we researched the data used in NewGen's LCA to understand how disposal affects the environmental impact of bagasse products.

Informational Interview: We met with Robert Chase from NewGen Surgical to discuss the LCA of their bagasse trays. We discussed how their LCA was completed, as well as data we needed from NewGen to complete our own LCA with the addition of environmental impacts from downstream transportation and disposal.

Data Analysis: We extrapolated bagasse disposal impacts and methods from the same study used by NewGen in their analysis to predict how disposal may have changed their assessment. This study gave us insight into how including disposal and downstream transportation of bagasse trays in the LCA may make the product less environmentally friendly in terms of carbon emissions than conventional polystyrene* trays.

*Polystyrene is the scientific name for "Styrofoam".

Figure 5: (Right) This figure, provided by Practice Greenhealth, shows the cost savings that an operating room can experience when it switches to various sustainable practices. Using more sustainable OR kits can save each OR $1,098 annually.

Data Collected

Informational Interview Takeaways

(Chase, 2022)

- NewGen did not conduct a complete LCA of products; there was a focus on upstream inputs and outputs; there was no focus on harmful chemicals
- NewGen created a calculator to understand the emissions reductions (from extractive inputs to renewable inputs)
- Products made in China; sugarcane sustainability farmed in Thailand
- Bagasse processed in Thailand and shipped to manufacturer in China
- Bagasse is a fiber byproduct from sugarcane harvest that is typically landfilled or burned
- Natural color makes trays white (no chemicals or bleach)
- > 40% of plastic production and waste comes from packaging

- Products are Proposition 65 compliant: requires California to maintain and update the list of chemicals known to the state to cause cancer or reproductive toxicity
- As of October, the following are the products that NewGen can replace with their plant-based alternative:
    - TRAY, FOAM, 14X20, DOUBLE, NS – Annual Usage: 45,840
    - TRAY, FOAM, 12X16IN, DOUBLE, NS – Annual Usage 1,992
    - TRAY, FOAM, 9X11IN, WHITE, NS – Annual Usage 12,204

Figure 6: This figure, provided by NewGen Surgical, is their plant-based surgical OR kit packaging tray.

Data Analysis

NewGen provided an original LCA of bagasse trays compared to polystyrene trays. However, this LCA report is confidential between NewGen and the project team. See "Limitations and Discussion" for further information.

Results

After reviewing the environmental impact of the bagasse study NewGen used to verify their assessment, we found that NewGen did not consider the entire bagasse study. Our analysis of the same study showed that bagasse creates more emissions than polystyrene products [Figures 7 & 8]. The lifecycle analysis provided by NewGen calculated emissions reductions that were less than what was advertised to WMC. The emissions reductions originally shared with WMC were for other alternative products and not surgical OR trays.

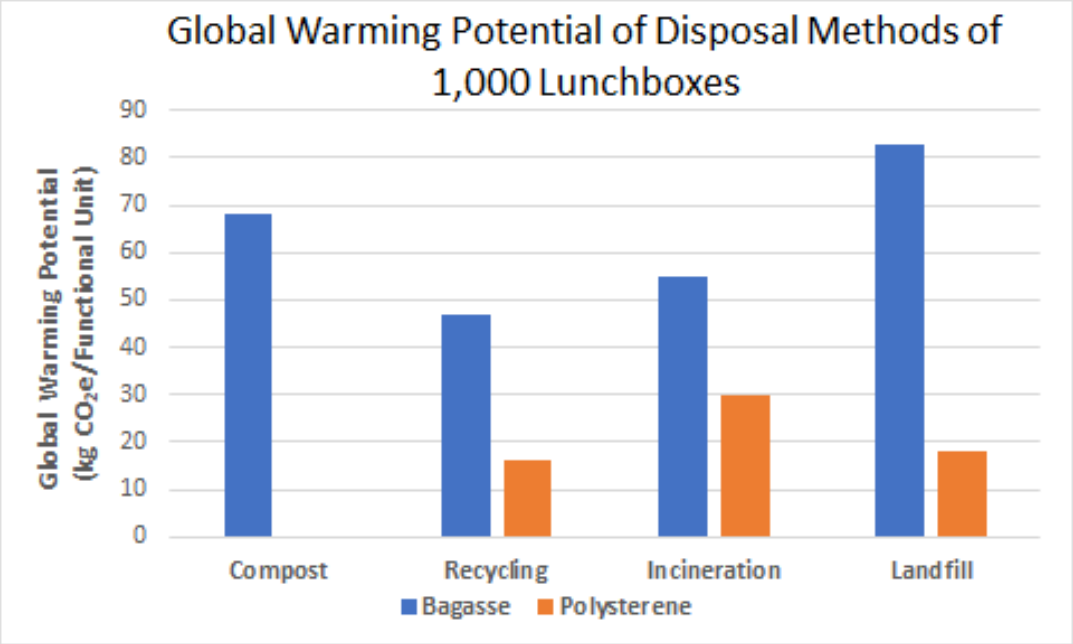

Figure 7: (Above) This graph compares the different disposal methods of bagasse and polystyrene lunchboxes. This graph is from the same study that NewGen used to base its claims, but this graph and data were omitted from their findings. NewGen did not include the disposal of bagasse in their assessment. The data for this graph was provided by the Journal of Sustainable Energy and Environment.

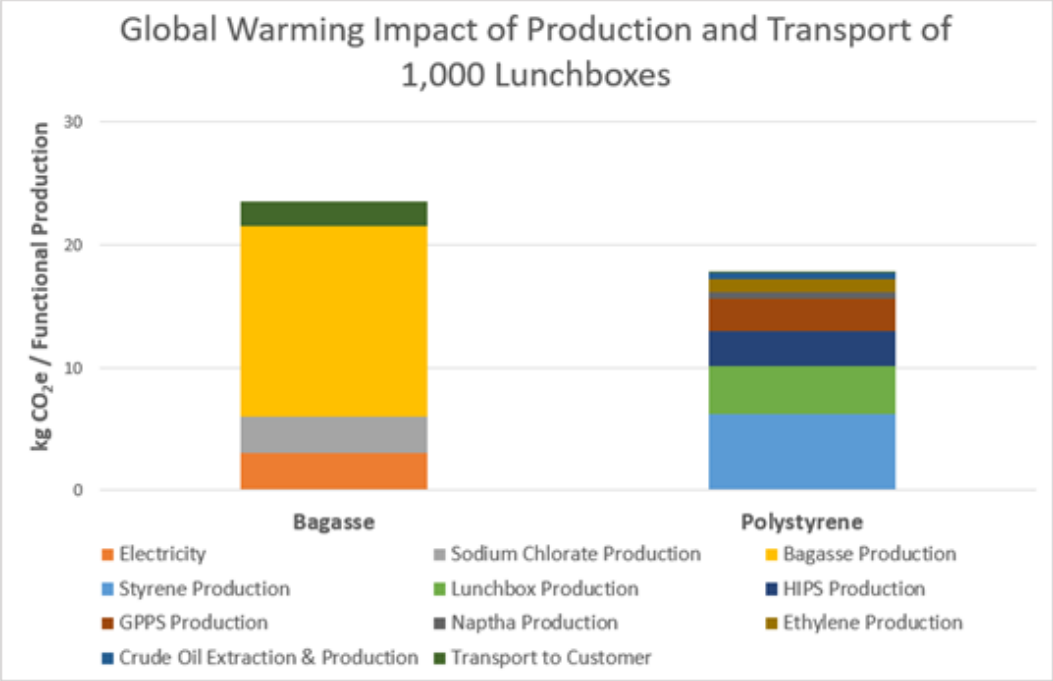

Figure 8: (Above) This graph, provided by the Journal of Sustainable Energy and Environment, shows the global warming impact of production and transport of lunchboxes made from bagasse compared to polystyrene. This graph was not used in the NewGen study but was in the same study that NewGen based its claims. NewGen used this study and claimed that its bagasse product reduced GHG emissions compared to polystyrene, this graph shows otherwise.

Limitations and Discussion

We could not complete the NewGen LCA research for this project due to insufficient data. Disposal and transportation data was required to complete a Scope 3 analysis for NewGen's bagasse trays. For transportation, we needed the locations of facilities involved in tray production to find the total transportation distance and types of transportation. The production locations were not provided for bagasse, as NewGen was unsure where the bagasse production took place in Thailand and China. Additionally, we failed to obtain data regarding whether the bagasse was transported using a plane, truck, or other transportation methods. The original report by NewGen was unable to take disposal and downstream transportation into account for their LCA. Upon further investigation into the research used in this LCA, we were able to find some data about the environmental impact of different methods for bagasse disposal. However, NewGen did not use this data in their LCA despite using data from the same source. We also needed energy use data for production throughout the cradle-to-grave life cycle, which the company did not collect.

Recommendation

We recommend that the Wexner Medical Center continue this study. More data is necessary to understand better the impacts of NewGen surgical trays on WMC's Scope 3 emissions. At present, WMC should not switch to the bagasse OR tray as our initial assessment suggests it produces more significant GHG emissions than its polystyrene counterpart. Instead, WMC should use polystyrene trays and recycle them through the specialty plastics recycling program at WMC, which uses chemical recycling.

Additionally, we recommend a Life Cycle Assessment of NewGen surgical trays specifically, with the following data as high importance:

- Type and length of transportation for bagasse sourced from Thailand
- Feasible bagasse disposal methods for WMC and related emissions
- Energy required to produce un-bleached bagasse

Objective 2: Determine and Compare Environmental Impacts of Recycled Blue Wrap Bedpans and Conventional Bedpans

Our second objective was to determine and compare the environmental impacts of 90% recycled blue wrap bedpans and conventional bedpans. The following research tasks were identified:

1. *Collect Background Information:* Interview Daniel Constant, CEO of the BlueCON Company to understand the company and their production process. Review WMC's sustainability reports to understand current use of blue wrap and bedpans.
2. *Conduct Energy Use Analysis:* Use the Ohio EPA eGrid to determine energy use from production.
3. *Complete LCA:* Utilize BlueCON calculator to determine environmental impacts and emission reductions of recycled blue wrap products.

Methods

Literature Review: We reviewed the Wexner Medical Center sustainability report to gather information about the current use of blue wrap. In addition, we researched data on electricity using the Ohio EPA eGrid and disposal trends on the Waste Management, Inc (WM) website.

Informational Interview: We met with Daniel Constant, the CEO of The BlueCON Company on Microsoft Teams. He shared the background of the company, BlueCON products, answered questions related to LCA, and provided us with the information needed to calculate environmental savings from recycling material versus extracting virgin plastic, and a material safety data sheet.

Data Analysis: We gathered transportation, electricity, and disposal data on BlueCON products to complete an LCA. We used these inputs in our LCA to determine if the recycled blue wrap bedpan would be more sustainable than the conventional bedpan.

Data Collected

Informational Interview:

- Bedpan makeup
    - Impact modifier added (Vista Max from ExxonMobil)
    - 5-10% added for flexibility so it doesn't crack
    - Colors can be added but BlueCON doesn't like to because it adds chemicals
- Annual environmental report
    - Contains reduction in emissions from (1) landfill diversion and (2) less oil and energy use
    - Contains landfill, oil, and kWh savings
- WMC to blue wrap recycling center trip distance
    - Owens & Minor collects used blue wrap (20 miles from WMC)
        - *2820 Global Dr, Groveport, OH 43125*

    - Then to Centerburg (45 miles from Owens & Minor)
        - *6589 Bennington Chapel Road Centerburg, OH 43011*
    - After recycling, turns into resin (150 miles* from Centerburg)
        - *Actually 329 miles
        - *57 Park Industrial Drive Hillsville, Virginia 24343*
    - Resin used in production (55-60 miles** from Hillsville)
        - **Actually 362 miles
        - *202 Hartmann Dr. Lebanon, TN 37087*
    - Full trip = 225 miles***
        - ***Full total trip is actually 1,152 miles
- Vehicle and fuel use: LTL short trailers with diesel engines

Data Analysis

We analyzed the data that was provided to us by BlueCON regarding emission savings from recycling material. For this, we were given equations that represent energy saving, oil savings, and subsequently emission savings. These equations relate the pounds of plastic recycled to the relevant savings. We then determined the emissions related to truck transportation used to transport the recycled material and bedpans using the locations of the collection, recycling, resin, and production plants. Lastly, to complete an LCA, additional information is needed on (1) the electricity used to produce the BlueCON blue wrap bedpans and (2) the global warming impacts of disposal of the blue wrap bedpans compared to its conventional alternative.

Results

Wexner Medical Center has recycled over 2,000 pounds of blue wrap plastic, which has turned into BlueCON's recycled blue wrap bedpans. This product recycling saves 5,774 kWh of electricity and 685 gallons of oil, which would have been used in the production process of conventional bedpans. The Greenhouse Gas Equivalencies Calculator from the EPA found that 5,774 kWh of energy equates to 5,544.5 pounds (around 2.8 tons) of CO_2 e emissions avoided, and 685 gallons of oil equates to 13,421 lbs (approximately 6.7 tons) of CO_2 e emissions avoided. Together, these two inputs result in 18,965.5 lbs (about 9.5 tons) of CO_2 e emissions avoided annually by recycling 2,000 lbs of sterilization wrap (EPA, 2022b).

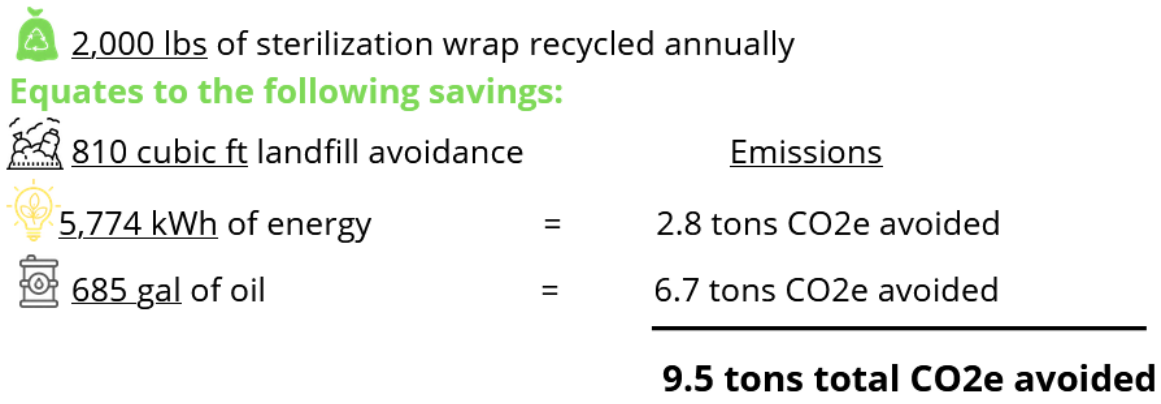

Figure 9: This figure shows the equivalencies of electricity savings and landfill avoidance from recycling blue wrap. Wexner Medical Center has recycled 2,000 pounds of blue wrap with BlueCON, which has saved over 9 tons of GHG emissions.

Based on the amount of blue wrap recycled by WMC to date, 9.5 tons of CO_2 equivalent emissions were avoided in electricity and oil usage because the blue wrap material was recycled rather than landfilled (EPA, 2022b).

The transportation distance of the recycled blue wrap material is a total of 1,152 miles by a 53-ft semi-trailer, resulting in 1.6 metric tons of CO_2 equivalent emissions (EPA, 2022b).

Limitations and Discussion

We could not complete the BlueCON LCA because of data unavailability. The data that was not available was the production practice of the blue wrap bedpans, including the energy required to produce the bedpans. We were able to determine tons of CO_2e avoided by recycling blue wrap instead of landfilling the material. BlueCon provided us with the metrics for oil and electricity savings from recycling instead of landfilling. We used these metrics as a proxy for the oil and electricity needed to recycle blue wrap in the production process. Although we could use these proxies for recycling, we did not have data or proxies for the rest of the production process (collection and molding). Furthermore, we could not determine a feasible disposal method for WMC or the related emissions for disposal methods of this product.

We collected transportation data and facility locations from BlueCon; however, the distances given between facilities were inaccurate. We recalculated the total roundtrip distance from WMC to the blue wrap collection, recycling, and production facilities using Google Maps.

Recommendation

We recommend that the Wexner Medical Center continue this study. More data is necessary to better understand Scope 3 impacts of BlueCON recycled blue wrap bedpans. We recommend a Life Cycle Assessment of recycled blue wrap bedpans with the following data:

- Energy required to produce recycled blue wrap bedpans.
- Feasible disposal methods for WMC of bedpans and related emissions.

Conclusion

Our team could not complete the LCA of recycled blue wrap bedpans and plant-based surgical OR trays with the limited information provided to us by our partner companies. The data shared with us was often incomplete or ambiguous. We are missing specific data, including NewGen's transportation length and type (truck, plane, etc.), energy use throughout the life cycle, and the disposal method. For BlueCON, additional data is needed on the energy used in the production of recycled blue wrap bedpans and feasible disposal methods for WMC and related emissions. Scope 3 is a vast category with many factors. Currently, there is not much public knowledge on the quantified emissions associated with Scope 3, which resulted in difficult data collection.

Another limitation of this project was the use of the Practice Greenhealth tool. To have correctly used this tool in our LCA research, our team required more time for training on how to use Practice Greenhealth correctly. The Practice Greenhealth tool was released too late during this project for us to learn how to use the new tool before the project deadlines. Additionally, this tool was difficult to understand without proper training.

Tracking Scope 3 emissions will continue to be a challenge both because of data limitations, accounting complexity as well as disclosure policy issues and proprietary information. Instead, we believe that companies and organizations should be tracking Scope 1 and Scope 2 emissions because these can be controlled and more positively impacted. If reporting all or even most of the Scope 1 and Scope 2 emissions would occur, then tracking Scope 3 emissions becomes much less important.

In this study, bagasse products showed more significant global warming potential than their polystyrene counterparts. NewGen's findings claimed emissions reduction but based on the

study they used, and we further researched, it appears likely that bagasse creates more emissions than polystyrene products. NewGen did not incorporate downstream transportation or disposal into their analysis. With these parts of the life cycle included, our analysis shows that the bagasse product produces far more emissions than its polystyrene counterpart. Overall, bagasse has more significant global warming potential than polystyrene for each disposal method studied and more emissions during production.

Overall, the data provided was insufficient and incomplete, which resulted in limited findings and substantive results. Due to these findings, we recommend completing an additional project to acquire additional data, evaluate the social benefits of using bagasse versus polystyrene for OR trays, and use the Practice Greenhealth Tool to measure and track Scope 3 emissions data at WMC.

Recommendations

Additional project(s) and research must be conducted to complete the initial goal of this project. The next steps include:

1. Utilizing the Practice Greenhealth tool for tracking Scope 3 emissions
2. Gathering additional data from the industry
    a. Energy use and production methods
    b. Transportation type and length
    c. Feasible disposal methods
3. Comparing disposal methods. The goal of carbon neutrality is complex and must also consider impacts on other greenhouse gases such as methane.

4. Instead of focusing on Scope 3 emissions, it might be more efficient to focus on reducing food and beef intake and composting food waste which could substantially reduce methane and N_2O emissions.

Institutions should continue questioning and exercising their purchasing power, whether in medical supplies, utilities, food, etc. Institutions should push suppliers to commit to using renewable energy, electrifying transportation, and being transparent in their energy use, production methods, etc. With the recent U.S. Securities and Exchange Commission (SEC) proposal of rule changes to enhance and standardize climate-related disclosures for investors, it is now more important than ever to leverage these calls for climate risk and emissions transparency to move the healthcare industry forward and closer to carbon neutrality (SEC, 2022).

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Appendix

Data Set #1: Chase_interview.dox

Source: Robert Chase, Founder and CEO of NewGen Surgical, Inc. Phone: (415)457-1138. Email: rchase@newgensurgical.com. Website: https://newgensurgical.com/

Description: Notes from a conversation with Robert Chase regarding their emissions reduction analysis for plant-based OR trays. Microsoft Teams meeting on February 8, 2022 and follow up emails. Questions included:

1. What type of transportation is used to ship bagasse from Thailand?
2. What type of energy and how much energy is used for production of bagasse trays?
3. What is the data source for claims about the amount of waste diverted?
4. Why is there a discrepancy between the 80% emissions reduction claim and what was in the original analysis?
5. What LCA tool is used for the trays?
6. Is "small changes big impact calculator" available for our use to compare findings?

Data Set #2: Constant_interview.dox

Source: Daniel Constant, CEO of The BlueCON Company, formally Sustainable Solutions. Phone: (678)414-0674. Email: daniel@theblueconcompany.com. Website: https://theblueconcompany.com/sustainable-solutions/

Description: Notes from a conversation with Daniel Constant regarding Scope 3 emissions analysis on bedpans made from recycled blue wrap. Microsoft Teams meeting on March 1, 2022 and follow up emails. Questions included:

1. Are there any common allergens in the product?
2. What type of energy and how much energy is used to recycle and create the product?
3. How far is the recycling center from WMC?
4. What type of fuel is used for your vehicles?
5. The bedpans are made of 90% recycled blue wrap plastic. What is the other 10%?
6. Would we be able to acces the annual environmental impact report provided to WMC?

Data set #3: NewGen LCA.pdf

Scope 3 info source: https://www.epa.gov/climateleadership/scope-3-inventory-guidance

Source: EPA website: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results

Description: This data set is a tool that calculates greenhouse gas equivalencies from a given input. Inputs are gallons of gasoline, gasoline-powered passenger vehicles, kilowatt-hours avoided, kilowatt-hours used, MCF of natural gas, and Therms of natural gas. These inputs are used to calculate pounds, tons, metric tons, and kilograms of carbon dioxide (CO_2) equivalent. The global warming potential of disposal options for each material is also included.

Disposal Option	**Bagasse**	**Polystyrene**	**Unit**
Compost	68	-	kg CO2e/FU
Recycling	47	16	kg CO2e/FU
Incineration	55	30	kg CO2e/FU
Landfill	83	18	kg CO2e/FU

Bagasse	Polystyrene	Unit	
76.03	17.75	kg CO2e/FU	**Total (extraction, production, some transport)**
52.4607	-	kg CO2e/FU	**bleaching process**
3.0412	-	kg CO2e/FU	**electricity**
2.96517	-	kg CO2e/FU	**sodium chlorate production**
15.56293	-	kg CO2e/FU	**bagasse production**
-	6.2125	kg CO2e/FU	**styrene production**
-	3.905	kg CO2e/FU	**lunchbox production**
-	2.84	kg CO2e/FU	**HIPS production**
-	2.6625	kg CO2e/FU	**GPPS production**
-	0.5	kg CO2e/FU	**naphtha production**
-	1.125	kg CO2e/FU	**ethylene production**
-	0.5	kg CO2e/FU	**crude oil extraction & production**
2.0	0.005	kg CO2e/FU	**transportation to customer**

Data set #4: BlueCON LCA.pdf

Plastic bedpan source: STACK-A-PAN Bedpan (medical-supplies-equipment-company.com)

Plastic bedpan LCA source: http://www.eiolca.net/cgi-bin/dft/display.pl?hybrid=no&value=3600732787&newmatrix=US430CIDOC2002&second_level_sector=32619A&first_level_sector=Other+plastics+product+manufacturing+&key=10497407210&incdemand=1&demandmult=1&selectvect=fuels&top=10

Blue Wrap Bedpan source: https://theblueconcompany.com/product/stackable-bed-pan/

Coal powerplant emissions source: https://www.eia.gov/tools/faqs/faq.php?id=74&t=11

Description: This dataset contains part of an LCA done for plastic bedpans, with data coming from Carnegie Melon's EIO LCA tool. The latter part of the dataset is part of an LCA done for blue wrap bedpans, with data provided by BlueCON about the product and related energy and emission savings.

Plastic Bedpans

Per Each	**Per 30,000 (WMC Annual Usage)**		
$1.09	$32,844	**Price**	
11.68 oz	9.9337 tons	**Weight**	
Per $1mil Production	**Unit**	**Per $32,844 (=30,000 bedpans)**	**Unit**
1.57	TJ energy	0.0047	TJ energy
39.7	tons CO2e	1.19	tons CO2e
0.525	tons CO	0.01575	tons CO
0.002	tons NH3	0.00006	tons NH3
0.095	tons NOx	0.00285	tons NOx
0.047	tons PM10	0.00141	tons PM10
0.018	tons PM2.5	0.00054	tons PM2.5
0.162	tons SO2	0.00486	tons SO2
0.118	tons VOC	0.00354	tons VOC
156,000	gal water	5,123.64	gal water
256,000	ton-km* (truck)	8,408.06	ton-km* (truck)
39,800	kg CO2e GWP	1,194.12	kg CO2e GWP

*ton-km = 1 ton transported 1 km

Blue Wrap Bedpan

Per Each	Per 30,000	
5oz	4.6875 tons	
$0.67	$20,100	
Resources SAVED from Recycling vs Using Virgin Material	**WMC has recycled 2,000 lbs blue wrap YTD***	
Oil	0.30 x lbs recycled material	600lbs oil *saved*
Energy (electricity)	2.89 x lbs recycled material	5,780 kWh *saved*
Resources USED for Recycling		
Oil	0.30 x lbs recycled material	2,812.5 lbs oil *used* per annual quantity**
Energy (electricity)	2.89 x lbs recycled material	27,093.75 kWh *used* per annual quantity**
Emissions Avoided		
1 kWh of energy saved from coal power plant = 2.23 lbs CO2e		
5,774 kWh		
12,876.02 lbs CO2e avoided		

*9,375 lbs of recycled blue wrap needed to make 30,000 bedpans annually

**The metrics for oil and electricity savings *from* recycling were used as a proxy for the oil and electricity *used* to recycle