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Methodology Companion for University of Michigan Athletics Sustainability Assessment: Michigan Athletics Scope 3 Analysis and NCAA Power 5 Landscape Assessment

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Methodology

This paper aims to elucidate the methodology employed in the University of Michigan Athletic Department's Scope 3 emissions (Category 1 - Purchased goods and services; Category 5 - Waste generated in operations; Category 6 - Business travel) calculations, and the Landscape Assessment conducted by the Erb Impact Project team.

Scope 3

Scope 3 emissions refer to indirect emissions that occur in the value chain of the reporting organization, including both upstream and downstream emissions[1]. Among the 15 categories aligned with the GHG Protocol, our team calculated 3 applicable categories to U-M Athletics: Category 1 - Purchased goods and services, Category 5 - Waste generated in operations, and Category 6 - Business travel.

Category 1 - Purchased Goods and Services

Definition

Extraction, production, and transportation from all goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in Categories 2 to 8. All upstream (cradle-to-gate) emissions of purchased goods and services[2].

Activity Data and Scope Boundary

U-M Athletics provided a supplier spend report for the fiscal year 2023, detailing the supplier name, the amount spent per supplier, and rank in spend. To avoid double counting, any expenses related to Scope 1 and 2, such as utilities, were omitted from the analysis. Any monetary transactions, such as conference revenue sharing or football game guarantees, were omitted as they are products or services that fall outside the definition of this category. The threshold for our analysis was set above $30,000, as the collective spend for the remaining 6,088 vendor categories constituted 8.24% of the total expenditure during the reporting period. A significant portion of these remaining categories would also be excluded to avoid double counting. With 300 suppliers meeting the threshold, U-M Athletics department attached product and service descriptions to the top 50 suppliers in spend. The remaining 250 suppliers were thoroughly researched by the team and provided descriptions that most accurately reflected the product or service it supplied to U-M Athletics.

Our team used the Supply Chain Greenhouse Gas Emission Factors v1.2 by NAICS-6 database from the EPA's US Environmentally-Extended Input-Output (EEIO) model. Based on the research, our team aligned the supplier descriptions with a specific EEIO supply chain GHG emission factor category. The emission factors were expressed in kg CO2e per 2021 USD purchaser price, so a deflation factor of 0.88[3] was used to adjust the 2023 USD spending data to the 2021 USD purchaser price. The inflation-adjusted supplier spend was then multiplied by the corresponding emission factors to calculate the emissions for each vendor.

Data Limitations

- **The analysis only accounted for suppliers with expenditures exceeding $30,000. Although the excluded categories represent a minor portion of the total emissions for Category 1, the analysis does not include all spending data in 2023.**
- **The team used supplier's products and service descriptions to generate product/service descriptions that align with the NAICS categories. We acknowledge that there may be some discrepancies between the researched description and the actual product/service provided.**
- **After evaluating the data availability and quality with the U-M Athletics, our team used the spend-based method for estimating emissions from the purchased goods and services. Due to data limitations, we were not able to apply the more accurate supplier-specific, hybrid, or average-data methods.**

Category 5 - Waste generated in operations

Definition

Disposal and treatment of waste generated in the U-M Athletics' operations in facilities not owned or controlled by the reporting company[4].

Activity Data

The Office of Campus Sustainability provided university-wide waste data, detailing waste streams for each location/ building, expressed in short tons. This data was refined to focus on buildings and facilities operated by U-M Athletics, covering 26 sites. Each site was segregated according to three waste disposal methods (i.e., compost, recycling, and landfill) for fiscal years 2022 and 2023.

This category includes all future emissions that result from waste generated in the reporting year. For U-M, the third parties include:

- Landfill Services: Republic Services Sauk Trail Hills Landfill
- Recycling Services: Western Washtenaw Recycling Authority
- Composting Services: City of Ann Arbor's Compost

* U-M has switched to Spurt Industries commercial compost processing center for the fiscal year 2024

The emission factors were as follows:

Disposal Method	Emission Factor (MT CO2e/short ton)
Landfilled	0.52
Recycled	0.09
Composted	0.17

Estimation and Exclusion

- From our interviews with the OCS staff, we understand that waste amounts are estimated through the volume which is then converted to a mass.
- Certain sites have waste grouped for convenience and efficiency. This reduced the accuracy of certain metrics like waste per square foot and waste per building.
- The waste emission factors from the US EPA include transportation emissions, using an average distance traveled to the processing facility. However, U-M's waste management services collect and transport the waste sent to facilities, so the transportation emissions are accounted for in U-M's Scope 1 emission. Hence, we believe the waste emissions for U-M Athletics are slightly lower than the calculated emissions.
- Sauk Trail Hills has a high-BTU landfill gas processing plant that processes and sells renewable natural gas recovered from the landfill. There is no publicly available emission factor for biomethane recovery, so we stayed consistent with using EPA landfill emission factors.
- SIMAP, the carbon accounting platform developed by the University of New Hampshire Sustainability Institute, is extensively used across colleges. The platform incorporates a negative emission factor to account for carbon soil sequestration from the spreading of the finished compost. Although the City of Ann Arbor and Spurt Industries both use compost for soil or mulch, we opted to stay consistent in applying emission factors provided by the EPA.

Category 6 - Business Travel

Definition

Transportation of employees for business-related activities in vehicles not owned by the U-M Athletics. This includes but is not limited to travel for recruitment, away games, conferences, or team trips[5].

Activity Data

The U-M Athletics department provided the travel data for fiscal year 2023. The data included air travel, ground travel, and hotel information for the reporting year. This data was gathered from Anthony Travel, U-M Athletics' travel management provider, and other spending data. Air travel data included each flight ticket purchased by U-M Athletics for fiscal year 2023. Column fields contained booking type (i.e., domestic, charter, international), issued date, departure date, arrival date, vendor name, routing location (i.e., origin and destination), and total amount paid.

Ground travel data included each vehicle leased by a rental company and Anthony Travel for fiscal year 2023. Column fields contained booking type (i.e., bus, rental car, rail), departure date, arrival date, vendor name, routing location, and total paid.

Hotel stay data included hotel bookings for fiscal year 2023. Column fields contained, the location, issue date, departure date, arrival date, number of nights, vendor name, and the total paid.

Methodology

Our team used the US EPA's Supply Chain Greenhouse Gas Emission Factors v1.2 by NAICS-6 database, US EPA Emission Factors Hub, and UK Defra's conversion factors. There are three ways to calculate emissions associated with business travel: fuel-based, distance-based, or spend-based. Given the data availability, we used the distance-based and spend-based methods.

For air travel, we estimated the miles between each airport. From these distances, we multiplied the distance by the appropriate EPA emission factor based on whether the flight was a short-haul (below 300 miles), medium-haul (between 300 and 2300 miles), or long-haul (above 2300 miles) flight.

	Carbon Dioxide (g/unit)	Methane (g/unit)	Nitrous oxide (g/unit)	Total (CO2 Equivalent) (g/unit)	
Air Travel- Short Haul (< 300 miles)	207.00	00.64	.0064	208.9282	passenger-mile
Air Travel- Medium (>= 300 miles, < 2300 miles)	1290.000	.0006	.0041	130.1033	passenger-mile
Air Travel - Long Haul (>= 2300 miles)	163.000	.0006	.0052	164.394	passenger-mile

For ground travel, the data did not include the destination of each trip. As a result, the distance for each trip couldn't be calculated. To estimate the emissions, we adopted the spend-based method. These emission factors were applied to the three travel methods: car, motor coach, and rail, and adjusted for inflation to account for the 2021 USD monetary values. We then multiplied the emission factors by the total spending amount to calculate the emissions from ground travel. This table shows the emission factors used for the calculations.

Type of Ground Transportation	EEIO Emission Factor	Units
Passenger Car Rental	.143	kgCO2e/2021 USD, purchaser price
Charter Bus Industry	.499	kgCO2e/2021 USD, purchaser price
Rail	. 021	kgCO2e/2021 USD, purchaser price

For hotel stays, UK Defra provided emission factors for hotel stays per room per night in each country. The data contained the total amount paid, so an average of $150 was assumed as the cost of each room per night to determine the number of rooms purchased each night. The emission factor was multiplied by the number of nights and rooms to estimate the emissions related to hotel stay.

Estimations and Exclusions

- Ground transportation data relied on spending data and lacked actual distance per trip. The spend-based method relies on national average data and may contain discrepancies with the actual emissions associated with this category.
- Data for ground transportation does not include short day-to-day trips, as this data is not available.
- Hotel data used an average cost of $150 per night to estimate the number of rooms booked.

Landscape Assessment

The Power 5 conferences (Pac-12, Big 10, Big 12, ACC, and SEC) were selected for the Landscape Assessment due to their similarities in collegiate athletic prominence and individual university's financial, political, and social power. The University of Michigan, Ann Arbor is located within the Big 10 and its largest competitors are within the Power 5 conferences.

To best understand sustainability initiatives within collegiate athletics, each university in the Power 5 conferences was analyzed in seven categories, earning a score of 0-3 for each category (rating system). These benchmarking categories began analyzing sustainability initiatives at the university-wide level and narrowed down to the athletic department.

The benchmarking categories and rating system went through many iterations over six months. The final categories and rating system hopes to best reflect quantifiable ratings, with clear distinctions between earned scores. Where applicable, the ranking system used time-bound criteria and science-based targets.

Data Collection

Data was collected online from websites available to the public. This includes official university websites, sustainability pages, athletic department websites, news articles, The Association for the Advancement of Sustainability in Higher Education (AASHE) rating system website, and other online sources. Data was collected in this manner to highlight information that universities transparently shared.

The data was collected in a Google Sheet, where a score was given to a university per category based on publicly available information. A link to the website where the data was found for the university to earn that score is placed on the Google Sheet. All data was reviewed for accuracy by at least two project team members, and reviewed for approval by our alumni team advisors. During the data review process, any updated information available online was included in the final scores. Additionally, alterations were made to the evidence link to provide the best citations to where data was found to rate the university.

Process Timeline

- Initial data was collected from July 2023 to December 2023.
- Data review and analysis took place between January 2024 and March 2024.

Landscape Assessment Ranking System

Category 1: Are there university-wide sustainability goals?

Score	Description
0	None
1	Limited sustainability initiatives. Mentions on website
2	Near-term (5-10) sustainability plan; limited actionable and time-bound steps
3	Long-term (2040-2050) sustainability plan; actionable time-bound steps including net-zero targets

This category ranks the universities based on their university-wide sustainability goals. This is not exclusive to the athletic department. To receive 1 point, the school has a broad statement on its university website but is not time-bound or involves any specific targets. To receive 2 points, the university has set a near-term (5-10) sustainability plan with very limited actionable and time-bound steps. To receive 3 points, the university has set out a long-term (by 2040-2050) sustainability plan. It includes specific strategies to reach these goals. For example, a climate action plan or a sustainability plan that illustrates the school's strategy will earn the school 3 points.

Category 2: Is the university reporting to AASHE Sustainability Tracking, Assessment & Rating System (STARS)?

Score	Description
0	None
1	Expired
2	Active Bronze/Silver ranking
3	Active Gold/Platinum ranking

This category ranks the universities based on their published AASHE Sustainability Tracking, Assessment & Ranking System (STARS.) The data and ranking system is based on the ranking system (Expired, Active Bronze, Active Silver, Active Gold, and Active Platinum) that AASHE standards utilize. To receive 1 point, the university has an expired AASHE ranking that is currently not active. To receive 2 points, the university has an Active Bronze or Silver ranking. To receive 3 points, the university has an Active Gold or Platinum ranking.

Category 3: Are there university-wide sustainability personnel?

Score	Description
0	None
1	Sustainability Team
2	High-level sustainability personnel (C-Suite, Director, VP)
3	Dedicated sustainability personnel within the Athletics

This category ranks the universities based on their sustainability personnel. This is not exclusive to the athletic department, but a higher score is awarded to those with sustainability-specific personnel in their athletic department. To receive 1 point, the university has a sustainability team but does not have a specific individual holding a full-time, high-level sustainability role for the university. To receive 2 points, the university has a dedicated individual who is a high-level sustainability personnel who holds the title in the C-Suite and is a Director or Vice President. To receive 3 points, the university has dedicated sustainability personnel within their athletic department to specifically overlook sustainability in the athletic department. For example, if a university has a Director of Sustainability at a university-wide level the school earns 2 points.

Category 4: Are there public university-wide GHG emissions data?

Score	Description
0	None
1	Scope 1 + 2 emissions data
2	Scope 3 data
3	Athletic-specific GHG emissions (Scope 1/2/3)

This category ranks the universities based on their public university-wide GHG emissions data. This is not exclusive to the athletic department, but having public athletic-specific GHG emissions (Scope 1/2/3) earns a higher score. To receive 1 point, the university has Scope 1 and 2 emissions data publically available. To receive 2 points, the university has Scope 3 data publically available. To receive 3 points, the university has athletic-specific GHG emissions data for either Scope 1, 2, or 3 publically available. For example, a university with Scope 1 and 2 emissions data publicly available receives 1 point.

Category 5: Are there athletic department sustainability goals?

Score	Description
0	None
1	Limited sustainability initiatives. Mentions on website
2	Near-term (5-10 years) climate action plan; limited actionable steps
3	Long-term (2040-2050) climate goal; actionable steps

This category ranks the universities based on their athletic department sustainability goals. This is exclusive to the athletic department. To receive 1 point, the athletic department has limited sustainability initiatives and/or mentions it on its website. To receive 2 points, the athletic department has a near-term (within 5-10 years) climate action plan that has limited actionable steps. To receive 3 points, the athletic department must have a long-term (2040-2050) climate goal with actionable steps.

Category 6: Are there student-athlete or athletic department-driven initiatives?

Score	Description
0	None
1.5	Has an inactive group (prior to January 2020)
3	Has an active working group (since January 2020)

This category ranks the universities based on their student-athlete or athletic department-driven initiatives. This is exclusive to the athletic department and/or student-athletes requiring one of the groups to be a part/sponsor the initiative. To receive 1.5 points, the university has an inactive group (before January 2020) that was a student-athlete or athletic department initiative. To receive 3 points, the university has an active working group (since January 2020) that is a student-athlete or athletic department initiative. For example, to earn 3 points the university could have an active athletics sustainability committee that leads zero waste game initiatives.

Category 7: Are there athletic department waste initiatives?

Score	Description
0	None
1	Mentions on website. Waste reduction program but not a zero-waste initiative
2	Have set targets/zero waste program or publicly disclose waste diversion rates
3	Zero-waste achieved (90% diversion rate) at least once since January 2020

This category ranks the universities based on their athletic department waste initiative. This is exclusive to the athletic department. To receive 1 point, the university athletic department must have a waste reduction program listed on their website, but does not have a zero-waste initiative. To receive 2 points, the university athletic department must have set waste reduction targets, sponsor a zero-waste program, and/or publicly disclose waste diversion rates. To receive 3 points, the university athletic department must have achieved zero-waste (90% diversion rate) on at least one instance for at least one sport since January 2020.

Exclusions and Estimations

The main limitation of this section lies within the data-gathering process. We used data only found online which would narrow the scope to publicly available, published, online data. With that, our data collection, and the ranking system, would not include any private data or initiatives from universities that could ultimately alter their final score.

A limitation to note is the wording and description of the ranking system. In some cases, hard lines had to be drawn for what makes a score of, per se, a 1 versus a 2. A noteworthy example is in the "University-wide Sustainability Personnel" category, where direct titles of "C-Suite, Director, VP" were required to earn a 2.

Another limitation is any changes or new data that have been posted since our team has gathered data and completed reviews. The time cut-off for this information would be after March 2024.

Our team has ensured, to the best of our ability, that the data used is the most up-to-date information and the most accurate information available online. We acknowledge that there may be information that was missed in the data collection process.

Appendix

1. https://www.epa.gov/climateleadership/scope-3-inventory-guidance#:~:text=Scope%203%20emissions%20are%20the,its%20upstream%20and%20downstream%20activities.
2. https://ghgprotocol.org/sites/default/files/2022-12/Chapter2.pdf
3. https://data.bls.gov/cgi-bin/cpicalc.pl
4. https://ghgprotocol.org/sites/default/files/2022-12/Ch5_GHGP_Tech.pdf
5. https://ghgprotocol.org/sites/default/files/2022-12/Chapter6.pdf