

Connection Creation Final Metrics Report

Johns Hopkins University Baltimore, MD Collegiate Wind Competition 2024

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Introduction

Throughout the past year, the Johns Hopkins Student Wind Energy Team (HSWET) has grown its presence in the local community through a variety of different outreach channels. Our team has been proactive in our recruitment of new members, visibility on social media, and interactions with both the Johns Hopkins University (JHU) and Baltimore communities when it comes to spreading awareness of renewable energy. As mentioned in the Outreach Strategy & Team Story Report, our team outlined three major outreach goals for CWC 2024:

- 1. **Outreach:** Raise awareness for renewable energy throughout JHU and in the local community
 - a. Educate and excite students in local Baltimore elementary to high schools through school visits involving presentations and interactive activities led by HSWET members
 - b. Leverage local media outlets and social platforms to inform the greater community about the need for renewable energy
- 2. **Community Growth:** Foster a community centered around sustainability by hosting social events and harnessing institutional support at both the team and university level
 - a. Recruit students from diverse backgrounds through school-sponsored outreach events, departmental events, and interpersonal connections.
 - b. Collaborate with other organizations passionate about sustainability to increase community awareness of clean energy and hold various relevant events.
- 3. Professional Development: Showcase the skills learned during CWC in professional endeavors
 - a. Share team members' accomplishments and experiences with industry professionals and job recruiters in renewable energy

While we set these goals in the earlier part of this competition year, it was a top priority that the team execute these goals to the fullest of our capabilities. Now, looking back on the competition year, our team is proud to say that we believe we have fulfilled this initial mission.

Recruitment Strategy Outcomes

HSWET began this year with 17 returning members from the 2022-2023 competition year and has now grown to 42 active members (Appendix A1), each of which brings a unique intellectual perspective to the team. Undoubtedly, a key strength to this year's team was the diversity in ideals and demographics exhibited by our members. A comparison of our team's demographic breakdown compared to that of JHU can be seen below and additional representations can be seen in Appendix A2 and A3.

Demographic	HSWET % Composition	JHU % Composition
Asian-American	26.8%	29%
Hispanic	22.0%	20%
African-American	9.8%	14%
White	24.4%	18%
International	17.1%	14%
Male	58.5%	55%
Female	41.5%	45%

These survey results show that our team approximately mirrors the demographics represented by our university, which reflects the fact that our recruitment strategies encompassed an equitable recruitment process for all students. Beyond demographic diversity, our team also exhibits a remarkable composition of intellectually diverse students. Appendix A4 describes our team members' academic areas of expertise;



while electrical and mechanical engineering respectively make up 31.7% and 19.5% of HSWET members' area of study, 9 other majors make up the remaining 48.8%. Additionally, the graduation year of HSWET members is spread somewhat evenly (Appendix A5), which adds the benefit of having different members being able to take different mentorship and leadership roles as necessary.

When comparing the obtained recruitment results to the original plan, our team can definitely say we have exceeded expectations and have successfully completed *Outreach Goal 2a*. Nearly 66% of our 42 person team is composed of new members, but notably only 22% of our members are first-year JHU students. This indicates that we were not only able to successfully recruit freshmen seeking experiential opportunities but also able to attract upperclassmen who saw value in our team's mission. Additionally, the 42 person team is the largest team in HSWET's 4 year history, surpassing the previous mark of 30 members. One potential area for improvement from this year's recruitment strategy would be the additional recruitment of members during the Spring semester – the 147% increase in team membership is due entirely to the novel recruitment methods used by our team in the Fall. However, by placing significant effort on Fall recruitment instead of splitting between Fall and Spring, our team was able to bring on new members for the entirety of the competition cycle. Our team feels this led to more engaged membership and an enhanced sense of responsibility amongst new members as the year progressed.

Social Media Strategy Outcomes

The @jhu_hswet Instagram account was the central form of social media utilized by our team this year. Key metrics regarding our team's social media growth from this year can be seen in the table below.

Metric	Number	% Change Since Fall 2023
Followers	330	+29.4%
Average Accounts Reached per Post	361	+24.5%
Average Likes per Post	35	+191%
Posts	9	N/A
Story Posts	15	N/A

Our Instagram account metrics indicate that we were able to successfully grow our social media presence from both a viewership (followers, accounts reached) and an engagement (likes) standpoint, fulfilling *Outreach Goal 1b*. Admittedly, these positive increases in our social media presence was not due entirely to our original goals outlined in the mid-year report; originally, we had planned to have a strict weekly "posting calendar" which would have resulted in many more posts. Our team decided to abandon this strategy because we felt as though it felt a bit too 'strict' in the sense that it removed the spontaneous, fun aspects of our team that we desired to show on social media. Instead, we transitioned to a story post approach, since story posts are generally considered far more informal in the Instagram community. Through story posts, we were able to capture many more candid moments within the team – late-night meetings, chaotic turbine testing, and casual team hangouts – that might not have been suitable for an official post. We felt as though our followers engaged with these stories more than a standardized bi-weekly update post. Of course, we still utilized posts for things such as advertising upcoming events or organized team-wide photos that were nice to share.

The team's social media strategy can be seen as a major source for improvement in upcoming years. Although there was originally an appointed Social Media Chair position within the team, external conflicts left that role vacant for the second half of the competition cycle. Cementing this role as a critical position within the team, as well as reminding members at general body meetings of the importance of social media outreach, will keep the team accountable in its social media duties going forwards.



Contest Activity Outcomes

When deciding on our team's three chosen connection creation contest activities, our team sought to choose those which best aligned with our team's previously stated outreach goals. The three events which our team executed according to this criterion and the contest activity guidelines were:

- *Student and Local Community Engagement:* We hosted a turbine engineering event with Mergenthaler Vocational-Technical High School (MERVO), a local Baltimore high school
 - **Outreach Goal:** This event corresponds to Outreach Goal 1a.
- *Interteam Activity:* We hosted an industry panel alongside the Penn State and VT/JMU teams in late February that featured 9 current wind energy industry professionals
 - **Outreach Goal:** This event corresponds to Outreach Goals 2b and 3a.
- *Cross-Technology Collaborative Opportunity:* We hosted a siting "Hackathon" open to all JHU students. This event incorporated siting principles for both solar and wind farms
 - Outreach Goal: This event corresponds to Outreach Goals 2a.

Our team was able to successfully execute all three of these events alongside our industry mentors, Baltimore City Public School connections, and fellow JHU students.

On February 27, our team held the "Pathways to Wind Energy" panel alongside the Penn State and VT/JMU wind energy teams. This panel gave members of the respective teams the opportunity to hear firsthand from professionals in the wind energy industry, which included a moderated Q&A session followed by open discussion amongst all participants. There were 9 total panelists present, 2 of which were associated with HSWET – Bill McNamara (President of EcoEnergy LLC) and Kristin Dugas (Operations Engineering Manager at Scout Clean Energy). When choosing which industry mentors to invite from our HSWET network, we sought to include a wide range of expertise and experience; Bill was able to use his decades in wind project development consulting to provide valuable insights, and Kristin used her unique experiences as an operations manager to keep in perspective the challenges behind sustained turbine operations. A total of 46 people from across the three teams registered for the event, with 27/46 of those members coming from our team (Appendix A11). The fact that HSWET's attendees nearly outnumbered the other two teams combined is a true testament to the passion of our members.

On March 7, our team visited MERVO teacher Dave Brelsford's class to speak about our team's work competing in CWC and engage with students in a "mock turbine design" activity (Appendix A12 and A13). Mr. Brelsford teaches math and science at the school, and he also leads STEM-related extracurricular activities for students; this year, Mr. Brelsford's students qualified for the KidWind finals. Three members from our team attended the MERVO visit, where we interacted with 22 students. The activity involved separating the students into different groups, where each group had to brainstorm what the ideal parameters would be for designing a few key components of a wind turbine. The components and considerations given to the students included:

- Structural Base: what shape and material should be used?
- Nacelle: what shape and material should be used?
- Blades: what shape and material should be used, and how many blades will you add?
- Generator: what are different ways one can make a generator for a turbine?

• Blade Control & Braking: what are some different ways one can slow down blade rotation? Groups were asked to focus on one of these components at a time, and after given time to do research and discuss their choices, a larger discussion was had amongst the class regarding different design decisions. We as presenters made an extra effort to encourage teams to focus on why they made a particular decision, and we encouraged teams to speak up if they disagreed with a particular justification. It was



interesting to hear the different teams' approaches and discuss the different pros and cons behind particular design choices. The students walked away with valuable insights which they can use when developing their turbine design for the KidWind competition, and Mr. Brelsford additionally requested that we send him our HSWET CAD files for our turbine structure so he could show his students.

On April 14, our team held our first ever HSWET "Siteathon" – an analog to a hackathon but with a focus on siting instead of coding. The Siteathon was open to the entire JHU undergraduate community and was advertised via flyers around campus and the HSWET Instagram account. To further incentivize community participation, catered food was promised as well as a cash prize for the winning team. Students signed up in teams of 2-4 people, and members of HSWET were allowed to participate in the event but under the restriction that they can only comprise maximum 50% of the competing team. Seeing as this event was meant to satisfy the CWC *Cross-Technology Collaborative Opportunity* event category, the Siteathon focused first on siting solar and wind farms in California and second on integrating them into the broader electrical grid. 21 undergraduates from the JHU community participated in the Siteathon, 5 of which were also HSWET members. Considering the relatively short time frame and inexperience of many of the competitors, teams were asked to prioritize the following considerations for their respective sites. Further considerations were listed on the distributed competition document.

Offshore Wind Farm	Solar Farm	
 Wind speed Bathymetry Turbine model parameters Foundation structure Construction + substation proximity 	 Solar irradiation Land availability constraints Land topography Solar panel materials and sizing Construction + substation proximity 	

A more detailed breakdown of competition attendees can be seen in Appendix A14 and A15. All of the Siteathon attendees were studying either engineering or natural sciences, and members of all four graduation years were represented. All teams gave presentations showcasing their proposed solutions, which were judged by the HSWET Project Development Subteam Leads. While further improvements can no doubt be made to this event, this initial implementation yielded positive feedback from outside students and HSWET members alike. Future improvements may include inviting industry mentors as competition judges and broadening the reach of advertisements to further diversify attendees' majors.

Closing Thoughts

Through HSWET's recruitment, social media, and event strategies, the team was able to make significant progress towards each of the *Outreach Goals* outlined in the Introduction. The visit to MERVO and increased presence on the @jhu_hswet Instagram account allowed us to forge meaningful connections with our community, achieving *Outreach Goal 1*. The widespread recruitment strategy utilized in the Fall semester and JHU Siteathon allowed us to spread awareness for wind energy throughout the Hopkins community, achieving *Outreach Goal 2*. The interteam industry panel provided HSWET members with the opportunity to speak directly with wind energy professionals and gain valuable insights, achieving *Outreach Goal 3*. While there is still room for improvement in each of these focus areas, our team will no doubt look back on this year as a successful one. The connections created during each of the aforementioned strategies and events have brought our team one step closer to our goal of shedding light on the benefits of sustainable energy to all members of our community.



Appendix

A1. Fall 2023 Team Photo



(From left to right) Front row: Evan Kuo, Emma Steinberg, Yarden Ben Hayon, Megan Lim, Eleni Daskopoulou, Yuhan (Amelia) Chen

Second row: David Corrente, Sophie Patrick, Trevor Black, John Oak, Lucas Wein, Hyewon Jung, Tom Wang

Third row: William Chavez, Chris Khoury, Lulu Grubb, Diego McHenry, Huanying (Joy) Yeh, June Metz Last row: Joel Rentas-Velez, Christopher Lo, Ian Raley, Rohan Bongu, Alexander Shen, Brendan Glennon, Enqi Yang

Not pictured: Eduardo De Azevedo Soares, Shivam Dixit, Hayley Chu, Raghav Agrawal, Enzo Larralde, Ashley Luo, Adit Bajaj, Grace Qiu, Eva Loftus, Kaity Shaughnessy, Victoria Ines, Patrick Dass, Michael Squeri, Oriane Nana, Ariana Diaz





A2. HSWET Self-Identified Member Race Survey Results

A3. HSWET Self-Identified Gender Survey Results





A4. HSWET Members' Primary Majors



A5. HSWET Members' Graduation Year





A6. Members' Previous Years in HSWET



A7. Baltimore Science Olympiad Instagram Story





A8. Subteam Lead Meeting Instagram Story





A9. "Site-athon" Flyer Instagram Post



A10. Pathways to Wind Energy Panel Recording Screenshot feat. Industry Mentor Bill McNamara







A11. Pathways to Wind Energy Panel Attendance Distribution



Appendix A12. Facebook post from Mr. Dave Brelsford, teacher at MERVO



David Brelsford is with Mervo Pride at Mervo High School. March 8 · Baltimore, MD · @ ...

Forgot to post yesterday. The JHU Wind Energy Team came by and did an activity with my students. Our kids that won the HS tournament will be in Minneapolis with the college kids- so this is a neat opportunity to work together. Kids did great!







Appendix A13. MERVO Presentation Close Up

A14. Siteathon Attendees' Areas of Study





A15. Siteathon Attendees' Graduation Years



A16. Siteathon Attendees Working





A17. Siteathon Attendees Group Picture



