

**2024 Northern Arizona University
Collegiate Wind Competition
Connection Creation**

Midyear Report



Fall 2023-Spring 2024

**Project Sponsor: US Department of Energy and The National Renewable Energy Library
Faculty Advisor: Professor David Willy**

1. Team Background

Northern Arizona University is represented in the Collegiate Wind Competition by the WindJax Team, based in Flagstaff Arizona. The WindJax Team consists of ten senior level undergraduate engineering students, seven mechanical and three electrical. Advising the team is Professor David Willy, an Associate Teaching Professor and Associate Chair for Undergraduate Programs in Mechanical Engineering at Northern Arizona University with experience in renewable energy integration. He can be reached at David.Willy@nau.edu. The student lead is Samantha Russell, contactable at sr2429@nau.edu.

Spread across two capstone classes, each of the team members in such a small team is integral to team success. In alphabetical order by last name, the team members and their roles are summarized in Table 1 below. While each team member has a specific responsibility, the team's commitment to success means that we cross these boundaries frequently to help each other. There is never just one student working on any component or deliverable, and the WindJax team has blurred the lines between the separate competition sub-teams where it contributes to overall success. Team members are listed with the acronym of their field of study, EE for electrical engineering, ME for mechanical engineering. A picture of the entire team is visible in Figure 1 at the end of this document as well as separately submitted.

Table 1: Team Members and Roles

Name and Email	Leadership Role	Primary Contest
Austin Burrows (EE) (ajb996@nau.edu)	Treasurer and Programming Manager CC Event Setup	Turbine Design and Test
Elizabeth Freeman (ME) (emf272@nau.edu)	Manufacturing Engineer and Rules Specialist CC Representative	Turbine Design and Test
Ryan Frost (EE) (rjf244@nau.edu)	EE Team Lead CC Facilitator	Turbine Design and Test
Holden Gardner (ME) (hyg6@nau.edu)	ME Project Manager and CAD Engineer CC Representative	Turbine Design and Test
Gabrielle Hall (EE) (glh85@nau.edu)	EE Project Manager CC Media Manager	Turbine Design and Test
Alexander Longoria (ME) (anl372@nau.edu)	Data Validation Engineer CC Representative	Project Development
David Perez (ME) (dlp262@nau.edu)	CAD Engineer CC Representative	Project Development
Samantha Russell (ME) (sr2429@nau.edu)	Logistics Manager and Rules Specialist CC Writing Proofer	Project Development
Niki Wilson (ME) (nlw94@nau.edu)	Financial Manager and Test Engineer CC Communications	Turbine Design and Test
Sergio Zuniga (ME) (saz52@nau.edu)	Website Developer CC Manager	Turbine Design and Test

The WindJax team is made of students who chose to compete in the CWC because they are passionate about renewable energy and want to pursue career opportunities in the field. Our team did not employ recruitment strategies, as aside from our advisor, none of the team members have interacted with the competition or wind energy in any capacity. This team came together as individual students looking for a capstone project that they could be proud to participate in and passionate about.

The team is excited to interact with other passionate people, put in all our effort, and start working towards making a difference. For competition, the team is also excited to understand the weak points of our designs and learn other approaches to the problems than we took to grow from this experience. Through the

connection creation competition in particular, we look forward to learning from professionals in industry, and reinforcing that learning by working with and teaching the local community. We are especially eager to potentially instill an interest in the youth for renewable energy in wind and hydropower with our sister team in the Hydropower Collegiate Competition. The team looks forward to attending the competition and meeting other teams, especially as for most of the team members it will be the last project before graduation!

We envision participating in creating a clean energy future where the population does not have so many misunderstandings of clean energy, and can continue to work together to navigate the challenges associated with implementing it. The team's vision of a clean energy future includes energy that does not have to come at the expense of the environment or indigenous communities, and does not endanger the health and well-being of any community. While the WindJax team has only ten members, we see ourselves as part of the larger global team that is working towards this future.

NAU has participated in the CWC for many years, and so has provided us with some insight into how to improve each year. From previous years, the team has learned the importance of starting early and seeking advisement in every step of the process, from several sources. We have already seen the importance of increasing recruitment through the NAU Energy club as well as in classes prior to capstone. We are learning from past team's choices, failures, and successes. Our strength as a team lies in our passion for this project and topic, we strive to succeed by learning from our failures and from previous year's failures. We come from diverse backgrounds financially, geographically, historically and can each bring a unique perspective into the challenges of the competition. We will use this strength by surpassing the boundaries of our individual roles.

Through our predecessor teams and university structure, the WindJax team has several industry connections we intend to use. Previously the team has utilized Professor Carson Pete who has instructed a wind energy course at NAU to learn more about design and difficulties in his experience with implementing wind energy. Through him, the team can get in contact with alumni and industry professionals. Another previous professor the team has already been in contact with is Dr Tom Acker, currently working at SRP in clean energy innovation development. Through him, the team has gotten into contact with two other wind energy industry professionals in Flagstaff, Ryan Adams and Luke Simmons. The team has already interviewed these last three individuals, learned of their career paths, their advice getting into the industry, their daily tasks and challenges, and how they might teach youth about wind energy. They have also provided the team with potential other contacts in industry to reach out to.

2. Outreach Strategy

In order to succeed in the connection creation contest, the WindJax team has developed the following outreach plan. This plan includes the team's goals, social media strategy, chosen connection creation activities, and proposed timeline.

One goal the team has for this year is to recruit students through energy club for next year's competition and increased community involvement in Flagstaff's renewable energy. The current competition team joined the energy club after joining the competition with the exception of one team member, and believe that with increased recruitment for the club, the WindJax team could be set up for stronger performance, increased diversity, and better outreach. With increased club size, renewable energy information could be easier spread to the University community outside of the college of engineering.

The team also has the goal of working with local youth to inspire them to pursue clean energy. At some point in each team member's past, we have encountered clean energy in a manner that inspired us to consider it as an option in future careers. Now we plan to work with local environmental science education center Willow Bend (as suggested by KidWind) to create effective and engaging activities and lesson plans for kids, aiming to bring in students that would otherwise likely not have access to the information, potentially from the local indigenous communities. Our aim is to create a fun and educational lesson that the students will remember and tell their families and friends about, highlighting activities over lectures.

The team's social media outreach will be conducted through the NAU Energy Club Instagram page, available at <https://www.instagram.com/nauenergyclub/>. This will be done with increased posts announcing energy club meetings, and activities that encourage future team recruitment. The team has already hosted a panel interview through energy club with Dr. Tom Acker, Ryan Adams, and Luke Simmons. This was posted in the WindJax Instagram page, the flyer visible in Figure 2.

The team has chosen to pursue the following three connection creation activities: Understanding the Wind Industry, Student and Local Community Engagement, and Communications Materials. The team has already completed 75% of the Understanding the Wind Industry activity, having interviewed Dr. Tom Acker in Wind Energy Innovation Development, Ryan Adams in Wind Resource Assessment and Green Hydrogen Development and Luke Simmons in Consulting for Offshore Project Development. These industry professionals gave the team guidance on their experiences and career paths, their daily activities, daily challenges, and their advice in pursuing a career in Wind Energy, as well as their suggestions for how to instill learning in youth from personal experience. The industry professionals also provided a fourth potential contact for this activity. Through the selected activities, the team will learn where misunderstandings are, and be able to help educate the local communities on the truths of wind energy.

As for Student and Local Community Engagement, through the Energy Club the team will pursue helping Willow Bend with a future KidWind events. KidWind is a large educational organization that facilitates regional competitions for kids between the grade of 4-12. The basis of these competitions includes the production of small-scale wind turbines that can produce energy. Our aim is to aid in any way we can with these competitions and in that pursuit, we found Willow Bend. Willow Bend is a local organization and the main organizers of the regional KidWind competitions. A meeting was held in the middle of November with Willow Bend to discuss Energy Club's potential role in these competitions. As a result, they have asked the club to aid in judging the competition, produce an educational video on the topic of wind turbines, and set up mini challenges at the event.

As of now everything is still in the process of being planned. A future meeting is scheduled with Willow Bend for them to come to an Energy Club meeting and present their progress on everything. This meeting will hopefully finalize everything so the club can proceed forward with necessary preparations, and the WindJax team plans to help as much as possible.

The team has created the following proposed timeline for outreach events, as visible in Table 2 below. The days are rough approximations, but provide a good guideline for the team to follow.

Table 2: Timeline for Proposed Events and Outreach

October 7-10 2023	Energy Club members attend the Clean Currents Conference on Hydropower for cross-curricular support
November 1 2023	Reach out to potential interview candidate through energy club
November 29 2023	Energy Club Panel Interview for Connection Creation with Dr Acker, Ryan Adams, and Luke Simmons
December 8 2023	Energy Club E-Fest for recruitment
December 13 2023	Team bonding event with donuts to celebrate DOE report completion and plan next events
December 14 2023	Attend Women in Renewable Industries and Sustainable Energy (WRISE) event for networking and potential contacts for interviews
January 18 2024	Meet with Willow Bend, Plan student engagement. Post finalized details of final interview inviting university students to attend.
January 25 2024	Final Interview
February 22 2024	Student/Community Engagement Event with Willow Bend and HCC team
February 29 2024	Poll Community via social media on their questions for clean energy
March 21 2024	Post Communications Materials to WindJax social media, college of engineering social media, NAU student email newsletter.

Not included in this table are the proposed biweekly postings to the WindJax Instagram page to encourage attendance in energy club meetings, where the team and club members can connect University students to this path of renewable energy.

Conclusion

The WindJax team, by following the above scheduling and planning, can improve the local community's perception of Wind Energy and increase University involvement in renewable energy. Regardless of selection of the top teams for competition, the team strongly looks forward to this aspect of the Collegiate Wind Competition, and making a perceptible difference in the local community.

3. Photos

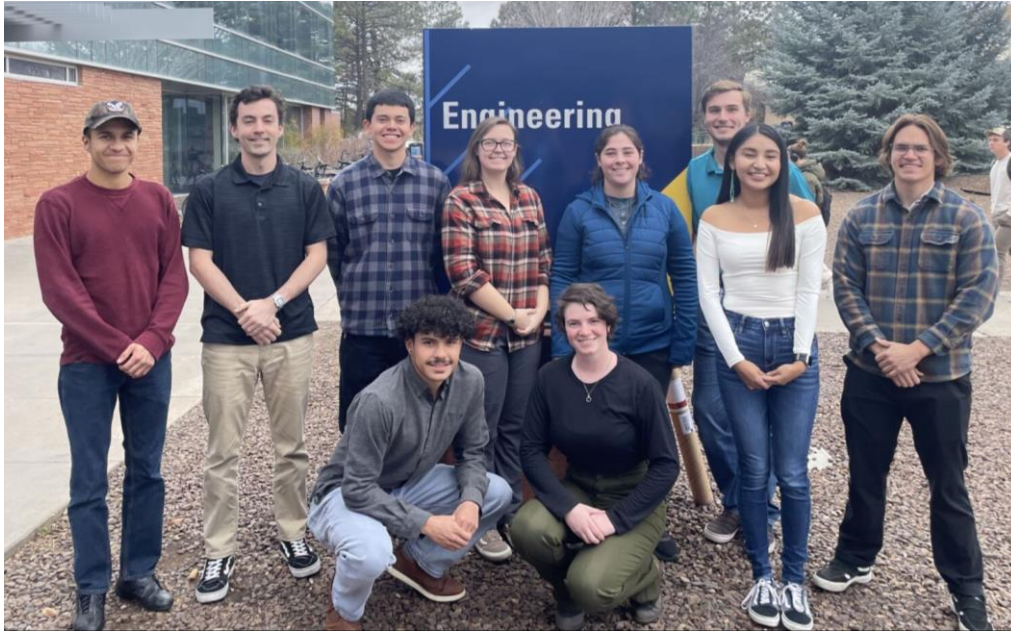


Figure 1: Team Picture. (From left to right) Top: David Perez, Holden Gardner, Alexander Longoria, Niki Wilson, Elizabeth Freeman, Austin Burrows, Gabrielle Hall, Ryan Frost. Bottom: Sergio Zuniga, Samantha Russell



Figure 2: First Flyer for Energy Club Outreach Interview

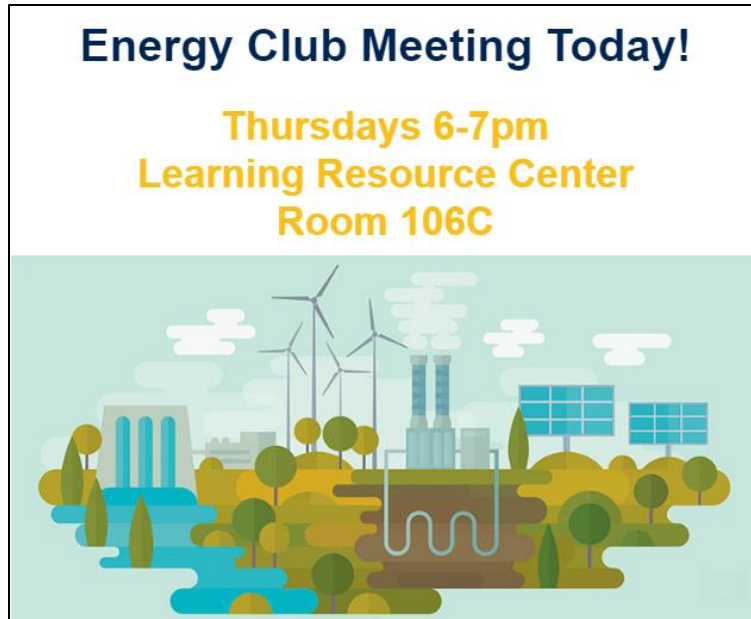


Figure 3: Email and Social Media Communication for Energy Club



Figure 4: WindJax Logo

Join Energy Club!



We celebrate with Donuts!

Figure 5: Potential Post Material from Team Bonding Event