



COLLEGIATE
WIND COMPETITION
U.S. DEPARTMENT OF ENERGY

U.S. DEPARTMENT OF ENERGY COLLEGIATE WIND COMPETITION 2025

Rules – Phases 2 and 3

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Preface

This competition will be governed by 15 U.S.C. §3719 and this official rules document, which establishes the prize rules and requirements for the competition. This is not a procurement under the Federal Acquisitions Regulations and will not result in a grant or cooperative agreement under 2 CFR 200. The prize administrators reserve the right to modify this official rules document if necessary and will publicly post any such notifications as well as notify registered prize participants. In case of a discrepancy with other competition materials or communication, this document takes precedence.

The National Renewable Energy Laboratory is supporting the U.S. Department of Energy on the development and administration of this prize.

Prize administrators are the Alliance for Sustainable Energy operating in its capacity under the Management and Operating Contract for NREL. When the prize administrator is referenced in this document, it refers to staff from the Alliance for Sustainable Energy. When competition manager is referenced in the document, it refers to Wind Energy Technologies Office (WETO) staff. Ultimate decision-making authority regarding prize matters rests with the director of WETO, who serves as the judge.

Date	Modification
9/27/24	<ul style="list-style-type: none">• Modified one subcriterion in the Project Development Contest rubric shown on Table 10.• Updated due dates for mid-year milestones in Table 1.

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1 Introduction

The U.S. Department of Energy Wind Energy Technologies Office’s Collegiate Wind Competition (CWC, also referred to as the “competition” in this rules document) invites interdisciplinary teams of undergraduate students from a variety of academic programs to solve complex wind energy challenges. Through the competition, the Wind Energy Technologies Office intends to offer students direct industry experience, valuable exposure to wind energy career pathways, and greater knowledge of wind energy’s potential to contribute to a clean energy future. The competition will select up to 35 teams to start, making them eligible to compete for a cash prize pool of up to \$280,000.

Each year, the competition identifies a new challenge and set of activities that address real-world research questions, thus demonstrating skills that students will need to work in the wind or wider renewable energy industries. The Collegiate Wind Competition 2025 challenge requires participants to compete simultaneously in four contests:

- **Turbine Design Contest:** Design, build, and present a unique, wind-driven power system.
- **Turbine Testing Contest:** Test the wind turbine in a competition wind tunnel at the final event.
- **Project Development Contest:** Research wind resource data, transmission infrastructure, and environmental factors to create a site plan and financial analysis for a hypothetical wind farm.
- **Connection Creation Contest:** Partner with wind industry professionals, raise awareness of wind energy in their local community, and work with local media to promote the team’s accomplishments.

The competition does not prescribe a power system market¹ or wind regime. It is expected that each team will participate in all four contests.

1.1 Background

The U.S. land-based and offshore wind energy markets are expected to grow significantly over the next few decades, with the installed capacity estimated to reach nearly 317,000 megawatts by 2030 for land-based wind and 24,000 megawatts by 2030 for offshore wind, according to the National Renewable Energy Laboratory (NREL) 2022 Standards Scenario Mid-case with nascent technology and current policy.² This potential industry growth under a business-as-usual scenario will need more qualified workers to support overall expansion, with estimates showing that the total workforce supply could be 134,000 and the total workforce demand could be about 258,500 in 2030. The deficit between supply and demand could be 124,000 workers in 2030 for both land-based and offshore wind energy deployment, necessitating connective workforce

¹ For example, <https://www.ferc.gov/electric-power-markets>.

² 2022 Standard Scenarios Report: A U.S. Electricity Sector Outlook, <https://www.nrel.gov/docs/fy23osti/84327.pdf>

programs, like CWC, to help develop a robust wind workforce pathway and encourage participants to apply to wind-energy-related jobs.³

The competition increases renewable energy job preparedness for students. Specifically, the CWC's objective is to prepare students from multiple disciplines to enter the wind energy workforce by providing real-world experience for researchers, scientists, engineers, educators, project managers, and business and sales forces. Wind-energy-specific advanced degrees are not required for many of these jobs, but having wind-related experience is highly valuable.⁴

1.2 Competition Overview

The Collegiate Wind Competition 2025 challenges teams to compete in four contests: Turbine Design, Turbine Testing, Project Development, and Connection Creation. Within each contest, teams' submissions receive points toward winning the contest. The competition is divided into three phases. This document only covers the requirements for Phases 2 and 3. Phase 1 – Preliminary Team Selection is covered in a separate rules document that was released earlier this year and only applies to Phase 1 and prizes under Phase 1.

This year's competition challenges the teams to explore floating offshore wind energy, with floating platforms being required for use in deep waters in place of fixed-bottom offshore wind platforms. All four contests that make up the competition will be held in three phases that determine a team's level of participation, with prizes under Phase 1 having been awarded. Eligible Competitors will have a chance to win prizes in the following two Phases, with a total prize pool across all three phases of up to \$280,000.

- Phase 1 – Preliminary Team Selection: winners received up to \$2,000/team from a total cash prize pool of up to \$70,000. Specific details include the following:
 - Teams shared their motivations for entering the competition and described their capacity to perform well in the competition.
 - It is recommended and expected that winning teams under Phase 1 leverage the Phase 1 prize to support their participation in Phase 2 of the competition.
 - 35 teams were selected from the pool of submissions.
 - The full set of submission requirements are described in the Phase 1 rules document.
- Phase 2 – Competitor Selection: winners receive up to \$15,000/team from a total cash prize pool of up to \$180,000. Phase 2 is open only to winners under Phase 1. Specifically:
 - This phase is the chance for students to demonstrate their skill sets in achieving competition objectives. Submissions, structured as written reports and videos,

³ McDowell, B., J. Stefek, E. Smith, B. Pons, Q. Ahmad. 2024. National Wind Energy Workforce Assessment: Challenges, Opportunities, and Future Needs. Golden, CO: National Renewable Energy Laboratory (NREL). NREL/TP-5000-87670. <https://www.nrel.gov/docs/fy24osti/87670.pdf>.

⁴ Keyser, D., and S. Tegen. 2019. *The Wind Energy Workforce in the United States: Training, Hiring, and Future Needs*. Golden, CO: National Renewable Energy Laboratory (NREL). NREL/TP-6A20-73908. <https://www.nrel.gov/docs/fy19osti/73908.pdf>.

have been designed to evaluate how likely the team is to be successful in competing in the rest of the competition.

- In this phase, teams will complete submissions during the fall semester for four contests: Turbine Design, Turbine Testing, Project Development, and Connection Creation. The competition judge will use those submissions to determine the 12 teams that will earn a cash prize and compete in Phase 3, which will take place during the Spring 2025 semester.
- Details on submission requirements, how the submissions will be evaluated, and when they are due are included in this rules document.
- Phase 3 – Grand Prize: up to a \$30,000 prize pool for winners in a variety of categories. Phase 3 will be open only to Phase 2 winners. Specific details include the following:
 - This final phase includes multiple submissions for each of the four contests. The final submissions will be evaluated at a final event, which includes the chance to present to industry experts, test the model turbines in the competition wind tunnels, network with industry professionals, and experience what the wind energy industry looks like.
 - Teams will compete throughout the spring semester to win the awards listed next and a portion of the prize pool.
 - The final event is expected to be from May 19 through May 22 (with teams to arrive on May 18) at American Clean Power Association’s CLEANPOWER Conference & Exhibition in Phoenix, Arizona, or a similar venue and timeline.⁵
 - All points earned throughout the competition for the four contests will roll up into a final score used in determining the final winners, along with consideration of program policy factors. Teams may win multiple awards. Awardees will split a \$30,000 prize pool. Awards will include but will not necessarily be limited to the following:
 - First-place winner: The team that earns the lowest sum of the ranks in the Turbine Design, Testing, Project Development, and Connection Creation contests. Ties will be broken by total score.
 - Second-place winner: The team that earns the second-lowest sum of the ranks in the Turbine Design, Testing, Project Development, and Connection Creation contests. Ties will be broken by total score.
 - Third-place winner: The team that earns the third-lowest sum of the ranks in the Turbine Design, Testing, Project Development, and Connection Creation contests. Ties will be broken by total score.
 - Turbine Design Contest winner: The team that earns the highest combined score from all Turbine Design Contest submissions.
 - Turbine Testing Contest winner: The team that earns the highest combined score in the Turbine Testing Contest.
 - Project Development Contest winner: The team that earns the highest combined score from all Project Development Contest submissions.

⁵ Should the venue change from CLEANPOWER, a decision will be announced by December 31, 2024. Teams are expected to provide their own travel funding to attend this event, which can come from prize winnings and other sources.

- Connection Creation Contest winner: The team that earns the highest combined score from all industry and community engagement submissions.
- Teams also have the opportunity to win a Best Poster trophy, which is awarded to the team with the highest points from the aggregated poster scores included in the individual rubrics in each contest.

2 Submission Requirements and Review Process

The CWC in its entirety comprises all the activities leading up to and during the final event. The final event is where the teams present their results from the four required challenges; the competing teams must have also submitted their written reports by the dates specified in this document.

While teams work on their submissions, faculty advisors, graduate student advisors, and members of industry secured by each team for support can provide feedback about the team's design so the students can identify mistakes, prove technical rigor, or demonstrate feasibility of their concept. Teams are highly encouraged to pursue mentorships and sponsorships early in the competition year; however, only undergraduate student team members may take an active role in any competition event. It is the role of the nonstudent team members, including mentors and sponsors, to provide a supportive environment and the educational background necessary for the students to achieve success in the competition. The faculty advisor advises, provides input, and coaches the students on the skills necessary to compete in the various aspects of the competition. **It is not appropriate for anyone other than an undergraduate student to be actively working on the wind turbine or making decisions.⁶ During in-person competition events individuals other than undergraduate students actively working on the turbine or found making decisions will be asked to leave the competition premises.**

2.1 Submissions

The details of required submissions for each challenge are provided in the following sections, including submission due dates. Refer to Appendix D for submission requirements and scoring, format requirements, and submission instructions. Teams are strongly encouraged to submit early in case of technical difficulties.

⁶ Any student who was an undergraduate student member of the team during the competition year may continue to act in that role throughout the competition year.

Table 1. Submission Deadlines, Points, and Prizes

	Turbine Design (295 points)	Turbine Testing (380 points)	Project Development (350 points)	Connection Creation (225 points)
Phase 1: Preliminary Team Selection; up to \$2,000/team from a cash prize pool of up to \$70,000	Deliverable outlined in phase 1 of the CWC rules document			
Phase 2: Competitor Selection; up to \$15,000/team and up to 12 teams from a cash prize pool of up to \$180,000	Design progress and prototyping fabrication	Prototype fabrication and testing video	Preliminary Project Development report	Team story Outreach strategy report
	Thurs., 12/19/24, 11:59 p.m. Mountain Time (MT)	Thurs., 12/19/24, 11:59 p.m. MT	Thurs., 12/19/24, 11:59 p.m. MT	Thurs., 12/19/24, 11:59 p.m. MT
Phase 3: Grand Prize; up to \$30,000 prize pool for winners as listed in Table 2	Turbine design report	Timed assembly video Technical inspection	Project Development report	Metrics report
	Thurs., 5/1/25, 11:59 p.m. MT	Thurs., 5/1/25, 11:59 p.m. MT	Thurs., 5/1/25, 11:59 p.m. MT	Thurs., 5/1/25, 11:59 p.m. MT
	Turbine design question and answer (Q&A) supporting materials optional, poster (one total across Design, Project Development and Connection Creation contests)	Test turbine and load system	Project Development presentation and Q&A, poster (one total across Design, Project Development and Connection Creation contests)	Connection Creation presentation and Q&A, poster (one total across Design, Project Development and Connection Creation contests)
At competition	At competition	At competition	At competition	

2.2 How Award Winners Will Be Determined

The prize administrators screen all submissions for completeness and, in consultation with the U.S. Department of Energy, assigns reviewers to independently score the applicable content of each complete submission. The reviewers comprise federal and nonfederal subject matter experts. Reviewers will review submissions in each phase according to the described evaluation criteria. The prize administrators will tally the scores using the scoring criteria.

New for this year, winners in Phase 2 will be determined by rank-based scoring, with the lowest-numbered rank beginning at one (1) going to the team with the highest score for the Phase 2 Project Submissions in each contest. Each contest includes a unique Phase 2 Project Submission that is designed to award the student teams based on progress leading up to the final event and incentivize key aspects of the design. Up to 12 of the teams that have the lowest total ranks on their Phase 2 Submissions will be invited to participate as a finalist and earn up to \$15,000. Ties will be broken by total score. Teams that are not Phase 2 winners are encouraged to keep learning along. Please refer to Appendix G for more details.

Winners of the individual contests in Phase 3 (i.e., turbine design, turbine testing, project development and connection creation) will be determined based on the total points scored for both Phase 2 and Phase 3 submissions and testing. **New for this year, overall winners will be determined by rank-based scoring**, with the lowest-numbered rank beginning at one (1) going to the team with the highest score in each contest. Ties will be broken by total score. Final calculation of scores and determination of winners for Phase 3 is described in Section 3.

2.2.1 Final determination

The director of the Wind Energy Technologies Office is the judge of the competition and will determine the final winners by taking the total scores, the ranked scores and program policy factors in Appendix L into account (see Table 2).

Table 2. How Award Winners Are Determined for the Phase 3 Grand Prize Awards

Award	Criteria*	Prizes**	
First Place	The team that earns the lowest sum of the ranks in the Turbine Design, Testing, Project Development, and Connection Creation contests. Ties will be broken by total score.	\$10,000	Cash prizes will be paid to each winning team's institution along with a trophy
Second Place	The team that earns the second-lowest sum of the ranks in the Turbine Design, Testing, Project Development, and Connection Creation contests. Ties will be broken by total score.	\$7,000	
Third Place	The team that earns the third-lowest sum of the ranks in the Turbine Design, Testing, Project Development, and Connection Creation contests. Ties will be broken by total score.	\$5,000	
Individual Contest Awards Design Contest Testing Contest Project Development Contest Connection Creation Contest	The team that earns the highest score in the associated contest	\$2,000 each	
Best Poster	The team that earns the highest total score of the poster sections of the Turbine Design, Project Development, and Connection Creation contest rubrics	-	Trophy (no cash prize)

*Specific details on earning points for each award are included in the following sections. The competition judge makes all final decisions in the allocation of prizes and awards.

**All participating teams in the final event receive a participation plaque.

3 Contest Submissions

CWC comprises four contests: Turbine Design, Turbine Testing, Project Development, and Connection Creation. As this rules document specifies the submission requirements for Phases 2 and 3 of the competition, each including a cash award, the following sections (Sections 3.1 through 3.4) are organized by contest and explain the submission requirements for both phases within that contest.

All formatting requirements are detailed in Appendix D. Where relevant, each contest section lists page limits, restrictions on length of video that can be submitted, and number of supplemental images that will be accepted for each submission. Anything beyond the limits will not be considered during scoring.

As a requirement for all contests, teams must create a poster that includes the Turbine Design Contest, Project Development Contest, and Connection Creation Contest activities with poster scoring included within each contest rubric. Teams are expected to have their posters on display at their booth for the duration of the in-person competition during Phase 3 and will also likely be used as part of an industry-facing poster session.

3.1 Turbine Design Contest

The Turbine Design Contest comprises two basic components: a Phase 2 turbine design milestone submission and a Phase 3 turbine design submission.

3.1.1 Phase 2 Turbine Design Milestone Submission

3.1.1.1 Design progress and prototype fabrication

A crucial part of designing and building any new system is having a viable concept that will meet the needs of the task. Finding such a concept involves having a deep understanding of the task to be accomplished and the physics of accomplishing that task along with a review of available resources (e.g., rules, OpenEI, webinars, past reports/designs). Brainstorming, high-level trade studies, and other methods can be used to focus on a concept that could be viable at this stage. Teams' thought process should include scoping out and ordering components to support prototype construction and testing. Deliverables include:

- Submit a one-page write-up including any images but not including a title page, which describes the concept the team has selected during the conceptual design process and summarizes the progress made toward fabrication and assembly of a prototype. Students must define the required tasks that the wind turbine needs to accomplish to be successful. This is a short summary, so details are not needed at this time. Note that the elements presented in this submission need not be the same as the elements that make it to the final delivery at the competition. It is more important to demonstrate the team has started building, assembling, and testing their wind turbine than to make the design perfect prior to first prototype assembly.

Scores will be based on how clear the concept is articulated, how likely it is to work for the tasks presented, and how much progress the team has made toward fabricating a prototype.

Table 3. Scoring Rubric for the Phase 2 Turbine Design Submission

Description	Possible Points
Design progress and prototype fabrication submission	
The concept is clearly articulated, detailing the progress made toward fabrication, assembly, and testing of a prototype	10
The proposed concept is likely to work well in achieving the student-defined tasks presented	10
The team has made sufficient progress toward fabricating a prototype, including ordering and assembling preliminary selected parts	10
Total	30

3.1.2 Phase 3 Final Turbine Design Submission

As a part of the final wind turbine design submission, teams will be required to develop a 15-page (maximum) technical design report, the overall competition poster, and a 10-minute (min) presentation during the final event.

3.1.2.1 Technical Design Report

The technical design report explains the wind turbine concept development process from an engineering perspective. The report must detail the turbine to be tested in the competition wind tunnel and should detail the complete design process, as well as the float, moorings, and installation approach that will be demonstrated in the competition wind tunnel.

At a minimum, the report must include the following sections:

- **A cover sheet.** Begin the report with a one-page cover sheet that includes the team affiliation and contact information. It should indicate the team roles/hierarchy and approximately how many students, faculty, and others (e.g., sponsors, volunteers, and family members) are involved in the project.
- **A table of contents.**
- **An executive summary.** The executive summary discusses components from all sections of the report and includes a short, high-level description of the team project. Teams should use their judgment when deciding how long to make the executive summary; however, one page is often sufficient.
- **The technical design.** Teams should provide detail that is adequate for an engineering review of the baseline and operating properties of the wind turbine and its subsystems, including mechanical loading requirements, operational limits, control algorithms, and software. At a minimum, the following topics should be included in the prescribed order:
 - A description of the design objective and how the design components support this objective.
 - If applicable, a clear and concise list of what is the same as submissions to prior competitions from the affiliated school, and why. This list should demonstrate an understanding of how previous research and design decisions have shaped the team’s approach. If a team’s school did not compete in a previous year’s

competition, they should address whether information in last year's winning design reports influenced their own design and if so, how.⁷

- A basic static performance analysis (e.g., C_p -Lambda report) of the turbine design that contains the annual energy production over a range of operational parameters.
- A basic engineering diagram of all mechanical systems and an analysis of the expected mechanical loads and associated safety factors within the design, both for operational and parked conditions.
- A basic engineering diagram of the float and a civil and structural analysis of the float and its mooring system.
- An electrical, one-line diagram of the overall system and electrical analysis comprising the generator model, power electronics (e.g., canonical model and one-line diagram), electrical load model, and operating voltage, including how the team plans to regulate voltage.
- A control model analysis of the operational modes (i.e., the control states diagram and a description of primary operational modes).
- Documentation of associated software architecture (e.g., data acquisition, turbine control, safety systems, states and state diagram, outputs to the turbine actuators, and data archiving) and its development. Note that this is about the development of the software itself, not the turbine control methodologies described previously.
- A description of the final assembly of the wind turbine's subsystems. Where relevant, include how a distributed team environment was managed.
- An assembly and commissioning checklist that can be followed during installation of the turbine in the wind tunnel to ensure it is functioning as expected before starting the scoring portion of the test. Note that this list should extend beyond a simple step-by-step assembly, and students should think carefully about how to ensure proper functionality of their wind turbine before commencing testing.
- The results of laboratory and/or field testing of turbine prototypes.

This report should be no more than 15 pages in length, including images, and formatted according to the specifications provided in Appendix D. Pages submitted beyond this limit will not be reviewed. The title page and references do not count toward the maximum page limit. At the conclusion of the competition, team reports will be posted to the CWC website for reference during future events. Accordingly, teams should ensure that personally identifiable information such as telephone numbers and residential addresses are not included in the report.

3.1.2.2 Presentation and Question-and-Answer Session

In addition to the written report, each team will present their design to a panel of reviewers followed by a question-and-answer (Q&A) session to answer any remaining questions that the reviewers may have from the written report. This presentation should begin with a brief overview that conveys the most important details of the technical design and clearly communicates the team's approach to design and development.

⁷ Past winning reports can be found at: <https://www.energy.gov/eere/collegiatewindcompetition/past-collegiate-wind-competitions>.

Presenters must be student team members and should showcase their wind turbine prototype and have the option to use posters, charts, PowerPoint slides, or other visual aids to engage with the reviewers and/or help clarify any questions the reviewers may have after reading the written report. Please bring necessary files on a USB drive along with any drivers needed to support presentation animation. Presentations are limited to 10-min, which will be followed by a 15-min Q&A period with the competition reviewers. Additional attendees are allowed in the Q&A session as observers at the discretion of the student lead.

The reviewers will use the content from this project overview and Q&A period to make final adjustments to the technical design report score. Answers provided during the Q&A session will also be evaluated to gauge the depth of students' technical understanding of wind turbine design.

3.1.2.3 Poster

Each team will design a poster that includes the design, project development, and connection creation components of the competition. Teams should ensure that their poster embodies all significant decision points as it relates to this component of the CWC and their linkages to other parts of the competition as applicable.

Table 4. Scoring Rubric for the Technical Design Competition

Description	Possible Points
Final Report	
Concise, readable, and descriptive with logical flow and clear communication	15
Comprehensive design objective description for test turbine, float, and moorings	15
Clear and concise enumeration of what elements of their technical design are the same as last year, why, ^a and what has changed from the previous year	15
Thoroughness and validity of the static performance analysis	15
Quality and clarity of the mechanical loads analysis and associated safety factors of structures	15
Clear description and analysis of the underwater structure and anchoring system	15
Clear description of the electrical system design choices and analysis of its performance	15
Quality and clarity of the engineering diagrams including mechanical and electrical drawings	15
Quality of controls analysis including states and algorithms	15
Comprehensiveness of software implementation and testing description including how it was developed and tested	15
Documentation of final assembly including how things go together, stay together, and are adjusted in tunnel testing	15
Completeness of commissioning checklist with logical flow	15
Quality of laboratory and/or field-testing process	15
Subtotal	195
Presentation and Q&A	
The presentation is delivered clearly and professionally	15
Presentation to reviewers tells an effective story as it relates to the team’s decision-making process	15
Demonstrated understanding of technical design during Q&A session	20
Subtotal	50
Total	245
Poster	
Competition poster includes/represents this component of the competition and relevant decision points in a well-designed, illustrative manner with efficient and effective use of text and graphics. The poster includes linkages to other parts of the competition as applicable	25

^a Teams whose schools did not compete last year should address whether and, if so, how the winning design report from last year influenced their current design decisions.

3.2 Turbine Testing Contest

The Turbine Testing Contest comprises a Phase 2 milestone submission, a Phase 3 submission, and a series of individual turbine tasks.

3.2.1 Phase 2 Turbine Testing Milestone Submission

3.2.1.1 Prototype Fabrication and Testing Video

This contest has a strong hands-on component. As such, it is important to make early progress toward tangible components and working systems. Building small test models and executing individual component tests can be very instructive in the overall design process and allow the

team to get a strong feel for what works and what does not. It is important to build early and iterate on a design as things rarely work perfectly the first time. Learning how those individual components interact with each other is also critical.

To ensure teams are successful in meeting this goal, specific submission requirements for the Phase 2 Turbine Testing Submission include:

- Submit a 5-min video that describes the team’s progress to date on a working prototype. The video need not demonstrate a complete working system although it can if the team has made that much progress. Early-stage component prototypes are also encouraged. Details should be presented on how those components are being tested and evaluated for functionality in the greater design. Note that the elements presented in this submission need not be the same as the elements that make it to final delivery at the competition. Rather, it is more important to get started building, assembling, and testing than it is to make the design perfect prior to first prototype assembly.
- Scores will be based on how clearly the concept is articulated, how likely it is to work for the tasks defined by the students in conceptual design, and how much progress the team has made toward fabricating a prototype.

Table 5. Scoring Rubric for the Phase 2 Turbine Testing Submission

Description	Possible Points
Prototype fabrication and testing video	
The concept is clearly articulated, detailing the progress made toward fabrication, assembly, and testing of a prototype.	10
The proposed concept is likely to work well in achieving the student-defined tasks that are presented.	10
The team has made sufficient progress toward fabricating a prototype, including ordering and assembling preliminary selected parts.	10
Total	30

3.2.2 Phase 3 Final Turbine Testing Submissions

As a part of the final turbine testing submission, teams will be required to develop a timed assembly video, conduct a technical inspection prior to the competition, and create the overall competition poster.

3.2.2.1 Timed assembly video

The assembly procedure at competition will be timed. To ensure teams are ready to meet this challenge, a timed assembly video must be provided for review. This video will show the same assembly elements that will be timed at the competition and must include everything from installing the float and moorings up until the team declares they are ready for testing. The teams will be given 6-min for this task at competition plus an additional 3-min for turbine commissioning. The wind tunnel door will be closed after 6-min and no further installation activities in or under the tunnel will be permitted. For this reason, this video submission must be exactly 6-min or less in length, uncut, and showing the wind turbine assembly in real time. Any video beyond the 6-min limit will not be viewed or scored. The video need not include a tank with water in it for the float and moorings but must include some method of showing the

moorings getting placed, the float being supported, and the wind turbine being installed on top of it, including mechanical and electrical connections.

3.2.2.2 Technical Inspection Prior to Competition

To test at the final event, teams will be required to pass a technical inspection. To make this process as smooth as possible, the prize administration team requires that student teams go through a practice inspection prior to the competition, working with someone who is qualified to interpret the rules and understand the competition as well as possible. Ideally, this person should be someone other than the faculty advisor to provide a fresh perspective at the end of the year. As part of the tech inspection process, each team must:

- Submit a short write-up summarizing the qualifications of the inspector, certify that both the student team and inspector have read Appendix A, and include a signed tech inspection sheet that includes all of the inspection points listed in Appendix E.
- Detail any deficiencies and plans on how to remedy those deficiencies before competition.
- **Include images of your cables and cable connectors along with specification sheets for the connectors showing that you have met the rules (e.g., no single-strand cables, Powerpoles are the correct polarity, and all connectors are quickly connectable).**

Scores will be based on the completeness of this inspection, not on whether the system passes all elements. The purpose of the inspection is to identify areas that would not pass technical inspection at the competition, thus giving the teams time to correct those deficiencies before the competition begins.

Table 6. Scoring Rubric for the Phase 3 Final Turbine Testing Submissions

Description	Possible Points
Timed assembly video	
The time for assembly is 6 minutes in length or less	5
The video is in real time with no cuts and acceptable production quality	5
The video shows the assembly of all wind turbine elements as specified	15
Subtotal	25
Technical inspection prior to competition	
Includes inspector qualifications and rules review certification	5
Lists deficiencies and planned remedies, if any	5
Includes images of cable connectors and specification sheets; cable and connectors comply with the rules	5
Inspection is complete and thorough	10
Subtotal	25
Total	50

3.2.3 Phase 3 Wind Turbine Performance Testing

Testing provides teams with the opportunity to demonstrate their wind turbine’s performance through objective tasks, and the outcomes help determine if they succeeded in developing a

durable, safe, high-performing machine. Performance is a strong indicator of a wind turbine’s ability to compete successfully in the marketplace.

Each turbine, along with its corresponding load system, will be tested in the competition wind tunnel. The contest will include the following tasks, over a range of wind speeds: power curve performance task, safety task, and float and mooring success task. This section describes the requirements of the individual tasks in which the wind turbine is expected to perform, the parameters of the testing conditions, and details on scoring algorithms and point allocations between individual tasks.

Students will use their load for all tasks. Although the prescribed testing order will be the same for each team, the exact amount of time at each set point could vary. Thus, teams are expected to design their turbines to sense the local conditions within the tunnel and react accordingly for each task.

Table 7. Scoring Summary for Wind Turbine Performance Testing

Description	Possible Points
Power curve performance task	50
Safety task	50
Float and mooring success task	50
Total	150

3.2.3.1 Power Curve Performance Task

The objective of this task is to test each wind turbine over a range of wind speeds to determine a power curve. It is meant to be a direct comparison of power performance between turbines, which is one factor by which real wind turbines are evaluated.

Each turbine will be tested at integer wind speeds between 5 and 11 meters per second (m/s) inclusive for a duration of 30 seconds (s) or less, with the stated intent of obtaining a “stable” power reading. A “stable” power reading is defined as stable rotations per minute and stable power per electronic testing device during the test period. As power output may fluctuate, for the purposes of this task, the allowable power outputs to be included in the maximum average power (per electronic testing device) during any 5-s interval will be defined as $\pm 10\%$ of the maximum average power.

This stability criterion will also consider any noise that the data acquisition system measures. The system samples at 50 kilohertz using a filter with a cutoff frequency of 22.5 kilohertz. These samples are then block-averaged down to 200 hertz. To meet the specified stability tolerance, teams should ensure that any noise the power their turbine produces is adequately filtered and that the combination of power variation and measured noise is within the specified tolerance when read by the competition data acquisition system. One way to reduce noise is to implement an LC filter (inductor-capacitor filter) on the power output lines to filter noise coming from the switching of power electronics.

A total score for this task will be calculated according to Table 8 by multiplying each power measurement in watts in 1-m/s wind speed intervals from 5–11 m/s by the factor given. If power is not stable within the specified tolerance, the score for the bin will be zero.

Table 8. Weighting for the Power Curve Performance Task

Wind Speed (meters/second)	Factor
5	0.7
6	0.8
7	0.8
8	0.7
9	0.4
10	0.3
11	0.1

3.2.3.2 Safety Task

Safety is of the utmost importance to wind turbine designers and manufacturers. To be certified, turbines must be able to safely shut down rapidly and with a fail-safe shutdown capability. Turbines must shut down when disconnected from the grid, as well as manually upon command. Each team may choose to address these shutdown scenarios with one or two systems or mechanisms.

In this task, the wind turbine will be required to safely shut down⁸ at two different times during the testing period at any wind speed, up to the maximum continuous operational wind speed specified in Appendix A: Turbine and Load Design Requirements. For each turbine, the shutdown process will be initiated once “on command” and separately by disconnecting the load from the point of common coupling. It is important to note that the open-circuit voltage of the wind turbine will be monitored during this shutdown and shall not exceed the limit provided in Appendix A: Electrical Requirements.

The safety task is scored on a pass/fail basis in two parts. If the wind turbine achieves a successful shutdown upon manual initiation, the team will receive 15 points. If it automatically restarts, the team will receive an additional 10 points. If the team must manually restart the turbine, they will receive zero points for the restart. If the turbine achieves a successful shutdown when disconnected from the load system, the team will receive an additional 15 points. If the turbine automatically restarts when reconnected, the team will receive an additional 10 points. If the team must manually restart the turbine, they will receive zero points for the restart.

The wind turbine must also be able to restart at any wind speed above 5 m/s. If the turbine fails to successfully restart, the team may work on their electronics to manually restart their turbine, resulting in a zero score for the restart portion of the task. The manual restart, if necessary, will occur with the tunnel running between 6 and 10 m/s.

⁸ For the purposes of this task, “shutdown” is defined as dropping below 10% of the maximum 5-second bin average rotations per minute achieved during power performance testing. This reduction in rpm must occur within 10 seconds and remain below the limit indefinitely until the shutdown condition is removed.

3.2.3.3 *Float and mooring success task*

The float's purpose is to keep the wind turbine within a watch circle and upright during the entire period of testing. However, the wind tunnel does have a "hard stop" that will prevent the turbine tower from moving beyond a certain point. This task will be scored according to whether the float hits the hard stop or tilts beyond an angle of 15 degrees during testing (see Appendix A: Physical Design Constraints Within the Tunnel), taking into account the highest wind speed that was experienced before hitting the hard stop or tipping occurs during the power performance task and a single 13-m/s point. Success requires all parts of the float or turbine to not touch any part of the tank, tunnel floor, or mooring weights (mooring line connections excepted) in a continuous or repeated manner. Teams should design their turbine with large margins as even apparent marginal contact will be considered contact. The turbine/float interface plane must also stay above the surface of the water at all times. Points will be awarded linearly from 0 to 50 based on the maximum wind speed attained from 5 m/s to 13 m/s before violating one of the three constraints, with 13 m/s being worth 50 points and 5 m/s being worth 0 points. No more than 50 points or less than 0 points can be earned for this task.

3.3 Project Development Contest

The Project Development Contest is a yearlong effort to investigate key aspects of wind farm siting and project development activities. This investigation should include assessing wind resource data and performance estimation, factors that affect project economics, bathymetry, environmental issues, transportation constraints, transmission design, permitting requirements, turbine technology, and performance variables (e.g., wakes, turbine availability, and site-specific losses).

For this contest, teams must assess wind farm development opportunities within the defined project area, which for the 2025 CWC is along the coastline of Oregon (see Appendix B for more information), create a rough development plan, and complete an assessment of the 30-year project economics. Team members must be prepared to explain their process to reviewers at the competition.

New this year, teams must develop a community benefits agreement, described in more detail in Appendix B.

As part of this contest, there is a Phase 2 submission and a Phase 3 final submission. The following steps describes the procedure for developing the site plan and preliminary wind farm design, reflective of the information needed to complete both submissions.

1. Select a specific lease area within the area discussed in Appendix B. Teams should:
 - Be prepared to explain how and why their lease area was chosen.
 - Include some considerations, such as wind resource, bathymetry, geotechnical data, lease boundary, access to transmission, transportation access, competing human uses, and environmental factors.
2. Develop a preliminary wind farm design. This should include:
 - Researching site characteristics, such as:
 - Wind resource information, bathymetry data, roughness, water depth, geotechnical data, significant wave height, hurricane impacts, port infrastructure, ocean activities (e.g., fishing, shipping, military), and so on.

- Sensitive species and ecosystems in the area, impacts to wildlife, and mitigation options, if relevant.
 - Drafting a preliminary site design, including:
 - Wind turbine type, hub height, rotor diameter, and number of turbines.
 - Foundation type.
 - Interconnection site on the coast.
 - Staging, construction, and operations and maintenance ports.
 - Survey, installation, and operations and maintenance vessels.
 - The project boundary.
3. Conduct a cost-of-energy and cash flow analysis for the 30-year expected life of the project. The analysis should, at a minimum, consider each of the following elements:
- **Initial capital cost.** This covers the costs associated with development, wind turbine procurement/installation, and balance of station. Costs include, but are not limited to, site preparation; wind turbines; foundations; electrical hardware; electric collection system and transmission lines; substation equipment; wind farm control and monitoring equipment; operations and maintenance facilities and equipment; shipping; resource assessment; preconstruction environmental monitoring; surveying; legal counsel; project management; permits; construction insurance; title insurance; lease payments; engineering services; and sales and use tax. Costs must be expressed in dollars and dollars per kilowatt.
 - **Annual operating expenses.** Key cost categories here include operations and maintenance costs (including preventative maintenance, corrective maintenance, and spare parts), lease costs, asset management, operational insurance, and scheduling fees. Teams should consider the potential of increased costs year over year. Costs should be expressed in dollars and dollars per kilowatt per year.
 - **Annual energy production.** The total amount of electrical energy the wind farm expects to make in a year, expressed in megawatt-hours.
 - **Market conditions.** This includes research as to what the market is willing to pay for the megawatt-hours produced and compare this with the cost of energy.
 - **Financing plan.** This should include consideration of construction financing; tax equity; sponsor equity; permanent (long-term) debt; financing fees; debt and equity return requirements; depreciation; and income tax.
 - **Incentives.** This includes national incentives, tax credits, and any regional incentives. The team should research potential abatements sales and use tax.
- Note:** Steps 2 and 3 may require several iterations to balance financial and technical elements.
4. Finalize detailed design of the site plan, including the following:
- Finalize wind turbine locations, turbine type, rotor diameter, and foundation type.
 - Finalize transmission design from project to point of interconnection.
 - Plan port activities.
 - Plan submerged land leases.

The Phase 3 design does not need to remain the same as the preliminary design proposed in the Phase 2 milestone submission.

5. Also, to be included is a sample community benefits agreement. Agreements between project developers and adjacent communities have been informally negotiated for years, with developers proposing activities within the community that will benefit residents or the community financially or otherwise. As part of the proposed wind farm project, please consider whether the project would be eligible for any funding under the Bipartisan Infrastructure Law or the Inflation Reduction Act and draft a list of key provisions the developer would want to include in a community benefits plan.⁹ The key provisions should demonstrate understanding of the adjacent community such as demographics, workforce needs, locate climate plans, and so on.

Community benefits agreements are one part of community benefits plans and are increasingly being used to demonstrate how project benefits will be realized by the impacted community. Along with the sample agreement, teams should propose ways of measuring and tracking fulfillment of agreed-upon benefits.

3.3.1 Phase 2 Project Development Submission

3.3.1.1 Preliminary Project Development Report

The Phase 2 submission should describe activities completed in Steps 1 and 2 in a short report that is no more than five pages and formatted according to the specifications in Appendix B. The deadline is listed in Section 2.1.

This report may also be used as part of the final report for this contest.

Table 9. Scoring Rubric for the Phase 2 Project Development Submission

Description	Possible Points
Preliminary site selection and down-select, including identifying potential siting challenges and opportunities associated with options, are adequately represented in the submission.	30
Total	30

3.3.2 Phase 3 Final Project Development Submissions

As a part of the final project development submission, teams will be required to develop a final project development report, a presentation, and an overall competition poster.

3.3.2.1 Project Development Final Report

The project development report is the primary means for a team to provide detailed information about the project to the reviewers, given that the reviewers have a limited opportunity at the competition event to evaluate the yearlong project development activities.

At a minimum, the report must include the following sections in the prescribed order and represent all five steps specified in the project development process:

⁹ For more information, visit: <https://www.energy.gov/infrastructure/about-community-benefits-plans>.

- **A cover sheet.** Begin the report with a one-page cover sheet that includes school affiliation, contact information, project name, team roles/hierarchy, and approximately how many students, faculty, and others (e.g., mentors, sponsors, or other volunteers) are involved in the project.
- **A site description and energy estimation.** This section should include information about the wind resource, site layout, wind turbine type, foundation, sensitive environmental regions and species, reason as to why this site was selected, and risks and fatal flaws (i.e., “fatal flaw” being circumstances that can lead to the project’s demise).
- **Financial analysis.** This section should outline the financial potential of the project, noting required capital, financing, and key assumptions (e.g., project marginal costs). The team should demonstrate the path to solvency and outline the project’s potential through cash flow analysis. Full *pro formas* (*pro formas* being financial statements forecasted for future periods typically used for Security and Exchange Commission filing) are not required; however, it is recommended that higher-level, longer-term summaries be included to communicate the attractiveness of the project for investment.
- **Discussion of optimization process.** This section should describe the iterative process of optimization that occurred between the preliminary site design and the financial analysis.
- **A bid for a lease.** The team should suggest the maximum bid they would be willing to pay for their chosen lease area.

The report should be no more than 15 pages in length and formatted according to the specifications laid out in Appendix D. Pages submitted beyond this limit will not be reviewed. Images and appendices count toward the total page count but title page, table of contents, and references do not.

At the conclusion of the competition, team reports will be posted to the competition website for reference during future events. According, teams should ensure that personally identifiable information such as telephone numbers and residential addresses are not included in the report.

3.3.2.2 Presentation

At the competition, teams will present their proposed wind farm site plan during an assigned presentation session with the reviewers who will represent potential project owners or investors. This presentation should convey the most important details of the project, which may include items from the project development report. Slides are required.

The teams will have 15-min to present their project and another 10-min for questions from the reviewers.

3.3.2.3 Poster

Each team will design a poster that includes components of the Turbine Design, Project Development, and Connection Creation Contest components of the competition. Teams should ensure that their poster embodies all significant decision points as it relates to this component of the CWC and their linkages to other parts of the competition as applicable.

Table 10. Project Development Contest: Develop Plan for Hypothetical Project

Description	Possible Points
Final Report	
The written report is concise, readable, and descriptive with logical flow; communicates technical information clearly	20
Wind farm design includes a detailed layout and resource assessment	20
Environmental impacts and mitigation approaches are clearly articulated	20
Levelized cost of energy (cost/kilowatt-hour) is realistic and adequately justified	20
Balance-of-station elements are adequately represented and considered in the financial analysis (capital expenditures)	20
Evaluation of annual operational costs (operational expenditures) are fully presented and adequately justified	20
Financial plan and bid price are fully presented and adequately justified	20
Understanding of market opportunities and constraints (e.g., power markets, equipment supply chains, ownership structures, taxes, policies, and incentives) are portrayed fully with adequate justification	20
Provides a holistic representation of a community benefits agreement including its risks and rewards as it relates to both the developer and the community at large.	20
Subtotal	180
Presentation	
The presentation is delivered clearly and professionally	15
The presentation is concise and visually engaging, professional and clear, and tells an effective story as it relates to the team’s decision-making process	20
Subtotal	35
Total	205
Poster	
The poster includes/represents this component of the competition and relevant decision points in a well-designed, illustrative manner with efficient and effective use of text and graphics. It includes linkages to other parts of the competition where applicable.	25

3.4 Connection Creation Contest

The Connection Creation Contest is designed to forge stronger connections between competition participants, the wind industry, students, and the team’s local community.

This contest includes activities that allow for maximum impact between the teams and their surrounding communities and stakeholders while informing the other competition contest elements to the extent possible.

As part of this contest, there is a Phase 2 milestone submission and a Phase 3 final deliverable.

3.4.1 Phase 2 Connection Creation Milestone Submission

3.4.1.1 Team Story

Teams will provide information about their background, and career aspirations. Prize administrators will include this information in the team stories on the CWC website and may edit the text for consistency and to meet necessary web standards on energy.gov. Teams are

encouraged to promote their stories through their social media channels and media connections once they are live on the CWC website.

As part of the Phase 2 submission form in HeroX, teams must complete the following short-answer fields:

- Team information, including:
 - Team name
 - University name(s), city, and state
 - Faculty advisor and student lead names and email addresses
 - Team social media accounts with hyperlinks
 - Answer to the question: How many times has your team participated in the Collegiate Wind Competition?
 - If you've had any articles published about your team, please provide the link
 - Team motto and/or logo.
 - Answer to the question: What makes your team unique? Some examples include (answer any that apply):
 - Is your team a first-time CWC participant?
 - Does your team have a partnership with an organization in the wind energy industry? If yes, what organization(s)?
 - Does your team have a partnership with any other U.S. schools or international schools? If yes, what schools?
 - Does your team have members who speak languages other than English? If yes, what languages?
 - Are any CWC alumni involved with your current team?
- Team career aspirations, such as:
 - At which renewable energy companies have current team members and/or alumni found jobs?
 - At which renewable energy companies are current team members exploring jobs?
 - If neither the first or second bullet apply, where have your current team members and/or alums found jobs after college? Why have they selected those organizations?

- Team photo, including:
 - A team photo, submitted as a .jpg or .png file.
 - The names of the team members in the order in which they appear in the photo.

Teams should ensure that personally identifiable information such as telephone numbers and residential addresses are not included in the report.

3.4.1.2 Outreach Strategy Report

The Phase 2 submission must include the team’s overarching strategic outreach goals, recruitment goals, and social media goals, and their plan for achieving those goals. The report should include an outreach timeline chronicling the team’s proposed activities and associated announcements throughout the year. An outreach plan is an industry best practice to help keep announcements on track and serve as an activity road map. Refer to the engagement toolkit on [CWC25 HeroX](#) for an example outreach timeline.

The outreach strategy report should include:

- High-level strategic goals the team aims to achieve with their outreach activities that could include but are not limited to:
 - Raising student and local community awareness of wind energy
 - Inspiring and recruiting new students to participate in the CWC and diversifying the team
 - Educating and exciting young students about opportunities in wind energy
 - Highlighting skills developed during the competition.
- The team’s recruitment strategy, including what steps have been taken to ensure diversity and inclusivity on the team
- Any industry connections or partnerships that the team has (including alumni), and how the team will leverage those connections to achieve their outreach goals
- The team’s social media and communications strategy, including team social media accounts with hyperlinks, and relationships developed with the team’s school newspaper or local media outlets
- Details on each of the team’s three chosen Connection Creation Contest activities (see details in Appendix C), including how these activities will help the team achieve their outreach goals and their plan for executing these activities. In addition: If the team has chosen to complete the Understanding the Wind Industry activity, they must include preliminary contacts for the interviews or information on how the team will find those contacts.
- A timeline for the contest elements presented in chart form (see the engagement toolkit for an example), including:
 - Timeline for proposed events or interviews
 - Planned outreach announcements and social media posts.
- Up to 10 photos or social media images that have been developed for outreach purposes.

The outreach strategy report should not exceed three pages (photos are not included in the page count). Formatting details can be found in Appendix D and the deadline is listed in Section 2.1.

Table 11. Scoring Rubric for the Phase 2 Connection Creation Submissions

Description	Possible Points
A clear strategy and direction and discussion of proposed impact of the three activities selected	10
Quality and creativity of activities as presented in the outreach strategy report	10
Informativeness of team story	10
Total	30

3.4.2 Phase 3 Final Connection Creation Submissions

As a part of the final Connection Creation Contest submission, teams will be required to develop a final metrics report, presentation, and the overall competition poster.

3.4.2.1 Final Metrics Report

Teams will submit a final report detailing the metrics of their Connection Creation Contest activities throughout the year. This report should include the following:

- The team’s overarching strategic outreach goals for the year and reflection on results attained
- Recruitment strategy outcomes, including:
 - Metrics on team breakdown and recruitment, including:
 - Team numbers and growth
 - Grade levels of team members
 - Composition of the team’s university overall and of the team (e.g., race, gender)
 - Breakdown of majors in the team.
 - Reflection on the team’s original recruitment plans versus results attained.
- Social media strategy outcomes, including:
 - Metrics on social media account growth, including for each platform:
 - Number of followers
 - Number of posts and likes
 - How those numbers grew throughout the year.
 - Reflection on the team’s original social media plan versus results attained.
- Each of the team’s three chosen contest activities, including:
 - Metrics on each activity, including:
 - Number and types of events or interviews
 - Numbers of team and participant attendance.
 - Reflection on how each activity met the team’s high-level strategic outreach goals
 - If the team has chosen to complete the “Understanding the Wind Industry” interviews, provide contact information for each interviewee in a separate document (not included in the report page count), including:
 - Full name, company affiliation, and email address (will not be published)
 - Origin of the relationship (i.e., professional or alumni)

- Sector in the wind energy industry
- Response regarding if this person would be open to continued participation in future CWC events.
- List all industry connections (including alumni) the team has engaged with for mentorship, sponsorship, outreach, and so on
- Teams may include up to 20 photos or social media images that depict their outreach activities.

This report should be no more than four pages in length (photos are not included in the page count). Formatting details can be found in Appendix D. Reports from each of the teams will be published on the competition website, used for reference for future events, and could be used to develop future competition submissions.

3.4.2.2 Final Presentation and Q&A

Teams must develop a final PowerPoint presentation to share their progress on each competition element throughout the year as well as their overarching outreach strategy. This presentation must include the following:

- Details on the outreach strategy, including the team’s initial high-level goals
- Details on the team’s recruitment strategy and execution
- Details on the team’s social media strategy and execution
- Each of the team’s three chosen contest activities, including the goals of each activity, planning and execution, and an assessment of activity impact (including how the impact relates to their overarching outreach strategy).

Teams should emphasize the quality and visual appeal of each slide and the accompanying presentation by the speaker. Slides should include high-resolution photos to represent each contest element. Teams may use videos, but this is not required. See Appendix D for instructions on submission and formatting details.

Each team will have 10 minutes to present to a panel of reviewers and to the public. This will be followed by 10 minutes of questions from the reviewers. Teams will be scored on the professional and clear structure of the presentation, use of effective storytelling techniques and visual elements, and their completion of each of the required submissions.

3.4.2.3 Poster

Each team will design a poster that includes components of the Turbine Design, Project Development, and Connection Creation Contest components of the competition. Teams should ensure that their poster embodies all significant decision points as it relates to this component of the CWC and their linkages to other parts of the competition as applicable.

Table 12. Scoring Rubric for Connection Creation Contest Metrics Report, Final Presentation, and Poster

Description	Possible Points
Final Metrics Report	
Written report is concise, readable, and descriptive with logical flow and communicates information clearly, particularly as it relates to their overarching outreach strategy	15
Quality of recruitment plan metrics and demonstrated understanding of impact	15
Quality of social media metrics and demonstrated understanding of impact	15
Quality of activity metrics and demonstrated understanding of impact	15
Subtotal	60
Final Presentation	
The presentation is concise and visually engaging, professional and clear, and uses effective storytelling techniques	15
Includes demonstrated execution of outreach plan and team goals, including improvement in digital public engagement (social media or other news outlets)	20
Includes execution and demonstrated impact of chosen activity #1, particularly as it relates to their overarching outreach strategy	15
Includes execution and demonstrated impact of chosen activity #2, particularly as it relates to their overarching outreach strategy	15
Includes execution and demonstrated impact of chosen activity #3, particularly as it relates to their overarching outreach strategy	15
Includes successful recruitment and inclusion of a multidisciplinary team with diverse backgrounds	15
Includes diversity of outreach methods and creativity in tactics used	20
Subtotal	115
Total	175
Poster	
The competition poster includes/represents this component of the competition and relevant decision points in a well-designed, illustrative manner with efficient and effective use of text and graphics. It includes linkages to other parts of the competition.	25

Appendix A. Turbine Design and Testing Contest Specifics

Wind Turbine and Load Design Requirements

Each team will design and build a prototype wind turbine. It must be designed to withstand continuous winds of up to 13 meters per second (m/s) at sea level. Each prototype must also be designed for testing inside the Collegiate Wind Competition wind tunnels.

Specifications for Competition Tunnel

A digital rendering of the competition tunnel is shown in Figure A-1. The dimensions of the test chamber are 122 centimeters (cm) wide by 122 cm high by 244 cm long. There are inlet and outlet components of the wind tunnel that extend beyond the test chamber. The tunnel has a drawdown configuration; that is, the air is sucked through the test section—entering at the left, exiting at the right—with the drawdown being induced by the fan on the right side of the tunnel. A honeycomb flow straightener at the inlet of the wind tunnel provides for near-uniform mixing of the incoming air. There is a debris filter upstream of the fan section. The screen is made of wire mesh to prevent wind turbine pieces from getting sucked into the fan unit.

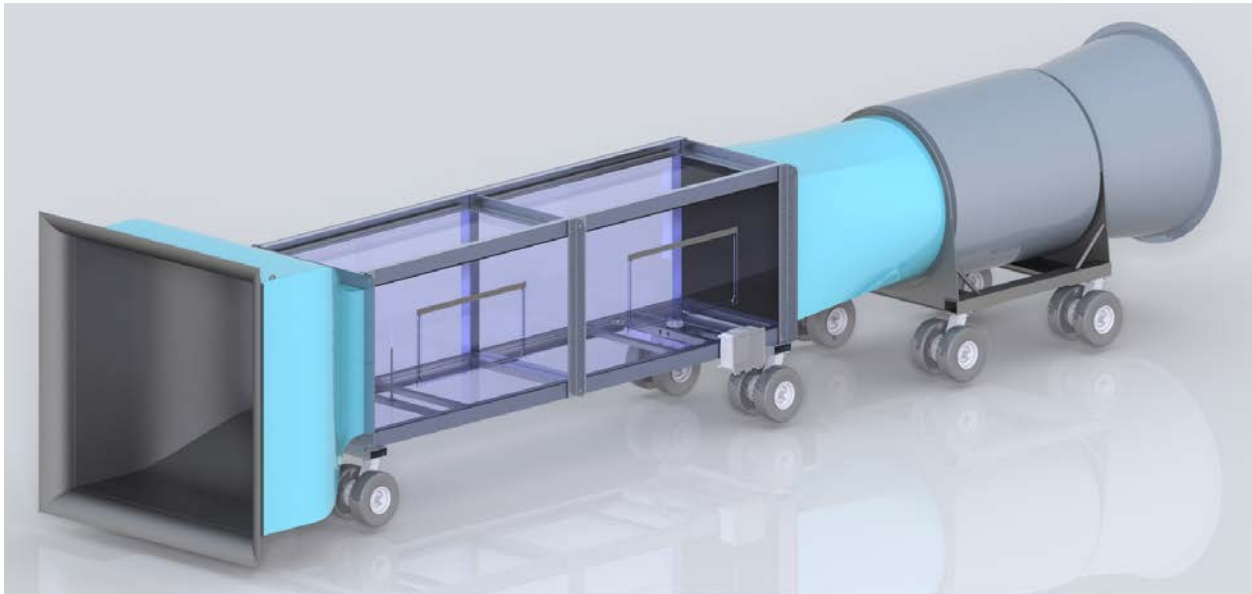


Figure A-1. The configuration of the Collegiate Wind Competition wind tunnel.

Image created by Jason Roadman, National Renewable Energy Laboratory (NREL)

Physical Design Constraints Within the Tunnel

At zero yaw angle, the entire wind turbine must fit within the volume specified and shown in Figure A-2. The turbine must have the following maximum geometry:

- All turbines and floats must fit through the 61-cm-by-122-cm tunnel door. Turbines and floats need not be joined together as they pass through the door.

- Rotor and nonrotor turbine parts must be contained in a 45-cm-by-45-cm-by-45-cm cube. This cube may be shifted as much as 10 cm fore or aft of the tower centerline when the turbine is aligned with the flow.
- Nonrotor turbine parts must be contained in a 9.0-cm-diameter cylinder extending from the turbine/float interface plane to the bottom of the previously mentioned cube. This cylinder should be centered on the mounting flange. For this purpose, these parts will be defined as anything that does not capture energy from the moving air, including the mounting flange. Note, if wingnuts are used to secure the turbine to the float or the practice tunnel floor, they may extend outside this cylinder.
- Hub height, defined as the distance from the turbine base plate and float top flange interface plane to the rotor midplane, must be between 55 cm and 75 cm.

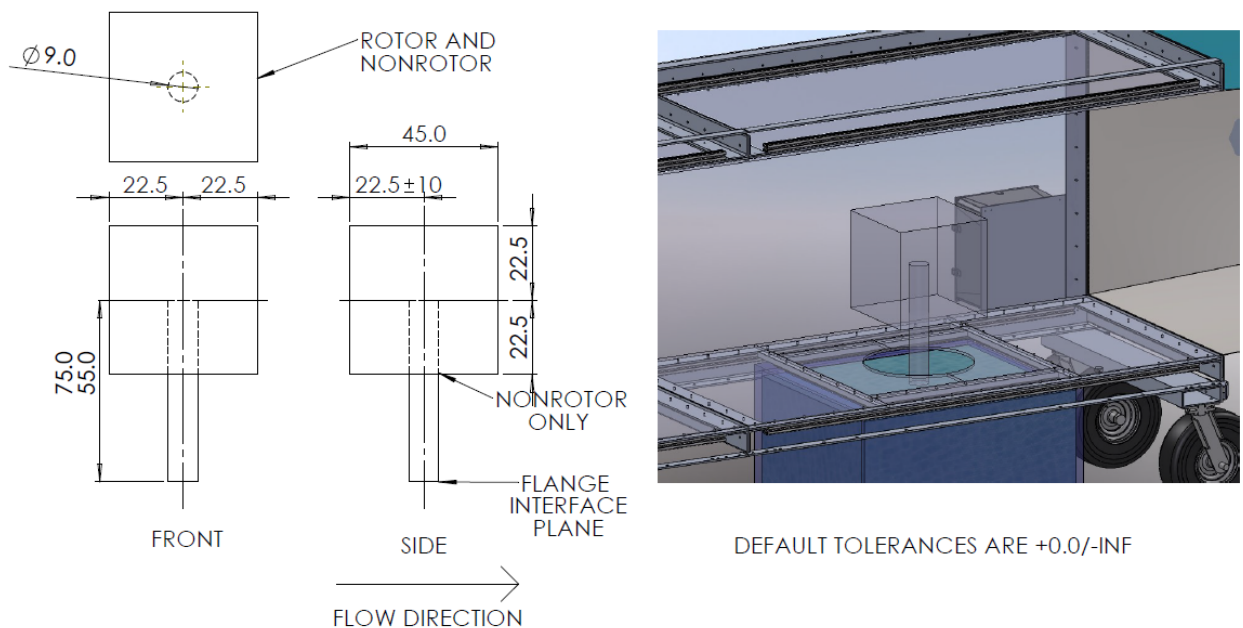


Figure A-2. Allowable wind turbine volume. Dimensions are in centimeters.

Image created by Jason Roadman, NREL

To measure turbine tilt, an inclinometer will be used. Specifically, the inclinometer will be mounted on a bracket that conforms to the tower and magnetically mounts to it. See Figure A-3. **To allow for magnetically mounting the inclinometer, towers must be ferrous with an outside diameter of 1.500 ± 0.015 inches.** Tubing can be sourced in various wall thicknesses from McMaster ([89955K389](https://www.mcmaster.com/89955K389) through [8305T22](https://www.mcmaster.com/8305T22)) or an equivalent source.

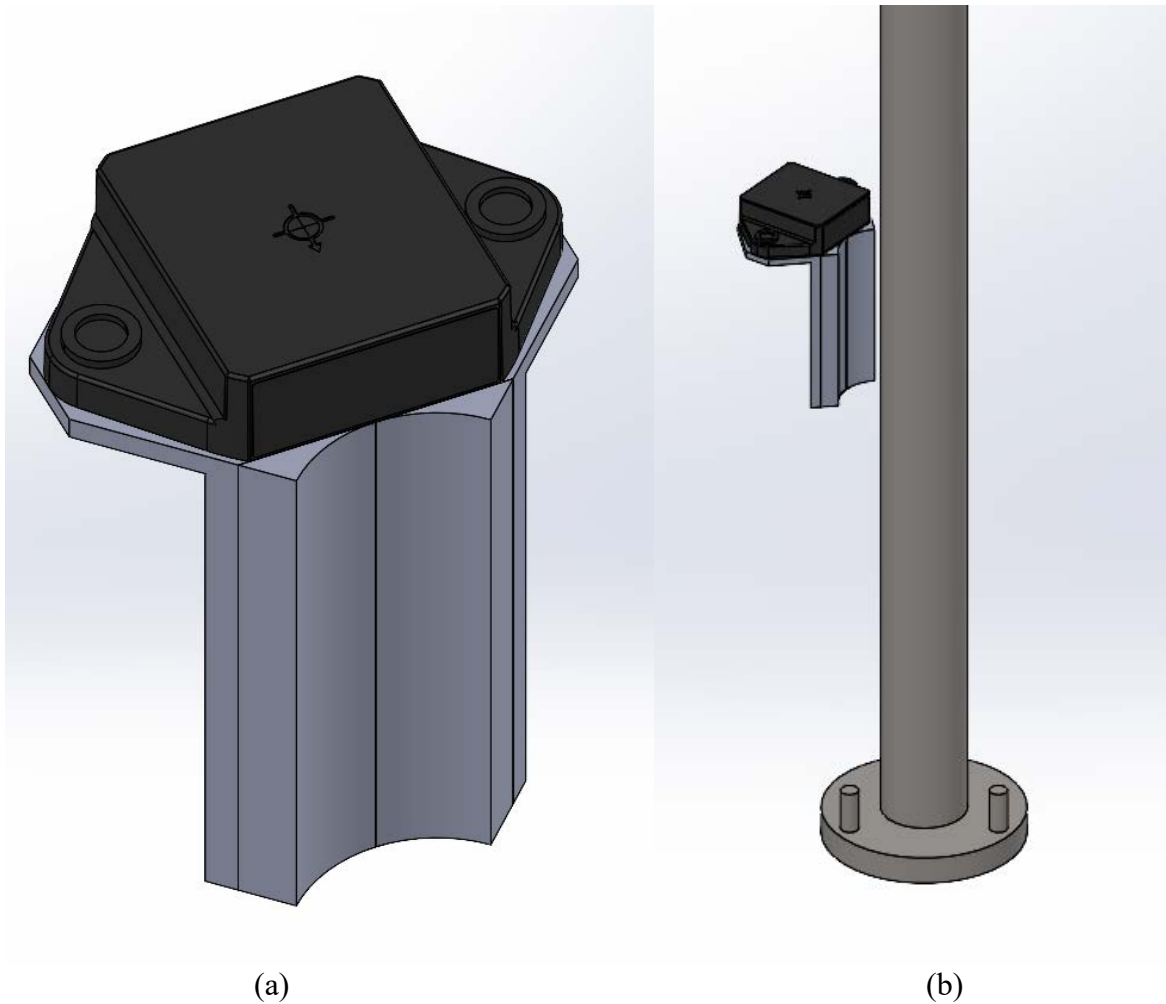


Figure A-3. Inclinator, mount, and tower.

Image created by Jason Roadman, NREL

The floating structure and moorings will be a primary focus of the competition. The floating structure of the system must adhere to the following:

- Students must design a structure and moorings to be installed in a water tank to simulate a floating offshore wind turbine installation. This floating structure and its moorings will be the sole support for the wind turbine. The moorings can be located anywhere on the tank floor. See Figure A-4, Figure A-5, and Figure A-6.
- The waterline will be approximately 4 inches below the top surface of the floor of the wind tunnel.

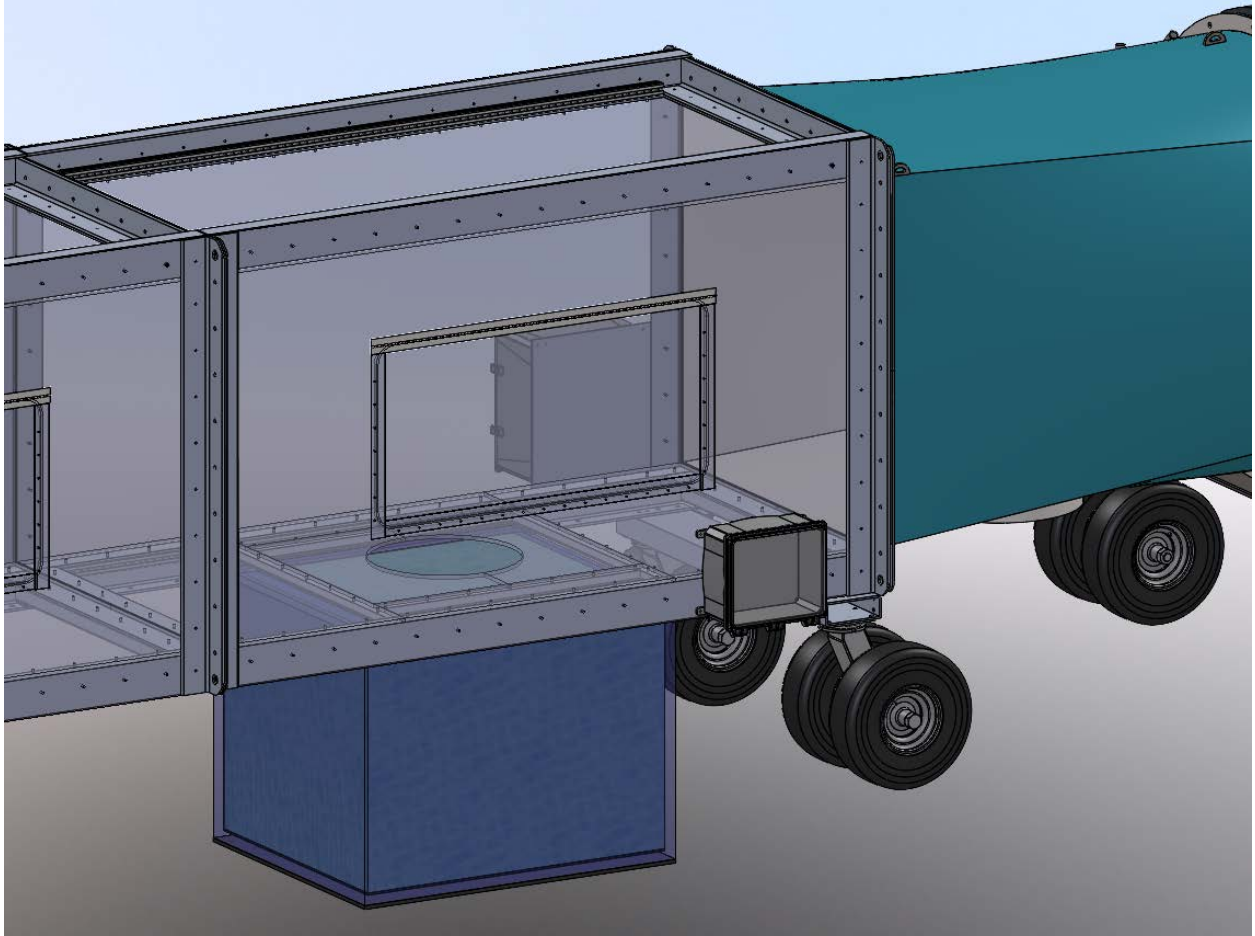


Figure A-4. Offshore simulation tank underneath the competition wind tunnel.

Image created by Jason Roadman, NREL

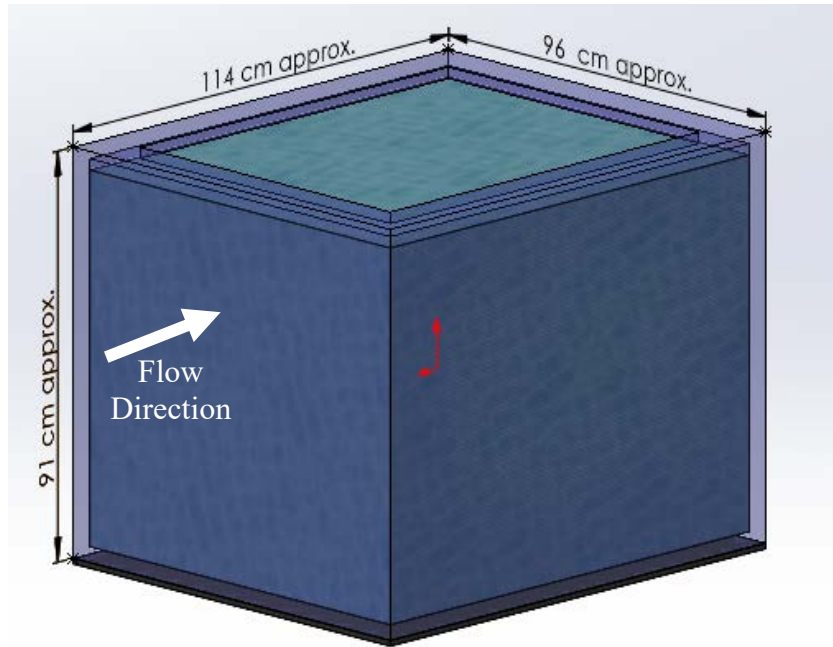


Figure A-5. Offshore simulation tank. Dimensions are in centimeters.

Image created by Jason Roadman, NREL

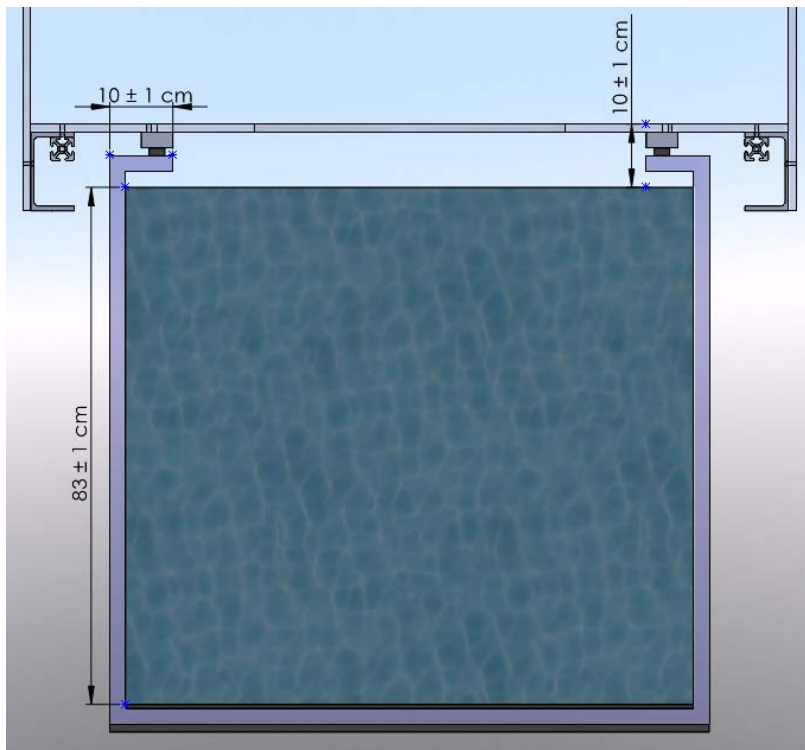


Figure A-6. Tank cross section and layout. Dimensions are in centimeters.

Image created by Jason Roadman, NREL

- The tank cover doors in the floor of the tunnel will have a 50 ± 1 cm diameter hole in them to serve as a hard stop to enforce the watch circle. See Figure A-7.
- There are no strict size limits for the float dimensions. Instead, the float must be sized such that it does not touch the watch circle, tank walls, or bottom of the tank during tunnel operation.

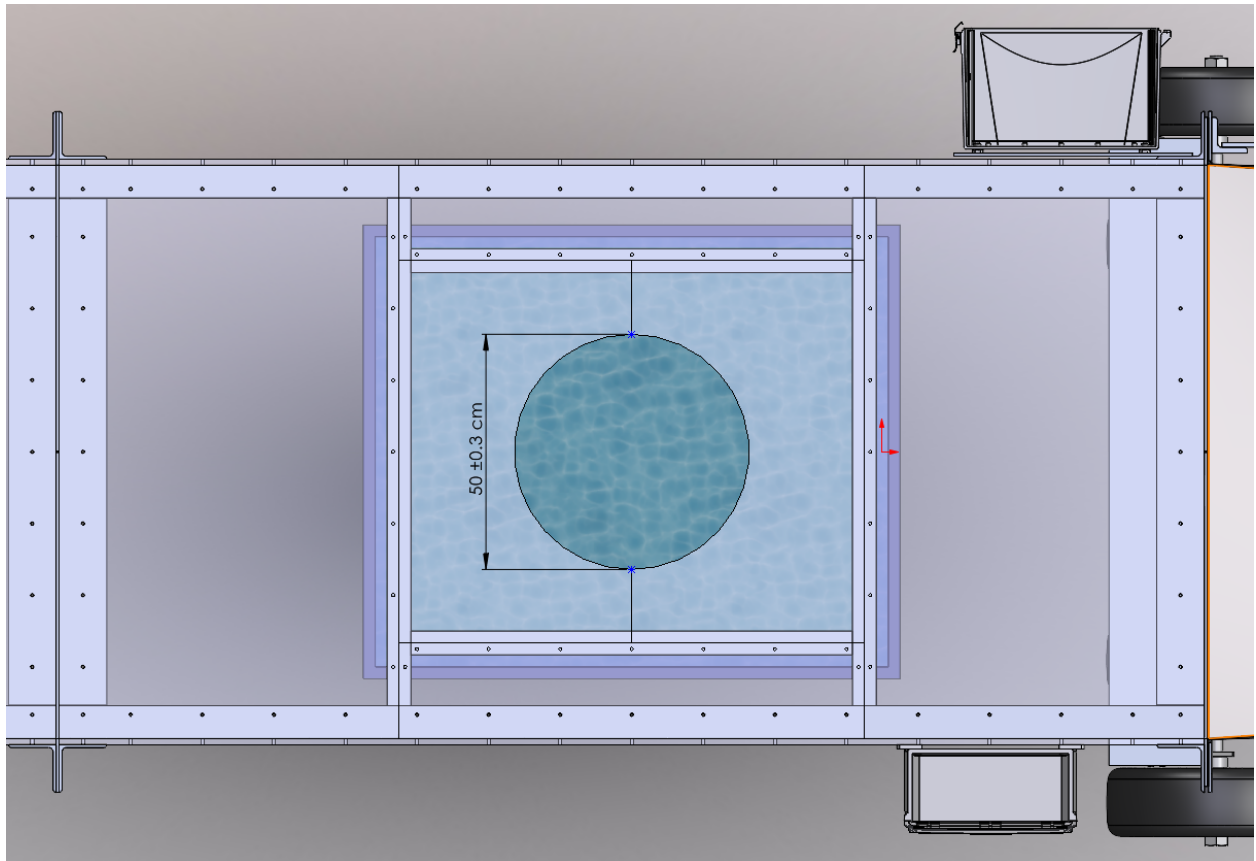


Figure A-7. Tunnel top view showing watch circle opening in doors. Dimensions are in centimeters.

Image created by Jason Roadman, NREL

- There will be guides provided to identify the watch circle while the tank covers are removed during float and mooring installation.
- The bottom of the tank will be fitted with a plate with rubberized coating.
- Up to four moorings will be provided by the prize administrators (see Figure A-8). They will comprise a 10.2 ± 0.3 -cm diameter, 7.4 ± 0.3 -cm¹⁰ tall stainless-steel cylinder ([McMaster 8984K79](#)) with an eye bolt ([McMaster 8891T88](#)) on top for mooring attachment. Each team will have to attach their mooring lines to the mooring weights, place the mooring weights into the tank, and nudge them into place with tools if necessary. Prize administrators will provide a few options for tools to position the moorings, but students are encouraged to bring their own.

¹⁰ In this way, four moorings can be cut from a single 12-inch-long piece of stock.

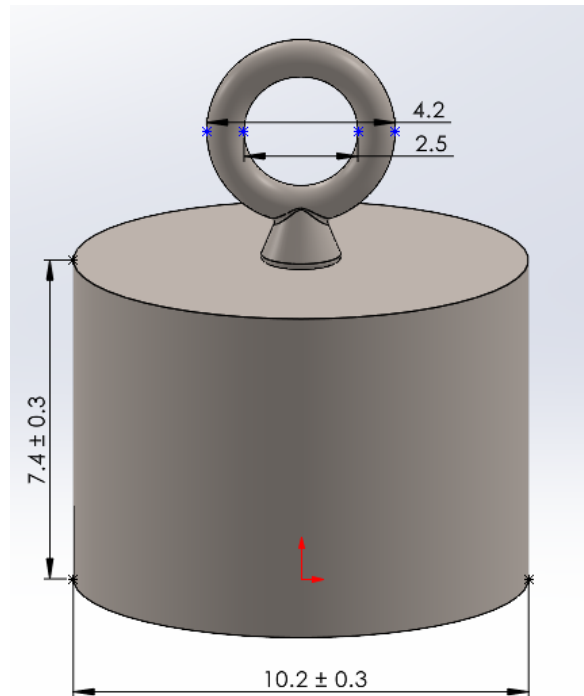


Figure A-8. Competition-provided stainless-steel moorings. Dimensions are in centimeters.

Image created by Jason Roadman, NREL

- Students may assemble the float/mooring system either inside or outside the tunnel, keeping in mind that only tools may touch the water during installation including retrieving a mooring or mooring line if it is dropped in the tank.
- Mooring lines must attach to the mooring eye bolt with a quick attach-and-close method, such as a carabiner with a spring latch or lock. Mooring lines may not be tied directly to the eye bolt but must be attached in a secure fashion to ensure that the mooring weight does not accidentally fall and hurt someone when being transported or installed.
- Students will be allowed to position their moorings after lowering them into the tank using their tools such as rods or sticks to move the moorings to the desired location within the tank. Students will not be allowed to get inside the tunnel or the tank, nor will they be allowed to reach into the water with any part of their bodies to move or adjust the moorings or the float. All access will be through the tunnel door. Students are permitted to reach and/or lean in through the door for access to these components. A platform to stand on will be provided by the prize administrators.
- To calibrate the lengths of the mooring lines and their attachments, students will be given a 25-min period before their testing slot to install their float into a second tank adjacent to the wind tunnel. This tank will not be the one used under the tunnel during testing, rather, the students will be required to remove their floating system from the second tank and install it in the tank under the tunnel by passing it through the door as described earlier. This task will be supervised by the prize administrators. The students will at no time be allowed to touch the water surface with any part of their bodies during installation. Only tools will be allowed to enter the water. This approach is to simulate installation of the device similar to the way full-scale structures of this type are installed at sea.
- No AC power will be provided for float and mooring installation.

- At the end of the testing period, students will be given 5-min to remove their floating structure and moorings from the tank and may touch the water at that time only.
- The electrical cable between the wind turbine and electrical components outside the tunnel (e.g., point of common coupling [PCC], load) must be unbroken (without connectors) inside the tunnel. Any connections on this cable must be outside the tunnel, for example, at the turbine controller or load box, or at the PCC. New for this year, there will be a 3.5-cm diameter hole in the floor of all three tunnels for the cables to pass through. The cable must pass through the tower wall or tower base and up through the watch circle hard- stop hole, travel perpendicular to the tunnel flow across the tank cover door, turn parallel to the flow, and feed down through this hole. Connectors must also be able to pass through this hole on their way to the PCC and the team-supplied electrical enclosures and be kept dry the entire time. Students must leave enough slack in their cables inside the tunnel to allow the tank cover door to slide underneath them when it is closed and minimize any resistance the cable may have on float movement. Prize administrators may adjust cable routing to ensure sufficient slack to allow free movement of the float. See Figure A-9 for required cable routing.

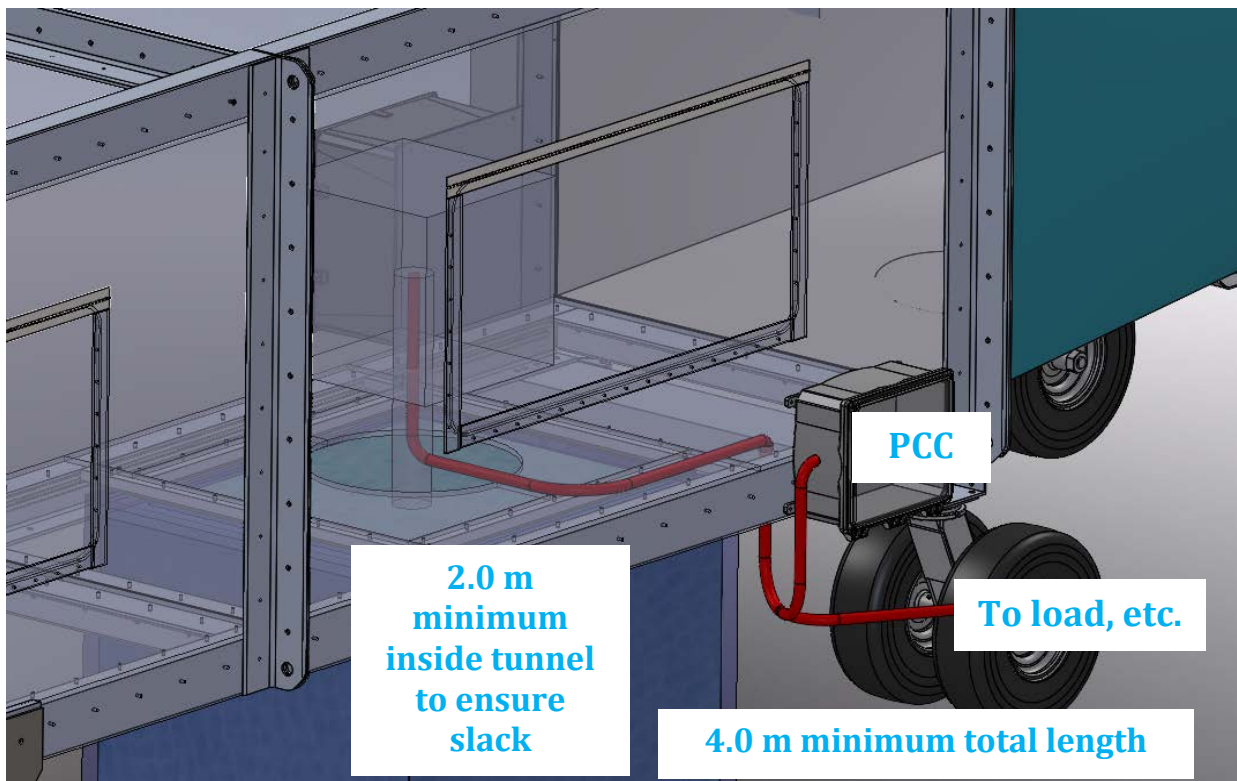


Figure A-9. The electrical cable routing (in red) from the wind turbine nacelle through the tower wall or turbine base to the point of common coupling and load.

Image created by Jason Roadman, NREL

- If the wind turbine or its floating system experiences excessive movement, sliding, twisting, tilting, or sinking during testing, the tunnel will be immediately stopped, and no further points will be awarded.

- Three tunnels will be available in this year’s competition: two small tunnels and the larger competition tunnel. The smaller tunnels will be used primarily for practice and will have a base flange with mounting studs (see Figure A-10). **Note that these flanges are not the same as in previous years.** The student-provided floating structure will not be used in the smaller practice tunnels. It is for this reason that a consistent mounting pattern is used between all three tunnels and float for the turbine baseplate. The top of the team-designed floating structure must include the flange shown in Figure A-10.
- No yaw turntable will be incorporated into this competition; however, students are still required to incorporate yaw capabilities into their turbine to align it with the predominant wind direction after installation.
- The turbine base flange must be constructed of material no thicker than 16.1 millimeters. It should be designed and constructed with adequate tolerances to smoothly fit over three studs, where it will be secured to the tunnel base flange/float with wingnuts. Figure A-10 shows the bolt pattern and sizing of this flange and the dimension for the hole in this base flange to allow cables and connectors to pass through.
- Teams may apply their engineering judgment to their own base plate design, keeping in mind that the turbine base must be designed to withstand the tension of the mounting studs. Torque values could be up to 30 newton-meters.

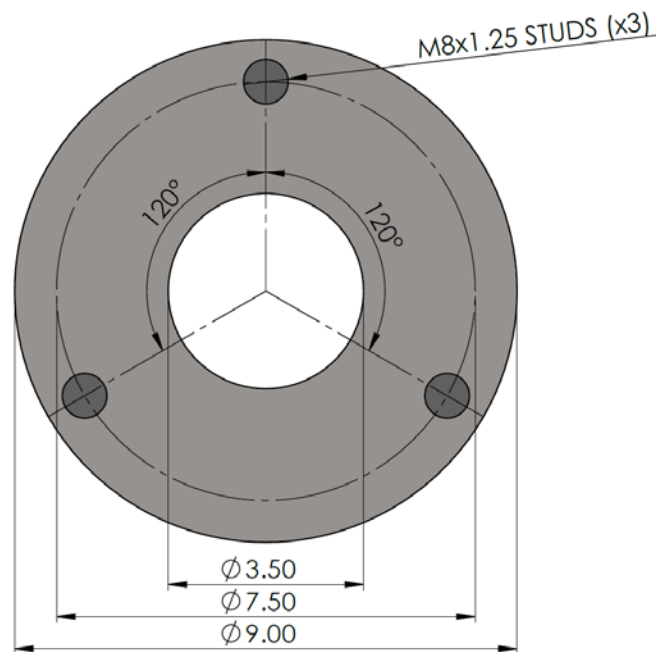


Figure A-10. Base flange dimensions for wind turbine attachment to the tunnel (dimensions in centimeters).

Image created by Jason Roadman, NREL

Physical Design Constraints Outside the Tunnel

There are no size specifications for components located outside the tunnel. However, the size of such components must be within practical limits. These components must be incorporated into closed enclosures that are firesafe and meet or exceed a National Electrical Manufacturers Association (NEMA) Type 1 rating. All components must be electrically insulated from the

enclosures. Teams should also pay careful attention to the standards for ventilating these enclosures, which include:

- NEMA Type 1 characteristics. Enclosures are constructed for indoor use to provide a degree of protection for personnel against access to hazardous parts as well as a degree of protection for the equipment inside the enclosure against ingress of solid foreign objects (should not be able to insert fingers or tools through the enclosure when closed). It is important that the intent of the NEMA Type 1 rating be preserved once all connectors and/or pass-through devices are installed.
- All cable pass throughs in enclosures must use cable glands or other similar devices that provide both strain and chafe protection.
- Tape is not considered adequate sealing of penetrations or pass throughs in the enclosure.
- All electrical cables external of enclosures must be in cable form (no individual strands except ground, if desired) and include connectors that are quickly connectable. No more than three cables including ground are permitted between the wind turbine and its external electronics. Ground may be an individual strand if not included in the other two cables. **Individual strands or bare wires will result in disqualification from testing until remedied.** Twisting two or more strands together is permissible if the resulting multistrand cable has a connector on the end. Multistrand cables are encouraged when used in a logical way. For example, there could be one cable for all power wires and one for all control wires.
- Cables must be continuous and unbroken in the vicinity of the tank. No connectors may be in any position that would allow them to be submersed (Figure A-9).
- Neither screw terminals nor spade- or fork-type lugs are acceptable connectors outside of enclosures. Each cable connection from the wind turbine to the enclosure should employ a quick-attach connector. Ideally, teams should be able to connect all their cables in a few seconds.
- All electrical components must be mechanically secured to the enclosure.

Electrical Requirements

Figure A-11 illustrates the electrical configuration of the prototype turbine, competition data acquisition system, and PCC, which is the point of electrical measurement for the competition.

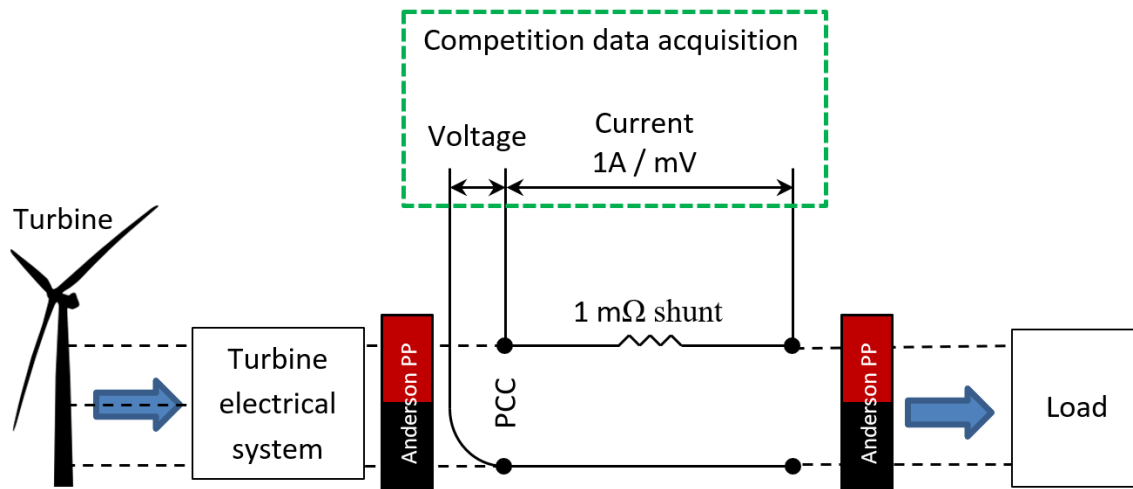


Figure A-11. Load, turbine, and point of common coupling arrangement.

Image created by Lee Jay Fingersh, NREL

Electrical requirements are as follows:

- Voltage must be DC at the PCC and is required to be at or below 48 volts (V) at all times.
- The turbine base plate must be made from conductive material such that the float studs may be used to tie the system ground to earth ground with a competition-provided alligator clip. To prevent overvoltage of the tunnel data acquisition system, turbine electrical system ground(s) must be electrically tied to the float studs with a 100-kiloohm or lower resistance connection.
- Teams are expected to choose their own generator and design their own wind turbine and load system. Off-the-shelf components may be used, but the turbine and load system should be designed and built by the teams. All components must meet safety requirements including, but not limited to, proper wiring practices, shielding of hazardous components, and proper heat rejection.
- The turbine electronics must be in separate enclosure(s) from the load to clearly differentiate load and control during inspection by reviewers, as shown in Figure A-12. The wind turbine nacelle may also contain turbine electronics, if desired.

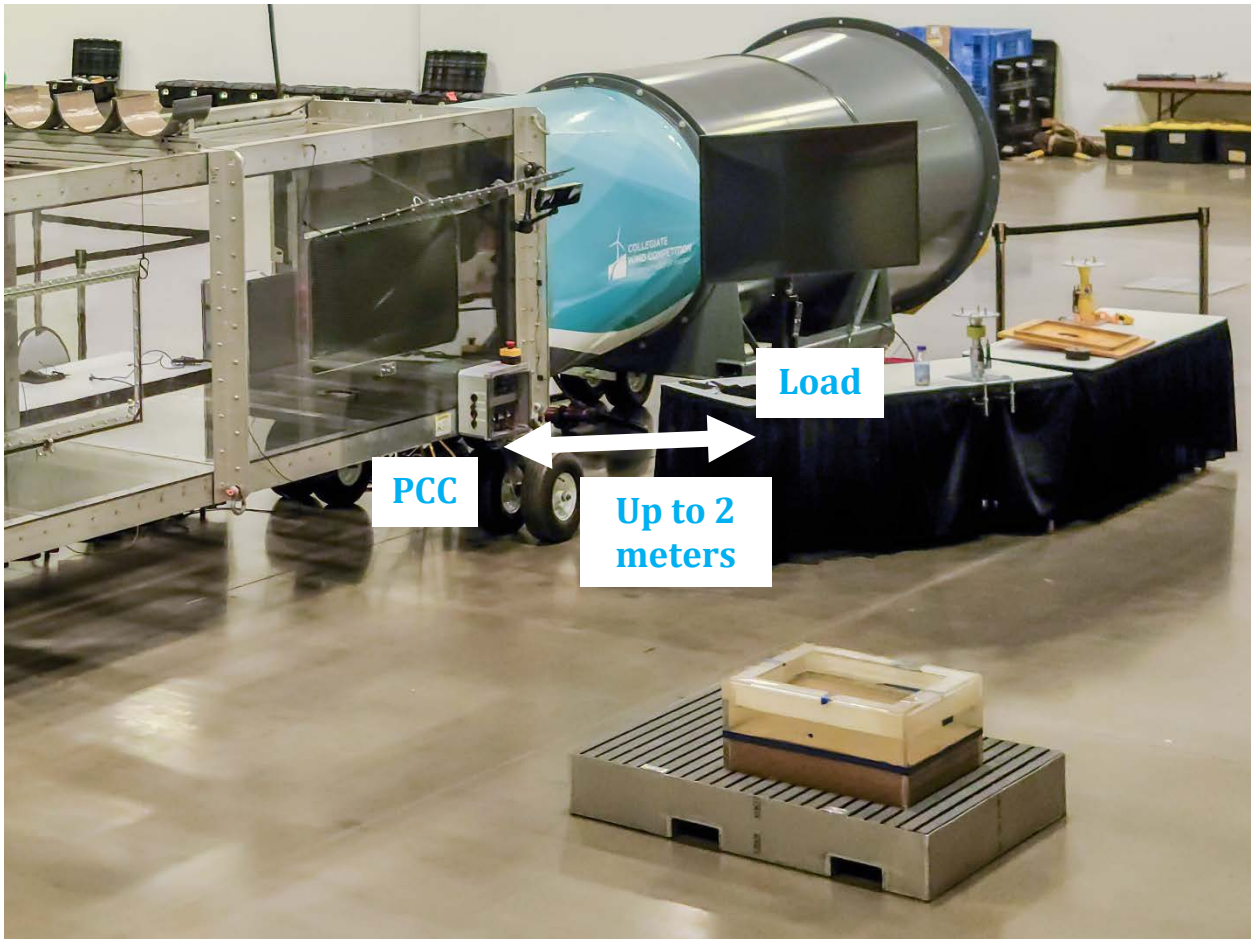


Figure A-12. Point of common coupling and student load display table layout.

Image created by Lee Jay Fingersh, NREL

Specifications for the Wind Turbine Side of the PCC

Specifications for the wind turbine side of the PCC are as follows:

- Energy storage elements, such as capacitors and/or inductors, may be used in both the turbine and load, but not for bulk energy storage on the turbine side of the PCC.
- No batteries of any type, capacitors, or combinations of capacitors with nameplate voltage and capacitance ratings corresponding to over 10 joules of energy storage ($E = \frac{1}{2}CV^2$) will be permitted.
- Turbine components may draw from the load but must register a zero state of charge at the beginning of the test.
- Wired connections between the wind turbine and load external to the PCC are allowed but must be optically isolated. The amount of power transferred through this connection must only be enough to facilitate communication, and that power may only be used for that purpose, not to power any other turbine systems. No appreciable energy may be transferred to the turbine around the PCC, even if that energy is not in the form of electrical energy.

Specifications for the Load Side of the PCC

Specifications for the load side of the PCC are as follows:

- Bulk energy storage is allowed in the load, provided it is used in a safe and reliable manner.
- To run the load, 120-VAC will be provided, if desired. However, new for this year, the load and control boxes designed by the team may input only low-voltage DC power (+/- 48 V and below) from an external, commercial power supply plugged into the 120-VAC source. No voltages above 48 V to case ground may be present inside any box the teams build. The external power supply can take any form as long as it is enclosed to at least the NEMA 1 standard and it provides only DC power to the load box.

Interfacing With the Competition Data Acquisition System

Protocols for interfacing with the competition data acquisition system are as follows:

- As shown in Figure A-12, a table will be provided to display the load on the side of the tunnel and hold any wind turbine electronics enclosures external to the tunnel. Rough distances are shown in the figure, but teams should provide adequate lengths of wire to run from the PCC to accommodate their desired enclosure arrangement on the table.
- To interface with the PCC, wires should be terminated with Anderson Powerpole, PP15-45, or a compatible connector (a red and a black for positive and negative, respectively). See Figure A-13 for correct polarity. Incorrect polarity must be corrected before testing and wire color must match the connector housing color. Colored electrical tape on each end of the wire will be considered sufficient color matching if the wire insulation is not colored (e.g., black).
- In addition to the Powerpoles on the PCC, all polarized connectors that have colored housings must match between sides to ensure correct polarity and to follow good design practice. For wires that do not connect to the PCC, color is not required to match housing color (for example, if all the wires to a given connector are the same color).
- Teams are expected to provide their own Powerpole connectors of an appropriate size—15 amperes (A), 30 A, or 45 A—that are specified to handle wire gauges from 10–20 American wire gauge. Each team can choose the wire size it wants to use in this range as long as the appropriate current-carrying capacities are considered. All three pin sizes fit into the same housing (PP15-45), as stated previously. Note that locking clips are available to lock Powerpole connectors to each other so that they do not come apart and the prize administrators recommend the teams use them where applicable in their turbine designs or tower base connections. These clips are not usable at the PCC connection.

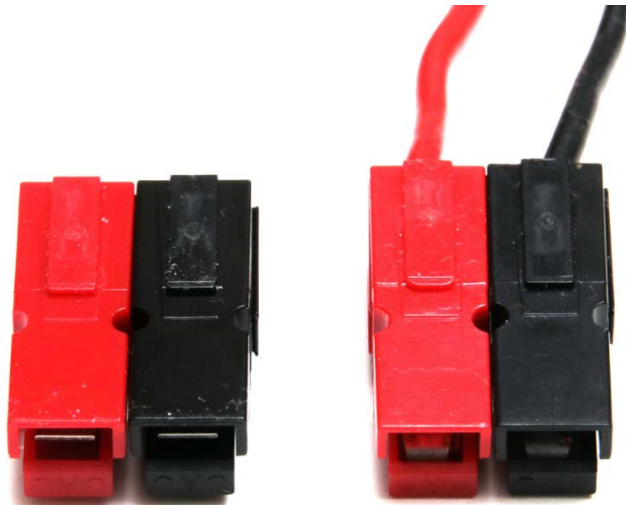


Figure A-13. Proper Powerpole polarity to match tunnel wiring.

Image created by Lee Jay Fingersh, NREL

- Wind turbines must be capable of shutting down on command through an emergency-stop button, as well as when electrically disconnected from the load. Specifically:
 - The emergency-stop button will be located outside the tunnel. It operates in the same manner as an industrial emergency-stop chain. That is, it is closed during normal wind turbine operation and opened during an emergency stop when the button is pressed.
 - In industry, emergency-stop systems use this switch logic so that multiple switches in and around a piece of hardware, such as a wind turbine, can be wired in series in a single wiring loop. In this configuration, opening any switch or a fault in the wiring will cause the whole circuit to open. Thus, an entire emergency-stop system can be monitored by a single channel input. If the switches used the opposite logic, the system would have to monitor each switch individually.
 - The emergency-stop connector and wiring is rated for 3 A, thus it is intended to carry a low-current control signal—not high-current power. Teams must describe their emergency-stop system during the safety and tech inspection process and explain how this design uses a signal that can never carry more than the rated 3 A.
 - Each team must provide a cable containing two wires (no smaller than 28 American wire gauge) that reaches the PCC, as labeled in Figure A-14. This cable must be terminated, prior to the competition, with a standard JST RCY female receptacle housing connector (Manuf. P/N: SYR-02T housing using SYM-001T-P0.6(N) for the corresponding male pin contacts) (Figure A-14).



Figure A-14. Team-provided connection to the manual shutdown interface.

Image created by Lee Jay Fingersh, NREL

- The competition switch will be terminated with the corresponding polarity JST RCY male plug (Manuf. P/N: SYP-02T-1 plug housing using SYF-001T-P0.6[LF][SN] socket contacts) (Figure A-15).



Figure A-15. Competition-provided connector for manual shutdown interface.

Image created by Lee Jay Fingersh, NREL

Safety Specifications

Competition staff will perform a safety inspection of the wind turbine and load system, which must be passed before they can be installed in the wind tunnel. Appendix E contains a draft version of the safety and inspection sheet used to evaluate the turbines. The turbine safety officials make the final and official determination about whether a turbine may be tested in the wind tunnel.

Reuse of Existing Equipment –

Teams will not be allowed to reuse designs, components, or code designed and/or built during past competition cycles. The teams will be required to certify, during tech inspection, that no previous team-created designs, components, or code were reused. Evolution in design is encouraged as long as the final design is substantially created by this year's team.

Any commercial, off-the-shelf components reused by the teams will have to be declared publicly in a HeroX forum at least a week before the beginning of competition to be reviewed and approved by the prize administrators. Use of the components will be determined based on a team's thorough technical justification for why the components are being re-used, what alternatives were considered, and how the reused components are superior provided by the teams. Simple, building-block components, such as screws, nuts, resistors, and capacitors, do not need to be declared.

This rule only applies to the hardware and software components used inside and at the wind tunnels during testing conducted under Phase 3. During design, development and

testing, teams may reuse equipment such as meters, dynamometers, wind tunnels, and tools, plus any design, development, or analysis codes created in past years.

Violation of any part of this rule will render the team ineligible to receive a score in the wind turbine testing portion of the competition.

Turbine Testing Specifications

Testing provides teams with the opportunity to demonstrate their wind turbine's performance through objective tasks, and the testing outcomes help determine if they have succeeded in developing a durable, safe, high-performing machine (performance is a strong indicator of a turbine's ability to compete successfully in the marketplace). The following additional constraints apply to testing the turbine:

- The installation and commissioning process will be timed. Teams will have 6 min to install the float and moorings, place the turbine on the floating system, and tighten the student-provided fasteners on the mounting studs, as well as install all electronics; route their cables and connect all necessary connectors to the PCC, safety system, and external enclosures; complete any final installation steps; and declare that they are ready for commissioning or testing. Once installed, the prize administrators will close the tank cover doors, adjust the slack in the droop cable to allow free movement of the float, mount the inclinometer, attach the grounding strap, and close the tunnel door. Teams will be allowed an additional 3 min to commission their turbine and become ready for testing.
- During the commissioning period, the teams may ask for any wind speed from 5–11 m/s and do any work on their turbine or electronics they deem necessary to get their systems operational. Teams may use as much of their 6-min installation time and/or 3-min commissioning time as they desire, keeping in mind that exceeding the limit for either period will result in the run automatically becoming a non-scoring practice run. A clock will be provided so that teams can keep track of their progress against the 6-min installation time limit and the 3-min commissioning period. Teams are strongly encouraged to practice assembly and preparation for testing so that they can beat the 6-min nominal install time easily and without rushing, because rushing can lead to mistakes, damage, or injury.
- Exceeding the voltage limit set in Section Appendix A:Electrical Requirements will result in an immediate abort of the testing sequence, with all points gathered to that point retained but no more points earned after the abort. Teams may then attempt to fix the cause of the overvoltage and use their retest, if available.^{11,12}
- Verification of zero energy at the start of the test will be accomplished using the competition data acquisition system to measure zero current flow into the load at the PCC. Any questionable elements are subject to additional verification of zero energy by the testing team with a multimeter or similar device before the testing begins.
- Only one team's wind turbine will be tested at a time. Teams are limited to 10 members (students and faculty advisors) within the testing area. Other members can act as spectators. Each team will have 25-min of tunnel time to install their turbine, commission it, test it, and

¹¹ Occupational Safety and Health Standards:

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=9880&p_table=STANDARDS

¹² <https://www.mouser.com/pdfdocs/Why-are-Power-Designs-Moving-to-48V.pdf>

uninstall. Note that this does not include the separate time provided to each school to calibrate their mooring system in the tank before testing.

- Teams may signal at any time during the test that they would like to stop. In that case, they will retain all points earned to that point. Teams may then turn the remainder of the session into a practice session, but teams must remain cognizant of the time limitations.
- If there are unforeseen delays outside the control of the teams (e.g., a wind tunnel issue or power outage), the time spent rectifying the problem will not be included as part of the team's allowable minutes. Team members will only be allowed to touch their turbine electronics or controls during the following phases of testing: commissioning and manually restarting their turbine if they fail to restart after a safety shutdown task. Turbine failure is defined as anything out of the ordinary, such as excessive displacement, cracking, breaking, pieces falling off, smoking, sparking, sinking, or failure to produce an electrical current, and will be cause for immediate stoppage of testing.
- If a team wants to re-test their wind turbine for any reason, they may request a single retest during the provided makeup sessions later in the competition. The retest will be a full test, and all scores from the first test will be replaced, regardless of the turbine's performance in the retest. Teams must confirm their desire to re-test with the prize administrators by 5:00 p.m. on the first day of testing. **If the prize administrators do not hear from a team by this time, no retest will occur.**
- Students are encouraged to bring spare components and/or assemblies and design their turbines so that damaged parts or assemblies can be easily replaced. However, it is important to keep in mind that the turbine configuration throughout the entire competition should remain substantially the same as what is documented in the written report. For example, the number of blades, rotor axis, configuration, and operating voltage must remain the same. Teams with questions about any changes or altered turbine components or assemblies are encouraged to raise questions to the prize administrators well ahead of the competition to ensure they are adhering to this requirement.

Appendix B. Project Development Contest Specifics

For the 2025 Collegiate Wind Competition Project Development Contest, teams will develop a hypothetical offshore wind development off the coast of Oregon. As of the writing of this rules document, Oregon has not released any lease blocks for their coast, but future development is possible. Teams should propose wind farms slated to be brought online in 2033.

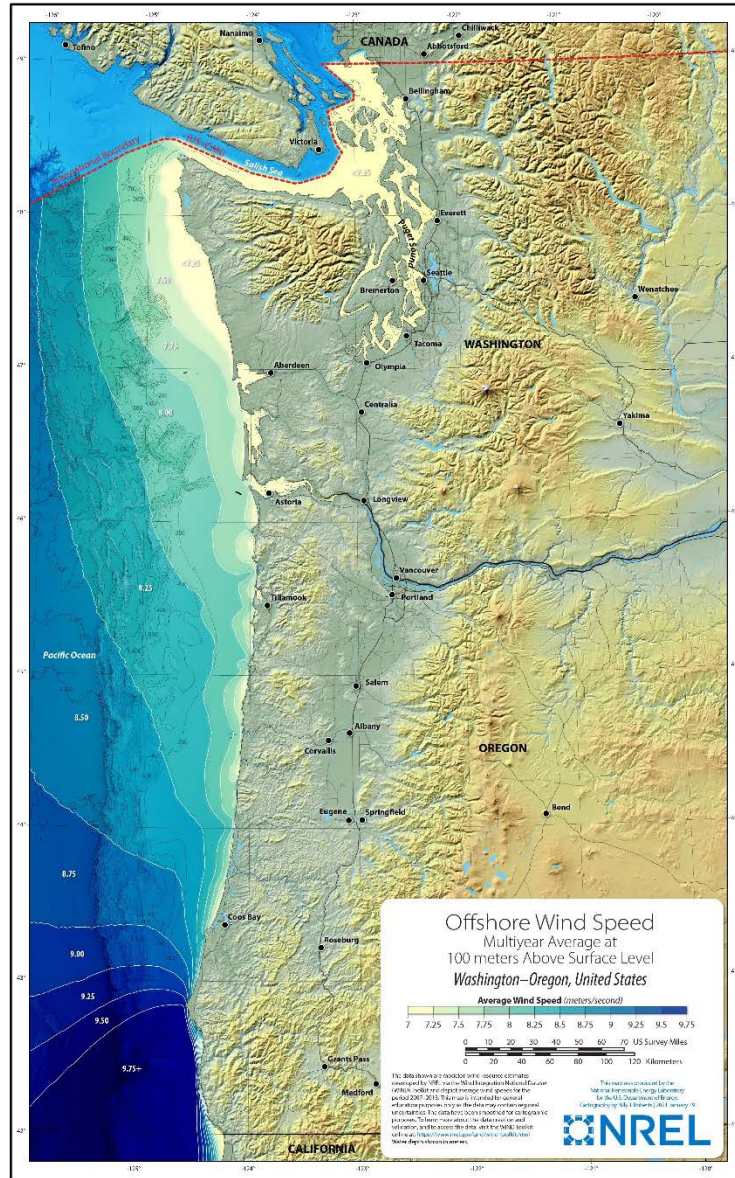


Figure B-1. Offshore wind speed at 100 meters above surface level
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Important elements for teams to consider as they investigate offshore wind farm development in Oregon include:

- Physical site characterization including, but not limited to, assessing ocean floor sediments, bathymetry, geology, etc.
- Infrastructure, ports, and vessel challenges including, but not limited to, assessing issues around access and estimating additional needs based on wind technology type.
- Technology options including, but not limited to, assessing infrastructure and supply chain needs to manufacture, transport, install, and maintain equipment.
- Electric grid interconnection and integration including, but not limited to, identifying points of interconnection to the existing electric power network and assessing their power-handling capacities.
- Environment and wildlife including, but not limited to, assessing impacts to migratory species, fish ecology, aquatic resources, and more.
- Human use including, but not limited to, assessing coexistence with residents and tribes that live in the region (see next paragraph on community benefits agreements).

New this year, students should develop a sample community benefits agreement for a community near to where the offshore wind farm will be located. These agreements are legal agreements between community benefit groups and developers, stipulating the benefits a developer agrees to fund or furnish, in exchange for community support of a project. Benefits can include commitments to hire directly from a community, contributions to economic trust funds, local workforce training guarantees, and more.

Community benefits agreements are one part of community benefits plans and are increasingly being used to demonstrate how project benefits will be realized by the impacted community. Along with the sample agreement, teams should propose ways of measuring and tracking fulfillment of agreed-upon benefits.

Appendix C. Connection Creation Contest Specifics

The Connection Creation Contest is designed to forge stronger connections between competition participants, the wind energy industry, students, and the team's local community.

This contest requires developing an overarching outreach strategy (outlined in Section 3.5.1) that includes three proposed activities from among the available options listed in the next section.

In alignment with expectations in a professional setting, the team will be required to present and summarize the purpose and impact of their work. This contest is designed, in part, to develop this skill set. Specific requirements are defined in the following contest segments, and deadlines are included in Section 2.1.

Sharing the team's progress will also help employers understand the skills the team has developed through involvement with the Collegiate Wind Competition (CWC) and prepare members for the final event presentation.

Teams are encouraged to capture high-quality photos and videos of their activities to present in the final presentation and include in their reports (described in Appendix D).

Teams should provide adequate photo release forms to any event attendees they take photos or videos of, especially at events where minors are present (recommend checking with the lead academic institution's communication office for photo release forms for any event attendees they take photos or videos of, especially at events where minors are present).

Events must occur prior to the final competition date so teams can speak to these experiences during their presentation to the reviewers. An explanation of the goals of the event, the planning process, estimated number of attendees, and an impact assessment should be included in the final presentation. One exception is if the team chooses to propose an activity to perform at the CWC final event.

Contest Elements

Teams need to select three activities from the following subtopics, including at least one from each list. Teams should not plan to execute more than three activities to ensure appropriate focus and impact across distinct activities that have been identified in their overarching outreach strategy.

List One

Understanding the Wind Energy Industry

For this contest element, teams are asked to explore multiple sectors of the wind energy industry and learn about career opportunities. The goal of this activity is to learn more about the industry and create outreach materials to educate and inspire younger students. If the team opts to perform this activity, they must interview at least four industry professionals to learn about their role in wind energy and produce four slides highlighting insights from the interviews. This activity should only be selected if the team can learn from the careers being explored. As part of the final report, the team must include what they learned from the interview and how it impacted their activities in the other competition contests. There will be no template for the interview slide, so

the team can best convey how these interviews were integrated into their overarching performance in the competition. The professionals interviewed may be alumni or other industry contacts that are employed in the wind or clean energy industries. Teams are responsible for making their own connections to professionals in the industry.

Returning teams may not interview any individuals they have already interviewed in past competition years. Any teams in need of support developing new contacts can begin their search using professional networking sites such as LinkedIn, webinars on wind energy topics, or biographies from clean energy conferences.

Teams should ask questions that will help them develop a clear and compelling presentation covering specific details about each job they are highlighting, what is interesting about it, and requirements needed. Details on other entry-level positions, internships, scholarships, or fellowships available within each organization are also of interest.

Please note that these industry professionals will be volunteering their time. Therefore, be mindful of their availability and ensure team members are fully prepared, professional, and concise with their interactions.

Teams should choose professionals in four different sectors of the industry. Examples include:

- Offshore, land-based, or distributed wind energy
- Project development, manufacturing, research and development, or operations
- Wind turbines or components (e.g., gearboxes, generators, blades)
- Stakeholder engagement, communications, or marketing.

The four interview slides developed in this contest element will be part of the final presentation along with the submissions from the other contest elements. More details on requirements for the final presentation are included in Section 3.5.2.2.

Host an Industry Event

Teams who select this element will organize an event that fosters industry connections with current CWC students and could include CWC alumni who work in the industry. Teams are encouraged to include other CWC teams in these activities.

Events could include (but are not limited to):

- A job or internship fair
- An industry panel.

List Two

Student and Local Community Engagement

With the high-level goals outlined in the team's outreach strategy in mind, if this activity is selected, each team must organize and run one educational event with middle school, high school, or college students. These engagement events may be done virtually or in person. Events could include but are not limited to:

- Participation with an established science, technology, engineering, math (STEM)-focused organization/event, such as KidWind
- An event at a local school
- An event at the team’s university that may include recruitment but must also incorporate outreach
- An event within the team’s local community.

Teams are encouraged to describe their project and share highlights from their story. Teams should also share what they have learned about wind energy and include some discussion about career opportunities in the wind industry. Teams should draw from elements learned through their other Creation Connection Contest activities, including, if applicable, “Understanding the Wind Industry” interviews and/or other work on the competition to date.

Development of an Educational Webinar

If this activity is selected, the team will develop an educational webinar for all CWC teams. The webinars will be recorded and included in the CWC reference library. The topic of the webinar should be of interest to the CWC community (e.g., wind energy, clean energy, entering the workforce, career opportunities), and may also support broader recruitment to CWC and similar workforce activities. Prize administrators will provide a form where teams may sign up to host, which will ask teams to select from available dates, and explain the team’s topic idea and how this topic will benefit current CWC students. The form must be submitted at least 3 weeks prior to the Phase 2 submission date (see Section 2.1), and prize administrators will notify teams if their topic is approved at least 2 weeks prior to the Phase 2 submission date.

The webinars may be held as live presentations or prerecorded videos and should include time for CWC students to discuss the topic and/or ask questions of the presenters or hosts.

Host an Alumni or Interteam Activity

Teams who select this option will organize an activity that benefits the greater CWC community. This activity must include at least two other CWC teams, may be held virtually or in person, and may be live events or ongoing discussions on a virtual platform such as the CWC LinkedIn group. Teams may choose to include alumni in these activities to foster connections with current CWC students.

Events could include (but are not limited to):

- A training session related to career development (e.g., using LinkedIn, resume building, and so on)
- A networking event with CWC alumni from multiple teams.

Execute a Cross-Technology Collaborative Opportunity

Teams who select this option will develop material(s), demonstration(s), activity(ies), or host an event that highlights the interconnectivity of certain clean energy options, with one of the options being wind energy. The material/demonstration/activity/talk should be designed to stimulate cross-technology discussion and raise awareness of important interdependencies as the nation strives to achieve its clean energy and decarbonization goals.

Propose Activity To Perform at the CWC Final Event

Teams who select this option will propose an activity that could be performed within or near the CWC space at the final event. Prize administrators will do their best to provide space/time for teams to perform their proposed activities but cannot promise all teams who submit proposals will be able to execute their activities. Scoring will be independent of any execution of an activity. An opportunity to execute an activity is not an indication of how that activity will be scored.

Activities could include, but are not limited to:

- Sharing an educational demonstration
- Hosting a panel
- Hosting a quiz bowl
- Hosting a fun challenge that can be open to industry.

Communications Materials

Teams who select this activity will create at least one piece of marketing material aimed at either inspiring younger generations to join the wind energy workforce or addressing potential public misconceptions regarding wind energy.

Marketing materials could include:

- Promotional videos
- A social media campaign
- Fact sheets
- Websites and blogs
- Online or print ads.

Teams will be evaluated on the quality of the product, rationale for decisions, and the teams' ability to show proof of impact through metrics. Teams must be creative and identify the most effective communications techniques through their research.

Appendix D. Communications, Submissions, and Contest Details

It is each team's responsibility to stay abreast of the latest competition communications from the prize administrators. Communication between the teams and the prize administrators occurs via one or more of the following:

- **HeroX forum.** Official communications suitable for viewing by all team members and prize administrators will be posted on this forum.
- **HeroX resources.** All Collegiate Wind Competition resources, templates, and meeting recordings will be uploaded to the HeroX Resources page.
- **Virtual meetings.** Teams are strongly encouraged to participate in scheduled virtual meetings with the prize administrators. Invitations and instructions for participation in these meetings are provided by the competition operations manager(s) via email.
- **Email.** The official email address for the competition is Collegiate.Wind@nrel.gov. Questions should be sent directly to this email address, and answers that may be of interest to all teams will be posted on the competition's HeroX forum. For expediency and to protect confidentiality, the prize administrators may choose to communicate via team members' email addresses, as listed in the HeroX database; however, official communications occur via the HeroX forum.
- **Website.** The Collegiate Wind Competition website will showcase the various elements of the competition, ongoing team engagement, and information about how to participate in future competitions. The website will also feature important documents, such as this official rules document and submission templates.

Branding

Teams are expected to set up a professional space in their booth to highlight their branding. This setup can include the concept design, posters, team logo, and school information. The team booths provide the opportunity to showcase all the work the teams have put into their project over the course of the year and are the best way to communicate their efforts to the industry.

DOE and National Renewable Energy Laboratory Logo Use

The U.S. Department of Energy seal must not be used in any team materials, printed or electronic. References to the U.S. Department of Energy, the Office of Energy Efficiency and Renewable Energy, and the Wind Energy Technology Office may be included in Team materials solely for the purpose of identifying the sponsors of the CWC and the source of the prize funding. The U.S. Department of Energy, the Office of Energy Efficiency and Renewable

Energy, and the Wind Energy Technology Office must not be used in any manner indicating an endorsement or implied endorsement of any team, product, service, or enterprise.

The National Renewable Energy Laboratory (NREL) logo may not be used as an endorsement, or implied endorsement, of any product, service, or enterprise. The following are approved uses of the NREL logo:

- Printed materials or digital marketing for an NREL-hosted event
- Printed materials or digital marketing describing an event or program where NREL is a financial or in-kind sponsor
- Printed or digital materials describing an ongoing partnership with NREL where NREL is providing financial or in-kind support (e.g., a cooperative research and development agreement, a work for others agreement).

Reviewing and Scoring

A panel of contest reviewers will be scoring team performance in each challenge and for each submission. The reviewers will come from diverse backgrounds and have expertise related to the content they are responsible for evaluating. This diversity helps the reviewers evaluate performance from a variety of angles.

Prize administrators will ensure that reviewers will not:

- Have personal or financial interests in, or be an employee, officer, director, or agent of any entity that is a registered participant in the competition
- Have a familial or financial relationship with an individual who is a registered participant
- Discuss team performance with other teams or their advisors.

Contest reviewers for Phase 2 submissions may be different than those providing reviews at the final event. The director of the U.S. Department of Energy Wind Energy Technologies Office is the judge of the competition and will make all final determinations.

Team Feedback

To provide as much feedback as possible, teams will receive their scores following completion of the competition. Teams will also receive a short narrative derived from the contest reviewers' deliberations after each team's presentation.

Submittals and Submission Locations

Go to HeroX and follow the instructions for registering and submitting all required materials before the deadline in Table 1 and as displayed on the HeroX website. When submitting, make sure to hit the "save and preview" button to finalize your submission.

The HeroX platform provides a space where parties interested in collaboration can post information about themselves and learn about others who are also interested in competing. Teams can submit early copies and updated revisions until the deadline.

Scoring Penalties

Scoring penalties include the following:

- No points will be awarded for a submission that is late.
- Five percent will be deducted for each incorrectly named file.
- Substantive and incorrect report formatting will be penalized up to 30% at the discretion of the reviewers. Formatting requirements are in place (and included in this appendix) to ensure an equal amount of space for all teams to tell their stories to the reviewers. Therefore, teams must not use more than the allotted space allowed.
- Pages in excess of the page limit will not be reviewed or scored.

All submissions must be saved in the formats indicated.

Use of Artificial Intelligence

The following are requirements regarding the use of artificial intelligence (AI) in competition deliverables:

- Teams must indicate if generative AI was used in any part of their deliverables, including which tool and prompts.
- Teams are not allowed to use verbatim text from a generative AI chatbot as part of their competition deliverables. Chatbots may reuse text from other sources, causing inadvertent plagiarism.
- All human authors of a deliverable are responsible for all of its content. ChatGPT and similar tools cannot be held accountable.
- Citations recommended by any generative AI chatbot must be verified with the original literature because chatbots are known to generate citations that are inaccurate and/or do not exist.
- AI-generated images and/or multimedia used in competition deliverables will not be accepted.
- The prize administrators may decline to move a deliverable forward in the competition if AI is used inappropriately according to the requirements outlined.

Written Submission Formatting Requirements

The following format requirements apply to the Phase 2 submissions and Phase 3 written reports:

- Reports must adhere to the page limits detailed in the respective sections. Cover pages and bibliographies do not count against the page limits, but any table of contents, executive summaries, and appendices do.
- Pages must be 8.5-by-11 inches, paginated, and have 1-inch margins at a minimum.
- References must begin on a new page with a distinct page number format from that used for the body of the report.
- Content must be single-spaced.
- The body of the report must use an 11-point font size at a minimum.
- Images should contain no tables and little text, only that which is necessary to identify the image, such as a one-line figure caption. Extensive text in the figure section will be ignored and not count toward the team's score.

- Captions for figures and tables must be numbered for easy navigation.
- Submission-specific guidance for images, equations, and tables are as follows:
 - For the Phase 2 submissions, images should be placed at the end of the document to make it easy for reviewers to determine page limit compliance and do not count against the page limit. Students may include images up to the number specified in the respective submission section. Equations and tables should be placed within the text and count against the page limit.
 - For the turbine design and project development reports, images, tables, equations, and so on must be included within the text and count against the page limit for written reports.
 - For the metrics report, photos or social media images must be placed at the end of the document to make it easy for reviewers to determine page limit compliance and do not count against the page limit. Students may include images up to the number specified in the respective submission section. Charts, tables, and so on used to show metrics must be placed within the text and count against the page limit.
- The final documents must be submitted as an Adobe PDF file, adhering to the following criteria:
 - Report sections must be bookmarked
 - Fonts must be embedded
 - All images must have a minimum resolution of 300 dots per inch
 - **Do not** create a PDF from scans or by outputting the content into a raster image format (e.g., .jpg, .tiff, .png, or .gif) and then creating a PDF from the images
 - **Avoid** all-raster PDFs. Although they are large files at 300 dots per inch, they are of unacceptable quality at lower resolutions and are not scalable without degradation.

Audiovisual Presentation Format Requirements

Audiovisual presentations are not required for all contests, but if used, they must adhere to format requirements. Teams should bring the file on a USB drive to their presentation slot. Specific requirements include the following:

- Videos must be recorded in a 1,920-by-1,080 frame size with a frame rate of at least 30 frames per second.
- Videos must be recorded horizontally rather than vertically.
- Teams may use any video recording software and file format they prefer.
- If the video includes narration, please include a transcript.
- No background music that violates U.S. copyright laws is allowed; all incorporated music must be an original or royalty-free composition, and proof of licensing must be submitted with the final file and transcript.

Electronic File-Naming Instructions

The required file-naming convention for all electronic files is:

[TEAM ABBREVIATION]_[SUBMISSION DATE (YYYY-MM-DD)]_[CONTEST ABBREVIATION]_[SUBMISSION ABBREVIATION].[EXTENSION]

Teams will choose their own team abbreviation and must use that same abbreviation for all submissions. Table F-1 lists submission names and abbreviations.

Example: A design report submitted by California Maritime Academy (as part of their final deliverable) would have the following file name: CALMARITIME_2024-04-18_TD_Design Report.PDF.


Table D-1. Submission Names, Contests, and Abbreviations

Submission Name	Contest Abbreviation	Submission Abbreviation
Design progress and prototyping fabrication	TD	Design Progress
Prototype fabrication and testing video	TT	Prototype
Preliminary Project Development report	PD	Preliminary Report
Outreach strategy report	CC	Outreach Strategy
Turbine Design report	TD	Design Report
Timed assembly video	TT	Timed Assembly
Technical inspection prior to competition	TT	Tech Inspection
Project Development report	PD	Final Report
Metrics report	CC	Metrics Report

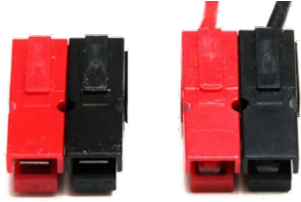
Appendix E. Sample Safety and Technical Inspection

A sample of the sheet used to evaluate test wind turbines prior to competition is provided in Table E-1. Teams are required to work through this process in advance of the competition with a qualified technician, advisor, or similar personnel as part of the Phase 2 project submission. **If a team makes a change to their system after passing tech inspection that could affect anything evaluated during that inspection, they must notify the prize administrators and undergo a revised inspection. Failure to do so may lead to disqualification.**

Table E-1. Sample Inspection Sheet for Evaluating Test Turbines

Collegiate Wind Competition 2025 Safety and Tech Inspection Sheet	
Team Name: _____	
BOLD – Cannot practice or test if noncompliant	
Regular – Can practice but must fix prior to official testing	
General	
<input type="checkbox"/>	Students certify no team designed and built designs, components, or code are re-used from previous years. Commercial components are declared and have been allowed on HeroX
<input type="checkbox"/>	Turbine for testing is substantively the same as in the Turbine Design report
<input type="checkbox"/>	Remind teams about timed install—6 minutes for install and 3 minutes for commissioning
<input type="checkbox"/>	Energized electrical components are adequately shielded—both electrically and mechanically (National Electrical Manufacturers Association Type 1 is preserved) (no tape)
<input type="checkbox"/>	For the team load: all charging or bulk energy storage follows industry-accepted best practices (i.e., safe circuitry overvoltage/undervoltage protection, flame/spill containment)
<input type="checkbox"/>	Proper heat rejection
Wiring and Enclosures	
<input type="checkbox"/>	Wiring is deemed safe and uses adequate gauges—no electrocution or overheating hazard
<input type="checkbox"/>	Droop cable is continuous and unbroken inside the tunnel; connectors capable of being kept dry during install
<input type="checkbox"/>	Voltage is ≤ 48 volts (V) direct current at point of common coupling (PCC) at all times
<input type="checkbox"/>	Team load runs on 120 V alternating current maximum, but the 120 V source is only present in an external commercial power supply that feeds only DC power less than ± 48 V to any box
<input type="checkbox"/>	All external wiring is in cable form and utilizes commercial connectors (no screw terminals or spade- or fork-type lugs); no single-pin connectors except ground; maximum three connections including ground
<input type="checkbox"/>	Turbine electronics and load electronics are in separate enclosures
<input type="checkbox"/>	Cable pass throughs in enclosures provide strain and chafe protection (e.g., cable glands)
<input type="checkbox"/>	All electrical components are mechanically secured to the enclosure
<input type="checkbox"/>	Turbine side of PCC: no batteries or excessively large capacitors (individual or combination ≤ 10 Joules)
<input type="checkbox"/>	Wired connections between the turbine and load external to the PCC are optically isolated
<input type="checkbox"/>	Emergency stop terminated with standard JST <i>female</i> receptacle with <i>male</i> pins
	
- student-side connector	
<input type="checkbox"/>	Emergency-stop signal (JST connector wiring) never draws more than 3 amperes and uses normally closed logic during turbine operation (students to describe)

- Powerpole polarity for the PCC is correct and wire color matches housing color or has electrical tape to match housing color**



- student-side connector

- Mating connector colors outside the PCC match to ensure correct polarity

Wind Turbine

Rotor and nonrotor components are:

- Within a 45-cm cube centered horizontally on the flange axis, shifted at most 10 cm fore or aft
- Vertically, the rotor midplane is 65 cm ± 10 cm above the float/turbine base interface plane

Nonrotor parts only:

- Base flange is ≤ 16.1 millimeters thick
- Nonrotor components (e.g., tower) fit in a 9.0-cm-diameter cylinder from the base of the cube to the turbine/float interface flange plane (wingnuts excluded)

Float

- Capable of being assembled with only tools touching water
- All mooring attachments to the competition-provided mooring weights are of a quick-attach-and-release type, such as carabiners; attachments are secure and will not come loose

Fit/Measure

- Electrical systems are tied to earth ground with 100 kiloohm or lower resistor at the studs; note, prize administrators will ground the turbines using an alligator clip on the students' stud**
- Turbine mounting flange fits over studs without having to be forced (test fit to tunnel flange)**
- Tower constructed of ferrous tubing 1.500 ± 0.015 inches in diameter (test fit inclinometer)
- Wiring will reach PCC (test fit)

Inspecting reviewer signature: _____

Date and time: _____

*Noncompliance checkboxes should be circled above

Reinspecting reviewer – initial compliancy above with date and time of reinspection

Reinspecting reviewer signature when complete: _____

Date and time: _____

Appendix F. Roles and Responsibilities

Table F-1 shows the competition roles, who is performing in each role, and what the role entails.

Table F-1. Roles and Responsibilities

Role	Individual(s) Assigned	Definition
Collegiate Team	Multiple	<p>Collegiate team members are led by the student lead and subteam leads under the mentorship of faculty advisors within the rules and requirements of the competition. Teams comprise undergraduate students only, but graduate students may be involved as mentors or advisors. There is no limit to team size. However, the number of students that teams may bring to the competition will be limited based on space requirements. Interdisciplinary teams are encouraged in the following areas of study: engineering, business, marketing, environmental science, communications, policy, and social sciences.</p> <p>Only undergraduate student team members who start the competition as an undergraduate student team member may take an active role in any competition event.</p>
Student Lead(s)	Minimum of one and maximum of three per team	<p>The student lead should take on the primary leadership and organizing responsibilities for the team under simple mentorship from the faculty advisor. In addition, the student lead attends informational sessions, represents the team when communicating with prize administrators, and disseminates information received from the prize administrators over the course of the entire competition, including monitoring communications during the event. The collegiate team student lead is effectively the leader of their collegiate team in all aspects of the competition.</p>
Faculty Advisor	Minimum of one per team starting in Phase 2	<p>Serves as the lead faculty member of a participating school in the competition. This person provides mentorship to the team throughout the competition and provides a supportive environment for student team leads to thrive in. The faculty advisor teaches, advises, and coaches the students on the skills necessary to compete in the various aspects of the competition. Some teams may specify multiple faculty advisors who are contacts for the team, but in this case, one person should be identified as the lead.</p> <p>Faculty advisors can provide feedback about the team's design so the students can identify mistakes, prove technical rigor, or demonstrate feasibility of their concept. It is not appropriate for faculty advisors to be actively working on a wind turbine or making decisions.</p>

Role	Individual(s) Assigned	Definition
Student Mentors	Multiple	Because of their unique perspective, students who have completed their undergraduate degree or graduate students are encouraged to act as mentors to the collegiate team. Similar to the faculty advisors, mentors should provide a supportive environment and the educational background necessary throughout the competition without making active decisions themselves.
Supporting Faculty	Multiple	Supports the faculty advisor in the previously mentioned duties but typically does not directly engage with prize administrators.
Competition Manager(s)	DOE	Represents DOE and provides oversight in all aspects of the competition.
Prize Administrators	NREL	The prize administrators lead correspondence with the collegiate teams regarding contracts, challenge questions, and team expectations. During the competition, the prize administrators are the primary point of contact for questions related to engagement with the reviewers, logistics, and protocol. Tasks include developing team schedules, coordinating/collating scores and team feedback from the challenges in time for the awards ceremony, and supporting the collegiate teams and reviewers.
Contest Reviewers	To be announced prior to the competition	Evaluate each contest at the competition.
Competition Judge	Director, WETO	The director of WETO is the judge of the competition and will make all final determinations.

Appendix G. Learn-Along Schools

New for this year, prize administrators will offer invited Learn-Along slots to teams that submit in Phase 2 but are not selected for Phase 3 to present to reviewers and test in the small wind tunnels at the competition final event. Teams will be offered these slots in ranked order based on the Phase 2 submissions until six slots are accepted for each contest (Turbine Design and Testing, Project Development, and Connection Creation). The Turbine Design and Testing contests are linked and teams who opt in to these contests must opt in to both. No Phase 3 reports will be reviewed, however teams who will be testing turbines at the final event must submit the Timed Assembly Video and Technical Inspection submissions by the date in Table 1.

Learn-Along teams who are offered and accept contest slots at the final event will receive:

- Presentation and Q&A slots with reviewers for each contest they are participating in
- If participating in Turbine Design and Testing, testing time in the small wind tunnels
- Space in the student booths with the rest of the competing teams.

Learn-Along teams will not receive:

- Testing in the large wind tunnel or float testing
- Review of Phase 3 written reports
- Opportunity to compete for cash prizes.

Teams that submitted in Phase 2 but are not selected for Phase 3 or offered invited Learn-Along slots are encouraged to keep learning and are welcome to participate in some or all of the competition contests in a high-level capacity.

This activity does not require that a team build a small wind turbine, though they are encouraged to do so and find alternative ways to test the wind turbine's performance. Teams that are new and building institutional knowledge are encouraged to consider building a simpler wind turbine. That turbine should focus on rotor design, power electronics, and basic reliability. Students are encouraged to develop a testing protocol to validate their turbine on their own and use resources beyond wind tunnels. Prize administrators and reviewers are available in the forum to help brainstorm ideas and provide advice on how to get worthwhile results safely.

All Phase 2 teams are welcome to attend the final event for observation and networking.

All Phase 2 teams will have access to the general resources provided to competing collegiate teams to support contest activities, including:

- Rules and requirements
- All available CWC resources (e.g., educational webinars, papers, other educational resources)
- CWC forum access for students to get answers to questions
- Access to the CWC LinkedIn group for students to build connections with current CWC participants, CWC alumni, and wind energy professionals
- Student rate for conference attendance
- Invitation to all educational webinars.

Phase 2 teams who are not selected for Phase 3 and will not be participating as invited Learn-Along teams at the final event will not receive:

- Testing time in any of the National Renewable Energy Laboratory wind tunnels
- Space in the student booths with the rest of the competing teams
- Review of any deliverables in Phase 3.

It is important to note that primary interaction with prize administrators will be through answering questions on the forum. Participation as a learn-along school is primarily an independent activity in which schools are encouraged to use the framework of the CWC rules to shape an educational program for academic growth. Additionally, participating teams will have a chance to provide feedback to prize administrators at the end of the year.

Appendix H. Logistics

Many logistical details will be provided throughout the course of the academic year and leading up to the event. Although prize administrators will make concerted efforts to inform teams, teams are responsible for familiarizing themselves with the details provided to proceed accordingly.

Proactive risk management in the face of uncertainty remains fundamental for any line of employment. The same is true for this event. In the event of force majeure, these rules are written in a way that ensures readers will clearly understand all aspects of the CWC in case the in-person event should become a virtual competition.

Should the venue change, an announcement will be made as soon as possible.

Teams are encouraged to communicate rules that are unclear, misguided, or in need of improvement. The prize administrators will seriously consider suggestions if they are feasible and intended to improve the competition, its rules, measurable outcomes, fairness, or precision.

Event Schedule

The event schedule will be provided to participating teams once it has been finalized. When prize administrators draft the schedule, slots will be assigned randomly. Teams may send requests for special consideration regarding scheduling; however, prize administrators are not obligated to accommodate them. Prize administrators will not accept requests for schedule adjustments after the lottery has been completed. Assigned slots will include:

- A safety and technical inspection
- Contest slots, including:
 - Tunnel testing practice
 - Tunnel testing and makeup testing
 - A Project Development Contest presentation
 - A Turbine Design Contest question-and-answer session
 - A Connection Creation Contest presentation.

Event Registration

All individuals attending the event will be required to register with the prize administrators. The number of individuals that can attend from each team will be limited based on constraints such as event space. This limit will apply to all attendees from each university, including students, faculty advisors, and mentors. The limit for attending participants for the event will be provided closer to the competition date.

Lodging

Prize administrators will coordinate with the American Clean Power (or similar conference convener if the final event is held at another location) to provide information to teams on lodging options. It is up to each team to ultimately book appropriate accommodations.

Local Resources

Each team is responsible for considering what local resources may be needed and identifying reasonable options near the event. These resources may include:

- Printing shops
- Shipping services
- Hardware stores
- Machine shops
- Electronic supply stores.

Team Booths

Teams will be provided with a space to use as their home base during the competition. There will be electrical outlets in the team booth area to allow students to operate tools, test equipment, or use computers. Appropriate personal protective equipment should be worn in the team booths when working on the wind turbines (see Appendix I for more details). Posters are encouraged to be displayed within the team booth throughout the event (easels and backboards will be provided). Additional materials that display the team's hard work and school spirit are also encouraged.

Shipping

It is each team's responsibility to transport their wind turbine and all supplies to the event safely and on time. It is also each team's responsibility to arrange return transport of those items. It is advised that teams consider how to ensure access to these items quickly upon arrival at the event and the safest way to transport fragile items, minimizing risk of damage. Shipping information will be provided before the competition event.

Storing Items at the Event

Prize administrators are not responsible for the security of supplies stored at the event space. If teams wish to avoid transporting supplies to and from the event each day, they are advised to explore reasonable options to store and secure those items appropriately. Gear that could aid in this might include lockable totes.

Feedback

Throughout the organization and execution of the event, prize administrators will request feedback from participating teams, reviewers, volunteers, and others. This feedback is taken very seriously both during the year and for future competitions as we work to improve the organization and execution of the event. To support that continued improvement, it is crucial that participating teams seriously consider and convey both positive and critical feedback. All participants should expect and plan to provide feedback at the conclusion of the event. Consider opportunities to capture and provide individual and/or team feedback to prize administrators throughout the year as well.

Appendix I. Safety and Conduct

The Collegiate Wind Competition is a forum for students with an interest in wind energy to showcase their innovative ideas and demonstrate their knowledge. The event is designed to be safe, fair, and competitive, as well as a fun learning experience and professional growth opportunity. Each team is responsible for the safety of its operations. Each team member must always work in a safe manner during the competition. Participants are expected to conduct themselves in the spirit of the competition by being team players both within their own teams and among competitor teams.

Teams must follow applicable safety and health rules (e.g., Occupational Safety and Health Administration for safety equipment based on expected activities). Prize administrators may issue a stop work order at any time during the project if a hazardous condition, such as using a power tool or soldering iron without safety glasses, is identified.

Personal Protective Equipment

All team members must wear appropriate personal protective equipment when working on, testing, and operating wind turbines and tools. Teams are expected to use the following appropriate protective equipment during wind tunnel testing and other potentially hazardous activities at the competition (note that all of these items must be student-provided):

- Safety glasses
- Hearing protection
- Steel-toed boots if expecting to handle heavy loads¹³ such as mooring weights, tools, and shipping boxes
- Electrical personal protective equipment if electrical voltage demands it.

Testing Hazards

Teams may encounter hazardous conditions while testing their turbines. Some examples of these conditions and safety controls that teams should follow are listed in Table I-1.

¹³ Teams should use their judgment for steel/composite safety-toed shoes. If there is any danger of foot injuries due to a falling or rolling object or objects piercing the sole, safety shoes should be worn. Steel toes are usually rated for 50 pounds dropped from 18 inches.

Table I-1. Potential Hazards and Controls for Testing Prototype Wind Turbines

(The following list is not intended to be exhaustive. It is the responsibility of the teams to identify and address potential hazards.)

Hazard	Control
<p>Inexperience with potentially destructive testing (Testing a rotor to failure can be hazardous to people nearby)</p>	<ul style="list-style-type: none"> • Work with the faculty advisor to determine appropriate safety measures for reducing the potential for injury. • Consult the local safety department to determine appropriate hazards and safety control strategies specific to the team’s campus and testing area that meet the school’s requirements.
<p>Electrical shock (A shock from contact with energized conductors)</p>	<ul style="list-style-type: none"> • Follow the team’s campus electrical safety requirements. • Only work on de-energized systems. • Lock the system so that it cannot be turned on or start moving inadvertently while someone is in contact with the rotor and test equipment.
<p>Noise (A rotor assembly coming apart can create a loud, sudden burst of sound.)</p>	<ul style="list-style-type: none"> • Wear appropriate hearing protection, such as approved ear plugs or earmuffs, in the test area. • Follow manufacturers’ recommendations for proper usage.
<p>Hazards to the eyes, face, and head (Projectiles could be thrown with great force from a rotor or component undergoing testing, injuring a person’s eyes, face, or head [if debris takes a parabolic trajectory].)</p>	<ul style="list-style-type: none"> • Wear eye protection marked with a Z87+ symbol around the rotor and test area. • Information regarding eye protection can be found here: https://www.osha.gov/eye-face-protection • Wear hard hats if there is potential for injury to the head from falling objects; for more information, visit: https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.100

Hazard	Control
<p>Thrown debris (A rotor assembly will come apart with great force, sending projectiles into the surrounding test area.)</p>	<ul style="list-style-type: none"> • Check the area to ensure it is clear before moving into the test phase; notify everyone involved that testing is about to begin. • Keep people away from the rotor during testing at what the team has determined to be a safe distance with appropriate barriers to keep others out; the barriers should have signage describing the hazard. • Station spotters around the perimeter of the area where the test is being conducted to prevent someone unfamiliar with the hazards of the test to inadvertently enter into a hazardous area. • Develop controls that allow testing to be done remotely at a safe location and to safely shut down the test. • Determine if equipment in the area could be damaged and protect it accordingly. • Determine if there are pressurized gas cylinders, hydraulic systems, or chemical storage containers that could be damaged during the test and if they need to be moved or protected. • Create housing surrounding the plane of rotation that can withstand the forces of the rotor coming apart. <ul style="list-style-type: none"> ○ The National Renewable Energy Laboratory uses 0.5-inch-thick polycarbonate. • Keep the area downwind and upwind clear of people where debris could be thrown with the direction of airflow or from sudden ricochets.

Sustainability

As part of the U.S. Department of Energy’s and National Renewable Energy Laboratory’s mission, renewable energy and sustainability go hand in hand. It is a common public perception as well. As a result, the competition is about renewable wind energy, and we expect that participants will embrace and showcase sustainability, where possible, during all aspects of the event (e.g., reducing waste in packaging for shipping, reusing packaging materials that were used in transporting items to the competition, and eliminating the use of nonrecyclable materials such as foam packing peanuts). In addition, we encourage team members to engage in common sustainable activities such as recycling paper and beverage containers. Team creativity to support this mission is encouraged.

Appendix J. Dispute Resolution

Disputes are a serious matter and will be treated as such. Disputes of score, evaluation, processing, or similar must:

- Be submitted to a prize administrator by the student team lead
- Be submitted in writing and accompanied by a direct notification of a prize administrator (e.g., in-person notification, text message, phone call; email is acceptable but does not guarantee a timely response)
- Include a clear description of the action being protested, referencing the appropriate section of this official rules document.

Once submitted, the prize administrators will initiate an internal review of the dispute. Disputes will be discussed among at least three prize administrators who will gather appropriate information through interviews or other means, and a final ruling will be issued. If it is concluded that the issue has a broader impact on the entire competition, the prize administrators will consult with the Competition Managers to determine next steps.

If the competition judge makes a decision that may directly or indirectly affect the strategies of some or all of the teams, the decision will be recorded in the HeroX Challenge forum (discussed further in Appendix D) within 24 hours. If the dispute is being handled during the competition event, an announcement at the next major address to teams (e.g., opening or closing remarks for the day, lunch) may be substituted for the forum post.

In all cases, the competition judge has the final say in all disputes. All decisions are final and are not appealable. **Neither the U.S. Department of Energy nor the prize administrators will arbitrate, intervene, advise on, or resolve any matters between team members.**

Appendix K. Alternative Competition Structure

In the event the in-person conference is cancelled, the following updates to the competition structure will go into effect and are listed in reference to their respective sections of the main document. Should there be extenuating circumstances for some but not all teams, a hybrid solution between a standard contest and what is described in this appendix may be developed and further communicated to the teams with as much advance notice as feasible.

The following modifications are designed to accommodate the possibility that the competition may not occur in person.

In the event an individual team is unable to complete any of the submissions because of extenuating circumstances, please reach out to the prize administrators. The primary goal of the competition is to maximize learning, and the prize administrators will work with each team to determine what is possible.

Background

Competition requirements for the wind turbine will be updated to reflect an effective, **digital-only**, mechanical, electrical, and aerodynamic wind turbine design that is safe and reliable for testing in an on-site wind tunnel. (The turbine need not actually be tested but should be designed as if it were going to be and subcomponents built and tested to the best of the teams' abilities according to the submissions.)

Competition, Contests, Submissions, and Awards

All references to the in-person competition presentations and question-and-answer (Q&A) sessions will shift to virtual execution. There will be no in-person turbine testing or designing of a wind farm during the competition. The planned scores for those sections will not be part of the competition scoring.

Submission Deadlines

The virtual competition sessions will be held in May or June 2025, and specific dates will be selected based on team and reviewer availability. If any team is unable to make the available dates or complete the submissions as outlined, they must reach out to the prize administrators to work out an alternative.

The expected submissions and the associated timeline will remain the same, except as shown in Table K-1.

Table K-1. Updated Submission Timelines

Submission	Submission Deadline
PRIOR TO COMPETITION:	
Unchanged	
DURING COMPETITION:	
Project Development Contest PowerPoint presentation (digital)	Presented on virtual meeting platform
Turbine Design Contest question-and-answer supporting materials (optional)	Presented on virtual meeting platform
Connection Creation Contest PowerPoint presentation (digital)	Presented on virtual meeting platform

Awards

Awards will shift to include:

- **A first-place winner.** This is the team that earns the highest combined score (not including the Turbine Testing Contest).
- **A second-place winner.** This is the team that earns the second-highest combined score (not including the Turbine Testing Contest).
- **A third-place winner.** This is the team that earns the third-highest combined score (not including the Turbine Testing Contest).
- **A Project Development Contest winner.** This is the team that earns the highest combined score from all Project Development Contest submissions.
- **A Turbine Digital Design Contest winner.** This is the team that earns the highest combined score from the digital Turbine Design Contest and submissions.
- **A Connection Creation Contest winner.** This is the team that earns the highest combined score from all industry and community engagement submissions.
- **A Best Poster winner. This is the team that earns the highest total score across all three poster sections in the Turbine Design, Project Development, and Connection Creation Contest rubrics.**

Note: There will be no Turbine Testing Contest, but there will still be an overall competition winner.

Final scores and rankings for the modified Project Development and Turbine Design contests will be shared with all participants.

Turbine Digital Design Contest

The Turbine Design Contest will remain unchanged except that presentations will move to a virtual format. Presentation dates may change.

Poster requirements will be replaced by a PowerPoint presentation, which must be delivered on a virtual meeting platform. Each team must submit their written report and PowerPoint presentation digitally.

Phase 2 Project Submissions

All submissions and due dates will remain unchanged. They are designed to be conducted in an entirely remote learning environment, if necessary.

Private Q&A Session

The Q&A session will continue as planned, albeit in a virtual format.

Presenters should showcase their wind turbine prototype as it exists, if possible, and have the option to use PowerPoint slides or other visual aids to engage with the reviewers. Note that visual aids will not be scored but can be used, if necessary, to help clarify any questions the reviewers may have after reading the written report. See further below in this appendix for virtual presentation best practices and to ensure it will function as intended in advance of presentation time.

Turbine Testing Contest

This contest will become optional remote testing, and wind turbines will not be tested in the competition wind tunnel. Testing will not be scored. Teams are encouraged to test their turbines remotely, using their own facilities, and to document their testing in a short video and present their results via an informal, unscored, public-facing webinar to celebrate this year's student accomplishments. Participating teams will have the option to:

- Conduct remote turbine testing. Teams should attempt to replicate as many of the tasks per Section 3.2 as they can, including:
 - Power performance
 - Controllability
 - Safety
 - Durability.
- Use the data they collect from their work on the submissions as a start on the remote testing
- Reach out to the prize administrators via the HeroX forum for advice on experimental design and instrumentation selection
- Conduct testing at a time most convenient for members, taking into consideration schedules, when resources are available, and the required submission deadline
- Document turbine testing results using photos, video, screenshots, and real-time data logging compiled into a single, edited video no longer than 5 minutes in length, detailing the:
 - Turbine components
 - Experimental setup and instrumentation
 - Testing procedures
 - Results.
- Optional: submit a bloopers reel, which does not count as part of the time limit, in a separate file(s).

Final submission deadline for the video will be provided during the transition to the virtual event but will be shortly before the event itself. This approach is meant to balance the time needed for teams to test with the time needed for reviewers.

Teams who submit a video summary of their turbine testing results will have the option to present their video in an interactive, public-facing webinar session as part of the Collegiate Wind Competition. These virtual sessions are designed to foster deeper learning among participants through direct feedback from the judging panel on the performance of their wind turbine, as well as through interaction with other competitors and the public. Each webinar session will include:

- A review of the submitted video
- Questions from the reviewers about the team's testing approach as well as feedback on the execution of testing and results
- A brief Q&A with the team, reviewers, and audience.

Project Development Contest

This contest will remain unchanged except that presentations will move to a virtual format. It has been designed to be completed in an entirely remote learning environment. Presentation dates may change.

Poster requirements will be replaced by a PowerPoint presentation, which must be delivered on a virtual meeting platform. Each team must submit their written report and PowerPoint presentation digitally.

Connection Creation Contest

This contest will remain unchanged except that presentations will move to a virtual format. It has been designed to be completed in an entirely remote learning environment. Presentation dates may change.

Poster requirements will be replaced by a PowerPoint presentation, which must be delivered on a virtual meeting platform. Each team must submit their written report and PowerPoint presentation digitally.

Rubrics

The rubrics will remain unchanged except for removing the scoring of the Turbine Testing Contest and designing a wind farm during the competition as part of the Project Development Contest.

Logistics

The most up-to-date logistics information will be provided to the teams directly from the prize administrators.

Event Schedule

The event schedule will be provided to participating teams once it has been finalized. Slots will be determined based on preferences provided by each team in a poll, and prize administrators

will do their best to accommodate those preferences based on reviewer availability. These slots are not guaranteed. Assigned slots will include:

- A Project Development Contest presentation
- A turbine digital design session and Q&A
- A remote testing review session
- A Connection Creation Contest presentation
- A final awards ceremony.

Virtual Event Login

For teleconferencing best practices, all individuals participating in the virtual presentations should review the Virtual Networking and Career Development section.

Any members of the team, including faculty advisors and mentors, are welcome to observe their team's presentation sessions and the final awards ceremony.

Virtual login information for private presentation sessions, access to the event app, and the awards ceremony will be provided closer to the assigned competition date.

Virtual Networking and Career Development

In lieu of attending an in-person conference, upon request, prize administrators will set up virtual meet-and-greet activities and informational interviews with industry representatives for any interested students. If any team members are interested in this opportunity, connect with the prize administrators to schedule a time prior to the assigned virtual presentation slot.

Prize administrators will also develop a video montage to feature each team's successes. Everyone's involvement is encouraged so it can highlight the wind energy experience gained, the breadth of students involved, and the continued dedication to learning. This video will be shared on available channels to wind energy professionals, where possible; students will be able to share it as well. It is designed to highlight the skills each team developed over the course of the academic year. More information on scheduling, best recording practices, and specific questions will be provided directly from prize administrators.

Dispute Resolution

Dispute resolution procedures are unchanged.

Communications and Contest Details

Teams will have the opportunity to set up virtual meet-and-greet events and informational interviews with industry experts by coordinating with prize administrators. Requests for these meetings must be submitted via the designated communications channel or email at least 5 days prior to the virtual competition date selected.

Given the shift to a virtual competition, teams can sign up for individual virtual interviews with the prize administrators so they will have the opportunity to share their story of how they continued working on the competition and what they learned during the year. Those interviews

will be recorded and disseminated after the conclusion of the competition to share the teams' accomplishments with the industry.

Virtual Conference Participation Etiquette

The following best practices are highly recommended for remote participation in any event.

Teams should:

- Be responsible for knowing their meeting point of contact and ensuring that connections and technology all work prior to their start time. Test the internet connection, audio and video capabilities, and ability to use the virtual meeting program before the presentation time. The prize administrators have built in transition time, but it is limited.
- Use a hard-wired internet connection (i.e., ethernet cord). Wi-Fi connections can be used but are not ideal because they are prone to more connection issues.
- Mute the audio connection (phone and/or computer) when the speaker is not intending to speak. The prize administrators will mute participants with excessive background noise.
- Ensure there is only one audio connection being used. Connect to audio via phone or computer, but not both. Connecting with two audio connections results in electrical feedback that is very uncomfortable for all involved.
- Feel encouraged, but not required, to use the team's webcam for presenting. Audio narration of slides is also acceptable.
- Ensure there is a clean background while streaming video (e.g., no inappropriate or offensive images in the background, or people walking around).
- Avoid window backdrops because of lighting.
- Be sure to dress and speak professionally during the presentation.
- Refrain from distracting behavior while sharing the video and/or audio, such as drinking or eating.

Appendix L. Additional Terms and Conditions

L.1 General requirements

Your submission for the Prize is subject to the following terms and conditions:

- You must post the final content of your submission or upload the submission form online by 11:59 p.m. MT on the prize deadline date, before the prize's submission period closes. Late submissions or any other form of submission may be rejected.
- You must include all the required elements in your submission. The prize administrator may disqualify your submission after an initial screening if you fail to provide all required submission elements. Competitors may be given an opportunity to rectify submission errors due to technical challenges.
- Your submission must be in English and in a format readable by Microsoft Word or Adobe PDF. Scanned hand-written submissions will be disqualified.
- Submissions will be disqualified if they contain any matter that, in the sole discretion of the U.S. Department of Energy or the National Renewable Energy Laboratory (NREL), is indecent, obscene, defamatory, libelous, and/or lacking in professionalism, or demonstrates a lack of respect for people or life on this planet.
- If you click "Accept" on the HeroX platform and proceed to register for any of the prizes described in this document, these rules will form a valid and binding agreement between you and DOE and are in addition to the existing HeroX Terms of Use for all purposes relating to these contests. You should print and keep a copy of these rules. These provisions only apply to the prize described here and no other prize on the HeroX platform or anywhere else.
- The prize administrator, when feasible, may give competitors an opportunity to fix nonsubstantive mistakes or errors in their submission packages.

L.2 Verification for Payments

The prize administrators will verify the identity and role of all competitors before distributing any prizes. Receiving a prize payment is contingent upon fulfilling all requirements contained herein. The prize administrators will notify winning competitors using provided email contact information for the individual, team, or entity that was responsible for the submission. A representative from the Team's lead academic institution will be required to sign and return to the prize administrators, within 30 days of the date on the notice, a completed NREL Request for ACH Banking Information form and a completed W-9 form (<https://www.irs.gov/pub/irs-pdf/fw9.pdf>). In the sole discretion of the prize administrators, a winning competitor will be disqualified from the competition and receive no prize funds if: (i) the person/team/entity does not respond to notifications; (ii) the person/team/entity fails to sign and return the required documentation within the required time period; (iii) the notification is returned as undeliverable; (iv) the submission or person/team/entity is disqualified for any other reason as specified in eligibility section in the executive summary or universal content section above.

In the event of a dispute as to any registration, the authorized account holder of the email address used to register will be deemed to be the competitor. The "authorized account holder" is the natural person or legal entity assigned an email address by an internet access provider, online service provider, or other organization responsible for assigning email addresses for the domain

associated with the submitted address. All competitors may be required to show proof of being the authorized account holder.

L.3 Teams and Single-Entity Awards

The prize administrators will award a single U.S. dollar amount to the designated primary submitter (i.e., the Team's lead academic institution). The primary submitter is solely responsible for allocating any prize funds among its member competitors or teammates as they deem appropriate. The prize administrators will not arbitrate, intervene, advise on, or resolve any matters or disputes between team members or competitors

L.4 Eligibility

Only submissions relevant to the technical areas laid out in [Section 1 and 3](#) of this document will be considered. The prize administrator has the right to refuse any submission for incompleteness or unresponsiveness to the technical topic areas.

Phase 2 is open to teams that were previously awarded as Phase 1 winners. Phase 3 is open to winning teams under Phase 2. The composition of a team may change between Phases but must maintain participation by the same academic institution serving as the primary submitter.

A team must be comprised of:

- Undergraduate students from:
 - One or more 4-year colleges or universities in the United States.
 - A mixture of 4-year colleges or universities in the United States together with students from 2-year institutions, such as community colleges.
- A domestic U.S. academic institution serving as the lead.
 - International institutions are welcome to apply but must partner and apply with a domestic U.S. institution as the lead, with both institutions being represented at the final event. International teams will not be eligible to receive cash prizes directly from DOE and the National Renewable Energy Laboratory (NREL) and must provide their own funding to support travel and competition expenses.
- A faculty advisor from the lead U.S. academic institution.

DOE employees, employees of sponsoring organizations, members of their immediate families (e.g., spouses, children, siblings, or parents), and persons living in the same household as such persons, whether or not related, are not eligible to participate in the Prize.

Individuals who worked at DOE (federal employees or support service contractors) within six months prior to the submission deadline of any contest are not eligible to participate in the Prize.

Federal entities and federal employees are not eligible are not eligible to participate in the Prize.

DOE national laboratory employees cannot compete in the Prize.

Entities and individuals publicly banned from doing business with the U.S. government, such as entities and individuals debarred, suspended, or otherwise excluded from or ineligible for participating in federal programs are not eligible to compete.

Entities identified in Department of Homeland Security (DHS) Binding Operational Directives (BOD) as publicly banned from doing business with the U.S. government are not eligible to compete. See <https://cyber.dhs.gov/directives/>.

Entities and individuals identified as restricted parties on one or more screening lists of the U.S. Department of Commerce, State, or the Treasury are not eligible to compete. See Consolidated Screening List. https://2016.export.gov/ecr/eg_main_023148.asp.

Individuals participating in a foreign government talent recruitment program¹⁴ sponsored by a country of risk¹⁵ and teams that include such individuals are not eligible to compete.

Entities owned by, controlled by, or subject to the jurisdiction or direction of a government of a country of risk.

To be eligible, an individual authorized to represent the competitor must agree to and sign the following statement upon registration:

I am providing this submission package as part of my participation in this prize. I understand that the information contained in this submission will be relied on by the federal government to determine whether to issue a prize to the named competitor. I certify under penalty of perjury that the named competitor meets the eligibility requirements for this prize competition and complies with all other rules contained in the Official Rules document. I further represent that the information contained in the submission is true and contains no misrepresentations. I understand false statements or misrepresentations to the federal government may result in civil and/or criminal penalties under 18 U.S.C. § 1001 and § 287, and 31 U.S.C. §§ 3729-3733 and 3801-3812.

L.5 Submission Rights

By making a submission and consenting to the rules of the challenge, a competitor is granting to DOE, the prize administrators, and any other third parties supporting DOE in the challenge, a license to display publicly and use the parts of the submission that are designated as “public” for government purposes. This license includes posting or linking to the public portions of the submission on the challenge website, DOE websites, and partner websites, and the inclusion of

¹⁴ Foreign Government-Sponsored Talent Recruitment Program is defined as an effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to U.S. entities. Compensation could take many forms including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

¹⁵ DOE has designated the following countries as foreign countries of risk: Iran, North Korea, Russia, and China. This list is subject to change.

the submission in any other media worldwide. The submission may be viewed by the DOE, prize administrators, and reviewers for purposes of the challenge, including but not limited to screening and evaluation purposes. The prize administrators and any third parties acting on their behalf will also have the right to publicize competitors' names and, as applicable, the names of competitors' team members and organization, which participated in the submission on the challenge website indefinitely.

By entering, the competitor represents and warrants that:

1. Competitor's entire submission is an original work by competitor and competitor has not included third-party content (such as writing, text, graphics, artwork, logos, photographs, likeness of any third party, musical recordings, clips of videos, television programs or motion pictures) in or in connection with the submission, unless (i) otherwise requested by the prize administrators and/or disclosed by competitor in the submission, and (ii) competitor has either obtained the rights to use such third-party content or the content of the submission is considered in the public domain without any limitations on use.
2. Unless otherwise disclosed in the submission, the use thereof by prize administrators, or the exercise by prize administrators of any of the rights granted by competitor under these rules, does not and will not infringe or violate any rights of any third party or entity, including, without limitation, patent, copyright, trademark, trade secret, defamation, privacy, publicity, false light, misappropriation, intentional or negligent infliction of emotional distress, confidentiality, or any contractual or other rights;
3. All persons who were engaged by the competitor to work on the submission or who appear in the submission in any manner have:
 - a) Given the competitor their express written consent to submit the submission for exhibition and other exploitation in any manner and in any and all media, whether now existing or hereafter discovered, throughout the world;
 - b) Provided written permission to include their name, image, or pictures in or with the submission (or, if a minor who is not competitor's child, competitor must have the permission of the minor's parent or legal guardian) and the competitor may be asked by the prize administrators to provide permission in writing;
 - c) Not been and are not currently under any union or guild agreement that results in any ongoing obligations resulting from the use, exhibition, or other exploitation of the submission.

L.6 Copyright

Each competitor represents and warrants that the competitor is the sole author and copyright owner of the submission; that the submission is an original work of the competitor or that the competitor has acquired sufficient rights to use and to authorize others, including DOE, to use the submission, as specified throughout the rules; that the submission does not infringe upon any copyright or any other third-party rights of which the competitor is aware; and that the submission is free of malware.

L.7 Challenge Subject to Applicable Law

All challenges, prizes and contests are subject to all applicable federal laws and regulations. Participation constitutes each participant's full and unconditional agreement to these Official Challenge Rules and administrative decisions, which are final and binding in all matters related to the challenge. This notice is not an obligation of funds; the final award is contingent upon the availability of appropriations.

L.8 Resolution of Disputes

The U.S. Department of Energy is solely responsible for administrative decisions, which are final and binding in all matters related to the challenge.

Neither the U.S. Department of Energy nor the prize administrators will arbitrate, intervene, advise on, or resolve any matters between team members or among competitors.

L.9 Publicity

The winners of these prizes (collectively, “winners”) will be featured on the DOE and NREL websites.

Except where prohibited, participation in the challenge constitutes each winner's consent to DOE’s and its agents’ use of each winner's name, likeness, photograph, voice, opinions, and/or hometown and state information for promotional purposes through any form of media worldwide, without further permission, payment, or consideration.

L.10 Liability

Upon registration, all participants agree to assume any and all risks of injury or loss in connection with or in any way arising from participation in this challenge. Upon registration, except in the case of willful misconduct, all participants agree to and, thereby, do waive and release any and all claims or causes of action against the federal government and its officers, employees, and agents for any and all injury and damage of any nature whatsoever (whether existing or thereafter arising, whether direct, indirect, or consequential, and whether foreseeable or not), arising from their participation in the challenge, whether the claim or cause of action arises under contract or tort.

In accordance with the delegation of authority to run this challenge delegated to the director of the Wind Energy Technologies Office, the director has determined that no liability insurance naming DOE as an insured will be required of competitors to compete in this competition per 15 USC 3719(i)(2).

Competitors should assess the risks associated with their proposed activities and adequately insure themselves against possible losses.

L.11 Records Retention and Freedom of Information Act

All materials submitted to DOE as part of a submission become DOE records and are subject to the Freedom of Information Act. The following applies only to portions of the submission not designated as public information in the instructions for submission. If a submission includes

trade secrets or information that is commercial or financial, or information that is confidential or privileged, it is furnished to the Government in confidence with the understanding that the information shall be used or disclosed only for evaluation of the submission. Such information will be withheld from public disclosure to the extent permitted by law, including the Freedom of Information Act. Without assuming any liability for inadvertent disclosure, DOE will seek to limit disclosure of such information to its employees and to outside reviewers when necessary for review of the submission or as otherwise authorized by law. This restriction does not limit the Government's right to use the information if it is obtained from another source.

Submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information and may use or disclose such information for any purpose.

The submission must be marked as follows and identify the specific pages containing trade secrets, confidential, proprietary, or privileged information:

Notice of Restriction on Disclosure and Use of Data:

Pages [list applicable pages] of this document may contain trade secrets, confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes. [End of Notice]

The header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Trade Secrets, Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure." In addition, each line or paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets.

Competitors will be notified of any Freedom of Information Act requests for their submissions in accordance with 29 C.F.R. § 70.26. Competitors may then have the opportunity to review materials and work with a FOIA representative prior to the release of materials.

L.12 General Conditions

DOE reserves the right to cancel, suspend, and/or modify the competition, or any part of it, at any time. If any fraud, technical failure, or any other factor beyond DOE's reasonable control impairs the integrity or proper functioning of the competition, as determined by DOE in its sole discretion, DOE may cancel the competition. Any performance toward competition goals is conducted entirely at the risk of the competitor, and DOE shall not compensate any competitors for any activities performed in furtherance of this prize.

Although DOE may indicate that it will select up to several winners for each competition, DOE reserves the right to only select competitors that are likely to achieve the goals of the program. If, in DOE's determination, no competitors are likely to achieve the goals of the program, DOE will select no competitors to be winners and will award no prize money.

DOE may conduct a risk review, using Government resources, of the competitor and project personnel for potential risks of foreign interference. The outcomes of the risk review may result in the submission being eliminated from the prize competition. This risk review, and potential elimination, can occur at any time during the prize competition. An elimination based on a risk review is not appealable.

L.13 Program Policy Factors

While the scores of the expert reviewers will be carefully considered, it is the role of the competition judge to maximize the impact of challenge funds. Some factors outside the control of competitors and beyond the independent expert reviewer scope may need to be considered to accomplish this goal. The following is a list of such factors. In addition to the reviewers' scores, the below program policy factors may be considered in determining winners:

- Geographic and program-type diversity
- Whether the use of additional DOE funds and provided resources are non-duplicative and compatible with the stated goals of this program and the DOE mission generally.
- The degree to which the submission expands DOE's funding to new competitors and recipients who have not been supported by DOE in the past.

L.14 National Environmental Policy Act (NEPA) Compliance

DOE's administration of the Collegiate Wind Competition is subject to NEPA (42 USC 4321, et seq.). NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website, at <http://nepa.energy.gov/>.

L.15 Return of Funds

As a condition of receiving a prize, competitors agree that if the prize was made based on fraudulent or inaccurate information provided by the competitor to DOE, DOE has the right to demand that any prize funds or the value of other non-cash prizes be returned to the government.

ALL DECISIONS BY DOE ARE FINAL AND BINDING IN ALL MATTERS RELATED TO THE CHALLENGE.