

# 2022 Kansas KidWind Challenge – Rules and Logistics

*Note: This document includes basic rules/logistics for how the 2022 Kansas KidWind Challenges will be operated. For additional details, please see the [National KidWind Rules](#). If you have questions, reach out to us ([ksenergyprog@ksu.edu](mailto:ksenergyprog@ksu.edu); 785-532-6026).*

## Logistics

- If you haven't yet registered, please do so as soon as possible, even if you're still missing some information (such as team names)! Registration at [www.kansasenergyprogram.org/kidwindchallenge](http://www.kansasenergyprogram.org/kidwindchallenge)
- Choose the regional event pool that makes the most sense for your team(s) location.
- Each regional competition will be limited to approximately 16 teams.
- Each school is limited to a total of six teams (three per age division). However, the third team in each age division is automatically added to our waiting list.
- If organizers receive registrations from more than 16-18 teams at a regional event, all new registrations will be put on the waiting list and may be requested to reduce the number of teams they're bringing by holding an internal competition at their school.
- For schools that have teams on a waiting list, we will notify them prior to the event regarding their registration. Waiting list priority will be based on registration date.
- The top two teams in each division (4th-8th and 9th-12th) in each regional event pool will be invited to participate in the statewide KidWind Challenge. The top two teams in each division at the statewide challenge will be invited to participate in the national event as the official Kansas representative teams.
- This is a full day event and should be planned for as such. Organizers will provide an agenda for the event a few days before hand to those registered.
- The agenda for the 2022 KidWind Challenge season is as follows:
  - 4 weeks before your regional event - Closed event registration, late registrants will need to directly contact the organizers to determine if there is still adequate time and space to be added to the event.
  - 2 weeks before your regional event – Information collection, this will include team and student names, to allow organizers to finalize event logistics and materials.
  - North East Regional (Overland Park) – Tuesday, February 22<sup>nd</sup>
  - South Central Regional (Hutchinson) – Thursday, February 24<sup>th</sup>
  - South West Regional (Dodge City) – Tuesday, March 1<sup>st</sup>
  - North West Regional (Oakley) – Thursday, March 3<sup>rd</sup>
  - North Central Regional (Manhattan) – Wednesday, March 9<sup>th</sup>
  - South East Regional (Burlington) – March 11<sup>th</sup>
  - State (Topeka) – April 2<sup>nd</sup>
  - Nationals – Currently, a decision on whether Nationals will be in-person, hybrid, or fully online is expected to be made by February 1<sup>st</sup>. If held in-person, the National KidWind Challenge will take place in San Antonio, Texas during the American Clean Power Association (formerly the American Wind Energy Association, AWEA) conference May 16<sup>th</sup> – May 19<sup>th</sup>, 2022. This information will be updated once a decision has been made.
  - *Additional information:* Scoring sheets and judges comments will be scanned and provided to teams digitally for their perusal after their regional event, this will typically occur the following week when organizers are back in office.

## Basic Rules (most of this follows the National KidWind rules)

### **Eligibility and registration**

- Any group of students in grades 4 to 12 is eligible to enter a team, including students from public and private schools, home schoolers, after school clubs, Boy Scout and Girl Scout troops, etc. As long as you have a coach and a team, you can attend!



- In the event of a mixed-age team (a team with members who are in both 4<sup>th</sup>-8<sup>th</sup> and 9<sup>th</sup>-12<sup>th</sup> grade levels), the team will automatically be considered in the 9<sup>th</sup>-12<sup>th</sup> grade division. The organizers verify the participating student grade level via signed photo release forms if this were to come to question.
- Teams are recommended to be 3 – 5 persons, to better allow each member to equally contribute.
- Each team must have a coach/sponsor. The coach/sponsor will be responsible for registering the team for the competition, managing the team’s progress, and supervising the team at events. This includes submission of the items required for each component of the competition.

## **Turbines**

- **General**
  - You cannot share any part of your turbine between teams.
  - The entire turbine must fit inside a 48”x48” wind tunnel – allow some room! If any part of the turbine (including a shroud, if used) would not fit, it will be disqualified.
  - The turbine must be free-standing, as a tower/stand will not be provided. There will be water weights available at competition, but be sure your turbine can be weighed down as needed to prevent it being blown over or sucked into the fans.
  - Power must be generated solely by wind using the wind tunnel and turbines can be either a vertical or horizontal axis.
  - While you are allowed to use purchased parts (other than the blades), points will be awarded for creativity and economical use of resources.
  - A Vernier Go Direct Energy Sensor will be used to measure output, which has a built-in 30-ohm resistor that must be turned on. The sensor will be using the Vernier Graphical Analysis software, which will generate the output file.
- **Generator**
  - To compete in the general competition, you MUST use a [KidWind Turbine Generator](#) (the organizers can ship you some, if needed).
  - The National KidWind rules allow for the hand-built/advanced generator division – at this time the organizers do not and limit the Kansas regional and statewide challenges to using the KidWind generators from Vernier. If a team wins the state competition and wants to try the open generator division at the National Challenge, that will be up to the team. *It should also be mentioned that to date only one Kansas team has produced a high enough energy output to exceed the threshold of the KidWind generator.* The organizers will reconsider this stance if this scenario were to become a regular occurrence.
- **Blades**
  - Teams cannot use pre-made airfoils.
  - Blades and turbine should be made of safe materials (cardboard, balsa wood, 3D-printed material, etc.). Metal, Plexiglass, and similar materials are discouraged. If the local coordinators deem a turbine to be unsafe, it will be disqualified. In the past when a team has been unsure if their blades will be allowed, a second set in an alternative material was prepared in advance and brought with.
  - If your team 3D-prints the blades, please make sure the team is prepared to explain to judges how it used this process (the judges want to make sure the team understands the technology).
- **Everything else**
  - Your team can use KidWind gearboxes and parts, purchase from other vendors, or create your own.
  - The approximate wind speed in a typical competition style tunnel is 3.5 meters/second (7.8 mph), so keep that in mind as this can affect the stability of your turbine.
  - Photo releases must be provided with team submissions for each team member and any other person that may appear photos taken through out the event day. The organizers

typically identify persons that for safety/privacy issues through lanyard color when determining usable photos, so all are required to wear their provided nametags the entirety of the day.

## Turbine Performance Testing

- To receive points, the turbine must be able to start producing power (turning) on its own without external assistance (e.g., students cannot give it a push to get it started).
- During a traditional event, once the team is ready (turbine is in the tunnel and connected to the data collection system), the wind tunnel coordinator will turn on the fans. Once the turbine has reached its "peak," the team will signal to begin collecting data. Once data collection has started, wind tunnel coordinators will not stop the run until the one-minute testing period is complete (barring catastrophic failure).
- The best runtime will be used for scoring purposes.
- Organizers and judges have final say on rulings and disputes.
- Only student team members are allowed to adjust the turbine, parents and coaches are asked to stand back and not assist while teams are collecting data for their Performance Testing.

## Scoring

- Each team will receive a score (out of 100) based on turbine performance (30 points), video judging (40 points), knowledge quiz (10 points), and instant challenge (10 points).
- *Turbine Performance (40 points)*
  - The best one-minute performance period will be used for scoring.
  - Turbines will be ranked by energy output (up to 30 points) and efficiency (up to 10 points).
  - The highest producing turbine will receive the full number of available energy points, the following turbines will receive points based on rank with a one to five-point deduction for each position they are from the top turbine (this deduction will depend upon number of teams). The same will apply to the points available from efficiency, which is the amount of power produced based on turbine size and wind speed.
- *Judging (40 points)*
  - Teams will present to a panel of judges, so be sure to prepare to do so. The method of presentation will be up to the team, but be prepared in the event that technology may fail or be unavailable.
  - A panel of three to five judges will ask questions during the remaining time period (additional time will not be given), and will be providing comments and feedback. The results will be provided to the team in the form of a scanned written forms that will contain any additional comments not shared with the team during their Q&A portion.
  - Spectators, teachers, and parents are not allowed within the room during judging. Students, judges, and an event time keeper are the only persons in the room during judging.
- *Knowledge quiz (10 points)*
  - Each team will collaborate to answer the questions on the quiz during their time slot at the event. If the students on the team require an adult to read out loud the questions for the team, please let organizers know before the event so we can make sure to have the option available – otherwise students may choose one of their teammates at that time to do so.
  - The resources used for the trivia questions will be posted online at [www.kansasenergyprogram.org/kidwindchallenge](http://www.kansasenergyprogram.org/kidwindchallenge). Some questions are considered general knowledge of wind turbines and wind energy and may not be included under the posted resources.
  - This is the one aspect of the competition that can possibly be completed earlier throughout the day. Normally we will see that teams finish their quiz ahead of the time allotted and organizers will do our best to keep this moving forward by allowing the next team to take

their quiz early. We will ask the team if they want to when they are next on the list, however, they are not required to do so and can wait until their original scheduled time.

- *Instant Challenge (10 points)*
  - Teams will be given 10 minutes of their scheduled 15-minute time period to complete the challenge. All information and materials needed will be provided to them at that time.
  - No other information about the Instant Challenge will be given, and it is asked that the challenge not be discussed with or in the hearing of teams that have not yet completed the task.

## **Additional Recommendations**

- *Project Documentation –*
  - Documentation is always recommended, as it can assist your team in keeping track of their ideas and progress. The type of documentation should reflect the design process and knowledge of wind energy science as the team progresses. It is up to each team to determine how they want to document their project. This documentation could take the form of a short report, a PowerPoint presentation, notebooks, poster boards, or anything else that effectively communicates their design process and experience.
- *Turbines –*
  - While we will have limited supplies available for repairs, when building your turbine make sure your team considers accessibility or ease of repair in the off chance something goes wrong. Examples of some of the things we have seen from teams in the past:
    - Unable to replace generator due to a faulty wire and not having access due to glue or closed/non-opening gearbox housing.
    - Replace a single blade due to breakage but had glued all the blades into the basic hub and had to cut dowel connections to remove all blades, requiring new hub and additional time to modify shorter blades instead of simply replacing the single blade or rearranging remaining blades within hub.
- *Supplies –*
  - If your team brings their own tools, be sure they are clearly marked as to who they belong to. While we will have limited supplies and tools available for repair, the majority of our tools have come from past event 'lost and found' items and it is not guaranteed we will have what is needed.
- *Clean up –*
  - We are very lucky to have great location sponsors allowing us to not only use their space, but their tables and other furniture. Make sure to take into consideration how big a mess you could be making and do your best to limit it. This includes lubrication items such as WD-40 and graphite that may end up on the floor/carpet – as well as saw dust. Avoid gluing or cutting directly on any of the surfaces. A cutting mat is always brought along by the organizers, but use paper or cardboard scraps is more appropriate when dealing with adhesives and paints.