Getting Started with the KidWind Challenge (Coach's Guide for Grades 4 –12)

The **KidWind Challenge** is a hands-on renewable energy design competition where student teams (grades 4 –12) build small wind turbines or solar devices and showcase their knowledge and creativity (Planning Page; Events Page). Teams test their custom-built wind turbines in wind tunnels or their solar structures under special lights and then present their design process and findings to a panel of judges. In addition to formal presentations, teams also tackle quick **Instant Challenges** at events to demonstrate on-the-spot problem-solving and teamwork. It's an exciting opportunity for students to engage with STEM through the lens of clean energy while having fun in a friendly competition.

Age Divisions: The KidWind Challenge is open to **4th–12th graders**, divided into three grade-level divisions: **Elementary (4th–5th), Middle School (6th–8th), and High School (9th–12th) (**Planning Page). This ensures teams compete against peers in the same age group. Challenges are typically **in-person** events hosted by schools or organizations during the school year, and top teams from regional events can even advance to nationals – the **World KidWind Challenge (**KidWind Worlds Page). Below is a step-by-step guide for coaches (and teams) to go from initial sign-up all the way to competing in an in-person KidWind Challenge.

Step 1: Form Your Team (and Find a Coach)

Every KidWind team needs two key ingredients: **students and a coach**. A team may include anywhere from 1 to 10 students, though many find that a group of about 3–5 students works best for managing tasks and collaboration. All team members should fall within the eligible grades (4th–12th). Teams will register in the appropriate division (Elementary, Middle, or High) based on the highest grade level on the team, so consider the age range of your students when forming teams.

Equally important, each team **must have an adult coach** to supervise and guide the project. The coach can be a teacher, parent, or any adult mentor – no advanced wind energy expertise required! As a coach, your role is to help the students navigate the Challenge: you'll facilitate team meetings, ensure safety during building and testing, and encourage the kids as they learn. Coaches also handle logistics, such as registration and communication with event organizers. (One coach can supervise multiple teams, but note that during in-person events, an adult can manage no more than 10 students.) If

you're a teacher, you might coach a team from your class or STEM club; if you're a parent or community mentor, you can coach a group of interested students in your area. The main goal is to provide support – the students themselves should do hands–on work and problem-solving.

Step 2: Find an In-Person Challenge Event and Register

Next, look for an in-person KidWind Challenge event that your team can attend. KidWind events are held in many regions – often hosted by schools, local science centers, or energy education organizations. Start by checking the **KidWind website's event finder** (the "Find a Challenge" page) to see upcoming **In-Person Challenges** near you and their dates. You can browse events by location and date; some regions have multiple local competitions (e.g., regional qualifiers and a state finals), whereas others might have one main event. Suppose you don't see a nearby event listed. In that case, you might reach out to KidWind or a local organizer to express interest or consider the online alternatives (KidWind also runs an Online Challenge and a Simulation Challenge) – but for this guide, we'll focus on in-person competitions.

Essential details here: KidWind 2025-2026 Rulebook Link

Once you've identified a suitable event, **register your team** through the provided channel. Most events allow (or require) coaches to sign up online, either through the KidWind site or a partner organization's site. For example, some regional events have a "Register" link that takes you to a local host's registration form. Follow the instructions for your chosen event and be mindful of any registration deadlines. Typically, you'll need to provide information such as your team's name, school/organization, the coach's contact information, the number of students, and their division (grade level), as well as possibly some preliminary information about your project. **An adult coach must create an account or fill out the form on behalf of the team.** Don't forget to register officially – *"Don't forget to register your team for your local KidWind Challenge! Check the website for upcoming events in your area and registration links."*

Registration Fees: Many KidWind Challenge events are free to enter, but some may charge a small registration fee (often on the order of ~$20) to help cover event costs. The event listing or organizer will note if a payment is required during registration. These fees help cover expenses such as the event venue, equipment (including wind tunnels and fans), and the **valuable learning resources** that KidWind provides to

teams. If your event has a fee, you'll typically pay it when you register or shortly after. Be sure to secure your spot early, as some events cap the number of teams.

Step 3: Review the Rules and Expectations

Before diving into building, **take time to read the official KidWind Challenge rules** for your competition category (wind or solar) thoroughly. The regulations define what materials are allowed, size constraints, how performance is scored, how judging works, and many other essential details. The KidWind website provides downloadable **Rulebook PDFs** for both the wind turbine challenge and the solar Challenge – these are the comprehensive guides for coaches and students. Rules Page. *"If you're a coach looking to lead a team toward victory, or a student wondering what to expect at the Challenge, you've come to the right place. These Rulebooks are our most thorough description of the rules and judging expectations for KidWind Challenges, so please read them carefully."* In other words, almost every question about what you can or cannot do is answered in the Rulebook, so use it as your blueprint!

Some key points to look for in the Rulebook include: team composition rules, device size or power limitations (for example, limits on voltage/current for safety), what needs to be documented, how the scoring is broken down (e.g., energy output, innovation, presentation, etc.), and the format of the event. **Pay special attention to any rules about required documentation** – KidWind often asks teams to prepare a **documentation notebook or presentation** detailing their design process, and possibly to complete a **Profile Form** (a summary of your project). Rulebook Here. All of this will be in the Rulebook. The rules can be detailed, but coaches should ensure the team understands the critical parts. If you have any lingering questions after reading, KidWind encourages you to reach out and ask – they're happy to clarify rules. Also note that **local events may have slight rule variations**. For instance, a regional challenge might introduce a unique task or modify an equipment rule. The Rulebook covers the standard guidelines, but always check communications from your specific event's organizer in case there are local adjustments. Staying well-informed on the rules will prevent unpleasant surprises on the day of the competition and will help your team maximize its score by meeting all requirements.

Step 4: Learn with KidWind's Curriculum and Tutorials

Activities Page Link Here.

With your event scheduled and rules in hand, it's time for the team to **learn about wind energy and solar power**! A big part of the KidWind experience is educational – students will need to understand the science and engineering concepts to build a successful device and explain it to judges. Spend the weeks (or months) before the competition researching and exploring relevant topics with your team. At a high level, students should grasp how wind turbines generate electricity or how solar panels work, and the factors that affect performance (blade design, gear ratios, turbine placement, circuitry for solar, etc.). According to KidWind, to succeed, *students must perform research to understand the science of renewable energy better, be analytical about testing, think creatively about solutions to problems, and work collaboratively to complete their project on time*. The more your team knows, the better they can innovate and troubleshoot their design – and the more confidently they can answer judges' questions.

Utilize KidWind's free resources: You don't have to start from scratch when educating your team. **KidWind offers a wealth of curriculum materials, lesson plans, and guides** for coaches and students. In the "Activities" section of the KidWind website, you'll find dozens of **standards-aligned lessons** for various grade levels that cover wind and solar energy concepts. For example, there are lessons like *"How Can I Design Better Blades?"* which teaches students about blade design to maximize turbine output, or *"Solar Fountains"* which involves building small solar-powered fountains. These can be great hands-on class activities to build background knowledge. KidWind has also developed resource guides that directly support the Challenge – for instance, a guide on **creating a basic PVC wind turbine** and a **performance calculator guide** for measuring your turbine's power output with a multimeter. All these resources are freely available (many as PDFs to download) on the KidWind site. Please take advantage of them! Have your team work through relevant lessons or experiments; this will not only teach science principles but might give them ideas for their own turbine or solar design.

Additionally, KidWind periodically offers **training workshops and webinars** for educators. These can be invaluable if you're new to renewable energy or the KidWind Challenge. Some workshops are in-person (often called REcharge Academy or educator workshops), and some are webinars online. KidWind provides fee-based training academies and also **free webinars for those interested in learning more** about wind energy and how to coach a team. Keep an eye on the "Workshops" or "Webinars" page on their site for opportunities. While not mandatory, training sessions can boost your confidence as a coach and connect you with a community of KidWind educators.

Step 5: Gather Materials and "Gear Up"

Helpful Gear Link Here.

Building a wind turbine or solar structure from scratch might sound daunting, but part of the fun is using creative engineering with everyday materials. **Gather the materials and tools** your team will need to construct and test their design. Many items can be found around your classroom, home, or local hardware stores. *"You can use all sorts of stuff you find around your house or classroom to build a solar structure or wind turbine."* For a **wind turbine**, at a minimum, you will need a **tower** (to raise the turbine off the ground), a **rotor** with **blades** (to catch the wind), and a **generator** (to convert the turbine's rotational energy into electricity). These mirror the parts of real wind turbines. You'll also need some **hub** to attach blades to the generator shaft, and likely a base to support the tower. Lightweight materials like PVC pipes, wood dowels, cardboard, or even recycled bottles can serve as towers and turbine bodies; blades can be made from cardboard, plastic, wood, 3D-printed shapes – whatever your students think might work, as long as it's safe (no sharp metal edges, etc., per the rules). A **multimeter** is highly recommended for measuring electrical output (voltage/current) during testing.

For a **solar device** (such as a solar "house" or structure), you'll need **solar panels (photovoltaic cells)** – small hobby panels (e.g. 2V to 6V panels) that can be wired together – plus various electrical components the students may want to power (motors, LED lights, etc.), and building materials for the structure that will hold the panels and components. Often, teams repurpose items like shoeboxes, toy parts, or craft materials to build creative solar-powered models. Basic tools (scissors, tape, hot glue, maybe a drill if cutting tougher materials) will be needed for construction.

While you can improvise many parts, some specialized components can make your life easier. A good DC generator (motor) for the wind turbine is crucial. KidWind sells a recommended **Wind Turbine Generator** (the "KW-GEN"), which is popular for its reliability at low wind speeds. KidWind (in partnership with Vernier) also offers **complete wind and solar kit bundles** – for example, a wind turbine starter kit with a generator, hubs, blade materials, and a multimeter, or a solar structure kit – available through their **online shop**. *"We know where to find the hard or specialized parts that make the process a little easier. Check out the Shop."*. As a coach, you may want to consider purchasing a kit if your budget allows, especially if you don't have any existing

materials – but it's not required. Many teams succeed with homemade components. Either way, gather what you need: **blades, hubs, a generator, wires, a tower, tape/glue, tools, etc.**, so that once you start building, the students have a variety of supplies to work with.

Additionally, James Madison University's CASE program, KidWind's Virginia Sponsor, is supplying free base-level kits for new teams as well as a list of other helpful gear to help your team succeed!
Request a free kit here. AND, view the gear guide here.

Step 6: Build, Test, and Refine Your Design

Now comes the core of the Challenge – **engineering your wind turbine or solar device**! Please encourage your students to be systematic and iterative in their build process. Rarely will the first design be perfect; the KidWind Challenge is all about learning through trial and error (just like real engineers). Students should construct their device, test its performance, evaluate results, and then refine the design repeatedly. The KidWind organizers emphasize that the **best-performing turbines and solar structures are usually those that teams spent hours tweaking and testing**. *"The best turbines and solar structures are the ones your team spends hours tweaking and testing. There is a lot you can learn just by putting things together and testing them out."*. In practice, this means after your first build, measure how it performs (e.g., how much voltage does your wind turbine generate? Does your solar house light up all the LEDs as intended?), then discuss with the team what could be improved. Maybe the blades could have a better angle or a different shape. Perhaps the turbine requires gearing for increased speed, or the solar panel arrangement could be optimized. Make one change at a time and test again – students will see firsthand how each adjustment affects performance.

Testing can be done right in your classroom or at home. For wind turbines, you'll need a fan to serve as a wind source. A box fan with multiple speed settings works well (place it a few feet away and try different speeds to simulate varying wind). Use a multimeter to measure your turbine's output in volts and amps, or try lifting small weights with the turbine to see the mechanical work it can do. For solar projects, use a high-intensity lamp or go outside on a sunny day to test the panels' output and the functionality of the device. KidWind also provides helpful tools on their website, such as an online **Performance Calculator** that allows you to input your turbine's

measurements and estimate its energy output, as well as design worksheets to track your testing data. Taking advantage of these tools can help your team quantify improvements.

Don't be afraid to let students experiment with bold ideas. Some teams try adding gearboxes or belt drives to increase generator speed, others test exotic blade materials or shapes (remind them of the rule: no metal blade edges or dangerous materials). Solar teams might incorporate storage (capacitors, batteries) or creative loads like water pumps or sensors. **KidWind's online "Tinker" guide** is an excellent resource for deeper technical tips on such topics. *"These pages will help you better understand the major systems when constructing a solar structure or wind turbine. There is a lot of information here, so take your time and explore all the links and information!"* Tinker Page. The Tinker section on the KidWind site delves into specifics: for instance, it explains different **generator options** (KidWind's standard generator vs. open division higher-powered generators or even homebuilt ones), discusses blade design considerations, tower stability, wind tunnel tips, and more. Use these guides to help troubleshoot problems with your team and inspire new solutions. Throughout the build-test cycle, also have students practice explaining what they're doing and why – this will prepare them for the judging session later.

Step 7: Prepare for Competition Day (Present and Have Fun!)

As the event day approaches, ensure your team is **ready to showcase their work**. Revisit the rules for any final checks: Do you have all the required parts of the project completed? (e.g., turbine built to specs, or solar house fully assembled), And did you prepare the **necessary documentation**? Most KidWind Challenges ask teams to document their design process, which could be a formal engineering notebook, a poster, a slideshow, or a written report – check your Rulebook for what's expected. Please ensure the students have compiled this and practiced discussing it. It's often helpful to rehearse a **presentation or interview**: have students take turns explaining how they designed their turbine/solar device, what problems they encountered, how they fixed them, and what they learned. Judges will likely ask questions along these lines, so practicing a bit will boost the team's confidence.

When the day arrives, **come prepared**. *"Make sure you know where you are going and what to expect when you get there!"* – double-check the event location, start time, and what you need to bring. Pack up your wind turbine or solar device carefully (you don't want it broken before you even compete!), along with any spare parts and tools for last-minute fixes. It's wise to bring things like extra blade materials, tape, scissors, and so

on, in case something comes loose or you want to tweak on-site. Also, get copies of your documentation (notebooks, posters, etc.) to show the judges. **All team members and the coach should be present** at check-in, as many events require the whole team to attend the judges' interview and be on hand during testing.

During the competition, your team will typically rotate through multiple **challenge components**. For the **performance test**, teams will run their device in the official testing setup. Wind teams will put their turbine in KidWind's wind tunnel (or in front of large fans) to measure energy output over a set time, usually 30 seconds per trial. Solar teams will test their solar structures under a high-intensity light array (a simulated sun environment) and demonstrate how well their device powers the intended loads. These performance tests often contribute a significant portion to the overall score. Then there's the **judging session**: a panel of judges will examine the device and ask the students questions about their design, their testing process, and their understanding of wind/solar energy principles. This is where your team's preparation in documenting their work pays off – students should show their posters or notebooks and confidently explain their project's journey. Judges love to see that students did the work themselves, learned from failures, and understand why their design behaves as it does.

Many in-person KidWind events also include one or more **Instant Challenges** or quick team tasks on the spot. For example, an instant challenge might be building a quick wind-powered car out of household materials, or a quiz bowl round with rapid-fire energy questions. These are scored separately and added to the team's total – they encourage teamwork and broader knowledge. There might also be a short **knowledge quiz/test** in some events, covering general renewable energy facts (the Rulebook's "Big Questions about Energy" section is a great study resource for this). It's all designed to be fun and educational, so encourage your students to do their best and enjoy the experience simply.

At the end of the event, scores from all components are tallied, and winners are announced by division. While everyone likes to win, the emphasis of KidWind is on learning and enthusiasm for clean energy. There are often awards or recognition for things like most innovative design, best documentation, or team perseverance – not just highest energy output. **Celebrate your team's hard work**, no matter the outcome. As a coach, make sure to highlight how much the students have learned and accomplished by participating.

And who knows – if your team performs exceptionally well, this might not be the end of the road! **Top-performing teams** at regional events often earn the chance to go on to higher levels of competition. In some areas, there may be a state or multi-state **KidWind Challenge championship**, and beyond that, the **World KidWind Challenge** awaits. *"KidWind invites top-performing teams from wind and solar Challenges to compete in the World KidWind Challenge."* These invited teams (across all three age divisions) get to travel to a national event to compete with the best of the best. This can be a phenomenal experience – meeting other teams from around the country (or globe), swapping ideas, and networking with energy professionals. If your team earns an invitation, KidWind will provide details on how to participate in the World Championship. Even if you don't make it that far, simply being part of the KidWind Challenge has a lasting impact on students. Many alums cite it as a highlight that inspired them to pursue STEM fields.

Step 8: Reflect and Enjoy the Journey

Finally, take time after the competition to **reflect on what was learned**. Discuss with your team what worked well and what could be improved. This reflection consolidates the learning experience – and perhaps sparks ideas for next year's KidWind Challenge! Encourage students to stay curious about renewable energy. They can continue exploring with more KidWind activities or even consider starting an energy project at school or in the community.

Most importantly, **have fun** throughout this entire journey. *"We like to think of KidWind Challenges as a celebration of renewable energy knowledge! Come ready to learn, share, and explore renewable energy."*. Whether your wind turbine barely flickers a light bulb or powers a small city (okay, maybe not a city…), the point is that students are engaging deeply with science and engineering. As a coach, you've enabled a hands-on learning experience that textbooks alone can't provide. So enjoy it! The KidWind community is passionate and supportive – don't hesitate to reach out to fellow coaches or the KidWind organizers for advice or to share successes. Good luck, and we hope to see your team's turbine spinning or solar house shining at a KidWind Challenge soon!

Resources and Links Summary: (All links go to KidWind's official website)

Find a Challenge Event: Use KidWind's event finder page to locate in-person competitions near you. KidWind Official 2025-2026 Rulebook

Official Rulebooks: Download the latest Wind Challenge and Solar Challenge rulebook PDFs from the KidWind Rules page. KidWind Rules.

KidWind Curriculum & Activities: Explore free lessons and project guides on the KidWind Classroom Activities page – e.g., blade design lessons, solar car activities, and more. KidWind Activities Page

Building Guides ("Tinker"): Read in-depth tips on turbine generators, blade construction, solar panel wiring, etc., on KidWind's Tinker resource section. KidWind Tinker Page

KidWind Shop: Browse wind and solar kits, replacement parts, and equipment on the KidWind Shop (for example, the KidWind generator, multimeters, and solar panels).
Workshops/Webinars: Check KidWind's training section for educator workshops or webinars if you want additional guidance (e.g., the REcharge Academy). These training opportunities can help you develop the skills to coach your team more effectively.

Request a free kit: https://docs.google.com/forms/d/e/1FAIpQLSdO8_0sJ-2dpEKKPxIBZvSLeRy4BlnEeI-VZ8ydctkEDSfQAA/viewform

Check out the additional supply suggestions:
https://www.jmu.edu/case/educator/kidwind_supply_info._for_educators.pdf.

By following these steps and utilizing the resources above, you and your students will be well on your way to a successful – and enjoyable – KidWind Challenge experience. Good luck, and **let the wind blow!**

Questions? Contact Dylan Mason @ 757-894-7275.