COLLEGIATE WIND COMPETITION
U.S. DEPARTMENT OF ENERGY

U.S. Department of Energy Collegiate Wind Competition

October 22, 2018

National Renewable Energy Laboratory
Collegiate Wind Competition Organizing Team

Please mute your line as you join the meeting.

Welcome

This purpose of this webinar is to share information about the U.S. Department of Energy Collegiate Wind Competition for those interested in responding to the **Collegiate Wind Competition 2020 Request for Proposal**.

Agenda

About the Collegiate Wind Competition	AWEA WINDPOWER
Why is this a priority?	Expectations
History of the Competition	Timeline
Overview of contests	Review of criteria
Wind tunnels	Lessons learned

Question & Answer Period

Type your question in the CHAT BOX in your "Control Bar" at any time during the webinar.

Questions will be addressed during the Q&A period at the end.

Note that organizers cannot answer questions specific to the RFP on this webinar.

Webinar recording and transcripts will be posted on energy.gov/CWC.

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About the Collegiate Wind Competition

The Collegiate Wind Competition is unlike any other undergraduate-level competition of its kind.

Interdisciplinary

- The wind energy industry is not one-dimensional so the competition shouldn't be either.
- The competition is designed to cultivate creative thinking and problem solving to formulate novel solutions. This requires teams comprised of diverse backgrounds.
- Help students see the comprehensive picture, not just one standalone piece of the puzzle.

Intertwines academic coursework with hands-on learning

- Good platform for STEM education.
- Learning experience that can't be replicated in the classroom alone.

Experience with real-world challenges

- Highly sought after by hiring managers.
- Best preparation for a successful career.

Direct interaction with industry experts

- Introduce next generation workforce to the wind energy industry.
- Show students the diverse opportunities in wind energy.
- Support industry in locating highly qualified candidates.
- Foster information sharing between industry and academia for mutual benefit.

Partner with K-12 programs

- Your own learning deepens when you invest in another's learning.
- Role models to younger students; inspire them to pursue pathways to wind energy careers.

Testimonials

"The event was a great experience for our students. I particularly enjoyed seeing the [school name] students embrace the spirit of the competition - interacting with the KidWind teams, discussing their plans and designs with other CWC teams, and supporting each other as they struggled, and persevered, through many challenges. **The experience they gained over the past year, and particularly this past week, will be invaluable as they continue their education and enter the workforce**."

"**Opportunities like CWC have allowed many of us to land our dream jobs.** I am excited to see how the wind industry can be transformed in the coming years and the impact it can have on the energy industry!"

"…the networking, interactions, and experience of it all is really **not comparable to anything the students can get in a classroom**."

"From a WHOLE PROGRAM perspective, my personal measure of success emphasizes the learning experience of our students. From that perspective it was a great success, as the **students from our institution were uniformly engaged and gained an experience that is impossible to replicate in a traditional classroom setting**. From an EVENT perspective my principal measure of success pertains to how well the event was executed and whether it was administered fairly, and in both cases my response is a resounding YES."

"**If it wasn't for this competition, our undergraduate programs wouldn't have such meaningful projects to work on related to wind energy**."

"This competition…has been my **favorite part of my undergraduate experience** and something **I will reference for the rest of my career** in developing me as an engineer."

Why CWC? Expanded Need for Workers in Wind Energy

Recent studies suggest that wind energy could supply 10% of the nation's electricity needs by 2020, 20% by 2030, and 35% by 2035.[1] We need a highly qualified workforce to meet growing needs.

AWEA and DOE research demonstrates the need for trained workers to support expanded industry growth with great career potential:

- Scientists, researchers
- Educators
- Design, research, and field engineers
- Technical workers: technicians, trade workers
- Project managers, marketing, finance, and business professionals

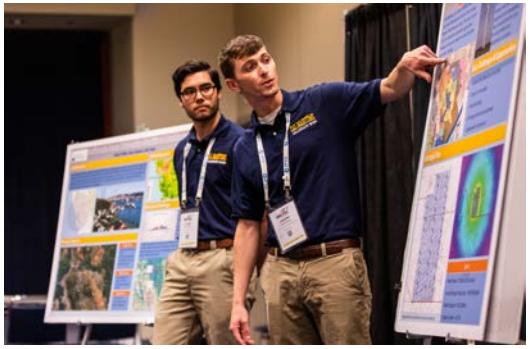
Research shows:

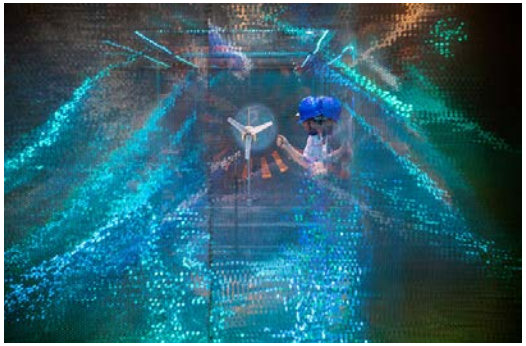
- Wind industry workers can earn high-paying salaries while working to change the world.
- Many of these careers require relevant bachelors degrees.
- Hands-on wind experience is of high importance to employers.
- Need to focus on undergraduate programs that have both formal wind focused programs and activities that expand cross-sector wind experience.

[1]U.S. Department of Energy, *Wind Vision.* 2015.

Collegiate Wind Competition History

Inaugural 2014 Competition	2015 Engineering Contest	2016 Competition	2017 Technical Challenge	2018 Competition
At AWEA WINDPOWER in Las Vegas, teams designed and built a **lightweight, transportable wind turbine to power small electronic devices**. One contest focused on wind deployment issues and challenges along with a business plan contest.	At the National Wind Technology Center in Colorado, the competition emphasized analytical modeling and validation together with electronics and turbine control skills.	At AWEA WINDPOWER in New Orleans, teams focused on the design and construction of a **wind-driven power system that can supply electricity to device(s) not connected to the grid** with a load system that visually indicated the power being generated. One contest focused on deployment expanding on the business plan.	At the National Wind Technology Center in Colorado, the Competition **introduced yaw** to the turbine testing contest and **piloted a siting contest** as a bonus challenge.	At AWEA WINDPOWER in Chicago, teams were asked to research and design a **turbine for a grid scenario with a high contribution of renewables** and be able to operate in an islanded mode. Had **siting** as an official contest along with a **business plan** contest.





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CWC Contests and Activities for 2020

COMPETITION CONTESTS:

Turbine Design

- Design report
- Questions and direct feedback from a panel of judges

Turbine Testing

- Test the durability and power generation of your turbine in an official CWC wind tunnel

Project Development

- Project development report
- Siting and financial analysis
- Private presentations with questions and direct feedback from an expert panel of judges.

RECOMMENDED OPPORTUNITIES:

- Industry engagement
- Community involvement and outreach
  - KidWind challenges
  - Wind energy events at the university.

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Competition Wind Tunnels

- Three purpose-built tunnels designed and fabricated by National Wind Technology Center engineers and technicians.
- Designed to test wind turbines with rotors less than 45 cm in diameter.
  - Two Gen 1 tunnels: 19-ft long with 4 by 4-foot test chamber.
  - One Gen 2 tunnel: *40-ft* long with *two* 4 by 4-foot test chambers.
- Turbines are subjected to a range of wind speeds and tested for durability, safety, cut-in, power curve, and control. See Rules and Requirements for examples.
- Wind tunnel specifications can be found in section 5 of the 2019 Rules and Requirements.

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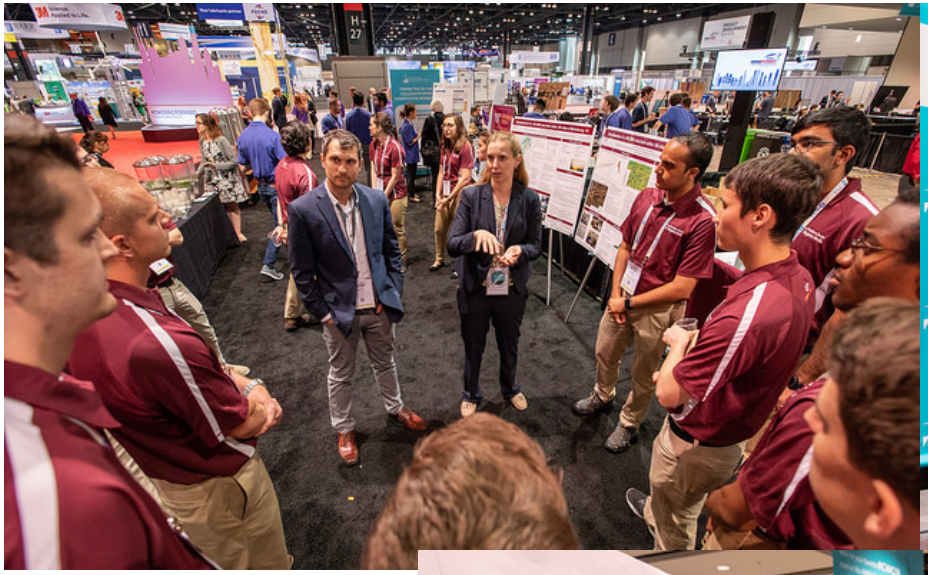
Co-Located with AWEA WINDPOWER



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Commitment from Organizers

- Host full-service collegiate competition at AWEA WINDPOWER in 2020
- Ensure fair and unbiased competition environment with expert judging
- $20K seed funding
- Wind energy educational opportunities
- Inclusion in alumni group
- Opportunities to engage with wind industry professionals
- Opportunities to engage with K-12 STEM education efforts.

Expectations from Teams

- Compete in 2020 competition in a professional and collegial atmosphere.
- Bringing wind energy education into the classroom.
- Further seed funding through fundraising.
- Spread the CWC message through outreach and local impact.
- Take advantage of educational opportunities provided.

Timeline

	Competition Activity
Fall 2018	Proposal development by prospective teams; due 11/30/18
Winter 2018/2019	Deliberation and selection of teams by selection committee
Early Spring 2019	Notify and announce awardees
Spring 2019	Awardees recruit team members and plan for competition year; pursue sponsorships and mentors
Fall 2019-Spring 2020	Product development and submission
June 2020	Competition takes place in Denver, Colorado.

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Competition Schedule

This schedule is *subject to change*, but provides a high-level overview of what to expect:

- Engagement throughout the full academic year
  - Development of contest products and product submission
  - Support student learning on relevant subject matter
  - Local outreach
  - Fundraising
  - Participation in all team calls
- 3-day live event at AWEA WINDPOWER
  - Team check in/registration
  - Technical inspections (safety and compliance check)
  - Kick-off meeting
  - Tunnel testing practice
  - Official tunnel testing
  - Presentations
  - On-site siting contest
  - Team expo
  - Awards ceremony.

Criteria for Selection

- Educational Objective and Integration (20%)
- Organization and Project Planning (20%)
- Team Inclusivity (20%)
- Institutional Support and Fundraising (20%)
- Communication and Outreach (20%)

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Lessons Learned

Matt Shields, Former PI from Seattle University

- Seattle University (first-time competitor in 2018)
  - Small, undergraduate-only school with no wind tunnel and no previous wind program
  - Available resources: 3D printers, machine shop, electrical engineering labs, senior design projects, internal funding (~$6K), access to University of Washington wind tunnel. Built a basic wind tunnel for $600 in summer 2017.

Challenges	Solutions/mitigation
Complexity of project – students have difficulty retaining all details of design	Focus on simple design (i.e., fixed pitch blades, basic control strategy); optimize later if there is time. Wind 101 workshops and "coursepacks" at the start of year. Identify tools and methods used by previous teams (i.e., Qblade blade design software). Industry and faculty mentors with a clear understanding of project.
Implicit, interdisciplinary design process (i.e., blade/generator dependencies, wind resource/market dependencies)	Have to start somewhere. Pick an initial design condition and build around it. Utilize commercially available design values. Electrical and control team should understand blade aerodynamics and vice-versa. Subteams need to meet frequently. Don't let teams get paralyzed. Test as early as possible.
Communication (faculty/students, within subteams, engineering/business, team/NREL)	Strong, organized student project manager. Understand R&R document (know where points are allocated). Work around busy schedule. Keep team members engaged. Balance university/CWC deliverables.

Lessons Learned

David Alexander, PI California State University, Chico

Lessons Learned

- Create opportunities for cross-disciplinary teams to work together
- Create firm internal deliverables
- Reach out to industry advisors for support
- Test early and get everyone involved
- Decide on your travel team early – logistics, payment, paperwork take time.

Questions and Answers

Submit questions through contact provided in the RFP

Important Links and Tips

- **Request for Proposals** are due November 30, 2018.
- **2019 Rules and Requirements**, **2018 Rules and Requirements** and **past competitions** are important to reference to get a better understanding of what the competition entails.
- Previous **reports** submitted by teams can be found by going to past competitions and then to the team pages.
- It is never too early to start looking for potential team mentors and sponsors!

energy.gov/CWC

Thank you for joining us today on this informational webinar!

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