Sunset overlooking the east side of the Las Cruces Organ Mountains from White Sand National Park Monument.

2025 JUDGE MANUAL

YOUR SOURCE FOR:

- Contest schedules
- Judging guidelines
- Judging logistics
- Online score entry
- Task Overviews
- Award descriptions

INTRODUCTION

Thank you for judging the WERC Environmental Design Contest! We depend on your experience as a professional to prepare undergraduate students for careers in engineering.

Judges' experience varies widely and may include expertise in evaluating:

- technical aspects,
- reporting,
- government regulations,
- scale-up and business implementation,
- waste streams,
- community relations, environmental impacts, etc.

You need not have experience in all of these areas. The combined experience of the team of judges is what we need to provide a wealth of insights for the students.

JUDGING PHILOSOPHY AT WERC

Approach your judging with kindness and consideration for students who may not have much real-world experience. A key role of a judge is to provide guidance and input in a professional way so that students learn from the experience. Treat the student teams as colleagues to help them learn how to communicate on an equal footing with engineers. When students feel respected by experienced professionals, they're more motivated to develop the skills needed for success.

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SCHEDULE OF EVENTS

Pre-contest Duties

April 1 – 6, 2025: Score all 25-page technical reports that you are assigned.

Contest Duties April 6 - 9, 2025 *(Schedule subject to change)*

NM Farm & Ranch Heritage Museum, 4100 Dripping Springs Rd., Las Cruces, NM

MANDATORY AND OPTIONAL JUDGE EVENTS

All events in this manual are listed in Mountain Time

2025 Mandatory Contest Duties for Judges		
April 1 – 6	Flexible	Score technical reports (from home)
Sun, 6 April	8p – 9p	Judges' Orientation Meeting
Mon, 7 April	8a – 4:30p	Breakfast, Oral presentations, Lunch, Poster Sessions
Tues, 8 April	8a – 2p	Breakfast, Bench-scale demonstrations, Lunch
Wed, 9 April	9a – 2p	Awards Deliberation Meeting, Lunch

Optional Events (we hope you can attend):		
Sun, 6 April	4p– 6p	Team Welcome & Flash Pitch Competition I (*Brief overview of all teams' designs*)
Sun, 6 April	6p – 8p	Welcome Dinner & Flash Pitch Finals Judges introduced ~6:30 pm
Tues, 8 April	4p – 6p	Game Night (taco bar, games, karaoke)
Wed, 9 April	6p – 8p	Awards Banquet

COMPLETE CONTEST SCHEDULE

All Events Below: Farm & Ranch Heritage Museum, Las Cruces, NM
Times: Mountain Time

2025 WERC Schedule - Judges	
Sunday, April 6	
1:00 - 4:00 PM	Registration
4:00 - 5:45 PM	*Welcome and Flash Pitch Competition, Round I (optional)*
6:00 - 7:00 PM	Dinner and Keynote Address – Judges Introduced
7:00 - 8:00 PM	*Flash Pitch Competition, Final Round (optional)*
8:00 - 8:30 PM	Mandatory Judge Orientation Meeting
8:30 - 9:00 PM	Judging groups meet and organize
Monday, April 7	
8 AM – 8 PM	*Bench-scale area is open. PPE required.*
7:30 - 8:30 AM	Judges' Breakfast served in Judges' Room
8:30 - 11:30 AM	Oral Presentations
11:30 - 12:15 PM	Lunch served
12:15 - 3:15 PM	Oral Presentations
3:15 - 3:30 PM	Teams move posters to Ventanas
3:30 - 4:30 PM	Poster Session Teams + Judges
4:30 - 5:00 PM	Judge's networking & score entry
Tuesday, April 8	
8 AM – 4 PM	*Bench-scale area is open. PPE required.*
7:30 - 8:30 AM	Breakfast served in Judges' Room
8:30 AM - 12:30 PM	Bench-Scale Demonstrations
1:00 - 1:45 PM	Lunch served
4:00 - 5:30 PM	*Game Night, Reception, Food (optional)*
Wednesday, April 9	
9 AM - 12:00 PM	Judges–Award deliberations
12:00 - 12:30 PM	Judges' Lunch served
12:30 - 2:00 PM	Judges' Award Deliberations, *continued*
5:30 - 8:00 PM	Dinner & Awards Ceremony

WERC ENVIRONMENTAL DESIGN CONTEST OVERVIEW

FIVE CONTEST EVENTS

There are five events at the contest. You will be judging four of them.

We refer to these four as the "Main Contest Events."

FLASH PITCH COMPETITION

The Flash Pitch Competition is a stand-alone event within the WERC Environmental Design Contest. It is judged by a separate set of judges that do not engage in main contest events. The competition is held on Sunday before and after the WERC Welcome Dinner. You are welcome to watch the competition, but you will not be involved in scoring it.

The primary goal of the Flash Pitch Competition is introducing engineering students to the process of creating a business pitch and sparking an interest in entrepreneurship. The second goal is to provide an avenue for students to learn to effectively communicate with a wide range of audiences (an ABET Engineering accreditation goal).

THE FOUR MAIN CONTEST EVENTS

You will be judging the four main contest events listed below.

- Written Report—Teams submit their report by midnight March 31, 2025.
  - Download, read, and score each written report prior to the Monday Oral Presentation.
  - Enter scores on the judging site for each rubric item.
  - Include detailed feedback in the "Comment" box to help the teams learn after the contest.

- Oral Presentation (Business/Business Casual attire)
  - 35-minutes each (15 for presentation, 15 for questions, 5 for team setup/breakdown). There is a 10-minute break between presentations.
  - Judges will not speak during a presentation until the team calls for questions.
  - Subtract 25 points for a team that goes over time or if a faculty advisor speaks up about the presentation (but helping teams with logistical problems is OK).

- Poster Presentation. (Business/Business Casual attire).
  - All posters set up in one room, with teams standing beside their posters to answer questions.
  - Judges visit each team's poster in groups of 2-3. Plan for a 10-minute visit per poster.

- Bench-scale Demonstration (Laboratory/working/business casual attire)
  - Judges visit each bench-scale demonstration in groups of 2-3, spending 30-minutes per team.
  - The team initiates the discussion by giving a very brief introduction to their project. This leads to a two-way discussion of engineers working together to solve a problem.
  - Teams should answer questions they could not address during their Oral presentation.

JUDGE RESOURCES:

- WERC WEBSITE. Find general rules, manuals, tasks here: https://werc.nmsu.edu
  - Study task requirements: https://werc.nmsu.edu/team-info/2025-tasks-faqs.html
  - Find Judge resources: https://werc.nmsu.edu/judges/judges.html

- WERC JUDGING SITE. Enter judging preferences, view your assigned teams, download reports, enter scores, view composite scores: https://wercteams.nmsu.edu

- SAMSUNG GALAXY TABLETS: You will often be on-the-move at the contest – walking around the poster session and the bench-scale demonstrations. You may use your own device to log in to the WERC judging site or we can lend you a Samsung Galaxy tablet with a keyboard to use for entering scores and comments while you are at the contest.

WHAT TO EXPECT

- April 1-6: Score technical reports for your assigned teams.
- April 6-9: Contest on-site in Las Cruces. NM Farm & Ranch Heritage Museum, 4100 Dripping Springs Rd.
- Be a part of a group of approximately 6-8 judges per task. Each judging group has a Group Leader.
- Work with the same teams throughout the contest and guide them from your unique perspective.

YOUR TASK ASSIGNMENT

- Log in to the WERC judging site to see your assigned teams.
- Ensure that you have completed your Profile before proceeding. If you have not, your Profile page will be the only page you can open.
- Click on "TEAM".
  - Task 1, 2, 4, and 6 judges: You will score all events for all teams that populate the TEAM page.
  - Task 3 and 5 judges: You will be assigned to score the reports from only five of the teams registered for your task, and you will score all teams for the oral, poster, and bench-scale presentations.

WERC JUDGING GUIDELINES

1. Remember kindness
   a. Be friendly and show respect for the students at all times.
   b. Bring all team members into the conversation.

2. You are part of a team of judges
   a. The judging team includes members with different strengths and expertise. Not everyone is technical or has the same focus. We are looking for an overall balanced evaluation.
   b. Score independently of other judges until we discuss scoring on Wednesday morning.

3. Attire:
   a. Orals and Poster: Business or Business Casual.
   b. Bench-scale Area: Business Casual. Wear proper PPE at all times in the bench-scale area (Tortugas Gallery) on Monday and Tuesday. At minimum:
      - Safety glasses (provided at the Tortugas entrance),
      - Long pants,
      - Close-toed shoes.
   c. Game Night, Tuesday: Casual dress

4. Be consistent across team scoring, and make sure there is a differential in your scores.
   a. Consistency: Try establishing the judging criteria you will follow before judging begins, and judge all teams against the same criteria. The criteria might be the judging rubric or your own 5-6 key points.
   b. Scoring Differentials: Ensure your scores reflect differences between teams and criteria. If your scores are too uniform, they won't help distinguish between teams and could effectively cancel out your input.
   c. The written report will be your first scoring opportunity, making it a good time to establish your goals for consistency and score differentiation. Do not judge a team's project solely on the basis of the written report. Take into consideration all aspects of the competition.

5. Q/A During the Oral Presentation
   a. Support and encourage the teams. They will be nervous.
   b. After every judge has asked one question, you may ask a second question.
   c. Ask one question at a time, without 10 parts. At most, ask a question with only two related parts. e.g., How did you determine the costs for your project, and what are the operating costs for your proposed project?
   d. Hard questions are fine, the students learn from them, but they need to be fair; do not argue with their answer or try to show you are smarter!
   e. Ask your questions as questions. Be considerate of the teams and do not make a statement to show off your knowledge.
      i. Do: "Can you explain your plan for addressing waste streams?"
      ii. Don't: "YOUR PLAN FOR ADDRESSING WASTE STREAMS WOULD NEVER BE APPROVED."
   d. Ask questions to help teams show their knowledge:
      iii. Do: "I did not see a cost analysis in your paper or presentation. Did you have an idea about what your costs might be?
      iv. Don't: "You did not provide a cost analysis. Why not?"

6. Reviewing the Bench-scale Demonstration
   a. Students are generally more relaxed and excited to discuss their projects during the bench-scale presentations.
   b. Ask all team members to present during the bench scale demonstration.
   c. Bench scale demonstrations rarely take the full amount of time allotted for review. If time allows, give the teams an opportunity to ask the judges questions.

CONTEST SCORING

ENTERING SCORES
Enter your scores on the WERC judging site. (Go to https://wercteams.nmsu.edu > TEAM; then click the Grading button for each team.)

For help using the judging site, See Appendix A (Judges' Guide to the Judging Site)

SCORING RUBRICS (See next 6 pages)
Continually re-evaluate this rubric as you progress through scoring the report, orals, poster, and bench events:

1- Technical Content, Environment, Community Outreach

Use the event-specific scoring rubrics for each event:

2A- Quality of Technical Report and Audits
2B- Quality of Oral Presentation
2C- Quality of Poster Presentation
2D-Quality of Bench-scale Demonstration
3-Bench-scale Demonstration Competition

SPECIAL SCORING STRATEGY FOR RUBRIC 1
Since Rubric 1 is scored across all events, consider your strategy for scoring along the way.

- **Take Notes:** Keep good notes to ensure that the team's final Rubric 1 score reflects your impression of their work across all events.

- **Setting preliminary points:**
  - The judge scoring site will allow you to update scores any time, up until 9:00 AM Wednesday April 9 (the beginning of the Awards Deliberations Meeting). Each time you press the Submit button, your scores will update.
  - After scoring the report, you may choose to enter preliminary points for Rubric 1 online, and re-score these after the Orals, Poster, and/or Bench presentations. Each time you press the Submit button, your scores will update.

Rubric 1 – Tasks 1, 3, 4, 5, 6 (75% of total)

- Items I through III are assessed across multiple events. Judges will continue to update your score in these areas as the contest progresses.
- Items IV and V are event-specific, with IV evaluating audits collected by your team and V covering Team Communication for each event (report, orals, bench, and poster).

Percent of Final Score

40% **I. Technical Content** (Written report, Oral presentation, Poster, Bench demonstration)

A. Background Research
B. Consideration of alternative technologies, justification for technology chosen, and discussion of situations in which alternative technologies may be preferable to your team's design
C. Innovativeness of chosen technology
D. Design thoroughness (mass & energy balances; process flow diagrams; waste stream management)
E. Quality, thoroughness, and reasonable results of Techno-Economic Analysis and addressing costs of alternatives.
F. Design practicality (cost-effectiveness; attainable with current technology, likelihood of implementation)
G. Lab results validate claims

20% **II. Environment** (Written report, Oral presentation, Poster, Bench demonstration)

A. Local environmental health and safety
   a. Safety considerations are appropriate and included in plans for construction and operation.
   b. Governmental regulations at all levels (federal, state, local) are accounted for and are appropriately applied to the project
   c. Reasonableness (i.e., do not require a hard hat when there are no head trauma hazards)
B. Natural environment
   a. Waste stream management
   b. Relevant agencies and permitting accounted for
   c. Long-term sustainability

10% **III. Community Outreach** (judging primarily focused on Written report & Oral presentation)

A. Effect on local area (quality of life; property values; pollution treatment or prevention)
B. Community Relations Plan: Plan and schedule for communication with local population to address perceptions. (i.e., overcoming perception that direct potable reuse is drinking toilet water.)
C. Public Involvement Plan (Community Acceptance Plan). Plans for engaging stakeholders in decision-making are sound.
D. Community outreach: Did the team post social media recognizing sponsor and WERC? (Judges will ask the team to show a social media post during the Bench-scale demonstration)

Rubric for Tasks 1, 3, 4, 5, 6

Rubric 2 – Tasks 1, 3, 4, 5, 6 – Effectiveness of Team Communication (25% of total)

10% **A. Quality of Technical Report**

1. Spelling and other typographical errors
2. Proper grammar
3. Organization (appropriate section flow, clearly marked sections, page numbers in Table of Contents)
4. Executive summary covers important points and omits non-essential information
5. Appropriate balance between background research and the final design discussion
6. Thorough and accurate process flow diagram (where applicable)
7. Effective use of figures and tables (Figures & tables aid communication; text & graphics are readable)
8. All three audits are included (Economics, Health & Safety, Legal)
9. Auditor credentials are appropriate to the audit topic
10. Auditor objectivity (should be far-removed from project development)
11. Team implemented auditor comments, as appropriate
12. Late reports are penalized by 25 points per day late.

5% **B. Quality of Oral Presentation**

1. Slides free of spelling and other errors.
2. Slide design (appropriate amoun/types of content on each slide; readability from the audience)
3. Presentation is well planned: smooth topic flow, appropriate number of slides, not rushed.
4. Quality of speakers' delivery (easy to hear & understand; talked to audience, not the floor; etc.).
5. Appropriateness of attire (Team Manual specifies business attire).
6. Quality of answers to judges' questions.
7. Subtract 10 points for each minute over time or if there are too many presenters.
8. Subtract 10 points if faculty advisor speaks once the presentation begins.

5% **C. Quality of Poster**

1. Poster attracted the judge to read it.
2. Poster is free of misspellings, grammar, and similar issues.
3. Poster is not overly nor under-worded, has no large blocks of text; has sufficient white space with easy-to-follow flow.
4. Good ratio of text and graphics (graphs, tables, photos).
5. Poster can stand on its own to convey information.
6. Poster can be read from a reasonable distance away (i. e., viewer should not have to stand six inches away to read the text).
7. 10 points deducted if the poster exceeds 36” x 48”

5% **D. Quality of Bench-Scale Presentation**

1. Apparatus demonstrates proposed technology and works as intended.
2. Apparatus is safely operated at all times.
3. Team clearly explains how proposed technology works.
4. Team incorporates poster when appropriate for needed information.
5. Teams appropriately addressed questions outstanding from oral presentation (if applicable).
6. Quality of answers to judges' questions about the bench-scale demonstration.

Rubric for Tasks 1, 3, 4, 5, 6

Rubric 1 – Task 2 (75% of total)

Below are the scoring rubrics that judges will use to score the contest. Task 2 has unique requirements that warranted a distinct rubric.

Items I through III are assessed across multiple events. The judges will continue to update your score in these areas as the contest progresses. Items IV and V are event-specific, with V covering Team Communication for each event (report, orals, bench, and poster).

Percent of Final Score

40% **I. Technical Content** (Written report, Oral presentation, Poster, Bench demonstration)

A. Demonstrated research and understanding of integrating an intermittent renewable resource with a hydrogen fuel cell to provide a firm dispatchable resource.

B. Successfully demonstrates integration of the hydrogen fuel cell with renewable energy sources.

C. Thoroughness and quality of operational protocol detailing how the utility will manage DER capacity and energy for dispatch, focusing on firm energy resources.

D. Reasonable and effective operational protocols for DER engagement that details how the utility will manage DER capacity and energy for dispatch, focusing on firm energy resources.

E. Algorithms for the overall system successfully respond to DERMS signals from the utility.

F. Algorithms successfully respond to PV system variability, ensuring that the firm dispatchable resource is as consistent as possible, with minimal DC ripple.

G. Innovativeness of technology

H. Demonstrates that the solution can be scalable from small residential size up to large-scale utility size.

I. Quality, thoroughness, and reasonable results of Techno-Economic Analysis for full-scale implementation of a DERMS grid-tied solution that integrates an intermittent renewable PV source with a hydrogen fuel cell to provide a firm dispatchable resource. Includes CAPEX, OPEX, and potential revenue, with graphical representations of cost data

J. Well-documented and reasonable predictions of the energy management improvements for grid operators based on the planned operational protocols.

K. Well-documented and reasonable predictions of energy and cost savings (in US dollars) for consumers and/or grid operators.

L. Design and implementation practicality (cost-effectiveness; attainable with current technology, likelihood of implementation)

M. Demonstrates significant impact on the grid per dollar spent: Energy or Demand effectively reduced/increased as needed (1=Below average effect on kWh, 5 = Superior effect on kWh)

10% **II. Environment, Health, Safety** (Written report, Oral presentation, Poster, Bench demonstration)

A. Implementation plan addresses and adheres to utility regulatory framework (FERC, NERC, NEC).

B. Discussion of how regulatory approval will be achieved.

C. Team identifies and quantifies direct environmental and ecological impacts of the solution, such as the energy and water needed for hydrogen production and for operating and maintaining the DERMS, as well as the impact of manufacturing and maintaining specialty equipment needed for this design.

D. Team identifies and quantifies indirect environmental and ecological impacts of the solution, including how the design will affect greenhouse gas emissions, water consumption, habitats, etc.

E. Team effectively considers long-term environmental and economic sustainability of the design.

F. Implementation plans include hydrogen safety protocols.

G. Implementation plans include safety considerations for the utility.

20% **III. Community Outreach** (Written report, Oral presentation, Poster, Bench demonstration)

A. Effect on local area (quality of life; water usage, property values; pollution treatment or prevention)

B. Public Involvement Plan (Community Acceptance Plan). As warranted by your design, include plans for engaging the community and stakeholders (hydrogen storage & Electric company) during initial design phases. The public involvement plan should address avenues for the public to express their concerns and provide input in decision-making.

C. Community Education Plan: Plan and schedule for communication with the local population to 1) educate them on how their choices can support the grid, including adjusting their usage during peak load events, contributing intermittent energy to the grid (rooftop solar, etc.); 2) educate the public about the safety and environmental impact of hydrogen production and storage (consider the specific hydrogen production (green-, blue-, or other) that your design uses).

D. The Community Outreach plans (Public Involvement Plan and Community Education Plan) are well-researched, written in non-technical language, and appropriately address community needs and concerns.

E. Did the team post social media recognizing sponsor and WERC? (Judges will ask the team to show a social media post during the Bench-scale demonstration—more than one post is even better!) The post should acknowledge the task sponsor.

A.

Rubric for Task 2

Rubric 2 – Task 2 – Effectiveness of Team Communication (25% of total)

10% **A. Quality of Technical Report**

1. Spelling and other typographical errors
2. Proper grammar
3. Organization (appropriate section flow, clearly marked sections, page numbers in Table of Contents)
4. Executive summary covers important points and omits non-essential information
5. Appropriate balance between background research and the final design discussion
6. Thorough and accurate process flow diagram (where applicable)
7. Effective use of figures and tables (Figures & tables aid communication; text & graphics are readable)
8. All three audits are included (Economics, Health & Safety, Legal)
9. Auditor credentials are appropriate to the audit topic
10. Auditor objectivity (should be far-removed from project development)
11. Team implemented auditor comments, as appropriate
12. Late reports are penalized by 25 points per day late.

5% **B. Quality of Oral Presentation**

1. Slides are free of spelling and other errors.
2. Slide design (appropriate amount of information on each slide; readability from the audience)
3. Presentation is well planned: smooth topic flow, appropriate number of slides, not rushed.
4. Quality of speakers' delivery (easy to hear and understand; talked to audience, not the floor; etc.).
5. Appropriateness of attire (Team Manual specifies business attire).
6. Quality of answers to judges' questions.
7. Subtract 10 points for each minute over time or if there are too many presenters.
8. Subtract 10 points if faculty advisor speaks once the presentation begins.

5% **C. Quality of Poster**

8. Poster attracted the judge to read it.
9. Poster is free of misspellings, grammar, and similar issues.
10. Poster is not overly nor under-worded, has no large blocks of text; has sufficient white space with easy-to-follow flow.
11. Good ratio of text and graphics (graphs, tables, photos).
12. Poster can stand on its own to convey information.
13. Poster can be read from a reasonable distance away (i. e., viewer should not have to stand six inches away to read the text).
14. 10 points deducted if the poster exceeds 36” x 48”

5% **D. Quality of Bench-Scale Presentation**

7. Apparatus demonstrates proposed technology and works as intended.
8. Apparatus is safely operated at all times.
9. Team clearly explains how proposed technology works.
10. Team incorporates poster when appropriate for needed information.
11. Teams appropriately addressed questions outstanding from oral presentation (if applicable).
12. Quality of answers to judges' questions about the bench-scale demonstration.

Rubric for Task 2

Rubric 3 – Bench-scale Demonstration Competition – Tasks 1, 3, 4, 5, 6

A. Apparatus solves the problem outlined in the task.
B. Apparatus demonstrates all steps required in the task problem statement.
C. Analytical results validate claims made in reports and presentations.
D. Originality and craftsmanship of the apparatus.
E. Apparatus is efficient, simple, and easy to use.
F. Apparatus is reliable and robust.
G. Apparatus is safely operated at all times.
H. Design promotes environmental sustainability/minimizes waste.
I. Team presentation of the bench-scale apparatus was a well-organized group effort. Each team
member was prepared to present specific aspects.
J. Team's proposals for improvements or next steps in their technology exhibit good engineering judgement.
K. Quality of answers to judges' questions, including answers to previous day's questions.
L. Team effectively refers to poster when needed, and poster contained the graphs/data needed to support the bench-scale demo.

Rubric for Tasks 1, 3, 4, 5, 6

Rubric 3 – Bench-scale Demonstration Competition – Task 2

A. Apparatus shows successful integration of the hydrogen fuel cell with renewable energy sources.
B. Demonstrates the ability of the system to respond to utility peak- load events.
C. Demonstrates the ability of the system to respond to utility excess-energy events.
D. Successfully emulates a utility signal by generating its own internet-based control signal.
E. Additional functionalities (if added by the team) improved system performance.
F. Originality and craftsmanship of the apparatus.
G. Apparatus is efficient, simple, and easy to use.
H. Apparatus is reliable and robust.
I. Apparatus is safely operated at all times.
J. Team presentation of the bench-scale apparatus was a well-organized group effort. Each team
member was prepared to present specific aspects.
K. Team's proposals for improvements or next steps in their technology exhibit good engineering judgement
L. Quality of answers to judges' questions, including answers to previous day's questions.
M. Team effectively refers to poster when needed, and poster contained the graphs/data needed to support the bench-scale demo.

Rubric for Task 2

SCORING GUIDELINES FOR SPECIFIC EVENTS

EVENT 1: SCORING THE TECHNICAL REPORTS

Technical Report Overview

Download. Download each team's technical report from the judging site (wercteams.nmsu.edu > TEAM) If you need help navigating the site, follow the "Judges' Guide to the Judging Site." (Appendix A)

Deadline. The reports are scored on your own time. Complete your scoring prior to the Monday Oral Presentations (score the reports April 1 – 6). Teams will submit their reports by 11:59 PM.

Report Formatting

Report page limit: 27 pages, including all elements listed below, excluding the Audits. See Appendix B for published formatting guidelines.

Required elements (All included in the page limit):

- Cover page identifying the task, team number, school name, advisor(s), and team members
- Table of contents (include page numbers in the table)
- Executive summary (maximum of two pages) highlighting the proposed solution
- Report body, including PFD, figures, illustrations, photographs, and graphs
- References (no specific formatting is required, but they should be consistent within a paper)
- Three Audits: Health/Safety, Legal, Economics. (Not included in the page limit). Audits have no specific formatting requirements, but should be on company letterhead, if applicable.

Scoring

To enter your scores, go to wercteams.nmsu.edu > TEAM; then click the Grading button for each team.

- "Submit" often to ensure you don't lose data.
- Enter scores for both Rubric 1 and Rubric 2A. You will re-visit Rubric 1, but should not need to re-visit 2A.
- Enter your comments. Please!
- Each time you press the Submit button, your scores will update. Scores may be updated online until the final Judges' Awards Deliberations Meeting.

Comments. Enter comments for the teams in two places (if possible):

- In-line comments: if team uploaded in .docx format, add comments in "Review" mode. If you make in-line comments, email the document to werc.nmsu.edu and we will forward it to the team after the contest.
- Red "Comments" box on the WERC judging site. Universities need the comments for ABET accreditation, and the students need to learn from these.
- Enter your comments after each event (Report, Orals, Poster, Bench). This helps you keep track of your evaluation trajectory throughout the contest.

Recommendation for IEEE Proceedings. While reading each report, consider if you would recommend the report to be considered for publication in the IEEE WERC Design Contest Conference Proceedings.

- The paper does not need to be perfect to be selected for the next stage of review; it only needs to have potential for publication. Teams will be expected to correct their reports according to judges' comments.
- Judges will discuss IEEE publishing recommendations during the Wednesday awards deliberations.
- After the contest, you may be asked to serve as a reviewer for the IEEE reports in your task.

Award Recommendations for "Overall Awards"

While reading each report, make note of papers that would be most deserving of the Freeport McMoRan (FMI) *Innovation in Sustainability* Award, the NM Space Grant Consortium (NMSGC) *Best Team* Award, and the *Pollution Prevention (P2)* Award. (See "Awards" for criteria)

EVENT 2: SCORING THE ORAL PRESENTATIONS

Oral Presentation Overview

- *Timing.* Oral Presentations will be back-to-back, with a 10-minute break for judges between presentations.
- *Team introductions*. The Team Leader should first introduce team members to the judges.
- *Number of presenters*. Up to four registered team members may give the oral presentation. Judges may allow more, but if it adversely impacts the presentation quality, adjust the score accordingly.
- *Attendees.* Students, team members, and the team's faculty advisor(s) may attend the presentations made by their own universities. The oral presentations are not open to other participating teams.
- *Recording.* Advisors are allowed to record the session to use as a teaching tool for their students.

Oral Presentation Schedule

- *5 minutes for setup/teardown.* This includes the time required for moving onto the stage, setting up and breaking down displays and audio-visual equipment.
- *15 minutes for the team's oral presentation.* Only presenters will speak. Judges remain silent.
- *15 minutes for Q/A from judges.* This is a professional and friendly Q/A session in which judges are advocates for the teams. They help teams explore implications of their designs in real-world applications. Questions may only be answered by the student-presentation team members who are on the stage.
- *10 minutes for judges to enter scores/take a break.* Please do not discuss your impressions of the team in ways that might influence the other judges' scoring. Evaluations and comparisons of teams are reserved for the Judges' Meeting on April 9.

Scoring

- Rubrics to have handy: Rubric 1 and Rubric 2B.
  (Print out from this handbook or access through the judging site online).
- To enter your scores, go to wercteams.nmsu.edu > TEAM; then click the Grading button.
  - Update scores for Rubric 1
  - Enter scores for Rubric 2B (Quality of Oral Presentation)
- When entering comments, indicate that your comments refer specifically to the oral presentation.
- Special awards: Note key aspects of the presentations that might fulfill requirements of the FMI Innovation in Sustainability Award, the NMSGC Outstanding Team Award, and the P2 Award. Submit recommendations to your Group Leader.
- Point Deductions. If applicable, on the scoring site, enter:
  - If a Faculty Advisor answers a question, interjects to clarify, or distracts the team by sending signals. (*Enter "1" for each time the faculty disrupts. For each "1" entered, the system will subtract 10 points.*) Immediately give a polite warning to the faculty advisor to apprise him/her of the issue.
  - The number of minutes the presentation went over time. (*Enter the number of minutes that the team went over time, rounding up to the next whole minute. The system will subtract 10 points per minute over*.)

7. Q & A During the Oral Presentation
    a. Support and encourage the teams. They will be nervous.
    b. After every judge has asked one question, you may ask a second question.
    c. Ask one question at a time, without 10 parts. At most, ask a question with only two related parts. e.g., How did you determine the costs for your project, and what are the operating costs for your proposed project?
    d. Hard questions are fine, the students learn from them, but they need to be fair; do not argue with their answer or try to show you are smarter!
    e. Ask your questions as questions. Be considerate of the teams and do not make a statement to show off your knowledge.
        i. Do: "Can you explain your plan for addressing waste streams?"
        ii. Don't: "Your plan for addressing waste streams would never be approved."
    f. Ask questions to help teams show their knowledge:
        v. Do: "I did not see a cost analysis in your paper or presentation. Did you have an idea about what your costs might be?
        vi. Don't: "You did not provide a cost analysis. Why not?"

List of Suggested Questions for the Oral Presentation

1) What are your plans to overcome the community concerns related to this process?
2) What is your approach to minimize the waste generated by your process?
3) How would you improve your design?
4) What are the lessons learned?
5) Why did you choose this design?
6) Who did the audits for you? Why did you choose them?
7) Did the test results in your lab meet the Task requirements, or did you go beyond them?
8) Which of the contaminants was the most difficult to remove and why?
9) What regulations (Federal and State) impacted your design the most?
10) Were you able to obtain the desired effluent limits in your test runs?
11) Did you have industrial partnerships or equipment donations for your project? In what capacity?
12) In case of spills, what is your emergency containment and cleanup plan?
13) In your process, what was the most difficult step? Why?
14) What is the most critical path for your proposed process?
15) How do you plan to arrive at a successful process?
16) What makes your process outstanding relative to others that are currently available?

EVENT 3: SCORING THE POSTER SESSION

Poster Session Overview

- Judges will evaluate each poster based on its ability to convey the team's research, data, and conclusions from their project as a stand-alone-document.
- All posters will be displayed in one room (Ventanas Ballrooms).
- Only one poster is allowed per team.
- Maximum poster board size: 36" X 48". WERC provides mounting boards of the correct size. A team's poster should not hang over the edges of the mounting boards.
- Judges will visit each team/poster in groups of 2-3 and spend 5-10 minutes talking to each team about their poster. Teams will be on hand to discuss their posters.

Scoring

- Have handy scoring Rubric 2C (Quality of Poster) (either printed or online).
- Enter scores online for Rubric 2C, along with your comments.
- When entering comments, indicate that your comments refer specifically to the Poster Session.
- Poster content: The poster should tell the whole story without a team member being in attendance.
- No more than 3 team members should attend the poster at one time, due to space constraints. Teams may rotate team members during the poster session.
- You may wish to update scoring Rubric 1 after the Poster Session.

EVENT 4: SCORING THE BENCH-SCALE DEMONSTRATIONS

Bench-scale Demonstration Overview

Teams build and test their bench-scale models at their home labs, using the resulting data for their reports. At the contest in Las Cruces, they must demonstrate that their apparatus performs as claimed.

The bench-scale demonstrations are often the students' favorite part of the competition, as they get to showcase what they built. Their enthusiasm can make it hard for you to step away after 30 minutes!

Is it Running? Our WERC Safety Staff oversee the official Bench-scale demonstration, including all data collection. When you get to each team's booth, it is likely that you will not see their apparatus actively running, due to logistical issues. In some cases, the team may be able to start it up to let you see it in action. In other cases, the team will only be able to point out features and function of their design. Judges find this to be valuable when discussing a team's project, and the students enjoy it immensely.

Team setup: Team activities behind-the-scenes. Students start setting up their bench-scale equipment at 1 PM on Sunday. WERC begins handing out samples to teams to run on their equipment on Monday at 8 AM, after the team has been commissioned to run the apparatus. The teams' bench-scale demonstrations are expected to be operational by Monday at 10 AM. WERC collects final samples for analysis no later than Tuesday at 2 PM and reports results to the judges at the Wednesday Awards Deliberations meeting.

Bench-scale demonstration logistics. On Tuesday morning, judges will follow their assigned times to visit each team's bench-scale demonstration. Each group of 2-3 judges will spend 30 minutes visiting with their teams.

The teams will give you a tour of their bench-scale apparatus. You will can ask them questions about design details. The teams' posters are also on display for quick reference during this session, but they will not be scored at the bench-scale demonstration.

Faculty advisors are discouraged from attending the bench-scale demonstration. If a faculty member is present, please ensure that he/she does not answer questions for the team, but only acts as an observer. Be diplomatic!

Bench-scale attire and required PPE: Dress is casual or business casual. Safety glasses (provided at the event), long pants, and close-toed shoes are required in the bench-scale demo area. Teams will provide additional PPE for their booth, if necessary. Teams may wear lab coats, but it is not required.

Judging considerations

- Make sure that teams address all waste streams. For example, if the proposed process includes removal of a contaminant by transferring it into another media, teams should: 1) include steps to properly clean and discharge the media and 2) address waste stream costs.
- Ensure that the bench-scale processes are being run safely. Although the teams go through a rigorous experimental safety screening, we depend on you to ensure that the teams observe expected safety measures. If you see hazards, bring it to the attention of Juanita Miller, WERC's Safety Officer, at the Safety Desk.

Scoring

- At the beginning of the Bench-scale Presentations, have handy the scoring Rubrics (print out or access online):
    - Rubric 2D: Quality of Bench-scale Demonstration
    - Rubric 3: Bench-scale Demonstration Competition
- Enter scores online, along with your comments. Indicate that your comments refer specifically to the bench-scale presentation.
- You may wish to update scoring Rubric 1 after the Bench-scale Demonstration.

AWARDS: DELIBERATIONS, DESCRIPTIONS, AND CRITERIA

AWARDS DELIBERATIONS

Wednesday, April 9, 9:00 AM – 1:00 PM (Lunch served).

Session I: Task Awards Discussions—only with your assigned team of judges).

Session II: Overall Award Discussions—all judges discuss potential winners of the non-task-specific awards).

AWARDS CEREMONY

Wednesday, April 9, 5:30 PM – 8:00 PM (optional). We hope you can join us to watch your teams win!

AWARD CATEGORIES

TASK-SPECIFIC:

1. Task awards (First, Second, Third Place; minimum amounts: $2500-$1000-$500, respectively). Based on the rubric scores for each team within a task. The number of awards depend on the number of entries in the task. We apply the one-half rule: No more than half of the teams receive awards. For example, a task with 3 entrants will be awarded a First-Place award only. If there are six entries, there will be First-, Second-, and Third-place awards, etc.
2. Bench-scale Demonstration Awards (First, Second, Third Place: $1000, $750, $500.) This award is determined solely on the teams' scores from Rubric 3: Bench-scale Demonstration Competition. Again, the one-half rule applies (see Task Awards, above).

NON-TASK-SPECIFIC ("OVERALL AWARDS"):

3. Freeport McMoRan Innovation in Sustainability Award ($2500). Awarded to the team that creates the best overall innovative product, process or solution to a land management, energy, water, and/or air or other sustainability issue(s). The award is discussed on the following page.
4. New Mexico Space Grant Outstanding Team Award ($1500). Recognizes the team that addresses a pressing engineering need in a unique and creative way that is shown to be feasible, and financially scalable, and has potential to contribute to a NASA Mission Directorate Solution. The award is discussed in more detail on a subsequent page.
5. WERC Resources Center Pollution Prevention (P2) Award ($1000) Recognizes the team that best utilizes the concepts of P2 (Pollution Prevention) and Energy, Environment, & Economy in their solution. The award is discussed in more detail on a subsequent page.
4. Judges' Choice Award ($500). Judges select up to two teams that either 1) came close to earning a top-tier award or 2) demonstrated resilience in overcoming challenges during the competition.
5. Peer Award ($250). Competing students vote on their favorite team projects.
6. Terry McManus Outstanding Student Award. ($500/student, according to funding). All participating students are eligible for the Award. Faculty nominate up to three students per team. Judges observe students during the contest and make recommendations. The award is discussed in more detail on a subsequent page.
7. Flash Pitch Competition ($1000-$750-$500-$250). You will not be judging this event. It is evaluated by a separate team of judges.

OVERALL AWARD:

Freeport-McMoRan *Innovation in Sustainability Award*

Overview

The Freeport-McMoRan Award focuses on the final product or solution that contributes to sustainability and is not intended to duplicate the process used by the WERC judges in selecting the winners for each task. The *Innovation in Sustainability Award* recognizes the team that creates the best overall innovative product, process or solution that addresses a land management, energy, water and/or air or other sustainability issue(s); and meets FMI's approach to Sustainable Development and Resource Conservation.

Selection criteria focuses on the final solution (rather than the process of developing the solution), how well it addresses the sustainability issue, and the ease and practical use in a real-world setting.

Freeport-McMoRan Award Selection Criteria

- Potential for real-life use and implementation
- The degree to which the proposed product, process, or solution successfully addresses a land management, energy, water and/or air or other sustainability issue(s).
- Demonstration of physical, chemical and ecological effects on sustainable development as it relates to land, energy, water, and/or air.
- Energy and water use efficiency.
- An understanding of the operational, environmental, and social impacts of product/solution or method, including upstream and downstream issues.
- Affordability/cost-effective operation and maintenance; quality of cost/benefit analysis including all sustainability elements or selections made in developing the product/solution/method.
- Overall potential environmental, social, and economic benefits.

Freeport-McMoRan Award Selection Process

The Freeport-McMoRan selection process centers on the bench-scale demonstrations and the results of these projects. Although the written and oral presentations may be used to document project results, these items will not be specifically evaluated for the Freeport-McMoRan Award.

Freeport-McMoRan Award Selection Schedule

Sunday – FMI award criteria, schedule and process reviewed with WERC judges at the Sunday evening meeting.

Monday – WERC judges review and evaluate oral presentations. Judges are encouraged to note key aspects of the solution presented that may be applicable to the FMI award. After the initial presentations, judges are asked to provide Freeport-McMoRan with an initial list of potential candidates for the FMI award.

Tuesday – WERC judges and Freeport-McMoRan personnel will review bench-scale project demonstrations and poster presentations. The Freeport-McMoRan team will focus on carefully reviewing those projects that were recommended by the WERC judges.

Wednesday – In coordination with Freeport-McMoRan personnel, WERC judges discuss projects and make final selection for the award. Freeport-McMoRan will present Innovation in Sustainability Award at the awards ceremony.

OVERALL AWARD:

NEW MEXICO SPACE GRANT OUTSTANDING TEAM AWARD

New Mexico Space Grant Award Selection Criteria

- **Impact Potential (35%)** – Addresses a pressing engineering need
- **Innovation (25%)** – Uses a unique and creative approach
- **Feasibility (20%)** – The design is shown to be feasible, credible, and financially scalable,
- **NASA Mission Directorate Connection (10%)** – The bench-scale demonstration is of high quality
- **Quality (10%)** – Has potential to contribute to a NASA Mission Directorate Solution.

The NASA Mission Directorates are:

1. *Aeronautics:* Developing flight technologies (aircraft, air-traffic control)
2. *Exploration Systems*: Human exploration system development (lunar orbit, lunar surface, Mars exploration), integrating science into human system elements.
3. *Mission Support:* Infrastructure (facilities, roadways, utilities) and the teams that secure contracts and acquisitions for the infrastructure management teams.
4. Science: Prioritizing Earth science, Planetary science, Biological and Physical Sciences, Heliophysics (ionosphere-thermosphere-mesosphere region), and Astrophysics.
5. *Space Operations:* Space operations in and beyond low orbit, exploration systems, space transportation, scientific research of orbit.
6. *Space Technology:* Advancing technologies for application on the moon as a testbed for Mars exploration. Engaging entrepreneurs in developing technologies that can be applied on Earth as well as in space (environmental hazard cleanup, drone monitoring, tracking weather events, etc.)

New Mexico Space Grant Award Selection Process

Sunday – NMSGC award criteria are reviewed with WERC judges at the Sunday evening meeting.

Monday – WERC judges review and evaluate oral presentations. Judges are encouraged to note key aspects of the solution presented that may be applicable to the NMSGC award. After the initial presentations, judges are asked to provide NMSGC staff with an initial list of potential candidates for the FMI award.

Tuesday – WERC judges and NMSGC personnel will review bench-scale project demonstrations and poster presentations. NMSGC will focus on reviewing those projects that were recommended by the WERC judges.

Wednesday – In coordination with NMSGC personnel, WERC judges discuss projects and make final selection for the award. NMSGC will present Innovation in Sustainability Award at the awards ceremony.

OVERALL AWARD:

POLLUTION PREVENTION (P2) INNOVATION AWARD

Award Overview

The College of Engineering at New Mexico State University (NMSU) has been providing technical assistance and outreach on energy and environmental issues to the business, agricultural, and educational sectors in New Mexico since 1999. Currently, this work is led under the auspices of the Department of Outreach within the College of Engineering.

In 2014, the College of Engineering initiated a Pollution Prevention Innovation Award to recognize teams in the WERC Environmental Design Contest that best utilize the concepts of Pollution prevention (P2). P2 is any practice that reduces, eliminates, or prevents pollution at its source. Reducing the amount of pollution produced means less waste to control, treat, or dispose of.

Less pollution means fewer hazards posed to public health and the environment. The student should consider the concept of P2 in their solution(s) and come up with cost-effective ways to reduce, minimize, and/or prevent pollution through improved operational processes which bring savings on all aspects of energy, environment, and economy.

Award Criteria

- Demonstration of an understanding and implementation of the following:
  - Significant reduction or elimination of wastes at their sources
  - Reduced generation of greenhouse gases
  - Reduced use of hazardous materials
  - Conservation of water and air resources
  - Utilization of sustainable materials
  - Energy efficiency measures
- Application of environmental hierarchy: reuse, reduce, recycle, treatment, disposal
- Adoption of “triple bottom line” concepts of environmental, social and economic benefits

Award Selection Process

This Award is based solely on results of the bench-scale demonstrations. Although the written and oral presentations may be used to document project results, these items will not be specifically evaluated and considered for the Pollution Prevention Award.

Tuesday – After the bench-scale demonstrations, judges are asked to provide WERC staff with list of preliminary recommendations for the P2 Award.

Wednesday – Judges finalize selection of the award winner during awards deliberations.

SPECIAL STUDENT AWARD:

OUTSTANDING STUDENT AWARD IN MEMORY OF INTEL'S TERRY MCMANUS

To honor his memory, in 2006 Intel created the Terry McManus Memorial Award to be given to a student or students who demonstrates the same drive Terry had. Terry loved coming to the Design Contest every year and seeing students who shared his drive for environmental excellence. This memorial award is given to a student who demonstrates a passion for the environment and has demonstrated this through their actions.

The award is determined by the judges.
Each team is given the opportunity to nominate up to 2 students among their team. They give the names of the nominated students to their advisor.

Each advisor is asked to write 3-4 sentences in support of the nominated students. The write up should demonstrate the student's commitment to environmental excellence with a passion to pursue global environmental improvements of the future.

Each judge will observe the nominated students during the competition and make recommendations for the award during the awards deliberations on Wednesday, 9 April.

2025 TASKS

You have been assigned to judge one of the following tasks. The next 12 pages give brief overviews of each task. You only need to refer to the one for the task you are judging.

These Overviews are for quick reference only. Please read the entire task problem statement prior to scoring the written reports: https://werc.nmsu.edu/team-info/2025-tasks-faqs.html

2025 TASK LIST

1. Mitigating the Effects of Wildfires on Watersheds
2. Smart Grids with Hydrogen Integration—Optimizing Storage & Use of Renewables
3. Using Fungi to Remediate Mining Waters
4. NASA Life Support Systems—Dust Mitigation in Lunar Habitats
5. Produced Water: Valuable Constituent Recovery
6. Open Task – This year's open tasks:
    a. Gasifier slag dewatering to mitigate runoff and carbon dust.
    b. Renewable Energy Solution for Water & Environmental Restoration
    c. Sailboat-Mounted Ocean and Atmospheric Sensor

2025 TASK OVERVIEWS

Task overviews on the following pages are excerpts from the full task statements.
They are **not** a substitute for reviewing the entire task problem statement.

TASK 1 - MITIGATING THE EFFECTS OF WILDFIRES ON WATERSHEDS

Sponsors and Task developers: EPA Office of ORD and Souder, Miller & Associates

DOWNLOAD FULL TASK: https://werc.nmsu.edu/team-info/2025-tasks-faqs.html

Problem statement

Your team will research, evaluate, and design an innovative, rapid-deployment, post-fire watershed restoration project for a site of your choice. The design will mitigate watershed issues in a 2000-acre (minimum) burn-scarred area in the event of a storm of average intensity for that area. Using actual fire-scar flooding and washdown sediments from Ruidoso, NM, your team will design and test a system that promotes infiltration, and reduces by 50%: runoff volumes and velocities, turbidity, and TSS in the flood waters.

Consider the needs of the targeted community. Solutions shall be innovative, low-cost, high impact, quickly implemented, require little routine maintenance once installed, and withstand storm-related flows during routine precipitation events for a minimum of three years.

Design Considerations

Your proposed design should provide specific details and outcomes as follows.

- Research the vegetation, soils, landscape, hydrology, and climate of the area and consider potential post-fire risks to the watershed, the community, and/or other downstream features of concern.
- Evaluate potential fire characteristics and burn severity, including the nature of the hydrophobicity of the soil, based on 80% of the vegetation and organic surface layers being destroyed by the fire.
- Assess the historical nature, scale, and frequency of storms in the locale, based on the last 10 years, and design the solution to address an average storm event for the area.
- In the technical report only, using supporting documentation, evaluate the potential effectiveness of your rapid-deployment plans in the event of a 10-year storm.
- Estimate the expected post-wildfire flow rates, erosion, and debris flows downstream of the watershed, assuming that 80% of the vegetation and organic surface layers will be burned across a 2000-acre area.
- Support all assumptions with appropriate data.
- Provide appropriate diagrams describing the processes involved in your solution. These may include a Process Flow Diagram (PFD) that includes mass and energy balances of all processes, water flows, waste streams, etc., and/or additional diagrams, such as site maps with dimensions that illustrate the features of the mitigation system.
- Plan a logistically feasible rapid-response watershed mitigation system that will scale to an average storm event. Plans should include a detailed implementation schedule and should optimize time to deployment vs. benefits vs. costs.
- Plan and demonstrate a bench-scale rapid-response watershed mitigation system that will scale to an average storm event. The bench-scale solution will:
    - Demonstrate that the rapid-deployment plans are feasible.
    - Set forth a timeline for achieving full deployment once the fire has been contained.
    - Produce the expected flow velocities due to an average storm and demonstrate flow reduction due to the team's mitigation solution, with the goal of reducing flow velocities by 50%.
    - Reduce turbidity and TSS by 50%.
    - Minimize the need for long-term storage of equipment or materials while awaiting a storm.

- Develop a community engagement plan, as appropriate.
- Present a solution that results in minimal disturbance to the infrastructure or existing land uses and minimizes aesthetic and environmental impact, cost, and waste generation.
- Quantify the local benefits and demonstrate that the needs of the targeted community are met and its local waterways are preserved.
- Discuss project implementation, including permitting, safety, and regulatory compliance.
- Develop a decision tree to help the deployment team quickly implement the solution.
- Present a Techno-Economic Assessment and Analysis (TEA) to construct your proposed solution. Target the TEA towards community needs, with the community or local government being the customer.
    - Consider capital expenses (CAPEX) to establish a full-scale rapid-deployment mitigation system and put in place any needed up-front infrastructure, materials, etc.
    - Include operating expenses (OPEX), according to typical costs in the community you are addressing. Include maintenance and storage of equipment, structures, or materials while awaiting a prospective fire.
    - Evaluate the balance between time-to-deployment, cost, and benefits.
    - Invite a business/economics major as part of a multi-disciplinary team (recommended) to help you draw up economic plans for full-scale implementation.
- Address safety aspects of implementing the rapid-deployment solution as well as potential issues with handling post-fire stormwater and any waste products. Safety issues for the full-scale design should be addressed in the written report. Safety issues for the bench-scale demonstration should be addressed in both the written report and the Experimental Safety Plan (ESP).

Bench Scale Demonstration

Bench-scale demonstrations will serve to illustrate the design considerations listed above. The bench-scale demonstration need not physically replicate the entire watershed area. It should illustrate the primary requirements: improving infiltration and achieving 50% flow reduction, and reducing both turbidity and TSS by 50%.

As a part of your engineering design, your team will design the bench-scale testing parameters. These include developing a means of producing appropriate flow velocities and ensuring storm-level sediment loads as well as gathering data from the bench-scale model. In particular, your team will:

1. Provide a bench-scale apparatus that will:
    a. Produce water-flow velocities and sediment loads that scale appropriately to the flow rates and sediment loads expected during an average post-fire storm in your selected locale.
    b. Set up a system that will allow you and the WERC staff to easily:
        i. Measure pre- and post-mitigation water velocities.
        ii. Collect pre- and post-mitigation samples of water for turbidity and TSS analysis. The design should provide a means of collecting water samples in 125-mL bottles with and without your mitigation system being implemented. (Upon request, WERC can ship you a sample of the type of bottle that we will use for collection.)
2. Demonstrate rapid deployment of a watershed mitigation project that will increase infiltration and reduce flow velocities, turbidity, and TSS by 50%.

TASK 2. HYDROGEN-BASED DERMS GRID-TIED TECHNOLOGIES

Sponsors: El Paso Electric Co. and Las Cruces Utilities

DOWNLOAD FULL TASK: https://werc.nmsu.edu/team-info/2025-tasks-faqs.html

Problem statement

Design and develop a small-scale model of a grid-tied DERMS solution that integrates an intermittent renewable PV source with a hydrogen fuel cell to provide a firm dispatchable resource, and demonstrate that your solution can be scalable from small residential size up to large-scale utility size.

The design should implement an operational protocol for DER engagement that details how the utility will manage DER capacity and energy for dispatch, focusing on firm energy resources.

Algorithms for the overall system should respond to PV system variability ensuring that the firm resource is as consistent as possible with minimal DC ripple, and respond to DERMS signals from the utility. System performance will be measured by measuring the output characteristics of the firm dispatchable resource, specifically DC ripple or variability.

Design requirements

Theoretical and Fundamental Design Requirements

- Design and Development of Hydrogen-based DERMS Solution:
  - Create a small-scale model of a grid-tied Distributed Energy Resource Management System (DERMS) integrating an intermittent renewable PV source with hydrogen fuel production and a hydrogen fuel cell.
  - Teams that are interested may propose innovative approaches to hydrogen fuel generation and storage, particularly if the overall grid-tied solution benefits from the technological advancements.

- Operational Protocol for DER Engagement:
  - Develop and present an operational protocol detailing how the utility will manage DER capacity and energy for dispatch, focusing on firm energy resources.
  - Describe the goals and objectives of the operational protocols, and the energy management/energy savings/cost savings they will produce for consumers or grid operators.

- Algorithm Development: Develop algorithms for the overall system:
  - To respond to PV system variability, ensuring the firm resource is as consistent as possible, with minimal DC ripple.
    - To respond to DERMS signals from the utility.

Bench-scale Demonstration Design Requirements:

- Bench-Scale Demonstration: Conduct a live bench-scale demonstration of the proposed solution at the contest, showing integration of the hydrogen fuel cell with renewable energy sources.
- Response to Utility Events: Demonstrate the ability of the system to respond to utility events such as peak load or excess-energy events, with the option to include additional functionalities.
  - Emulate a utility signal by generating your own internet-based control signal.
  - If additional functionalities are implemented, describe their contributions to system performance.
- Communication and Control Systems: Select and demonstrate the communication types and control infrastructure used to optimize energy management and interaction with the utility grid.
- Techno-Economic Assessment: Present a comprehensive Techno-Economic Assessment (TEA) analysis including capital costs (CAPEX), operational costs (OPEX), and potential revenue, with graphical representations of cost data.

TASK 3. MYCOREMEDIATION: BIOREMEDIATION OF MINING-INFLUENCED WATERS USING FUNGI

Sponsor: Freeport-McMoRan

DOWNLOAD FULL TASK: https://werc.nmsu.edu/team-info/2025-tasks-faqs.html

Problem Statement

Assess the efficacy of fungus as a candidate for passive or semi-passive bioremediation of MIW flowing from legacy mining sites, based on a full-scale throughput of 10 gpm.

- Propose a solution that is passive or semi-passive and minimizes waste generation.
- Select and grow fungal species that have a tolerance for metal-laden waters in a pH range of 4.5-5.0 and that can efficiently remove metal from a synthetic solution. Your team may determine other parameters, such as water temperature, aeration, and lighting conditions.
- Identify the fungal species or strains selected;
- Quantify metal-removal efficiency by the fungi, with a goal of removing a minimum of 90% of the metals;
- Suggest strategies, in the technical report, for recovering metals from the fungi.

Design Considerations

Your proposed design should provide specific details and outcomes as follows.

- Design a continuous metal-removal process on the bench scale that is scalable to a system that operates at 10 gpm.
- Identify one or more species or strains of fungi (maximum of 5) that can remove metals and thrive in a synthetic solution of chemistry indicated in Table 1.
- Establish an appropriate fungal-colony growth strategy that would be easily implemented at bench scale and at full scale at a legacy mine site.
- Determine amounts/types of nutrients and substrate necessary to establish and stimulate the growth of your selected species of fungi in the specified water chemistry;
- Ensure that the substrate does not contribute additional metals nor remove metals. Do not add pre-treatments to sequester metals. Other properties of the mine waters, such as pH, may not be altered.
- Include a Process Flow Diagram (PFD) for the selected treatment process. The PFD must include mass and energy balances (input and output streams, reactants, reaction rates, etc.). This is a major component of judging. Take extra care to ensure that all processes and waste streams are included. (See Team Manual for PFD examples).
- Determine the hydraulic retention time to treat 10 gpm. This will help determine the volume needed for the full-scale treatment system and help with costing of the system.
- Research and follow state and federal permitting requirements related to fungi treatment and discharge of treated water.

- Determine the efficacy of your strategy by reporting:
    - Metal-removal efficiency of at least 90%;
    - Viability for full-scale implementation (consider fungal colony size, growth, maintenance, residence time required for remediation of metals, etc.);
    - Mechanisms responsible for metal remediation;
    - Physicochemical parameters (pH, ORP, electrical conductivity, temperature) for both the influent and effluent and CUE for the effluent.
    - Potential feasibility for recovering metals from the fungi addressed in the technical report.
    - Waste management strategies and/or alternative uses for fungi that have absorbed the metals: What should be done with them if metals can/cannot successfully be removed?

- Present a Techno-Economic Assessment and Analysis (TEA) to construct a full-scale treatment system designed to treat up to 10 gpm of mining-impacted water.
    - Consider creating a multi-disciplinary team by inviting a business major to help draw up economic plans for full-scale implementation of your designs.
    - Capital expenses (CAPEX) typically include, but are not limited to, equipment, pipes, pumps, etc. needed to set up the system. Do not include costs of buildings and appurtenances to the treatment process.
    - Operating expenses (OPEX) should be calculated as cost to grow and maintain the fungi and dispose of any waste products. Costs should include, but not be limited to, materials needed, including consumables (chemicals, sacrificial components, etc.) In addition to other operating costs your team identifies, include these: staff labor rate ($70/hour); solids disposal costs ($50/ton).
    - Evaluate the potential of metals to be successfully recovered from the fungi and estimate the income that might be gained from metal extraction after subtracting estimated costs of the process.
    - Visualization tools: Sensitivity analyses, etc.
- Any chemicals used must be identified in the experimental safety plan (due by February 26, 2025).
- Once a successful bench-scale system is established, if desired, send a back-up of the fungal portion of the apparatus to WERC to arrive two weeks prior to the contest to allow the fungi to acclimate.

Bench-scale Demonstration

- Demonstrate the use of fungi to remove metals on a bench-scale basis using synthetic mine water of
- chemistry outlined in Table 1. The bench-scale unit should demonstrate a continuous process that can be scaled up to a plant that treats 10 gpm of mining water.
- Teams will prepare the synthetic feed solution for bench-scale testing at their home institution and WERC will provide each team with up to 5 liters of this synthetic MIW to work with during the bench-scale demonstration. At the end of the treatment process at the contest, each team will submit for analysis four 125-mL aqueous samples: 1 sample of influent (synthetic solution) and three samples of their mycoremediated solution (effluent).

TASK 4. LIFE SUPPORT SYSTEMS: DUST MITIGATION IN LUNAR HABITATS

Sponsor: New Mexico Space Grant Consortium

DOWNLOAD FULL TASK: https://werc.nmsu.edu/team-info/2025-tasks-faqs.html

Problem Statement

Your challenge is to research, design, and demonstrate a method for preventing dust from entering a lunar habitat by effectively removing lunar dust simulant from an object while it is in an airlock and prior to it entering the habitat's volume.

The team-designed object, representing a spacesuit or a CTB, shall be covered in hardgoods or soft goods, or a combination of these, that are selected to enhance your process. The team-built bench-scale dust-removal system shall fit inside a simulated airlock provided by WERC, as described on pp. 6-7, unless other arrangements are made.

Success will be judged primarily by the percent of dust reduction by the dust-mitigation system, and its ESM: ease of use, minimization of crew time, expected reliability, and conservation of power, volume, and mass.

Design Considerations

- Review available literature on the mechanical properties of lunar dust, Apollo lessons learned, and the fundamentals of dust mitigation borrowed from lunar and other applications. Generate concepts for your solution, narrow the focus to a small number of options, then fabricate one or more prototypes of dust mitigation processes; test and iterate.
- Design a dust-mitigation system that strikes an appropriate balance between minimizing crew time (simplicity in setup, training, operation, and maintenance), energy to operate, mass, volume, footprint, and cost).
- The system will operate in Earth's gravity. Address in the technical report: the design's applicability in ⅙ Earth's gravity at the lunar surface, and document your conclusions.
- Include a complete process flow diagram in your technical report showing all inputs, outputs, and processes, and documenting appropriate mass and energy balances.
- Follow the Bench-scale Demonstration criteria for building the bench-scale prototype item (CTB or space suit) from which dust will be removed.
    - Select exterior materials. These may include hard goods, fabric, soft goods, dust-resistant materials, etc.
    - The surface materials must be abrasion- and impact-resistant, durable, and suited for use in space. Provide supporting evidence for this in the technical report.
    - Include diagrams in the Technical Report that illustrate a full-scale design of your item prototype.
- Follow the Bench-scale Demonstration criteria for building the bench-scale dust-removal system. Your team's plans for transferring an item from the lunar surface to the airlock to the habitation area shall be included in the technical report, but is not expected in the bench-scale demonstration.
- Ensure that the dust-removal process does not damage the surface of the container either due to the mechanisms that remove the dust nor by dragging dust particles against the prototype.
- Conduct an engineering analysis on the ability to scale the process so that it can be integrated into an actual lunar habitat airlock and be able to clean multiple full-size objects (of size 1·CTBE) in a reasonable amount of time. These factors will be addressed in the technical report, but are not required of the bench-scale demonstration:
    - Time needed for the system to complete the cleaning of one item and for cleaning a set of 4 similar items. Cleaning of multiple items may be conducted in any way chosen by the team (in bulk or one at a time, etc.). Consider, as applicable to your design, the expected frequency and time requirements for recharging or resetting equipment between cleaning jobs, disposing of dust, cleaning the system itself, etc.)

  - Containment, disposal, and/or re-use of the dust collected during cleaning.
  - Expected power usage, volume, and mass;
  - Operational controls for item transfer from the lunar surface to the airlock and then to the habitat: Consider automation vs interaction by crew members or ground control. Provide supporting documentation.
  - Expected effect on crew members' workload (direct interaction, time, convenience, etc.);
  - Expected routine maintenance of the system;
  - Modularity of parts in the event of repairs, maintenance, etc.
- Consider safety concerns for the crew: dust exposure, off-gassing, flammability, etc.
- Evaluate the possibility of waste products or by-products being produced by your system (in addition to collecting dust). If there is a potential for these, address how they will be disposed or retained for another use.
- Present a Techno-Economic Analysis (TEA) to construct and operate a full-scale dust-mitigation system for a lunar habitat airlock; The TEA will include your estimate of capital costs (CAPEX) and operational costs (OPEX) for a full-scale solution, expected revenue (if applicable) and appropriate graphical representation of your cost data. Include:
  - Capital expenses: These typically include, but are not limited to, equipment, pipes, pumps, electronics, etc. needed to build the system as well as any surface materials required. Do not include costs of buildings in which the dust-removal system will be manufactured. Do not include the cost of the airlock, unless its design is a specific and integral part of the dust-mitigation design.
  - Operating expenses: These should be calculated as the cost for launch, based on total ESM. Equivalent mass considerations include crew time, consumables, repair parts, power, cooling, mass, volume, etc. (see [9]).
  - Crew time: Conduct human-in-the-loop testing in your lab.
  - Visualization tools: Sensitivity analyses, cash flow diagrams, etc.
- Address safety aspects of handling the dust or cleaning equipment. Safety issues for the full-scale design should be included in the technical report. Safety issues and PPE needed for the bench-scale demonstration should be addressed in both the written report and the Experimental Safety Plan (ESP).

Bench Scale Demonstration

- Teams will demonstrate a bench-scale design that will clean lunar dust simulant from a prototype item (spacesuit or CTB) designed by the team from which dust will be removed.
  - This item may be either a fully or partially designed spacesuit or CTB, or it may be a simple rectangular parallelopiped covered with team-selected material(s).
  - The prototype shall be comparable in size to ½ CTBE*.
  - All items shall be sized to easily pass through a 20" x 20" square opening*. The third dimension may be longer.
  - The exterior may include materials that are currently used in the space industry for your selected item or may include innovative materials that minimize dust accumulation and/or improve the performance of your dust-removal system. The materials may be made of either soft or hard goods. In either case, provide supporting evidence that the selected material is feasible for use in space expeditions and is feasible for your selected item.
- A functional bench-scale dust-mitigation system that is compatible with the WERC-provided test chambers* that can remove dust from the surface of the team's selected item.

TASK 5. MAXIMIZING VALUE CAPTURED FROM PRODUCED WATER

Sponsors: Chevron, NGL Water Solutions, NM Produced Water Research Consortium

DOWNLOAD FULL TASK: https://werc.nmsu.edu/team-info/2025-tasks-faqs.html

Problem Statement

Your team will design a process to produce a useful product from Permian Basin pre-treated brine concentrate. Base the constituent recovery on a 25,000 bbl/day stream of brine concentrate. Your solution should be optimized to obtain the greatest market value for your product while reducing the volume of the reject brine, thereby reducing disposal costs of the liquids remaining after constituent recovery.

Teams are encouraged to be innovative in their solutions and consider new applications and/or creating new markets for their proposed products. Solutions should be logistically feasible, provide a long-term offset of PW treatment costs, and include a plan for post-treatment and/or disposal of the reject concentrate stream after the product has been produced.

Design Considerations

Your proposed design should provide specific details and outcomes as follows.

- Base your analysis on a 50,000 bbl/day treatment facility having a 25,000 bbl/day reject concentrate stream.
- Produce a usable and marketable product from the constituents recovered from the provided concentrated brine. Select the constituents to optimize a long-term, stable income from the sale of the product while minimizing the costs associated with disposal of the remaining concentrate.
- Include a Process Flow Diagram (PFD) for the selected treatment process. The PFD must include mass and energy balances (input and output streams, reactants, reaction rates, etc.). Take extra care to ensure that all processes and waste streams are included. This is a major element of judging (see Team Manual for PFD examples).
- Propose a plan for waste-stream management after product generation. If post-treatment prior to injection into an SWD is needed to ensure safety and/or regulatory compliance, include this in your PFD and process analyses as theoretical considerations. A bench-scale demonstration of waste stream post-treatment is not required.
- Ensure that the TDS of your residual (waste) stream will be no higher than 250,000 ppm to comply with SWD injection regulations.
- Assume that constituent recovery and disposal of any remaining brine will be accomplished within the PW treatment facility, thus eliminating the need for considering transportation logistics or costs on either end of your process.
- Present a Techno-Economic Assessment and Analysis (TEA) to construct a full-scale process to produce a usable product that will scale with an influent rate of 25,000 bbl/day of brine concentrate. This will include your estimate of costs for a full-scale solution. Include appropriate graphical representation of your cost data.
    - All costs must be demonstrated, including the cost of managing and disposing of the residual streams, staffing, and any post-treatment needed after product generation.
    - CAPEX (Capital costs) typically include, but are not limited to, equipment, pipes, pumps, etc. Do not include costs of buildings and appurtenances to the treatment process.

- OPEX (Operating costs) should be calculated as cost to produce your product on an annual basis, based on a rate of 25,000 bbl/day of influent brine concentrate. Include these costs:
    - Materials needed, including consumables (chemicals, sacrificial components, etc.)
    - Staff labor rate ($70/hour); solids disposal costs ($50/ton); energy requirements (cost/bbl and Kwh/bbl): use an electricity rate of $0.10/kWh and research an industrial natural gas rate and state in $/MM BTU.
    - Additional operating costs that your team identifies.
    - If higher production rates (up to 150,000 bbl/day) would improve earnings from constituent recovery, include this analysis in your TEA, along with 25,000 bbl/day estimates).
- Address the cost offset for treating PW that will result from the sale of your recovered constituent. Compare this with the current cost of $1-3/bbl for treating PW and the disposal rate of $1.00/bbl for SWD injection.
- Visualization tools: Sensitivity analyses, etc.
- Teams are advised to create a multi-disciplinary team by inviting a business major to help draw up economic plans for full-scale implementation of your designs.

- Include a public involvement plan that addresses public perception and potential public contributions in utilizing PW in your chosen product and its application (see Team Manual).
- Address any intangible or indirect benefits of the selected treatment process, such as improving the environmental impact of mining and/or producing your selected product.
- Address safety aspects of handling the raw clean brine concentrate, residual streams, and final products. Safety issues for the full-scale design should be addressed in the written report. Safety issues for the bench-scale demonstration should be addressed in both the written report and the Experimental Safety Plan (ESP).

Bench Scale Demonstration

- The bench-scale unit should demonstrate a process that will produce a useful, marketable product from pre-treated brine concentrate obtained from the Permian Basin.
- The bench-scale design should be scalable to a plant that produces 25,000 bbl/day of concentrated brine.
- Chemistry of the brine is shown on next page.
- This is the actual analysis for the brine concentrate that has been provided to each team.
- Note that some analytes were analyzed by two different labs, providing us a check on the constituent amounts.

Continued on next page.

Clean Brine Analytes Ion chromatography was used for anions and cations using two different methods requiring different configurations such as different ion exchange columns.			**Clean Brine Analytes** ICP-OES ND = not detected
Constituent	**mg/L**	**mg/L**	**Constituent for Lab 2, If different from Lab 1**
	Lab I - Ion Chromatography	**Lab 2 - ICP-OES**	
TDS			
Chloride	119,000.00	–	
Sodium	63,200.00	53280	
Calcium	8,320.00	7153	
Strontium	–	1314	
Magnesium	1,250.00	1150	
Potassium	1,200.00	1529	
Ammonium	1,780.00	–	
Sulfate	425.00	141.5	Sulfur
Carbonates	6.30	–	
HCO3	Not measured	–	
Lithium	36.90	48.02	
Silicon	–	29.92	
Barium	–	4.506	
Phosphate	ND	ND	Phorphorous
Iron	–	ND	
Manganese	–	0.78	
Aluminum	–	–	
Zinc	–	ND	
Lead	–	ND	
Bromide	1,110.00	–	
Total Nitrogen:	1,080.00	–	

Additional Constituents Tested via ICP-OES (Standard 28-panel Analysis)	
Constituent	**mg/L**
As	0.8442
Boron	71.83
Mo	0.1123
Ni	ND
V	4.75
Be, Cd, Co, Cr, Ni, Se, Ti, Bi	ND

TASK 6: OPEN TASK

DOWNLOAD FULL TASK PROBLEM STATEMENT: https://werc.nmsu.edu/team-info/2025-tasks-faqs.html

Due to the general nature of the Open Task, we give teams very generalized guidelines intended to cover many possibilities. Below is the information shared with the teams.

This year's Open Tasks are judged side-by-side:

- Gasifier slag dewatering to mitigate runoff and carbon dust.
- Renewable Energy Solution for Water & Environmental Restoration
- Sailboat-Mounted Ocean and Atmospheric Sensor

Problem statement

Identify a real-life environmental challenge in an emerging technological area, design the solution to the problem, and identify the potential market for your solution.

Build an apparatus to demonstrate a bench-scale version of your proposed solution. Evaluate the cost of building and operating a full-scale version of your proposed solution, and consider regulations and implications for implementing the full-scale solution.

Design Considerations

Your proposed design should provide specific details and outcomes as follows.

- Describe the product or process and explain why it is valuable to society and the environment.
- Develop, demonstrate and present a complete package that includes technical performance as well as financial, regulatory, and safety information.
- Provide a process-flow diagram (PFD), complete with quantified inputs/outputs and mass and energy balances for the designed process (if applicable). If a PFD does not apply to your project, provide diagrams that illustrate each component in your design and include a description of its function. Waste streams, if any, should be addressed in the diagrams.
- Discuss the advantages and disadvantages of your solution versus both current technologies and other potential approaches (cost, ease of operation, design elegance, waste minimization, energy efficiency, etc.).
- Build an experimental apparatus to demonstrate your process.
- Develop an analytical testing protocol to evaluate your solution at the contest.

- Techno-Economic Analysis. The TEA will include your estimate of capital costs (CAPEX) and operational costs (OPEX) for a full-scale solution and appropriate graphical representation of your cost data:
  - Capital expenses typically include, but are not limited to, equipment, pipes, pumps, etc. Do not include costs of buildings and appurtenances to the treatment process.
  - Operating expenses (OPEX) should include, but not be limited to, materials needed, including consumables (chemicals, sacrificial components, etc.). In addition to other operating costs that your team identifies, include these operating costs: staff labor rate of $70/hour; solids disposal costs ($50/ton); energy requirements using an electricity rate of $0.10/kWh. If your full-scale solution requires natural gas as an energy source, research and use up-to-date prices.
  - Include a financial analysis of any potential product salable value. Consider transportation logistics and cost from site of raw materials to final consumer.
  - Visualization tools: Sensitivity analyses, etc.
- If your team is designing a device, instead of developing a TEA, your team will present a rudimentary business plan. Include: (*List may vary, as appropriate to your device.)*
  - Costs, cost-recovery structure, recovery rate and schedule.
  - Level of profit to show viability to a prospective lender (as an indication of ability to pay off a loan needed to set up the manufacturing process).
  - Projected sales forecast, market potential, potential market share
  - Reduction in the marginal cost of each device as manufacturing progresses over successive years (to reflect economies of scale: i.e., the cost of manufacturing a single car is $50M, but the cost of manufacturing 5M cars is $30,000 each).
  - Discuss your plan's adherence to appropriate federal (USA), state, and local laws and regulations.

- Include a Public Involvement Plan, as applicable (see Team Manual).

- Identify waste streams, if any, for your design and plans to address them.

- Identify the hazards of the proposed solution and approaches to mitigate the them.

- Address safety aspects of operating your technology. Safety issues for both the full-scale design should be addressed in the written report. Safety issues for the bench-scale demonstration should be addressed in both the written report and the Experimental Safety Plan (ESP).

- Discuss the intangible benefits of the product or process, if any.

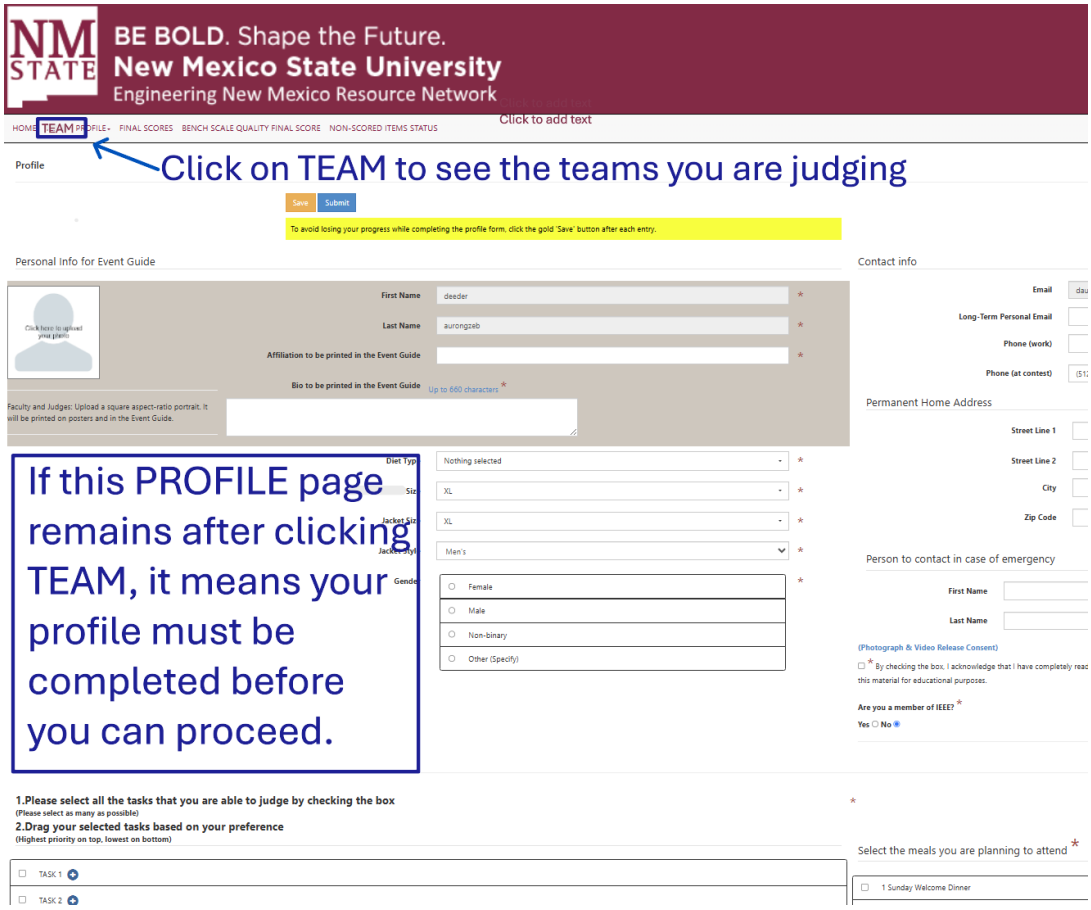
APPENDIX A. JUDGES' GUIDE TO THE JUDGING SITE: https://WERCTEAMS.NMSU.EDU

A. Register to be a judge

1. All judges sign up each year, as no profiles are saved from year to year. Please be ready to upload your bio and photo, enter your t-shirt and Jacket size, and meals you plan to attend.
2. Go to **wercteams.nmsu.edu**, click the green button: "Faculty and Judges: Sign up for the 2025 contest." On the next page, click the radio button "Judge" and complete your information.
3. Wait for a confirmation email: "Step I Complete."
4. Log in and complete your Profile immediately.
5. Once you complete your profile, you will be assigned a task to judge.
6. After being assigned your judging task, you will have access to scoring for all teams assigned to you. You will not be able to see other judges' scores or teams in other tasks.

B. Completing your PROFILE (Refer to figure below)

1. Your profile must be complete before you can gain access to score teams: Indicate order of preference for judging tasks, upload your photo and bio, jacket size, etc.
2. When completing your profile, press "Save" after each entry.
   a. A pop-up window will confirm: "Your information has been saved successfully."
   b. Review your profile after saving. If data is missing, re-enter it.
   c. Click "Submit" when done. If fields are missing, a pop-up will indicate what needs to be completed.
3. The profile can be changed at any time after it is completed. Just click the top PROFILE tab.
4. **Below is a screenshot of an incomplete PROFILE.** This must be completed before you can view teams or enter scores.

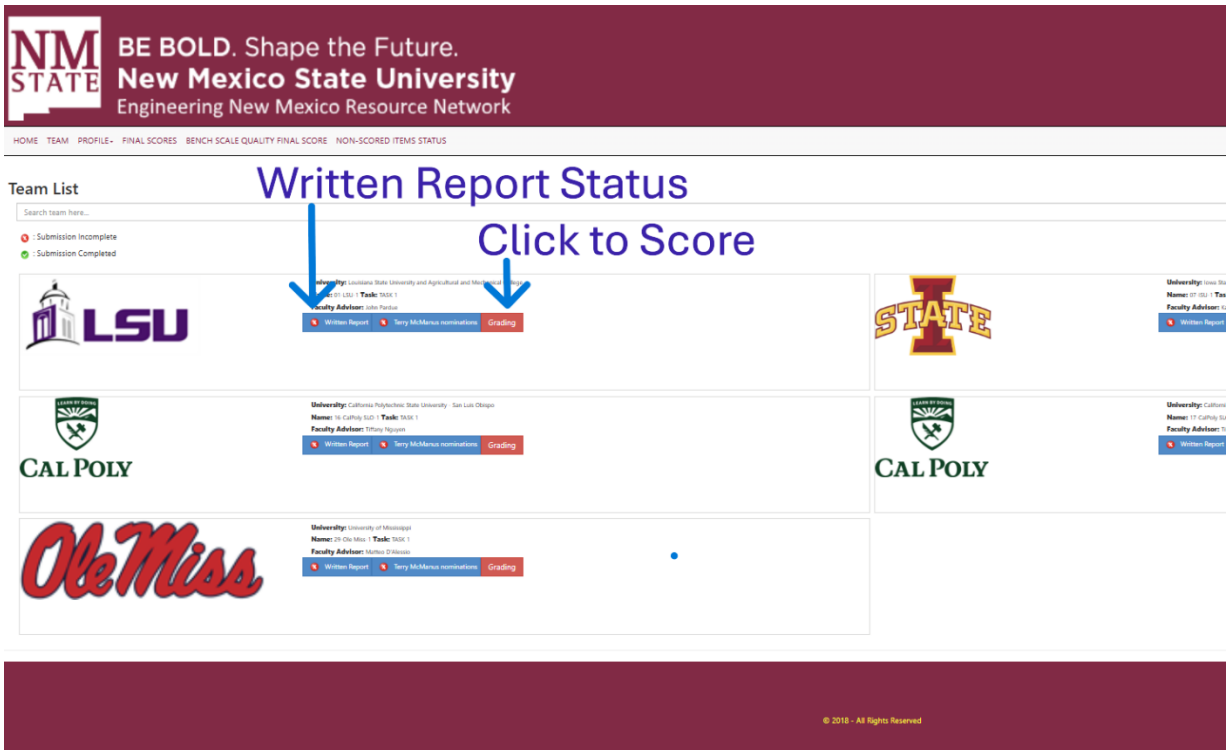


C. Find judging assignments. (Refer to figure below)

1. We will assign you to judge a task within 1-2 days of your completing your profile.
2. Log in to your account to see the task you have been assigned and the teams you will be judging.
3. Click on the top tab, "TEAM" to see the teams you will be scoring.
4. If you only see your PROFILE after logging in (see image on previous page), then you have not completed your registration and you will not see your task/team assignments.

D. Find and Download Reports (refer to figure below of TEAM view)

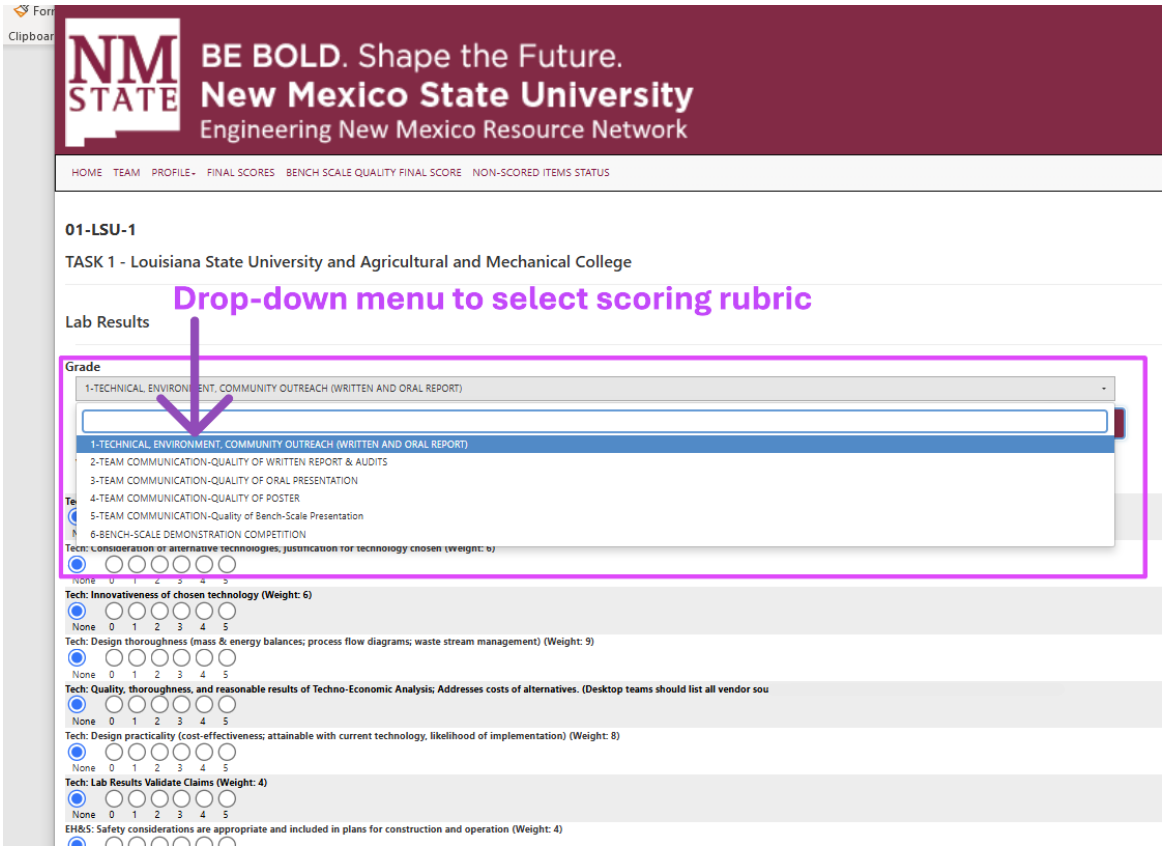
1. Teams will submit their reports no later than 11:59 PM, March 31, 2025 (their time zone). Some teams submit early, but this is rare.
2. Between April 1 – April 6, log into your account and click the top tab, "TEAM"
3. The blue button "Written Report" indicates the status of each team's report:
    a. If the button contains a red X, the team has not yet submitted the assignment.
    b. If the button contains a green checkmark, the assignment is ready for scoring.
2. The report will appear in a new browser window when you click the button. You may read it from there or:
    a. Download the report.
    b. If it is a .docx file, please download it and make in-line comments in Review mode. Email it to us after scoring it, so we can send your comments to the team.

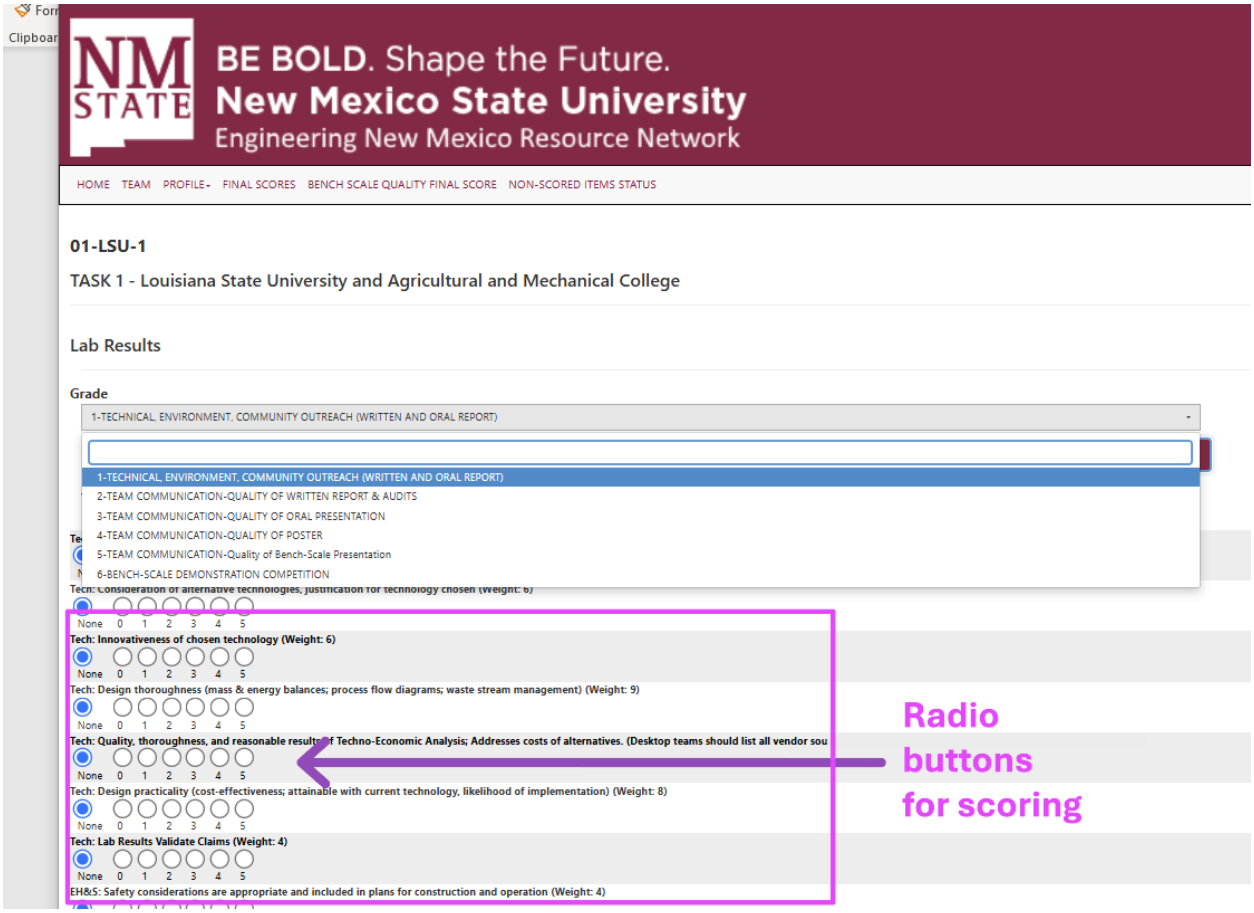


E. **Read and Score reports** (Refer to the figures on the next page)
When you are ready to score a report for a specific team:

1. Log into your account
2. Click on "TEAM"
3. Click the red "Grading" button for that team.
4. The scoring window will open showing the team's name.
5. Below the team's name is a drop-down menu that lets you select which items to score.
6. Click on the event you wish to score and it will take you to that scoring rubric.
   This year's options:
   a. 1-DERMS-Technical, Environment, Community Outreach (For Task 2 only)
   b. 1-Technical, Environment, Community Outreach (For Tasks 1, 3, 4, 5, and 6)
   c. 2-Quality of Written Report & Audits
   d. 3- Quality of Oral Presentation
   e. 4- Quality of Poster
   f. 5-Quality of Bench-scale Demonstration
   g. 6- Bench-scale Demonstration Competition

Dropdown menu showing your Rubric Options:


BE BOLD. Shape the Future.
New Mexico State University
Engineering New Mexico Resource Network
HOME TEAM PROFILE FINAL SCORES BENCH SCALE QUALITY FINAL SCORE NON-SCORED ITEMS STATUS
01-LSU-1
TASK 1 - Louisiana State University and Agricultural and Mechanical College
Drop-down menu to select scoring rubric
Lab Results
Grade
1-TECHNICAL, ENVIRONMENT, COMMUNITY OUTREACH (WRITTEN AND ORAL REPORT)
1-TECHNICAL, ENVIRONMENT, COMMUNITY OUTREACH (WRITTEN AND ORAL REPORT)
2-TEAM COMMUNICATION-QUALITY OF WRITTEN REPORT & AUDITS
3-TEAM COMMUNICATION-QUALITY OF ORAL PRESENTATION
4-TEAM COMMUNICATION-QUALITY OF POSTER
5-TEAM COMMUNICATION-Quality of Bench-Scale Presentation
6-BENCH-SCALE DEMONSTRATION COMPETITION
Tech: Innovativeness of chosen technology (Weight: 6)
Tech: Design thoroughness (mass & energy balances; process flow diagrams; waste stream management) (Weight: 9)
Tech: Quality, thoroughness, and reasonable results of Techno-Economic Analysis; Addresses costs of alternatives. (Desktop teams should list all vendor sou
Tech: Design practicality (cost-effectiveness; attainable with current technology, likelihood of implementation) (Weight: 8)
Tech: Lab Results Validate Claims (Weight: 4)
EH&S: Safety considerations are appropriate and included in plans for construction and operation (Weight: 4)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01-LSU-1
TASK 1 - Louisiana State University and Agricultural and Mechanical College
Lab Results
Grade
1-TECHNICAL, ENVIRONMENT, COMMUNITY OUTREACH (WRITTEN AND ORAL REPORT)
1-TECHNICAL, ENVIRONMENT, COMMUNITY OUTREACH (WRITTEN AND ORAL REPORT)
2-TEAM COMMUNICATION-QUALITY OF WRITTEN REPORT & AUDITS
3-TEAM COMMUNICATION-QUALITY OF ORAL PRESENTATION
4-TEAM COMMUNICATION-QUALITY OF POSTER
5-TEAM COMMUNICATION-Quality of Bench-Scale Presentation
6-BENCH-SCALE DEMONSTRATION COMPETITION
Tech: Innovativeness of chosen technology (Weight: 6)
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Tech: Quality, thoroughness, and reasonable results of Techno-Economic Analysis; Addresses costs of alternatives. (Desktop teams should list all vendor sou
Tech: Design practicality (cost-effectiveness; attainable with current technology, likelihood of implementation) (Weight: 8)
Tech: Lab Results Validate Claims (Weight: 4)
EH&S: Safety considerations are appropriate and included in plans for construction and operation (Weight: 4)
Radio buttons for scoring

F. Scoring the reports–Entering scores (Refer to figures on previous page)

a. Score by clicking the radio buttons.
b. "Save" often. The WERC judging site has strict time limitations (beyond our control).
c. When finished, click "Submit"
d. Wait for a confirmation that the scores were saved
e. You may go back later and change the scoring at any time before the cutoff deadline (9:00 AM, April 9, 2025).
f. Click on the Crimson "Comment" button to enter detailed comments
    a. Please enter extremely detailed comments to help schools use the contest to meet ABET Requirements. Specify which event the comment applies to (report, orals, poster, or bench)
    b. ***Recommended:*** Enter comments in a Word document and copy/paste into the comment box.
    c. See below for ABET's list of student outcomes that universities must demonstrate

G. ABET Student Outcomes–Please address these points in your comments, if possible.

1. ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. ability to communicate effectively with a range of audiences
4. ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

APPENDIX B. MANUSCRIPT FORMAT REQUIREMENTS

1. **Page limit:** 27 pages, including report cover page, table of contents, executive summary, report body, figures, tables, references, and appendices. The audits are not included in the page count.

2. **Page order:**
   - Cover page
   - Table of Contents
   - Executive Summary
   - Body of Paper
   - References
   - Audits

3. **Cover page** (Title page):
   - ***Title:*** 2" top margin, 1" minimum side and bottom margins, 14-point type
   - ***Center:*** 12-point type. School name, team name, optional team logo, task number, advisor and team member names
   - ***Spacing*** between title entries (school name, team name, etc.): 1.5 line

4. **Table of contents**
   - ***All margins:*** 1" minimum
   - ***Type:*** 12-point type
   - ***Justification:*** Left and right justified
   - ***Spacing:*** 1.0 – 1.5 lines, as appropriate to your format

5. **Executive summary and body of paper**
   - ***All margins:*** 1" minimum; left justified with ragged right edge
   - ***Spacing:*** 1.5 lines
   - ***Type:*** Title: 14-point, Body: 12-point.
   - ***Page limit:*** Maximum of two pages. Preferably one page. Include mostly data and findings – no fluff.

6. **Footers:** Required on each page
   - ***School name and task number:*** Centered
   - ***Page number:*** Centered below school name and task number

7. **Headings:**
   - ***Title:*** Center, upper case, bold; 14-point type
   - ***Major Headings (Level 1):*** Flush left, Title Case, Bold, 12-point type
   - ***Subheadings (Level 2):*** Flush left, Title Case, Bold Italic, 12-point type
   - ***Sub-subheadings (Level 3):*** Indented, Bold, Title Case, End with a period, 12-point type
   - ***Fourth-level headings (Level 4):*** Indented, Bold Italic, Title Case, End with a period, 12-point type
   - ***Leading below headings:*** no more than 6 points. (Leading=vertical distance between lines of text)

8. **References**
   - ***In text***: Use superscript numbers when referring to references in the text.
   - ***Reference list:*** List and number all bibliographical references at the end of the paper.

9. **Equations**
    - ***Variables:*** Italicize variables in equations.
    - ***Placement:*** Center equations; right-justify equation numbers and enclose the numbers in parentheses. (*Hint for aligning these: enter equation and its number in a 1-row, 2-column table*)

10. **Figures and Tables**
    - ***Numbering:*** Number figures and tables consecutively within the text (Figure 1, Figure 2, etc.)
    - ***Figure Captions:*** flush left below the figure; include figure number; description in sentence case.
    - ***Table Titles:*** flush left above the table; include table number; description in sentence case.
    - ***Clarity:*** Lines and images within a figure should be sharp and easy to read. Include a legend where needed.
    - ***Legibility:*** All lettering should be large enough to be readable (minimum 10-point type)
    - ***Size:*** Illustrations should fit on an 8.5" X 11" page (with proper margins). Be sure all elements are readable.
    - ***Placement:*** Figures and tables should be placed in the document in the order in which they are referred, closely after (not before) they are referenced in the text.

11. **Symbols and Abbreviations**
    - ***Standard:*** Use only standard symbols and abbreviations in text and illustrations.
    - ***Defining:*** Define all abbreviations the first time of use by stating the full name and adding abbreviation in parentheses (even if you think the abbreviation is obvious, define it–it may not be obvious to every reader).

12. **Audits**
    - ***Format:*** Audits have no specific formatting requirements, but should be on company letterhead, if possible.
    - ***Voice:*** Auditors should format their audit in a professional manner that is appropriate to their field of expertise.

Thank you so much for helping engineering students develop into better engineers!

APPENDIX C. ROLE AND DUTIES OF THE LEAD JUDGE

ROLE

The Lead Judge serves as a judge in one of the tasks and presides over all judges at the contest. The primary role of the Lead Judge is to set the tone for judging, provide perspective and advice to other judges, and ensure fairness during awards deliberations.

LEAD JUDGE DUTIES

PRE-CONTEST

1. Spring/Summer 2025: Attends Task Exploration meetings and gives advice on potential tasks that will be successful at the contest.
2. Attends the final Task Development meeting each Fall to ensure clarity and feasibility of all upcoming Task Problem Statements.
3. Spring 2026: Plans for the contest: Task-breakout session; Orals, Poster, Bench, Awards deliberations.

CONTEST

1. Speaks at the Opening Dinner (*or Welcome Ceremony, if needed*)
2. Conducts the Mandatory Judge Orientation Meeting:
   a. Explains WERC's judging philosophy and scoring
   b. Discusses judging duties and mandatory events (report, orals, poster, bench)
   c. Ensures that the Safety Officer presents a bench-scale safety overview
   d. Facilitates the Judge Task-breakout session
3. Serves as the Group Leader for the task he/she is judging or delegates the role of Group Leader to another judge in the group.
4. Is available throughout the contest to answer judges' questions and encourage teams. Attends judge breakfasts, if possible.
5. Moderates the Awards Deliberation Meeting
   a. Session 1: Task Awards – is primarily focused on his/her assigned judging group.
   b. Session 2: Facilitates Overall Awards discussions.
   c. Ensures that all awards and award announcers are clearly reported to the WERC staff.

Lead Judge Schedule - 2025	
Sunday, April 6	
4:00 - 4:30 PM	Speaks at Welcome Ceremony (*If needed*)
6:00 - 7:00 PM	Dinner Address (~6:45 PM) – Introduces the Judges
8:00 - 8:30 PM	Mandatory Judge Orientation Meeting
8:30 - 9:00 PM	Judge Breakout Groups – Grouped by Task assignment
Monday, April 7	
7:30 AM – 5:00 PM	Attends all judge events
Tuesday, April 8	
7:30 AM – 5:00 PM	Attends all judge events
Wednesday, April 9	
9 AM - 2:00 PM	Oversees judge awards deliberations
5:30 - 8:00 PM	Speaks and/or announces awards at Awards Ceremony

APPENDIX D. ROLE AND DUTIES OF TASK GROUP LEADERS

ROLE

The Task Group Leader oversees judging for their assigned task, guiding new judges on WERC's supportive approach. They moderate task judging sessions and promote fairness during awards deliberations.

DUTIES

PRE-CONTEST:

1. Spring/Summer 2025: Attends Task Exploration meetings and advises on promising contest tasks.
2. Spring 2026: Plans for the task-specific needs of the judges during the contest: Breakout session during Orientation; Orals, Poster, Bench, and Awards deliberations.

CONTEST

3. ***April 6 – 9, 2025:*** Serves as a judge in one of the tasks.
4. ***Sunday, April 6:*** Conducts the Task-specific breakout session during the Sunday Judge Orientation.
    a. Ensures that all judges in the group understand:
        i. The requirements of their Task Problem Statement
        ii. The scoring rubric and entering scores in the online system
        iii. The importance of entering comments while scoring
        iv. The schedule for their group's participation in mandatory events (report, orals, poster, bench):
            1. Establishing scoring protocols when the task has more than 6 teams competing
            2. Clarifying smaller-group judging assignments for poster and bench events.
    b. Arranges for members of the judging group to assist with:
        i. Oral Presentation timekeeping. The timekeeper ensures the presentations stay on schedule by tracking time, notifying judges of the time remaining, admitting the next team, and announcing when all presentations are complete.
        ii. Accommodating virtual attendance of judges, if needed (Orals and Award Deliberations)
        iii. Additional assignments, as needed.
        iv. Taking group photos of the members of your judging group.
5. ***Monday, April 7:*** Facilitates the oral presentations:
    a. Welcomes the team, introduces the judges, engages the students and judges in friendly conversation to put students at ease prior to their presentation.
    b. Signals when it is time to begin the presentation.
    c. Moderates the Q & A session (allowing 15 minutes for Q&A)
    d. Closes the presentation session and thanks the team for their participation.
    e. Apprises the group of the time before the next session.
6. ***Wednesday, April 9:*** Moderates the Task Awards Deliberation Meeting
    a. **Session 1:** Task Awards.
        1. Assists judges in accessing team score totals online.
        2. Moderates Task award deliberations, ensuring all opinions are heard.
        3. Assigns a speaker to announce their task awards at the Awards Ceremony (Priority: Task sponsor representative or their designee).
        4. Submits the Task Awards sheet to WERC staff, ensuring all Task awards are clearly indicated.
        5. Moderates Overall Awards deliberations among their Task Group.
        6. Completes the Overall Awards sheet for reference, and delegates Task judge(s) to advocate) for nominees.
    b. **Session 2:** Engages in the Overall Awards deliberations, as appropriate.