Guidelines

Wildlife-Friendly Solar Photovoltaic System Competition: Powering with Purpose

Competition Name: Wildlife-Friendly Solar Photovoltaic System Design

Division: Environmental Coordination Division

Competition Type: Pre-Conference Competition (No On-Site Judging)

- Students submit their concept ahead of time.
- **Final submission of all materials due October 1st by 5:00 pm**
    - **SUBMIT COMPLETED PROJECTS HERE**
- Concepts are judged based *solely* on the submitted digital proposal.
- Finalists (and winners) are selected and notified based on this judging.

Eligibility Levels: Secondary (9th-12th Grade)

AGFC Conservation Education Standards:

- **Using Technology for Conservation:** Applying solar engineering design and energy production processes to address environmental issues.
- **The Importance of Habitat Conservation:** Designing solar arrays with consideration for pollinators, habitats, wetlands, and animal migrations.
- **Promoting Responsible Interaction with Natural Spaces:** Integrating environmental considerations into land use for energy production.
- **Understanding Arkansas' Fish and Wildlife:** Considering the impact of designs on local wildlife and ecosystems.

Competition Overview:

The overall objective of this competition is for students to gain familiarity with the solar engineering design and energy production processes while addressing the environmental issues and necessary budgeting associated with project delivery.

Competition Purpose (Problem or Abstract):

For this project, students will be given a budget of $1 million for a solar facility and will be asked to create a solar design that maximizes energy output AND natural habitats. Students are expected to optimize maximum energy production for their budget, describe how they will connect to the grid, and optimize wildlife-friendly habitats within the solar array by considering pollinators, habitats, wetlands, animal migrations, etc. Students may also develop a long-term maintenance plan and discuss whether or not battery storage is needed/included. Students are allowed to locate the solar facility in any part of the State and can choose any real or hypothetical plot of land.

You will showcase your ability to:

- **Design a Solar Array:** Create a comprehensive plan for a solar power system on the chosen plot of land.
- **Consider Environmental Factors:** Incorporate the needs of pollinators, habitats, wetlands, and animal migrations into your design, explaining how these are addressed.
- **Optimize Energy Production:** Clearly demonstrate how you will maximize electricity generation from the sun on your chosen land and whether or not battery storage should be needed.
- **Plan Grid Connection:** Provide a detailed description of how your solar photovoltaic system will connect to the existing power grid.
- **Develop a long-term plan:** Discuss how mowing, repairs, and other maintenance needs will be included in your solar photovoltaic system.
- **Communicate Your Design:** Present your ideas clearly, effectively, and comprehensively in a digital proposal.

Competition Guidelines:

You will create a **detailed digital proposal** outlining your solar field design. This proposal will be the sole basis for judging.

Team Size: 2-4 students per team.

Parameters for Submission (Pre-Conference):

Your submission must be a comprehensive digital proposal created using presentation software (like Google Slides, PowerPoint) or a document editor (like Google Docs, Microsoft Word). It must showcase conservation in a way that judges can easily understand without a live presentation.

Your digital proposal **must** include the following sections and details:

1. **Title Page:**
    - The names of all team members.
    - Your school's name, school district, and city/town.
    - The name of your proposed solar field design project.
2. **Executive Summary (1-2 slides/paragraphs):**
    - A concise overview of your entire project, including the proposed solar array, key environmental considerations, maintenance plan, and expected energy output.
3. **Site Description & Analysis (1-2 slides/pages):**
    - Clearly describe the specific plot of land (real or hypothetical) you've chosen for your solar field. Include details like its size, general topography (flat, hilly), and any existing features.
    - Identify and thoroughly describe at least **three (3) key environmental features** on or near your site that significantly influenced your design. Examples include:

        - Presence of specific local plants or animals (flora/fauna).
        - Existing water bodies (ponds, streams, wetlands) and their characteristics.
        - Known animal migration pathways or important wildlife corridors.
        - Sensitive habitats (e.g., nesting sites, rare plant areas, critical foraging grounds).
    - Explain *how* these features posed challenges or opportunities for your design.
4. **Solar Array Design & Optimization (2-3 slides/pages):**
    - **Proposed Solar Array Configuration:** Provide detailed diagrams, schematics, or visual renderings of your solar panel arrangement. Explain your chosen layout (ex., rows, tracking systems), mounting system, the type of panels, and how they will be oriented to maximize sun exposure.
    - **Energy Optimization Strategy:** Clearly explain the specific strategies and calculations (if applicable, even simple ones) you used to optimize maximum energy production for the given plot of land. This could include panel density, tilt angles, shading analysis, or proposed maintenance. Include a plan for battery storage, or discuss why it is not needed for your specific array.
    - **Estimated Energy Output:** Provide a reasonable estimate of the energy your solar field is expected to produce (ex., in kWh per year, or enough to power X number of homes).
5. **Grid Connection Plan (1-2 slides/pages):**
    - Describe, step-by-step, how the electricity generated by your solar field will be connected to the main electrical grid. This should include a basic diagram or explanation of the necessary infrastructure (ex., inverters, transformers, transmission lines, substation connection points).
    - Address any potential challenges or considerations for grid integration.
6. **Maintenance Plan (1-2 slides/pages):**
    - Provide a maintenance plan that describes how contractors, engineers, mowers, biologists, etc. will access the array to fix any mechanical problems, clean panels, monitor performance, remove debris, manage vegetation, and maintain biodiversity and wildlife-friendly habitat. How often will maintenance and routine monitoring take place and how does this fit into the budget?
7. **Environmental Integration & Impact Mitigation (2-3 slides/pages):**
    - This is a critical section. You **must** address how your design and maintenance plan actively considers and either minimizes negative impacts on, or positively integrates with, the specific environmental aspects identified in your site description.
    - Provide concrete examples and explanations for each of the **three (3) distinct ecological aspects** you identified (ex., "To protect pollinators, we will plant native wildflowers between solar panel rows and use pollinator-friendly ground cover," or "To avoid disrupting animal migration, we designed the array with elevated panels and clear corridors").
    - Explain any mitigation strategies for potential environmental concerns (ex., stormwater management, erosion control, glare reduction).

8. **Practicality & Benefits (1-2 slides/pages):**
    - Discuss the overall feasibility of your design. What makes it a practical and achievable project?
    - Discuss the challenges associated with your given budget of $1 million. Was it difficult to stay under the budget? Did you go over the budget? What was the biggest cost and what did you have to cut back on? What are the real-world implications with these challenges?
    - Explain the positive benefits your solar field would bring to the environment, local community, and/or the state of Arkansas (ex., clean energy, reduced carbon footprint, educational opportunities, economic benefits).

Submission Format:

- Your final digital proposal **must be submitted as a single PDF file**. This ensures your formatting, visuals, and content are preserved exactly as you designed them.
- **Length Limit:** The entire proposal (including title page and all sections) should be no more than **12 slides** for a presentation deck converted to PDF, or **9 pages** for a written report saved as PDF.

Judging (Pre-Conference):

- Submissions will be judged by ECD Staff, potentially with solar industry partners, based *solely* on the content and quality of the digital proposal.
- Finalists (and winners) will be selected and notified after all submissions have been thoroughly reviewed.
- There will be no live presentations for this competition.

Rubric

Rubric

Powering with Purpose Rubric

This rubric will be used by judges to score your digital proposal.

I. Problem Understanding & Design Concept

Points Available	10-9 (Leading)	8-5 (Developing)	4-1 (Exploring)
Problem Comprehension	Demonstrates a deep and accurate understanding of the challenge to design a solar array considering environmental factors and energy optimization.	Shows a good understanding of the problem, though some nuances or requirements may be missed.	Understanding of the problem is limited or inaccurate.
Solar Array Design Concept	Presents a highly creative, innovative, and well-defined solar array design concept for the given plot of land.	Presents a clear solar array design concept, but may lack significant innovation or detail.	The solar array design concept is unclear, unoriginal, or incomplete.
Energy Optimization Strategy	Clearly explains highly effective strategies to optimize maximum energy production for the given budget of $1 million.	Explains strategies for energy optimization, but some details or rationale may be missing or less effective.	Explanation of energy optimization is unclear, incomplete, or lacks a viable strategy.
Grid Connection Plan	Articulates a clear, accurate, and comprehensive plan for connecting the solar array to the electrical grid.	Articulates a generally clear plan for grid connection, but some steps may be vague or incomplete.	Plan for grid connection is disorganized, difficult to follow, or contains significant inaccuracies.
Maintenance Plan	A clear and reasonable maintenance plan is described and	A maintenance plan is described but details are vague and do not address the common	A maintenance plan is not identifiable or is disorganized and does not consider any

	realistically addresses common maintenance issues on a solar system.	solar system maintenance issues well.	common maintenance practices on solar arrays.

II. Environmental Integration & Impact

Points Available	**10-9 (Leading)**	**8-5 (Developing)**	**4-1 (Exploring)**
Consideration of Pollinators	Design clearly demonstrates thoughtful and effective consideration of pollinators, with specific integration methods.	Design shows some consideration for pollinators, but integration methods may be less defined or effective.	Design shows little to no consideration for pollinators.
Consideration of Habitats	Design clearly demonstrates thoughtful and effective consideration of existing habitats, minimizing disruption and potentially enhancing them.	Design shows some consideration for habitats, but may have minor negative impacts or missed enhancement opportunities.	Design shows little to no consideration for habitats, or may negatively impact them.
Consideration of Wetlands	Design clearly demonstrates thoughtful and effective consideration of wetlands, minimizing impact and potentially contributing to their health.	Design shows some consideration for wetlands, but may have minor negative impacts or missed opportunities for positive interaction.	Design shows little to no consideration for wetlands, or may negatively impact them.
Consideration of Animal Migrations	Design clearly demonstrates thoughtful and effective consideration of animal migration pathways, minimizing	Design shows some consideration for animal migrations, but may have minor negative impacts or less effective integration.	Design shows little to no consideration for animal migrations, or may disrupt them.

	disruption and allowing for movement.		
Overall Environmental Responsibility	The design demonstrates an exceptional commitment to environmental responsibility, balancing energy production with ecological protection.	The design shows a good commitment to environmental responsibility, but some aspects may be less optimized.	The design shows limited commitment to environmental responsibility, with potential for significant negative impacts.

III. Proposal Clarity & Professionalism

Points Available	**10-9 (Leading)**	**8-5 (Developing)**	**4-1 (Exploring)**
Visual Representation Quality	Visuals (diagrams, schematics, renderings) are exceptionally clear, professional, and effectively convey the design concept.	Visuals are generally clear and supportive of the design, but may lack some polish or optimal effectiveness.	Visuals are unclear, unprofessional, or do not effectively convey the design concept.
Clarity of Explanation (Written)	Explanations of the design, environmental considerations, and energy optimization are exceptionally clear, concise, and easy to understand.	Explanations are generally clear, but some parts may be confusing or lack detail.	Explanations are unclear, disorganized, or difficult to follow.
Feasibility & Benefits (Written)	The proposal clearly evaluates the design's feasibility and articulates its benefits to the environment, community, and/or state.	The proposal generally evaluates feasibility and benefits, but may lack specific detail or strong articulation.	Evaluation of feasibility or benefits is weak, unclear, or missing.
Overall Cohesion & Professionalism	The entire digital proposal is exceptionally	The proposal is generally well-structured and	The proposal is disorganized, lacks cohesion, or contains

	well-structured, cohesive, and demonstrates outstanding professionalism (grammar, spelling, formatting).	professional, with minor inconsistencies or errors.	significant errors in grammar, spelling, or formatting.
Adherence to Length Limits	Accurately adheres to the specified page/slide limits.	Slightly exceeds the page/slide limits but remains within acceptable range.	Significantly exceeds the page/slide limits.