**2027**

***Task 2 Preview –** Blue italics indicate items that have not been resolved with our Subject-matter experts (SMEs). View in Review Mode to see comments about italicized entries.*

# Solar Facility Vegetation Control Using Passive Systems

**Task sponsored by: El Paso Electric Charitable Foundation**

**Task developed by:** El Paso Electric Company

### Task Summary

Your team is invited to support clean energy production by developing a large-scale passive *or low-intervention* system to control vegetation for utility-scale solar installations *located in the Chihuahuan Desert region,* where vegetation can emerge rapidly, despite the arid climate.

Vegetation growing around photovoltaic (PV) modules can introduce significant risks, including electrical outages, wildfires, and equipment damage. It can also restrict access needed for operations and maintenance (O&M). By reducing these risks and limiting the need for routine vegetation management, your team's solution could lower solar power lifecycle costs, enabling utilities to maintain affordable electricity rates while they expand their efforts to generate clean energy.

Your team's solution may draw on multiple engineering perspectives, including biological, ecological, hydrological, geotechnical, materials, geosynthetics, electrical, or other innovative approaches.

### Problem Statement

*Objective:* Design an innovative, passive vegetation-management system for the El Paso Electric Company (EPE) *29-acre, 10,000-module, 3-megawatt Aggie Power solar and battery storage facility. The proposed solution shall be retrofitted to an existing solar installation* and provide long-term *(minimum XX years*) control of unwanted vegetation under climatic conditions typical of the Chihuahuan Desert.

Purpose: Support reliable electricity generation by reducing vegetation-related risks to solar facilities. Maintain safe and effective site operations and focus on minimizing lifecycle costs.

Key constraints: Exclude the use of gravel or aggregate groundcovers as well as labor-intensive methods, such as *herbicide applications* and physical removal (mowing, tilling, pulling, etc.). Proposed solutions may consist of a single technology or multiple integrated components. Refer to page 5 for potential passive approaches.

Performance requirements: The solution shall be technically, economically, and operationally feasible for this facility and demonstrate the potential for deployment at larger solar installations. It shall maintain site access while minimizing water and energy consumption, operational complexity, and maintenance requirements. The design shall also minimize adverse environmental impacts on soil health, erosion, drainage patterns, stormwater runoff, water quality, native vegetation, wildlife, and surrounding ecosystems, while complying with all applicable regulatory requirements.

Monitoring and Mitigation: Develop a post-installation monitoring strategy to identify areas where undesirable vegetation is becoming established, determine if supplemental vegetation control is needed, and plan for corrective action, if warranted.

Refer to the *Design Requirements* (pp. 10-11) for an annotated list of the task requirements.

## Background

### Managing Risk: Vegetation Management

Utility-scale PV installations are critical to the transition to low-carbon energy. Because these facilities may span hundreds or thousands of acres, they require ongoing operations and maintenance (O&M) to ensure safe, reliable, and cost-effective performance throughout their service life. Minimizing costs is essential to providing affordable electricity to the customer.

After a facility is commissioned, O&M activities begin. These include all actions that sustain facility performance throughout its expected service life. Within utility-scale solar installations, vegetation management is a key O&M function because unmanaged vegetation can reduce energy production, restrict access, increase wildfire hazards, and increase maintenance costs.

Historically, vegetation management has represented a significant portion of solar facility O&M expenses because it relies on recurring, labor-intensive activities such as mowing, herbicide application, and manual inspections [1]. Increasingly, operators are looking to passive strategies to reduce human interaction, and are adopting risk-based, data-driven technologies such as LiDAR, aerial imagery, and satellite observations to better understand site conditions and prioritize maintenance activities. This approach reflects a broader industry shift toward proactively managing risk while controlling long-term operating costs [2].

### PV Module Function, Efficiency, and Reliability

The top priority for all solar utility operations is providing reliable, efficient power to the electrical grid. Because vegetation management can play a key role in this effort, it is important to review the fundamentals of solar energy generation.

<u>Definitions</u>

***A PV module*** consists of multiple photovoltaic cells that are electrically connected, either in series or parallel. The cells and circuits in the module are sealed within a protective polymer laminate.

***PV Panels*** are field-installable units that contain PV modules.

***PV arrays*** are collections of PV panels that operate together as part of a solar energy system or facility.

***PV system reliability*** refers to the ability of solar technologies to produce power consistently and predictably throughout their expected service life. A reliable PV system aims to provide uninterrupted power, even during extreme weather events [3].

***PV module efficiency*** is the percentage of incoming solar energy that is converted into usable electrical power. This value, known as the module's *conversion efficiency*, is conventionally measured under standardized test conditions (STC) to enable comparisons among modules. Even under these controlled conditions, conversion efficiencies remain relatively low because much of the sun's energy is lost as heat during the energy conversion process [4].

**PV performance** describes the conversion efficiency of specific PV modules under actual operating conditions, where weather extremes, heat, dirt, and shading can reduce energy production [4].

**Efficiency vs Performance.** Although the terms *PV efficiency* and *PV performance* have distinct meanings, they sometimes appear to be used interchangeably in the literature. This is because *conversion efficiency*, in both cases (STC and operating conditions), is used to compute the percentage of solar energy converted into usable electrical power.

## Producing energy from the sun

Utility-scale solar facilities use large arrays of PV modules containing crystalline silicon solar cells protected by transparent polymer materials and housed in solar panels. The crystals initially have no free electrons. When sunlight strikes the silicon, its photons can free some of the silicon electrons, leaving behind positively charged holes. An internal electric field separates the electrons and the holes, creating a voltage across the cell. When connected to a circuit, the electrons flow through the wiring to perform useful work before recombining with the holes, thus producing a continuous electric current [5].

The current flows in a single direction, known as direct current (DC). However, the electric grid operates on alternating current (AC), where the direction of flow periodically reverses. Inverters convert the DC output from the modules into AC power. From there, the electricity is sent through power lines to the grid, where it supplies power to homes and businesses.

## PV Performance

The performance of PV modules is influenced by both short-term operating conditions and long-term material degradation.

During normal operation, the power output of a PV module decreases when the modules become hot, soiled, or shaded. High temperatures, such as midday heat, reduce voltage and power output, making it important to keep modules as cool as possible during operation. Soiling and shading reduce the amount of sunlight reaching the PV cells, lowering their power-generating efficiency and potentially creating hotspots that can damage the modules [6].

## PV Degradation and Retirement

While operational losses are generally temporary, module performance gradually declines over time because of irreversible degradation mechanisms. One of the most significant is thermal cycling. The repeated transition between daytime heating and nighttime cooling induces mechanical stresses in the inherently brittle crystalline silicon cells and their solder joints. Over time, these stresses introduce microcracks that propagate through the cells, disrupting current flow, increasing electrical resistance, and reducing the amount of energy converted into usable electrical power. As a result, the module's in-service performance declines over time because an increasing fraction of the available solar energy is dissipated as heat rather than converted into usable electrical power [6].

In arid regions, daily temperature swings are often substantial. Clear skies and low humidity allow intense solar radiation to heat PV modules during the day, while limited atmospheric moisture and cloud cover promote rapid cooling after sunset. As a result, PV modules in desert environments experience greater thermal cycling stresses, which can accelerate degradation and shorten service life. In contrast, humid, cloudy climates generally experience smaller daily temperature fluctuations because clouds and atmospheric moisture reduce solar heating during the day and limit heat loss at night.

Other degradation mechanisms include ultraviolet (UV) exposure, which degrades protective polymer materials, reducing sunlight transmission to the silicon semiconductors. In addition, corrosion at electrical contacts increases resistance and reduces power output.

These principles inform the development of vegetation-management strategies that intentionally support PV module performance and longevity by creating conditions that maintain, and potentially enhance, PV module efficiency and lifespan.

Eventually, PV modules reach the end of their useful service life. Traditionally, end-of-life has been defined as the point when module performance falls below 80% of its rated capacity. However, many operators now make retirement decisions based on economic performance, continuing to operate systems as long as they remain safe, reliable, and financially viable [7].

**Vegetation-related Risks**

If left unmanaged, vegetation can contribute to high O&M costs due to the following risks.

<u>Obstructing maintenance access.</u> Excessive vegetation can limit access to equipment, potentially extending equipment downtime and delaying repairs.

<u>Retaining moisture.</u> Vegetation can trap moisture around equipment by reducing air circulation and slowing evaporation. The moisture may accelerate corrosion and degrade protective coatings.

<u>Creating wildlife habitats.</u> Dense vegetation provides shelter for rodents, birds, etc. They may be harmed by facility operations and can also damage equipment or create safety hazards for personnel.

<u>Increasing fire risk.</u> When combined with accidental ignition sources, such as electrical faults, dry vegetation can catch fire, potentially causing damage to equipment and infrastructure.

<u>Shading losses.</u> PV module efficiency is reduced when portions of a module become shaded. Not only do they receive less solar energy, but they can also develop hot spots, where energy is dissipated as heat rather than converted to electricity. These hot spots reduce power output, accelerate degradation, and may lead to permanent module damage.

See References [1, 8, 9, 10] for additional discussions of traditional vegetation-management strategies and their economic considerations.

**Conventional vegetation-control practices**

Traditional vegetation-control practices (mowing, herbicides, etc.) can be effective, but they are costly, requiring a high level of human intervention. They focus on prevention or removal, or a combination of both. The primary approaches are discussed below from the perspective of hot desert climates, where native vegetation can thrive because it has adapted to sunny, hot, dry conditions.

<u>Prevention</u>

*Weed-suppressing native vegetation or agrivoltaics*.* Some solar facilities use low-growing native vegetation or understory crops to suppress weeds, with agrivoltaics providing additional land-use value [8, 11]. Studies in New Mexico and West Texas suggest that carefully selected native plant communities may be successful in limiting taller vegetation [12]. In arid environments, however, sparse plant cover can leave bare soil vulnerable to weed invasion, and limited water supplies can constrain agrivoltaic activities. Teams adopting these strategies should demonstrate that they can meet project objectives for performance, reliability, maintenance, and cost.

*Gravel and aggregate.* These groundcovers have been used for vegetation prevention in the arid southwest, but this approach is losing favor because: 1) it does not provide long-term weed prevention; 2) it is costly to install; 3) it can increase runoff and alter site drainage patterns; 4) it may create uneven surfaces; 5) and it retains heat that can elevate module temperatures and reduce PV efficiency [12].

** Agrivoltaics is defined as the intentional use of land for both solar energy generation and agricultural production, including crops, livestock, or pollinator habitat.*

*Pre-emergent herbicides*. Pre-emergent herbicides prevent many weeds from germinating but do not eliminate all vegetation, making additional control measures necessary. They also require ongoing investments in chemical applications, including periodic re-formulation to mitigate herbicide resistance, scheduled treatments, worker training, safety protocols, and regulatory compliance. Environmental concerns include chemical drift, runoff, and potential impacts on workers and surrounding ecosystems. In addition, perception of their use can be negative, particularly when stakeholders perceive chemical vegetation control as conflicting with broader environmental stewardship goals [12].

Removal

*Post-emergent herbicides.* Post-emergent herbicides can effectively eliminate most existing vegetation, but they share the same concerns as pre-emergent herbicides. In addition, additional labor is required to remove dead vegetation to reduce fire hazards and prevent reseeding.

*Physical removal.* Although effective, these approaches require repeated implementation, resulting in ongoing labor, equipment, fuel, and maintenance costs [1]. Each physical removal strategy has unique disadvantages, as discussed below [11]:

*Above-ground physical removal:*

- *Mowing or string trimming.* These methods remove above-ground growth but leave root systems intact, requiring frequent retreatment. They also introduce the risk of power tools damaging the facility and thrown debris damaging the modules.
- *Livestock grazing.* A form of agrivoltaics, livestock grazing using "solar sheep" can provide effective vegetation control. However, this approach is constrained by animal availability. It also introduces additional challenges, including manure management and potential interference with equipment access [1, 13].

Both tillage and hand removal, described below, are vegetation-control methods that disturb and destabilize the soil by uprooting plants. Such disturbance can increase erosion, alter drainage patterns, and adversely affect site access, stormwater management, and long-term site stability. Disturbed soils may also create favorable conditions for additional weed germination and growth.

1. *Hand Removal***.** The manual uprooting of unwanted vegetation. Hand removal is labor-intensive, presents worker safety concerns, and causes soil disturbance that can contribute to erosion and subsequent weed establishment.

2. *Tillage.* The digging, stirring, or turning of soil to remove vegetation. Tillage typically requires mechanized equipment and fuel, may cause more soil disturbance than hand removal, and can damage solar infrastructure or other site improvements.

**Passive Vegetation Management at the Task 2 Site**

Passive vegetation-control systems offer a long-term approach to weed mitigation that minimizes human intervention. Rather than repeatedly removing vegetation, these systems modify site conditions to suppress plant germination and growth by restricting access to light, water, nutrients, or other resources needed for plant establishment.

Passive Solutions may include *(the list is waiting on SME approval):*

- *Engineered ground covers, surface treatments, or coatings*
- *Geotextiles, geosynthetic barriers, and engineered barriers*
- *Soil amendments or modifications that may consider media regeneration and reuse.*
- *Passive hydrologic controls*
- *Electrical stimulation*
- *Other approaches*

Solutions for this Task must exclude:

- Gravel or aggregate materials
- *Herbicides*

**Assessing Weed Mitigation Strategies**

Equations (1) through (3) (see reference [14]) provide examples of weed-control metrics based on comparing weed abundance in untreated and treated plots. These metrics provide a useful starting point, but teams are encouraged to identify and evaluate additional assessment methods appropriate for their proposed solution and supporting research.

Weed Control Percentage (WCP): Measures % of growing weeds destroyed due to herbicides, pulling, etc.

- Initial weed count = the number of actively growing weeds before applying treatment;
- Weed count at interval = the number of weeds after treatment has been applied:

$$WCP = \frac{Initial\ weed\ count - Weed\ count\ at\ interval}{Initial\ weed\ count}\ x\ 100 \quad (1)$$

Weed Control Efficiency (WCE): Compares weed dry weight in treated and untreated plots.

- $W_C$ = weed dry weight for the control (untreated) plot;
- $W_T$ = weed dry weight in the treated plot.

$$WCE = \frac{W_C - W_T}{W_C} x\ 100 \quad (2)$$

Weed Persistence Index (WPI): Evaluates the reduction in weed growth over time.

$W_C$ and $W_T$ are defined above for equation (2).

- $W_{pC}$ = Weed population in the control (unweeded) plot;
- $W_{pT}$ = Weed population in the treated plot.

$$WPI = \frac{W_T}{W_C}\ x\ \frac{W_{PC}}{W_{pT}} \quad (3)$$

**Task 2 Study Site**

The El Paso Electric Company (EPE) recently installed the Aggie Power facility, a 3-megawatt solar and battery storage installation in Las Cruces, NM (Fig. 1). It provides solar energy for about one-third of the 900-acre New Mexico State University campus. The facility spans 29 acres of previously unoccupied Chihuahuan Desert land and is equipped with 10,000 single-access tracking solar panels and a 1MW Tesla battery pack.


Fig. 1. Aggie Power facility, aerial view. Desert plants line the perimeter of the facility.

For solar facilities in arid and semi-arid environments, vegetation management is a recurring concern despite relatively low rainfall. Many desert plants are opportunistic, meaning they readily germinate and grow rapidly in areas that are disturbed by plowing, land clearing, or fires. Their rapid growth allows them to take over before slower-growing plants can become established. Heavy Monsoon-season precipitation (July – early September in Southern New Mexico) provides ideal conditions for opportunistic plants, as vegetation often seems to appear overnight after heavy rain.

This effect can be pronounced in PV facilities where site clearing disturbs the land, providing ideal conditions for opportunistic plants to take root. In the Chihuahuan Desert, for example, the Russian thistle (tumbleweed) (Fig. 2) is a key indicator of recent soil disturbance. Other species commonly found in disturbed desert soils include black henbane, yellow star thistle, creosote, and mesquite [15].

Fig. 2. Russian thistle (tumbleweed). Left: actively growing; Right: fully mature and dried. Dried plants break from their base and tumble across the landscape, freely spreading seeds. Tumbleweeds are indicators of disturbed soils.

The Chihuahuan Desert

North America contains four major deserts, all of which are located in the western portion of the continent (Fig. 3). The Great Basin Desert is considered a cold desert, and the other three (Mojave, Sonoran, and Chihuahuan) are hot deserts. The Aggie Power facility is located within the Chihuahuan Desert, therefore, it is important to understand this ecosystem when evaluating vegetation-management strategies.

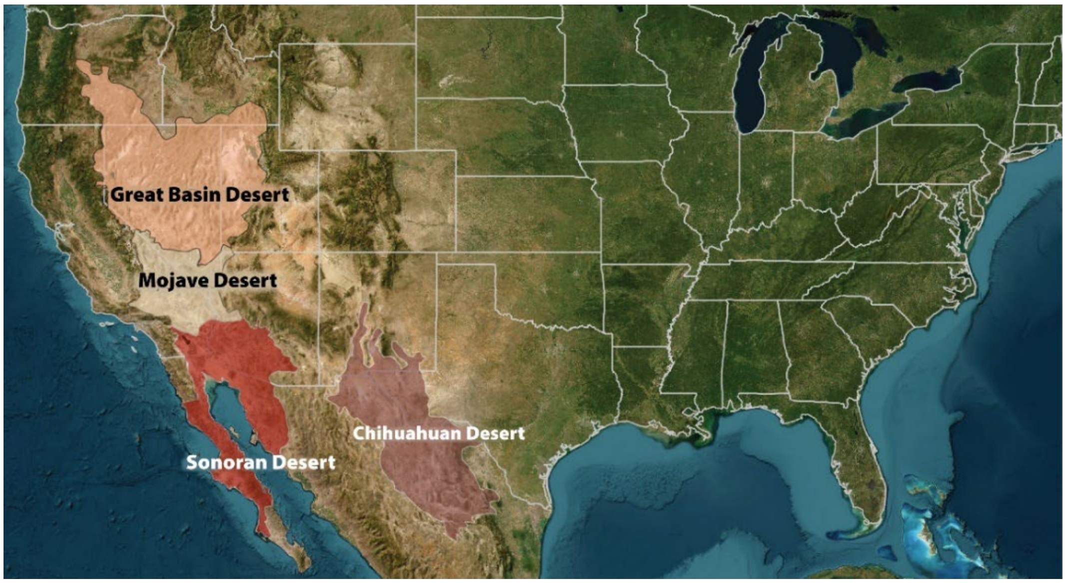


Fig. 3. The four deserts of North America (north to south: Great Basin, Mojave, Sonoran, Chihuahuan deserts). The Chihuahuan Desert is shaded mauve. Desert boundaries shown are approximate and may vary among published maps due to differences in classification criteria. *Reproduced from* [17].

The Chihuahuan Desert is characterized by higher elevations and colder winters than the other two North American hot deserts, with winter freezes being common [18]. The region supports nearly 3,500 plant species, including approximately 1,000 endemic species found nowhere else in the world, and nearly one-quarter of the world's cactus species are native to this desert [16]. Its native vegetation is dominated by low shrubs, succulents, and small cacti[1].

Annual precipitation typically ranges from 8 to 9.5 inches, with most occurring during the summer monsoon season from July through early September. The remainder is associated with winter storms. These precipitation events can rapidly trigger seed germination and vegetation growth, particularly in disturbed soils such as those commonly found within solar facilities [18].

Native vegetation in this region can be patchy, allowing space for opportunistic plants to take hold. Although sparse, many species have the potential to grow high enough to interfere with a module's exposure to sunlight.  Fig. 4 shows a north-side view of the Aggie Power facility. The unmanaged vegetation outside the facility boundary illustrates the natural plant community capable of encroaching on the site. Early-stage growth of opportunistic plants are visible in rows parallel to the PV modules.

[1] *Note that the iconic saguaro cactus, often depicted in desert landscapes, with its thick green ribbed trunk and upward-curving arms, is native to the Sonoran Desert (Fig. 1, red shading). It cannot survive the freezing winters in the Chihuahuan Desert.*


Fig. 4. Aggie Power facility viewed from the north. Vegetation outside the perimeter fence serves as a potential seed source at the facility. *Photo by G. Scarbrough, August 6, 2026.*

Another EPE solar facility in San Elizario, Texas, 60 miles SE of Las Cruces, is located in the same desert. Fig. 5 illustrates Russian thistle encroaching on the facility. Although the plants appear to be sparse, some are reaching up to the middle of the tilted PV modules, potentially shading the modules and creating hot spots. This species usually grows to about 3’ tall, but can reach 4’ to 6’, under certain conditions.

Fig. 5. EPE Facility in San Elizario, TX (about 60 miles SE of Las Cruces, NM). Note the Russian thistle beginning to grow to at least half the height of the PV modules.

**Site Monitoring and Corrective Action**

Your team's proposed vegetation management system should prevent the establishment of invasive species within a solar facility for XXX years, with a target tolerance of YYY.

However, because perfect vegetation control cannot be guaranteed, the proposed solution should incorporate an adaptive management approach that monitors for invasive species, evaluates site conditions, and identifies appropriate corrective vegetation-control measures when needed.

## Design Requirements

Your proposed design shall answer the *Problem Statement* given on page 1 and demonstrate these key features (discussed above):

- ***Propose a solution that can be** retrofitted to an existing solar installation and minimizes human intervention, requiring little to no routine inspection, maintenance, or material replenishment.*
- ***Maintain PV performance and limit degradation*** by avoiding conditions that impair PV efficiency or accelerate module degradation. Where feasible, create conditions that might increase module efficiency and extend service life.
- ***Support site management*** by protecting facility infrastructure and preserving site access.
- ***Deliver long-term vegetation control*** for a minimum of *XX* years under high solar intensity conditions. Opportunistic plant occurrence should fall below a target tolerance of *YY*.
- ***Minimize health and safety risks*** throughout the system lifecycle, including installation, operation, maintenance, and decommissioning**.**
- ***Promote environmental stewardship*** by minimizing adverse impacts on soil health, erosion, stormwater runoff, water quality, native vegetation, wildlife, air quality, dust generation, and the surrounding ecosystems while complying with all applicable regulations.
- ***Demonstrate scalability*** by applying the solution to a *29-acre* solar facility, with the potential to scale up to a 1,200-acre site.
- ***Demonstrate feasibility*** by showing that the solution is technically sound, operationally practical, and economically viable for construction, operation, and maintenance at utility-scale solar facilities. Designs should account for seasonal and operational variations and minimize total lifecycle costs, including capital, operating, maintenance, and end-of-life considerations.
- ***Address regional conditions*** of the Chihuahuan Desert in the southwestern United States.

### Supporting Elements:

- ***Review the literature*** for previous vegetation mitigation efforts for PV facilities and develop your own innovative solution.
- ***Implement monitoring, modeling, and predictive tools*** to support design development and optimization by evaluating alternative concepts, characterizing vegetation-growth behavior, and forecasting the effects of seasonal, climatic, and operational changes under local climatic conditions. This step is optional.
- ***Implement a risk-management plan*** that identifies and addresses the key variables influencing your system's effectiveness and supports adaptive management by proposing an approach for tracking the system's performance, identifying locations that may require supplemental vegetation control, and recommending appropriate corrective measures when needed.

- ***Include a System Diagram*** (or PFD) for the selected system. (See *Team Manual*).
- ***Develop a bench-scale prototype*** to demonstrate the capabilities of your design. Validate the prototype's operational feasibility and sustainability through extended bench-scale studies conducted at your institution, report these in your deliverables, and demonstrate the design's functionality during the Bench-scale Demonstration (see details below).
- ***Quantify the effectiveness of your approach*** (see reference [14]) by analyzing prototype performance and scaling the results to a utility-scale solar facility.
- ***Present a Techno-Economic Analysis*** (TEA) for implementing your full-scale vegetation management system. Report all costs for a full-scale operation on an annual *basis ($/acre/yr).*

  For the full-scale solution, include your estimates of capital costs (CAPEX), operational costs (OPEX), and graphical representations of these estimates.

  - Capital expenses typically include, but are not limited to, equipment, pipes, pumps, etc., required to install the proposed vegetation management system. Do not include the cost of buildings or other structures, unless they are directly associated with the retrofit vegetation control system.
  - Operating expenses (OPEX) shall include all materials required for both operation and maintenance. Include anticipated equipment or supplies, consumables (chemicals, sacrificial components, etc.), disposal costs (include hauling, if needed), and other O&M costs identified by your team. Use the following operating costs:
    - Labor rates: Professional engineer ($150/hr), operator ($70/hr).
    - Energy costs: If appropriate, research an industrial natural gas rate (state in $/MM BTU); Use an *electricity rate of $0.09/kWh*.
  - Visualization tools: Use sensitivity analyses, graphs, and other visuals to illustrate how key parameters impact system performance and economics.
- ***Develop a community engagement or public involvement plan***, as applicable (see *Team Manual*).
- ***Reflect on alternative designs*** and the conditions under which they may be preferable to yours.
- ***Address any intangible benefits*** of the selected treatment process.
- ***Address safety aspects*** of constructing, operating, and/or maintaining the proposed system. These issues should be addressed:
  - for both the full-scale design and the bench-scale demonstration
  - In both the written report and the ESP
- ***To qualify for the P2 (Pollution Prevention) Award***, document your project's success in improving energy efficiency, pollution prevention, and/or waste minimization. Place this in a separate "Pollution Prevention" section of the report.
- ***Report the use of AI, machine learning, predictive modeling, automation, or other decision-support tools,*** and describe how the tools were used. These resources may be used only to support the team's independent engineering research, analysis, calculations, assumptions, and conclusions. Teams remain fully responsible for verifying all information, performing the underlying engineering analysis, and defending their design decisions based on their own work.
- ***Flash Pitch:*** The audience for the Task 2 pitch is *El Paso Electric Company* as potential investors in your contract engineering services. (Teams solving other tasks may be assigned to pitch to community leaders or funding agencies).

**30% Project Review**
Due in late December, the 30% Project Review ("30% Review" for short) outlines the general design and functionality of your vegetation management system, with emphasis on your plans for demonstrating and testing your system during the contest in Las Cruces. The 2027 *Team Manual* gives general guidelines for the 30% Review. Pay particular attention to submitting a **complete** System Diagram (PFD).

Include the following project-specific details:

1. System Diagram. This serves as a robust outline of all processes in your treatment system, showing balanced inputs and outputs.
2. Drawing of your bench-scale demonstration setup. The draft should be a 3-D view, drawn to-scale, with dimensions labeled.
3. Potential safety concerns and related mitigation plans for running the prototype at the contest.
4. Describe any supplies or equipment you would like WERC to provide at the contest.

**Bench Scale Demonstration**
Teams shall design and construct a working bench-scale system to demonstrate the requirements of the Problem Statement and the *Design Requirements* listed above. The prototype will be displayed and demonstrated at the contest in Las Cruces, NM: April 4-7, 2027.

The demonstration will be conducted in a 10' × 10' booth with an 8' table and 120V power. Standard laboratory resources (e.g., fume hoods and ovens) will not be available.

**Before the contest:**

Your team shall submit the 30% Project Review, build and test the bench-scale prototype at your institution, attend the ESP-preparation short course, obtain ESP approval to operate the prototype at the contest, and submit an equipment transport form, if shipping to Las Cruces. During prototype construction and testing, comply with all safety requirements established by your institution.

**At the contest, your team will provide:**

A working bench-scale prototype that demonstrates your team's full-scale vegetation-mitigation system, including all materials and supplies needed to demonstrate the system.

**At the contest, WERC will provide:**

- Basic booth setup, as described in the *Team Manual*
- Any other supplies or equipment requested by your team in the 30% Review and/or the ESP.

**Contest Analytical Testing Techniques** (Guided by WERC)
Demonstrate the functionality and effectiveness of the vegetation-mitigation system during the bench-scale demonstrations on Tuesday, April 6, 2027.

Task 2 teams will likely demonstrate their solutions outdoors.

Since participating teams may propose widely different solutions, WERC will work with each team through virtual meetings prior to the contest to develop appropriate analytical testing protocols. These protocols will be based on the team's 30% Project Review and the ESP.

**Deliverables** (See *Team Manual*)

Each team must submit (*see Dates and Deadlines, next page*):

- 30% Project Review
- ESP and required short course
- Technical Report—System design, data analysis, bench-scale results, full-scale plans, and 3 independent audits.
- Equipment Transport Form (if shipping equipment to Las Cruces)
- Flash Pitch—The audience for the Task 2 Pitch is the El Paso Electric Company as potential investors.
- Oral Presentation—Slides and presentation summarizing the design and key findings
- Poster Presentation—Visual summary of the design and results; presentation at the poster.
- Bench-Scale Demonstration—Working model, tested onsite; presentation benchside.

**Evaluation Criteria**

Each year, the WERC Environmental Design Contest and its sponsors award more than $35,000 in cash prizes. Awards include task-specific prizes and overall contest awards.

Read the *2027 Team Manual*, as a team, for a comprehensive understanding of the contest evaluation criteria: https://werc.nmsu.edu/team-info/guidelines.html

Judges' evaluation of your entry will include consideration of the following points specific to this task.

- Quality of the System Diagram
- Quantitative confirmation of vegetation management
- Bench-scale demonstration that effectively demonstrates the technology.
- Potential for real-life implementation, including passivity, effectiveness, expected reliability, and maintainability.
- Ability to support PV module reliability and performance.
- Minimal waste generation; Efficient waste management, if applicable
- Cost effectiveness of your solution, compared with other options your team identifies.
- Thoroughness and quality of economic analysis.
- Originality and innovation demonstrated by the proposed technology.
- Other specific evaluation criteria that may be provided at a later date (watch the FAQs).

**Dates, Deadlines, FAQs** (*dates subject to change—watch website FAQs*)

| | |
|---|---|
| Today | Email us to reserve a spot for your team and join the email list for this task. Registration at the contest is limited to the first 34 teams. |
| Weekly | Check FAQs weekly for updates:<br>Task-specific FAQs: 2027 Tasks/Task FAQs<br>General FAQs: WERC General FAQs |
| Nov. 1 – Dec. 31, 2026 | Early Bird Registration (discount applies) |
| Dec. 31, 2026 | 30% Project Review Due |
| Dec. 1, 2026 – March 1, 2027 | Mandatory on-demand Course: *Preparing the Experimental Safety Plan*. See WERC's website and Team Manual for information. |
| February 15, 2027 | Final date to register a team. |
| March 1 – 5, 2027 | Email ESP to Juanita Miller (miljgh@nmsu.edu).<br>Include requests for chemicals, materials, etc. |
| March 22, 2027 | Submit Equipment Transport form (if shipping items to Las Cruces) |
| March 26, 2027 | Technical Report due |
| March 29, 2027 | Submit Flash Pitch Slides and Summary |
| April 4 – 7, 2027 | Contest in Las Cruces |

**Contacts:**

*ESP and Safety Officer:* Juanita Miller, miljgh@nmsu.edu

*Program Manager:* Ginger Scarbrough, gscarbro@nmsu.edu (for non-ESP questions)

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