

# SWANA STUDENT DESIGN COMPETITION (SDC)

*Addressing solid waste and resource management challenges*



## PROBLEM STATEMENT AND PROTOCOL

November 2024 - April 2025



## 1. Introduction

The SWANA Student Design Competition (SDC) is a team project focused on solving a “real world” problem faced by solid waste and resource management professionals. The competition provides a professional experience to students pursuing an education and/or career in solid waste, resource management and related environmental fields. The goals of the SDC are to:

- Provide students with real world experience in solving complex solid waste, resource management and environmental issues in a supportive and fun environment.
- Provide students with an opportunity to display their problem-solving, professional writing and communication skills.
- Encourage student involvement in SWANA.

This document outlines the problem statement and guidelines for the competition. **Participants are advised to read the entire document as guidelines detailed in this document must be followed.**

## 2. Problem Statement & Competition Format

The problem statement is provided under **Attachment 1**. In general, the SDC is organized as explained below:

- Students will review the Problem Statement and existing information. Interested teams will submit a completed Team Commitment Form.
- SWANA will host a virtual kick-off meeting to explain the Problem Statement and associated data.
- Students will be guided by the SWANA SDC committee and, upon request, be paired with a mentor to assist their team with the project.
- Student teams will present their solutions through a report, infographic, and virtual presentation by the deadlines summarized in Section 4.

The solution to the Problem Statement must be detailed in a design report, infographic, and presentation. Guidelines for each of the three components are provided in Sections 5 through 7.

## 3. Eligibility to Participate

Participating teams must comply with the following criteria:

- Each participating student must be a member of SWANA. You are encouraged to activate your free membership in advance. [SWANA Student Membership](#).
- Each participating team can have a minimum of two (2) and a maximum of eight (8) team members. The recommended team size is four (4) members.
- Each participant must be enrolled as a full-time or a part-time student during competition enrollment. We understand that some students may graduate or be near graduation at the time of the presentation. However, to ensure participation, **we require at least one student in the team to anticipate graduation after the scheduled date for presentations.**

- Preferably all team members should be from the same school/university; however, exceptions can be made. An exception request must be made using the *Team Commitment Form* provided as **Attachment 2**, and the participants should reach out to the contacts provided for further discussion.
- The *Team Commitment Form* must be signed by a school faculty member as the team's sponsor.

## 4. Deadlines

The deadlines for the competition are detailed below. Submissions must be made electronically (unless specified otherwise) to the contact person identified in Section 11.

- **Team Commitment Form**: Teams must submit the Team Commitment Form (**Attachment 2**) to participate in the competition. SWANA recommends to interested teams submit the Team Commitment Form as soon as possible. Applications are **due by December 4, 2024**. Acceptance of the Team Commitment Form to confirm participation in the SDC will be provided by December 9, 2024.
- A kickoff meeting will be held December 11, 2024, to provide the teams with an overview of the competition, review the SDC problem statement, requirements, and answer general questions. An additional follow-up meeting will be scheduled for January 29, 2025. Further information will be provided for the selected teams.
- **Design Report**: The final design report must be submitted by March 26, 2025. The guidelines presented in Section 5 must be followed for the design report.
- **Infographic**: Infographic must be submitted by March 26, 2025. The guidelines presented in Section 6 must be followed for the infographic.
- **Presentation**: The student design teams will present their solutions virtually April 9, 2025 – April 10, 2025. The specific date and time for each presentation will be communicated to teams in March. The guidelines listed in Section 7 must be followed for the presentation. All presentations will be recorded and become the property of SWANA.

## 5. Design Report Guidelines

The Design Report must follow the structure listed below:

- Report must be submitted in pdf format.
- Font must be a 12-point standard business font (e.g., Calibri, Arial, Times New Roman) and double-spaced text.
- Recommended format for Citations/References: Chicago Style.
- The maximum report length is limited to 30 pages (not including a cover sheet and references).
- Tables and figures can be provided as attachments in addition to the 30-page limit. There is no page limit on the attachments (tables and figures), but attachments should not be narrative in form (i.e., attachments cannot be used to extend the length of the core report narrative).

Refer to the judging sheet provided as **Attachment 3** to gauge the expectations of the judges.

## 6. Infographic Guidelines

The following guidelines must be followed.

- Infographics should be geared toward the general public and should condense the key points of your report and presentation into an engaging and informative summary.
- All infographics must be created in a desktop page layout software (e.g., PowerPoint, Adobe InDesign, QuarkXPress) or an online infographic design site that can produce high-res images.
- All art must be formatted as CMYK, hi-res images at least 266 dpi in RAW .jpg format.
- Final document must be saved as a hi-res PDF with all art and images embedded.
- All files shall be submitted using the method directed by SWANA staff prior to the deadline. The submission method will be communicated directly to participating teams in March 2025.
- Be clear and concise with infographic design and content. Overcrowding the infographic makes it difficult to read.
- Your infographic must include the university represented and all team member names. Figures, graphs, and tables should be uncluttered and simple and arranged in the sequence in which you want them to be viewed.
- Remember contrast and accessibility. Put light-colored text on dark backgrounds and dark text on light-colored backgrounds so that your viewer can see your text clearly.
- Drawings, illustrations, and/or diagrams (with the exception of open-source icons and clipart available through the design software of your choice) must be the student's own work.

### Tips for imbedded graphics:

- Use high-resolution images.
- Do not cut and paste art or screen-filled shapes from PowerPoint.
- Text may be copied and pasted from PowerPoint into the layout software, but it will require applying the "create to outline" setting after pasting.

Refer to the judging sheet provided as **Attachment 3** to gauge the expectations of the judges.

## 7. Presentation Guidelines

Each of the participating teams will present their design solution virtually. Presentation dates and times will be communicated by SWANA in March 2025. Presentation order will be chosen randomly, and all team members need to actively participate in the presentation and/or question and answer period. Plan for a 20-minute presentation followed by 10 minutes for question and answer.

### Presentation Guidelines and Tips:

- Treat the judges as if they are your client and your firm is hired to solve their "real world" problem.
- The presentation needs to flow in a way that makes sense. Your team should present the problem, discuss alternatives, and provide a solution.
- Do not read word-for-word from the slides. Slides should contain a summary of what students will say.
- Do not overwhelm the slide with too many images or complicated animations. Slides should be clean and easy to read with a common theme.

- Be sure to thank anyone who provided mentorship and information throughout the project.
- Each speaker should have somewhat equal time presenting. We recommend at least 50% of team members participate in oral presentations, with a minimum of 2 presenters for each team. For a team of two (2) members, both members must present. It is expected that most (if not all) team members will participate when responding to questions from the judges.
- Clearly state the main points, assumptions, and conclusions. You will have to make assumptions in the real world, so the judges need to understand your thought process.
- Understand that there is a balance to the amount of background information that should be presented. You can assume that there might be people in your audience (including judges) that will not be familiar with the topic, so a little background is helpful, but it should be limited, since it is not the main purpose of the competition.
- Discuss the challenges that you were faced with and how that affected the outcome. Practice presenting and answering questions in front of an audience. The judges understand that you are a student but like to see that you understand the basic technical principles, and that you can think about their questions and come up with a thoughtful answer.
- Consider recording yourself during a practice presentation and make notes of distracting mannerisms (i.e. saying “ummm” or “like” too often). Practice timing yourself.
- Make sure you dress for the part. You are presenting as though you are trying to win a job. Attire is business professional.

## 8. Judging

Judging sheet is provided as **Attachment 3**. The following Table provides a breakdown of the total points:

Item	Maximum Points
Design Report	100
Infographic	25
Presentation	125
<b>TOTAL</b>	<b>250</b>

## 9. Award

Team awards will be presented to the top teams with maximum overall scores (see chart below). A minimum of one member from each team must attend the Awards Ceremony for the team and individual members to be eligible for awards. The Awards ceremony will be April 14, 2025.

Participating students will receive complementary registration for a SWANA Annual National Conference.

Rank	Prize
First Place Prize	\$2,000
Second Place Prize	\$1,500
Third Place Prize	\$1,000

Best Team Presentation and Emerging Leader/Rising Star awardees will receive \$500. It is possible for a team to receive more than one award.

Please note: Cash prizes are subject to the laws of the winning team's country including Somalia, Iran, Cuba, Sudan, Syria, North Korea, or any other nation that may be under sanction by the United States at the time of the competition or award distribution.

## 10. Closing Remarks

Although most information may be available online, participants should note that additional information may require contacting vendors. If this is the case, always identify yourself as a student working on a project where you are acting as a consultant. Be professional, polite, persistent, and concise in the requests to obtain necessary information.

At the end of the day, a consultant may need to contact the client for data requests. If you run into an issue that requires critical information that you believe is not provided, please contact the persons listed below.

## 11. Contact Persons

Submissions must be made electronically (unless specified otherwise) to SWANA. Natalie Boyd ([nboyd@swana.org](mailto:nboyd@swana.org)) is the staff liaison for the competition.

Questions regarding the projects may be directed to SDC co-chairs:

- Sarah Gustitus-Graham ([sgustitusgraham@geosyntec.com](mailto:sgustitusgraham@geosyntec.com))
- Kashev Parikh ([kparikh@cecinc.com](mailto:kparikh@cecinc.com))

## 12. Use of Material

License: Team hereby grants to SWANA a royalty-free license to use, reproduce and distribute the infographic and presentation (including all handouts and PowerPoint presentations) to SWANA members and customers through the SWANA website, with appropriate attribution to Team.

Promotion: It is understood that SWANA may use Team's University name, photograph, and biographical material solely for the purpose of advertising and promoting Team's participation and appearance SWANA's Student Design Competition.

Recording: Team provides consent for SWANA to record the presentation in audio and/or visual form. Team understands that SWANA will be the sole copyright owner of the recording and can distribute it, along with any supporting materials. Teams will receive a link to the recording.

Warranty: Team warrants and represents that, to the best of Participant's knowledge, nothing in the presentation violates any proprietary or personal rights of others (including, without limitation, any copyright or privacy rights), the presentation is factually accurate and contains nothing libelous or otherwise unlawful. The team further represents and warrants that the presentation is Team's own original work or has obtained all necessary permissions or licenses from any persons or organizations whose material is included or used in the presentation.

## **ATTACHMENT 1 – Problem Statement**

### **Problem Statement:**

## **Disposal Planning for Sustainable Technologies in Generation and Transportation**

### **Background**

As global energy demands rise, the transition to renewable energy sources has accelerated. Solar panels, wind turbines, and electric vehicles are at the forefront of this shift, offering cleaner alternatives to fossil fuels. However, as renewable energy technologies deployed years or decades ago reach the end of their usable life, challenges related to their disposal and recycling have arisen.

Currently, millions of solar panels and wind turbines are installed worldwide, many of which will reach the end of their useful lives within the next decade. Solar panels are complex pieces of equipment consisting of layers of adhesives, polymers, and precious metals. The durability that allows solar panels to withstand extreme weather makes them difficult to break down to recycle the individual components. Similarly, wind turbine blades, often made of composite materials including hard-to-recycle fiber glass, present significant recycling challenges due to their size and composition. In addition to renewable energy technologies, other “green” technologies such as the first wave of electric cars are beginning to approach end of life on a massive scale. Lithium-ion batteries used in electric vehicles pose unique hazards, including fire risks and environmental contamination if not handled properly.

With increasing regulations and public awareness surrounding renewable energy and electronic waste management, there is an urgent need for innovative solutions that address the safe and effective management of waste from these renewable technologies. Universities and research institutions can play a critical role in developing strategies that align with sustainability goals while navigating the complexities of technical, safety, and policy challenges.

### **Scenario**

Your team is tasked with developing a comprehensive waste management plan for a local municipality, Greentown, that aims to enhance their sustainability efforts. Twenty years ago, the municipality committed to becoming a leader in renewable energy and installed a significant number of solar panels and wind turbines. Ten years ago, the municipality became supportive of the adoption of electric vehicles by residents and added 15 electric vehicles to the city fleet. As all of these technologies have aged and are beginning to approach the end of their useful lives, Greentown is now under pressure to decommission and replace these technologies in a sustainable manner that aligns with their recycling goals. Greentown residents would like to see leadership develop a plan that balances both environmental and budgetary concerns.

Greentown has contracted your team to draft a Decommissioning Plan that addresses the following:

1. **Technical Challenges:** The current disposal methods for waste materials from solar panels, wind turbines, and electric vehicles are inadequate and often lead to environmental harm. Your team is expected to explore various recycling techniques and alternative disposal options that minimize waste and recover valuable resources to reduce the demand on global mining
2. **Safety Concerns:** There have been reports of lithium-ion battery fires at the Greentown landfill and transfer station, as well as instances of fiberglass contamination from improperly disposed wind turbine blades. Local activist groups have also expressed concern that heavy metals may leach from solar panels disposed of in the landfill and contaminate groundwater. Your task is to identify safety protocols and best practices that can be implemented by landfill operations to mitigate these risks. Your team will also need to communicate these best practices to the public through an infographic to be circulated through the municipality's social media accounts and website.
3. **Policy Framework:** The municipality is facing pressure from state regulations and Greentown residents regarding electronic waste which may affect future investment in solar panels, wind turbines, and electric vehicles. Your team must analyze the economic impacts and recommend policies that consider disposal and recycling prior to the next round of investments in these technologies.

As you work on this project, your team should consider the environmental, social, and economic implications of your proposed solutions. Additionally, your team should create a timeline for implementation and develop strategies to prevent illegal disposal of privately owned solar panels, wind turbines, and electric vehicles within Greentown. Your final report will be primarily read by Greentown utility and solid waste department employees. Your final presentation will be attended by Greentown leadership and interested residents at a town hall meeting, and your infographic will be distributed virtually on Greentown's website and social media platforms to provide the public with a high-level summary of the plan.

## Additional Resources

You are encouraged to visit the following resources for a high-level introduction to management of waste types referred to in this problem statement.

- EPA solar panel recycling information: <https://www.epa.gov/hw/solar-panel-recycling>
- DOE wind turbine end of service guide: <https://windexchange.energy.gov/end-of-service-guide>
- EPA lithium-ion battery recycling information: <https://www.epa.gov/hw/lithium-ion-battery-recycling>

These resources are meant to be a starting point for your research. Additional research may include (but is not limited to) web resources, textbooks, journal articles, trade publications and interviews with industry professionals.



## ATTACHMENT 2

### Team Commitment Form

Name of School: \_\_\_\_\_  
 Team Members and Contact Information:

<u>Name</u>	<u>Email</u>	<u>Phone</u>	<u>Anticipated Graduation (MM/YY)</u>

(Maximum team members = 8)

Chosen Name of Your Consulting Firm: \_\_\_\_\_

Designated Team Contact (Captain): \_\_\_\_\_

School Faculty Name/Phone Number/Email: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

School Faculty Signature: \_\_\_\_\_

**Any Requested Exception to Section 3 Criteria:** Yes  No

If NO, we understand that the participant complies with requirements of Section 3. If YES, briefly state the requested exemption and reason below:

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#### Use of Materials

By submission of this application, each team member gives SWANA permission to use any and all of my voice, image and likeness, with or without using my name, in connection with the products and/or services of SWANA for the purposes of advertising and promoting such products and/or services and/or SWANA and/or for other purposes deemed appropriate by SWANA in its reasonable discretion, except to the extent expressly prohibited by law.

## ATTACHMENT 3 Judging Form

<b>Design Report (Maximum Points = 100)</b>			
Description	Max. Points	Awarded	Comment #
Introduction	5		
Realistic / Innovative Assumptions and Data Analysis	25		
Strategic Choice of Decommissioning Practices	20		
Safety Considerations	10		
Conclusion and Recommendations	10		
Feasibility and Public Acceptability of Decommissioning Plan	10		
References	5		
Formatting & Appearance	5		
Grammar, Spelling & Overall Technical Writing	5		
Visual Aids (Graphs, Pictures etc.) presented clearly	5		
<b>Infographic (Maximum Points = 25)</b>			
Proposed solutions are summarized succinctly in a communication appropriate for the general public	5		
All components of decommissioning plan given appropriate level of attention	5		
Infographic includes clear messaging that conveys safety topics to the public	5		
Visually attractive, legible text, effective use of figures, tables, & graphic devices	5		
Easy to follow, focused, and organized	5		
<b>Presentation (Maximum Points = 125)</b>			
Clear introduction that sets stage for presentation	15		
Main points are developed, organized, and well formulated	15		
Material presented at an appropriate level and pace for audience, yet includes relevant detail and clarity	10		
Visual aids are clear, well-constructed, and effective, aiding in understanding	15		
Realistic plan with high likelihood of success	10		
Solution considers broad range of impacts such as environment, economics, society, and sustainability	15		
Questions answered competently, all members demonstrate a clear understanding of topic	20		
Team presents a professional image, projecting enthusiasm and competence	15		
Timing (presentation rehearsed and less than 20 min.)	10		