

2020 SPELLMAN HIGH VOLTAGE ELECTRONICS CLEAN TECH COMPETITION
“REDUCING INDIVIDUAL IMPACTS”
PAPER SUBMISSION SCORING RUBRIC

PAPER ABSTRACT

| | 5 points | 4 points | 3 points | 2 points (0 points if not present) |
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| ABSTRACT CONTENT The abstract should be a summary of their paper. | Abstract contains concise summary of background info, problem description, results/solution. | Abstract contains a vague summary of background info, problem description, results/conclusion, and is presented in an acceptable abstract format. | Abstract attempts to summarize the background info, problem description, and results/solution, but does not include sufficient information. | Abstract does a very poor job at summarizing the background info, problem description, and results/solution. |
| ABSTRACT FORMAT AND MECHANICS How well does the abstract address all important information in an acceptable format (200-250 words) | Abstract is clear, coherent and concise, with no grammatical errors. | Abstract is clear, coherent, and concise, with some grammatical errors. | Abstract is somewhat clear, coherent, and concise, but has major grammatical errors. | Abstract is poorly written and is not clear, coherent, or concise. Contains major grammatical errors. |

“REDUCING INDIVIDUAL IMPACTS” RELATED PROBLEM ASSESSMENT AND BACKGROUND INFORMATION

| | 10 points | 8 points | 6 points | 4 points (0 points if not present) |
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| <p>BACKGROUND INFORMATION How well does the paper address the background, causes, and contributing factors of the problem?</p> | <p>Provides real and accurate example of a “Reducing Individual Impacts” related problem, and details the background including the location, reasoning, duration of issues, and direct and indirect causes. Well researched, detailed history and analysis of the problem.</p> | <p>Provides real and accurate example of a “Reducing Individual Impacts” problem, and discusses the background including the location and duration of issues. Addresses direct (but not indirect) causes. Includes research, but lacks detailed analysis.</p> | <p>Provides real example of a “Reducing Individual Impacts” problem, and discusses the background including the location and some history. Addresses only some direct causes. Includes minimal research or no analysis.</p> | <p>Mentions an example of a “Reducing Individual Impacts” problem, but provides minimal explanation. History of the problem is not addressed, and only some direct causes are mentioned. Includes no research or analysis.</p> |
| <p>PROBLEM ASSESSMENT How well does the paper address the effects and related problems of the issue?</p> | <p>Addresses specific example of a “Reducing Individual Impacts” related problem and details its direct and indirect effects on the physical structure, ecosystems, and human populations. Includes research and analysis of the broader impact on social, political, and economic matters. Discusses what is currently being done to manage the problem and its effects.</p> | <p>Addresses specific example and discusses direct (but not indirect) effects on the physical earth, ecosystems, and human populations. Includes some research and discussion of broader impact on social, political, or economic matters. Mentions what is currently being done to manage the problem.</p> | <p>States an example of a “Reducing Individual Impacts” related problem and partially discusses direct effects on the physical earth, ecosystems or human populations. Includes minimal research and limited discussion of broader impact.</p> | <p>Provides a general example of a problem and only minimal discussion of its direct effects. No research or analysis is included.</p> |

CLEAN ENERGY DESIGN PROCESS AND RESEARCH

| | 10 points | 8 points | 6 points | 4 points (0 points if not present) |
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| <p>SCIENTIFIC APPROACH How well do the students use scientific processes and methods in their research and solution design?</p> | <p>The paper demonstrates an organized scientific process. Thorough research is evident, and the hypothesis is logical and detailed. Students show sufficient planning and clearly explain necessary resources and methods for experimentation and data collection, including types of data to be collected.</p> | <p>The paper demonstrates a fairly organized scientific process. Research is evident and the hypothesis is logical. Students show a fair amount of planning and explain necessary resources and methods for experimentation or data collection.</p> | <p>The paper loosely demonstrates a scientific process, but may be disorganized. Some research is evident but the hypothesis seems logical but may not be explained sufficiently. Students show some planning and address ideas for experimentation or data collection.</p> | <p>The paper demonstrates an attempt at a scientific process but is very disorganized. Minimal or no research is evident, and the hypothesis is illogical or not explained. Students show minimal planning for experimentation.</p> |
| <p>TECHNOLOGICAL ELEMENTS How well do students incorporate technological elements into the function of their solution design?</p> | <p>Design process includes the appropriate use of technology in a way that enhances the design and assists in solving the problem. Technology is integral in the design process and will increase functionality of the design.</p> | <p>Design process includes appropriate use of technology that assists in solving the problem. Use of technology is beneficial and a major component of the design process.</p> | <p>Technology is used to assist in some aspects of the project, but is a minor component of the design or is not used in a way to help solve the problem; OR technology is overused in unnecessary or inefficient ways.</p> | <p>Technology has a very minimal role in project design or functionality; or is excessively over used to the point of impracticality.</p> |

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| <p style="text-align: center;">ENGINEERING DESIGN</p> <p>How well do the students explain and illustrate the engineering of their solution design?</p> | <p>The design is detailed and explained schematically, with the use of diagrams. The solution directly connects to the problem to be solved, and should function efficiently. The design is practical and applicable, considering the components of the specific problem.</p> | <p>The design is mostly explained, with the use of diagrams. The solution connects to the problem to be solved, and should function efficiently. The design is mostly practical and applicable, considering most components of the problem.</p> | <p>The design is mostly explained, but no diagrams are present. The solution connects loosely to the problem to be solved and has some inefficient aspects. The design is somewhat practical and applicable considering the components of the problem.</p> | <p>The design is not fully explained, and no diagrams are present. The solution may connect to the theme in general, but not to the specific problem to be solved, or may be inefficient. Considering the components of the problem, there are significant problems with practicality or applicability.</p> |
| <p style="text-align: center;">TESTING AND REDESIGN</p> <p>Do the students propose sufficient testing processes for their solution and address possibilities for redesign?</p> | <p>Includes a detailed, practical, and logical plan for testing the design and redesigning. Analyzes limitations of the current design and considerations for improvement.</p> | <p>Includes a somewhat detailed, practical, and logical plan for testing the design and redesigning. Addresses some limitations of the current design.</p> | <p>Acknowledges that testing is necessary, but includes minimal planning to do so. Fails to address limitations of the current design.</p> | <p>Acknowledges that testing may be necessary, but includes no planning to do so, or fails to understand the relationship between testing and redesign. Fails to address limitations to the current design.</p> |
| <p style="text-align: center;">CREATIVE DESIGN</p> <p>How creative are the students with the original concepts of their design?</p> | <p>The design is completely original and innovative, shows creativity in scientific thinking. Design is based on and supported by sufficient research. Or, the paper includes sufficient recognition of the original inventor(s) and makes significant improvements to an existing design.</p> | <p>The design is completely original but is not highly creative, or is supported by limited research. Or, the paper recognizes the original inventor(s) and makes moderate improvements to the existing design.</p> | <p>The design is completely original but does not show innovative thinking or is not supported by research. Or, the paper does not recognize the original inventor(s) of an existing design or makes minimal improvements.</p> | <p>It is unclear whether or not the design is original. Or, the paper proposes changes to an existing design, but they do not improve it in any way.</p> |

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| RESULTS AND CONCLUSION | Results and conclusion relate directly to the specific “Reducing Individual Impacts” related problem set to be solved, and are presented in a clear, thorough, and objective manner. Sufficient discussion and analysis is present. | Results and conclusion relate to the specific problem set to be solved, and are presented in a clear and objective manner, but may not be thorough. Some discussion and analysis is present. | Results and conclusion relate loosely to the specific problem. They are objective, but may not be clear or thorough. Minimal discussion and analysis is present. | Results and conclusion relate generally to the theme, or may be inaccurate. They may not be completely objective, clear or thorough. No analysis is present. |
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REFERENCES

| | 5 points | 4 points | 3 points | 2 points (0 points if not present) |
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| QUALITY OF SOURCES | Contains at least three primary sources, among others. All sources are directly related to the background, problem, and/or solution, and content is referenced strategically to enhance the paper. | Contains at least two primary sources and two other sources that are somewhat related to the background, problem, and/or solution, and content is referenced to support their ideas. | Contains at least two sources that relate to the background information, problem, or sources. | Contains two or less sources, or sources are not related to the background, problem, and/or solution. |
| FORMAT | References are properly cited at the end of the paper, and throughout. A form of academic citation convention is used correctly. | References are mostly correct but mentioned in-text only, or are not properly cited. An academic citation convention is used, but with a few mistakes. | An academic citation convention is used, but with many mistakes. | References are mentioned but not formatted in an academic manner. |