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### **Rhetorical Analysis of a Solar Energy Research Paper**

I chose the article “Solar Energy” in particular to explore more areas in renewable energy. Solar energy is vital for our planet as an alternate form of clean energy. The purpose of this rhetorical analysis is to analyze how the authors communicate this type of information in order to achieve their purpose on ceramic solar panels being a better option over conventional solar panels. They do this through their sophisticated language, exigence, conventions, and appeals to convey towards a very specific audience.

The intended audience for this solar energy research paper are big budget corporations and engineering firms in high demand of better solar technology. These companies are in need of clean and renewable energy sources. The authors concluded that the main advantage of ceramic collectors compared to conventional flat plate collectors is a very long service life of the monolithic absorber and therefore could benefit major corporations and firms (Zukowski et al., 2019). The authors of the article use very sophisticated language and terminologies since their intended audience are CEOs in charge of major engineering companies who can understand these complex terms. In the introduction, Zukowski et. al (2019) discussed information before he began his experimental research saying, “The test results regarding thermal and hydraulic characteristics include compact ceramic heat exchangers, applied in high-temperature solar systems or in systems operating in highly corrosive environments, were presented by Li et al.” (p.27). The diction in the writing such as thermal, hydraulic, compact, operating, and corrosive

are terminologies used by an engineer for engineers. The language for the rest of the article is very similar to this example showing that the intended audience, who can see the value in the work being brought forth by these engineers, are people who understand how to use it like CEOs of major engineering firms.

The authors who suggested this idea of ceramic panels for these engineering firms are Mirosław Żukowski , Grzegorz Woroniak, and Joanna Piotrowska-Woroniak. These authors work for the Department of HVAC Engineering, Faculty of Civil and Environmental Sciences, and the Bialystok University of Technology in Poland. What this shows is a large amount of credibility and trust we can give to these scientists and engineers for trying to research new ways in helping the solar energy industry. This also allows these CEOs of companies to understand that these results were not from studying graduate students but professionals who have used their years of expertise in various fields to conduct this research.

Although these results could be very beneficial for some companies, the urgency in the paper isn't very high. Through the author's language, readers can understand that the article is intended to share information for a particular audience who can benefit from it. There is no call to action to encourage more researchers to do what they are doing through their results; it simply is to share information they feel is important about an area that could potentially be improved on. They even mention that despite some disadvantages ceramic panels could potentially compete in the market (Zukowski et al., 2019). Pointing out that the technology could have some disadvantages shows it's not too urgent or revolutionizes the solar panel industry but instead suggests that an area of it could be improved.

The paper uses the method of IMRaD to format the paper in sections from the abstract, introduction, data, and then the final conclusions. The abstract's purpose was to get the reader on track with the article so they understand the subject matter and the need and purpose of the paper as a whole. The introduction contains a quick overview of the whole article explaining the overall research and why they decided to carry it out the way they did. The methods come after and show how they went about and carried out their experiments. The results showed data like graphs and the multiple equations they used alongside the rendered models from the software ANSYS. The conclusion summarized the benefits from ceramic panels from all the experiments they conducted. The paper was different from the IMRaD method when they decided to pivot and dedicate entire sections describing the ceramic panels they created and CFD modeling. The language is also very formal and sophisticated with the goal to carry out their information and experiments as best as possible for their audience with very little opinion on the subject matter as their research would do that for them.

The author uses ethos, pathos, and logos in the paper to appeal to the audience's emotions, logic, and credibility. Ethos can be seen in the introduction as the audience can clearly identify the areas of expertise the authors have on the subject matter as it is mentioned that Zukowski and Woroniak worked on thermal characteristics of ceramic solar panels in real operating conditions on a previous project (Zukowski et al., 2019). Ethos can also be seen in the abstract as they begin their paper by saying that everything they are about to say is based on testing and numerical simulations (Zukowski et al., 2019). They also validate their research in the acknowledgments by mentioning that they were able to do this through ANSYS which is a

very credible piece of software technology for analyzing models. Logos can be seen throughout the data and results as they show the proof through graphs and calculations on why ceramic panels are better than conventional ones. The organization of the paper being in IMRAD also shows how professional the paper is and where to easily find information. Pathos is not seen very often as most of what they are saying uses a lot of calculations, graphs, and explaining how they went about experiments instead of appealing to emotion. The final sentence of the paper does however show how the researchers dream of this technology to be beneficial towards everyday people in the distant future when manufacturers, in engineering firms, are able to commercialize it.

This rhetorical analysis allowed me to understand the importance of language in a research article. Language determines many factors of your writing as it creates the intended audience, the drive behind the research, and the appeals to credibility, logic, and emotion. These authors were able to successfully appeal to their intended audience through their language. I plan to use this information for my professional career as understanding how to appeal to a board of professionals or even just people in that area of interest is very important.

## References

Zukowski, M., Woroniak, G., Piotrowska-Woroniak J. (2019). Experimental research and numerical simulations of a ceramic panel used for solar energy conversion. *international energy society*. <https://web-a-ebsohost-com.ccny-proxy1.libr.ccny.cuny.edu/>