

# Sustainability Assessment of Perovskite Solar Cells

*Application for Emergency Shelters*

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Days left until deadline: **7 days, 2 hours and 24 minutes**

### **Abstract**

Concise summary of objectives, methods, key findings, and conclusions. Will do last.

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# 1 Introduction

Natural disasters are a significant global issue, affecting over 100 countries each year. More than 200 million people are impacted annually by natural disasters, and on average, 20 to 40 million people require temporary shelters (Alves, B., 2014). The ability to provide timely, efficient, and sustainable shelter in such situations is critical, making the assessment of emergency shelter technologies highly relevant. As a *[engineering/design/sustainability]* student, I'm motivated by the challenge of balancing humanitarian<sup>1</sup> needs with environmental responsibility in disaster responses.

This study conducts a comprehensive sustainability assessment of emergency shelter tents<sup>2</sup>, looking at their social consequences, socio-environmental trade-offs, economic feasibility, and environmental impact.

With a focus on energy systems, various prevalent shelter technologies in response to catastrophes are analyzed and contrasted. Three distinct power solutions come to mind:

- **Perovskite-integrated shelters:** The primary focus, representing an emerging technology with potential advantages in efficiency and manufacturing cost compared to conventional options.
- **Silicon solar-equipped shelters:** Serving as the baseline renewable alternative, with established performance data and widespread deployment in field operations.
- **Diesel generator systems:** Representing conventional power solutions for shelters in grid-independent scenarios, despite their known environmental drawbacks.

This selection encompasses both mature and emerging technologies to provide a balanced perspective on sustainability trade-offs in disaster response applications.

The focus of this study is on comparing emergency shelter power solutions to understand their implications for both disaster relief efforts and sustainability goals.

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<sup>1</sup> Concerned with or seeking to promote human welfare. "*groups sending humanitarian aid*" <sup>2</sup> An emergency shelter tent is a portable structure, often lightweight and easy to set up, designed to provide temporary protection from the elements in emergency situations. It offers a safe and sheltered space, especially in scenarios where traditional housing is unavailable or inadequate, as noted by Gala Tent (2024) and ICBrintle (2022)

## 2 Environmental Assessment

## 3 Economic Assessment

## 4 Social Assessment

## 5 Interpretation / Discussion / Incorporation into Design



## 6 Conclusions

## 7 References

1. GalaTent (2024). *Emergency Medical Tents and Shelters*. [online] Available at: <https://www.galatent.co.uk/uses/emergency-medical-tents-and-shelters>.
2. ICBrindle (2022). *Rapid Deployment Inflatable Emergency Shelters*. [online] Available at: <https://icbrindle.com/rapid-response-inflatable-shelters/inflatable-emergency-shelters-tents.html>.
3. Alves, B., (2014). *Topic: Natural disasters*. [online] www.statista.com. Available at: <https://www.statista.com/topics/2155/natural-disasters/>