

## Title: Improving solar panel efficiency in the Stanislaus County region

### Introduction:

The purpose of this research is to determine which solar panel cleaning method will be the most effective in the Stanislaus County region.

- Solar energy has the capacity to replace the fossil fuels that are used today.
- One of the main issues that needs to be solved in regards to solar panels is the collection of dust and particulates on their surface.
- Many methods have been proposed to clean the surface of the solar panels, each with their own pros and cons.
- The weather patterns of Stanislaus County offer a unique environment, which lends itself to further research on this topic.

### Literature Review:

- Solar panels can lose up to 15% of their efficiency per day due to the accumulation of dust.
- Multiple methods have been proposed to solve this dust accumulation problem: robotic cleaning methods, chemical coatings, and mechanical methods.
- Two methods have shown a significant amount of promise in this region: chemical coatings and the use of an “electric curtain”
- The two methods have their pros and cons, the “electric curtain” tends to work better in dryer climates while the chemical coatings work well in wet climates.
- The Stanislaus County region offers unique blend of a dry and wet climate that offers an area for research

### Methods:

- Multiple different research papers will be used to determine the effectiveness of the various cleaning methods.
- Aggregate data of the Stanislaus County region weather will be used to determine which method will be most effective.
- Predictions of future weather conditions will be taken into account when analyzing the cleaning methods.
- Cost and energy efficiency will be evaluated for all cleaning methods analyzed.
- This analysis entails that the solar energy that is available to the Stanislaus County region be determined.

- There are some downfalls to this methodology, mainly the time span and the data needed.
- Years of weather data is needed to make accurate assumptions about the conditions that these solar panels will be placed in.

#### Expected Conclusions:

- There are one of four conclusions that may arise due to this research.
- The first two conclusions may be that a particular method is better than the other, and a combination of the methods is not needed.
- The third conclusion is that some combination of the methods would produce the highest energy efficiency while also being the most cost efficient.
- Lastly, there is a chance that, solar panel cleaning costs more money than is produced by the solar panels, and therefore solar panels should not be cleaned (at least consistently) in the Stanislaus County region.
- I believe that the electric curtain cleaning method will be the most efficient due to the generally dry climate in this area.

#### Significance:

- This research can be the starting point for a more physical research project, therefore, giving a definite solution to the problem.
- This research can lead to the improvement of solar panel efficiency leading to more widespread urban use of.

#### Selected References:

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