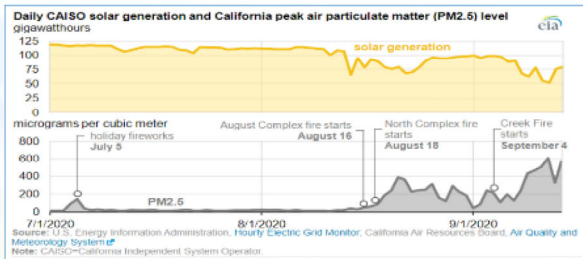


Analyzing the Impacts of Wildfires on Solar Photovoltaic Generation

J. Glaister, E. Garcia, P. Tabares, PhD
Department of Mechanical Engineering
Colorado School of Mines, Golden, CO, USA

Introduction

- Climate change is causing wildfires to be more frequent and intense
- Fires eject particulate matter (PM) into the air
- Previous studies show that concentrations of $\sim 75 \mu\text{g}/\text{m}^3$ of PM_{2.5} decrease photovoltaic (PV) generation by $\sim 20\%$
- An understanding of this relationship is vital to illuminate future trends in energy



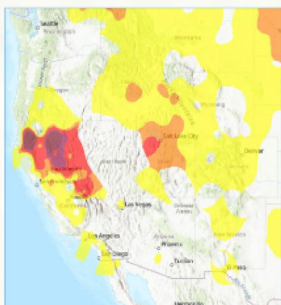
Example of a previous study performed by the EIA in California

Objective

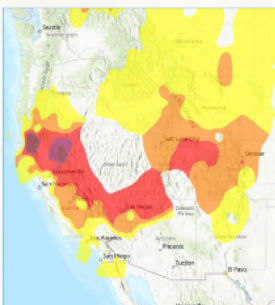
Quantify the effect of out-of-state wildfires in 2021 on PV generation in Golden, CO

Air Quality Maps

August 6, 2021

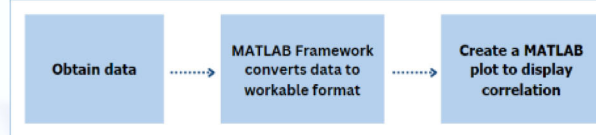


August 7, 2021

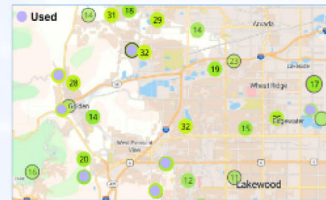


Methodology

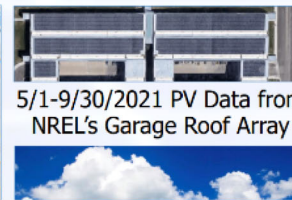
Data Analysis



Data Sources



PM_{2.5} Data from PurpleAir Air Quality Sensors

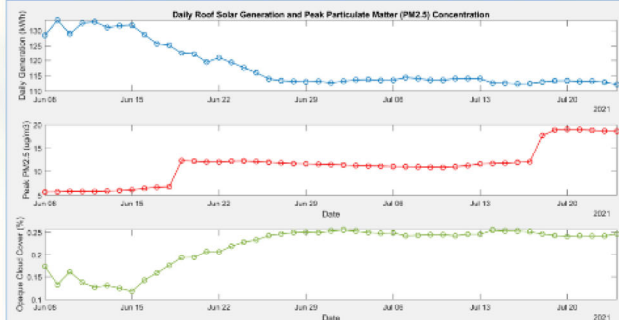


5/1-9/30/2021 PV Data from NREL's Garage Roof Array



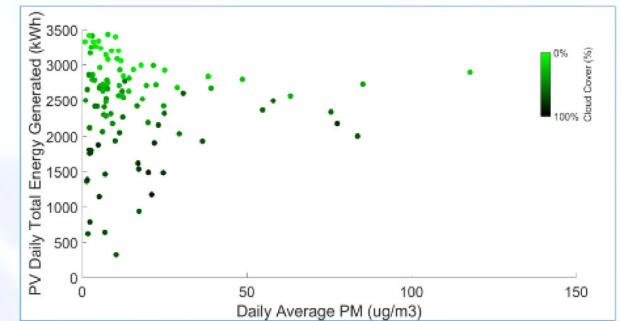
Atmospheric Data from NREL's Solar Radiation Research Laboratory

Power Generation, Particulate Matter and Cloud Cover Data



- Organized, close-up analysis of data of 47 dates centered around 7-1-2021 to show two PM_{2.5} spikes
- Shows average daily PV generation, average daily value of the sensor with the highest PM_{2.5} concentration that day, and average daily opaque cloud cover percentage

Results



- Correlation between cloud cover and power generation
- No correlation between PM_{2.5} and power generation

Conclusion

Summary

There may or may not be a correlation between PM_{2.5} and PV Generation as results undergo bias from cloud cover

Future Work

Employ analytical techniques to control for false cloud cover readings caused by high PM concentrations

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