Examining the Sustainability of Sustainability: The Relationship between Residential Solar Energy & Gentrification in San Diego, CA

Jessie LaMasse, BSBA 2021

Under the direction of Mr. Jeffrey Mittelstadt

Abstract

Minimal research examines the social impact of residential solar energy on communities. This thesis provides a first look at the wholistic sustainability of renewable energy by examining the relationship between solar energy growth in both owner-occupied and renter-occupied households and the probability of gentrification occurring in San Diego, CA. The research aims to help policymakers, solar businesses, and nonprofits make educated decisions about solar energy deployment. The regressions indicated that residential solar energy growth in owner-occupied households and gentrification occurring between 2000-2018 are not statistically significant. However, residential solar energy growth in renter-occupied households and gentrification occurring between 2000-2018 are statistically significant under some conditions. The qualitative interviews also found renters faced greater barriers to residential solar energy. Thus, solar energy growth in renter-occupied households creates an area of concern. Further research should use a diversity of cities and conditions to examine the relationship between residential solar energy and gentrification pressures.

Introduction

With the consistent growth of renewable energy investments & many cities taking on aggressive renewable energy goals, I was curious what kind of effect solar energy would have on non-adopters. Since climate inequities and cost burdens disproportionately fall on disadvantaged neighborhoods; I found it important to see if solar deployment has been equitable in order to preserve communities in the long run.

Existing research on solar energy's social effect found that, in a study on all energy infrastructures, solar was the only infrastructure that added a housing price premium to households[1]. Additionally, one study found that installers are motivated by the reduced utility price from solar energy because of the rising costs from traditional utilities[2]. On the other hand, On the other hand, broad research ties factors of rising home values and utility prices to risks of urban gentrification[3].

Methodology

To have sufficient insight on the neighborhood effects from residential solar energy, I ran a mixed methodology study. While the quantitative analysis brought statistical evidence, the qualitative analysis offered community behaviors and opinions. I chose to focus on a solar energy and gentrification data rich city, San Diego, CA, to control for extraneous variables from city and state specific policies.

Quantitative Analysis

Data from the American Community Survey and the Urban Displacement Project was used to run a bivariate logit regression and neighborhood change comparison table to identify whether gentrified census tracts correlated with residential solar energy growth in San Diego City, CA.

Qualitative Analysis

Interviews were conducted on 10 individuals from San Diego City, CA whoa are council members, non-profit employees, community members, or solar energy developers. The transcripts were used in a thematic analysis to deeper analyze the quantitative data and identify areas of concern for solar energy growth.

Hypotheses

1. High growth in residential solar energy for heating fuel would increase the probability of gentrification occurring in San Diego, CA between 2000-2018
2. Owner-occupied solar energy growth for heating fuel would increase the probability of gentrification less than renter-occupied solar energy for heating fuel growth in San Diego, CA

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Results

Regressions & Comparison Table Results

My results indicated three things about my research hypotheses:

1. High solar energy growth in owner-occupied households in San Diego is **not** statistically significant. No relationship exists.

2. High solar energy growth in renter-occupied households in San Diego is statistically significant* and **increases the probability** of gentrification occurring by almost 7%.

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	5.6020	1	**0.0179**
Score	4.4759	1	**0.0344**
Wald	3.3706	1	**0.0664**

*statistically significant under likelihood ratio and score estimates

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Highrenter	**6.856**	0.878	53.532

3. Owner-occupied solar energy growth and renter-occupied solar energy growth in San Diego exhibited different relationships

Interview Summary Analysis Results

Most participants did not notice initiatives to prevent gentrification nor negative impacts from solar energy growth in their neighborhoods. The most common response to low-income barriers was high housing and living costs. The most common response to solar energy accessibility was non-profit assistance from Grid Alternatives. Finally, the most common response to what more needs to be done to overcome any negative impacts of solar was increasing the accessibility and overcoming high costs for low-income neighborhoods. Overall, the interview analysis emphasized the large growth of solar and the barrier to entry for low-incomes and renters in SD.

Conclusion

Conclusion

The results highlighted some trends towards gentrification, including rising housing costs and income barriers from residential solar energy. In San Diego, CA the areas of concern were the housing premium from the new construction mandate, no renter authority, and sector renewable energy goal disconnect. On the other hand, prevention measures were also highlighted. Recently, SD approved a community choice energy where households can switch from the traditional utility to solar energy without installing solar to their properties. Additionally, the non-profit Grid alternatives is working to fill the gap in communication between sectors and works directly with the community.

Limitations

The study was limited by the available data. First, the single city design limited the conditions and results to San Diego, CA specifically. Second, the solar energy growth variable is limited by its sample size and geographical representation. The ACS heating fuel question is not the best data for San Diego solar energy use because heating fuel is not as common as other solar energy uses and the PUMA level geographical regions were not as precise as census tract level data. Third, the sample size for the interviews was small and did not represent every area of the city.

Recommendations

Based on the inconclusive relationship between renter-occupied solar energy growth and gentrification occurring, future research should study a diverse set of cities against multiple sensitivity variables. A multivariate analysis should explore the elements between owner-occupied and renter-occupied solar energy growth to understand this difference. Additionally, interviews should be held with a larger sample and in at-risk areas. Nonetheless, readers should take note of the results regarding the potential areas of concerns and prevention measures for the potential negative impacts of residential solar energy.

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