

# Expanding the Community:

A Pro Bono Project in Conjunction with



Melissa Cooper

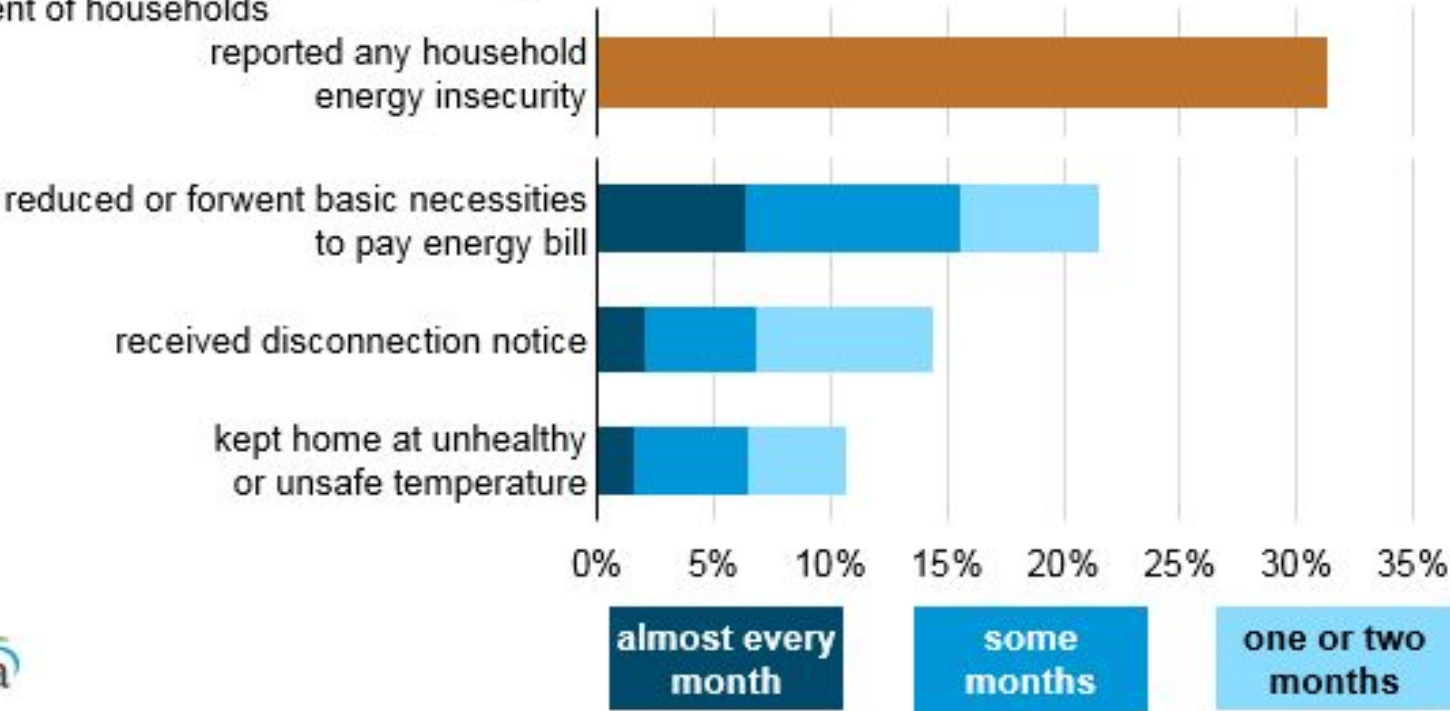
CEO/Founder - DS for Good

# One in three U.S. households faces a challenge meeting energy needs

According to US Energy Information Administration

## Households that experienced energy insecure situations, 2015

percent of households





# **Project objective:**

Predict the low-income areas most suitable for and most amenable to participating in community solar projects.



# Methodology

## The Data



**DeepSolar**  
By Stanford

## The Algorithm

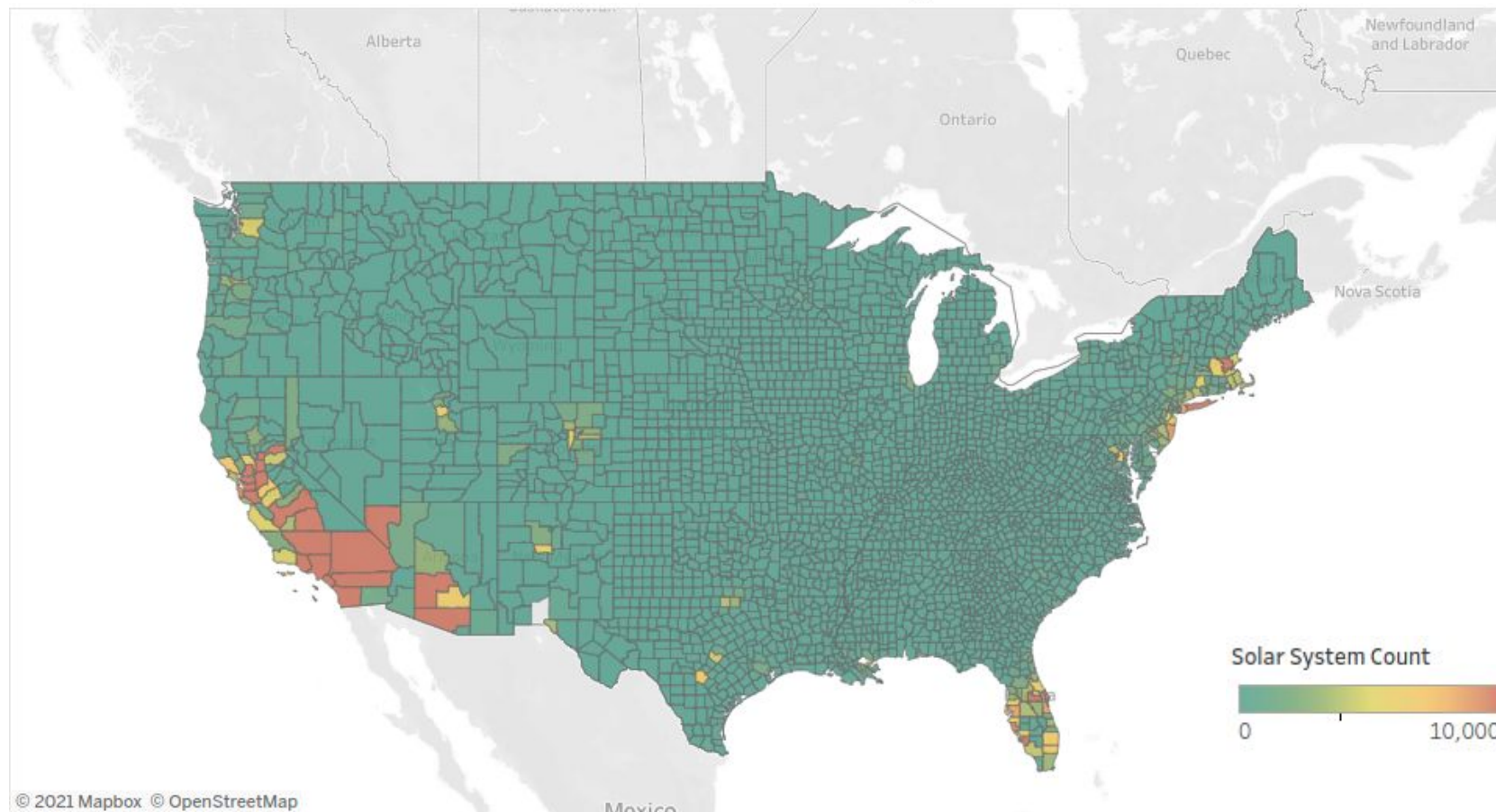
### Clustering

- DBSCAN
- K-Means
- KNN

## The Prediction

- Determine characteristics that influence solar adoption
- Apply to underserved areas nationwide

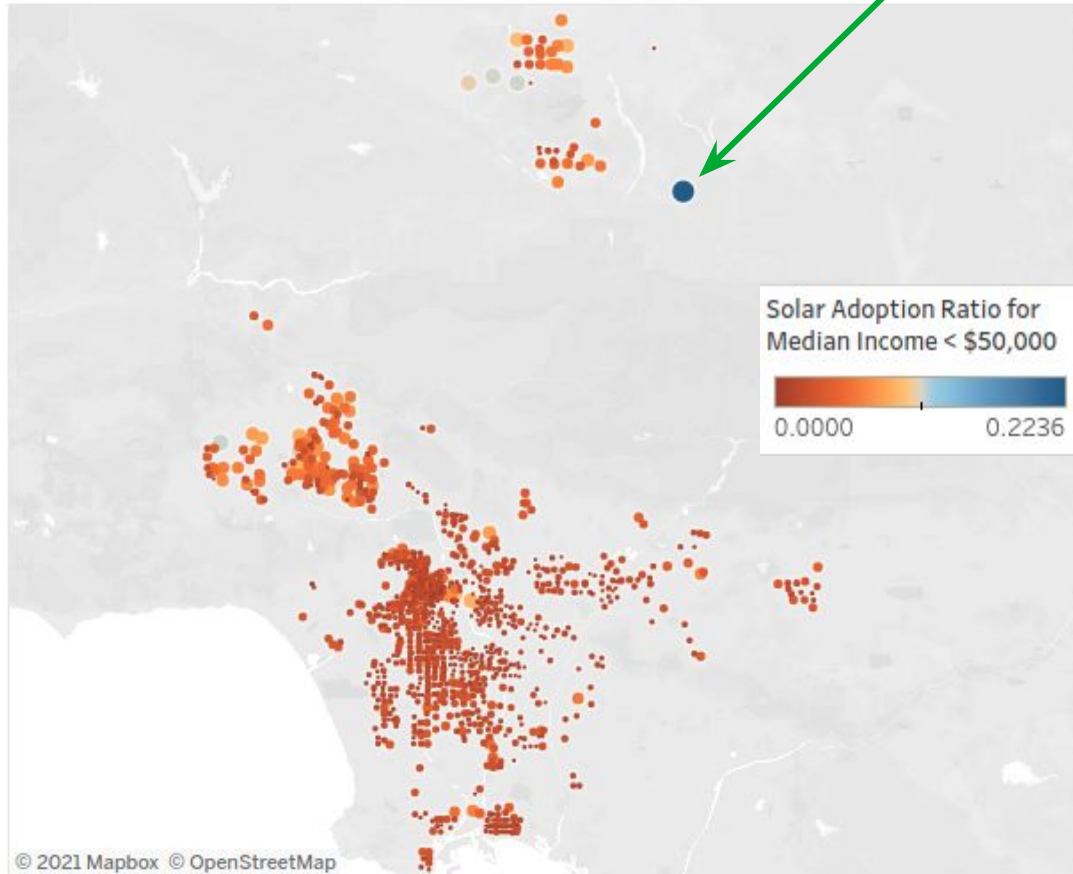
## US Residential Solar Hotspots





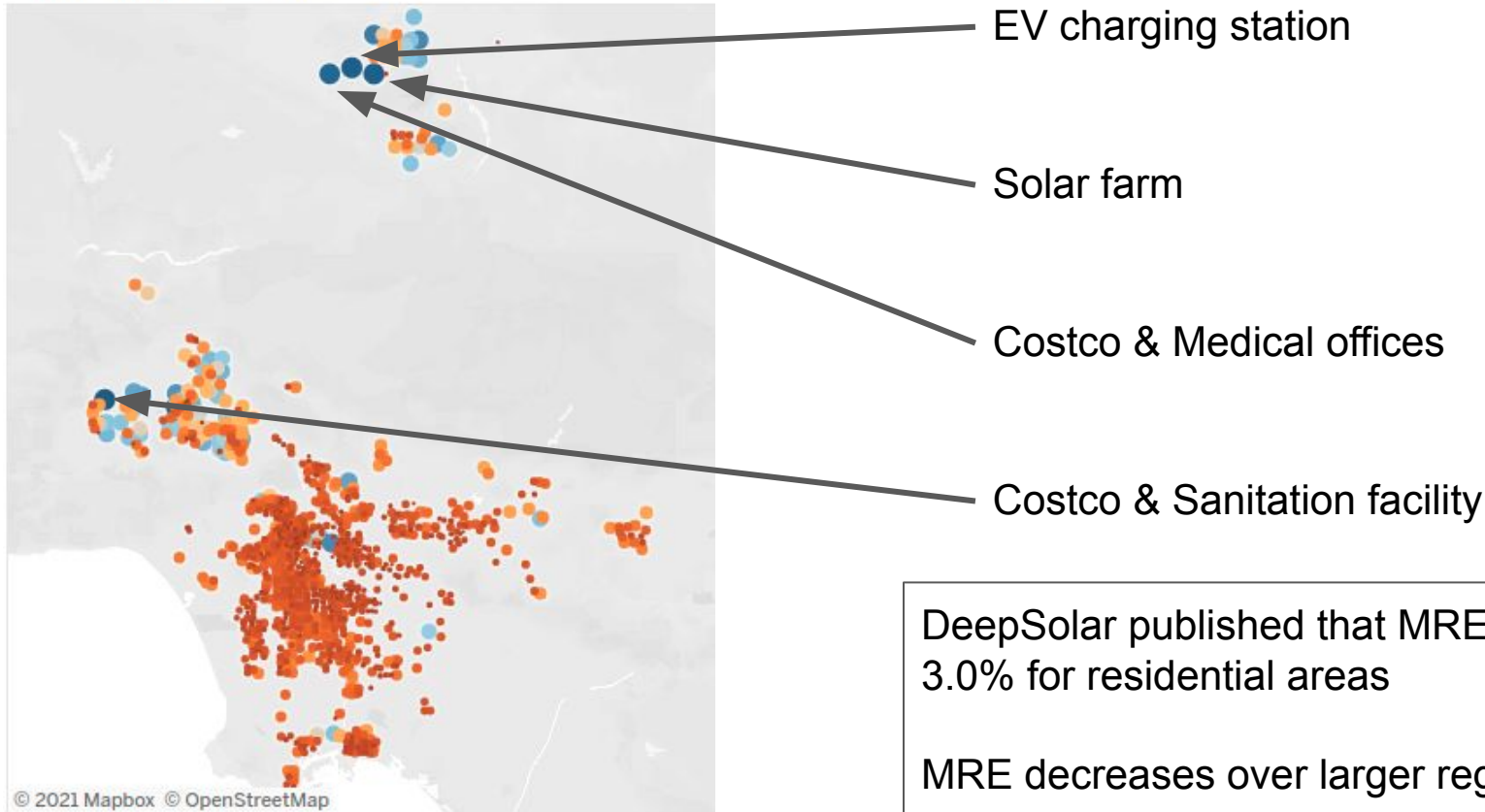
% Households (Median Income < \$50,000)  
with Solar Rooftops in Los Angeles County

???





Los Angeles County  
% Households (Median Income < \$50,000)  
with Solar Rooftops



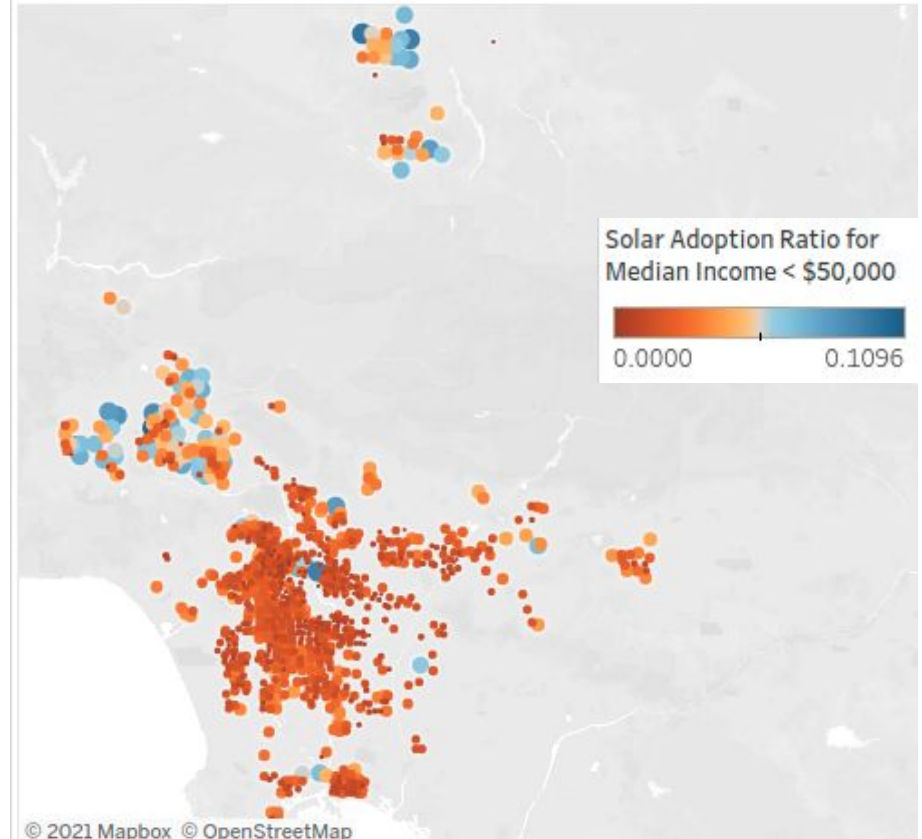
# One More Try...

Focus areas:

- smallest dark orange spots
- especially near blue spots

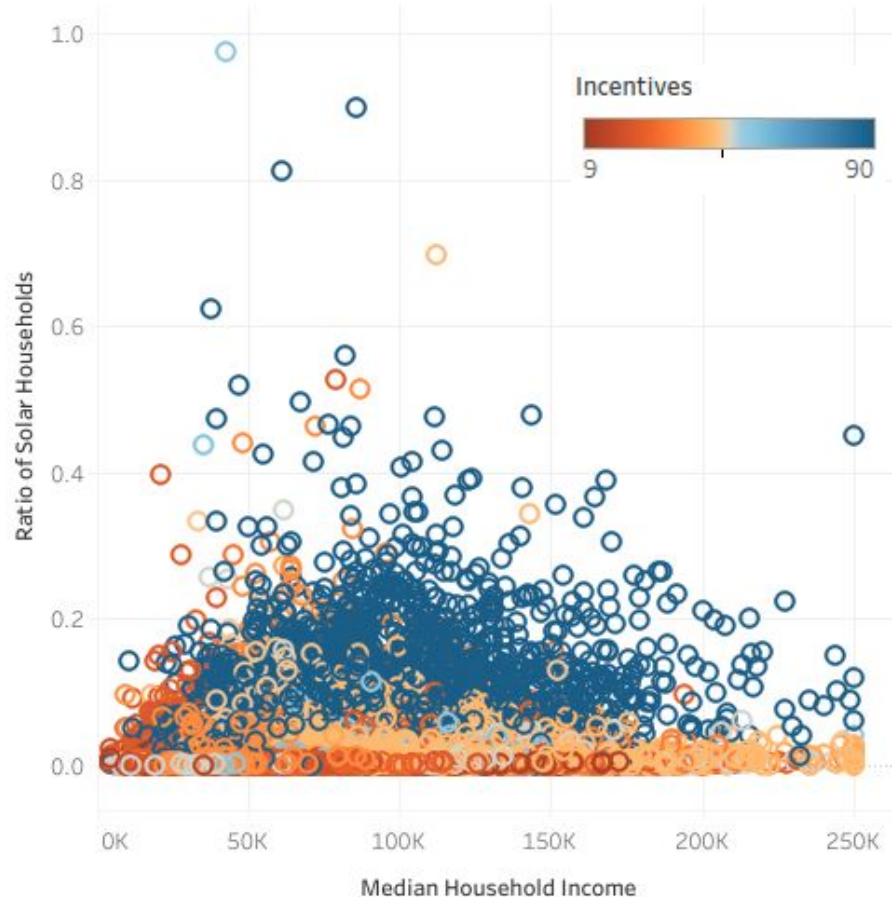
Existing solar begets more solar

Los Angeles County  
% Households (Median Income < \$50,000)  
with Solar Rooftops





## Median Household Income vs. Ratio of Houses that have Solar Panels



Strong correlation between incentives  
and going solar

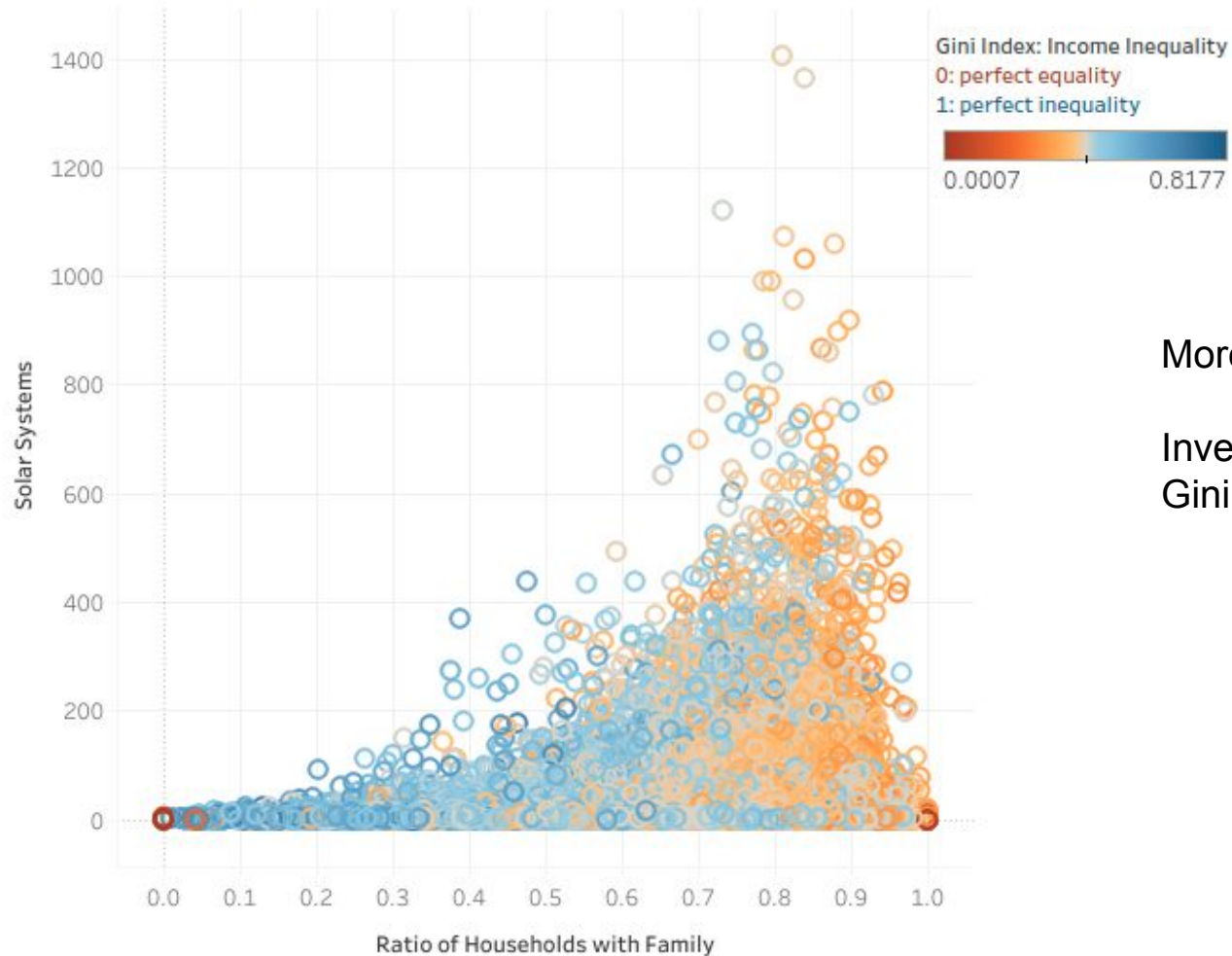
More outliers:

Large arrays in CO

Several solar projects in AZ

70,000 data points

## Family Households with Solar Systems



More families adopt solar

Inverse correlation with the  
Gini index

# Impact - LA County



| <i>Los Angeles Only</i>           | <b>Total Solar Systems</b> | <b>Total Qualified Rooftops</b> | <b>% Solar Rooftops</b> |
|-----------------------------------|----------------------------|---------------------------------|-------------------------|
| <b>Median Income &lt;\$50,000</b> | 15,688                     | 611,411                         | <b>2.57%</b>            |
| <b>All households</b>             | 92,651                     | 1,980,624                       | <b>4.68%</b>            |



**5.14%**



# Future Steps

## **More data**

Final model will need to use satellite images to determine eligible rooftops' locations

## **Problems**

Different regions -> different low-income levels

## **Testing the model:**

- Use a smaller geographic area
- Will predicted census tracts yield more solar adoption?

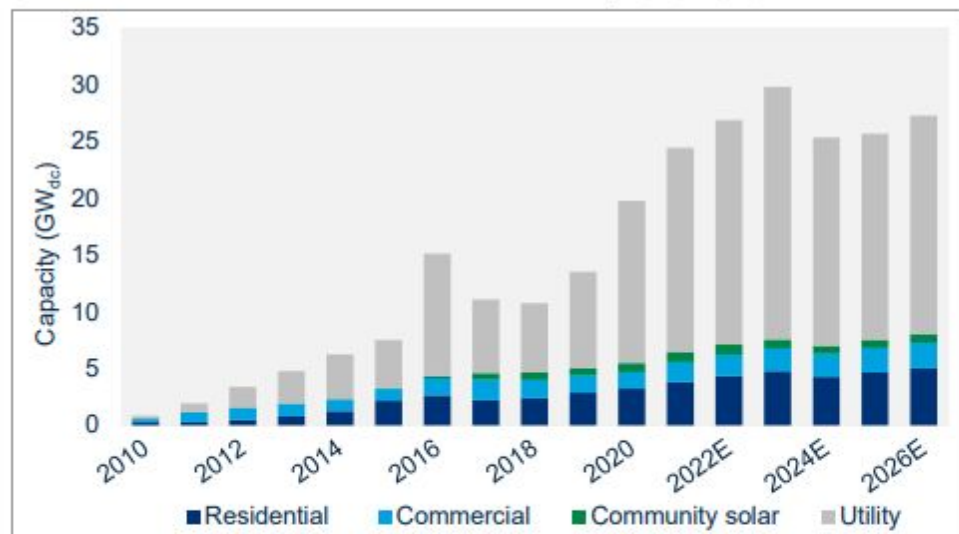
## **Benefits:**

- Zero emissions contributions
- Increase of local self-reliance

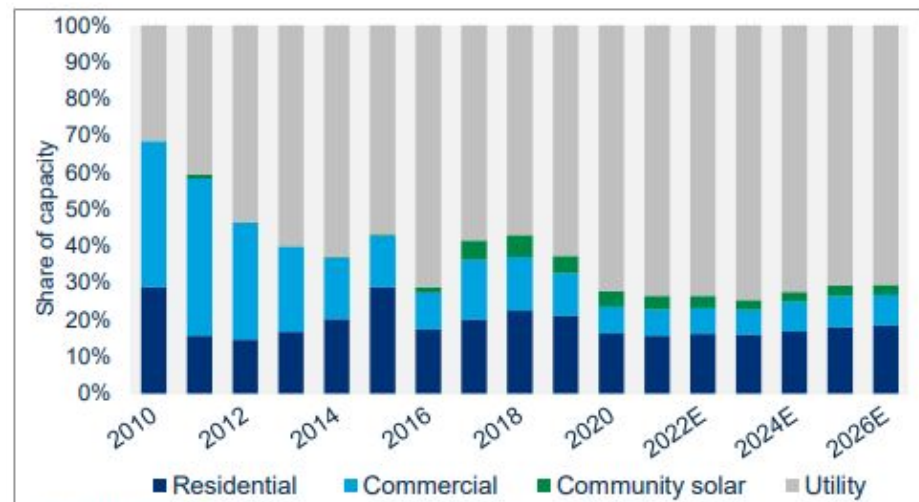
# Appendix

# U.S. Solar PV Forecasts

U.S. PV installation historical data and forecast, 2010-2026E



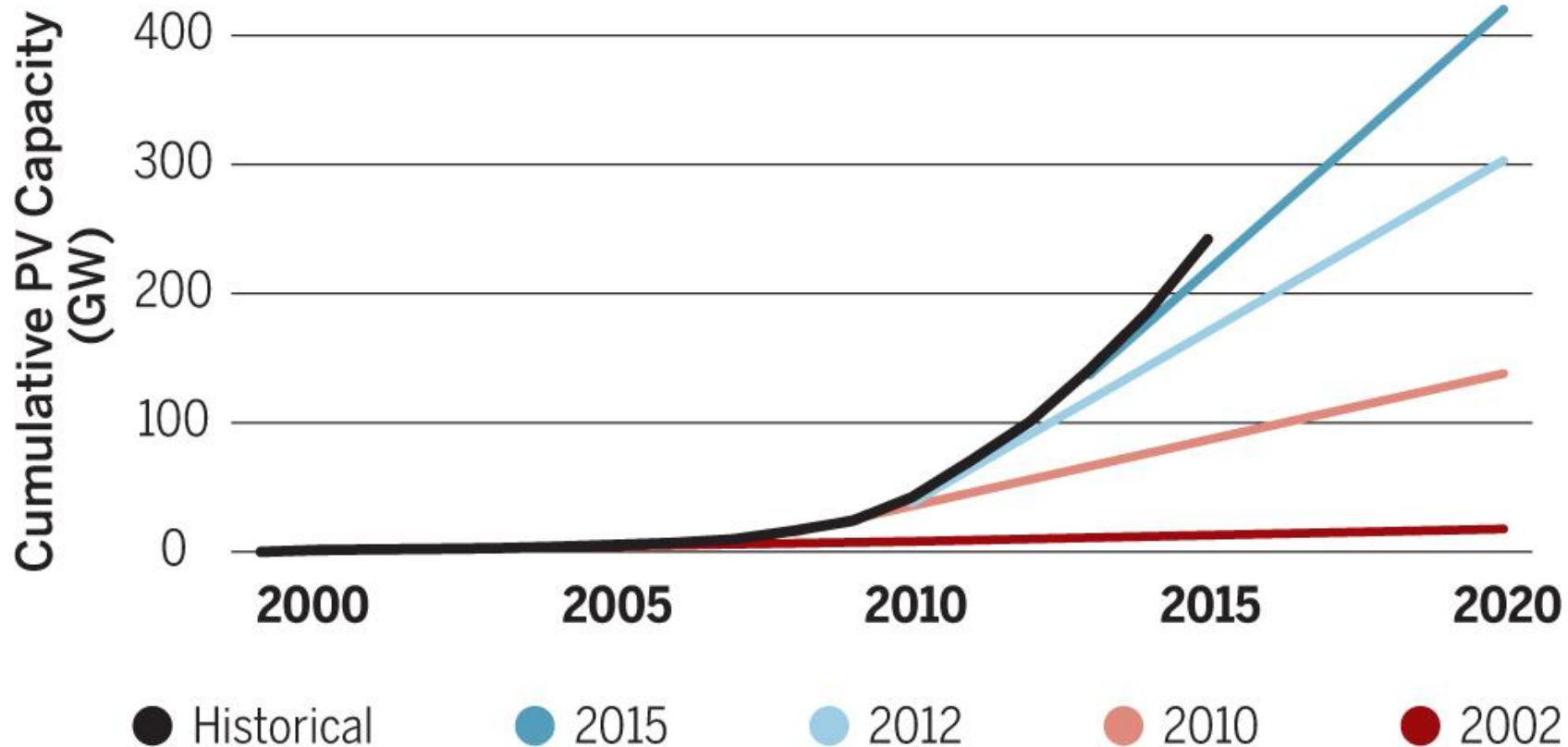
U.S. PV installations by share of capacity, 2010-2026E



Source: Wood Mackenzie



# Solar Growth is historically underestimated



# Impact - Nationwide



| <i>U.S.<br/>Households<br/>Nationwide</i> | <b>Total Solar<br/>Systems</b> | <b>Total Qualified<br/>Rooftops</b> | <b>% Solar<br/>Rooftops</b> |
|---|--------------------------------|-------------------------------------|-----------------------------|
| <b>Median Income<br/>&lt;\$50,000</b>     | 248,709                        | 19,358,968                          | <b>1.28%</b>                |
| <b>All households</b>                     | 1,277,794                      | 53,303,908                          | <b>2.4%</b>                 |



**2.56%**