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College of Information  
& Computer Sciences

Proposal Track: ICML 2021 Workshop Tackling Climate Change with Machine Learning

# Leveraging Machine Learning for Equitable Transition of Energy Systems



Enea Dodi, Anupama Sitaraman,  
Mohammad Hajiesmaili, Prashant Shenoy

# Inequities in our current energy system

Los Angeles Times

CLIMATE & ENVIRONMENT

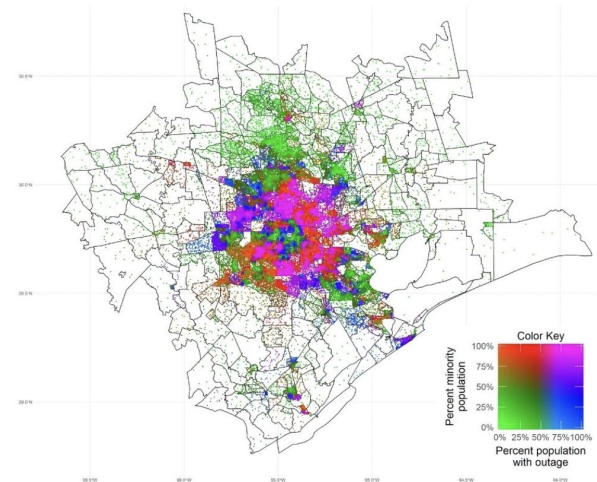
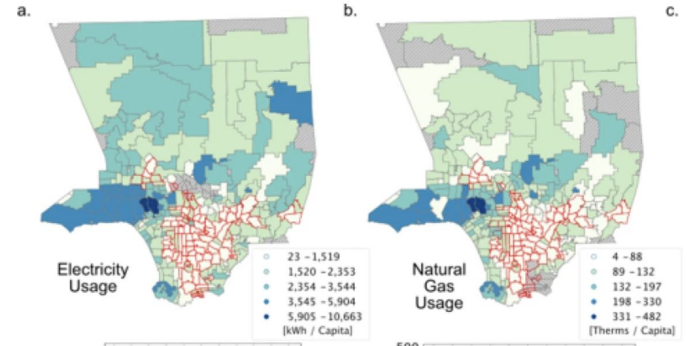
California's clean energy programs are mainly benefiting the rich, study finds

## *Texas Blackouts Hit Minority Neighborhoods Especially Hard*

As the freak winter storm raged, historically marginalized communities were among the first to face power outages, experts say.

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# A Just and Equitable Transition

Transition to a low-carbon energy system is an opportunity for the placement of a more just and equitable system.

## Implementing Biden's Justice40 Commitment To Combat Environmental Racism

By [Cathleen Kelly](#) and [Mikyla Reta](#) June 22, 2021, 9:02 am



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## Justice in 100 Scorecard

Evaluating equity in 100% renewable energy or 100% clean energy laws



## NEW YORK'S CLIMATE LEADERSHIP and COMMUNITY PROTECTION ACT



California Energy Commission approves \$384M plan to accelerate zero-emission transportation; 50% of funds to benefit disadvantaged communities

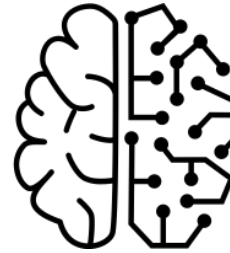
15 October 2020

# Using ML for an equitable transition

Leverage scalable machine learning for measurement of the equity of the current energy system and to facilitate a just transition to clean energy systems

Use cases of ML for energy equity

- Classification and diagnosis of inefficiencies
- Time-series predictive analysis
- Wide-scale classification/optimization of clean energy installments
- Etc.

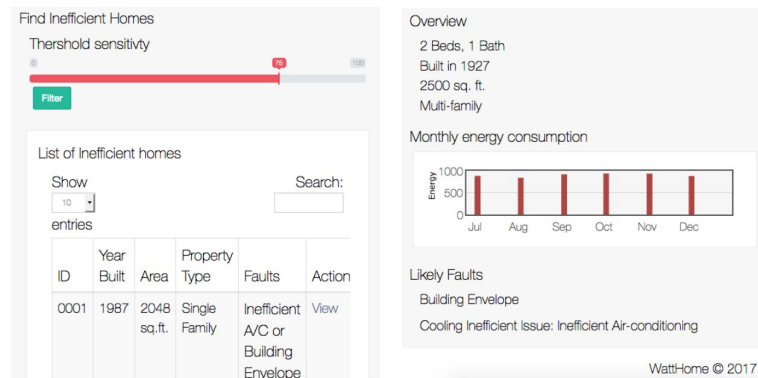




## To Cover:

- **Leveraging Machine Learning for Equity Analysis of Inefficient Buildings**
- Leveraging Machine Learning for Equity Analysis of Residential Solar Potential Estimation
- Expected Impact and Target Audience

# Machine learning and energy efficiency



(a) Find Inefficient homes

(b) Inefficiency Report

Fig. 5. Screenshot of our implementation of WattScale.



Wathome and  
Wattscale



Iyengar, Srinivasan, et al.  
“WattScale: A Data-driven  
Approach for Energy Efficiency  
Analytics of Buildings at Scale.”  
ACM Transactions on Data  
Science (2021).

## To Cover:

- ~~Leveraging Machine Learning for Equity Analysis of Inefficient Buildings~~
- **Leveraging Machine Learning for Equity Analysis of Residential Solar Potential Estimation**
- Expected Impact and Target Audience

# Leveraging Machine Learning for Solar Equity Analysis

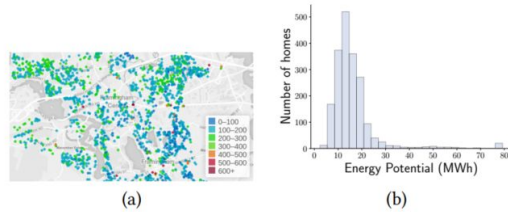


Figure 11: (a) Spatial representation of the annual solar energy generation potential (b) Energy potential distribution.

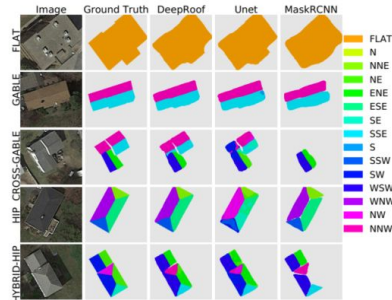
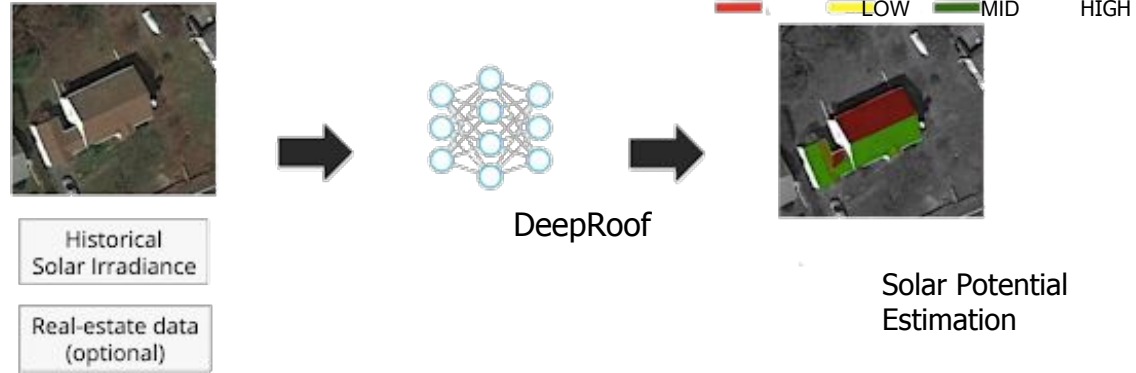


Figure 7: Segmentation output on different roof types.

Lee, Stephen, et al. "Deeproof: A data-driven approach for solar potential estimation using rooftop imagery." *ACM SIGKDD*, 2019.



- Manual Solar Potential Estimation of rooftops is slow and expensive
- Widely available GPS imagery in conjunction with ML allows for scalable and highly accurate estimation of rooftop solar potential
- Results can be used to optimize installation of solar panels in disadvantaged communities



# To Cover:

- ~~Leveraging Machine Learning for Equity Analysis of Inefficient Buildings~~
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## Our Target Audience and Expected Impact



Government  
Policy Makers



Social and  
Environmental  
Scientists



Residents

## Recap

- The current energy system is steeped in inequities.
- The transition to renewable energy should be used to make a more equitable system
- By leveraging machine learning, we can perform wide-scale and cost-efficient analysis to build a more equitable energy system
  - We have highlighted two examples, but there are many more applications
- These analysis tools should be visualized and offered to policy-makers, scientists, and the general public.

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## COMPUTING FOR THE COMMON GOOD

Enea Dodi - [eneadodi@umass.edu](mailto:eneadodi@umass.edu)

Anupama Sitaraman - [asitaraman@umass.edu](mailto:asitaraman@umass.edu)

Mohammad Hajiesmaili - [hajiesmaili@cs.umass.edu](mailto:hajiesmaili@cs.umass.edu)

Prashant Shenoy - [shenoy@cs.umass.edu](mailto:shenoy@cs.umass.edu)