IMPACTS OF NON-RESIDENTIAL SOLAR ON RESIDENTIAL ADOPTION DECISIONS

SPEAKERS

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Isa Ferrall-Wolf, NREL
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RE-VOLV
Building Community Through Solar

Webinar Overview

- Solar Energy Innovation Network
  Isa Ferrall-Wolf, NREL
- Summary of results from recent study
  Eric O'Shaughnessy, LBL
- Amplifying the seeding effect
  Andreas Karelas, RE-volv
- Q&A

Photo by Joe DelNero, NREL 73221

Solar Energy Innovation Network (SEIN) Round 3
Equitable Adoption of Solar PV in Underserved Communities

Objective

Overcome distributed solar energy adoption barriers through a network of multi-stakeholder teams, national labs, and partners.

SEIN is a collaborative research program that supports multi-stakeholder teams to *research*, *develop*, and *share* solutions to place-based challenges associated with solar energy adoption.

Project team led by RE-volv focused on installing solar on BIPOC houses of worship nationwide

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Impacts of non-residential solar on residential adoption decisions

Eric O'Shaughnessy, Galen Barbose, Alexandra Grayson, Isa Ferrall-Wolf, Deborah Sunter

Presentation based on findings published in *Frontiers in Sustainable Energy Policy*

This material is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under Solar Energy Technologies Office (SETO) Agreement Number 34158 and Contract No. DE-AC02-05CH11231.

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Summary

- Demand for emerging technologies can be influenced by the adoption decisions of others
- Social influence has mostly been studied between households
- We explore how non-residential solar installations could influence the adoption decisions of households

Key findings:

Results suggest that solar installations on non-residential buildings influence residential adoption decisions, including installations on commercial buildings, government buildings, schools, and houses of worship

Non-residential systems exert a continuous, long-term influence on residential adoption decisions

Non-residential solar adopters could serve as partners to “seed” residential solar adoption

Photo by Dennis Schroeder, NREL 45243

Background: What drives rooftop solar adoption?

- Most research focuses on personal incentives
- An alternative approach explores how social influence drives rooftop solar adoption decisions
- Social influence has mostly been studied between households

Photo by Joe DelNero, NREL 73221

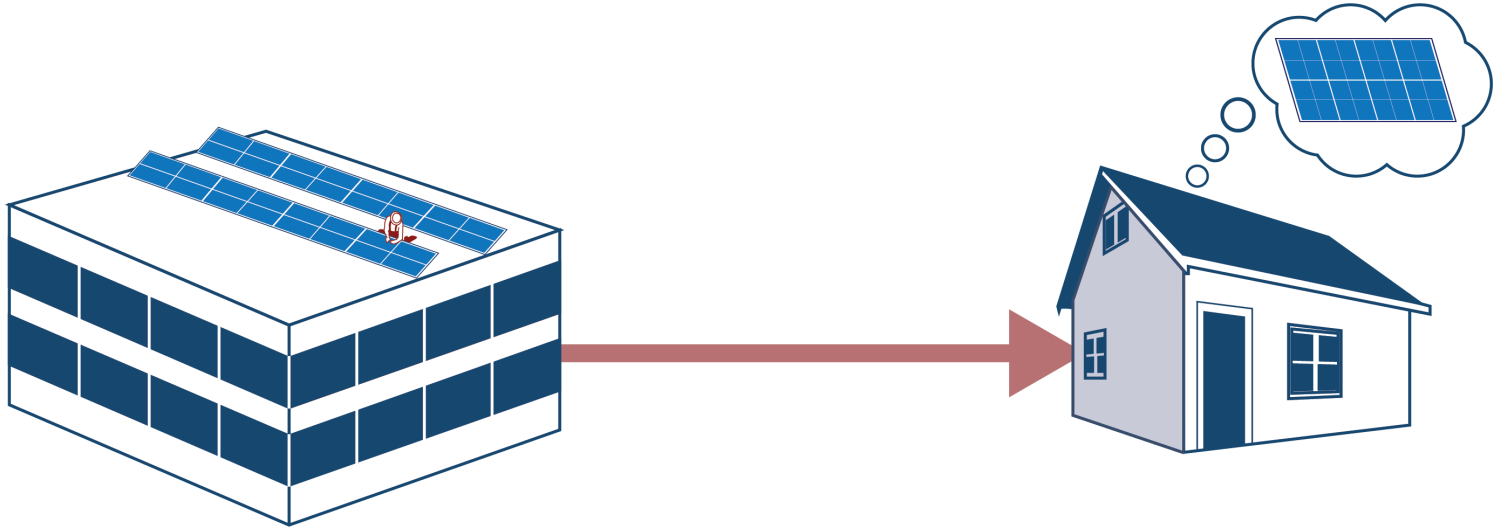
Background: Non-residential influence

- Rooftop or ground-mounted solar at non-residential sites could influence residential adoption decisions
- Influence could be passive (e.g., seeing panels) or active (e.g., interactions with customers, constituents, and congregations)

Photo by Dennis Schroeder, NREL 45145

Research questions

- Do non-residential solar installations influence residential adoption decisions?
- How does that influence compare to influence between households?



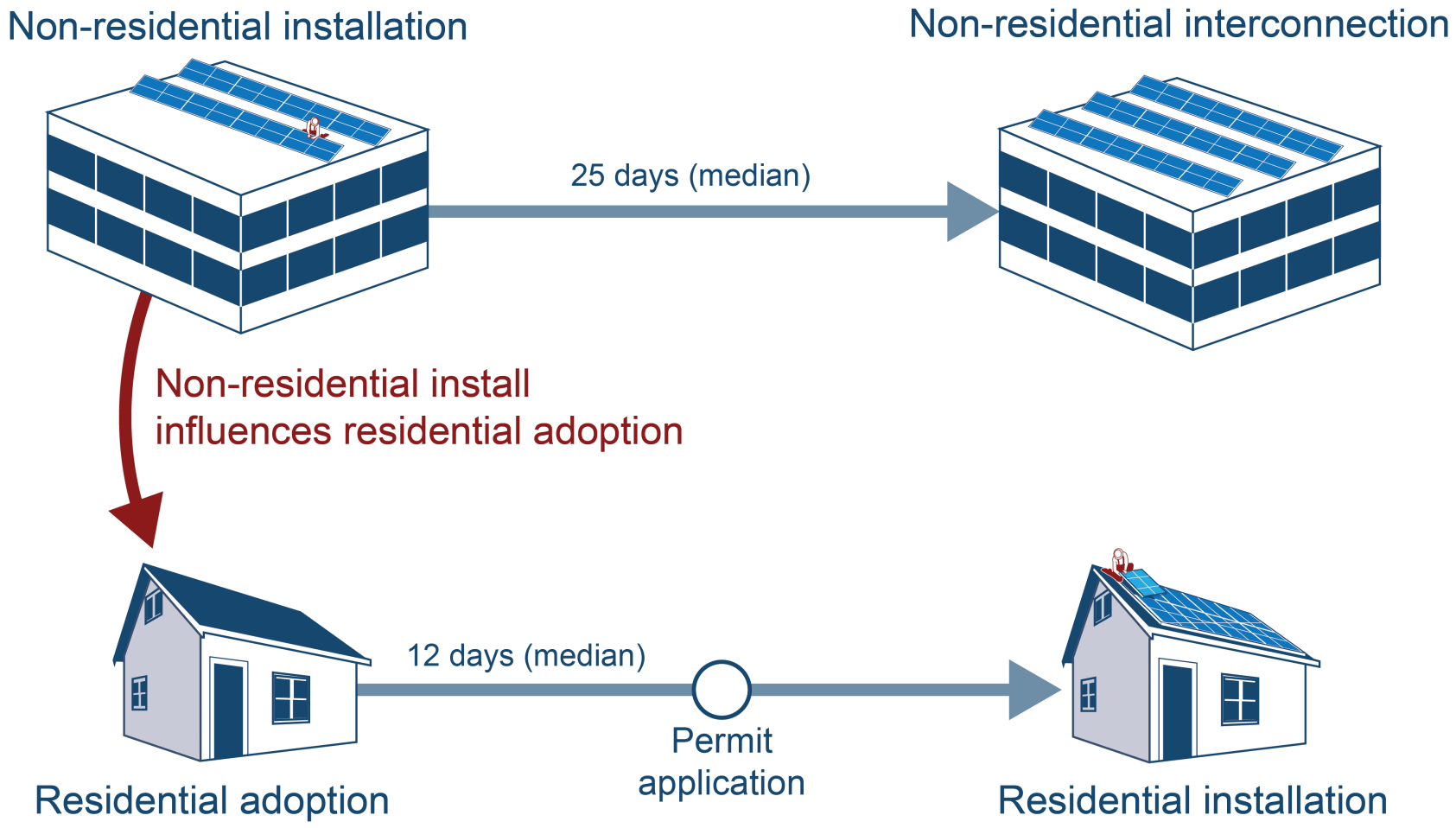
Non-residential installation

Residential adoption

Data

- Non-residential systems
  - LBL's Tracking the Sun data set identifies 35,526 non-residential PV installations from 2010-2021, including systems installed on commercial buildings (N=23,975), government buildings (N=3,989), and schools (N=2,089)
  - We also identified systems installed on houses of worship based on data from Interfaith Power & Light and the Department of Homeland Security (N=1,329)
- Residential system data comes from BuildZoom (N=1,449,189)

Methods


Non-residential installation
Non-residential interconnection
25 days (median)
Non-residential install
influences residential adoption
12 days (median)
Permit
application
Residential adoption
Residential installation

Methods

- We use staggered difference-in-differences to measure temporal changes in residential adoption rates after non-residential system installations (see paper for complete description of Methods)
- We implement the analysis at the zip code-quarter level:
  - The “treatment” is a non-residential installation, the treatment group comprises zip codes with non-residential systems from 2010-2021
  - The “control” group comprises zip codes without non-residential systems from 2010-2021

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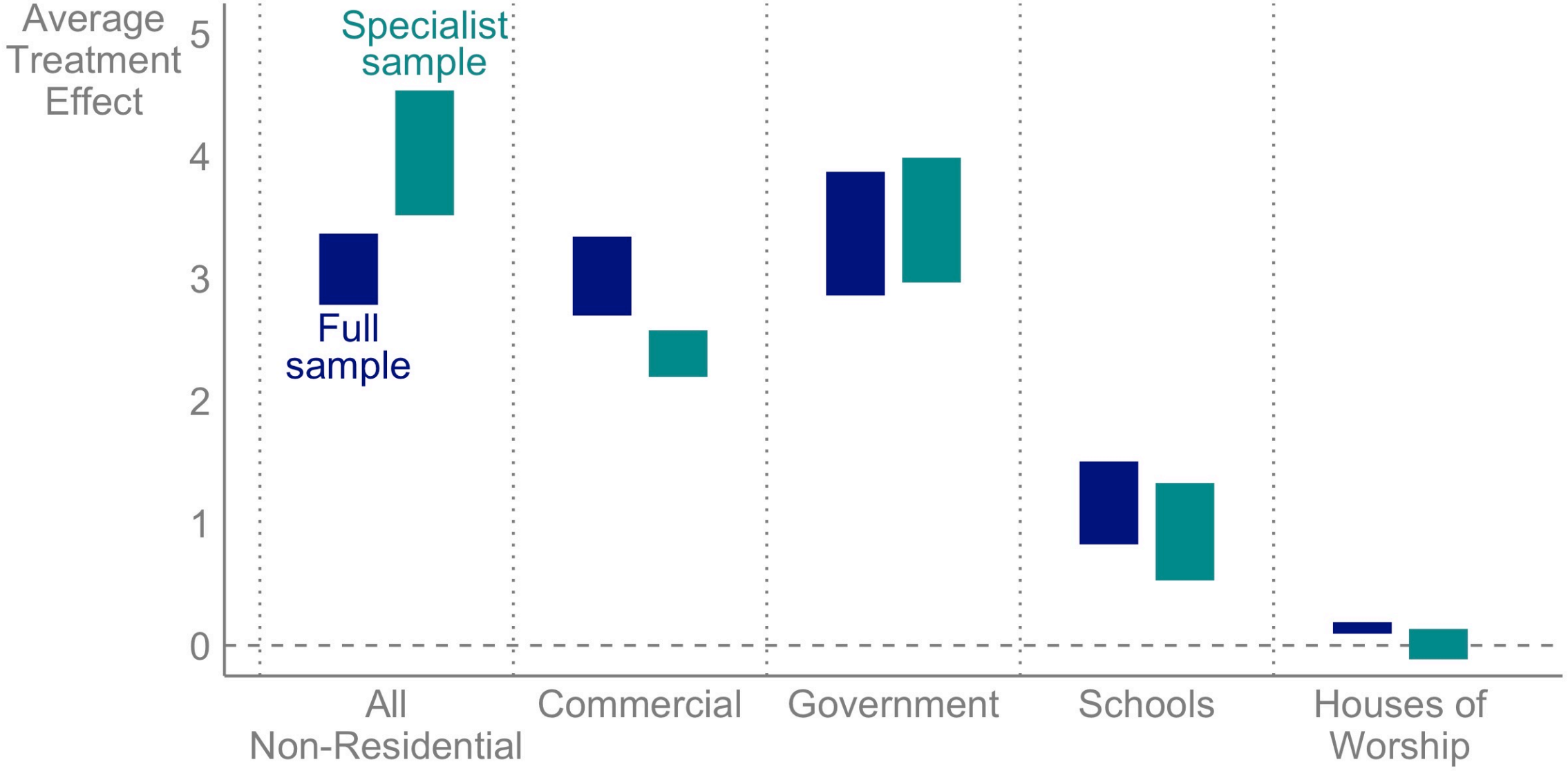
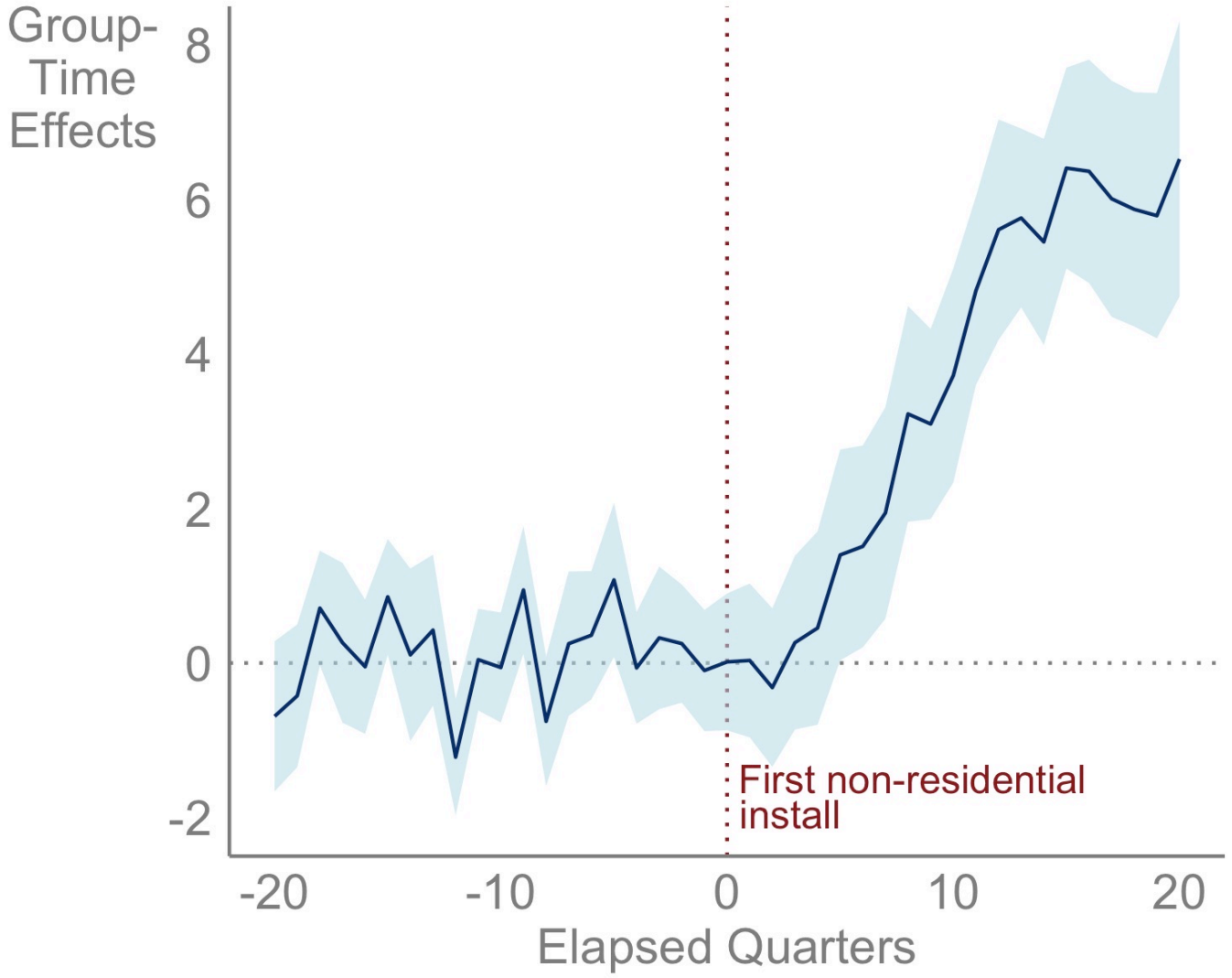
Results

Results: Evidence of influence across all building types

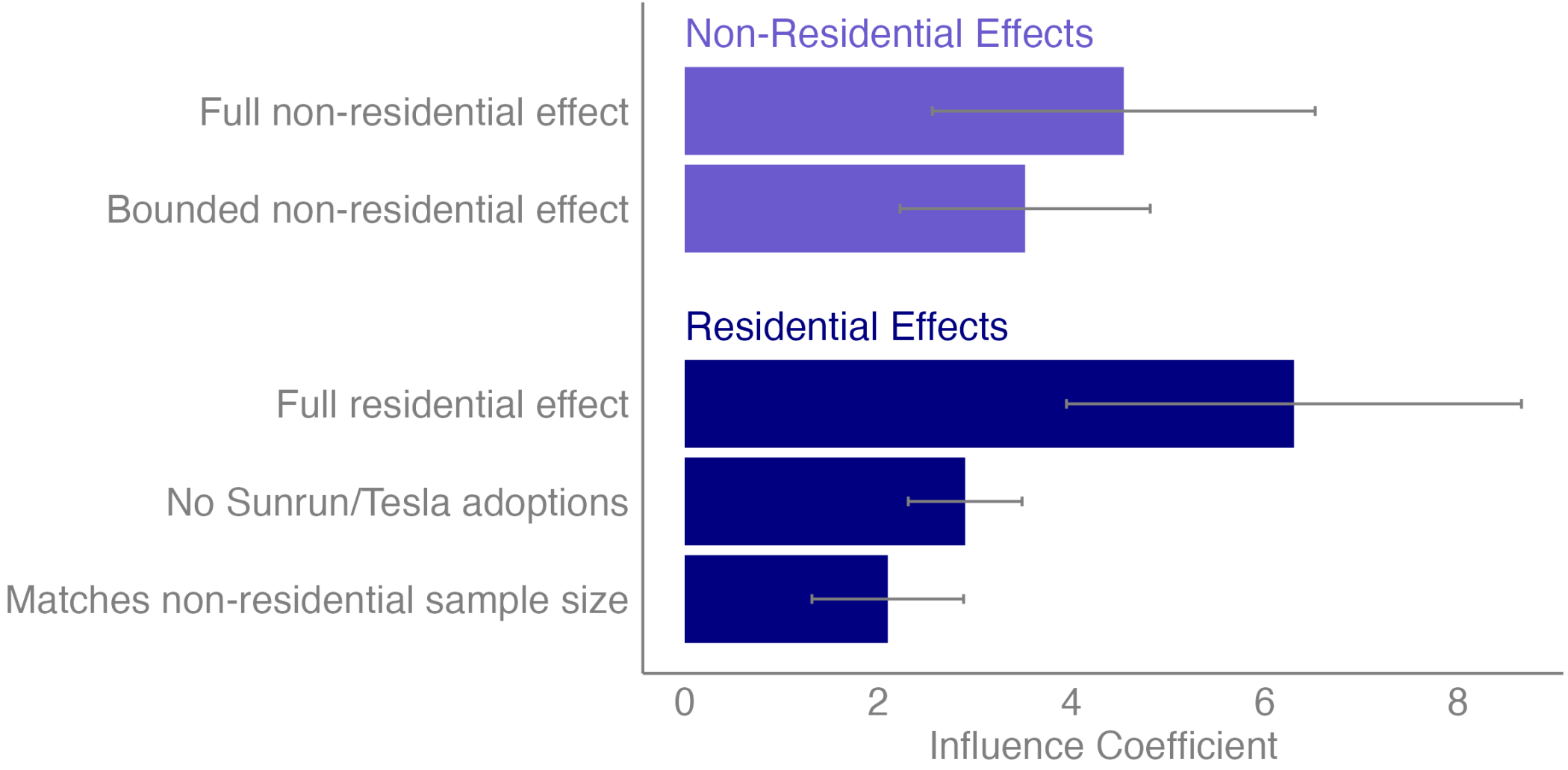


Results: Sustained influence over time

- Results suggest that residential adoption rates increase in zip codes with non-residential installs
- That influence effect is persistent
- The sustained influence could reflect compounding influence over time: initially influenced adoptions go on to influence other adoptions



Results: Non-residential influence effects comparable to residential effects



Discussion

- The results suggest that policy-enabled non-residential installations could “seed” rooftop PV adoptions
  - Non-residential institutions could be effective partners for seeding PV adoption in underserved communities
- Comparability of results between non-residential and residential effects suggests shared mechanisms
- Results suggest that effects vary across building types

Open questions

- What are the mechanisms of non-residential influence?
- Could certain non-residential institutions more effectively influence residential adoption than other institutions?
- How can non-residential influence be leveraged and optimized?

Amplifying the Seeding Effect in Communities

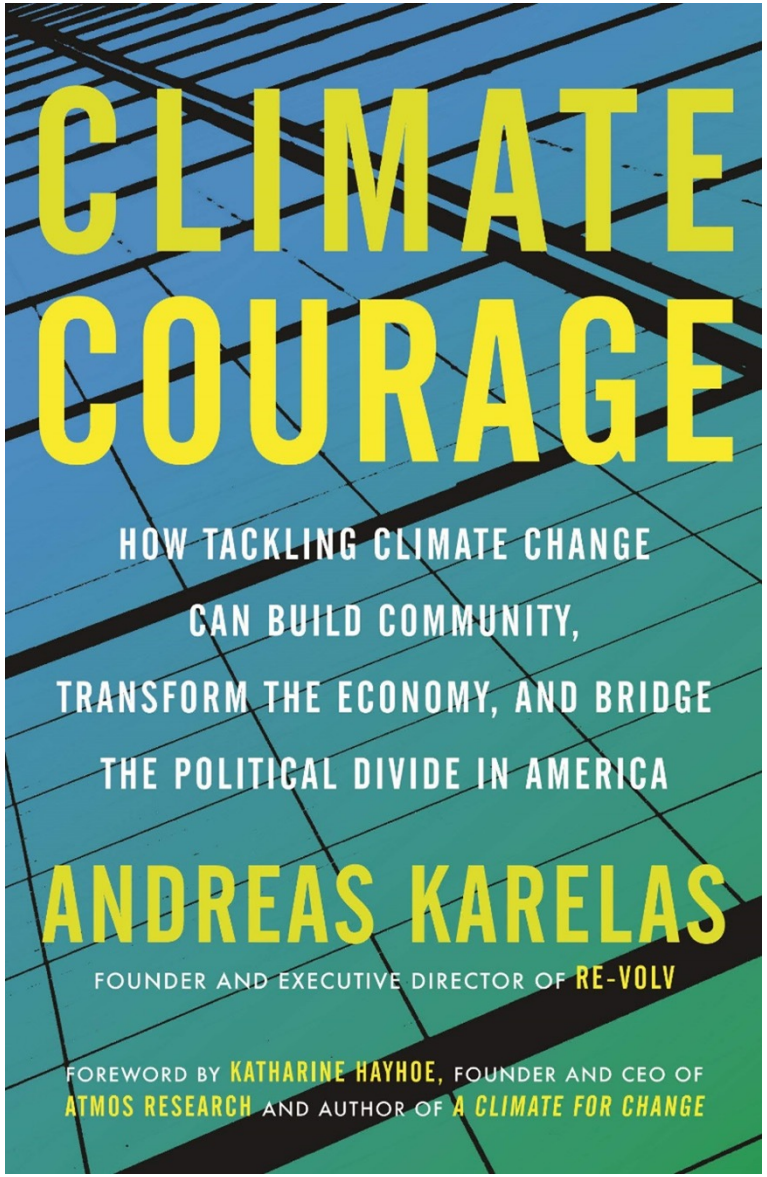
February 07, 2024

Andreas Karelas, RE-volv
Executive Director
andreas@re-volv.org

What is RE-volv?

A climate justice organization that offers solar financing to help fellow nonprofits go solar, while educating community members about the benefits of clean energy.

- **501(c)3 Nonprofit**
- **Based in San Francisco**
- **Incorporated in 2011**



www.climatecourage.us

EMPOWER INVEST EDUCATE

Solar Installation for Harbor House Ministries in Oakland, CA

EMPOWER

Solar Ambassador Fellowship

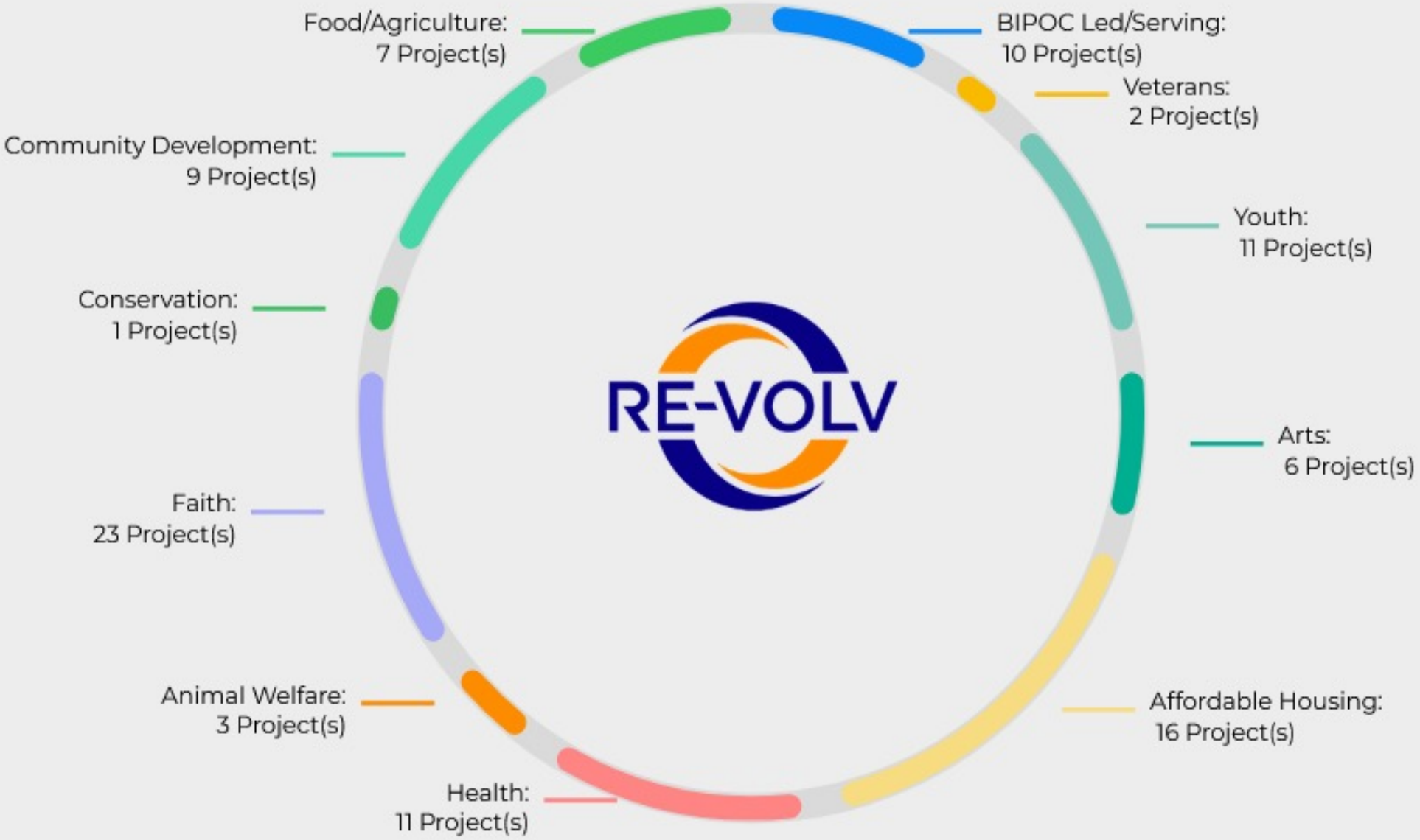

EMPOWER
INVEST
20 year Solar Lease, PPA, or Loan


EMPOWER
INVEST
EDUCATE
Community Engagement

Our Impact To Date

- **$12 Million** deployed
- **4 MW** of solar projects financed
- **100,000 tons of CO2** avoided
- **70,000 people** collectively served
- **70 nonprofits** in **18 States**
- **$24 Million** in nonprofit electric bill savings
- **400 Solar Ambassadors** trained at 30 universities

RE-volv Projects by Impact Area



Solar for BIPOC Houses of Worship

SOLAR ENERGY INNOVATION NETWORK
U.S. DEPARTMENT OF ENERGY

RE-VOLV

INTERFAITH Power & Light

GREEN THE CHURCH

nature sustainability

ANALYSIS

https://doi.org/10.1038/s41893-018-0204-z

Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity

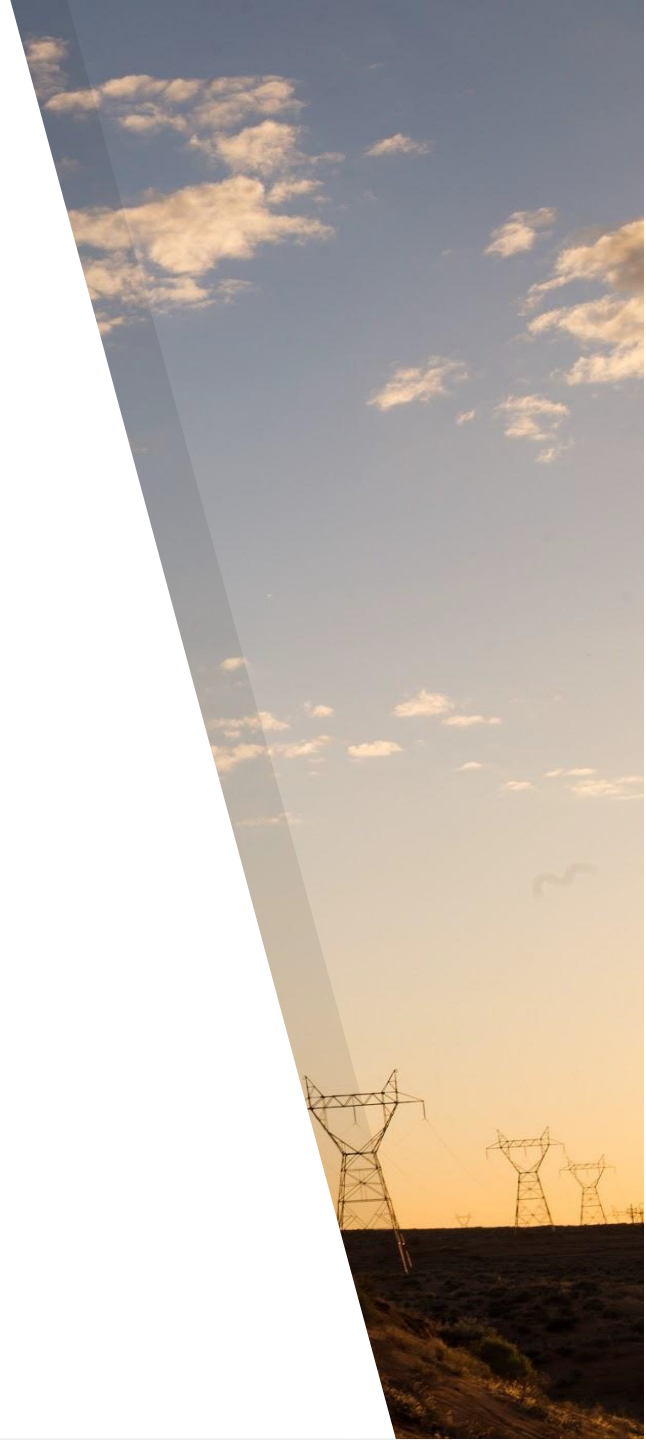
Deborah A. Sunter [1,2,3,4*], Sergio Castellanos [3,4,5,6*] and Daniel M. Kammen [3,4,7]

The rooftop solar industry in the United States has experienced dramatic growth—roughly 50% per year since 2012, along with steadily falling prices. Although the opportunities this affords for clean, reliable power are transformative, the benefits might not accrue to all individuals and communities. Combining the location of existing and potential sites for rooftop photovoltaics (PV) from Google's Project Sunroof and demographic information from the American Community Survey, the relative adoption of rooftop PV is compared across census tracts grouped by racial and ethnic majority. Black- and Hispanic-majority census tracts show on average significantly less rooftop PV installed. This disparity is often attributed to racial and ethnic differences in household income and home ownership. In this study, significant racial disparity remains even after we account for these differences. For the same median household income, black- and Hispanic-majority census tracts have installed less rooftop PV compared with no majority tracts by 69 and 30%, respectively, while white-majority census tracts have installed 21% more. When correcting for home ownership, black- and Hispanic-majority census tracts have installed less rooftop PV compared with no majority tracts by 61 and 45%, respectively, while white-majority census tracts have installed 37% more. The social dispersion effect is also considered. This Analysis reveals the racial and ethnic injustice in rooftop solar participation.

“when communities of color are initially seeded—or have first-hand access to rooftop PV technologies—the deployment significantly increases compared with other racial/ethnic groups…

These results suggest that appropriately ‘seed-ing’ racial and ethnic minority communities may mitigate energy injustice in rooftop PV adoption”

(Sunter et al 2019, Nature Sustainability)



Amplifying the Seeding Effect

- Communicate **shared values**
- Build on **trusted relationships**
- Tell **success stories**
- Engage **the community**
- Offer **incentives**

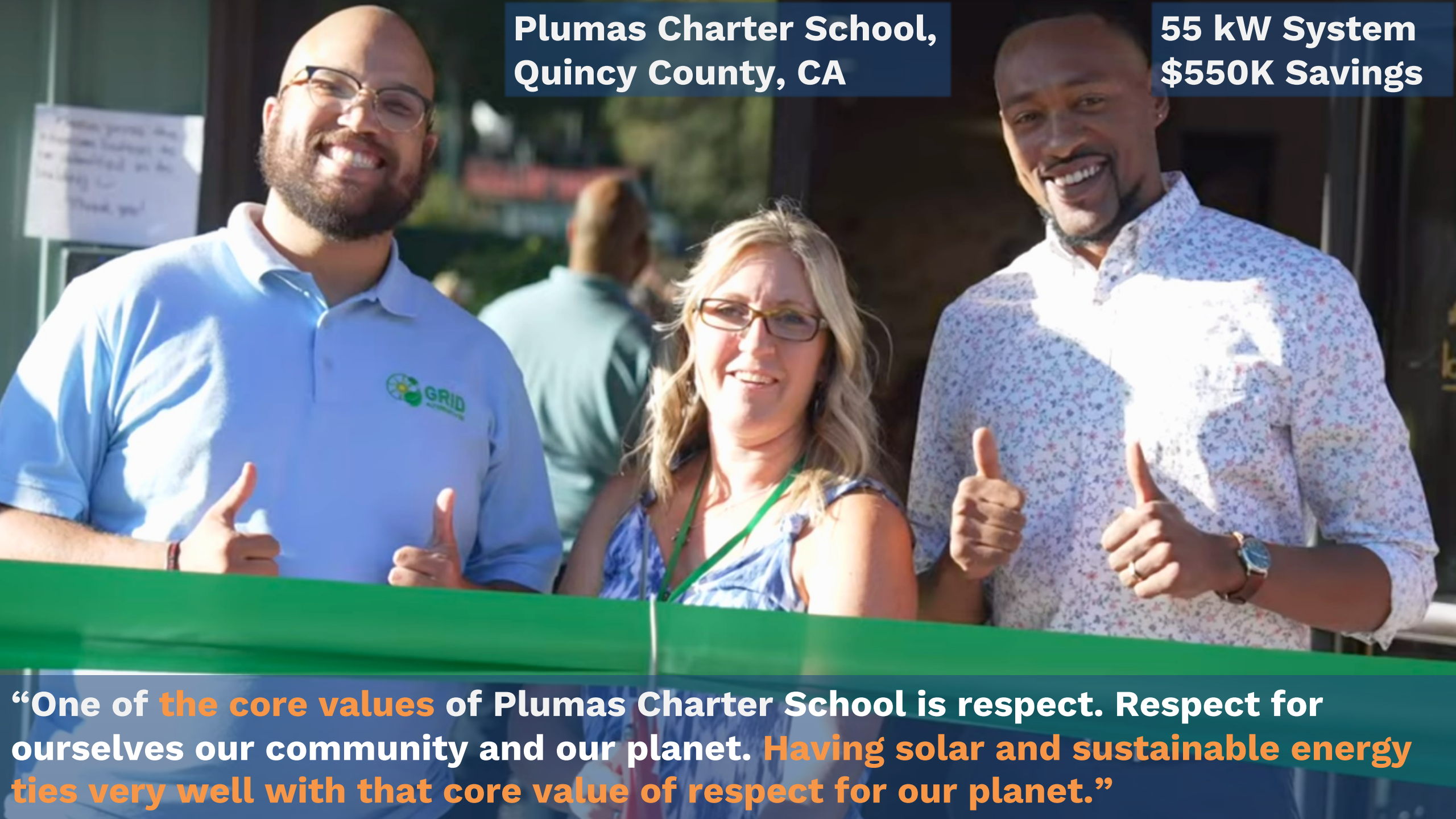
“The belief that we are called by God to be faithful stewards of the creation with which He has entrusted us. We have responded to that call in part by taking steps to reduce our own energy consumption, including the decision for a solar installation that will not only minimize our reliance on fossil fuels and cut our greenhouse gas emissions, but will also serve as a visible witness to the surrounding community of our commitment to sustainability.”

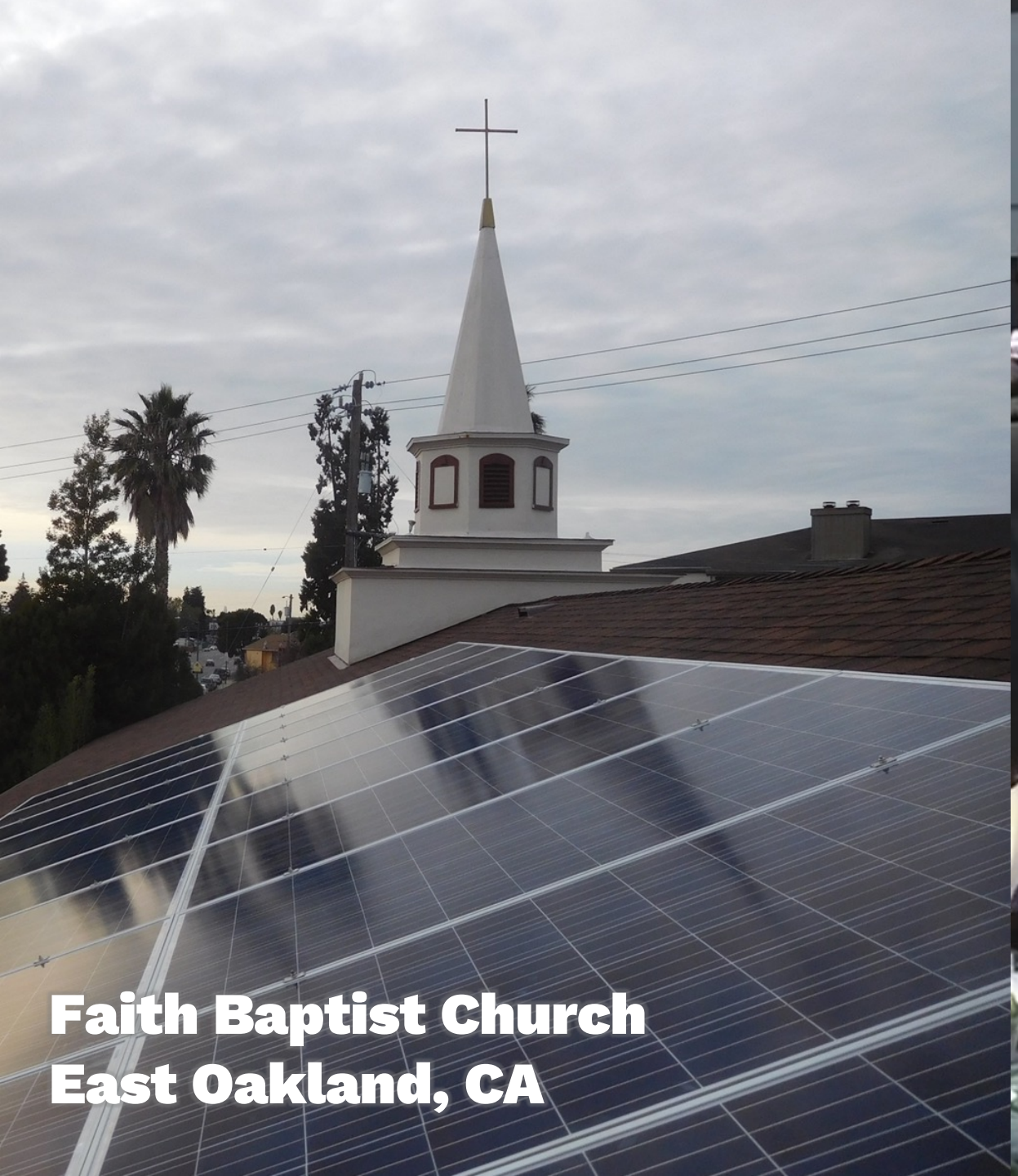
St. Thomas of Canterbury
Episcopal Church
Albuquerque, NM

“This arrangement, with RE-volv installing solar panels at no cost to our Meeting, allows our congregation to both use green energy and to continue funding the causes we believe in, such as social justice, poverty elimination, justice reform, and peace efforts. We're excited to save money on our energy usage, but most of all, we want to use renewable energy to help our planet recover from the harm we have all caused.”

Sandy Spring Meeting House
Montgomery County, MD

28 kW System
$150K Savings


Plumas Charter School,
Quincy County, CA
55 kW System
$550K Savings
GRID
“One of the core values of Plumas Charter School is respect. Respect for ourselves our community and our planet. Having solar and sustainable energy ties very well with that core value of respect for our planet.”



Faith Baptist Church
East Oakland, CA

6 kW System
$50K Savings


2680


True Fellowship
Baptist Chur

Bill McKibben
@billmckibben

Solar power where we need it most. Congrats to True Fellowship Baptist Church in Richmond, CA – home of the Chevron Refinery. This new solar system crowdfunded by @RE_volv is going to save the church $15,000 on their electric bills, and avoid over 140,000 lbs of CO2 emissions.

1:48 PM · Oct 22, 2018

Veterans

- VFW Post 10804: 15 kW
- VFW Post 10420: 19 kW
- South Carolina
- Coastal Carolina University Ambassador Team

Solar setup at Oakland church provides energy security for community

A church in east Oakland has become a model for providing refuge during power shutoffs and

Kehilla Community Synagogue,
Piedmont, CA

22 kW System
$72K Savings


LifeLi
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Thank You!

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Questions?

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Additional resources

Full paper: https://www.frontiersin.org/articles/10.3389/fsuep.2023.1203517/full

LBL Tracking the Sun: https://emp.lbl.gov/tracking-the-sun

LBL Solar Demographics: https://emp.lbl.gov/projects/solar-demographics-trends-and-analysis