



## Clean Energy for Low Income Communities Accelerator (CELICA)

Using Data to Drive Low Income Energy Solutions:  
DOE Tool Demo and Case Studies

February 8, 2018

# Logistics

- Attendees are in listen-only mode.
- For questions, attendees are encouraged to type questions / feedback in the webinar chat box. Feel free to ask clarifying questions during the presentations, and we will have time at the end to answer questions from the panelists.
- The recorded webinar, transcript and slides will be available online at:  
<https://energy.gov/eere/slsc/state-and-local-solution-center>, and,  
<https://betterbuildingsolutioncenter.energy.gov/>

# Agenda

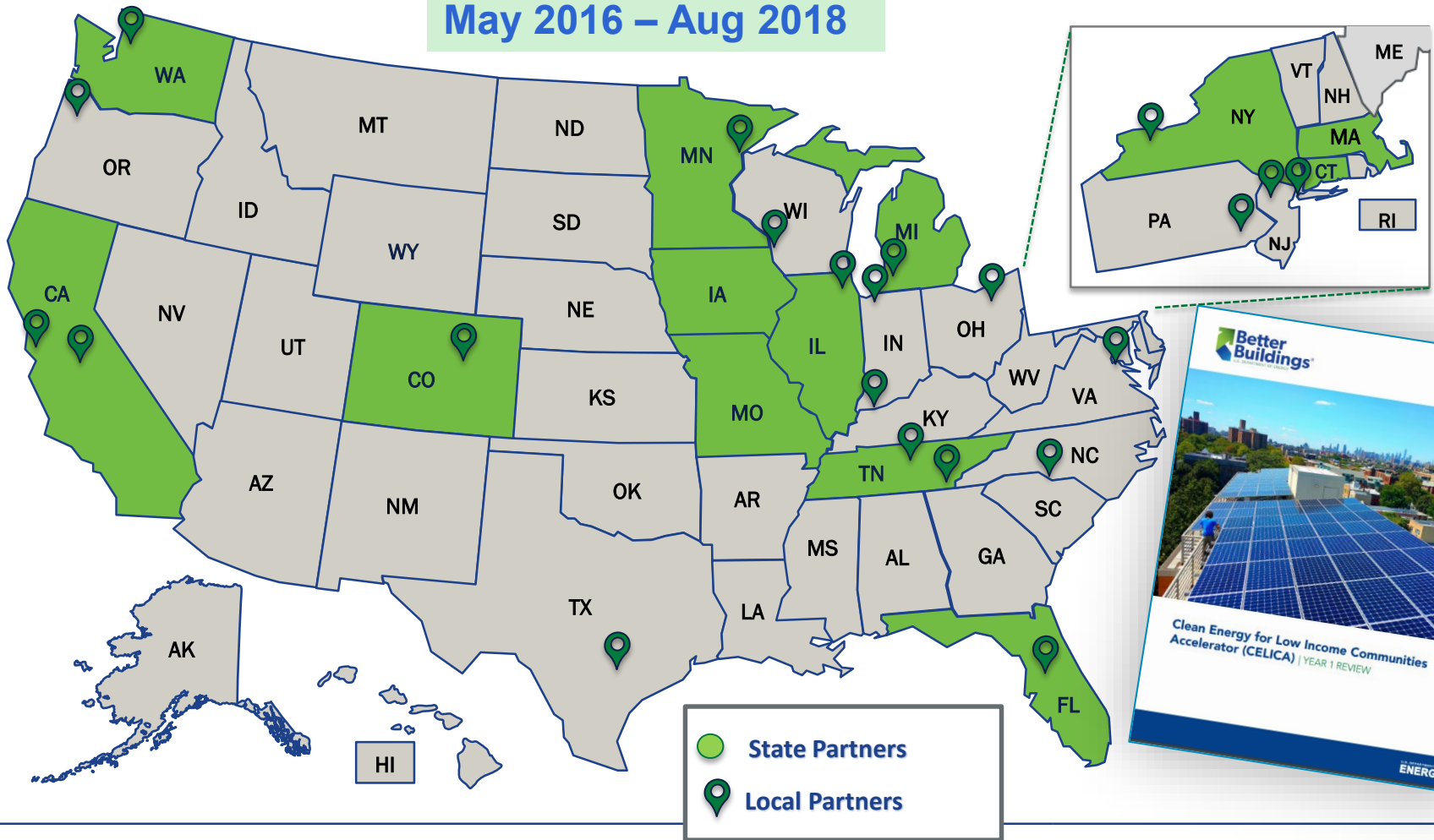
- Overview
- Methodology
- Rochester, NY Example
- State of Connecticut Example
- Q&A

# U.S. DOE Better Buildings Initiative: Clean Energy for Low Income Communities Accelerator

# Clean Energy for Low Income Communities Accelerator (CELICA)

37 partners (14 state, 12 local, 11 community action agencies/non-profits/utilities)

May 2016 – Aug 2018



# Low-income Energy Affordability Data (LEAD) Tool

# LEAD Tool on OpenEI.org

The screenshot displays the OpenEI.org website interface. At the top, there is a navigation bar with 'OpenEI' logo, 'Wiki', 'Apps', and 'Datasets' links. Below this is a search bar and 'Login' and 'Sign Up' buttons. A green banner features the 'U.S. DEPARTMENT OF ENERGY Open Data Catalog' logo. The main content area is titled 'Low-Income Energy Affordability Data (LEAD) Tool'. It includes a 'License' section (Creative Commons Attribution 4.0), an 'Author' section (Office of Energy Efficiency and Renewable Energy), a 'Contact' section (Christina Bowman), and 'Share on Social Sites' (Google+, Twitter, Facebook). The 'Collection' section lists 'U.S. Department of Energy'. The 'ABOUT THIS TOOL:' section describes the CELICA accelerator and the LEAD tool's purpose. The 'HOW TO USE:' section provides instructions on using the tool and accessing data. The 'Data and Resources' section lists three files: 'DESCRIPTION OF FILES', 'METHODOLOGY', and 'DATA DICTIONARY', each with 'Preview' and 'Download' options.

OpenEI Wiki Apps Datasets  
Find data Add data About CKAN

U.S. DEPARTMENT OF ENERGY Open Data Catalog

License Dataset Activity Stream

Creative Commons Attribution 4.0 OPEN DATA

Author  
Office of Energy Efficiency and Renewable Energy

Contact  
Christina Bowman

Share on Social Sites  
Google+  
Twitter  
Facebook

Collection  
U.S. Department of Energy

## Low-Income Energy Affordability Data (LEAD) Tool

ABOUT THIS TOOL:

The Better Building's Clean Energy for Low Income Communities Accelerator (CELICA) was launched in 2016 to help state and local partners across the nation meet their goals for increasing uptake of energy efficiency and renewable energy technologies in low and moderate income communities. As a part of the Accelerator, DOE created this Low-Income Energy Affordability Data (LEAD) Tool to assist partners with understanding their LMI community characteristics. This can be utilized for low income and moderate income energy policy and program planning, as it provides interactive state, county and city level worksheets with graphs and data including number of households at different income levels and numbers of homeowners versus renters. It provides a breakdown based on fuel type, building type, and construction year. It also provides average monthly energy expenditures and energy burden (percentage of income spent on energy).

HOW TO USE:

The LEAD tool can be used to support program design and goal setting, and they can be paired with other data to improve LMI community energy benchmarking and program evaluation. Datasets are available for all 50 states, census divisions, and tract levels. You will have to enable macros in MS Excel to interact with the data. A description of each of the files and what states are included in each U.S. Census Division can be found in the file "DESCRIPTION OF FILES".

For more information, visit: <https://betterbuildingsinitiative.energy.gov/accelerators/clean-energy-low-income-communities>


### Data and Resources


<b>DESCRIPTION OF FILES</b> Describes what is included in the following data files, particularly which...	<a href="#">Preview</a> <a href="#">Download</a>
<b>METHODOLOGY</b> Describes the methodology in datasets, covers data sources and calculations...	<a href="#">Preview</a> <a href="#">Download</a>
<b>DATA DICTIONARY</b>	<a href="#">More info</a>


<https://openei.org/doe-opendata/dataset/celica-data>

# Data Navigation

 **STATE\_ALL\_2015**  
Contains data for all 50 U.S. states down to the county level for housing...

 **COUNTY\_WESTNORTHCENTRAL\_2015**  
Contains county-level and state data in the West North Central region for...


 **COUNTY\_WESTSOUTHCENTRAL\_2015**  
Contains county-level and state data for the West South Central region for...


 **COUNTY\_PACIFIC\_2015**  
Contains county-level and state data for the Pacific region for housing units...


- State, City, County, and Tract level files are now available on OpenEI
- States (and corresponding counties in each state) are organized by Census Division
  - 9 Census Division files
    - COUNTY\_WESTNORTHCENTRAL\_2015
    - COUNTY\_WESTSOUTHCENTRAL\_2015
  - Look at the “Description of Files”

For example, to generate city-level charts:

1. Download CITY\_SHORT\_2015
2. Download the state file (e.g. CITY\_SH\_NY\_2015)
3. Copy and paste the state file data into the CITY tab of the CITY\_SHORT\_2015 file starting after cell A27

 **CITY\_SHORT\_2015**  
INSTRUCTIONS: For city level charts, the user should find the app

 **CITY\_SH\_AK\_2015**  
Contains city level data for AK. Download the CITY\_SHORT\_2015 f

 **CITY\_SH\_AL\_2015**  
Contains city level data for AL. Download the CITY\_SHORT\_2015 f

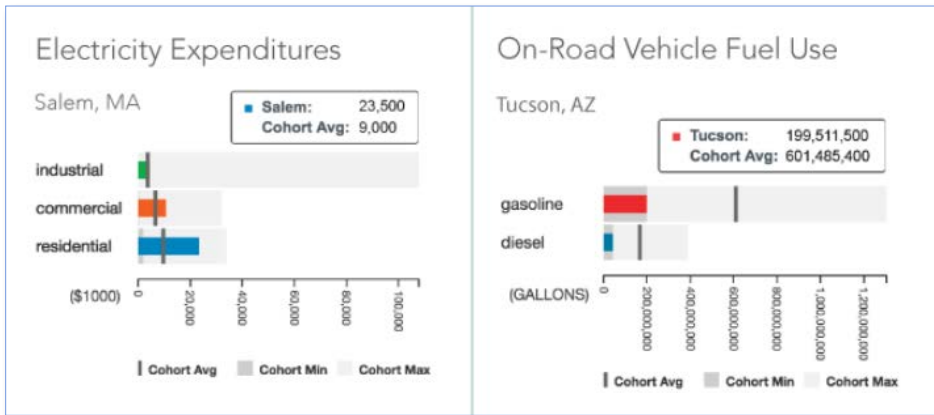


# Low Income Energy Affordability Data (LEAD Tool)

- **Housing unit characteristics by income level.**
- **Based on the HUD area median income:**
  - Low income = less than 80% of area median income
  - Very low income = less than 50% of area median income
  - Extremely low income = less than 30% of area median income
- **Tabulated by**
  - Tenure (owner/renter),
  - Number of units in the building,
  - Primary heating fuel type, and
  - Year of the building first construction.
- **Available at the national, state, county, and city levels.**
  - Raw data at the Census Tract level.

# Cities-LEAP ([energy.gov/eere/cities](http://energy.gov/eere/cities))

- City Energy Profiles/SLED Tool: Energy use data for 23,400+ cities across the United States



- The Local Energy Action Toolbox: Searchable database of resources on city policy actions

**Local Energy Action Search: Learn about community energy policy**

The local energy toolbox provides a cataloged, customizable list of actions to help local communities make strategic energy decisions. Resources are cataloged by a classification system developed in *City-Level Energy Decision Making, Data Use in Energy Planning, Implementation and Evaluation in U.S. Cities* to provide users with an accessible entry point to a wide variety of local energy policies, programs and actions.

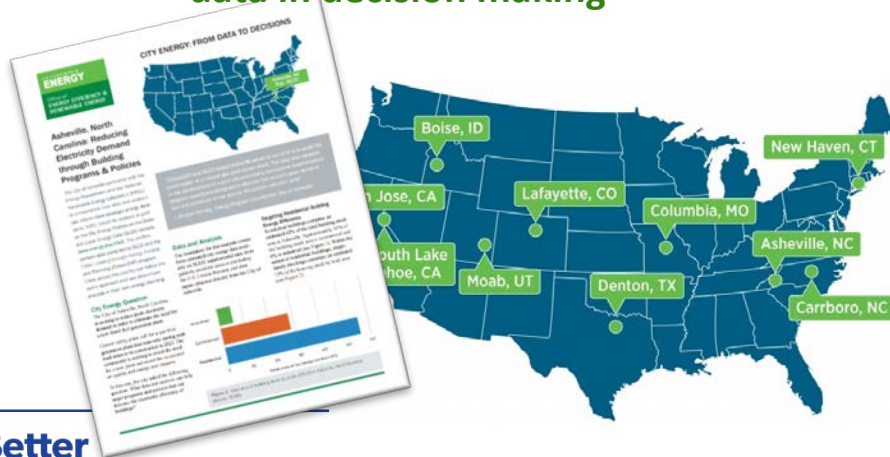
Category:  Buildings & Efficiencies  Renewable Power

Subcategory: Local Power Generation

Keyword:

About the Data

- "City Energy: From Data to Decisions" Fact Sheets: Case studies of how to use city energy data in decision making



- Two reports about city-level policy actions

**Why Cities?**

Cities consume approximately **70%** of global energy

**City-Level Energy Decision Making: Data Use in Energy Planning, Implementation, and Evaluation in U.S. Cities**

Read a report analyzing data such as utility type, vehicle use, and median household income from a sample of 20 cities across the United States.

LEARN MORE

Cities can achieve **20%** of abatement potential as primary policy architects









Cities can achieve **80%** of abatement potential as critical implementers and strategic partners

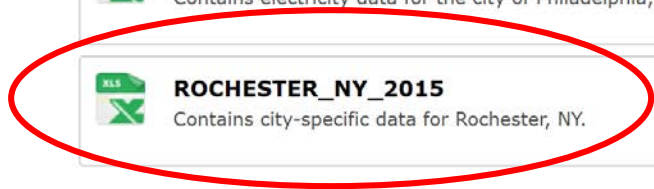
**Estimating the National Carbon Abatement Potential of City Policies: A Data-Driven Approach**

Read the report and summaries detailing how commonly implemented city actions can reduce U.S. carbon emissions.

LEARN MORE

# Example for Rochester, NY

 <b>TRACT_VA_2015</b> 2015 Census tract-level data for the state of Virginia.	<a href="#">Preview</a> <a href="#">Download</a>
 <b>TRACT_VT_2015</b> 2015 Census tract-level data for the state of Vermont.	<a href="#">Preview</a> <a href="#">Download</a>
 <b>TRACT_WA_2015</b> 2015 Census tract-level data for the state of Washington.	<a href="#">Preview</a> <a href="#">Download</a>
 <b>TRACT_WI_2015</b> 2015 Census tract-level data for the state of Wisconsin.	<a href="#">Preview</a> <a href="#">Download</a>
 <b>TRACT_WV_2015</b> 2015 Census tract-level data for the state of West Virginia.	<a href="#">Preview</a> <a href="#">Download</a>
 <b>TRACT_WY_2015</b> 2015 Census tract-level data for the state of Wyoming.	<a href="#">Preview</a> <a href="#">Download</a>
 <b>PHILADELPHIA_2015</b> Contains electricity data for the city of Philadelphia, Pa.	<a href="#">More info</a> <a href="#">Download</a>
 <b>ROCHESTER_NY_2015</b> Contains city-specific data for Rochester, NY.	<a href="#">More info</a> <a href="#">Download</a>



# Rochester, NY

# City of Rochester

Melissa Chanthalangsy

Office of Energy & Sustainability

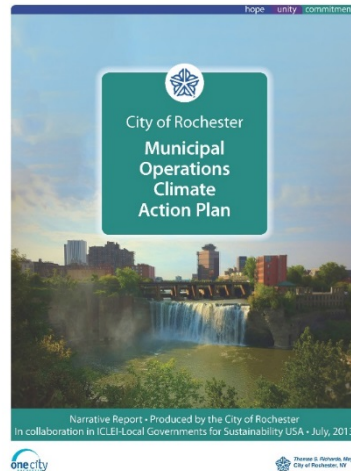
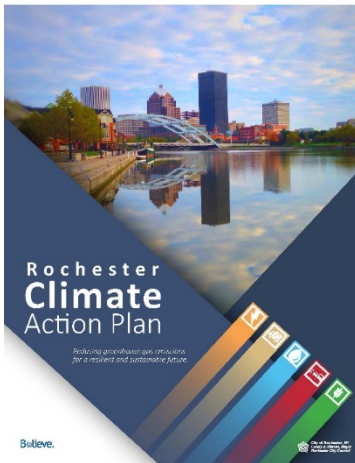
February 8, 2018



City of Rochester, NY  
*Lovely A. Warren, Mayor*

# Office of Energy & Sustainability

- Certified Climate Smart Community by NYS DEC
- Designated Clean Energy Community by NYSERDA
- Climate Action Plan
  - 40% reduction in GHG emissions from 2010 levels by 2030



# Mayor's Office of Innovation & Strategic Initiatives

- Created in 2014 to focus on issues related to poverty in Rochester
- Responsible for data analysis, GIS mapping, research, and public engagement for programs targeting distressed neighborhoods
- Facilitate initiatives
  - Microloans
  - Shared mobility
  - Wage disparity analyses
  - Adult mentoring



City of Rochester, NY  
*Lovely A. Warren, Mayor*

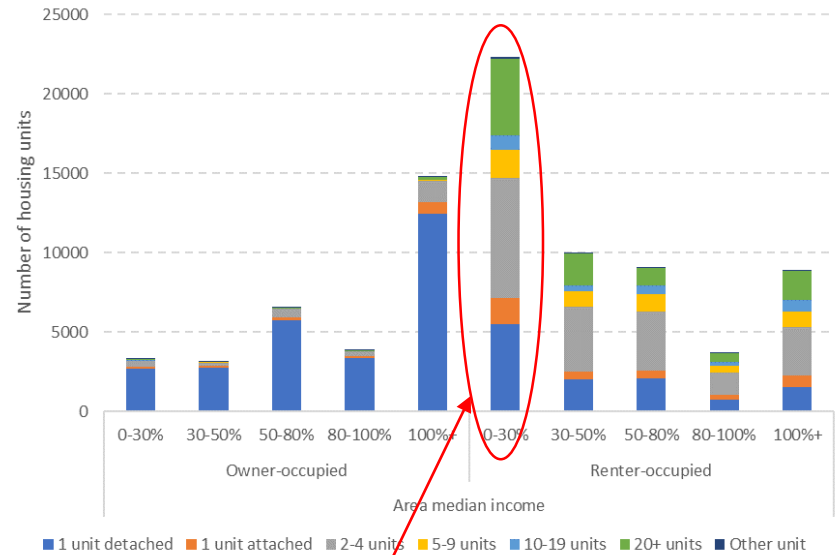


# Community Profile

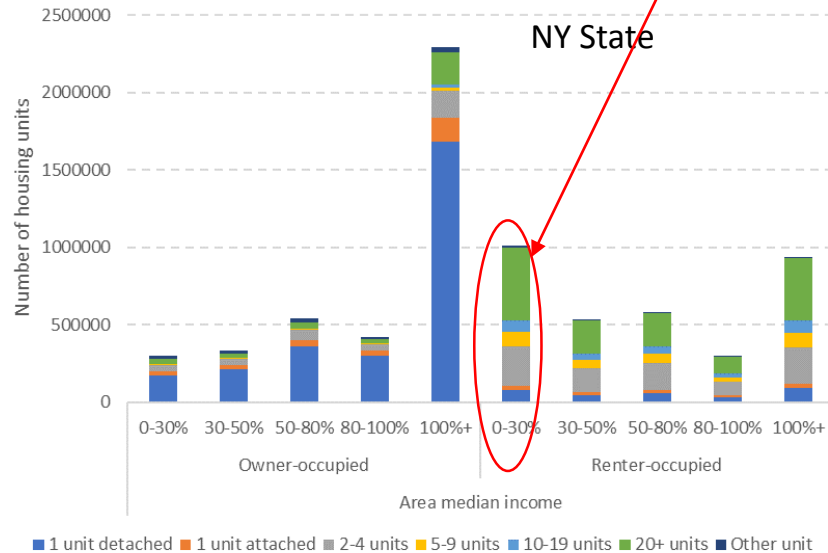
- 57% of City residents are tenants
- Most LMI residents are also tenants
- Living in single-family homes or multi-unit homes, not multi-family buildings as in many larger cities



Rochester, NY



NY State

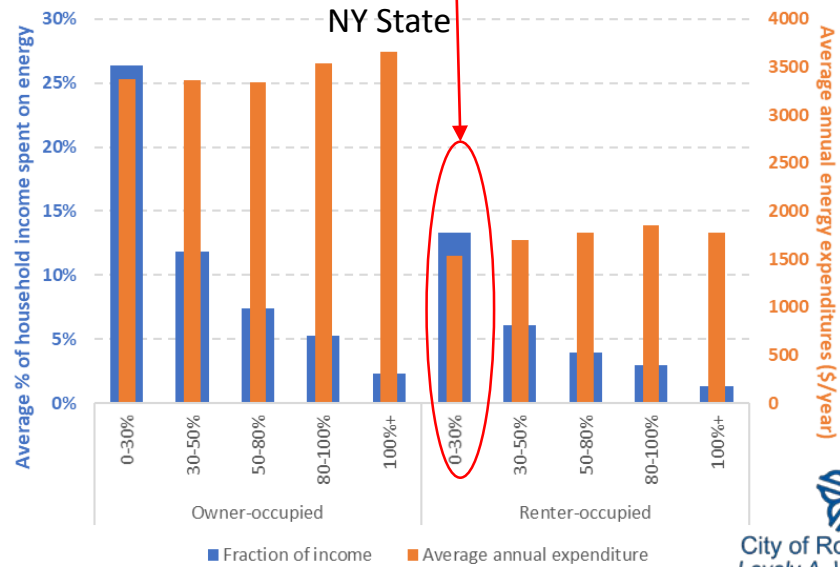
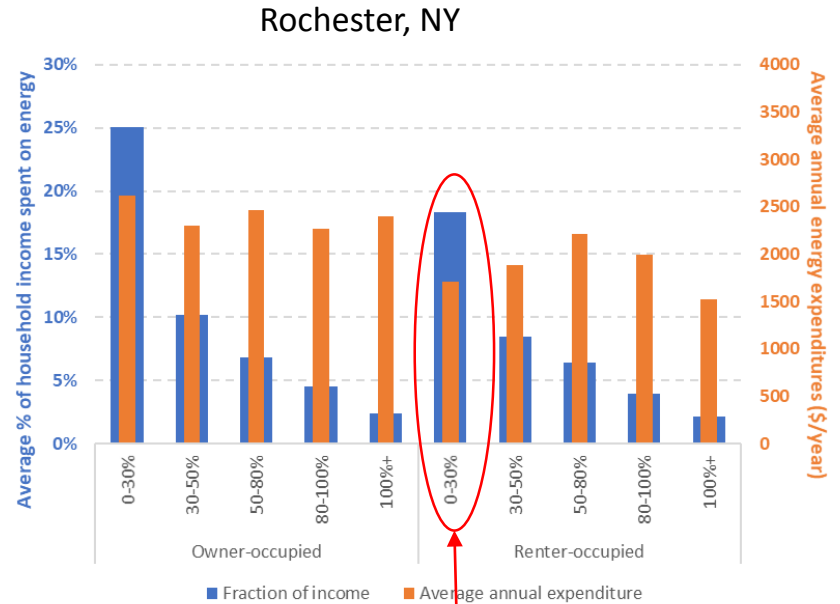


City of Rochester, NY  
Lovely A. Warren, Mayor

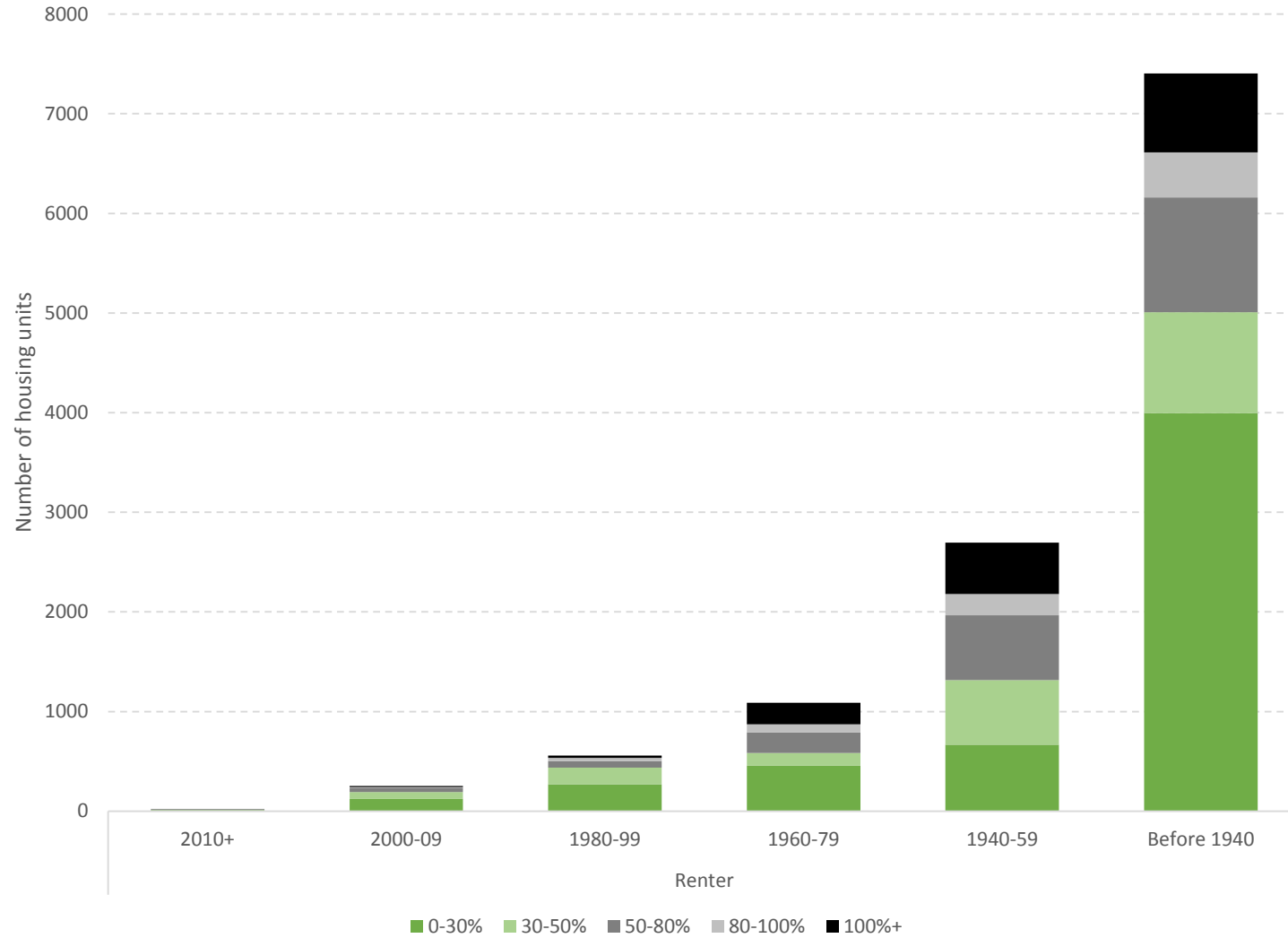


# Challenges

- Lack of economy of scale
- Split-incentive problem
- Existing NYS programs target homeowners
- Older housing stock → higher costs



## Number of Homes by Home Age and Tenant Income Level



# Engagement Strategy & Program Development

- Landlord associations
- Targeted outreach
- Trusted messengers
- Community and neighborhood associations



# Data

- Helps communicate issue's importance internally and with local partners
- DOE & NREL strengthens mission and message
- Will be used to inform grant applications to develop EE programs in LMI communities
- On-going partnership with RG&E (Rochester Gas & Electric)



City of Rochester, NY  
Lovely A. Warren, Mayor

# Contact Info

- [chantham@cityofrochester.gov](mailto:chantham@cityofrochester.gov)
- Office: 585-428-7034



City of Rochester, NY  
*Lovely A. Warren, Mayor*

# State of Connecticut / Connecticut Green Bank



# Advancing the Low-to-Moderate Income Residential Market for Clean Energy Improvements

January 2018



# CT Green Bank - the nation's 1st!

## Mission and Goals



Support the strategy to achieve **cheaper, cleaner, and more reliable sources of energy** while creating jobs and supporting local economic development

**Attract and deploy private capital investment** to finance the clean energy policy goals for Connecticut

**Leverage limited public funds** to attract multiples of private capital investment while returning and reinvesting public funds over time

Develop and implement strategies that **bring down the cost of clean energy** in order to make it more accessible and affordable to customers

**Support affordable and healthy buildings in low-to-moderate income and distressed communities**



# Residential 1-4 Owner Occupied Low-to-Moderate Income Portfolio



- Residential Solar Investment Program
- Low-to-Moderate Income **Performance Based Incentive** for Third Party Owners
- Nearly **3x market rate** incentive
- Income screen of 100% AMI or lower



- \$30 MM Solar for All campaign
- **Solar Lease** and Energy Efficiency Energy Services Agreement
- HES or HES-IE (direct install EE) leveraged
- Alternative underwrite
- Community partnerships



- Low interest
- Unsecured loan
- 40+ measures (EE and RE)
- **580+ FICO, 50% DTI** (waived for 680% FICO, offered through CDFI and credit unions)
- 25% of loan for health and safety upgrades

# Tapping into our LMI Market



Market research and data-driven approaches are key to:

- Identifying our target audiences
- Developing programs that address the needs of our target audiences
- Targeting our efforts and developing community partners
- Adapting our messaging and communicating benefits

## DATA WE USE

- Census and general market data (DOE LEAD)
- Credit data (FICO)
- Customer segmentation data (PRIZM)
- Energy burden modeling



# CT Low-to-Moderate Income Market: By the Numbers

Income Level by AMI Band	# Census Tracts	Tract Households	% of Households	Tract Owner Occupied Households	% OO HHs in AMI Band	Tract Renter Occupied Households	% Rental HHs in AMI Band	Average 2010 Tract Median HH Income
<60% AMI	171	240,062	18%	73,593	31%	166,469	69%	\$34,401
60%-80% AMI	109	193,791	14%	104,971	54%	88,820	46%	\$54,797
80%-100% AMI	153	269,711	20%	179,352	66%	90,359	34%	\$68,396
100%-120% AMI	140	237,488	18%	190,944	80%	46,544	20%	\$84,763
>120% AMI	251	411,504	30%	357,267	87%	54,137	13%	\$118,624
Grand Total	824	1,352,556	100%	906,227	67%	443,163	33%	\$77,623

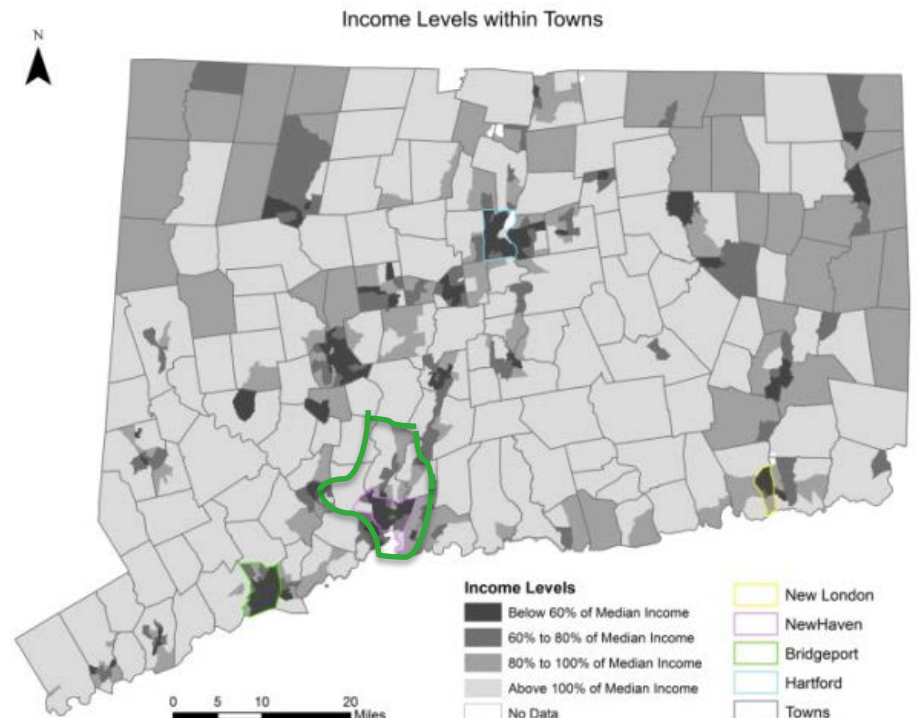
## CT Green Bank Definitions

**Low Income = 80% AMI or lower,  
40% are homeowners**

**Moderate income – 81%-100% AMI,  
65% homeowners**

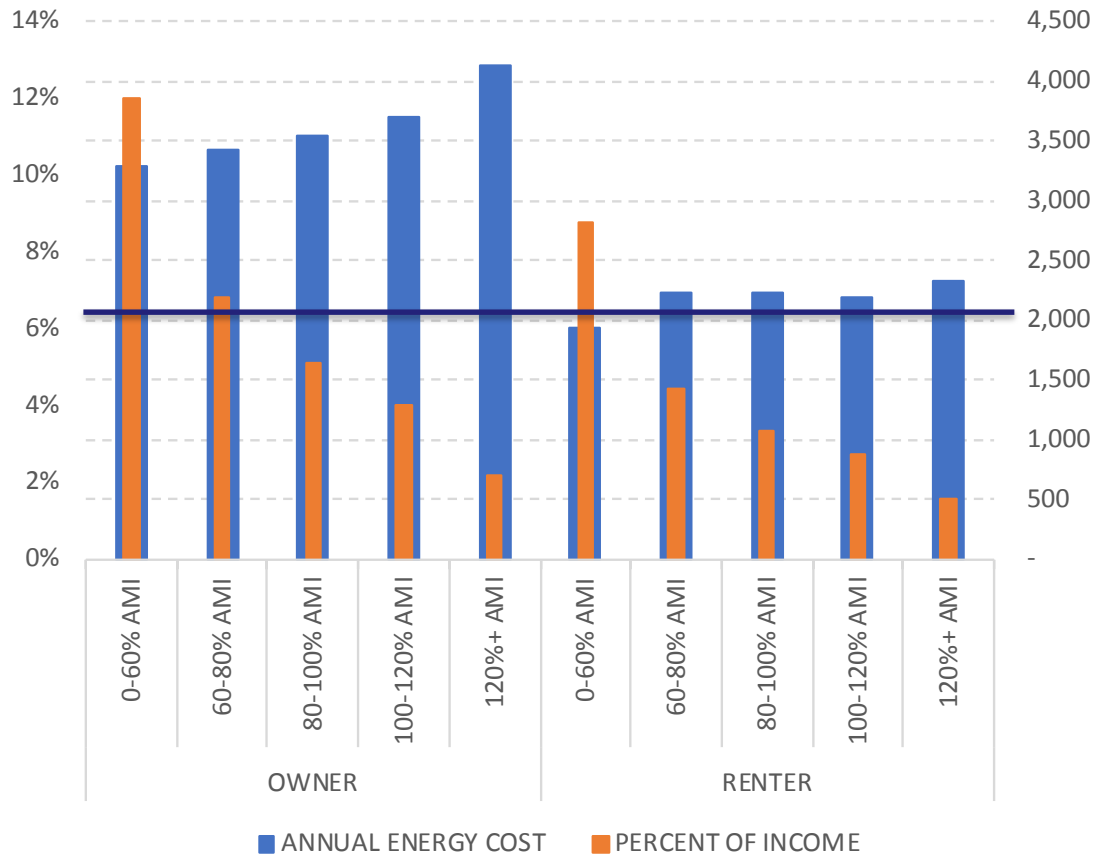
### REFERENCES

2015 ACS Census Info. Totals are greater than individual lines due to some projects falling in unclassified census tracts.



# Reducing Energy Burdens For Those That Need It Most

**ENERGY BURDEN [AVG. EXPENDITURES/AVG. INCOME, \$/YEAR]**



**Energy costs are amongst the highest in the country and a significant portion of household expenses**

More than half our low income residents suffer a high energy cost burden (>10% of income)

AMI Bands	Avg. Household Income – MF
0-60%	\$20,000
60-80%	\$48,000
80-100%	\$65,000
100-120%	\$77,000
120%+	\$131,000

The energy burden of our low income renters is 3-4 times greater than our renters with higher incomes.

# Using the Data To evaluate our impact



## Solar Assumptions

### (i.) Household Income Selection

Decision point (i.): Use **DOH** Program Limits or **Custom** Income Input?

\*Action Item\*: **DOH**

Custom Annual Income: **\$80,000**

Household Size (# in Family): **3.0**

AMI Level: **80%**

DOH Program Household Income Level: **Lower Band**

DOH Program Household Annual Income: **\$59,150**

Annual Income Inflation/Escalation Rate (%): **0.00%**

Household Income Status for PBI Consideration: **Non-LMI**

LMI PBI (\$/kWh): **\$0.11/kWh**

Non-LMI PBI (\$/kWh): **\$0.06/kWh**

PBI Term (Yrs): **6.0 Yrs**

Total PBI Payments	\$1,606
Total Customer Savings Across the PBI Term	\$3,412
<b>Total Customer Savings per PBI \$ Spent (across the PBI Term)</b>	<b>2.125x</b>
Total Customer Savings Across the Lease Term	\$16,248
<b>Total Customer Savings per PBI \$ Spent (across the Lease Term)</b>	<b>10.118x</b>

Discounted PBI Payments @ **6.00%**: \$1,317

Discounted Customer Savings Across the Lease Term @ **6.00%**: \$8,543

**Discounted Customer Savings per PBI \$ Spent (across the Lease Term)**: **6.486x**

### (ii.) Household Electricity Assumptions

Utility Provider: **UI**

Annual Household Electrical Load - Yr 1 (kWh): **7,039 kWh**

Annual Electrical Load Inflation/Escalation Rate (%): **0.00%**

Monthly Household Fixed Distribution Charges (\$/Month): **\$9.67/Mo.**

Annual Fixed Charge Inflation/Escalation Rate (%): **3.00%**

Monthly Household Electricity Rate (\$/kWh): **\$0.234/kWh**

Annual Electricity Inflation/Escalation Rate (%): **3.00%**

Total Annual Fixed Charges (i.e. no impact from solar) - Yr 1: **\$116**

Total Annual Electricity Rate Charges - Yr 1: **\$1,649**

Annual Household Electricity Cost - Yr 1 (\$'s): **\$1,765**

### (iii.) Solar PPA/Lease Assumptions

Decision point (iii.): Include a **Solar PPA/Lease** in the Analysis?

\*Action Item\*: **Yes**

Decision point (iv.): **Solar Lease or Solar PPA?**

\*Action Item\*: **Lease**

Solar Lease Term (Yrs): **20.0 Yrs**

Solar Lease Rate - Yr 1 (\$/Month): **\$55.00 /Month**

Annual Solar Lease Escalation Rate (%): **0.00%**

Include Degredation in Escalation Rate?: **No**

Solar System Size (kW): **4.5 kW**

Solar System Annual Capacity Factor (%): **12.50%**

Annual Solar System Production - Yr 1 (kWh): **4,928 kWh**

Solar System Annual Degredation Rate (%): **0.50%**

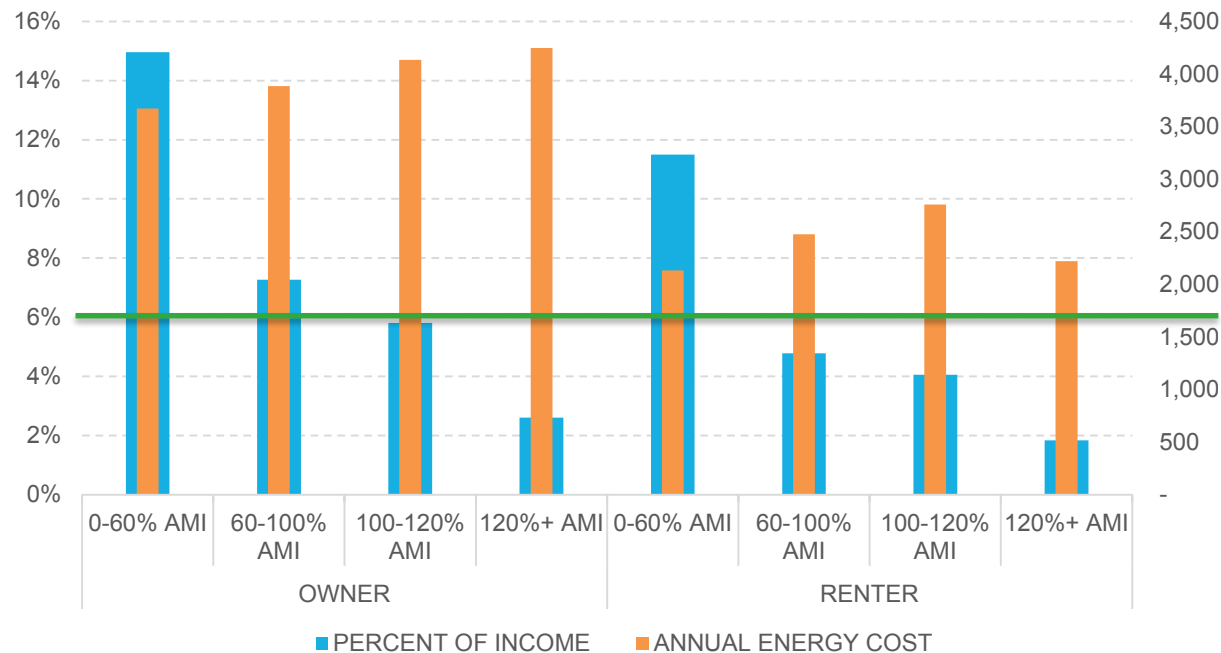
Solar Lease Economics	
Household Annual Income	\$59,150
Annual Income Inflation/Escalation Rate (%)	0.00%
Include Solar Lease in Analysis?	Yes
Utility Provider	UI
Annual Household Electricity Cost - Yr 1 (\$'s)	\$1,765
Annual Electrical Load Inflation/Escalation Rate (%)	0.00%
Annual Fixed Charge Inflation/Escalation Rate (%)	3.00%
Annual Electricity Inflation/Escalation Rate (%)	3.00%
Annual Household Electricity Cost - Yr 20 (\$'s)	\$3,096
Solar Lease Term (Yrs)	20.0 Yrs
Solar System Size (kW)	4.5 kW
Solar System Annual Capacity Factor (%)	12.50%
Annual Solar System Production - Yr 1 (kWh)	4,928 kWh
Solar System Annual Degredation Rate (%)	0.50%
Solar Lease Rate - Yr 1 (\$/Month)	\$55.00
Annual Solar System Cost - Yr 1 (\$'s)	\$660
Annual Solar Lease Escalation Rate (%)	0.00%
Include Degredation in Escalation Rate?	No
Periods of Household Savings across Solar Term:	20
Periods of Household Losses across Solar Term:	0

Our “energy burden model” allows us to evaluate the impact of solar (and EE) on LMI household energy burdens and savings across 20 years



# Using the Data To target our LMI Communities

## Energy Burden: New Haven, CT



Combining data can help you target your outreach efforts and achieve high impacts with your program

## Canvassing Map New Haven, CT

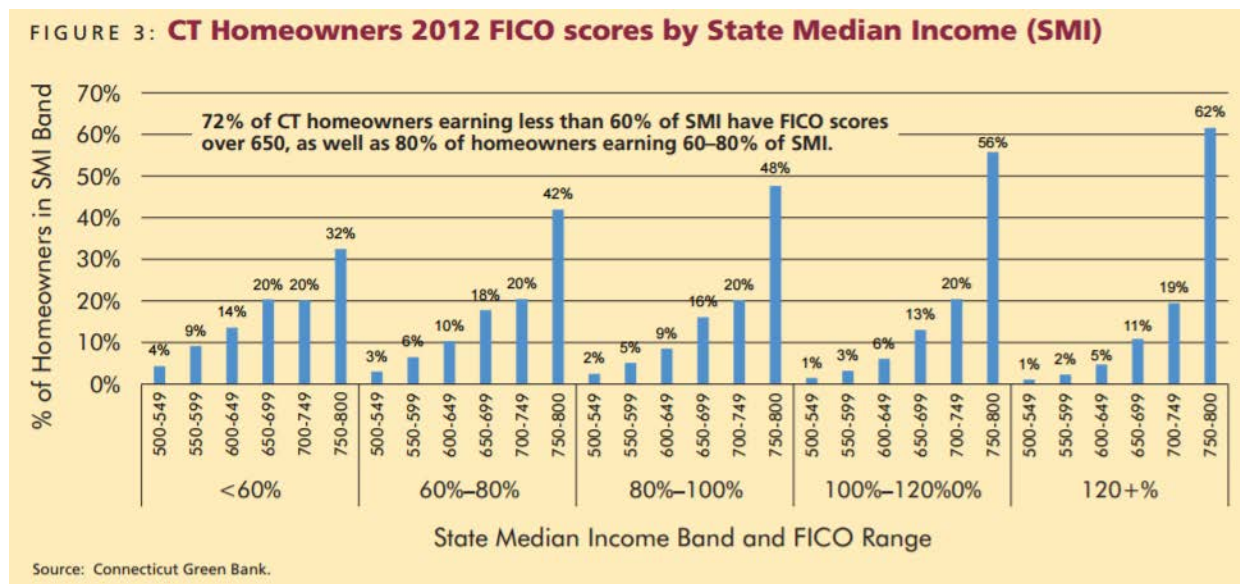
*Canvassing maps developed that identify census tracts that are low-income and have high concentrations of OO homes*



# Using the Data

## What next?

- Integrating DOE LEAD tools data with 2017 Experian and customer segmentation data
  - Triangulate census tracts with high concentrations of LMI OO homes, good credit and likelihood to adopt solar + other technologies
  - Identify opportunities for strategic electrification
- Start using data to identify opportunities in MF sector
  - Help identify large master-metered large MF
- Share data with municipal partners to develop outreach partnerships and community campaigns



# Poll: How do you anticipate using the LEAD Tool?

*(Multiple choice)*

1. Better understand low income population energy affordability
2. Inform policy discussions
3. Target programs to where needed most
4. Benchmark our region and/or set goals
5. Other *(please enter comment in chat box)*



Questions?

**Thank You!**