



Resilience Applications for Low-income Communities

Thursday, July 11
9:00am – 10:30pm



Speakers and Moderator

- Moderator: Krystal Laymon, US DOE
- Speaker: Jeni Hall, Energy Trust of Oregon
- Speaker: Laurie Schoeman, Enterprise Community Partners
- Speaker: Michael Walton, Green Spaces

U.S. DEPARTMENT OF
ENERGY

Office of
**ENERGY EFFICIENCY &
RENEWABLE ENERGY**

Snapshot: Federal Resiliency Activities

JUNE 2019



Weatherization & Intergovernmental Programs (WIP) Office

WIP's mission is to enable strategic investments in energy efficiency and renewable energy technologies through the use of innovative practices across the United States by a wide range of stakeholders, in partnership with state and local organizations and community-based nonprofits.

State Energy Program



Partnerships and Technical Assistance



Weatherization Assistance Program

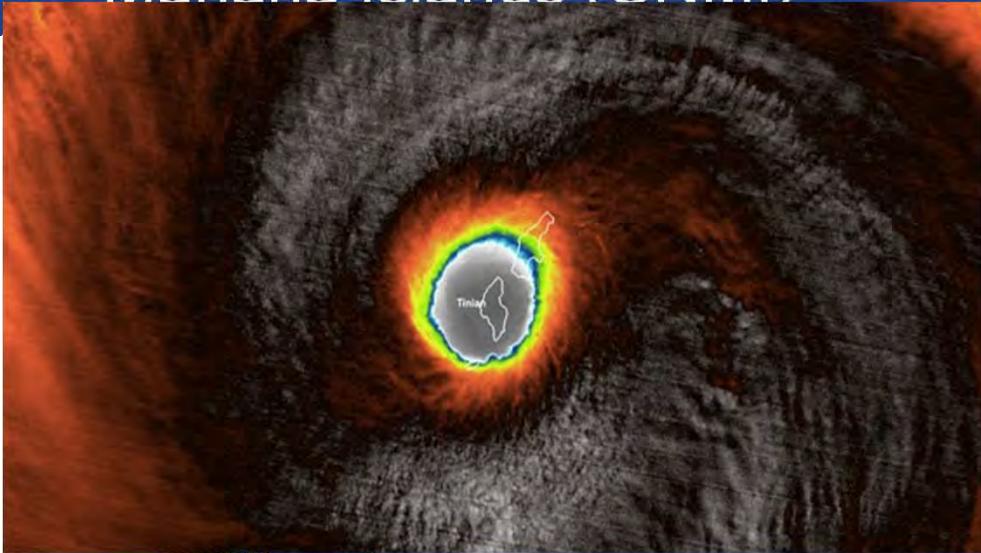


Strategic & Interagency Initiatives



Commonwealth of Northern Mariana Islands (CNMI)

Puerto Rico



Puerto Rico Solar Photovoltaic (PV) Pilot Program

- Puerto Rico's State Office of Energy Policy requested DOE WAP funding be dedicated, to provide photovoltaic (PV) and battery storage to WAP-eligible single-family homes.
- DOE's SEP 2 solar PV and battery storage in Mona Island, a natural reserve where research is conducted. Remaining funds used for residential PV project.



CNMI's Care Package Deployment

- CNMI's Energy Division was able to receive support from the State Energy Program to deliver over 950 relief care packages to those affected by the storm.
- Care packages included portable burner butane stoves so people could still cook food for their families, baby wipes, and toilet tissue



Statewide Assistance for Energy Reliability and Resiliency, (SAFER²) Wisconsin

Overview:

DOE Funding: \$300,000
Cost Match: 20%

Partners: Wisconsin Emergency Management, Focus on Energy, Public Service Commission of Wisconsin, Wisconsin Clean Cities, Wisconsin Energy Institute

Project Goals:

Wisconsin will provide technical assistance to local governments to advance energy resilience planning.

- Create baseline and track progress via pre- and post-project surveys to all county and tribal Emergency Management Directors
- Host regional educational roundtable events and cross-jurisdictional tabletop exercises
- Develop an energy assurance website with resources for technical assistance
- Create a local government Energy Resiliency Handbook

Impact:

- Communities improve plans by using the outage templates and lessons learned in the Energy Resiliency Handbook
- Forming partnerships with local governments and having ongoing collaboration will improve energy emergency resiliency, mitigation and response statewide



Financing Advanced Microgrids, New Jersey

Overview:

DOE Funding: \$299,840
Cost Match: 29%

Partners: New Jersey Institute of Technology, Rutgers University,
New Jersey Clean Cities Coalition

Project Goals:

NJ will address a significant gap in the current process of developing advanced community microgrids; the lack of clear guidance on the procurement and financing process.

- Utilize “real-world” data from the 13 NJ Town Center Distributed Energy Resource (TCDER) microgrid feasibility studies as they enter the procurement and financing process
- Develop a local government procurement guide to financing advanced community microgrids
- Guide stakeholders through the process to maximize the economic and resiliency benefits of the microgrid

Impact:

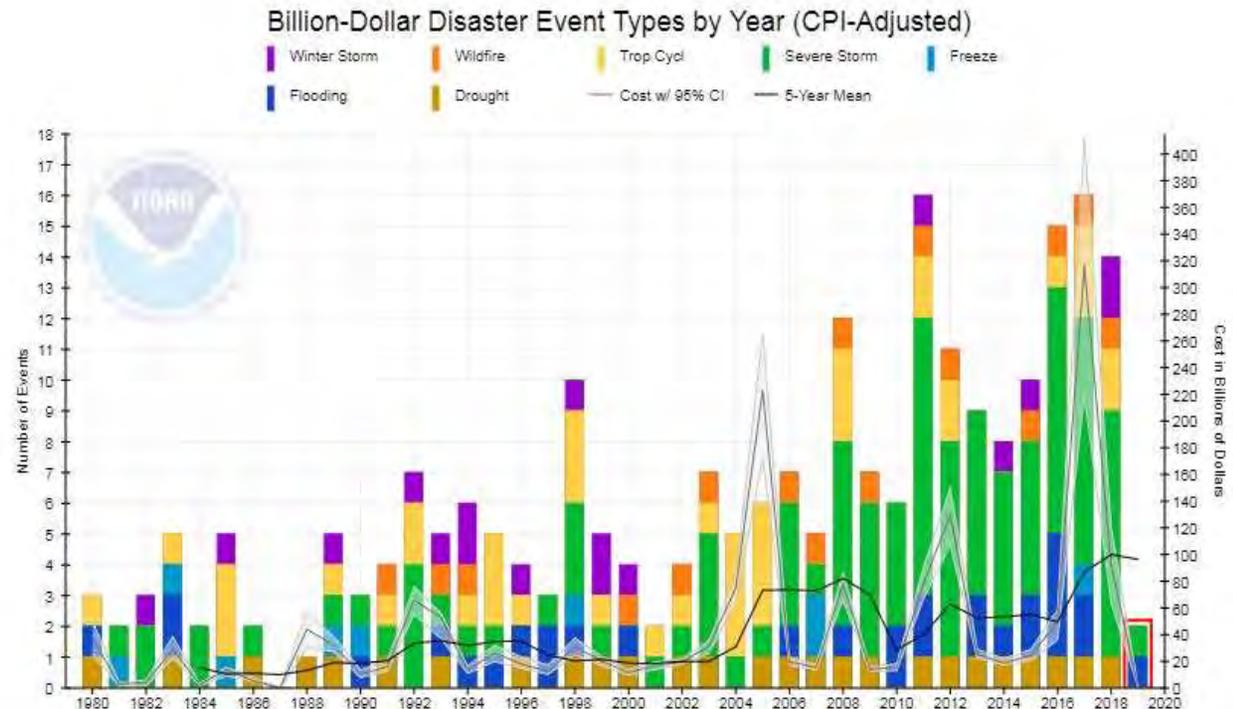
- Jurisdictions across the US will have access to a guide grounded in legal, economic and regulatory realities that improves understand the process of procuring and financing advanced community microgrids
- Advancement of shovel-ready projects that are in need of financial options for construction and economic optimization



Disaster Recovery Reform Act of 2018

Established more than 50 new authorities and requirements across FEMA:

- Building Resilient Infrastructure and Communities (BRIC)
- Building Codes and Enforcement
- Wildfire Prevention
- Hazard Mitigation Grant Program for Earthquakes



Now Released!

Clean Energy for Low Income Communities Accelerator (CELICA) Online Toolkit

CELICA PROGRAM DEVELOPMENT ACTIVITIES

Program development refers to the planning and implementation actions program administrators take to create and manage a program.



CELICA PROGRAM MODELS

Program model refers to the defining features of a program, such as target market, key product and service attributes, terms and conditions, resource flows and benefits.



Clean Energy for Low Income Communities (CELICA): Outcomes

Partners successfully leveraged resources to commit **up to \$335 million to help 155,000 low income households** access energy efficiency and renewable energy benefits, and demonstrated promising program models for:



Single Family

Example: **State of Connecticut** and CT Green Bank's bundled energy efficiency and solar program has been so successful that *solar PV systems are owned by households in low income communities as much as those in non-low-income areas.*



Multifamily Affordable

Example: **District of Columbia** is incentivizing building owners to *serve 100,000 low income households with 240-300MW solar PV.*



Low Income Community Solar

Example: **State of Michigan** Energy Office's low income community solar program partnered with utilities to deliver *\$350/yr in additional savings for participating, previously weatherized, low income households.*

Questions?

Krystal Laymon

Office of Energy Efficiency & Renewable Energy

U.S. Department of Energy

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Jeni Hall

Energy Trust of Oregon



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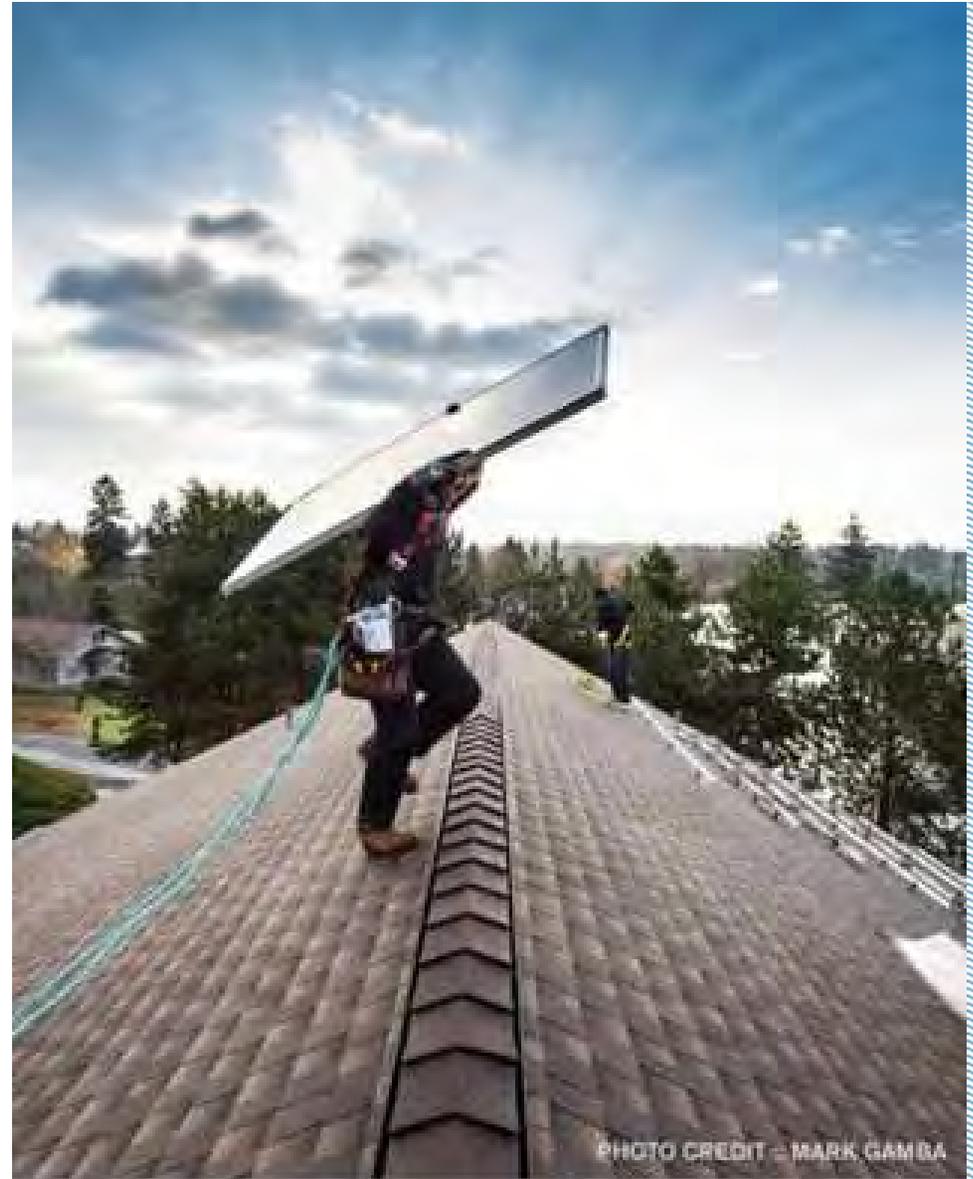


Building a Business Case for Solar + Storage in Oregon
2019 Better Buildings Summit
July 11, 2019



Agenda

- Market drivers in Oregon
- Research on the business case for solar + storage
- Lessons learned
- Looking to the future



About us

Independent
nonprofit

Serving 1.6 million customers of
Portland General Electric,
Pacific Power, NW Natural,
Cascade Natural Gas and Avista

Providing
access to
affordable
energy

Generating
homegrown,
renewable
power

Building a
stronger Oregon
and SW
Washington

A clean energy power plant

724 average megawatts saved

129 aMW generated

65 million annual therms saved

Enough energy to power **727,000** homes
and heat **129,000** homes for a year

Avoided **29.3** million tons of carbon dioxide



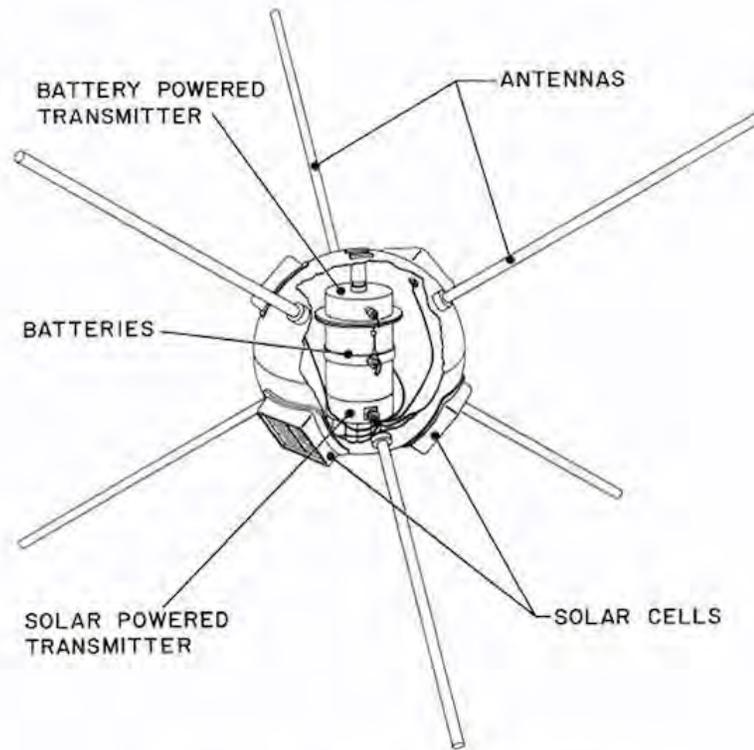
Energy Trust Solar Incentive Program

- Closed network of trade ally contractors
- Residential & Commercial incentive
- Above code design & installation requirements
- Battery storage requirements
- 100% inspection rate for systems installed
- Consumer education
- Consumer protection
- Soft cost reduction

*The future is already here—
it's just not evenly distributed.*

- William Gibson

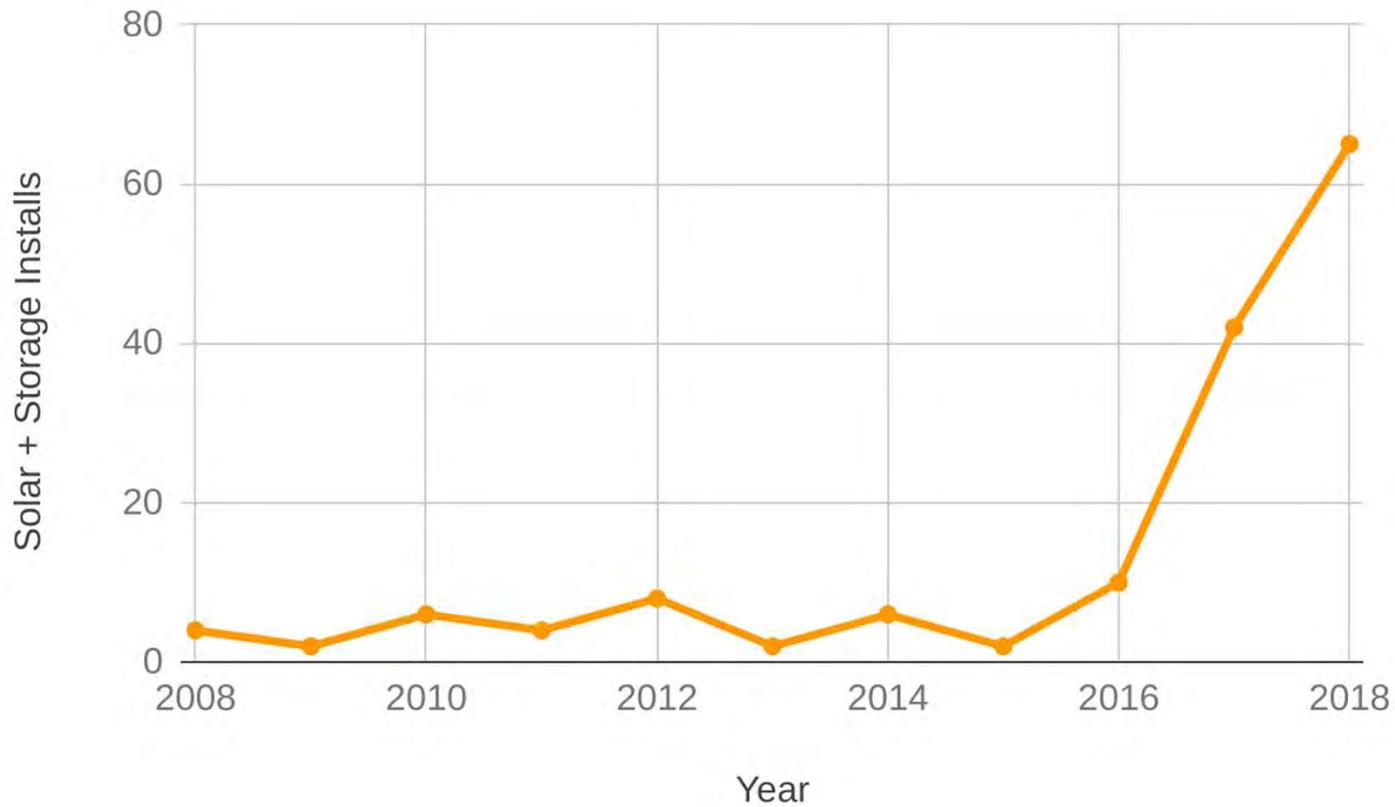
Cutting-edge technology for over 60 years



CUTAWAY DRAWING OF VANGUARD 6.4 INCH TEST SATELLITE

Vanguard 1 satellite launched March 17, 1958.
Source: radiomuseum.org

Increasing solar+storage installations

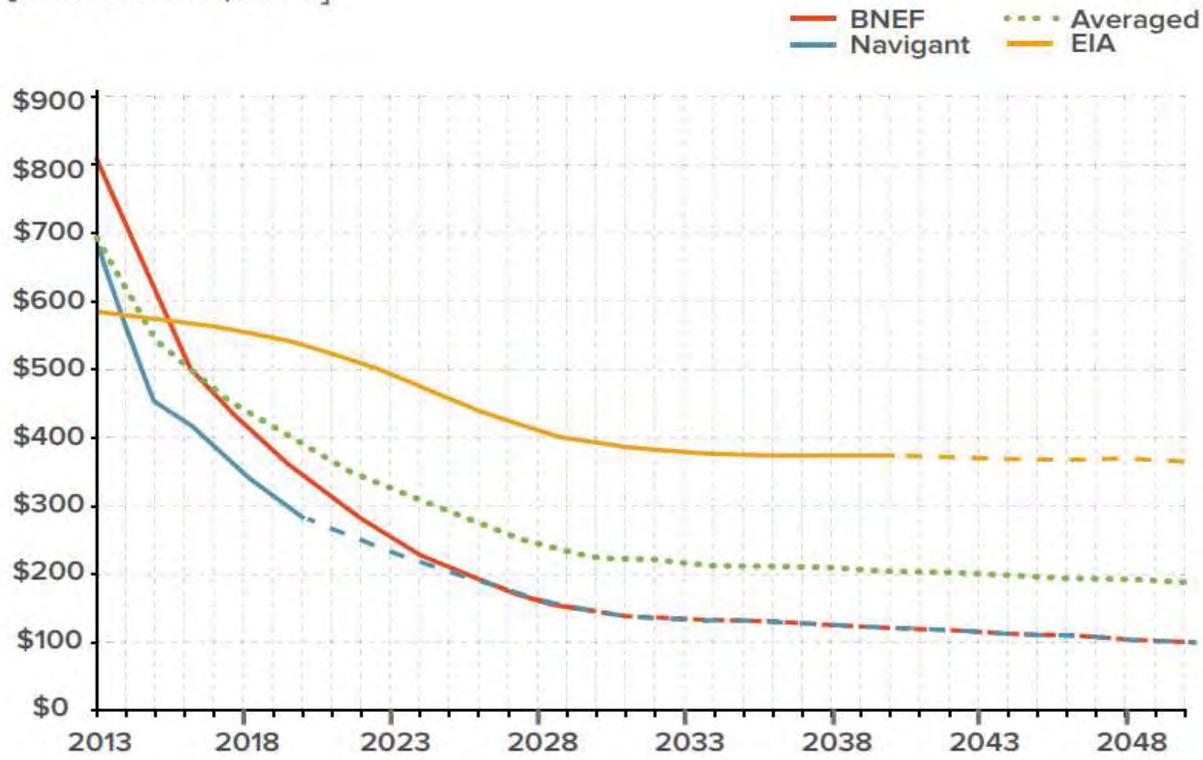


Source: Energy Trust of Oregon annual report

Falling battery storage costs

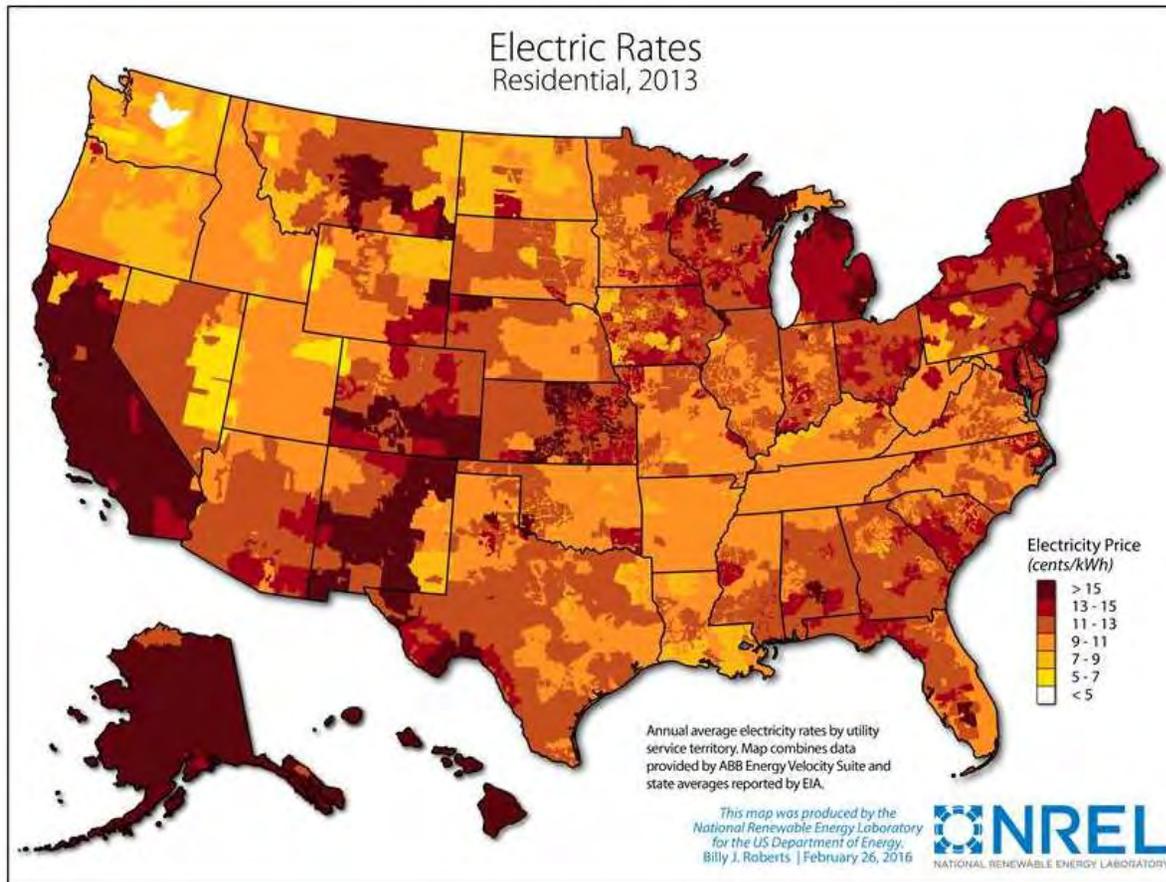
FIGURE 19: BATTERY PRICE PROJECTIONS

[Y-AXIS 2012\$/kWh]



Source: Rocky Mountain Institute, [The Economics of Grid Defection](#).

No existing rate structure to capture value



Increasing Awareness of Resilience

THE REALLY BIG ONE

An earthquake will destroy a sizable portion of the coastal Northwest. The question is when.

BY KATHRYN SCHULZ

“OSSPAC estimates that in the I-5 corridor it will take between one and three months after the earthquake to restore electricity, a month to a year to restore drinking water and sewer service, six months to a year to restore major highways, and eighteen months to restore health-care facilities. On the coast, those numbers go up. Whoever chooses or has no choice but to stay there will spend three to six months without electricity, one to three years without drinking water and sewage systems, and three or more years without hospitals. Those estimates do not apply to the tsunami-inundation zone, which will remain all but uninhabitable for years.”



The next full-margin rupture of the Cascadia subduction zone will spell the worst natural disaster in the history of the continent.

ILLUSTRATION BY CHRISTOPH NIEMANN; MAP BY ZIGGYMAJ / GETTY

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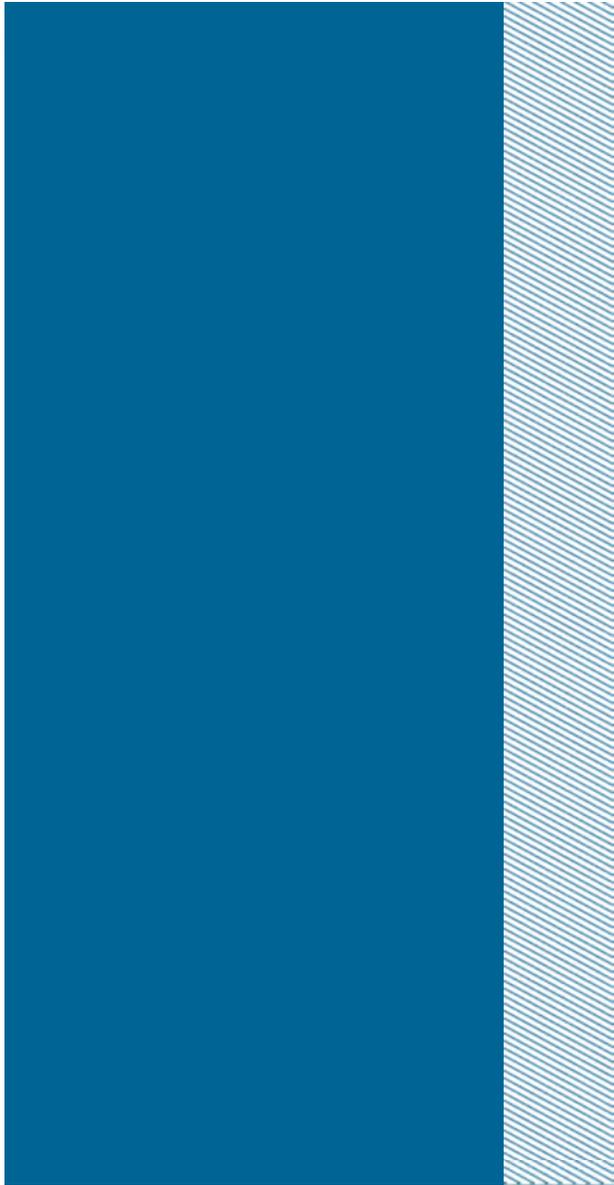
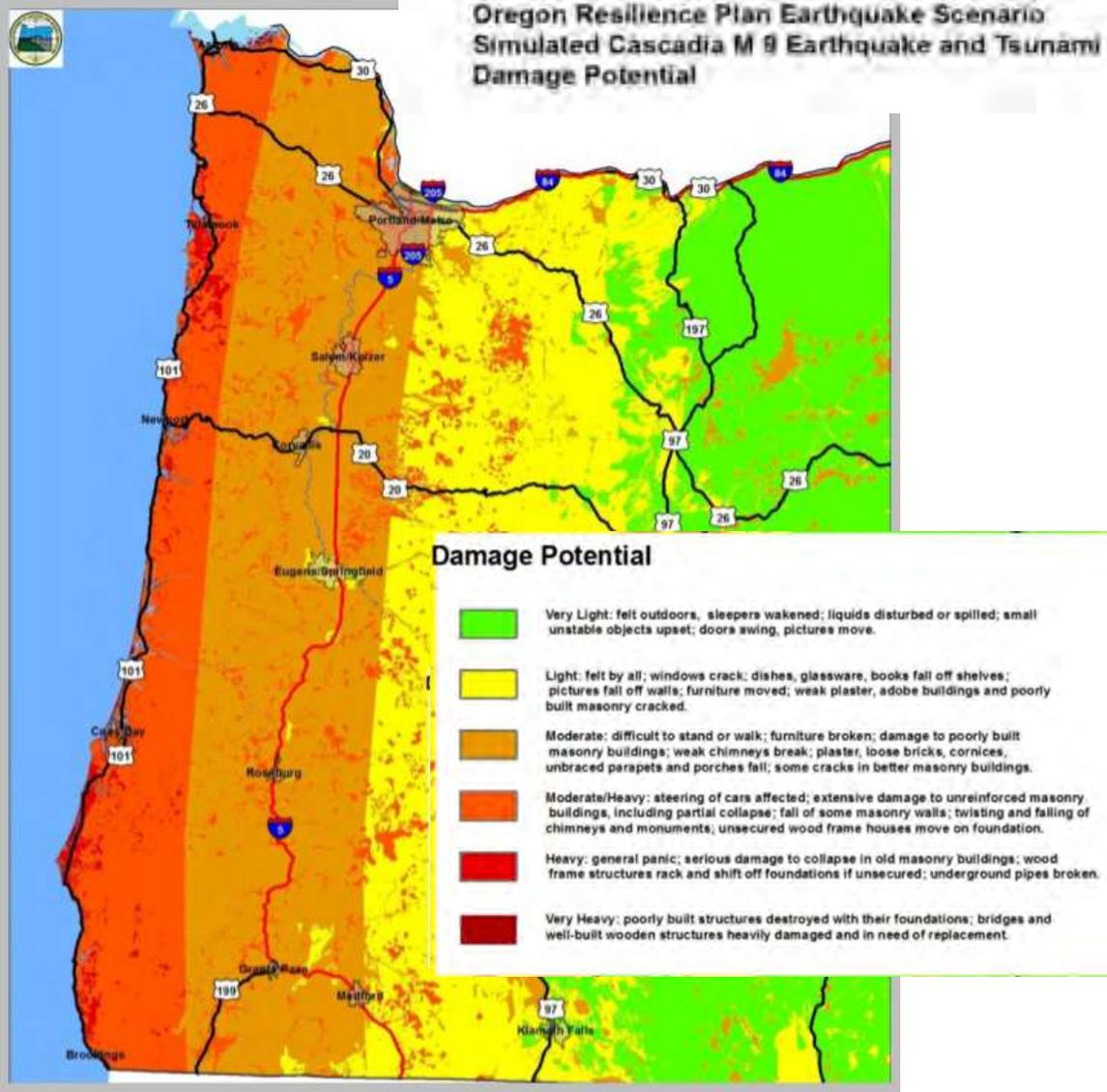


The next full-margin rupture of the Cascadia subduction zone will spell the worst natural disaster in the history of the continent.

ILLUSTRATION BY CHRISTOPH NIEMANN; MAP BY ZIGGYMAJ / GETTY



Oregon Resilience Plan Earthquake Scenario Simulated Cascadia M 9 Earthquake and Tsunami Damage Potential



Neighbors Helping Neighbors



After a large earthquake, your community's emergency responders will be overwhelmed and possibly victims themselves. You, your family, and neighbors will need to be your own first responders. Get together with your neighbors to talk about and plan for emergencies.



We are all in this together

No one survives and recovers from a disaster alone. Disasters have shown that where people are organized and prepared, families recover faster. Your neighborhood will recover faster if you organize now. Once you have organized, you can move to more ambitious projects like practicing emergency drills and helping build supply caches with your neighbors.

When disasters happen, we rely on the aid of others to help us through. Even with the best preparedness efforts, our neighbors and others in our neighborhoods will help us respond to and recover from a disaster.

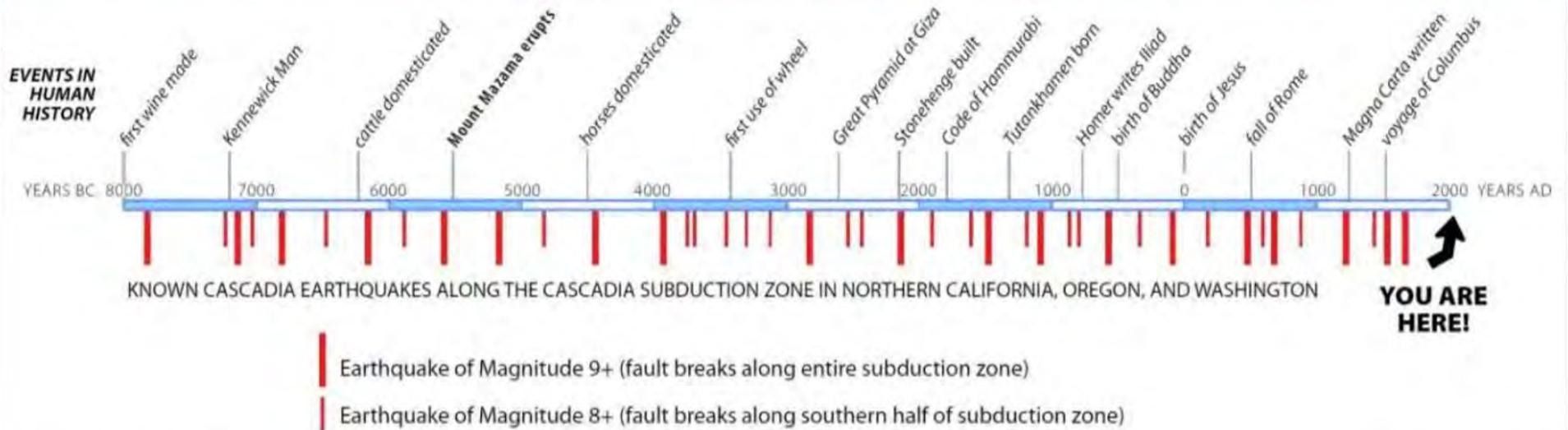


Home and neighborhood hazard hunt

Make a game out of looking for hazards in your neighborhood and in your home. You can search online to find "home hazard hunts" and get the kids and neighbors involved.



CASCADIA EARTHQUAKE TIME LINE



Comparison of the history of subduction zone earthquakes along the Cascadia Subduction Zone in northern California, Oregon, and Washington, with events from human history. Ages of earthquakes are derived from study and dating of submarine landslides triggered by the earthquakes. Earthquake data provided by Chris Goldfinger, Oregon State University; time line by Ian P. Madin, DOGAMI.

Solar + Storage Research

- 10 sites serving low income communities
- Define & measure resilience
- Identify & address barriers
- Gain visibility into the storage market





Lessons

- No existing "neural networks"
- All people no process
- Storage has a Cinderella problem
- Storage adds value*
- Net Zero buildings impact the grid
- Solar contractors are not ready
- Customers are not ready
- O&M is a blackbox

**it depends*

Lessons: Multifamily Affordable Housing

- Large opportunity both for resilience and for grid benefits
- First cost is a challenge
- Tenant rent & utility subsidies
- How the building is metered matters
- Utility rates can drive value or be a barrier





Looking forward

- Expand research to do a deeper dive on more sites
- Publish a report early next year

- HB2618: Solar Rebates for All
- Utility battery storage programs
- TOU Rates & utility capacity deficits
- "Smart Grid Test Beds"
- Public Safety Power Shutoffs
- Voluntary Green Building Standards

Jeni Hall
Sr. Project Manager - Solar
jeni.hall@energytrust.org



Laurie Schoeman

Enterprise Community Partners



U.S. DEPARTMENT OF
ENERGY

Enterprise: Who We Are

Create opportunity for low- and moderate-income people through fit, affordable housing in diverse, thriving communities.

















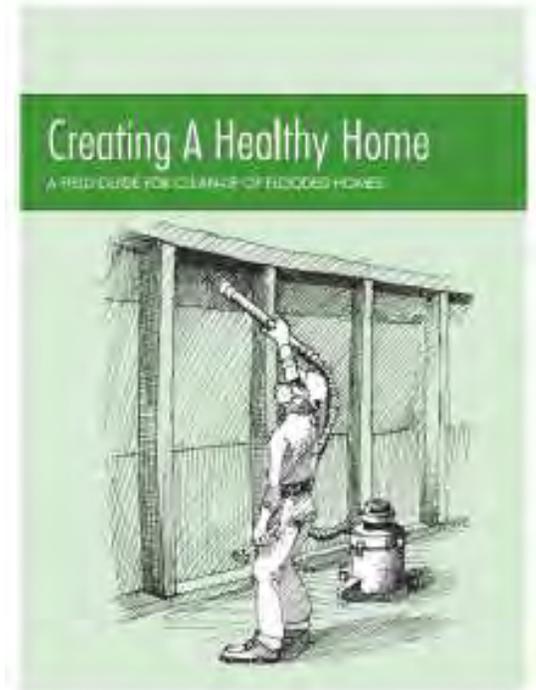
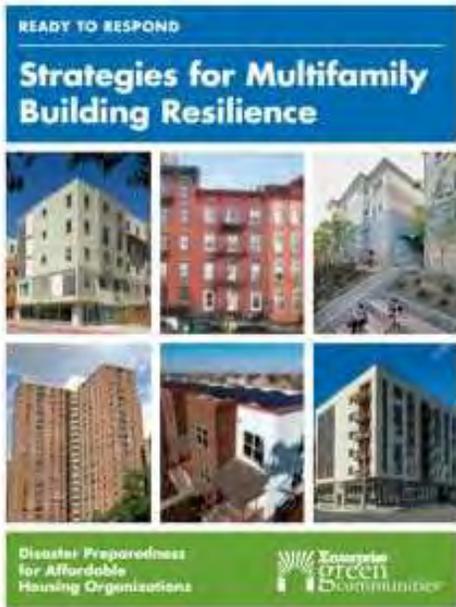












Enterprise mercy CommunityWorks	
Funding for Rapid Recovery & Rebuilding	
What it's for	<ul style="list-style-type: none"> • Funding available for recovery projects related to major disasters of the kind that are eligible for assistance under the Community Development Financial Institutions Fund (CDFIF) program. • Available in participating cities for developing, operating and maintaining projects to meet basic needs. The goal is to get the city back on its feet as quickly as possible. • Available for use in a variety of ways, including: <ul style="list-style-type: none"> • Rebuilding or repairing damaged housing or other structures. • Rebuilding or repairing damaged infrastructure. • Rebuilding or repairing damaged public facilities. • Rebuilding or repairing damaged public works. • Rebuilding or repairing damaged public services. • Rebuilding or repairing damaged public works. • Rebuilding or repairing damaged public services.
Why it's for	<ul style="list-style-type: none"> • Supplement of Federal Community Loan Fund, Merit Loan Fund and the CDFIF program.
How much you can borrow	<ul style="list-style-type: none"> • Up to \$100,000 per project.
How long the loan term is	<ul style="list-style-type: none"> • Up to 24 months (or longer under certain conditions).
What it will cost	<ul style="list-style-type: none"> • Interest rate is 0% (subject to cap). • No application or processing fees. • Administrative fee of 2.0%.
How you'll receive it	<ul style="list-style-type: none"> • Proceeds from grants, interest-free loans, flexible funding, construction or permanent financing and/or loan advance from the CDFIF.
Repayment	<ul style="list-style-type: none"> • No repayment required.
Eligibility	<ul style="list-style-type: none"> • May be eligible to seek it if you are a city or county.
Collateral	<ul style="list-style-type: none"> • This table is for informational purposes only. It does not constitute an offer of any financial product or service. For more information, please contact your local Enterprise CommunityWorks office.

Enterprise Multifamily Tools For Resilience
<https://www.enterprisecommunity.org/solutions-and-innovation/disaster-recovery-and-rebuilding>







Faces of Resilience



People

The extent of personal discomfort, harm, injury, or loss of life.



Physical Assets

Loss or damage to structural and architectural building components, MEP and IT equipment, utilities, landscaping, contents.



Operations

Disruption to building operations and functionality, occupancy, egress/ingress, critical systems, or lab activities.



Revenue

Loss of revenue due to business interruption, specifically in relation to tenants.



Reputation

Negative media attention or impact on industry reputation in the aftermath of an impactful shock or stress.

Guiding Principles of Strategies of MF Building Resilience

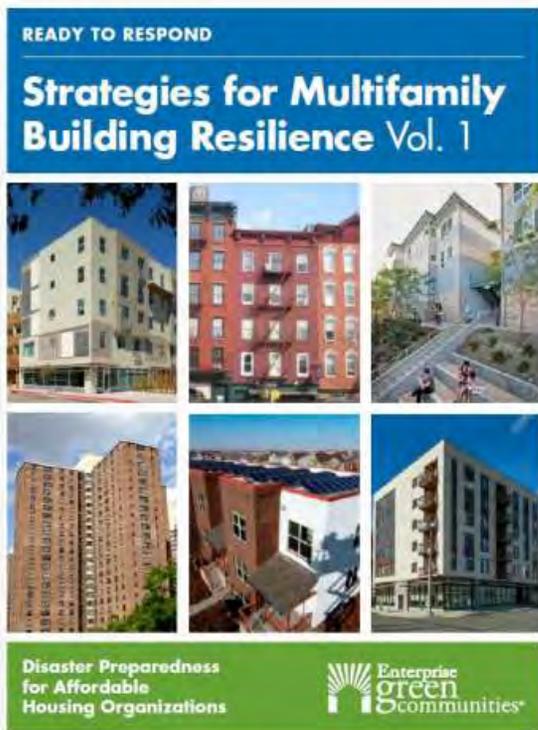
Resilience is a smart investment

Resilience should be a part of the capital improvement planning process

Use lessons learned from extreme weather events to rebuild smarter

Connected communities are more resilient

Ready to Respond: Strategies for Multifamily Building Resilience



19 practical strategies for building owners to make their properties more resilient against the effects of extreme weather events typical to the Northeast United States.



Getting Started: Decision Making Process



Determine your Resilience Strategies

Resilience Strategies Decision Matrix

	Low to Mid-Rise walk-up's	Small-Rise contemporary	Mid-rise contemporary	High-Rise contemporary	Estimated Cost	Related Strategies
Protection						
1 Wet Floodproofing	●	●	●	●	\$5-\$55	6, 8, 9, 10
2 Dry Floodproofing	○	○	○	○	\$5-\$55	3, 5, 6, 14
3 Site Perimeter Floodproofing	○	○	○	○	\$5-\$55	2, 6, 10
4 Resilient Elevators	○	○	●	●	\$5-\$55	2, 3, 6, 6, 13, 18
5 Backwater Valves	●	●	●	●	5	2, 6, 10
6 Sump Pumps	●	●	●	●	5	1, 2, 5, 6, 10, 13
Adaptation						
7 Envelope Efficiency	●	●	●	●	\$5-\$55	11, 12
8 Elevated Equipment	○	○	○	○	\$5-\$55	1, 7, 9, 12
9 Elevated Living Space	○	○	○	○	\$5-\$55	1, 2, 8
10 Surface Stormwater Management	○	○	○	○	\$5-\$55	2, 3, 5
11 Window Shading	●	●	●	●	5	7
12 Distributed Heating and Cooling	●	●	○	○	55	7, 8, 11
Backup						
13 Maintaining Backup Power to Critical Systems	●	●	●	●	\$5-\$55	4, 6, 8, 15, 18
14 Emergency Lighting	●	●	●	●	5	13
15 Access to Potable Water	●	●	●	●	5	13
Community						
16 Building Community Ties	●	●	●	●	5	17, 18, 19
17 Creating Community Resilience Spaces	○	○	○	○	\$-55	12, 15, 16, 18, 19
18 Developing an Emergency Management Manual	●	●	●	●	5	16, 17, 19
19 Organization for Community Resilience	●	●	●	●	5	16, 17, 18

Strategies for Multifamily Building Resilience, Vol. 1

16

Legend					
Building Types*					
	Units	Floors	Year Built	Typical Building Construction	Elevator
	8-30	3-6	pre-1920	Masonry structural walls, brick masonry, cast-in-place concrete, wood roof and wood joist floors	Y/N
	4-8	2-3	1920-Present	Wood frame, concrete block, masonry, and shingled roof	N
	10-250	4-12	1920-Present	Masonry bearing wall with wood joist or concrete, concrete, brick, or wood-frame masonry, and tar roof membrane or shingled roof	Y
	50-400	12-80	1950-Present	Concrete masonry structure, cast-in-place concrete, brick masonry, brick masonry, and tar roof membrane	Y
Applicability					
○ Minimally applicable ○ Potentially applicable ● Applicable					

Strategies for Multifamily Building Resilience, Vol. 1

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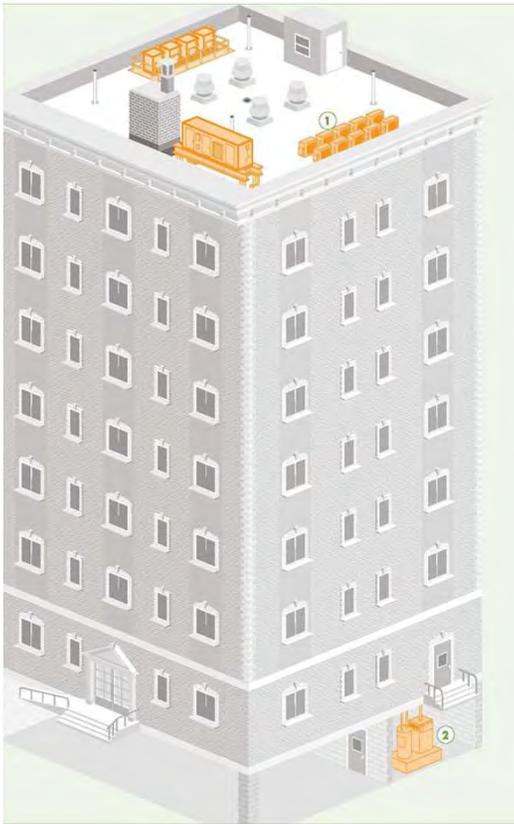
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Strategies for Multifamily Building Resilience, Vol. 1

17

Flood Prevention – High Cost

Elevated Equipment



Hey New York, are you flood-ready?

SCALEABLE TECHNICAL ASSISTANCE MODEL





Mayor Muriel Bowser



NATIONAL
HOUSING
TRUST

The logo for NEI (National Environmental Institute) features the letters "NEI" in white, set against a green leaf background.

The logo for CleanEnergyGroup features a stylized globe icon to the left of the text "CleanEnergyGroup". Below the main text is the tagline "Innovation in Finance, Technology & Policy".



Resilience Capital Needs Assessments-Mid Atlantic



KEEP SAFE

A GUIDE TO
RESILIENT HOUSING
DESIGN IN ISLAND
COMMUNITIES



REINFORCE SITE WITH INFRASTRUCTURE

STEP 3 - IMPLEMENT GREY INFRASTRUCTURE ON SITE

- Consult a contractor, civil engineer, agronomist or the Agricultural Extension Service (SEA, by its Spanish acronym) to design gray infrastructure systems as outlined below.
- Be cautious when choosing where to deposit water. If water is contaminated with debris, do not deposit into a lake, river, or sea.
- Gray infrastructure may require special permits and a larger and more specialized professional team, can be more costly, and can be disruptive to the site if not properly designed and built.



RETAINING WALLS

Retaining walls are permanent barriers that prevent water from saturating the site. They are designed to contain the weight of the terrain on a steep slope that otherwise would collapse. Without a retaining wall, extreme rain might destabilize the exposed terrain and cause a landslide. These structures are beneficial in areas where erosion is inevitable or where critical infrastructure needs to be protected.

NATURAL HAZARDS IT PREVENTS

- Flooding
- Landslides
- Erosion
- Heat

WHAT YOU NEED TO KNOW

- Built with reinforced concrete.
- Usually shaped as an inverted T.
- On the side of the terrain being stabilized, use a drain along the wall to keep water away from the structure.
- The drain consists of a PVC pipe surrounded by gravel and fabric that



DRY WELLS

Dry wells are underground tanks, usually made of concrete, that store water to percolate or drain slowly to another site or source. Their design is similar to a pool.

NATURAL HAZARDS IT PREVENTS

- Flooding
- Erosion

WHAT YOU NEED TO KNOW

- A simple dry well is a 4'-6" deep and 3' diameter pit filled with gravel or aggregate covered with topsoil.



TRENCH DRAIN

A Trench Drain system slowly drains surface water and can consist of a PVC tube with holes, different grades of rock or similar materials that allow percolation of water through the soil and out to a desired area.

NATURAL HAZARDS IT PREVENTS

- Flooding
- Erosion

WHAT YOU NEED TO KNOW

- Perforate a PVC tube and place into a trench.
- Surround the tube with gravel and then cover with a permeable fabric.
- Direct water to a sump, dry well, or other method of disposal.



DITCH

Ditches are channels that are used to redirect water flow. Historically, common practice has been to "re-channel" or "re-direct" rivers to avoid flooding but in recent years communities are adapting to "living with water," rather than channeling it off site, by allowing water to flow through sites.

NATURAL HAZARDS IT PREVENTS

- Flooding
- Erosion

WHAT YOU NEED TO KNOW

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PERMEABLE SURFACE

Permeable surfaces consist of a power, joints, concrete, or other flooring system that allows water to pass through and percolate slowly into the soil, instead of solid pavement that reduces the area of the terrain that naturally percolates water.

- Usually made of asphalt, concrete, or pavers surfaces.

Areas with permeable pavement are usually utilized as an amenity for non-environmental purposes like recreation.

NATURAL HAZARDS IT PREVENTS

- Flooding
- Heat

WHAT YOU NEED TO KNOW

- For joints, the terrain is flattened and prepared prior to placement.
- The porous pavement or surface material is poured in place like regular concrete. Its porosity is a result of the permeable sub-base surface.
- If pavement needs to bear "loads" such as vehicles, it will need to be validated for load-bearing capacity in advance of placement.



Products for Affordable Housing Industry

- Lenders Financing Tool
- Portfolio Assessment and Risk Reduction
- Resilience Capital Needs Assessments-
Florida/California
- Community Mitigation Input-Democratizing
Disaster Recovery
- National Readiness and Mitigation Trainings

Building a Resilient Boston-A Call To Action



A portrait of Laurie Schoeman, a woman with voluminous, curly, reddish-brown hair, smiling warmly. She is wearing a dark red, off-the-shoulder top. The background is a solid dark grey or black. A semi-transparent dark grey rectangular box is overlaid on the bottom left of the image, containing white text.

Laurie Schoeman
Senior Program Director Resilience and Recovery
lschoeman@enterprisecommunity.org

Michael Walton

Green Spaces



U.S. DEPARTMENT OF
ENERGY



green|spaces

Mission:

Advancing the **sustainability** of living, working, and building in Chattanooga and the surrounding region.

Programs:



BUILD IT GREEN

CHATTANOOGA GREEN PRIX

GREEN AND HEALTHY HOMES

MEMBERSHIP LUNCH & LEARNS

SUSTAINABILITY PROFESSIONALS OF
GREATER CHATTANOOGA

GREEN SCHOOLS SUMMIT & DESIGN
THINKING

MAIN X24

BUILDING RECOGNITION IN
CHATTANOOGA (BRIC) AWARDS

CONSULTING/SPEAKING

RESILIENCE (AS WE DEFINE IT)



RESILIENCE

The capacity to recover quickly from adversity.

Economic Resilience

- Emergency Expense (Like an \$800 electric bill)
- Lost job
- Lost business
- Lost industry

RESILIENCE

The capacity to recover quickly from adversity.

Social Resilience

- Trust
- Equity
- Access
- Civic Engagement
- Education

RESILIENCE

The capacity to recover quickly from adversity.

Environmental Resilience

- Climate Change
- Storms
- Drought
- Flooding
- Heat Island Effect

RESILIENCE

The capacity to recover quickly from adversity.

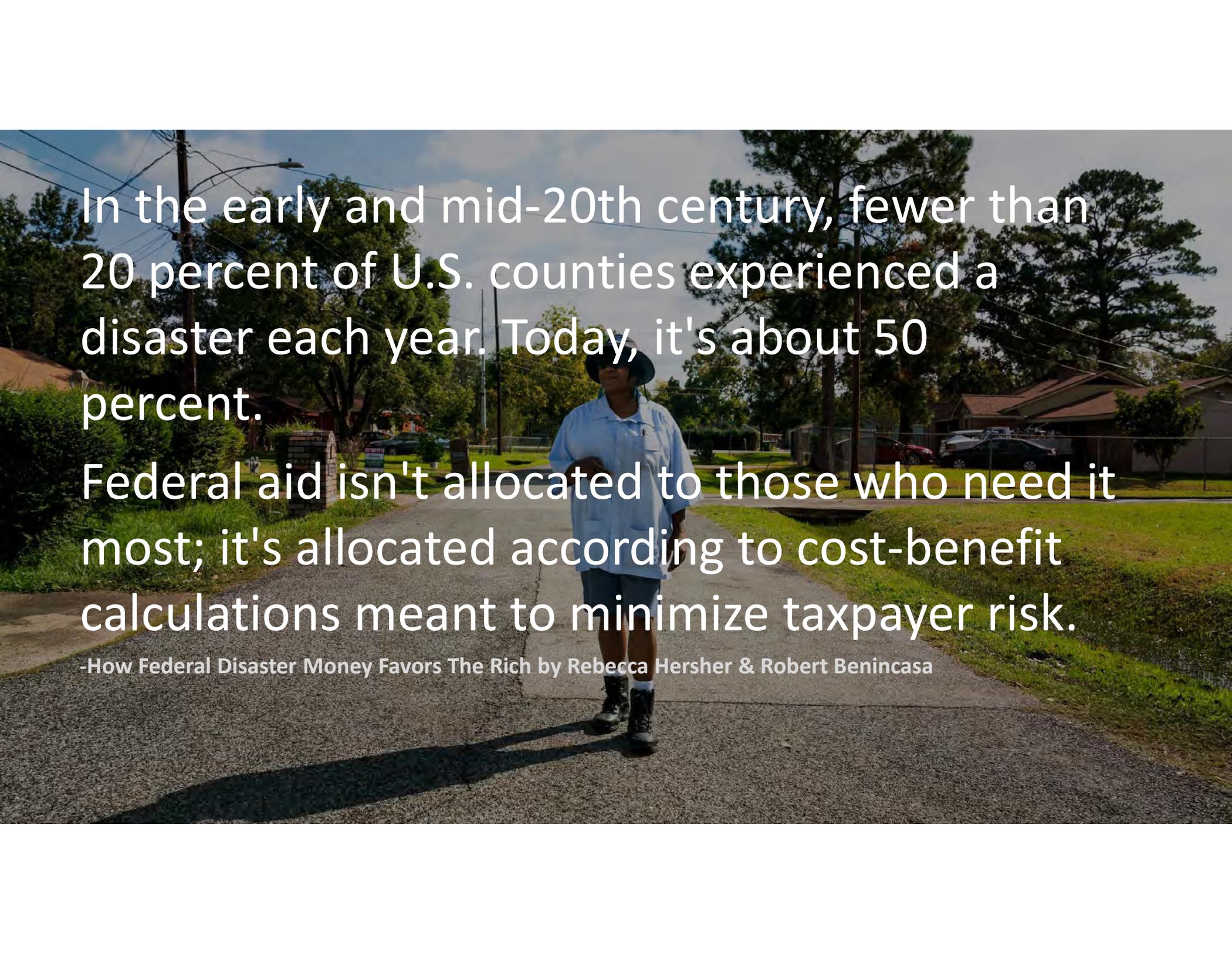
Time Horizon

- Short term
 - Disasters
 - Life Emergencies
- Medium term
 - Community stability: Housing, transportation, food, health, opportunity
- Long term
 - Climate change
 - Industry changes
 - Systemic racism

A group of police officers in uniform are walking on a sidewalk. They are carrying bags and equipment. The scene is outdoors, with a brick building and a car visible in the background. The text is overlaid on the image.

The Chicago heat wave in 1995 killed 739 people, many of which lived in isolated poverty. However, some neighborhoods with high poverty had some of the lowest mortality. The difference was **social infrastructure**. Neighborhood conditions that isolate people from each other on a good day can, on a really bad day, become lethal.

-Palaces for the People by Erik Klinenberg



In the early and mid-20th century, fewer than 20 percent of U.S. counties experienced a disaster each year. Today, it's about 50 percent.

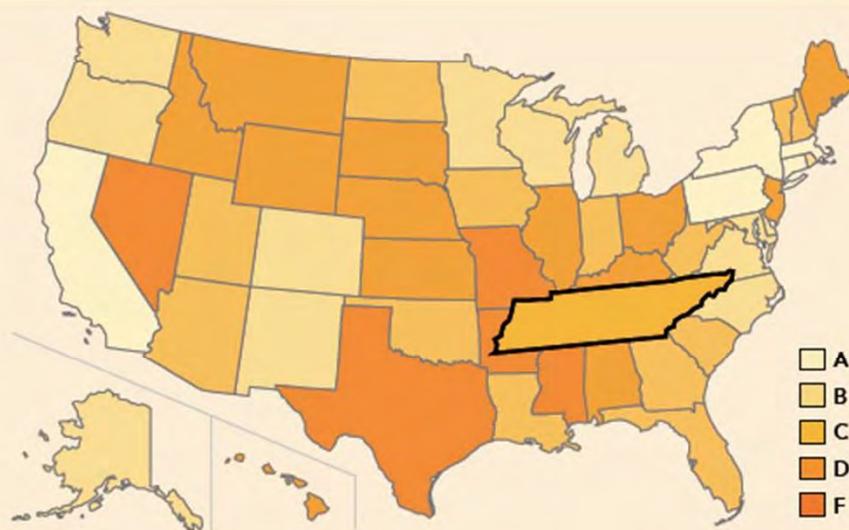
Federal aid isn't allocated to those who need it most; it's allocated according to cost-benefit calculations meant to minimize taxpayer risk.

-How Federal Disaster Money Favors The Rich by Rebecca Hersher & Robert Benincasa

CHATTANOOGA CONTEXT

OVERALL
 GRADE:

C



OVERALL: C

EXTREME HEAT: C+

DROUGHT: C+

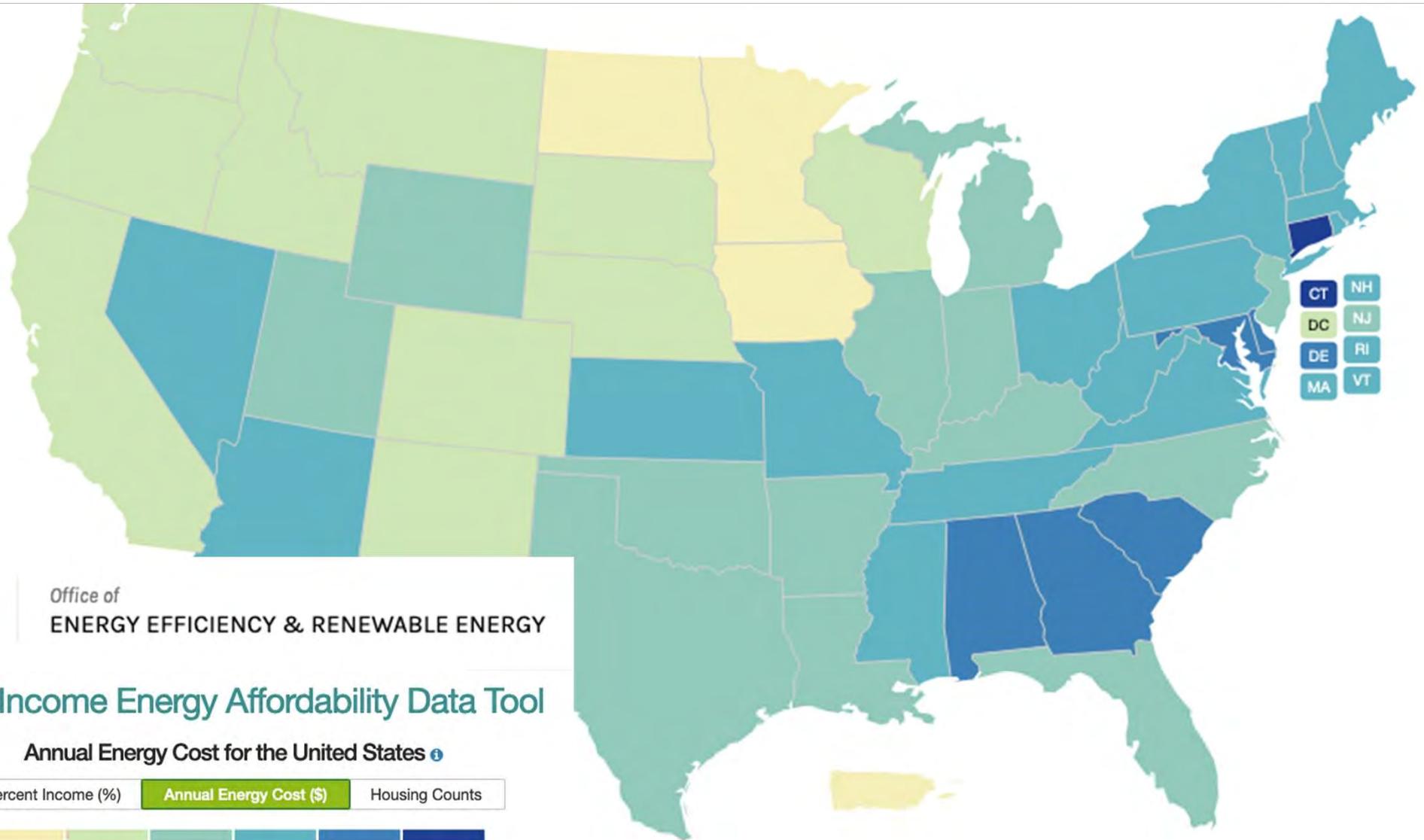
WILDFIRE: C+

INLAND FLOODING: D

COASTAL FLOODING: -

Tennessee faces considerable and significantly increasing threat levels from extreme heat, drought, wildfire, and inland flooding between now and 2050. Tennessee scores an overall grade of C on the Report Card, with grades ranging from a D for inland flooding to a C+ for extreme heat, drought, and wildfire. The grades are relative to other states, and relative to the magnitude of the climate threats themselves. Tennessee has taken *strong action* to address its current climate risks, including a comprehensive *Hazard Mitigation Plan* and threat-specific programs like Firewise (wildfire), Silver Jackets (inland flooding), and the *Tennessee Drought Management Plan* (drought). Tennessee has also taken *limited action* to assess its climate change vulnerabilities for the transportation sector. Tennessee has not assessed climate change vulnerabilities for other sectors, and it has taken *no action* to develop or implement an adaptation plan.

climatecentral.org



Office of
ENERGY EFFICIENCY & RENEWABLE ENERGY

Low-Income Energy Affordability Data Tool

Annual Energy Cost for the United States [i](#)



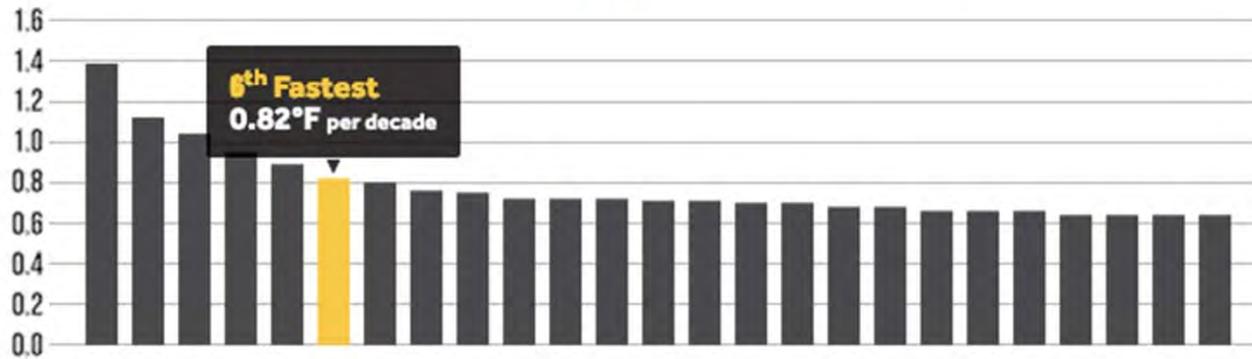
Hot and Getting Hotter



The top 25 hottest and fastest-warming cities

Which are the hottest?

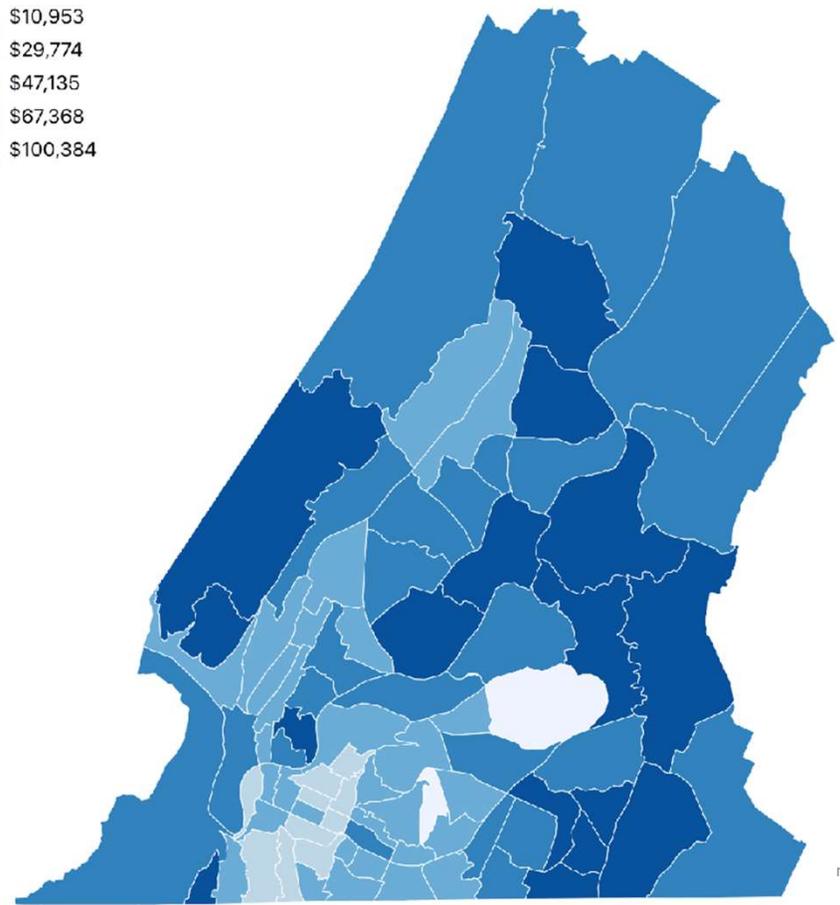
Fastest-warming



ECONOMY INDICATORS

- Unemployment Rate ▲
- Children Under 6 With Parents in Labor Force ▲
- Employment Population Ratio ▲
- Job Count ▲
- Labor Force Participation Rate ▼
- Gini Coefficient ▲
- Households Receiving SNAP Benefits ▲
- Median Household Income ▼
- Poverty Rates ▲

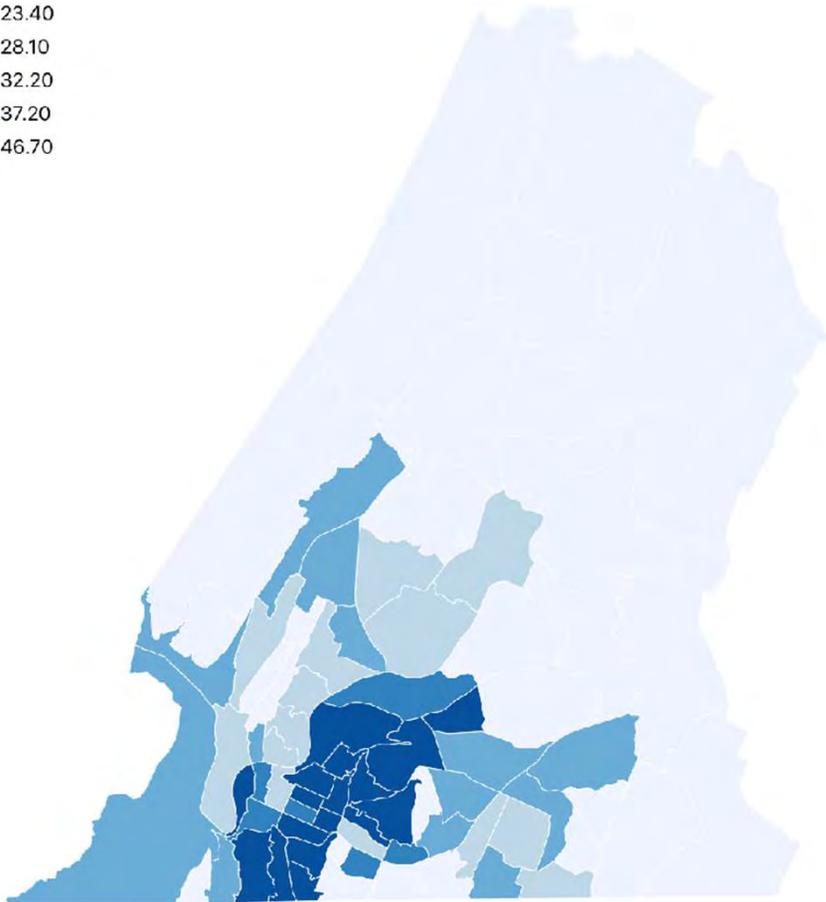
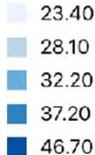
Median Household Income (2016)



HEALTH INDICATORS

- Cancer Rates
- Obesity Rates**
- Asthma Rates
- Poor Mental Health
- Poor Physical**
- Health Uninsured**
- People Homicides
- Teenage Pregnancy

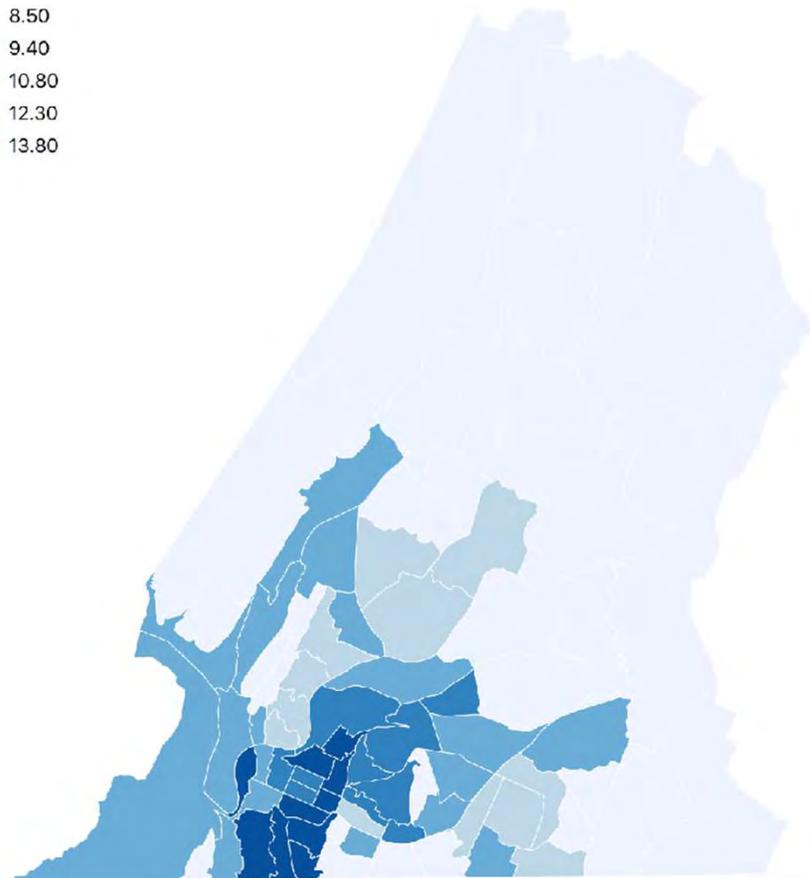
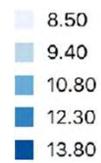
Obesity Rates (2015)



HEALTH INDICATORS

- Cancer Rates
- Obesity Rates
- Asthma Rates**
- Poor Mental Health
- Poor Physical
- Health Uninsured
- People Homicides
- Teenage Pregnancy

Asthma Rates (2015)



HOUSING INDICATORS

Median Home Value

Housing and Transportation Affordability Index

Housing Burdened

Homeowners Housing

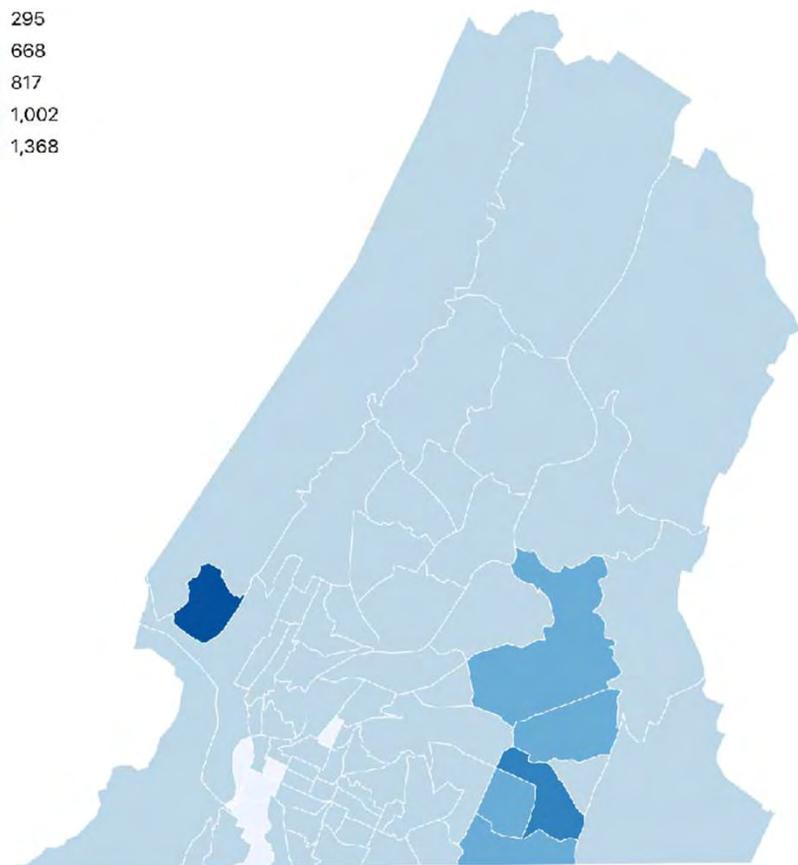
Burdened Renters Median Rent

Housing Age

Owner Occupied Housing Units

Vacant Rental Units

Median Rent (2000)



HOUSING INDICATORS

Median Home Value

Housing and Transportation Affordability Index

Housing Burdened

Homeowners Housing

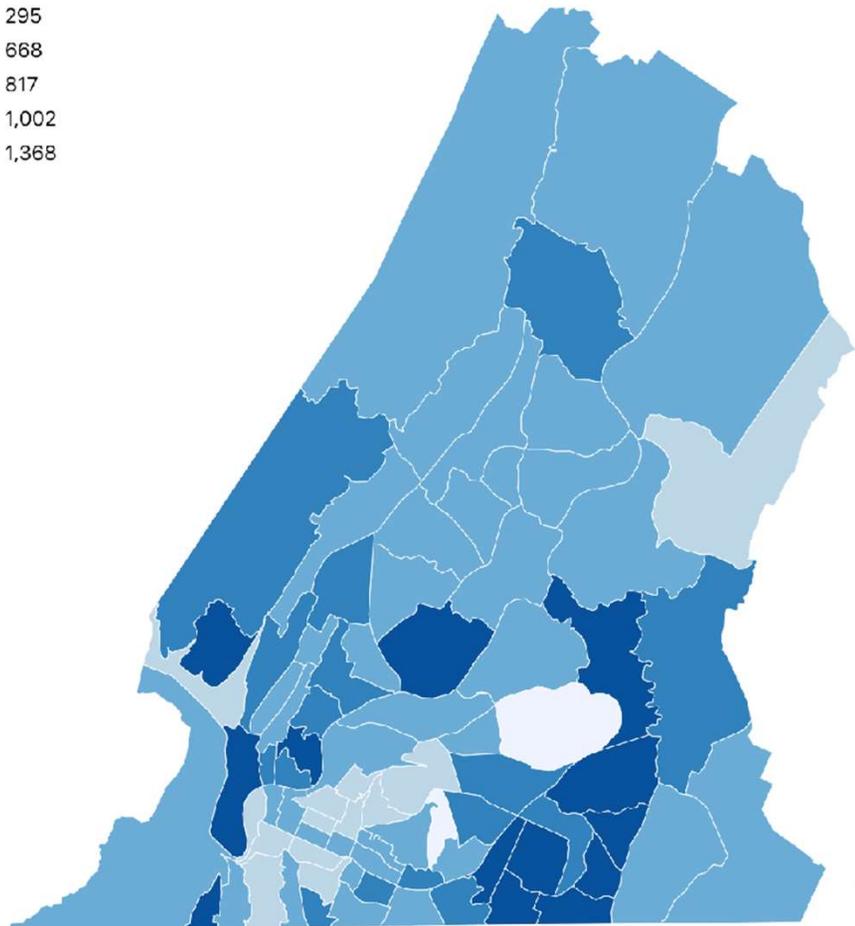
Burdened Renters Median Rent

Housing Age

Owner Occupied Housing Units

Vacant Rental Units

Median Rent (2016)



HOUSING INDICATORS

Median Home Value

Housing and Transportation Affordability Index

Housing Burdened

Homeowners Housing

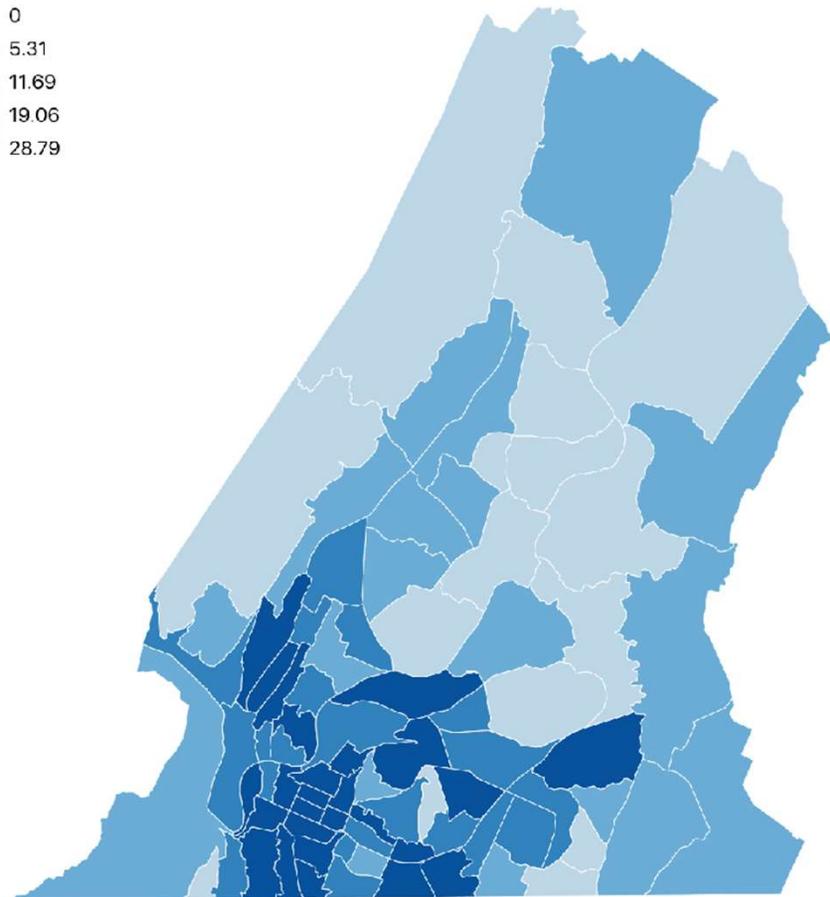
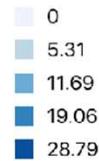
Burdened Renters Median Rent

Housing Age

Owner Occupied Housing Units

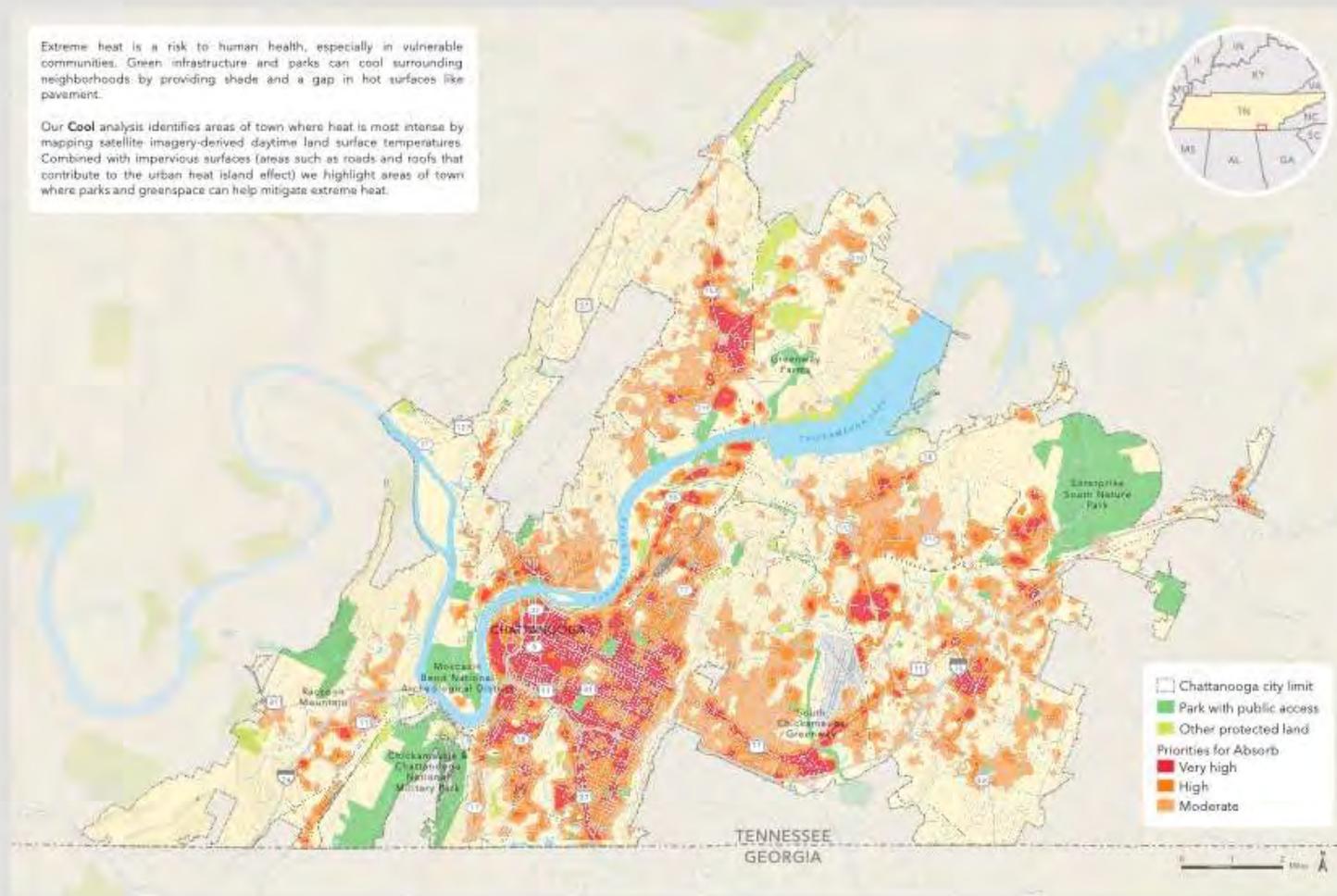
Vacant Rental Units

Housing-Burdened Renters (2016)



Extreme heat is a risk to human health, especially in vulnerable communities. Green infrastructure and parks can cool surrounding neighborhoods by providing shade and a gap in hot surfaces like pavement.

Our **Cool** analysis identifies areas of town where heat is most intense by mapping satellite imagery-derived daytime land surface temperatures. Combined with impervious surfaces (areas such as roads and roofs that contribute to the urban heat island effect) we highlight areas of town where parks and greenspace can help mitigate extreme heat.



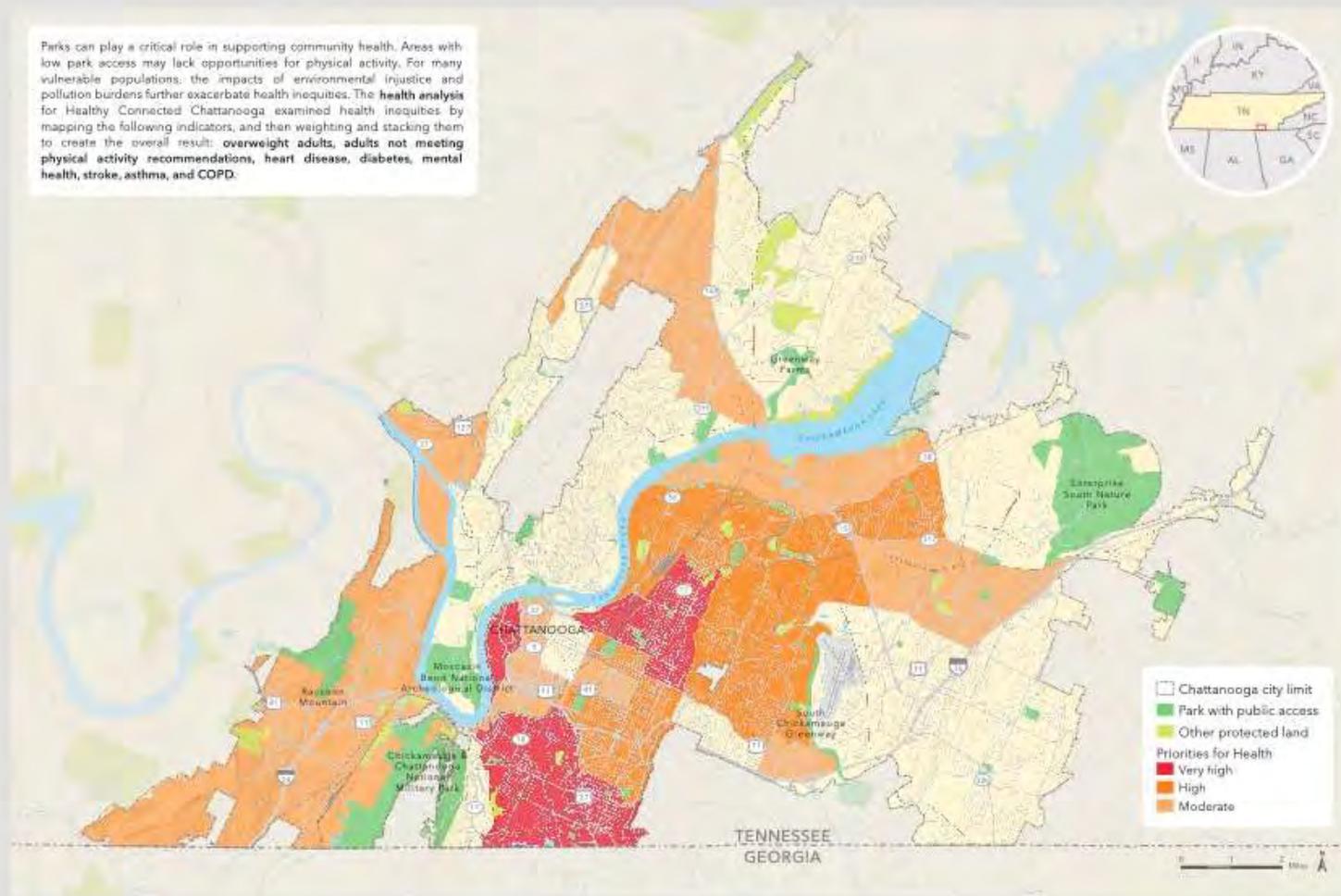
Cool

HEALTHY CONNECTED CHATTANOOGA

December 4, 2018. Project funded by City of Chattanooga and Hamilton County, Tennessee. Map created by The Trust for Public Land. The Trust for Public Land is a 501(c)(3) nonprofit organization. For more information, visit www.trustforpublicland.org.



Parks can play a critical role in supporting community health. Areas with low park access may lack opportunities for physical activity. For many vulnerable populations, the impacts of environmental injustice and pollution burdens further exacerbate health inequities. The **health analysis** for Healthy Connected Chattanooga examined health inequities by mapping the following indicators, and then weighting and stacking them to create the overall result: **overweight adults, adults not meeting physical activity recommendations, heart disease, diabetes, mental health, stroke, asthma, and COPD.**



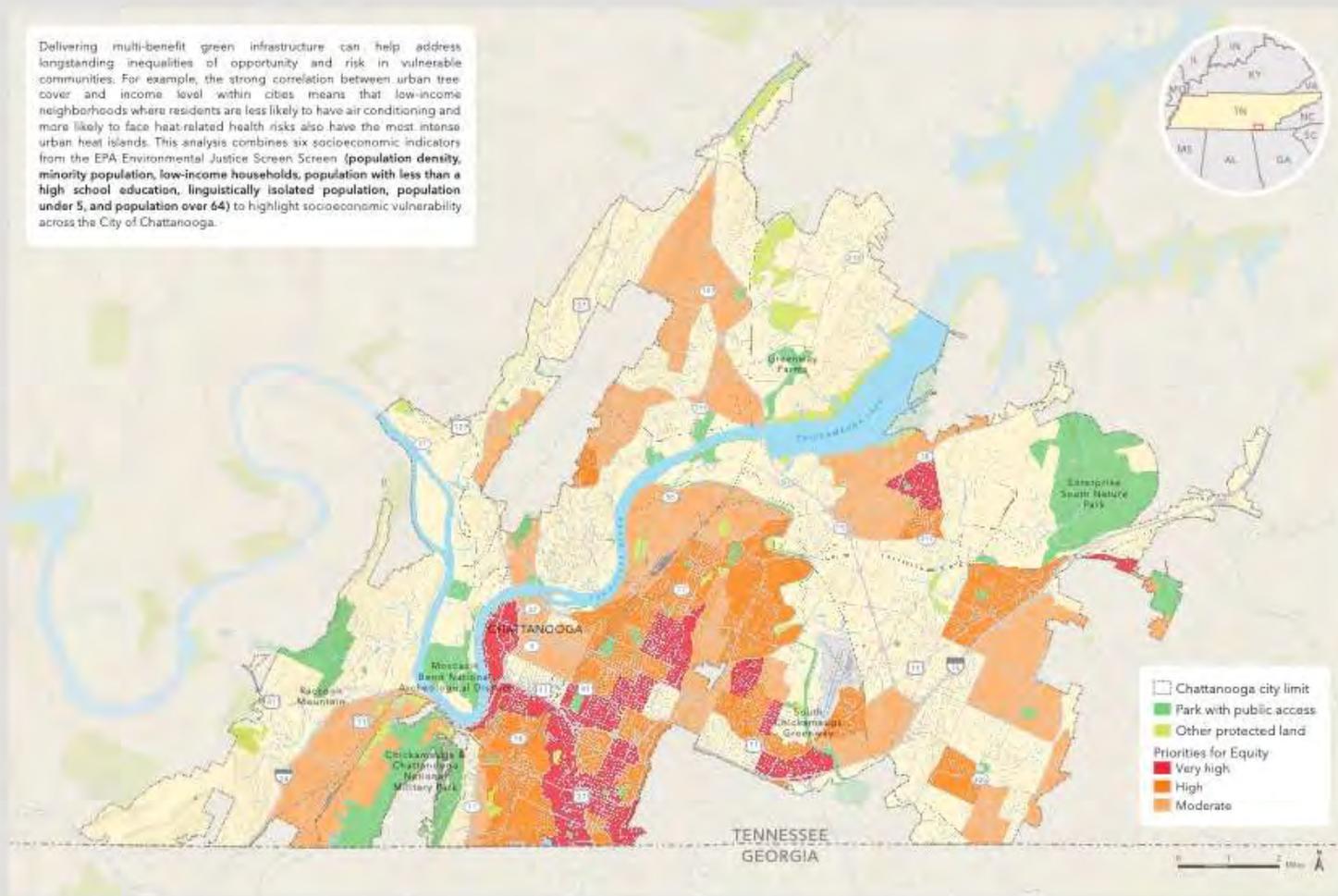
Health

HEALTHY CONNECTED CHATTANOOGA

December 4, 2018. Local Progress Group, Chattanooga's Health Equity Center, University of Tennessee Health Science Center, and the Trust for Public Land. The Trust for Public Land is a 501(c)(3) nonprofit organization that works to protect and restore public lands. www.trustforpublicland.org



Delivering multi-benefit green infrastructure can help address longstanding inequalities of opportunity and risk in vulnerable communities. For example, the strong correlation between urban tree cover and income level within cities means that low-income neighborhoods where residents are less likely to have air conditioning and more likely to face heat-related health risks also have the most intense urban heat islands. This analysis combines six socioeconomic indicators from the EPA Environmental Justice Screen Screen (population density, minority population, low-income households, population with less than a high school education, linguistically isolated population, population under 5, and population over 64) to highlight socioeconomic vulnerability across the City of Chattanooga.

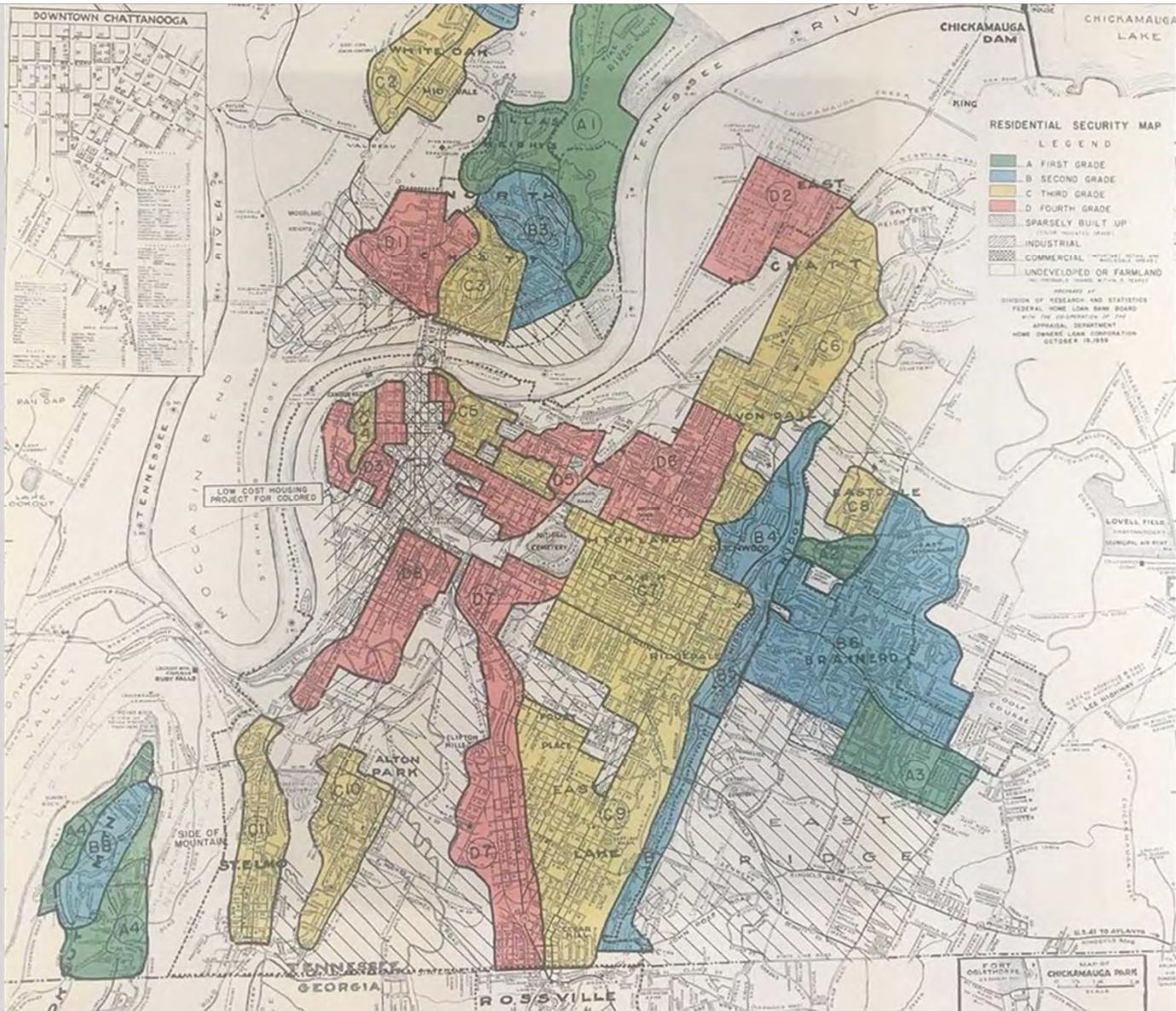


Equity

HEALTHY CONNECTED CHATTANOOGA

December 4, 2018. Project funded by City of Chattanooga and Hamilton County. Prepared by The Trust for Public Land. The Trust for Public Land is a 501(c)(3) nonprofit organization. For more information on our mission and work, visit www.trustforpublicland.org.





MEDIAN EARNINGS

1999 › \$45,480 per year

2014 › \$39,683 per year

AVERAGE EARNINGS

1999 › \$65,308 per year

2014 › \$56,896 per year

AVERAGE GROSS RENT

1999 › \$669 per month

2014 › \$743 per month

RESILIENCE IN CHATTANOOGA

CLIMATE ACTION PLAN OF 2009

City of Chattanooga, EPB, green|spaces, and other partners addressed 90% of plan action items.

Renewable Energy

- TVA closed nearest coal plant and is currently installing utility-scale solar reducing overall carbon footprint for Chattanooga region. Other sources include nuclear and hydro.
- SolSmart Gold Designation
- Community Solar
- First NZE Airport in US (Also leverages microgrid)
- VW investing in 9MW Solar
- First NZE Residential Development

CLIMATE ACTION PLAN OF 2009

City of Chattanooga, EPB, green|spaces, and other partners addressed 90% of plan action items.

Energy Efficiency

- City of Chattanooga achieved over 30% reduction for 2 Million SF from baseline energy consumption through Better Building Challenge
- Empower trained over 2000 residents w/ Basic Energy Workshops, still averaging over 100 per month, 5% avg savings.
- 250 Deep energy retrofits for low-income residents, 28% avg savings.

CLIMATE ACTION PLAN OF 2009

City of Chattanooga, EPB, green|spaces, and other partners addressed 90% of plan action items.

Other topics include:

- Waste Reduction
- Smart Growth Engagement
- Promote Local Growers
- Vehicle Miles Traveled
- Codes and Zoning

EPB SMART GRID

Chattanooga's Municipally Owned Utility

Invested in first municipally-owned, PEER-certified gigabit fiberoptic smart grid and communication services for residents.

- Fastest, most pervasive gigabit fiberoptic network provides internet, phone, and television service, decoupling revenue and maintaining low electric rates.
- Uses algorithms to notify customers of abnormal usage spikes
- Uses aggregated data to inform efficiency work and policy
- Supports local building codes by providing DET testing w/ Smart Build
- Partners with ORNL to research uses for data stream. (modeling, microgrids, maintenance, etc.)

THRIVE 2055

Thrive Regional Partnership of 16 Counties in SE Tennessee, NE Alabama, NW Georgia

Economic and Community Development

Regional Transportation and Infrastructure

Conservation and Outdoor Recreation

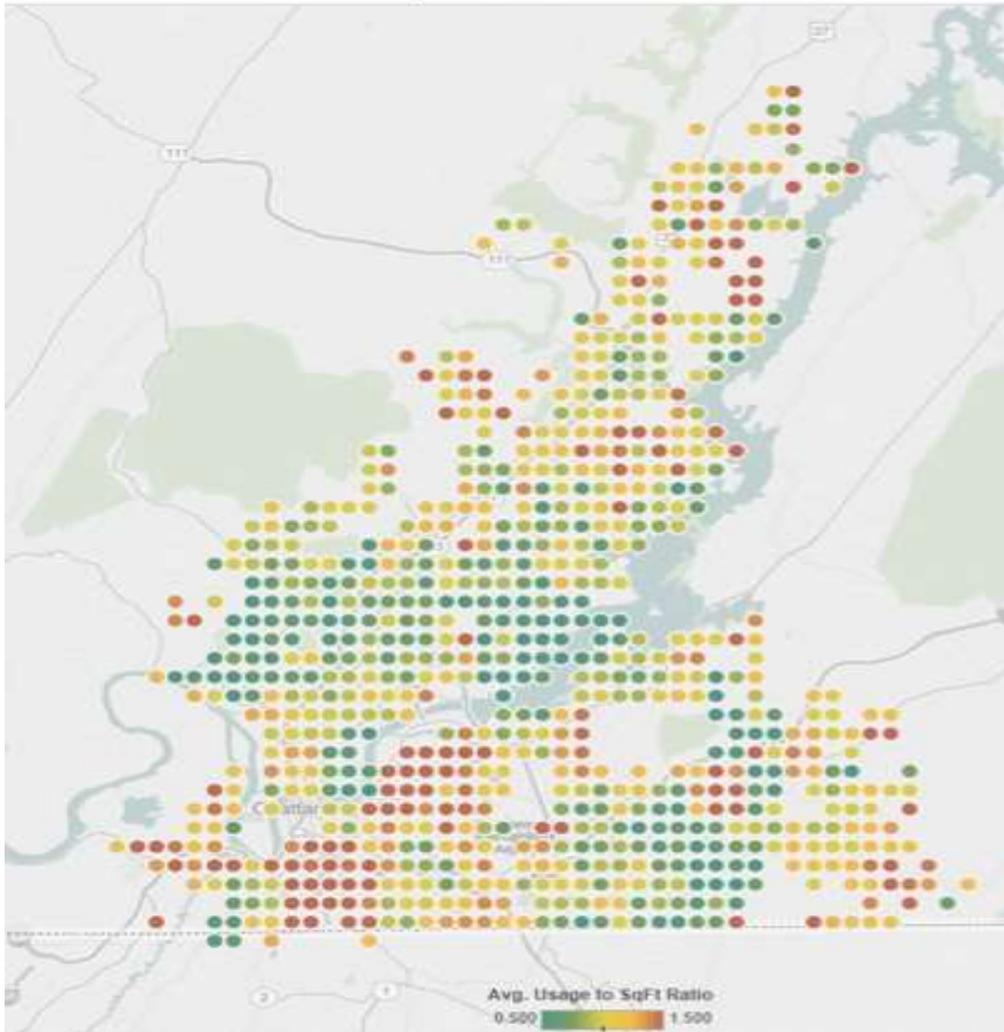
Education and Workforce Development

Forces and trends report identified both the impact of natural hazards, (\$259 Million and over 100 deaths) and the increased frequency of events as major considerations.

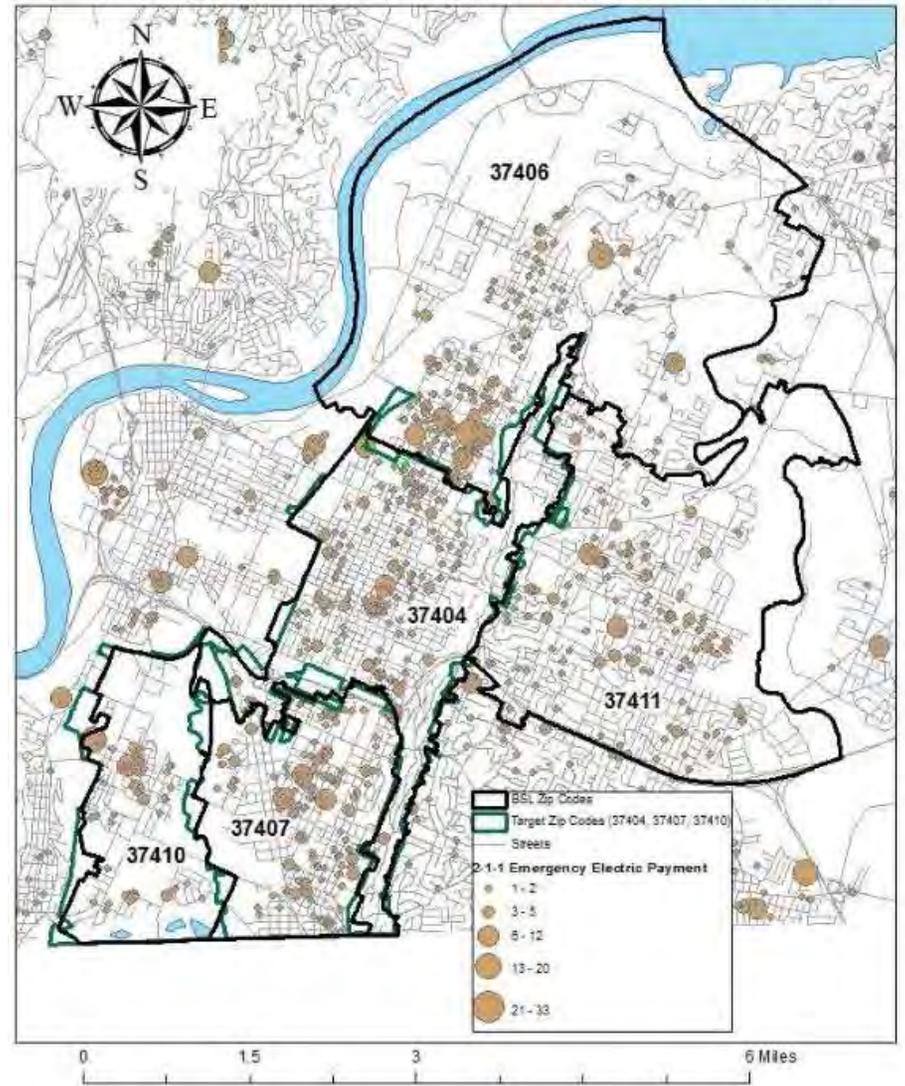
Empôwer

CHATTANOOGA

January 2012 & 2013



Select Zip Codes and 2-1-1 Calls for Electric Payment Assistance (2014)



EMPOWER CHATTANOOGA Community Events

“Change moves at the speed of trust.”

-Nathaniel Smith Partnership for Southern Equity

Empower began with a series of focus groups that were asked about challenges specific to their neighborhoods. While energy bills came up, other things like public parks, jobs for youth, education, and food insecurity were also leading topics.

Then, with the help of resident-led community advisory and action groups, Empower helped build social infrastructure by sponsoring, facilitating, and hosting community events that bring diverse residents together for a range of activities.



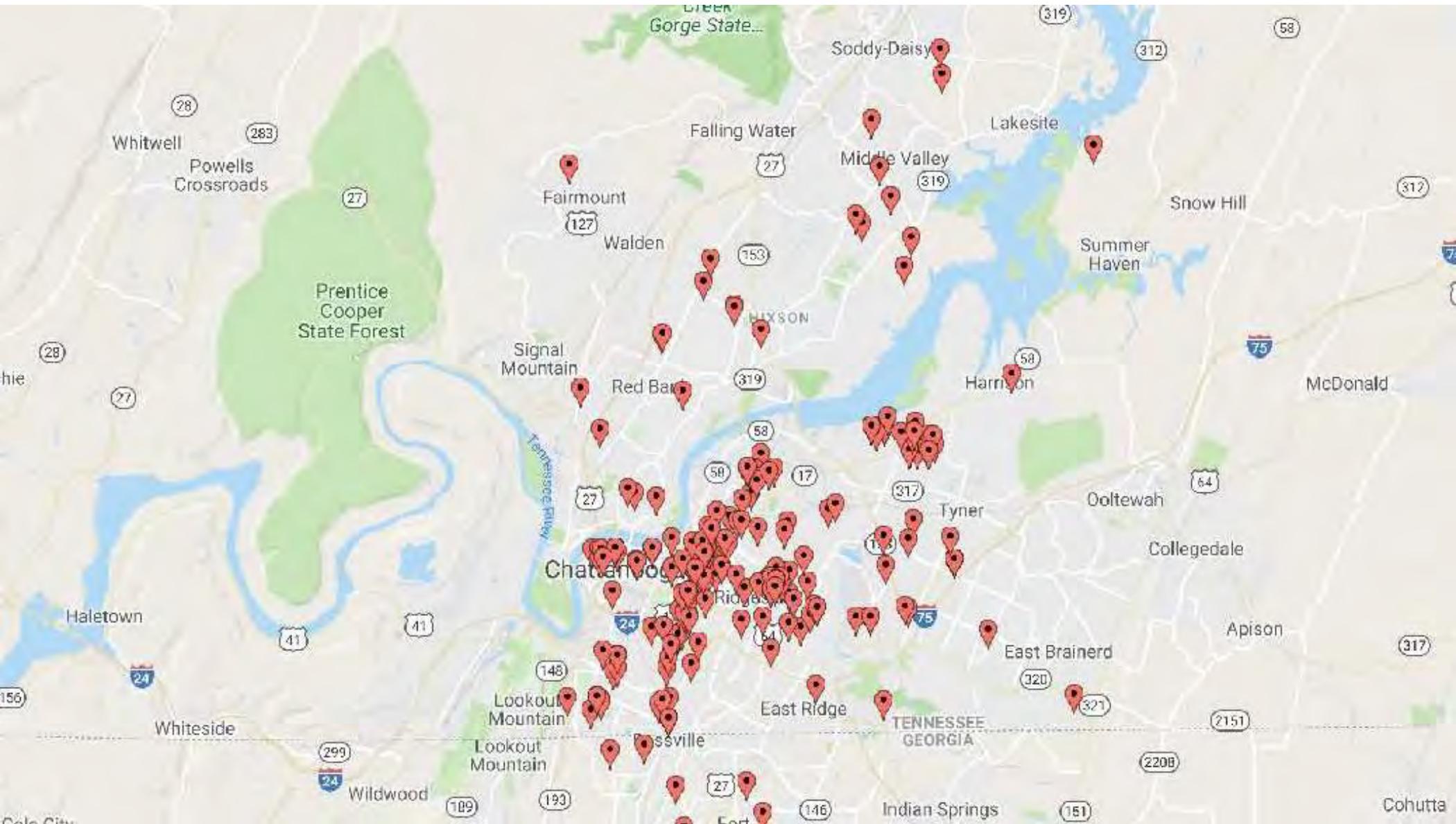
EMPOWER CHATTANOOGA Basic Energy Workshops

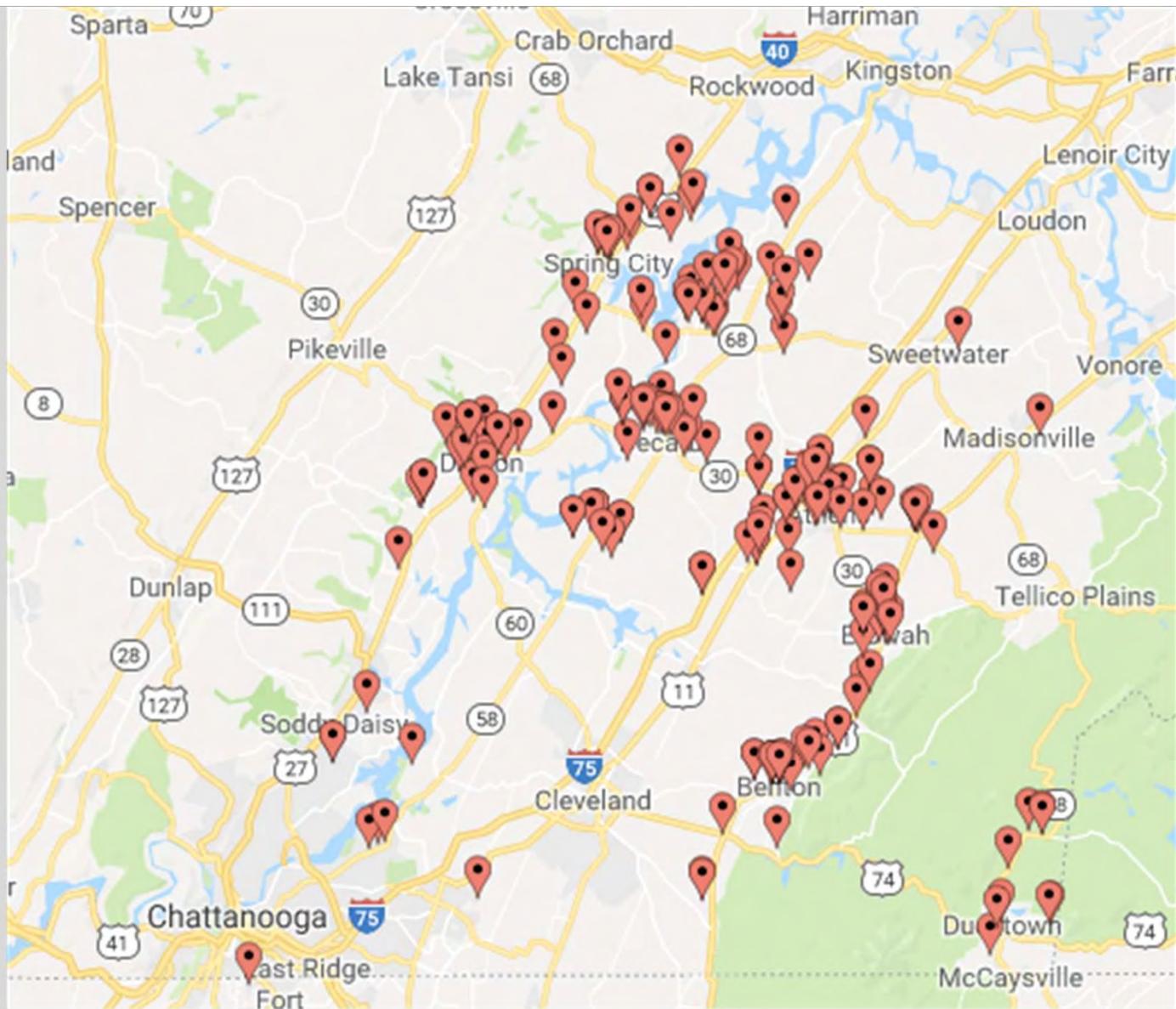
Since 2014 green|spaces has been providing Basic Energy Workshops in low-income neighborhoods. Attendees receive a free energy savings kit provided by TVA.

Thanks to the efforts of Allen Shropshire, our new outreach coordinator hired in 2018 who grew up in Avondale and graduated from our inaugural Build it Green class, attendance at Empower workshops increased from 416 to 900 for a total of over 2000.

EPB helps us track the effectiveness of our program and found an average savings of 5% with single home savings as much as 40% which is hundreds of dollars a month.







EMPOWER CHATTANOOGA Build it Green Workforce Development

The average age of workers in the construction industry is almost 50 and for every 5 retiring, there is just 1 person replacing them. The shortage of qualified labor has substantially increased construction costs in the Chattanooga market.

Launched in 2018 with Build Me a World, from a grant in partnership with EPB and the City of Chattanooga, Build it Green recruits at-risk young men and women (ages 18-36) from Empower neighborhoods for a 12 week, paid, leadership and workforce development program. 100% of trainees graduated or left early with a job.

All graduates received OSHA-10 Certification and lead paint abatement certification. 90% of graduates are currently employed.



EMPOWER CHATTANOOGA

Build it Green Work Team

Social enterprise employing Build it Green graduates in partnership with a local contractor to make energy efficiency improvements to homes of Empower Workshop attendees and nonprofit partners.

Work will include:

- Blown-in cellulose insulation
- Air sealing
- Painting
- Repairs



EMPOWER

Federal Home Loan Bank of Cincinnati

TVA/EPB Home Energy Upgrade

Home Energy Upgrade provides Deep Energy Retrofits to qualifying residents. Current program focuses on homeowners w/ income of 50% AMI or less and are either elderly or special needs.

Scope of work includes

- Insulation
- Airsealing
- HVAC
- Windows and Doors
- Appliances



EMPOWER CHATTANOOGA Green and Healthy Homes Asthma Program

118 estimated people hospitalized in Chattanooga for asthma each year costing \$3.9M annually

1,435 estimated people visiting the ED for asthma each year costing \$4.3M annually

Through this innovative program, green|spaces brought EPB, TVA, Lifespring, GHHI, Erlanger Children’s Hospital, and the City of Chattanooga to identify low-income patients with severe asthma, fund much-needed home improvements to improve air quality and energy efficiency, and then use health care savings to pay for those improvements. The team is currently piloting the project with 10-20 homes in 2019.



Adapted from, “Pay for Success: Basics.” Nonprofit Finance Fund.
Available at: www.payforsuccess.org/learn/basics/#what-is-pay-for-success.

EMPOWER CHATTANOOGA Chattanooga Green Prix

Launched in 2018, green|spaces purchased 9 kits of parts for elementary schools, middle schools, and high schools with support from the Lyndhurst Foundation, EPB, and TVA.

Students had to take these parts, build fully functional electric racecars, design and build their own body, and then race the cars around a track set up by the local Sports Car Club of America at Chattanooga State Community College.

The inaugural event was so successful, green|spaces raised enough funds to purchase kits for 25 more schools. Along with visiting schools, we had over 50 student-built EVs at the 2019 Green Prix



INTEGRATED COMMUNITY SUSTAINABILITY PLAN

Two year planning process focusing on resilient systems with focus on equity.

Long term thinking

Broad in scope

Integration of multiple systems

Collaborative

Public engagement and education

Implementation at different scales

Monitoring and evaluation





Michael Walton AIA, LEED AP

Executive Director

michael@greenspaceschattanooga.com

The logo for Empower CHATTANOOGA features the word "Empower" in a bold, yellow, sans-serif font with a red upward-pointing arrow above the letter 'o'. Below it, the word "CHATTANOOGA" is written in a smaller, yellow, sans-serif font.

Empower
CHATTANOOGA



NextGen Homes

BUILD IT GREEN

CHATTANOOGA GREEN PRIX

GREEN AND HEALTHY HOMES

MEMBERSHIP LUNCH & LEARNS

SUSTAINABILITY PROFESSIONALS OF
GREATER CHATTANOOGA

GREEN SCHOOLS SUMMIT & DESIGN
THINKING

MAIN X24

BUILDING RECOGNITION IN
CHATTANOOGA (BRIC) AWARDS

CONSULTING/SPEAKING

