Innovative Ways to Support Cities and Municipalities

Jamie Lian, Victoria Snelling, Jennifer Westerholm

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socket
Nashville's Sustainability Outlet

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY


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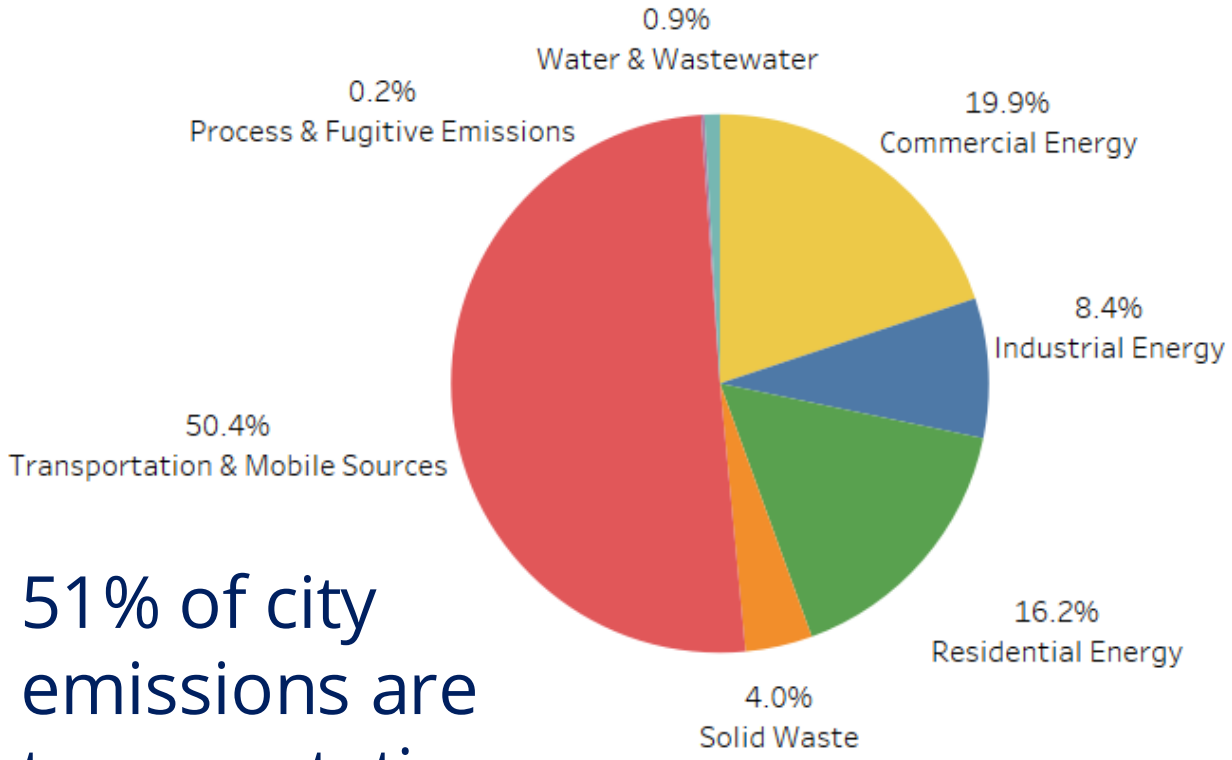
2019 Emissions by Sector



Energy use comprises 44% of the city's emissions

51% of city emissions are transportation -related

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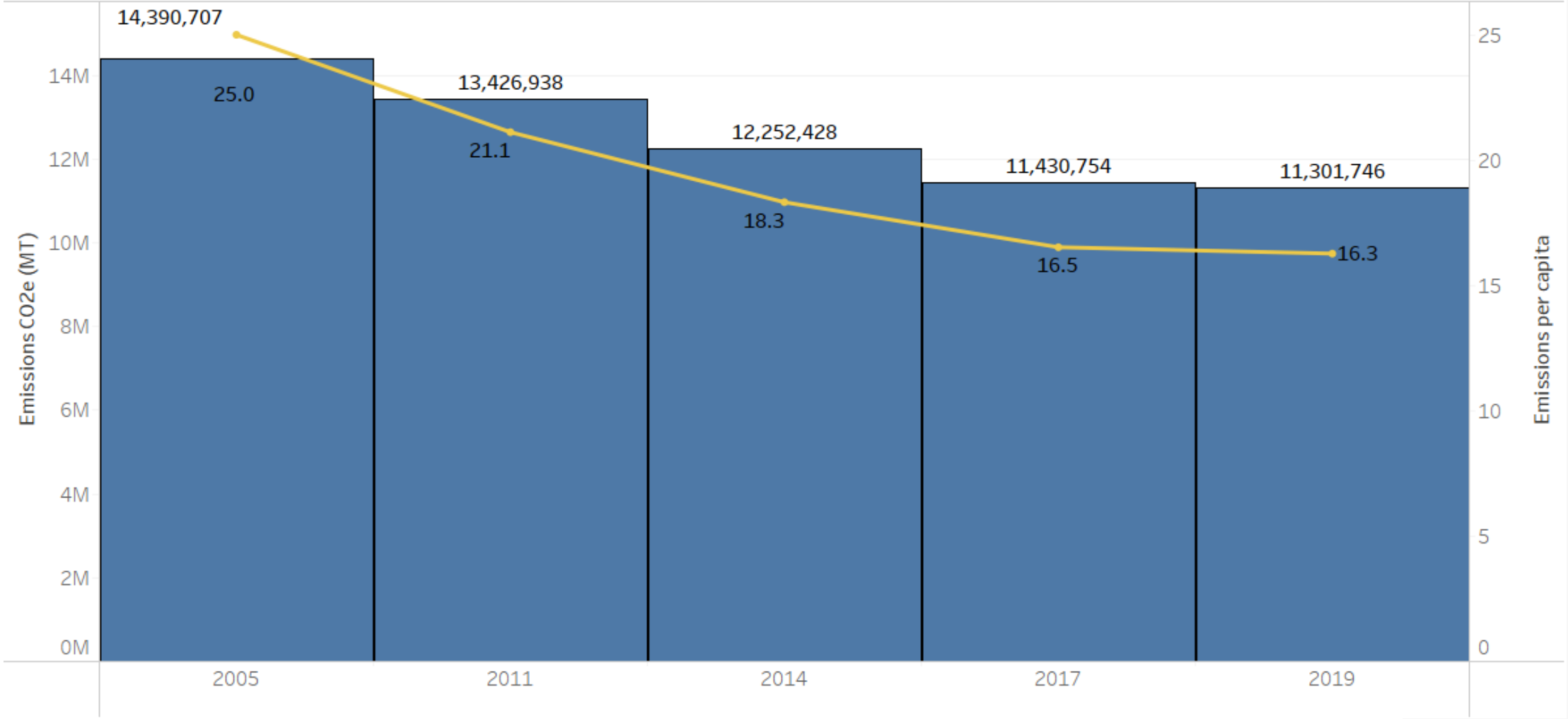
Metro Nashville's Community GHG Emissions, per Capita



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Nashville has committed to a greenhouse gas emissions target.

80% REDUCTION by 2050

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Nashville's "Green New Deal"

1. **Greener buildings now**
2. 100% renewable energy by 2041
3. Zero emissions city fleet by 2050

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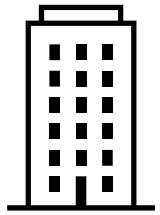
Metro ordinance requires "greener" buildings



LEED  LEED 

Retrofits to reduce energy use and reduce GHGs in existing facilities:

12.5%

LEED Zero

20%
energy use reduction
across 9%

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General Services LEED Buildings

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Energy Management

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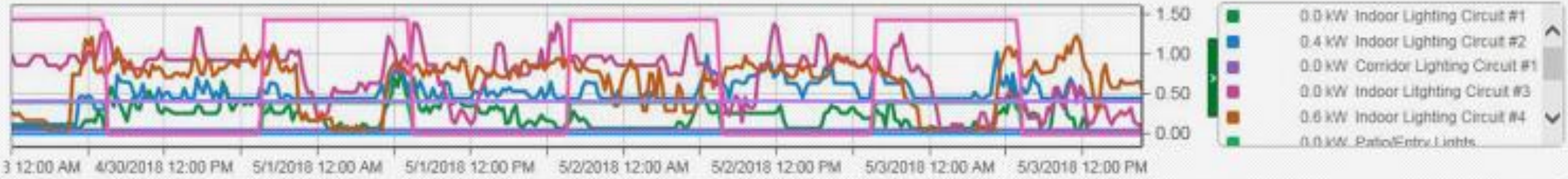
Power Monitoring Expert

supervisor 5/3/2018 Log Out | Help

Dashboards | Diagrams | Tables | Trends | Alarms | Reports

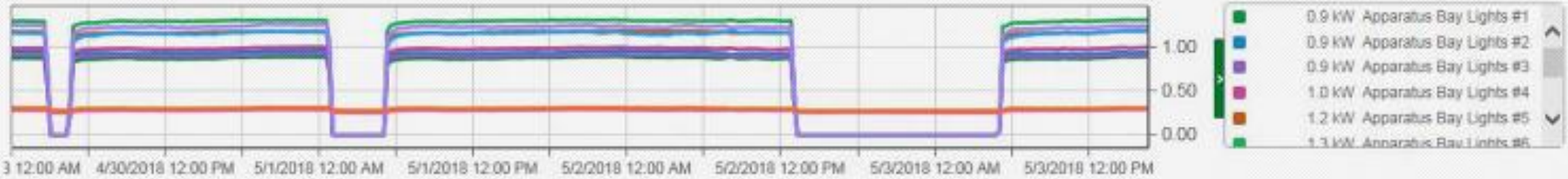
Interior Lighting

Updating... View: 3 days



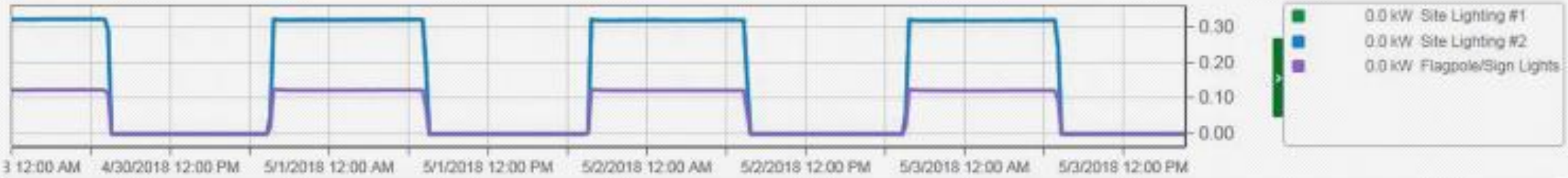
Apparatus Bay Lighting

Updating... View: 3 days



Exterior Lighting

Update in 0:01 View: 3 days



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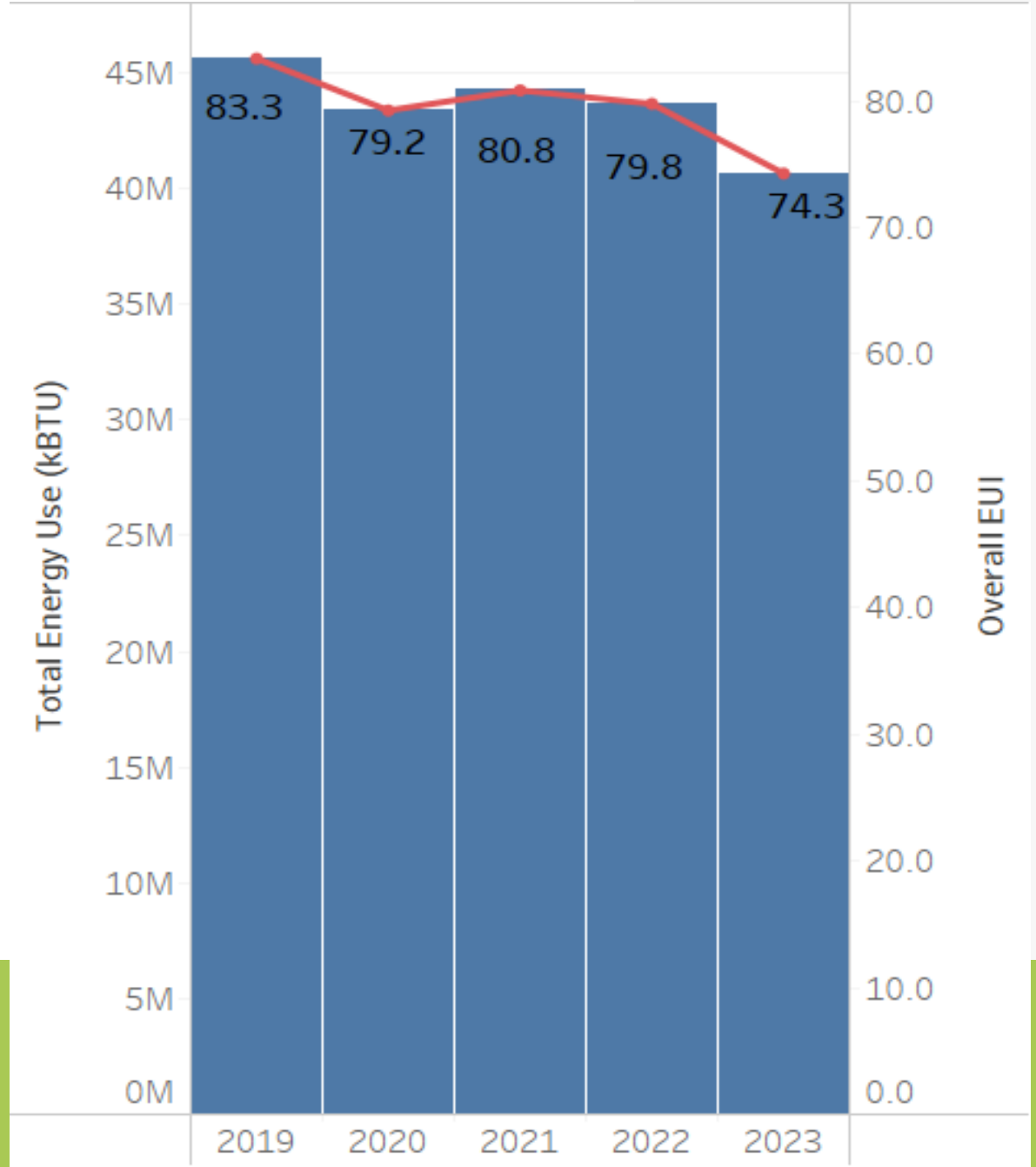
Energy Conservation Measures



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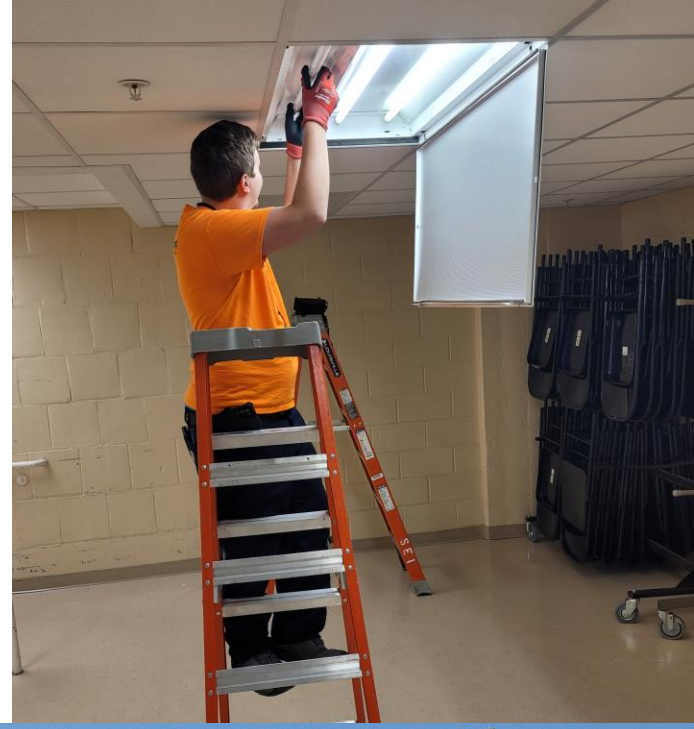
Federal Funding: EECBG

$644,400 for LEDs & envelope sealing



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Informational Kiosks

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MetroConnect

Hands On Education for Employees

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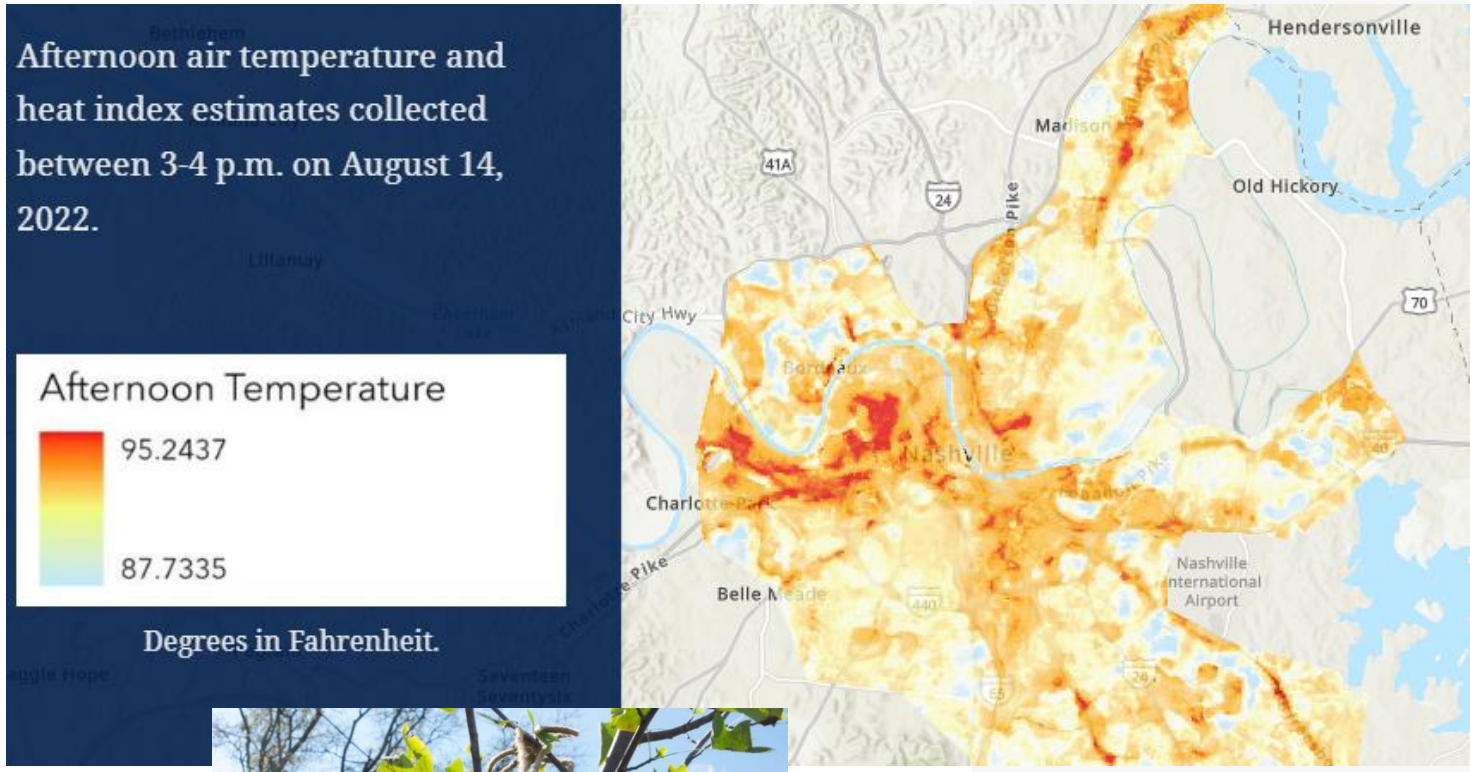
Urban Heat

Heat Mapping
Tree Planting
Cool Roofs



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Thank you!

Jennifer Westerholm, MPH
jennifer.westerholm@nashville.gov

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MEMPHIS AND SHELBY COUNTY DIVISION OF PLANNING AND DEVELOPMENT

Division of Planning and Development
Department of Housing

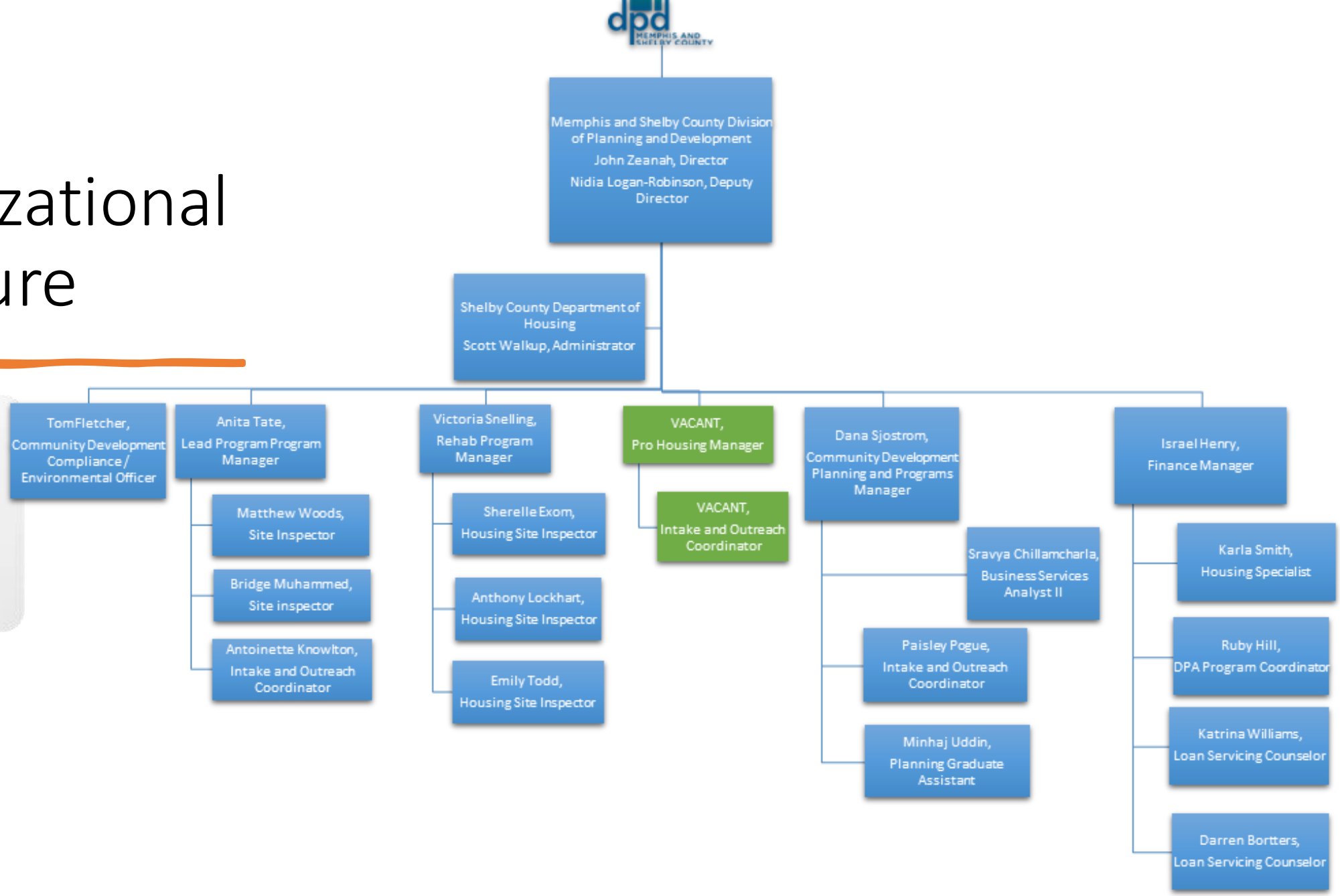
Presented by Victoria Snelling

Housing Rehab Program Manager

Who we are:

- Dedicated professionals
- Equity-focused programming
- Social-impact at the forefront of our work
- Public service delivery improvements

Organizational Structure



Our Programs

Lead Hazard Reduction Program

Rehabilitation Program

Down Payment Assistance Program

Community Development Projects

Public Services Activities for Seniors

Supportive Services for Survivors of Domestic Violence

Our Funding Sources

Community Development Block Grant (CDBG) – urban county
HOME Investment Partnerships Program – urban county
HOME Investment Partnerships Program – City funds
Local Funds – Shelby County wide
Leverage Funds – Shelby County wide
Foundation Grants – small initiatives ongoing
HOME ARP - urban county
CDBG-CV - complete

Our Impact Broadly

2024

- Rehab: 36 homeowners last year alone

2020-2024

- Lead: 150 since 2020 grant award

2024

- DPA: 53 clients last year alone

2020-2024

- CDBG-CV: 108 clients since 2020 grant awards + parks

2021-2024

- HOME-ARP: 31 clients since 2021 grant award

2024

- 702 elderly clients in the urban county participated in arts events

Rehab Program Initiatives

- Reduction of unsafe and unsanitary housing conditions
- Neighborhood preservation
- Neighborhood reinvestment and community pride
- Improvement to low and moderate-income owner occupants
- Correction of housing code violations
- Reducing energy burden
- Installation of Energy Efficient systems

Housing Rehabilitation Process

Step 1	**Site Inspector will inspect the housing unit for codes compliance and health & safety violations**
Step 2	Scope of Work and Contract are drafted and reviewed with Homeowner
Step 3	Pre-Construction Meeting is held with awarded Contractor and Homeowner
Step 4	Home Rehabilitation Construction is underway with multiple progression visits
Step 5	**Final Inspection is conducted to ensure all energy efficient systems are installed properly and meet code compliance**
Step 6	Warranty period of one year is in effect

Our Immediate Impact

Before

After

Our Immediate Impact

Before

After

Rehab Program Funding Last Year

Funding Source	Units Complete	Total Invested
Shelby County CDBG	6	$181,280.00
Shelby County HOME	12	$355,799.00
Local Funds	16	$581,800.50
City of Memphis HOME	2	$47,700.00

Broader Outreach Also Happening

Professionalization Opportunities

MANY OF US IN ADVANCED DEGREE PROGRAMS

NEW CERTIFICATIONS SOUGHT

INTEREST AND GROWTH EVIDENT IN OUR TEAM

How can we support each other?

We are on the same team

We have common goals

We care about community impact

Support acceptance of grant funds

Support grant-directed activities

Help us secure new funds

Grants and New Funding

- 2024 Lead Hazard Reduction Grant award announcement
- 2022 and 2024 Weatherization foundation funds
- 2024 Weatherization Cooperation Grant with the City
- 2024 PRO Housing Grant application submission
- Others on the horizon!

Weatherization Training & Community Outreach

Thank you!

Happy to take questions

Please reach out anytime

We want to support your efforts to support our residents

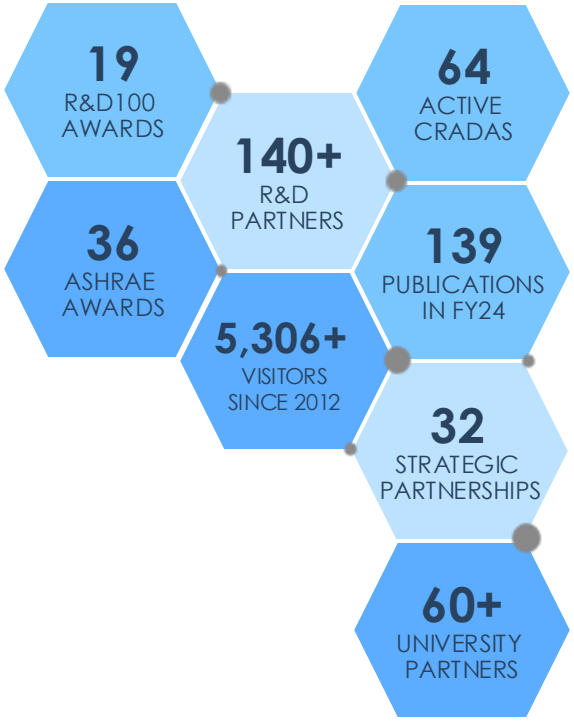
Spatial Data Visualization Platform for Integrating Energy Efficiency into Community Planning and Engagement

Jamie Lian, Ph.D.
Distinguished Scientist & Group Leader
Building Technologies Research and Integration Center (BTRIC)
Oak Ridge National Laboratory
November 21st, 2024

Introduction

- BTRIC (DOE's only designated user facility for early-stage R&D in building technologies)

Melissa Lapsa
Building Technologies
Program Manager



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- Urban Energy Modeling Team

Joshua New

Frank Li

Shovan Chowdhury

Avery Stubbings

- Building Energy Modeling Team

Piljae Im

Sen Huang

Yeonjin Bae

Yanfei Li

Borui Cui

Community Planning

Stakeholders <=> Community Boards <=> Community

https://gis.pittsburghpa.gov/pghzoning/

Who will be impacted?

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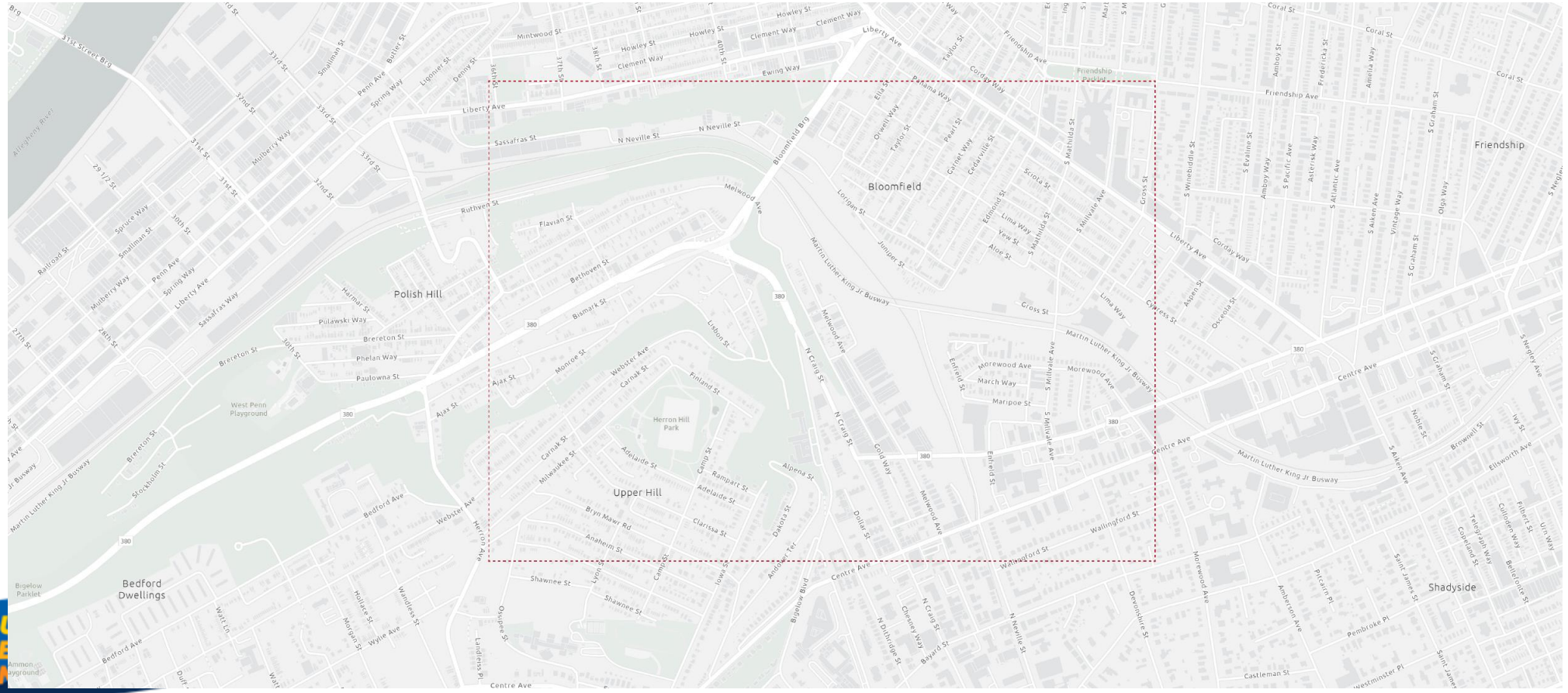
Community Planning (cont.)

- Define community interests/needs/goals

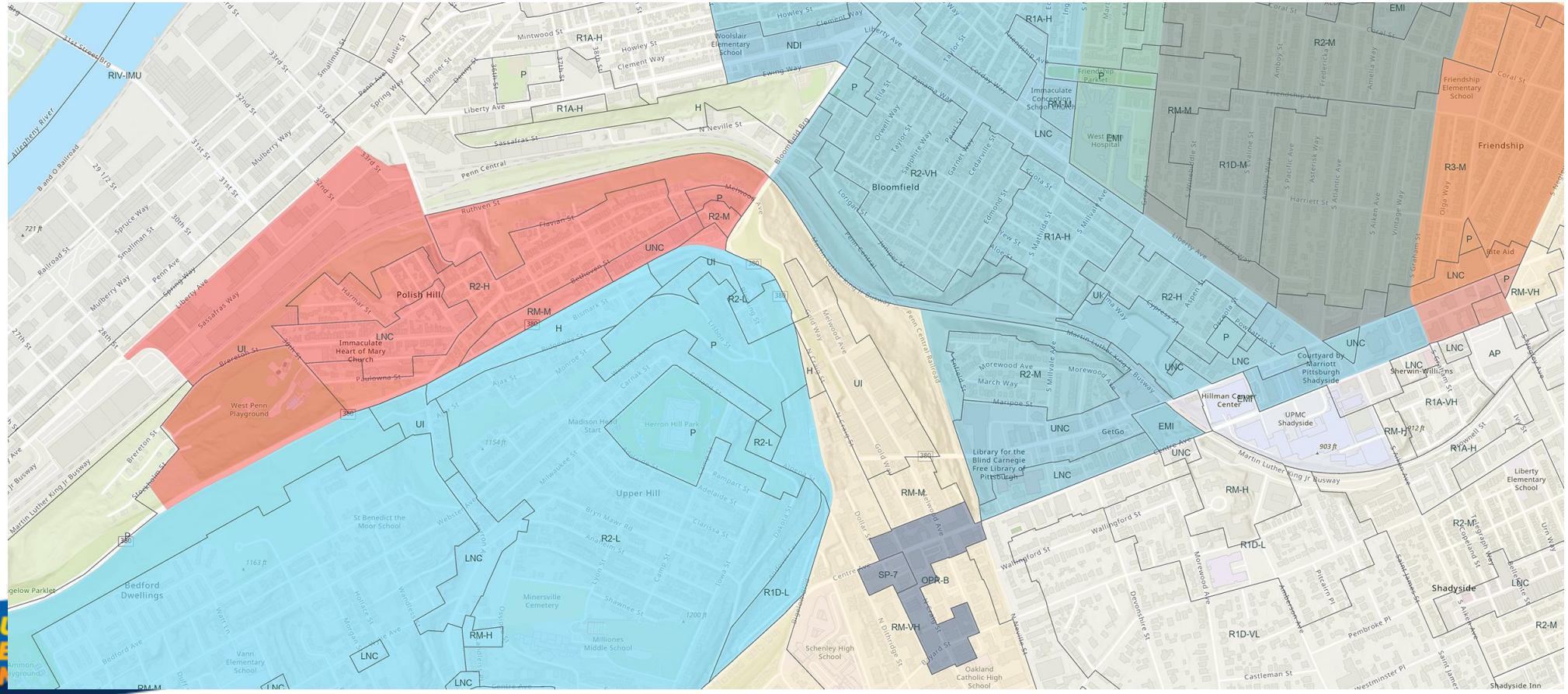


Community Planning (cont.)

- Coordinate with multi-scale parameters

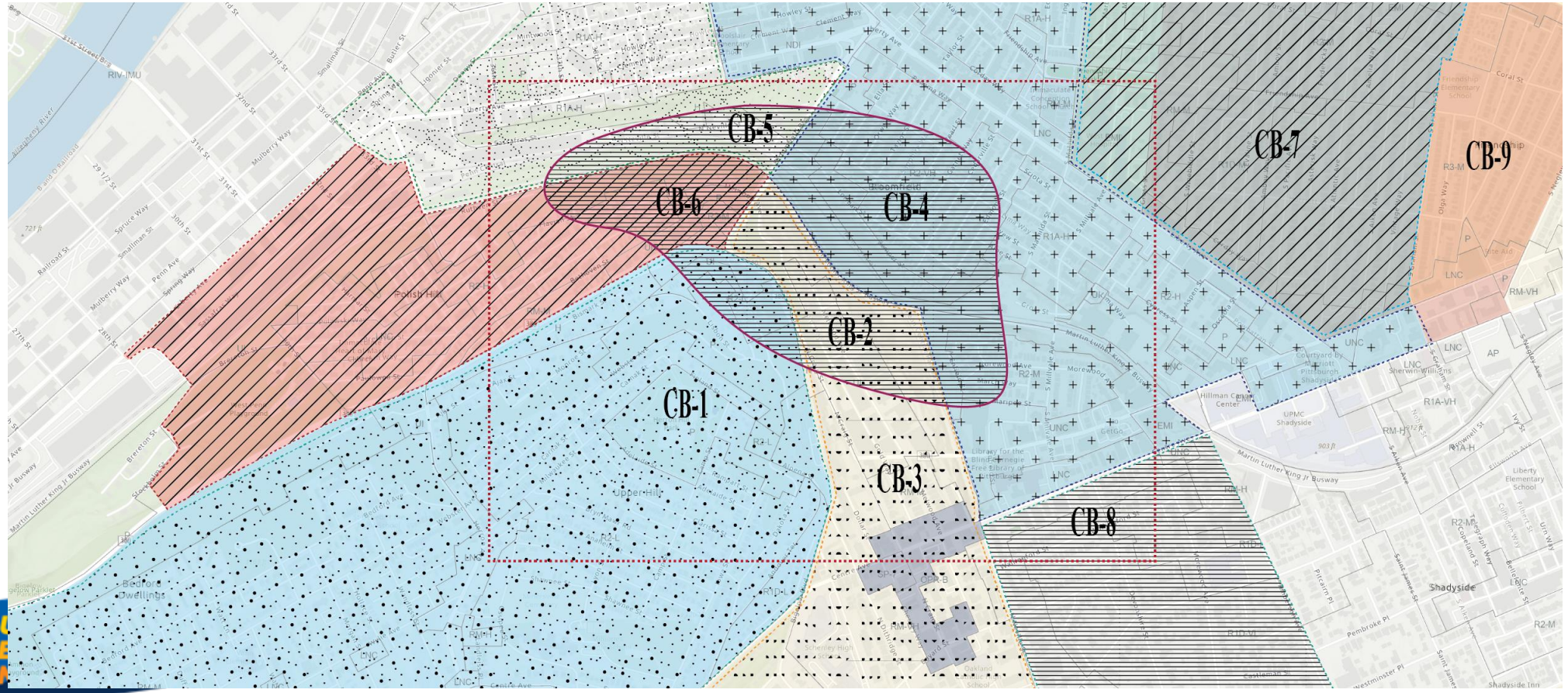
Community Planning (cont.)

- Perform scenario-based analysis



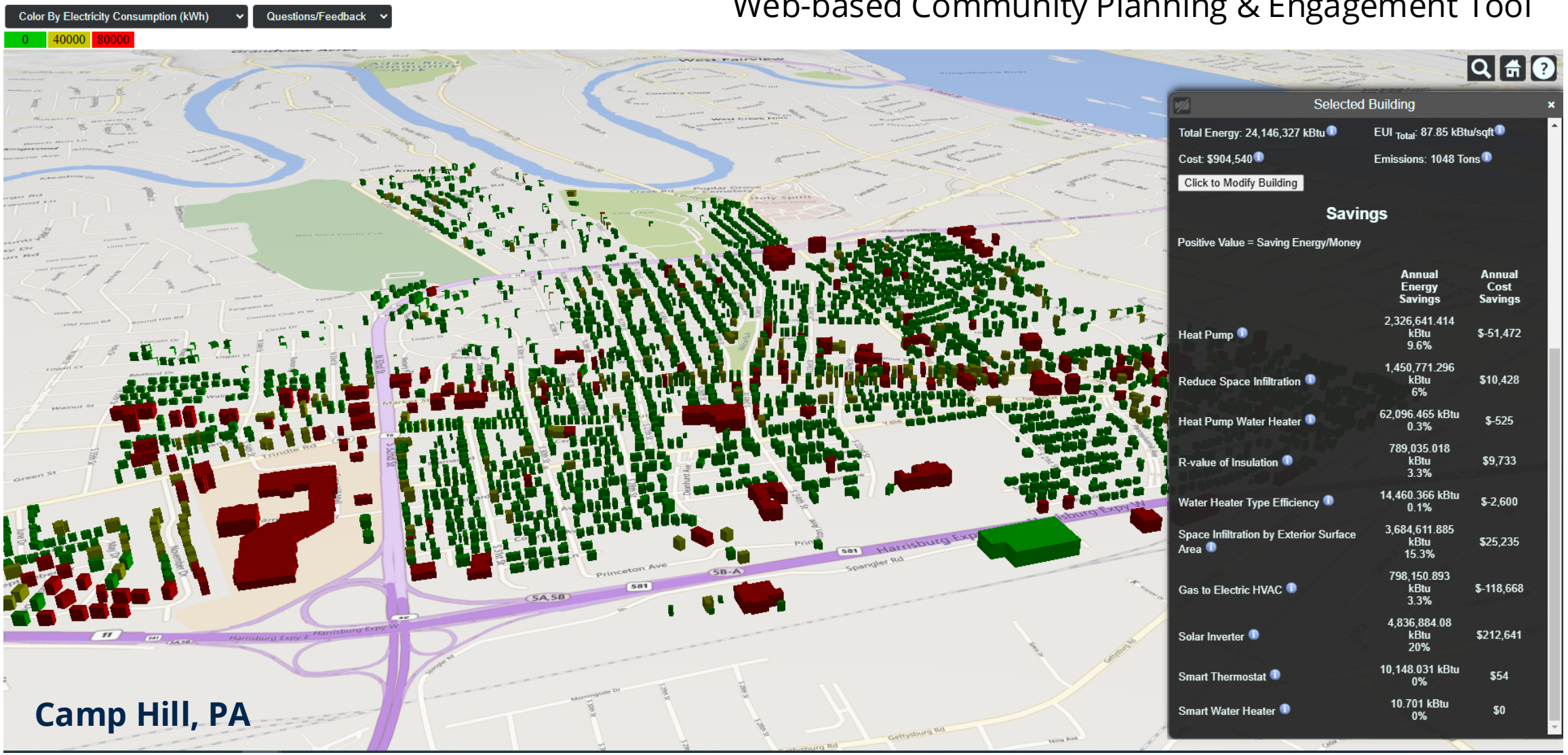
Community Planning (cont.)

- Layer specific urban conditions



UrbanScape

Web-based Community Planning & Engagement Tool

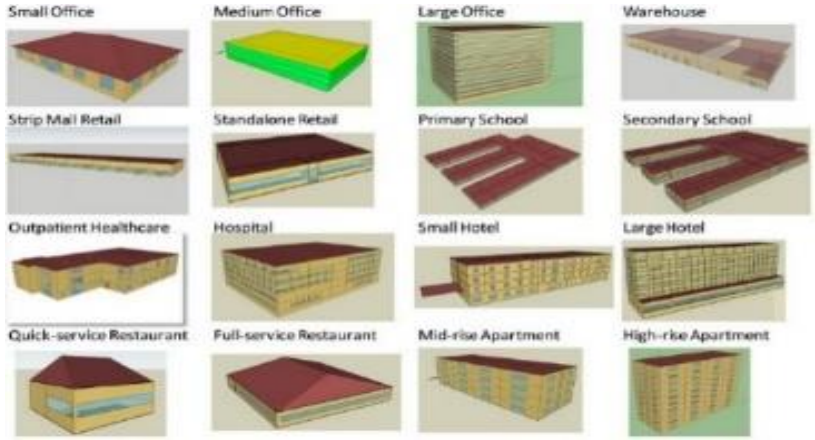


AutoBEM

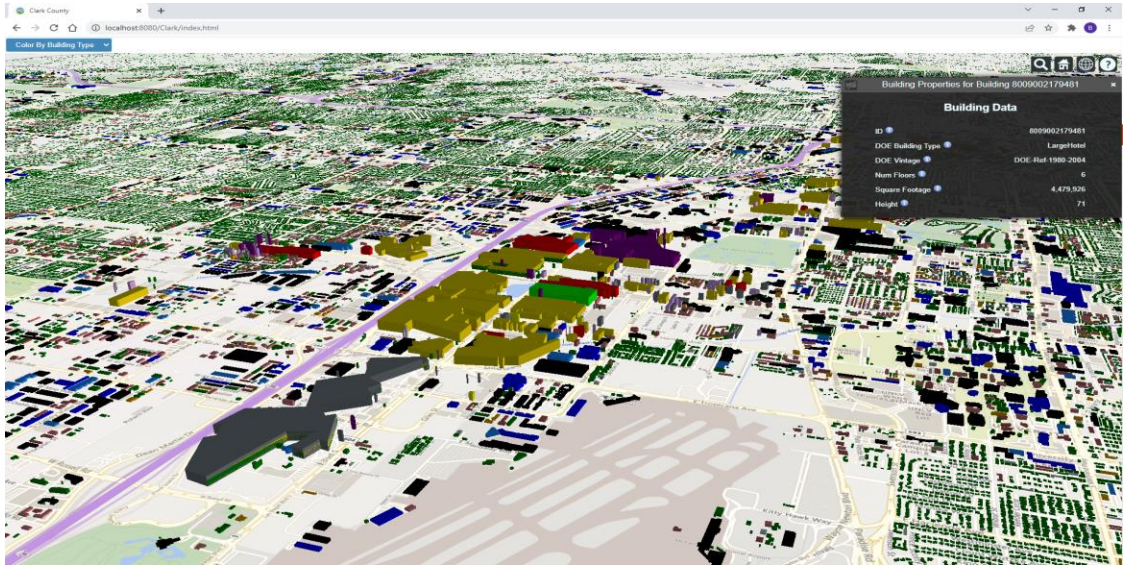
- AutoBEM develops building energy models using OpenStudio and simulates Models using EnergyPlus
- Building properties as inputs
  - Building Footprint
  - Building Height
  - Building Type
  - Building Age
- Internal characteristics and other building properties (occupancy, equipment, insulation, etc.) determined non-intrusively by building type and year built

OpenStudio

EnergyPlus



DOE Prototype Buildings



Clark County (Las Vegas) Modeling Example

https://bit.ly/AutoBEM

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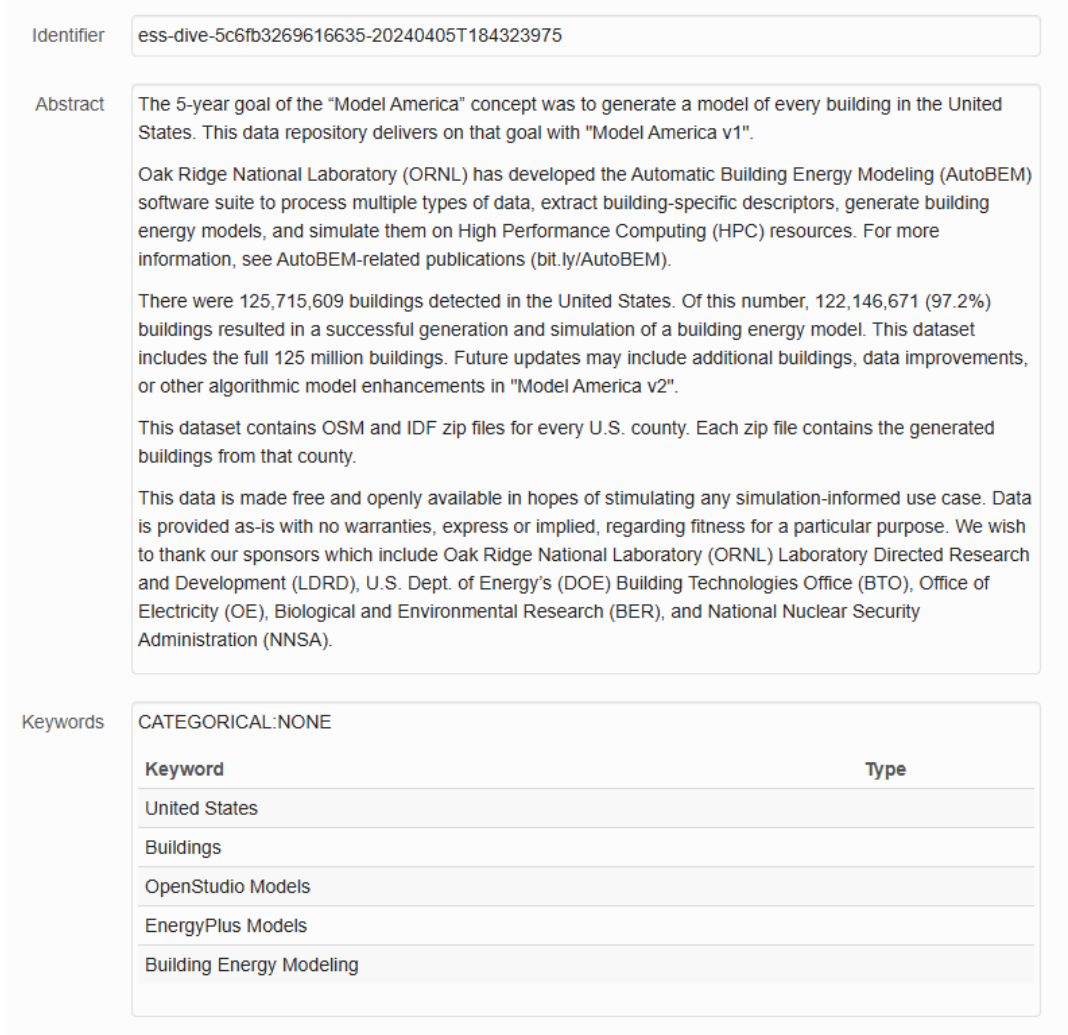
Model America Dataset

- Data and models of every U.S. building
  - MAv1: Version 1.0
    - Open access via https://bit.ly/ModelAmerica1
    - 125,714,640 buildings; 124,276,332 simulated
    - 122,930,327 models (97.8%) shared
    - OpenStudio (v3.2.0) and EnergyPlus (v9.5)
    - Organized by State_county.zip
    - Location-specific requires NDA
  - MAv2: Version 2.0
    - Still in progress
    - ~140 million building

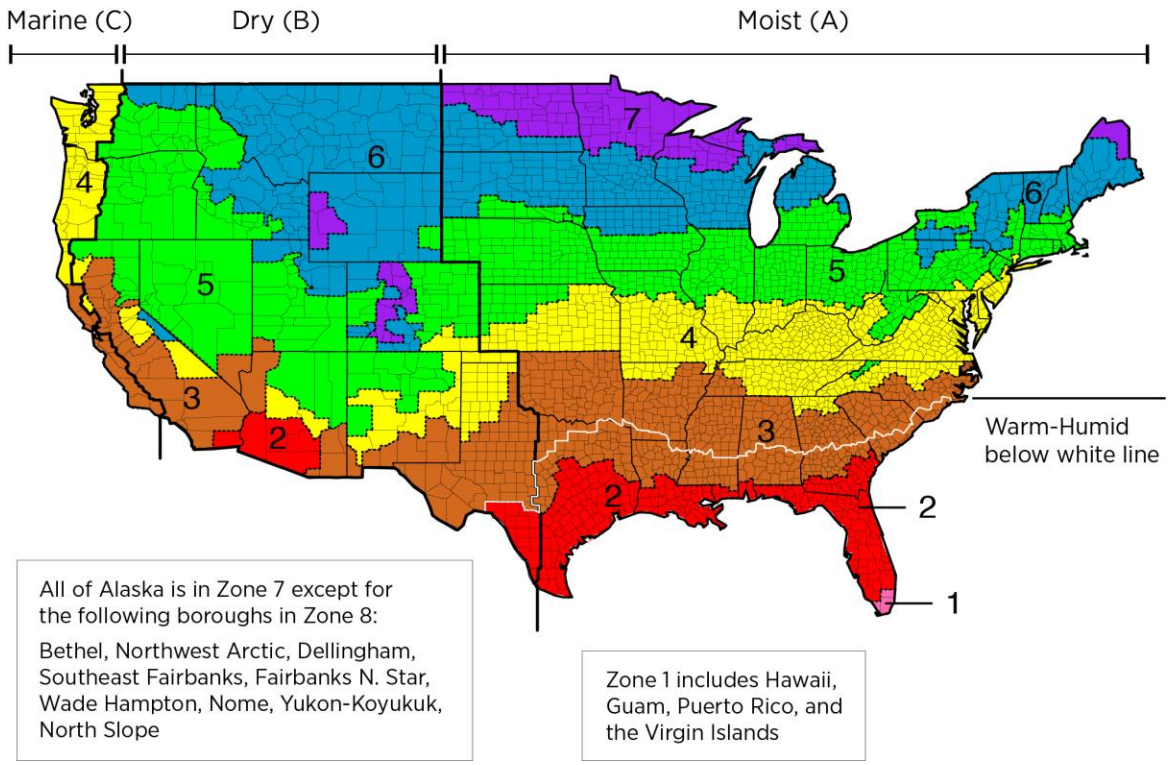


Identifier	ess-dive-5c6fb3269616635-20240405T184323975
Abstract	The 5-year goal of the "Model America" concept was to generate a model of every building in the United States. This data repository delivers on that goal with "Model America v1". Oak Ridge National Laboratory (ORNL) has developed the Automatic Building Energy Modeling (AutoBEM) software suite to process multiple types of data, extract building-specific descriptors, generate building energy models, and simulate them on High Performance Computing (HPC) resources. For more information, see AutoBEM-related publications (bit.ly/AutoBEM). There were 125,715,609 buildings detected in the United States. Of this number, 122,146,671 (97.2%) buildings resulted in a successful generation and simulation of a building energy model. This dataset includes the full 125 million buildings. Future updates may include additional buildings, data improvements, or other algorithmic model enhancements in "Model America v2". This dataset contains OSM and IDF zip files for every U.S. county. Each zip file contains the generated buildings from that county. This data is made free and openly available in hopes of stimulating any simulation-informed use case. Data is provided as-is with no warranties, express or implied, regarding fitness for a particular purpose. We wish to thank our sponsors which include Oak Ridge National Laboratory (ORNL) Laboratory Directed Research and Development (LDRD), U.S. Dept. of Energy's (DOE) Building Technologies Office (BTO), Office of Electricity (OE), Biological and Environmental Research (BER), and National Nuclear Security Administration (NNSA).
Keywords	CATEGORICAL:NONE

Keyword	Type
United States	
Buildings	
OpenStudio Models	
EnergyPlus Models	
Building Energy Modeling	

Future Typical Meteorological Weather Data (fTMY)

- 4 SSP, RCP Scenarios weather files
- Covers from 1980 to 2100
- Every CONUS county (3,281) and 18 cities
  - Representative cities of each climate zone (intl use)
- 6 Climate Models from various climate institutions around the globe
  - ACCESS-CM2; BCC-CSM2-MR; CNRM-ESM2-1; MPI-ESM1-2-HR; MRI-ESM2-0; NorESM2-MM
- 9 Weather Variables
  - Air Temp; Longwave; Shortwave; Vapor Pressure; Vapor Pressure Deficit; Relative Humidity; Precipitation; Wind; Pressure



https://bit.ly/fTMY

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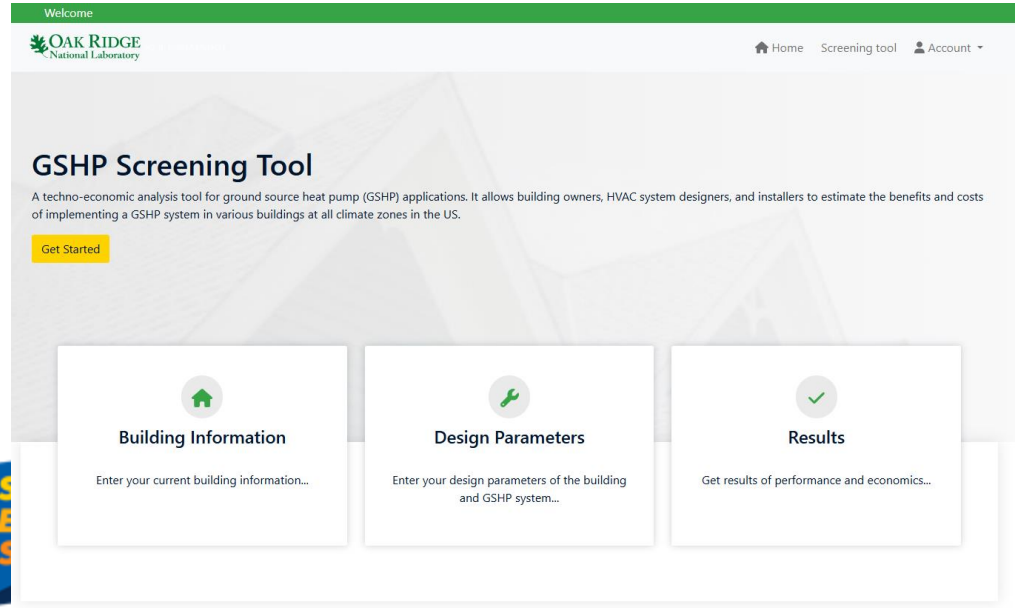
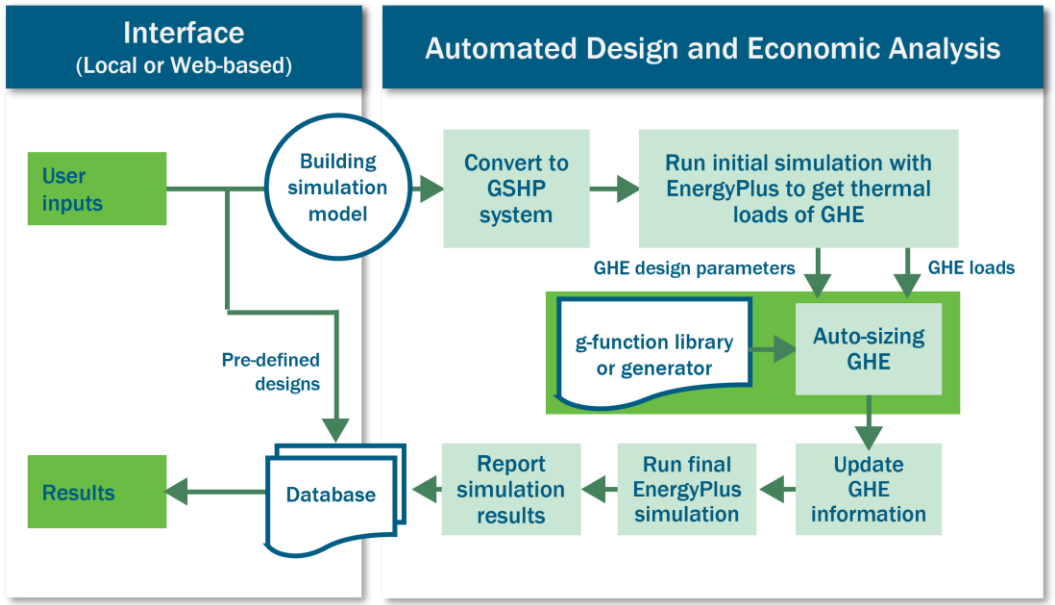
Existing Applications
Ground-source Heat Pump (GSHP) Screening Tool

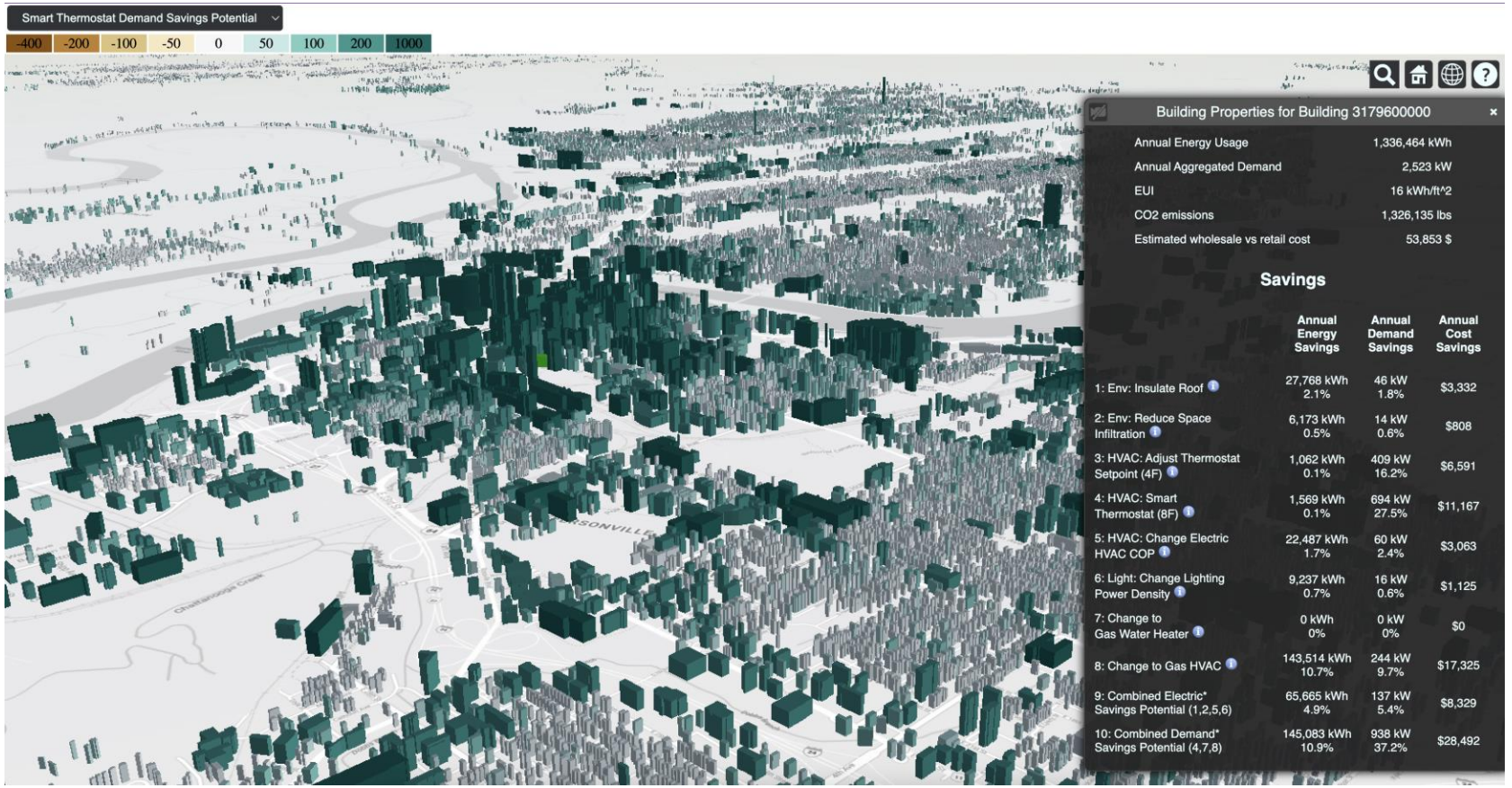
- https://gshp.ornl.gov/
- Utilize the state-of-the-art building energy simulation programs: OpenStudio and EnergyPlus
- Integrated with the latest development in Geothermal Heat Exchange (GHE) modeling to increase flexibility, speed, and accuracy
- Automatically create building energy models, size HVAC equipment and GHE, and evaluate the economics of GSHP retrofit for almost any existing building in the U.S.





Existing Applications
Virtual EPB (Chattanooga)

- Used EPB's 15-minute electricity data along with GIS data to build a "digital twin" of Chattanooga, i.e., a calibrated building energy model, for each of the 178,000 buildings in EPB's service territory



https://bit.ly/virtual_epb

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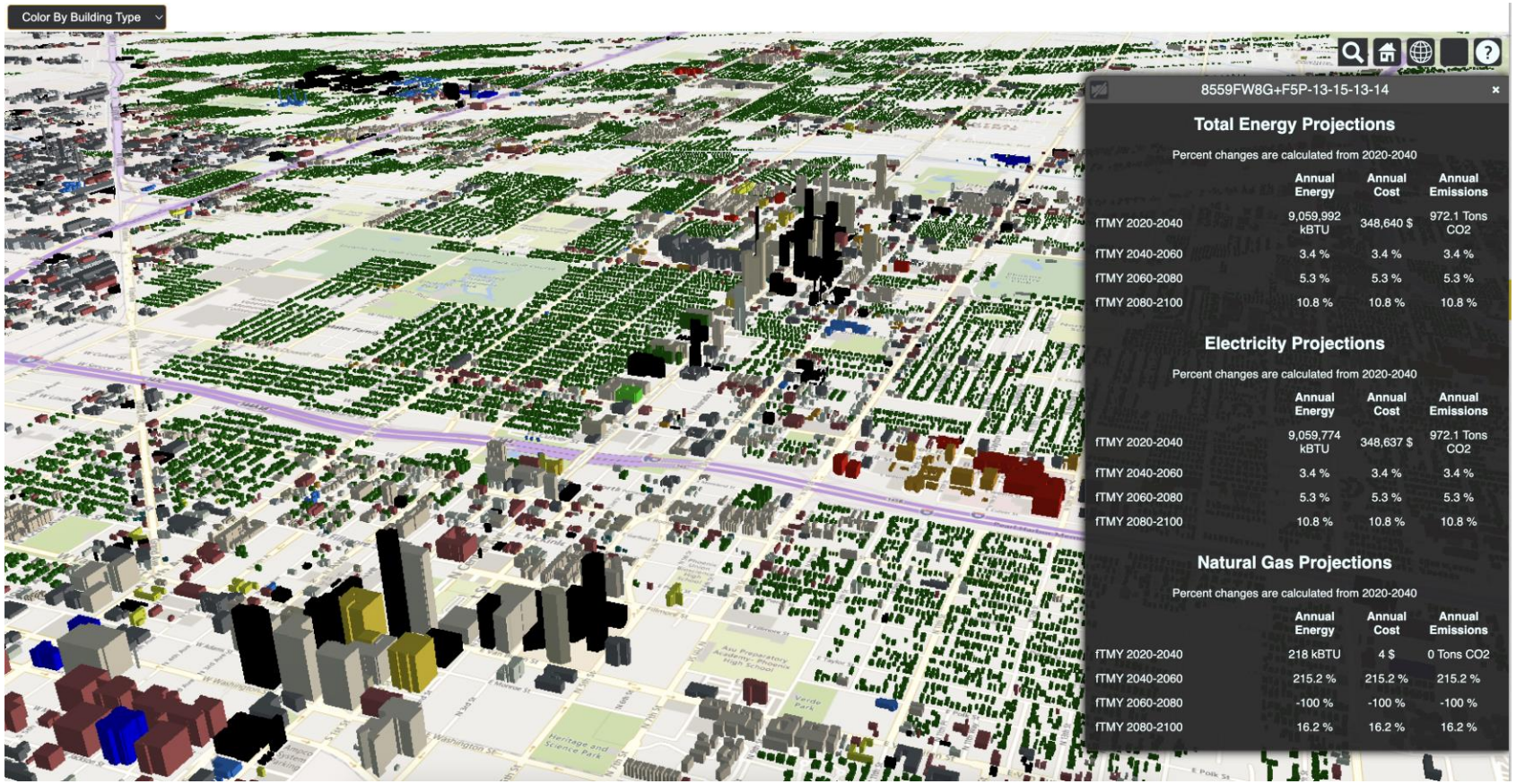
Existing Applications
Southwest Integrated Field Laboratory project

- Generate Publicly-available data and building energy models for 2,555,152 buildings in Arizona
- Study climate change impacts through year 2100 under IPCC's SSP-5, RCP-8.5 for each building in Maricopa County of Phoenix, AZ



https://ess.science.energy.gov/urban-ifls/sw-ifl/

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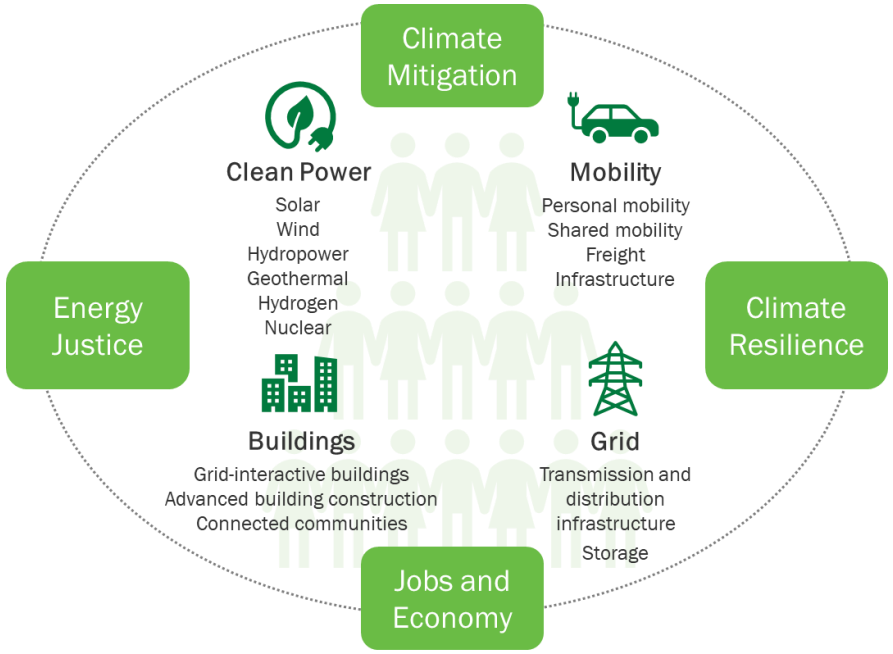
C2C: Clean Energy *to* Communities

U.S. DEPARTMENT OF ENERGY

C2C will provide innovative, cross-cutting technical solutions using an integrated approach

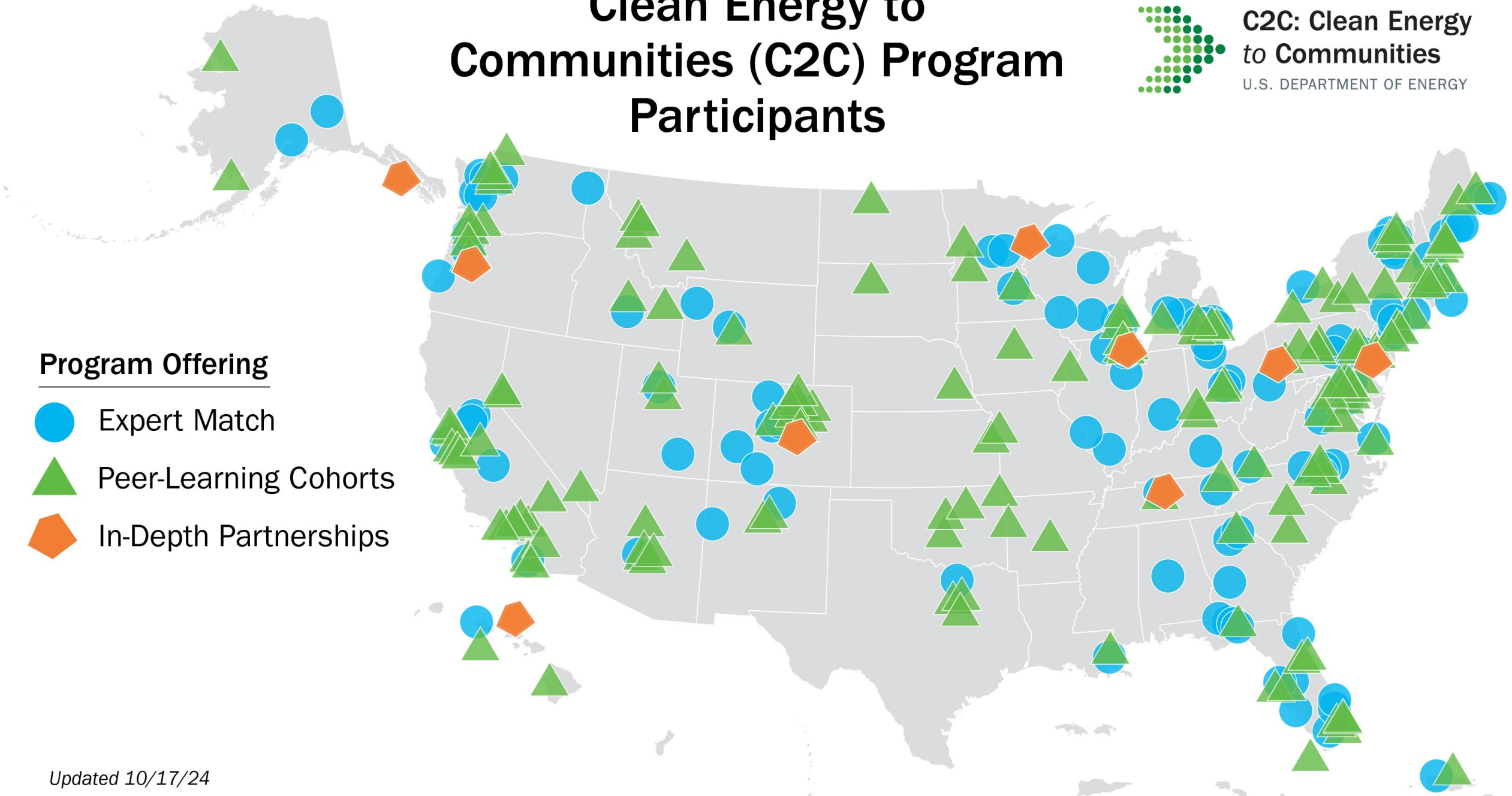


	Expert Match	Cohort	In-Depth Partnership
Eligibility	Individual organizations	Individual organizations	Teams that include: utility, local government, and a community-based organization (CBO)
Number to be Served	~200 communities	~50 communities	~4 communities
Length of Engagement & How to Apply	~2 months via web-form (live as of March 2023)	~1 year via web-form	~3 years via RFP (live as of February 2023, due May 17, 2023)

Note: "Local government" can include city, town, or county governments, tribal government, metropolitan planning organization, or regional planning organization.
The C2C was developed based on feedback from more than 160 community stakeholders and validated through piloting in Fairbanks, Alaska, and Cohoes, New York.
Additional information: www.nrel.gov/c2C and https://www.nrel.gov/docs/fy23osti/85084.pdf

Clean Energy to Communities (C2C) Program Participants

C2C: Clean Energy *to* Communities
U.S. DEPARTMENT OF ENERGY



Updated 10/17/24

ORNL's Technical Assistance Request

- Completed TA
  - Camp Hill, PA: Community Engagement
  - Barrio Carite, Puerto Rico: Clean Energy Solution; Stakeholder Engagement
  - Lansing, MI: GSHP Design
  - Raymond, NH: GSHP Design
  - Rockland, ME: HP Retrofitting
  - Brainerd, MN: CHP System Design
  - UT-Knoxville: Solar Siting & Sizing
  - Stowe, VT: Smart Grid Baseline
- Ongoing TA
  - AppVoices: VPP programs in rural Appalachia
  - Floyd, KY: Climate Mitigation & Resilience
  - Hartford, VT: GSHP & District Heating
  - Montour, IA: Building
  - Cross River, NY: Building
  - Columbus, IN: Solar Siting & Sizing
  - South Yarmouth, MA: Clean Power
  - St. Louis, MO: Clean Power
  - East Harris, TX: Mobility System
  - Viroqua, WI: Mobility System

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Mobile Homes and Municipalities Find Heat Pumps To Fit Their Needs | News

For more information:

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Thank you!