

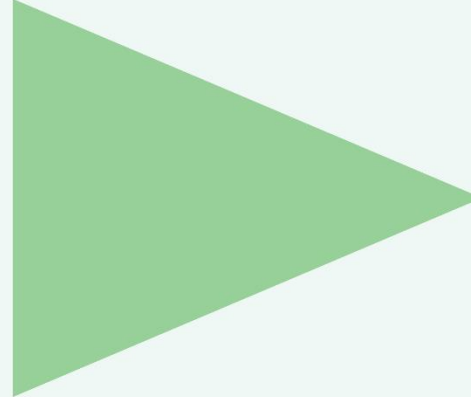
MetroCommon × 2050

#ClimateEquity #MetroCommon2050

MAPC 2019 Clean Energy Forum

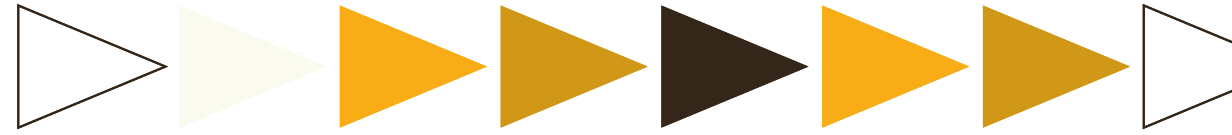


MetroCommon × 2050
Shaping our Region Together



Hello MetroCommon 2050!

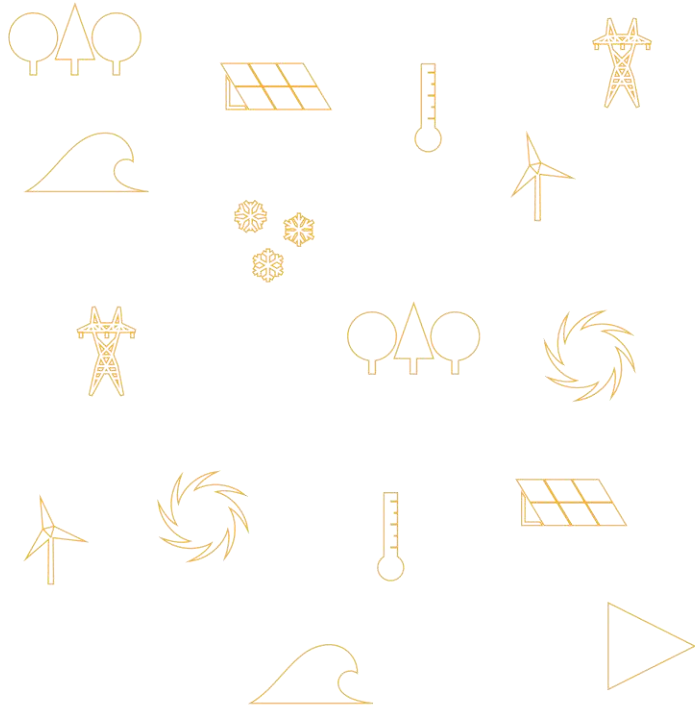
MetroCommon will let
those of us who live, work,
and play here imagine and
create the future we want –
together.

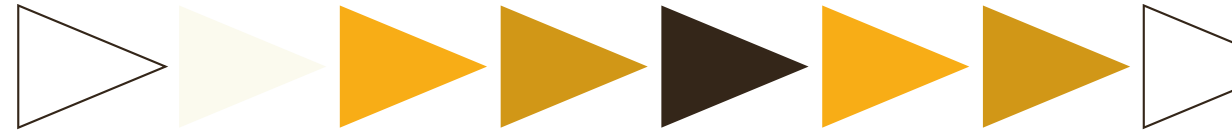


Today's Agenda

- 9:00 AM Welcome and Opening Remarks | **Marc Draisen, MAPC**
- 9:10 AM Advancing Climate Equity through MetroCommon 2050 | **Rebecca Davis, MAPC**
- 9:20 AM Opening Keynotes on Climate Justice and Audience Q&A | **Moderated by Rebecca Davis, MAPC**
- 10:35 AM *Coffee Break*
- 10:50 AM Zero to 101: Next Steps in Net Zero Planning | **Cammy Peterson, MAPC**
- 11:00 AM Tools and Frameworks for Putting Social Equity into Action | **Moderated by Megan Aki, MAPC**
- 11:30 AM Creating Access to Quality Jobs on Our Pathway to Zero | **Moderated by Jeanette Pantoja, MAPC**
- 12:25 PM Closing Remarks | **Megan Aki and Cammy Peterson, MAPC**

Our changing climate





A Climate-Resilient Region

- ▶ Metro Boston is prepared for – and resilient to – the impacts of climate change

A Net Zero Carbon Region

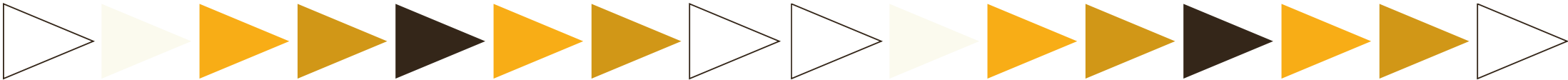
- ▶ The Metro Boston region is highly energy efficient and has reduced its greenhouse gas (GHG) emissions to net zero.

A Healthy Environment

- ▶ Greater Boston’s air, water, land, and other natural resources are clean and protected – for us and for the rest of the ecosystem.

Our response to, and preparation for, this climate crisis we face also presents an opportunity...

...to build an equitable net zero future for the Greater Boston region.



Climate Equity × MetroCommon × 2050

#ClimateEquity #MetroCommon2050

Opening Keynotes on Climate Justice

MetroCommon 2050 Speaker Series

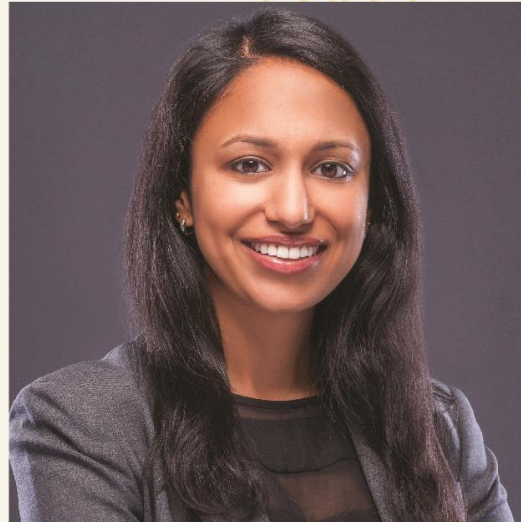


Climate Equity × MetroCommon × 2050

#ClimateEquity #MetroCommon2050



Nicole Hernandez Hammer
Project Director
Clean Energy States Alliance



Sandhya Murali
Co-Founder and COO
Solstice



Varshini Prakash
Executive Director and Co-Founder
Sunrise Movement

MetroCommon × 2050

#ClimateEquity #MetroCommon2050



**Nicole Hernandez
Hammer**
Project Director
Clean Energy States Alliance



Front-line
Communities:
Impacts and
Solutions

Nicole Hernandez
Hammer



Climate Change Impacts

Where

When

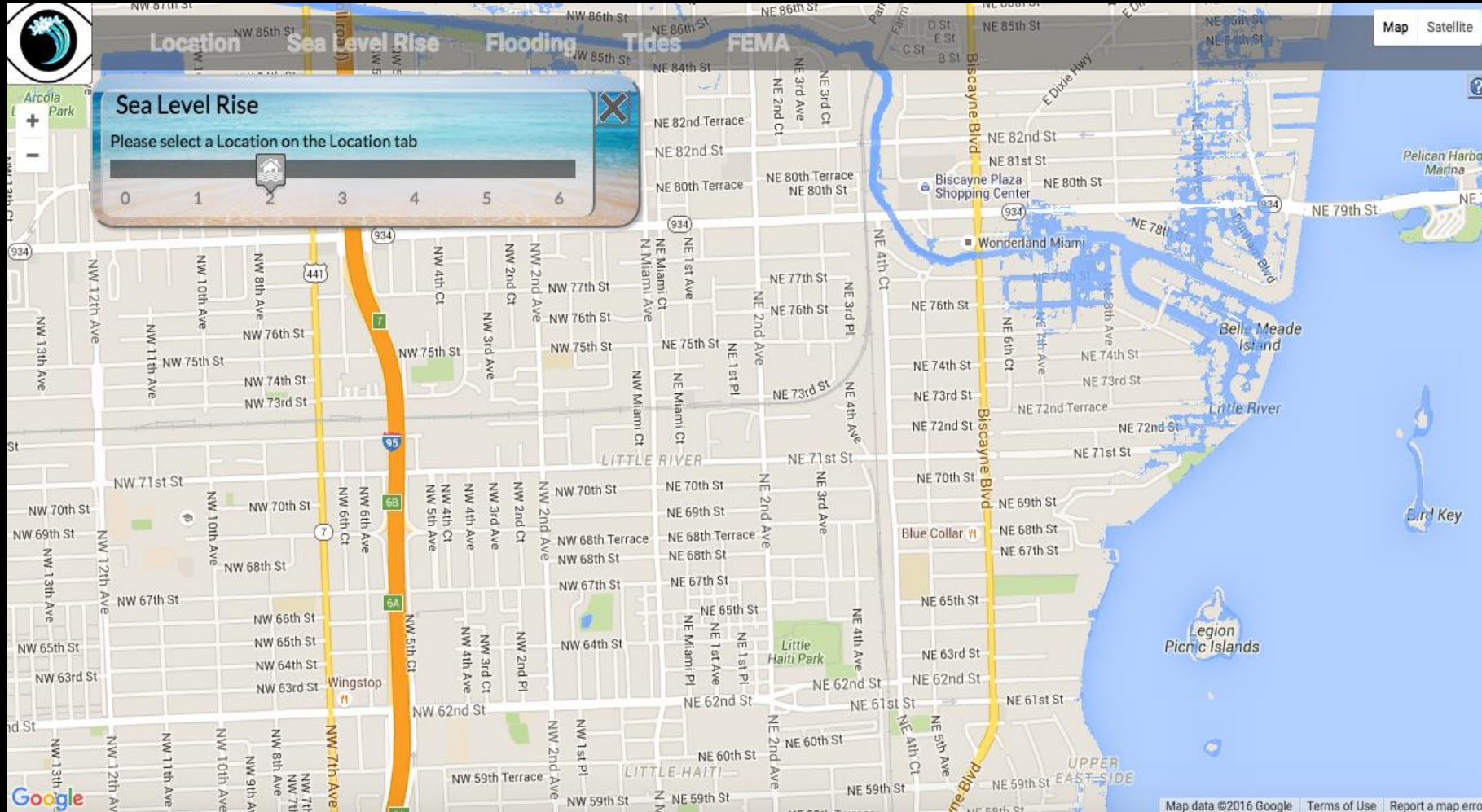
Ground Truthing

Local Outreach

Resiliency



FIU Sea Level Rise App



High Tides



StationId:8723178
 Source:NOAA/NOS/CO-OPS
 Station Type:Harmonic
 Time Zone:LT/LDT
 Datum:mean lower low water (MLLW) which is the chart datum of soundings

NOAA Tide Predictions

GOVERNMENT CUT, MIAMI HARBOR ENTRANCE, Florida, 2016

Times and Heights of High and Low Waters

October				November				December			
Time	Height	Time	Height	Time	Height	Time	Height	Time	Height	Time	Height
h m	ft cm	h m	ft cm	h m	ft cm	h m	ft cm	h m	ft cm	h m	ft cm
1 02:59 AM	0.4 12	16 02:33 AM	-0.1 -3	1 03:41 AM	0.4 12	16 02:54 AM	-0.4 -12	1 02:50 AM	0.1 3	16 03:29 AM	-0.5 -15
Sa 09:34 AM	3.1 94	Su 09:20 AM	3.5 107	Tu 10:22 AM	3.0 91	W 09:44 AM	3.4 104	Th 09:38 AM	2.7 82	F 10:16 AM	3.0 91
● 03:20 PM	0.5 15	● 03:01 PM	0.2 6	● 04:05 PM	0.7 21	● 03:25 PM	0.1 3	● 03:17 PM	0.5 15	● 04:01 PM	-0.1 -3
● 09:47 PM	3.0 91	● 09:35 PM	3.4 104	● 10:28 PM	2.8 85	● 09:56 PM	3.1 94	● 09:43 PM	2.5 76	● 10:32 PM	2.7 82
2 03:36 AM	0.4 12	17 03:22 AM	-0.2 -6	2 04:15 AM	0.4 12	17 03:46 AM	-0.2 -6	2 03:25 AM	0.2 6	17 04:22 AM	-0.3 -9
Su 10:11 AM	3.0 91	M 10:10 AM	3.6 110	W 11:00 AM	2.9 88	Th 10:36 AM	3.3 101	F 10:17 AM	2.7 82	Sa 11:06 AM	2.8 85
● 03:57 PM	0.6 18	● 03:51 PM	0.2 6	● 04:40 PM	0.7 21	● 04:20 PM	0.2 6	● 03:54 PM	0.5 15	● 04:55 PM	0.0 0
● 10:22 PM	2.9 88	● 10:24 PM	3.4 104	● 11:05 PM	2.7 82	● 10:50 PM	3.0 91	● 10:24 PM	2.4 73	● 11:24 PM	2.6 79
3 04:11 AM	0.4 12	18 04:12 AM	-0.2 -6	3 04:50 AM	0.5 15	18 04:41 AM	-0.1 -3	3 04:03 AM	0.2 6	18 05:16 AM	-0.1 -3
M 10:46 AM	3.0 91	Tu 11:01 AM	3.5 107	Th 11:39 AM	2.8 85	F 11:29 AM	3.1 94	Sa 10:58 AM	2.6 79	Su 11:55 AM	2.7 82
● 04:33 PM	0.7 21	● 04:43 PM	0.3 9	● 05:17 PM	0.8 24	● 05:17 PM	0.3 9	● 04:34 PM	0.5 15	● 05:50 PM	0.1 3
● 10:57 PM	2.8 85	● 11:15 PM	3.3 101	● 11:45 PM	2.6 79	● 11:46 PM	2.9 88	● 11:06 PM	2.4 73		
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Tu 11:26 AM	2.9 88	W 11:54 AM	3.4 104	F 12:20 PM	2.7 82	Sa 12:23 PM	3.0 91	Su 11:41 AM	2.5 76	M 06:12 AM	0.1 3
● 05:09 PM	0.8 24	● 05:37 PM	0.4 12	● 05:57 PM	0.9 27	● 06:17 PM	0.4 12	● 05:19 PM	0.5 15	M 12:46 PM	2.5 76
● 11:34 PM	2.7 82							● 11:54 PM	2.3 70	● 06:48 PM	0.2 6
5 05:22 AM	0.6 18	20 12:08 AM	3.2 98	5 12:27 AM	2.5 76	20 12:45 AM	2.7 82	5 05:33 AM	0.3 9	20 01:13 AM	2.3 70
W 12:05 PM	2.8 85	Th 06:00 AM	0.1 3	Sa 06:10 AM	0.6 18	Su 06:42 AM	0.3 9	M 12:26 PM	2.5 76	Tu 07:10 AM	0.2 6
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		● 06:35 PM	0.5 15	● 06:43 PM	0.9 27	● 07:21 PM	0.5 15			● 07:45 PM	0.2 6
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Th 06:01 AM	0.7 21	F 07:01 AM	0.3 9	Su 05:59 AM	0.7 21	M 07:46 AM	0.5 15	Tu 06:29 AM	0.4 12	W 08:10 AM	0.4 12
● 12:47 PM	2.7 82	● 01:47 PM	3.1 94	● 12:55 PM	2.6 79	● 02:19 PM	2.7 82	● 01:17 PM	2.4 73	● 02:30 PM	2.2 67
● 06:28 PM	1.0 30	● 07:39 PM	0.6 18	● 06:38 PM	0.9 27	● 08:23 PM	0.5 15	● 07:06 PM	0.4 12	● 08:42 PM	0.2 6
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F 06:44 AM	0.8 24	Sa 08:06 AM	0.4 12	M 06:58 AM	0.7 21	Tu 08:49 AM	0.6 18	W 07:32 AM	0.4 12	Th 09:08 AM	0.4 12
● 01:34 PM	2.6 79	● 02:49 PM	3.0 91	● 01:49 PM	2.6 79	● 03:17 PM	2.6 79	● 02:12 PM	2.4 73	● 03:23 PM	2.1 64
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8 01:42 AM	2.5 76	23 03:12 AM	2.8 85	8 02:12 AM	2.5 76	23 03:52 AM	2.5 76	8 02:50 AM	2.4 73	23 04:08 AM	2.1 64
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● 02:27 PM	2.6 79	● 03:52 PM	2.9 88	● 02:47 PM	2.6 79	● 04:12 PM	2.5 76	● 03:10 PM	2.5 76	● 04:16 PM	2.1 64
● 08:13 PM	1.1 34	● 09:52 PM	0.7 21	● 08:43 PM	0.7 21	● 10:15 PM	0.4 12	● 09:12 PM	0.1 3	● 10:25 PM	0.2 6
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10 03:41 AM	2.5 76	25 05:22 AM	2.8 85	10 04:21 AM	2.7 82	25 05:38 AM	2.6 79	10 04:58 AM	2.7 82	25 05:50 AM	2.2 67
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		● 07:24 PM	2.9 88					● 07:02 PM	2.8 85	● 07:20 PM	2.2 67

Ground Truthing

Town or City	Intersection	Google Map	W
Miami Beach	IndianCreek Road between 28th and 29th Street /Flamingo Drive	https://www.google.com/maps/place/Miami+Beach,+FL+33140/@25.8051499,-80.1921111,15z	9:2
Miami Beach	Collins Ave. and 24th St	https://goo.gl/maps/o5kZCDGTtr12	9:2
Miami Beach	Collins Ave. and 29th St.	https://goo.gl/maps/vGCyuJwJfSv	9:2
Miami Beach	North Bay Rd. between W. 27th St. a	https://goo.gl/maps/RMAtjnxMts22	9:2
North Bay Village	S. Treasure Dr. and Adventure Ave.	https://goo.gl/maps/4bcokbLsaZC2	10:
Venetian Islands/ San Marino	3rd San Marino Terrace and E. San I	https://goo.gl/maps/JCSXkfPp1A22	10:
Miami	N.E. 77th St. and N.E. 7th Ct.	https://goo.gl/maps/xHz3Qh5ocuw	9:5
Miami	N.E. 10th Ave. and N.E. 78th St	https://goo.gl/maps/H2xGUyepfK2	9:5
Miami	N.E. 7th Ave. and N.E. 32nd St	https://goo.gl/maps/HW312ipLi9y	9:5
Palm Island	N. Coconut Ln.	https://goo.gl/maps/8LeU3Gg2ZSH2	9:5
Coral Gables	Matheson Hammock Park	https://goo.gl/maps/44GboKKab42	9:5
Sweetwater	S.W. 5th Ter. and S.W. 114th Ave.		9:5
Cutler Bay/Homestead	S.W. 240th St. and S.W. 97th Ave.	https://goo.gl/maps/YQBxFN1FtLz	9:5
Tamiami/Kendall West	North of 2423 S.W. 147th Ave.	https://goo.gl/maps/guDpgsRNUi42	9:5
Hialeah	W. 31st St. and 14th Ln.	https://goo.gl/maps/aaxjtr4JGwM2	9:5
Hialeah	W. 6th Ave. and W. 25th St.	https://goo.gl/maps/tYgnWxu7J9J2	9:5
Hialeah	W. 23rd St. and W. 9th Ave.	https://goo.gl/maps/nXjrRgYM4NM2	9:5
North Miami	N.E. 141 St. between N.E. 3rd Ct. an	https://goo.gl/maps/vCjZB3fuFQ62	9:5
BBC Campus	Bay Vista Blvd between AC2 Parking Lot and Kovens		9:5
MMC Campus	SW 112th Avenue and East Campus Dri	https://www.google.com/maps/@25.7600926,-80.3755174,18z	9:5







Yuzbeny Escobar, 2015

Town Hall



Town Hall Photos,
David McDougall 2016





Shorecrest

Little River Edge/Bank

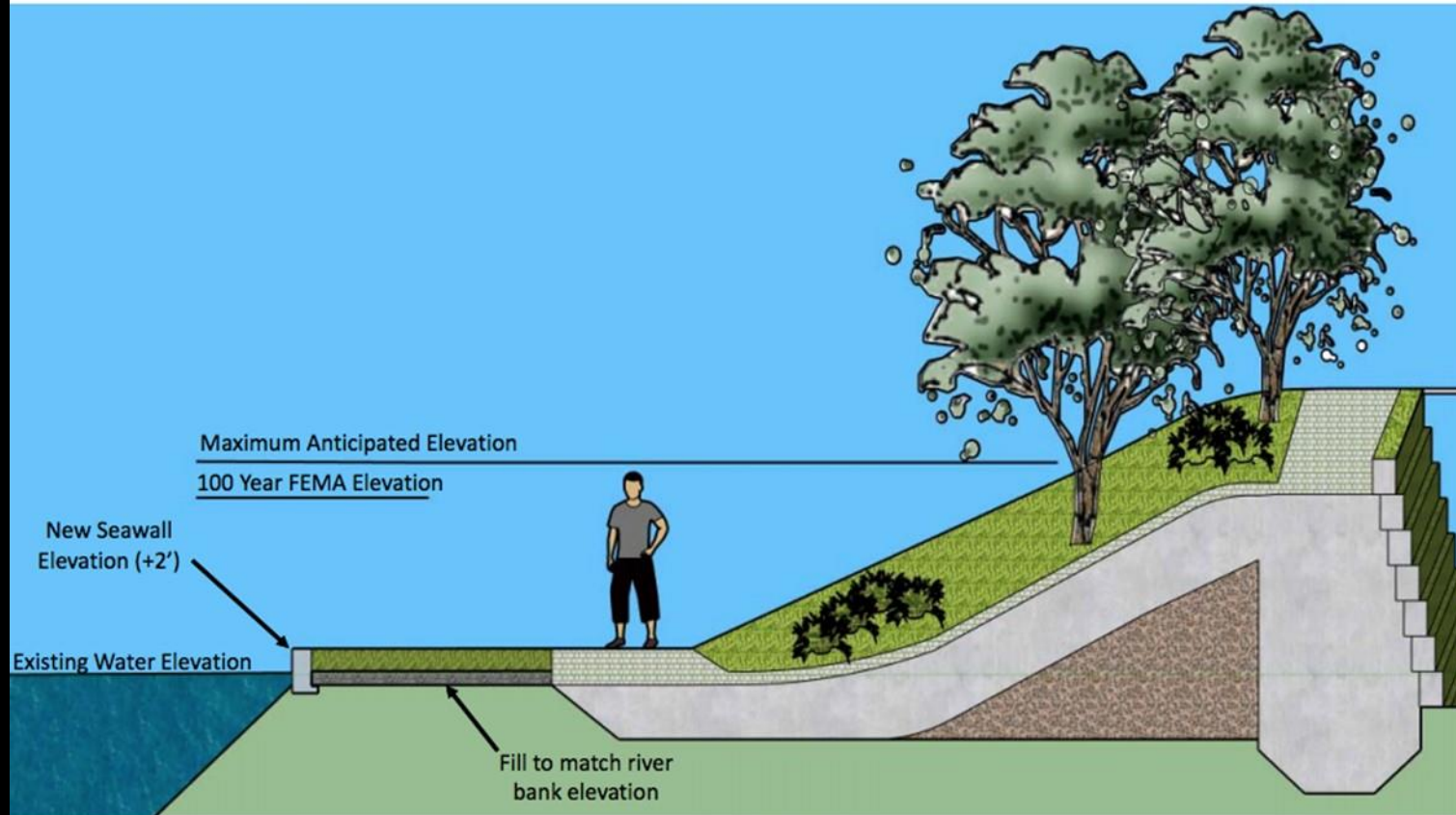


February 2017



Shorecrest

Opportunities for Riverbank



February 2017





Solar with Justice

Strategies for Powering Up Under-Resourced
Communities and Growing an Inclusive Solar Market



Clean Energy States Alliance • Jackson State University Department of Urban and Regional Planning
Partnership for Southern Equity • PaulosAnalysis • University of Michigan School for Environment and Sustainability
The Nathan Cummings Foundation • The Solutions Project



Becca Eiland



Energy Trust of Oregon

Nicole Hernandez Hammer

Project Director

Clean Energy States Alliance

Email: nicole@cleanegroup.org

MetroCommon × 2050

#ClimateEquity #MetroCommon2050



Sandhya Murali
Co-Founder and COO
Solstice





SOLSTICE

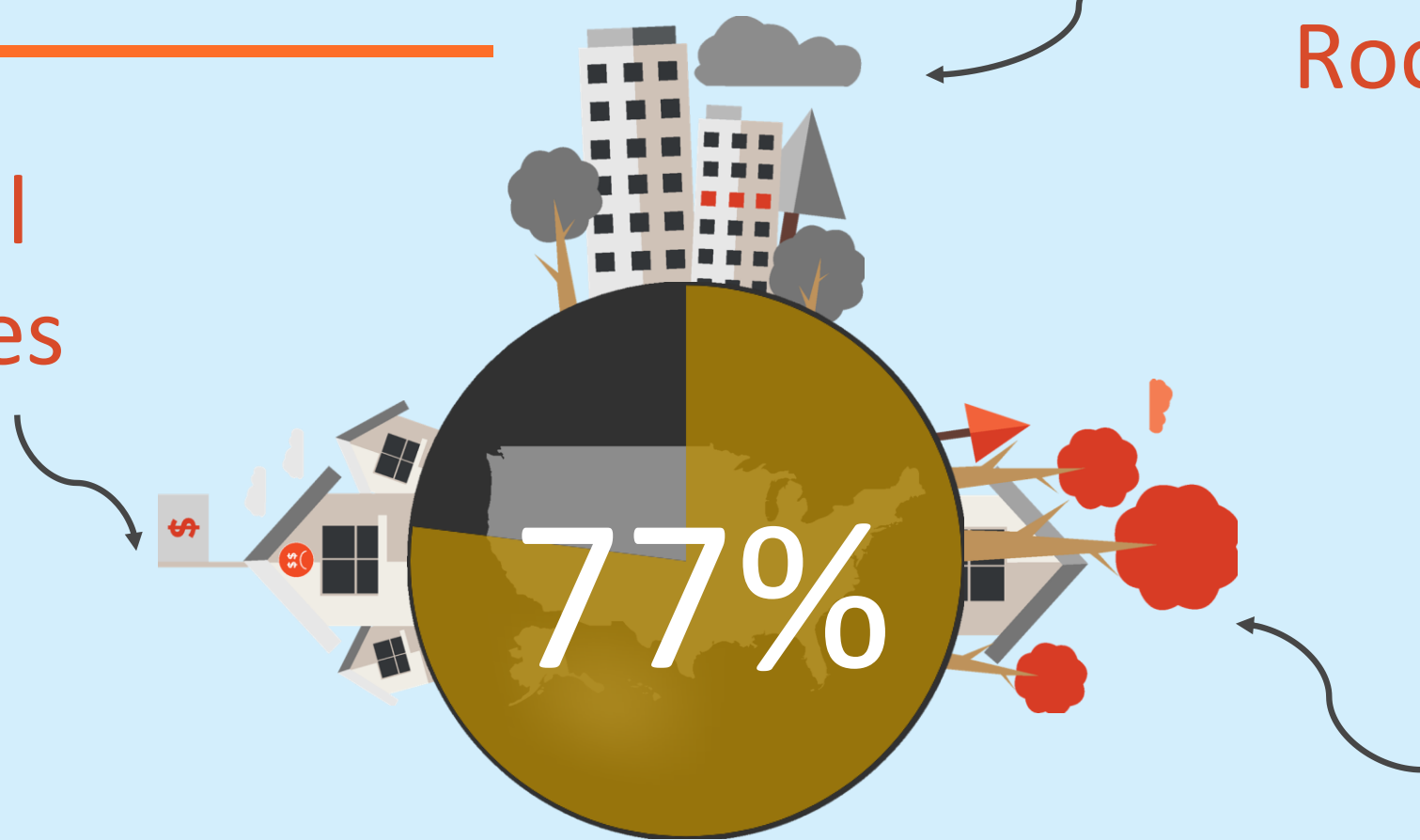
Solar for every American

MAPC Climate Equity x MetroCommon 2050
December 11, 2019
Sandhya Murali, Co-founder & COO

THE PROBLEM

Financial
Obstacles

No
Roof



Shading /
Structural
Issues

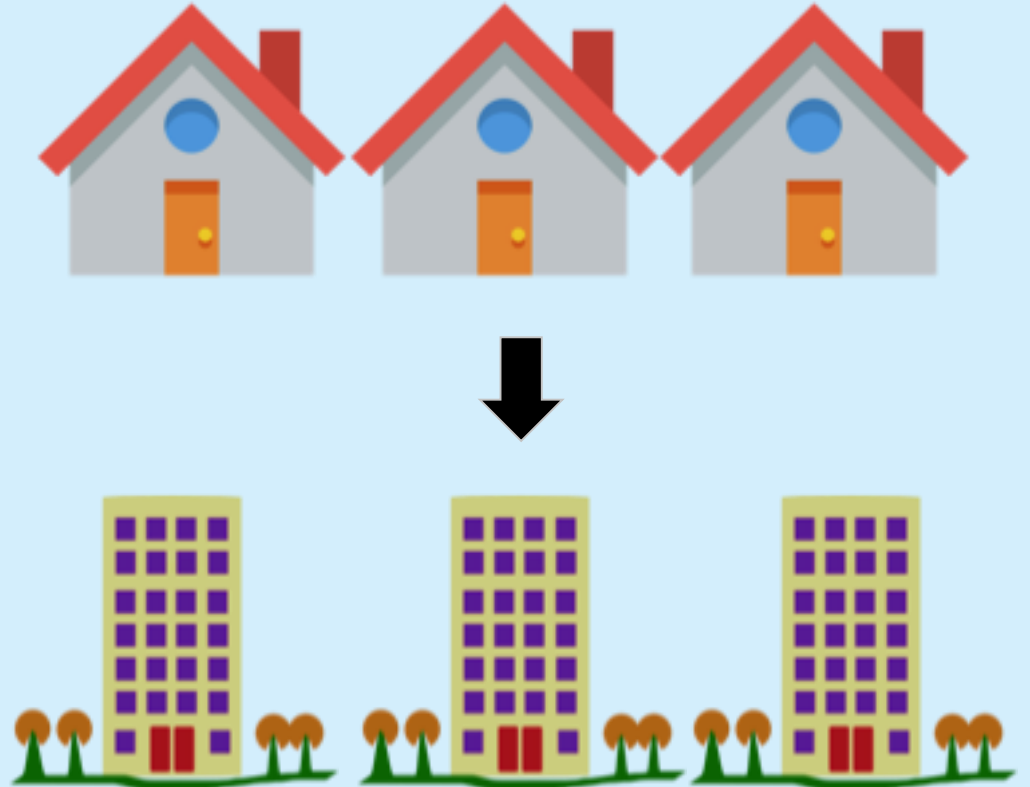
Locked Out of Rooftop Solar

WHY ENERGY EQUITY?

Low-to-moderate income households (LMI) disproportionately:

- 1) Pay a portion of their income on electricity
- 2) Bear the effects of climate change, pollution, and extreme weather
- 3) Are locked out of the benefits of clean energy

Current Clean Energy Beneficiaries:
High-Credit Homeowners



Future Beneficiaries:
Underserved Renters

THE SOLUTION: COMMUNITY SHARED SOLAR



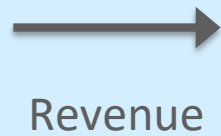
No prohibitive,
upfront cost

No rooftop
requirements
or restrictions

THE SOLSTICE MODEL

Solstice expands the market for community solar by creating a seamless customer experience and viral community for shared solar

Solar project developers



Households and organizations that cannot do rooftop solar



SOLAR FOR EVERY AMERICAN



Financial Innovation:

EnergyScore, an inclusive underwriting metric for solar projects



Inclusive Solar Project Enrollment:

Inclusive solar education for LMI communities
Affordable housing demonstration projects

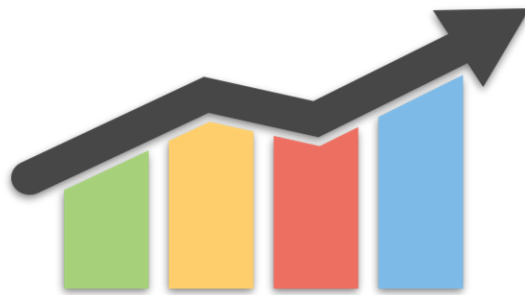


Advocacy:

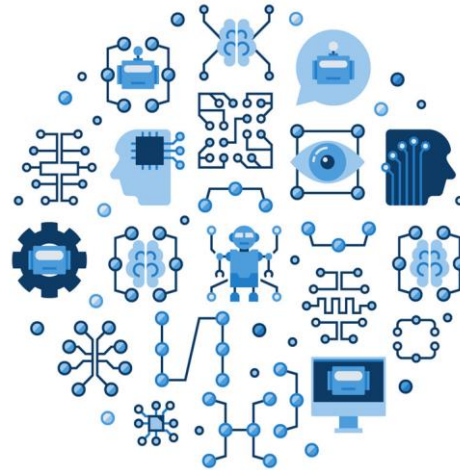
Public policy
Movement building

THE ENERGYScore

Data- Driven Inclusion: Typical FICO credit score requirements exclude over half of all Americans



Analyzed consumer data to identify payment trends



Built alternative qualifying metric: "the EnergyScore"



Piloting the EnergyScore through inclusive solar projects

THE ENERGYScore

More accurate and inclusive than FICO for community solar



Machine learning using
consumer records



Increases accuracy in
predicting utility bill payment
by 40%



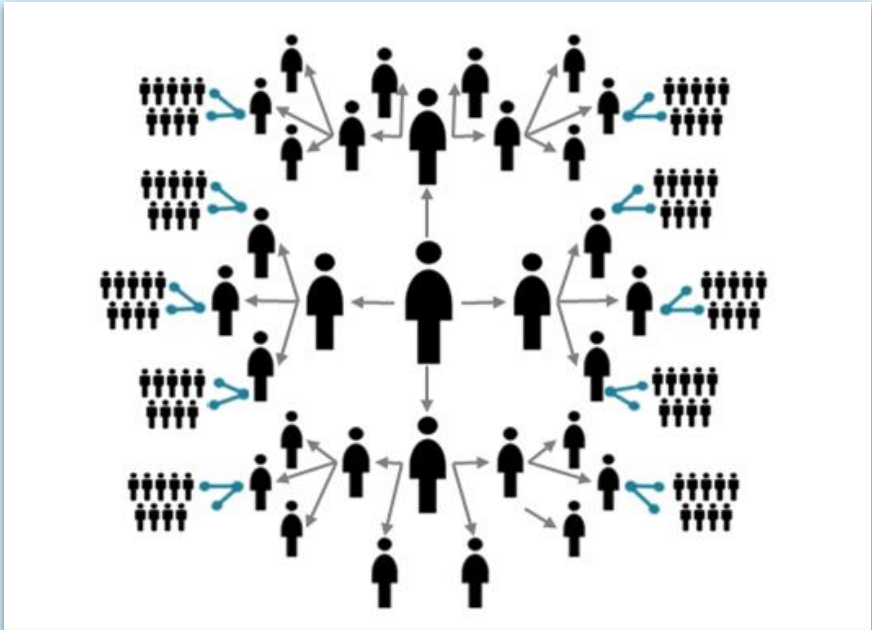
11% more inclusive of low-
and moderate- income
households

INCLUSIVE SOLAR EDUCATION

Unlocks access for low-income households




Confronting information asymmetries through community organizing and education



Harness network effects to achieve scale and inclusion

INCLUSIVE SOLAR EDUCATION



Simplifying the customer experience via a frictionless digital platform



60,000
Households
Educated



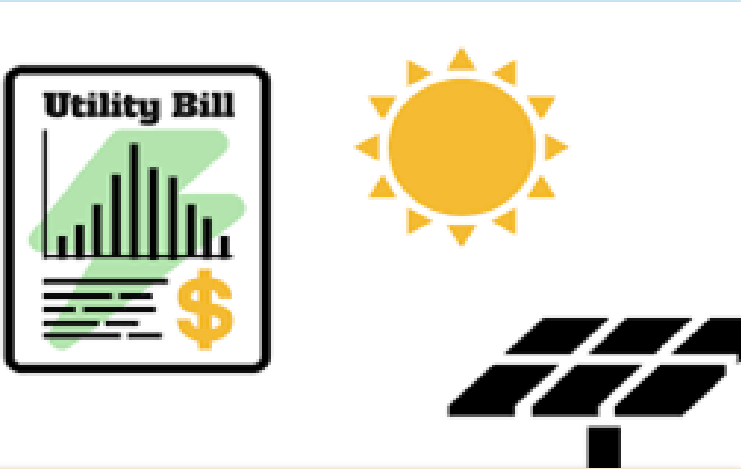
100+ MW
Solar Demand
Generated

COMMUNITY SOLAR ON AFFORDABLE HOUSING

4 MW of solar on New York City Housing Authority properties will pilot the EnergyScore and offer:



Workforce training and job creation for tenants

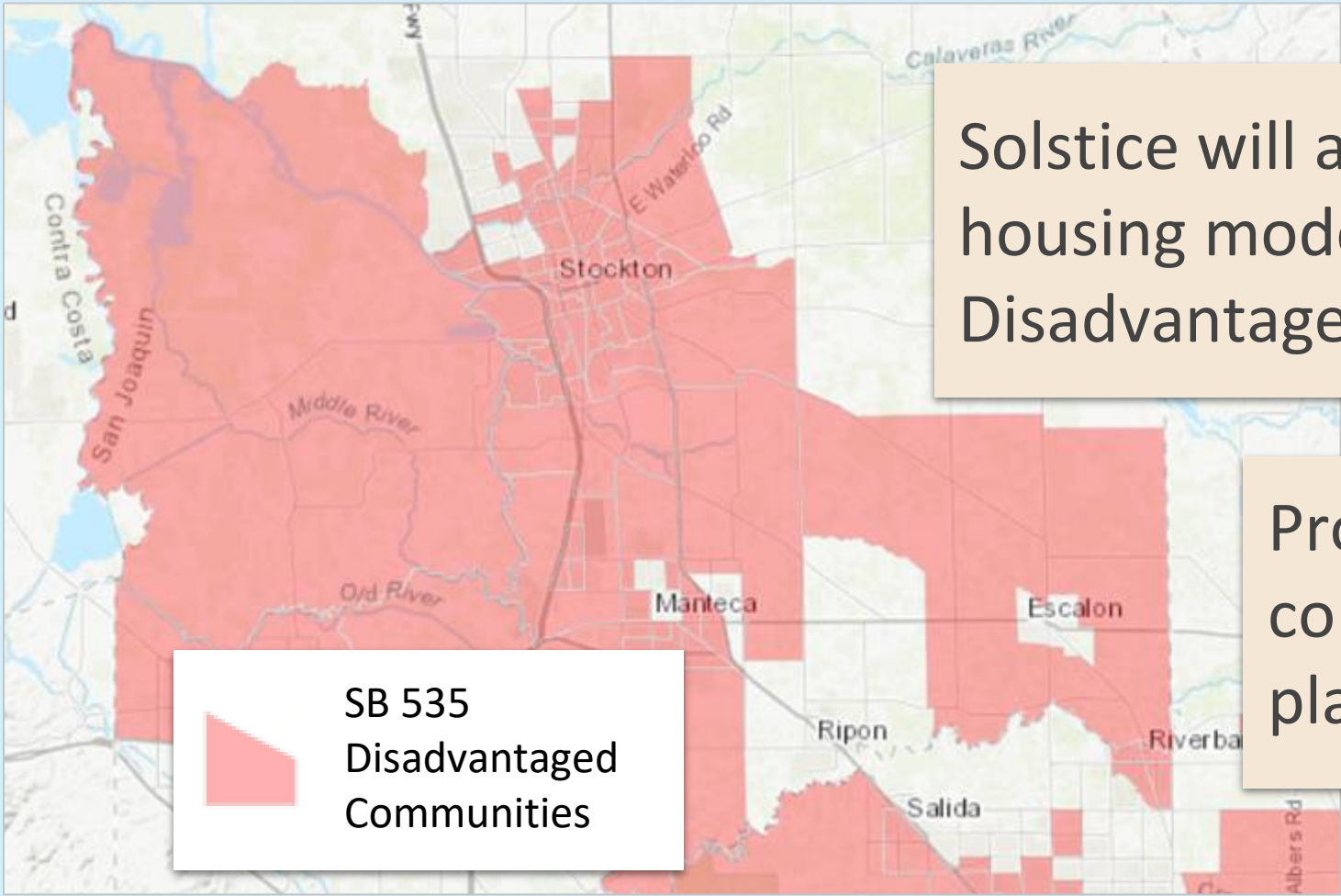


Energy bill savings for low-income households



Lease payments to NYCHA to fund tenant programs

CA AFFORDABLE HOUSING EXPANSION



Solstice will adapt our affordable housing model to California Disadvantaged Communities (DACs)

Projects will incorporate community leadership in planning and outcomes

INCLUSIVE POLICY FRAMEWORK

Solstice is active in 11 states across the country



New York State Policy Wins

Advocated for and helped shape a \$21 million incentive for low-income community solar in NY

Successfully lobbied NY Public Service Commission to de-risk low-income solar pilot projects via a New York Green Bank loan-loss reserve

MetroCommon × 2050

#ClimateEquity #MetroCommon2050



Varshini Prakash
Executive Director and Co-Founder
Sunrise Movement

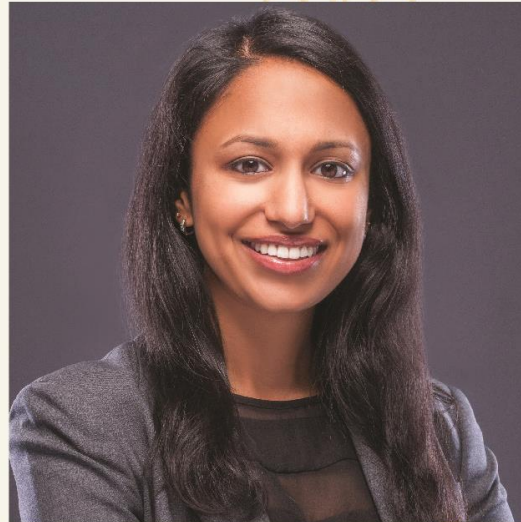


Climate Equity × MetroCommon × 2050

#ClimateEquity #MetroCommon2050



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Co-Founder and COO
Solstice



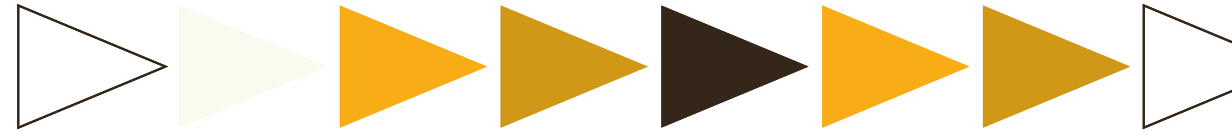
Varshini Prakash
Executive Director and Co-Founder
Sunrise Movement

MetroCommon × 2050
Process Timeline

2.5 years

- ▼ **Phase 1**
What do we want for the region?
- ▼ **Phase 2**
What larger forces could help or hamper us?
- ▼ **Phase 3**
What can we do that will work?
- ▼ **Phase 4**
What recommendations and policies should we adopt?
- ▼ **Phase 5**
The Common work begins





Today's Agenda

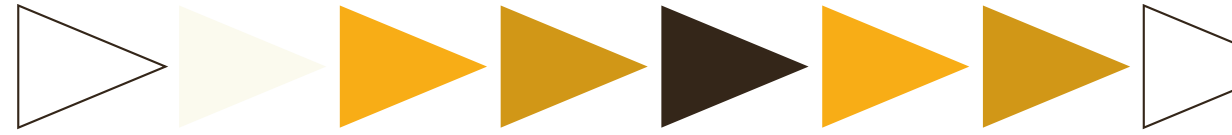
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- 11:00 AM Tools and Frameworks for Putting Social Equity into Action | **Moderated by Megan Aki, MAPC**
- 11:30 AM Creating Access to Quality Jobs on Our Pathway to Zero | **Moderated by Jeanette Pantoja, MAPC**
- 12:25 PM Closing Remarks | **Megan Aki and Cammy Peterson, MAPC**

Climate Equity × MetroCommon × 2050

Next Steps in Net Zero Planning

Zero to 101





MAPC Clean Energy

Regional Clean Energy Projects

- ▶ LED Streetlight Retrofit Program
- ▶ ESCO Procurement
- ▶ Regional Solar Initiative
- ▶ Green Municipal Aggregation
- ▶ Green Mobility Program
- ▶ Energy Resiliency

Climate and Clean Energy Planning

- ▶ Clean energy and climate baselining, planning, and strategizing
- ▶ Connecting municipalities with incentives + plug-and-play programs
- ▶ Outreach programming and education

Clean Energy Technical Assistance

- ▶ Grant Writing
- ▶ Green Communities Support
- ▶ Methane Leaks
- ▶ Permitting and Zoning
- ▶ State and Local Policy
- ▶ Net Zero Guidance & Education



A quick look back in time...



Climate Equity × MetroCommon × 2050



NET ZERO TO 101

Net Zero Process Guide

Set a Target and Make a Plan

The suggestions below are a sampling of best practices drawn from exemplar cities and towns, guidebooks, and MAPC's experience working in the region. The steps below are not linear and are dependent on the current stage of planning for each municipality. The process will likely look different from municipality to municipality due to governance structures, funding, staff capacity, and other resources.



Recruit
Support
from
Community



Pursue
Commitment



Prioritize
Holistic
Planning



Gather
Necessary
Information

FROM NET ZERO TO 101

Explore steps to conduct your own Net Zero Plan.

- [What is Net Zero?](#)
- [Planning Framework](#)
- [Process](#)
- [Net Zero Case Studies](#)
- [Energy Consumption Dashboard](#)

QUESTIONS?

For more information about Net Zero Planning, contact Clean Energy Coordinator, Nicole Sanches, at nsanches@mapc.org.

[BACK TO MAIN MENU](#)

www.mapc.org/net-zero

What is Net Zero?



Net Zero Planning means the development of community-wide multi-sectoral goals, strategies, and processes to enable a municipality to achieve net zero carbon emissions.

To achieve **Net Zero**, a community – or other entity – must reduce greenhouse gas (GHG) emissions to the greatest extent possible and balance out any remaining emissions through GHG removal.

Holistic Planning Framework

Focused on the benefits of carbon mitigation:



Working with MAPC on Net Zero

DATA

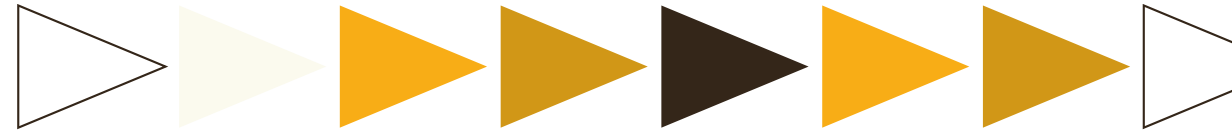
- ▶ Complete data collection and development of a GHG inventory
- ▶ Analysis of inventory results and summary report development
- ▶ Training and/or coaching on use of MAPC's new Inventory Tool (coming in 2020)
- ▶ Design of communications materials with GHG inventory data

GOALS

- ▶ Development of ordinances / goal setting language
- ▶ Support on adoption processes

PLANS

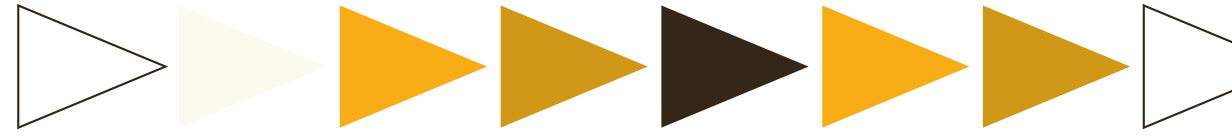
- ▶ Assessment and mapping of vulnerable populations
- ▶ Development of community engagement strategy
- ▶ Creation of net zero action roadmaps
- ▶ Creation of climate action plans



Working with MAPC on Net Zero

STRATEGIES (a sampling of net zero best practices)

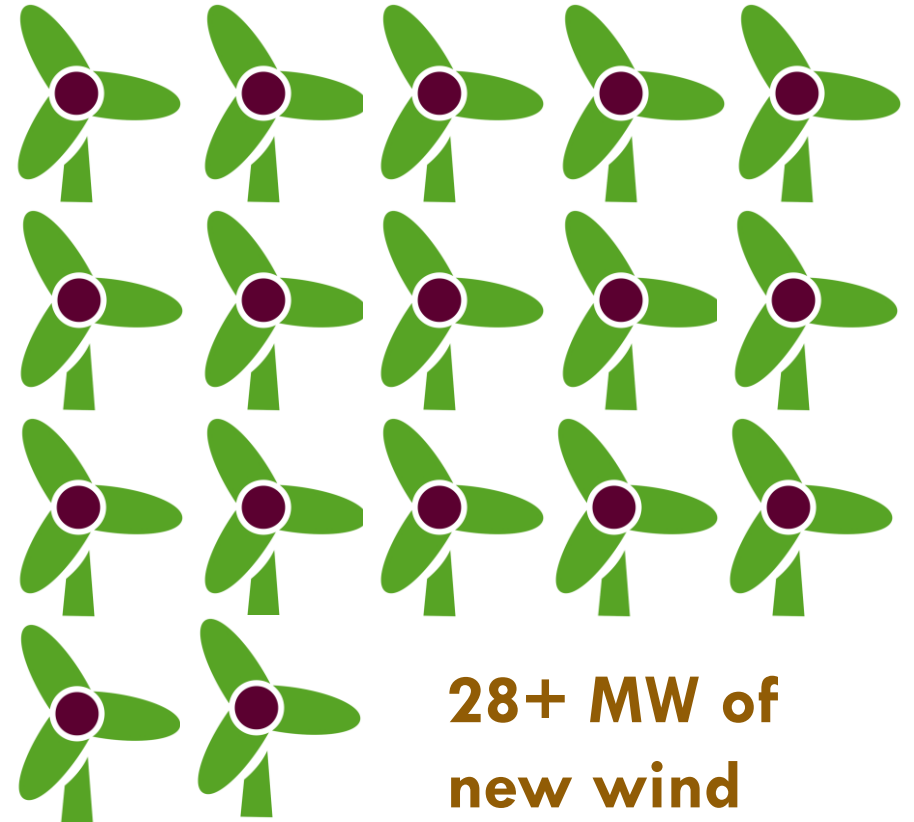
- ▶ Establish a green municipal aggregation program to increase renewable energy supply
- ▶ Encourage adoption of zero emission vehicles in the passenger and commercial fleet
- ▶ Perform deep energy efficiency retrofits of all existing buildings
- ▶ Build all new construction to passive house / net zero standards
- ▶ Adopt climate-smart zoning and permitting practices
- ▶ Host community shared solar to spread the benefits of renewable energy
- ▶ Increase and improve bicycle and pedestrian infrastructure to encourage mode shift
- ▶ Implement nature-based solutions, from the streetscape and built environment to shorelines and wetlands

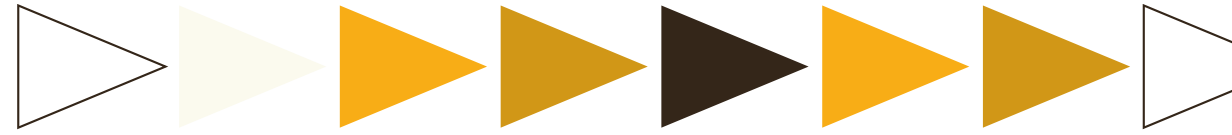


Municipal Playbook – Green Municipal Aggregation

The MAPC strategy effectively increases the state's minimum requirement for new renewable energy, helping to build even more renewable generation in our region.

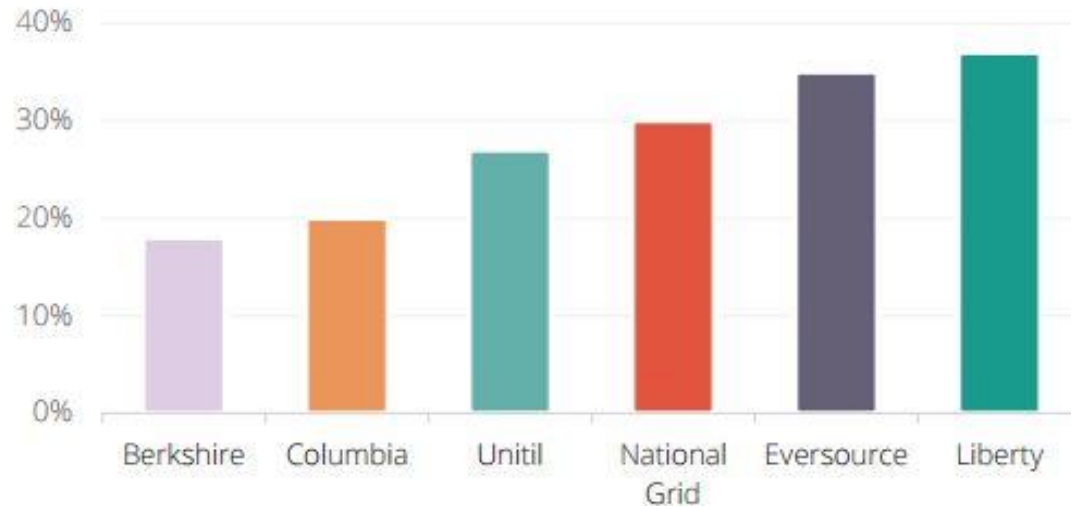
- Arlington
- Bedford
- Brookline
- Dedham
- Gloucester
- Hamilton
- Medford
- Melrose
- Millis
- Rockland
- Scituate
- Somerville
- Stoneham
- Sudbury
- Waltham
- Winchester





Municipal Playbook – Gas Leaks

Percent Leak-Prone out of Total Gas Mains by Gas Company



[FixOurPipes.org](https://www.fixourpipes.org)



CORROSION:
Leak-prone pipe is susceptible to rust and corrosion, causing new leaks.

JOINTS:
Leaks frequently occur at the joints of leak-prone pipe, as old fittings degrade and the freeze-thaw cycle shifts soil.

Our Aging Infrastructure

DID YOU KNOW: Massachusetts has some of the oldest natural gas main infrastructure in the nation. The average age of pipe is >60 years, and over 30% of this infrastructure consists of leak-prone pipe, primarily made of cast-iron.

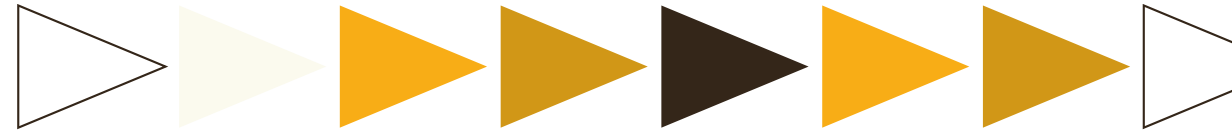
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Tackling emissions from our buildings

- ▶ Maximize energy efficiency in our existing buildings.
- ▶ Build all new construction to net zero emissions standards.
- ▶ Power our buildings with affordable, carbon-free energy



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Four ways that Massachusetts municipalities can impact building regulations...

VOTE

COMMENT

ADOPT

ENFORCE

International Energy
Conservation Code
(IECC)

Base Code
(MA Building Code
CMR 780)

Stretch Energy Code
(780 CMR Ch. 15 AA)

Zoning and other
local ordinances

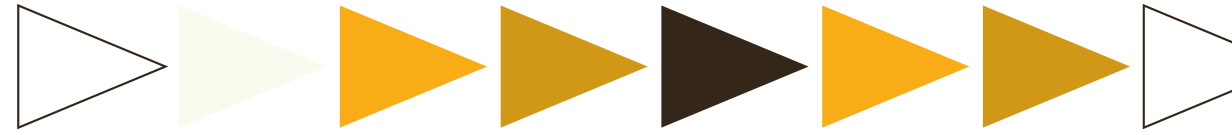
Stretch Energy Code
(780 CMR Ch. 15 AA)

Zoning and other
local ordinances

Base Code
(MA Building Code
CMR 780)

Stretch Energy Code
(780 CMR Ch. 15 AA)

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Communities across Massachusetts are using local levers to enact change



Wayland
MASSACHUSETTS

MARCH 26, 2018

MOVER: *Ellen Tohn*

MOTION – 2018 ATM

ARTICLE 22: RESOLUTION: ENERGY AND CARBON SAVINGS IN MUNICIPAL BUILDING CONSTRUCTION

I MOVE YOU SIR:

MOVED:

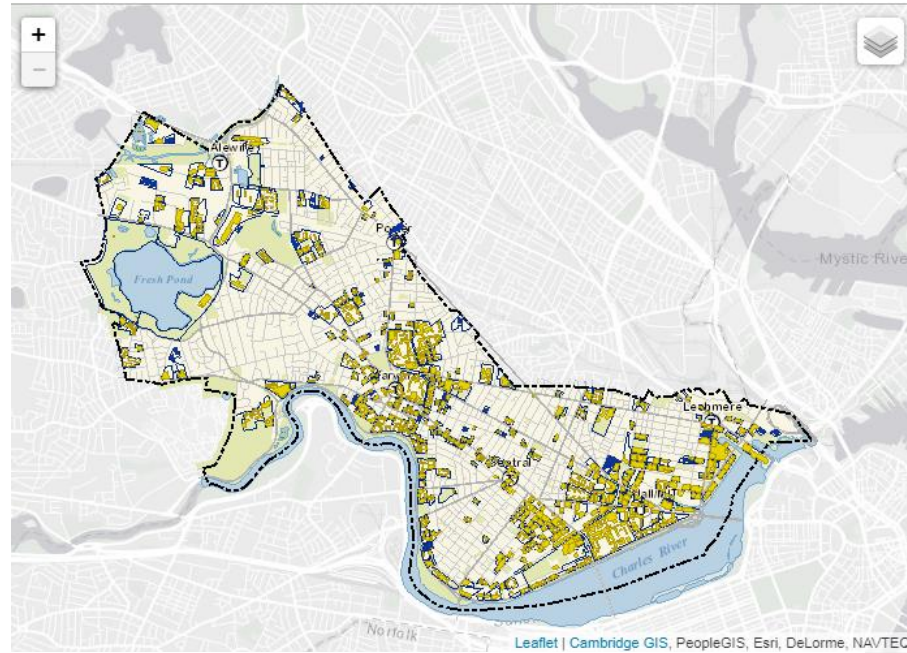
Whereas Wayland was recognized as a Massachusetts Green Community in 2011 and has a commitment to reduce municipal carbon-based energy use and encourage reduction of residential and commercial carbon-based fuel use.

Whereas, Wayland recognizes that global warming is a threat to our world, impacting the ability of current and future generations to lead healthy, productive and enriching lives.

Whereas, buildings can be designed to reduce their energy and carbon use, lower their lifetime energy operating costs, and improve their energy resiliency by incorporating cost effective energy efficient design, building system controls, and on-site renewable energy generation and energy storage.

Whereas, our municipal buildings are a significant contributor to municipal carbon-based energy costs. New construction and substantial renovation of municipal buildings are significant expenditures and create structures that will endure for decades.

Therefore, be it resolved that Wayland shall seek cost-effective design and construction of all new municipal building construction and substantial renovation projects to minimize carbon-based energy use through cost-effective energy efficient design, building system controls, and on-site renewable energy generation and energy storage.



Building Energy Use Disclosure Compliance Map



CITY OF BOSTON
BUILDING ENERGY REPORTING AND DISCLOSURE ORDINANCE

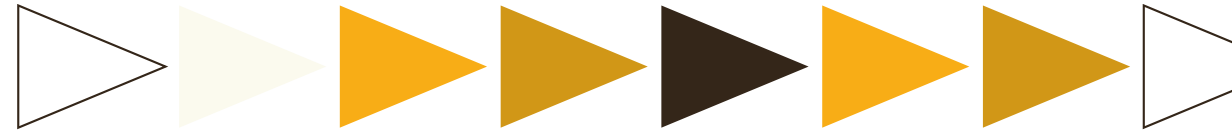
Art. 29: Zero Energy Town Buildings

Amherst Select Board & Mothers Out Front

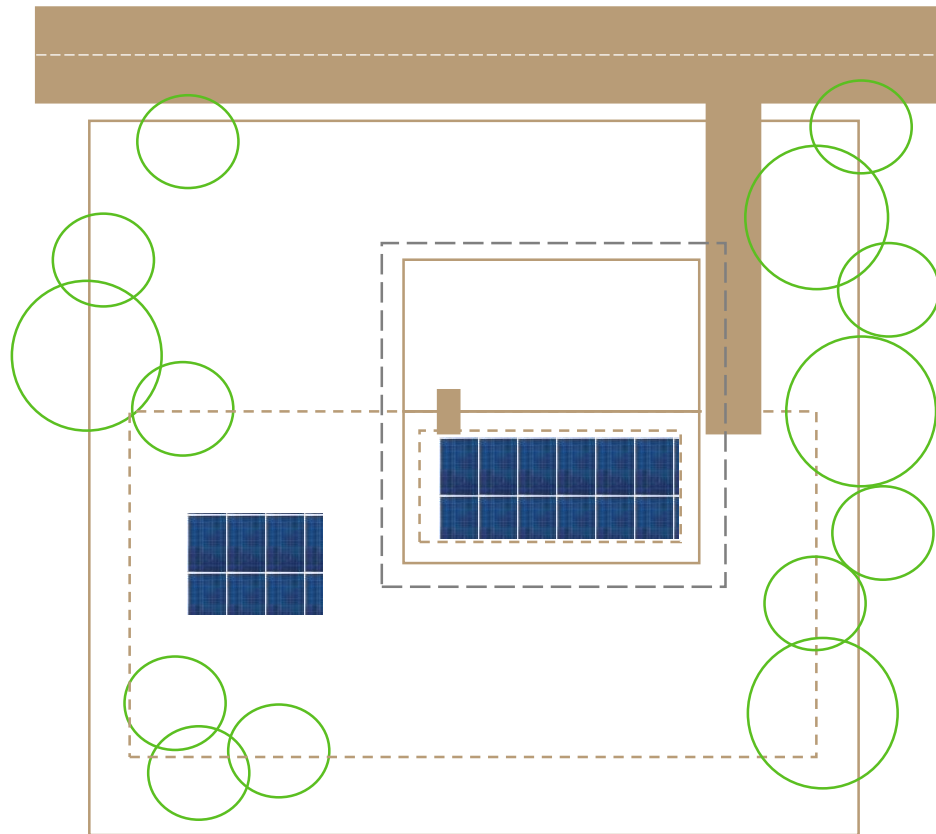
April 11, 2018

The work was done in a spirit of collaboration with a goal of preserving the original purpose of the Zero Energy Bylaw, while avoiding possible obstacles to implementation identified by Town officials. The following chart summarizes the major changes from the original bylaw that would be made by the proposed replacement Zero Energy Town Buildings Bylaw:

Current Zero Energy Bylaw	Proposed Zero Energy Town Buildings Bylaw
1. Compliance is based on the energy performance of the Project during 12 months of operation of the completed Project. The building administrator was to continue working towards zero energy compliance each year until achieved. [See current bylaw § 2.e.i]	1. Compliance is based on the modeled performance of the Project at the completion of the construction design documents, with zero energy capability certified by the Project's architect. The design will also be peer reviewed for zero energy capability. [See proposed bylaw § 3]
2. More challenging to determine at funding and contracting whether the Project is bylaw-compliant (since compliance is based on future operation).	2. Easier to determine at funding and contracting whether the Project is bylaw-compliant (since compliance is based on design, not future operation).
3. Required energy efficiency of the building or addition is implicit, but not explicit in bylaw. [See § 2.c]	3. Required energy efficiency of the building or addition is explicit in proposed bylaw. [§§ 1.a, 3.a, and Definition of "Zero Energy Capable"]

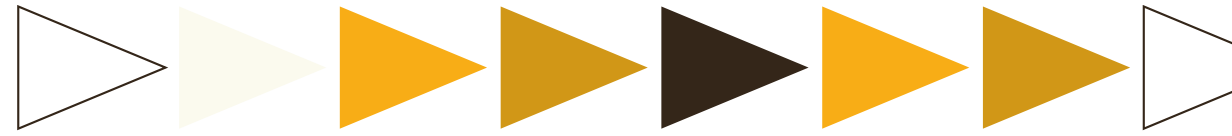


Municipal Playbook – Climate Zoning

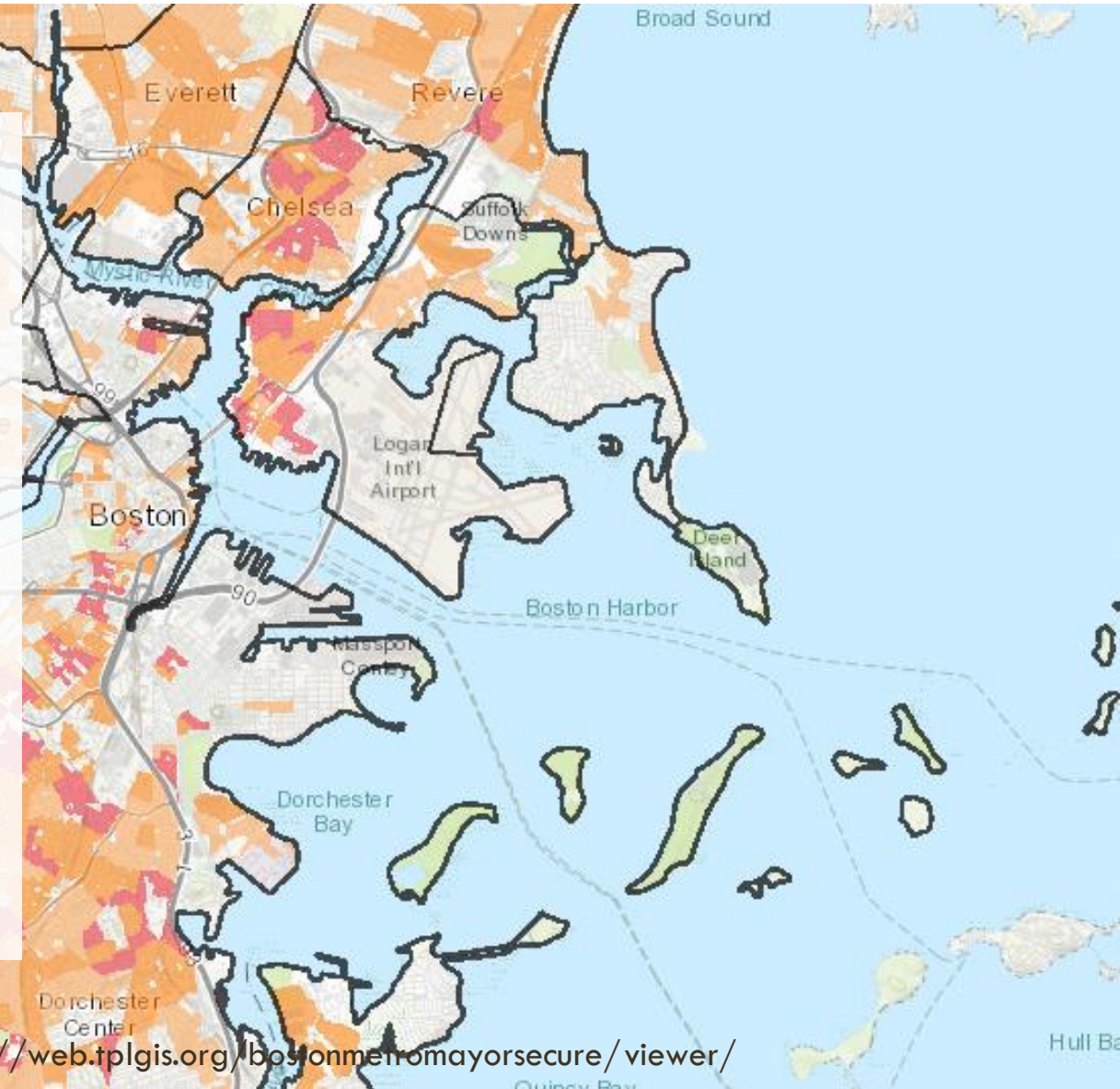


- ▶ Setback exemptions for insulation
- ▶ Clean energy technology by-right
- ▶ Special Permits and plan reviews
- ▶ Multi-pathway building standards
- ▶ Climate overlays
- ▶ Eco-roof requirements
- ▶ Siting of public and shared transportation infrastructure

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- ▶ Where are urban heat island effects concentrated?
- ▶ Where will there be increased risk of flooding?
- ▶ Where is resilient infrastructure located?
- ▶ Where do vulnerable populations live?
- ▶ What are barriers to building renovations?
- ▶ Where is there a risk of displacement?
- ▶ How will we engage environmental justice communities, and populations that may be most affected?



Our learning goals for today

- ▶ Describe why we need to overtly consider whom climate change has affected in the past, and which populations a measure or solution will seek to serve
- ▶ Demonstrate how to use data and develop plans, programs, and projects that center on equity in our communities
- ▶ Discuss the actions that can be undertaken locally and regionally to strengthen the adaptive capacity of our communities' most socially vulnerable populations



Across the 101 cities and towns in our Greater Boston region...

21 municipalities have, or are developing, **climate action plans**

33 municipalities have adopted **goals to reduce greenhouse gas emissions** community-wide

66 municipalities have **volunteer committees** dedicated to climate, sustainability, or energy issues

* Based on a preliminary review completed by MAPC of municipal websites and publicly available information.

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#ClimateEquity #MetroCommon2050

Tools and Frameworks for Putting Social Equity in Action

MAPC Research Launch



Framework for Equity

Clean Energy Forum
December 11th, 2019



Defining Equity



Equity



A **practice** that takes into consideration the history, policies, power structure, and culture of a community and **responds to these existing dynamics** by calibrating tools and resources according to each population's needs.

Other Terms

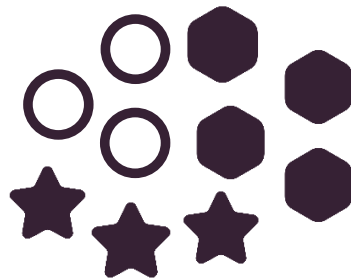
Equality

Treating all groups the same without taking into consideration existing dynamics



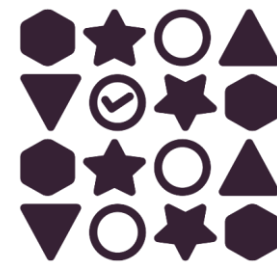
Diversity

The presence of different groups, populations, and identities in a community



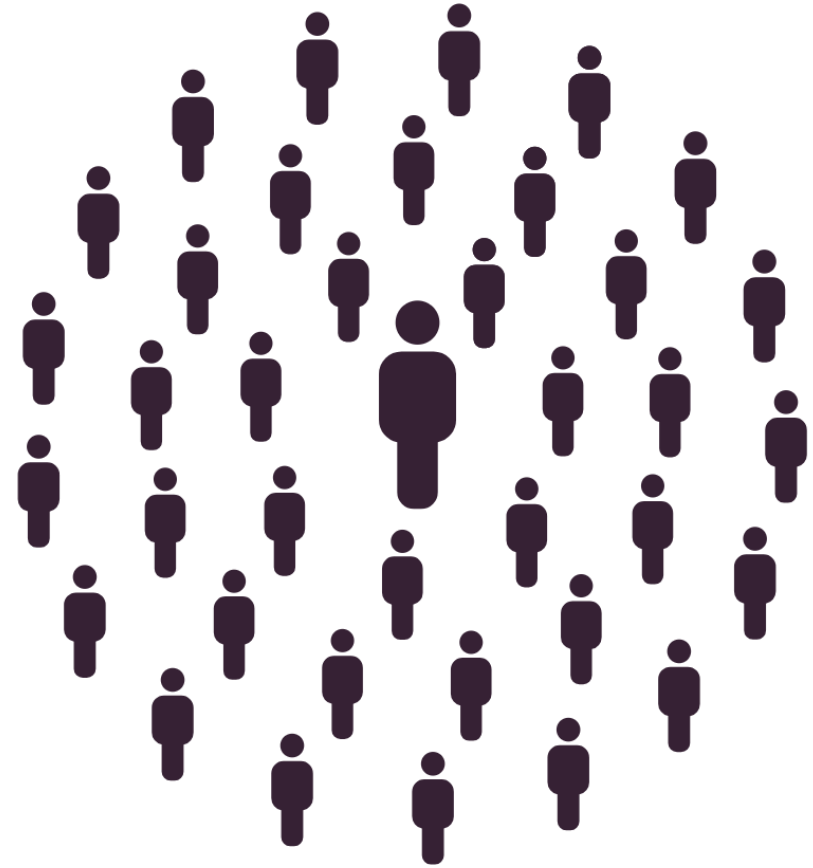
Inclusion

Diverse groups have access within the community



Who are We Talking About?

- ▶ Race
- ▶ Socio-Economic Class
- ▶ Ability
- ▶ Immigration Status
- ▶ Gender & Sexual Orientation
- ▶ Language
- ▶ Age

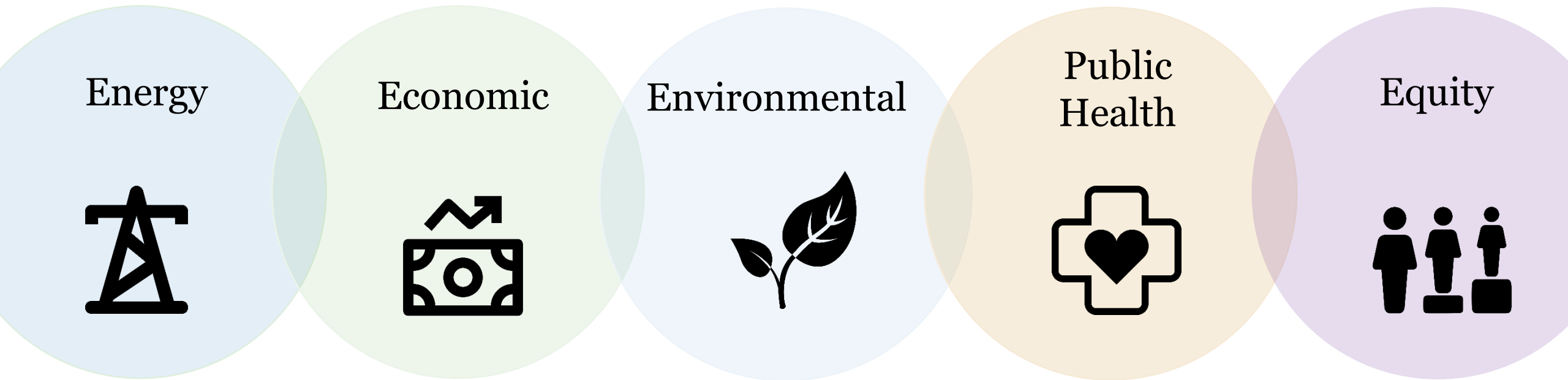


Why Equity

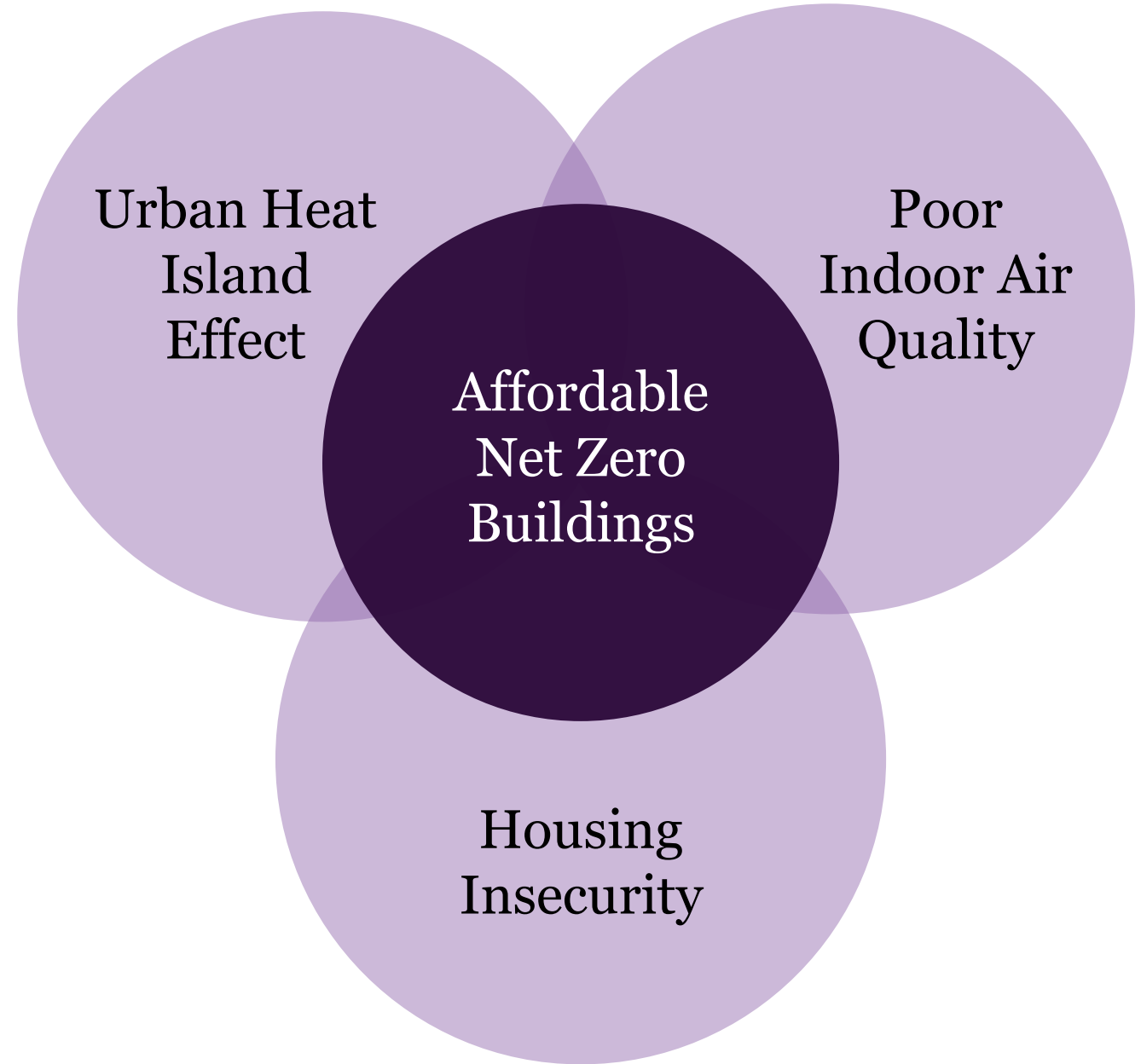


Holistic Planning Framework

Focused on the benefits of carbon mitigation:

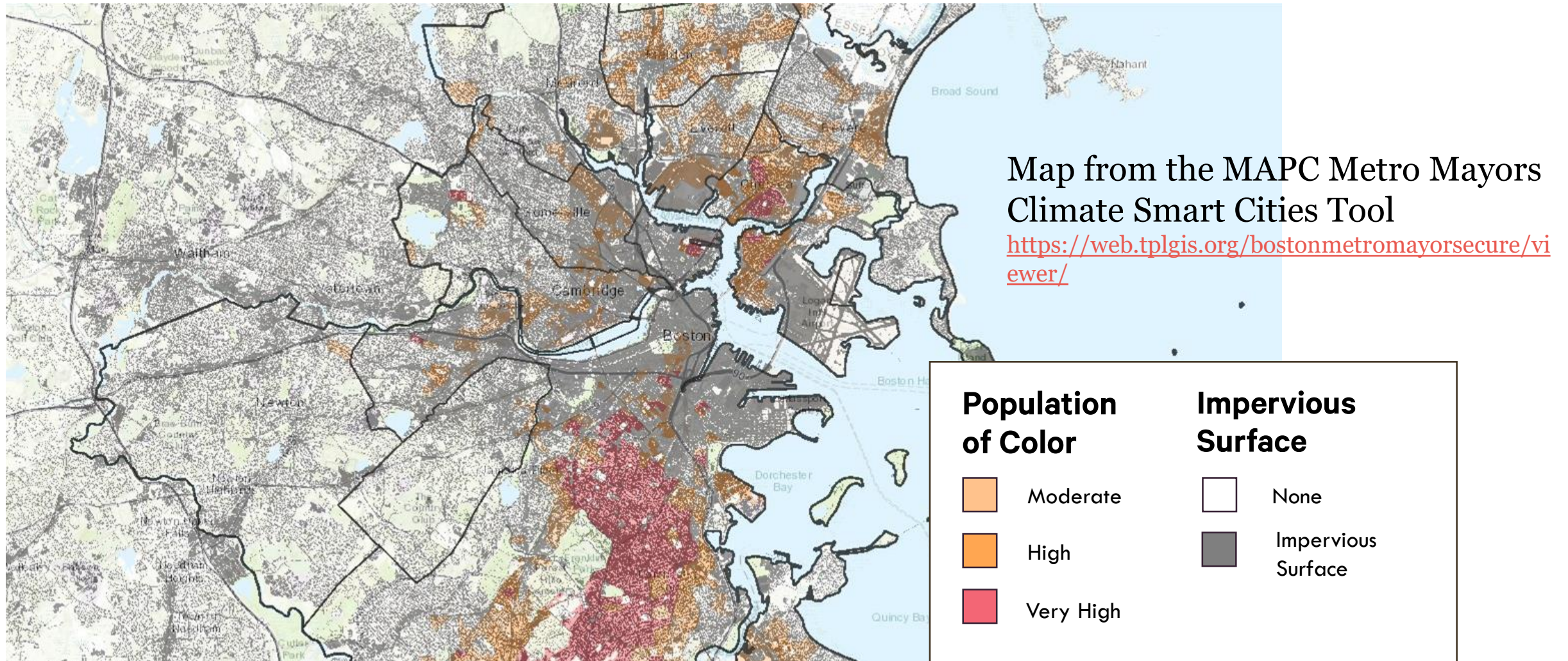


Intersection of Solutions



The Cost of Business as Usual

Intent does not equal impact



Our Net Zero Future



Implementing Equity



Equity Assessment

For each measure in your Net Zero Plan, answer:

Who has been historically impacted?



Both by the change this measure aims to mitigate, and by previous solutions.

Who would be most impacted in the types of changes in our climate we expect to see?



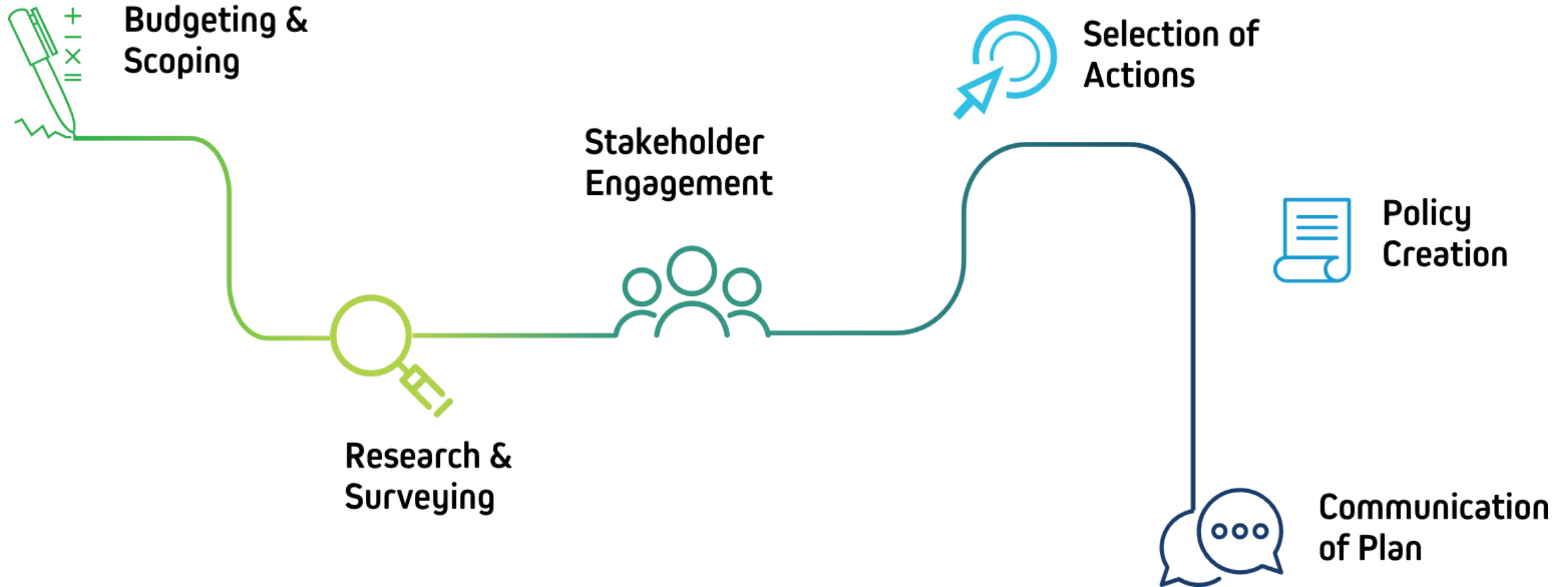
Which populations are most vulnerable to the change? Who is least likely to be able to enact this solution without action?

How will the co-benefits of this measure be distributed?



Where will assets be located? Where will health benefits be realized?

How We Can Center Equity



Equity in Net Zero Plans

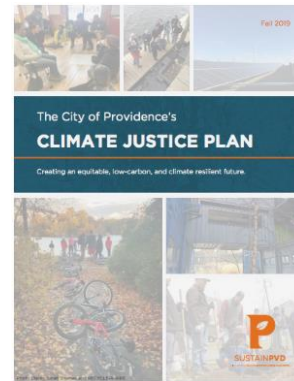
▶ District of Columbia Clean Energy DC Plan



An Equitable Transformation Chapter

https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Clean%20Energy%20DC%20-%20Full%20Report_0.pdf

▶ Providence, RI Climate Justice Plan



Racial and Environmental Justice Committee (REJC) Future Stories

<http://www.providenceri.gov/sustainability/climate-justice-action-plan-providence/>

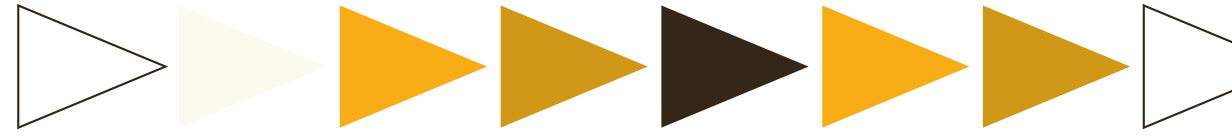
▶ Boston, MA Carbon Free Boston



Social Equity Report

https://www.boston.gov/sites/default/files/embed/file/2019-10/city_of_boston_2019_climate_action_plan_update_4.pdf

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OR

Respond online at **[PollEv.com/mapcpoll](https://pollev.com/mapcpoll)**.

Social Vulnerability to Climate Change in Greater Boston


Seleeke Flingai, PhD, MPA
Research Analyst II



BACKGROUND

Climate Vulnerability

A definition



“[Climate vulnerability is] the propensity or predisposition to be adversely affected by the impacts of climate change. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.”

Intergovernmental Panel on Climate Change (IPCC),
Fifth Assessment Report (2014)

January 2018
Nor'easter

YIELD
TO
PEDESTRIANS
ON TURNS



AQUARIUM
← ELEVATOR → TO TRANS

AQUARIUM
→ TO TRANS

DI



March 2018
East Boston flooding



July 2019
Hottest month on record
for the planet




Photo credit: Jean-Sebastien Evrard/AFP/Getty Images


**An elderly man sits outside
in hot weather**



Why are we interested in climate vulnerability?



Climate change impacts some populations more severely than others



Efforts to mitigate climate change and build resiliency through the built environment should prioritize communities most vulnerable to climate impacts



For solutions to tackle vulnerabilities at the root, those most impacted should be active leaders and participants in mitigation and resiliency efforts

BACKGROUND

How do we think about vulnerability?

Vulnerability is often characterized as encompassing **three** dimensions:

Exposure

How close is an individual or group to a hazard

Sensitivity

The pre-existing social, economic, and political conditions of a given community influence access to resources and exposure to hazards

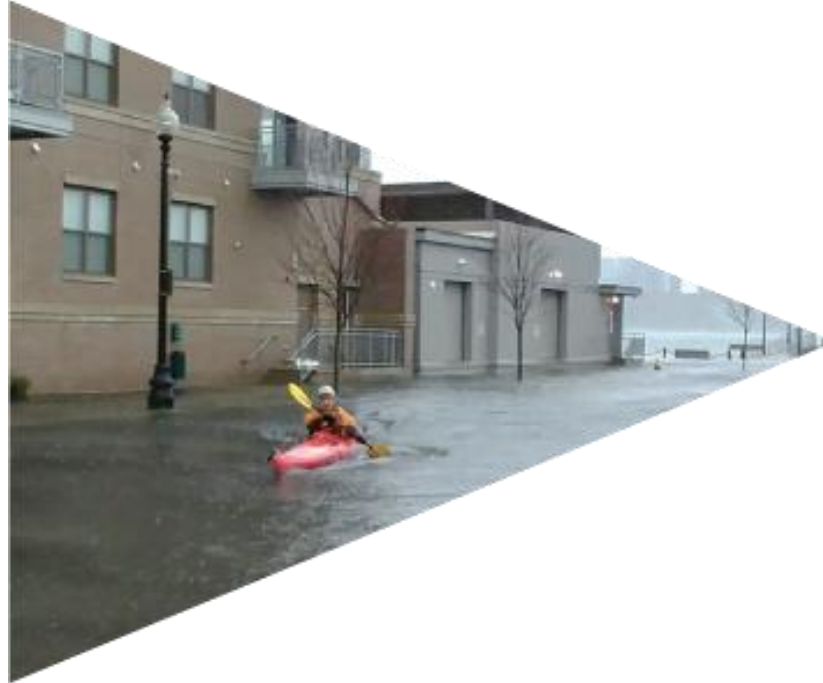
Adaptive Capacity

A group's ability to plan for and adapt to changing conditions

Climate Exposures



**Extreme
Heat**



Flood



**Future
Coastal Flood**

Climate Sensitivity



Age



Exposed Occupations



**Housing Features
& Demographics**



Health

March 2010
Mystic River Flooding



Workers Exposed to Extreme Heat





**Chronic disease:
increased risk of medication and diet
interruptions, hospital visits and deaths**

Climate Adaptive Capacity



**Info Access, Social
Networks & Mobility**



**Financial Resources
& Access**



**Race, Ethnicity,
and Language**



**Additional Housing
Demographics**



**Internet access and digital equity:
accessing information to plan for climate change**



Housing: can we build apartment complexes and affordable housing that are resilient enough to mitigate climate impacts for residents?

Social networks and community building



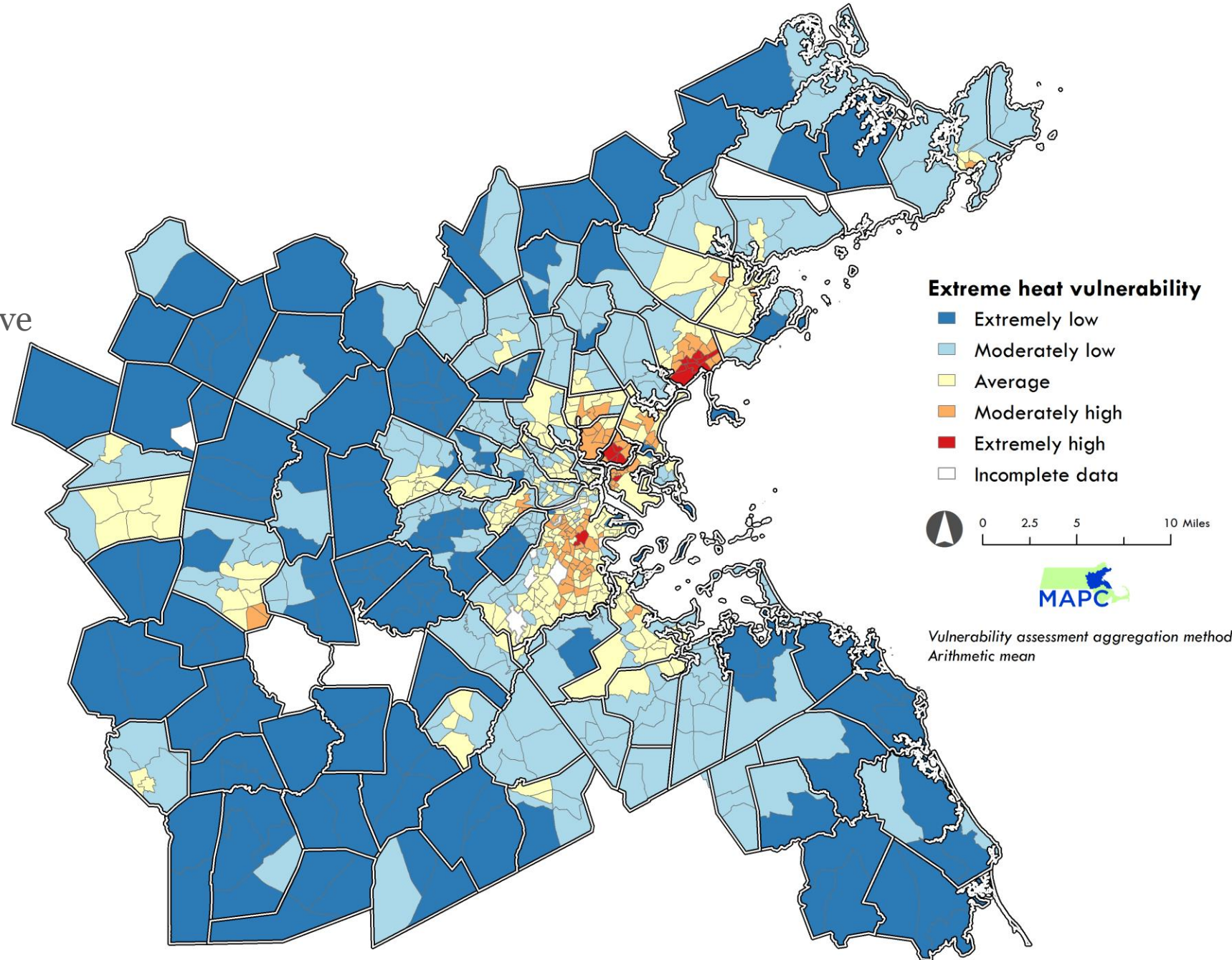
METHODS AND RESULTS

Extreme Heat Vulnerability



Extreme Heat Vulnerability

13% of the region's residents live in heat-vulnerable tracts

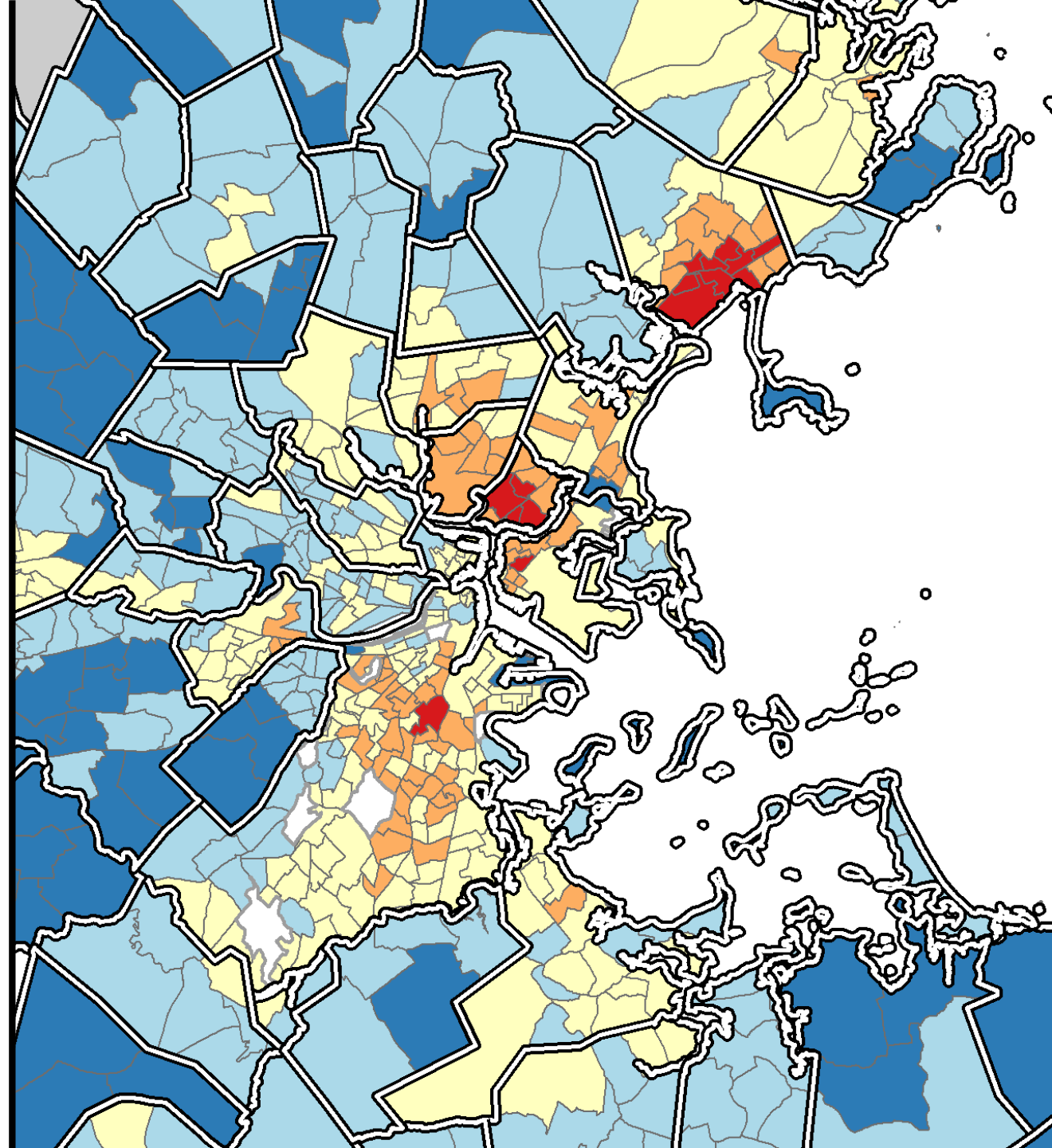


METHODS AND RESULTS

Extreme Heat Vulnerability

Highly concentrated in the urbanized inner core

Highest heat vulnerability in 7 of 101 MAPC municipalities: Chelsea, Everett, Lynn, Revere, Boston, Malden, Framingham



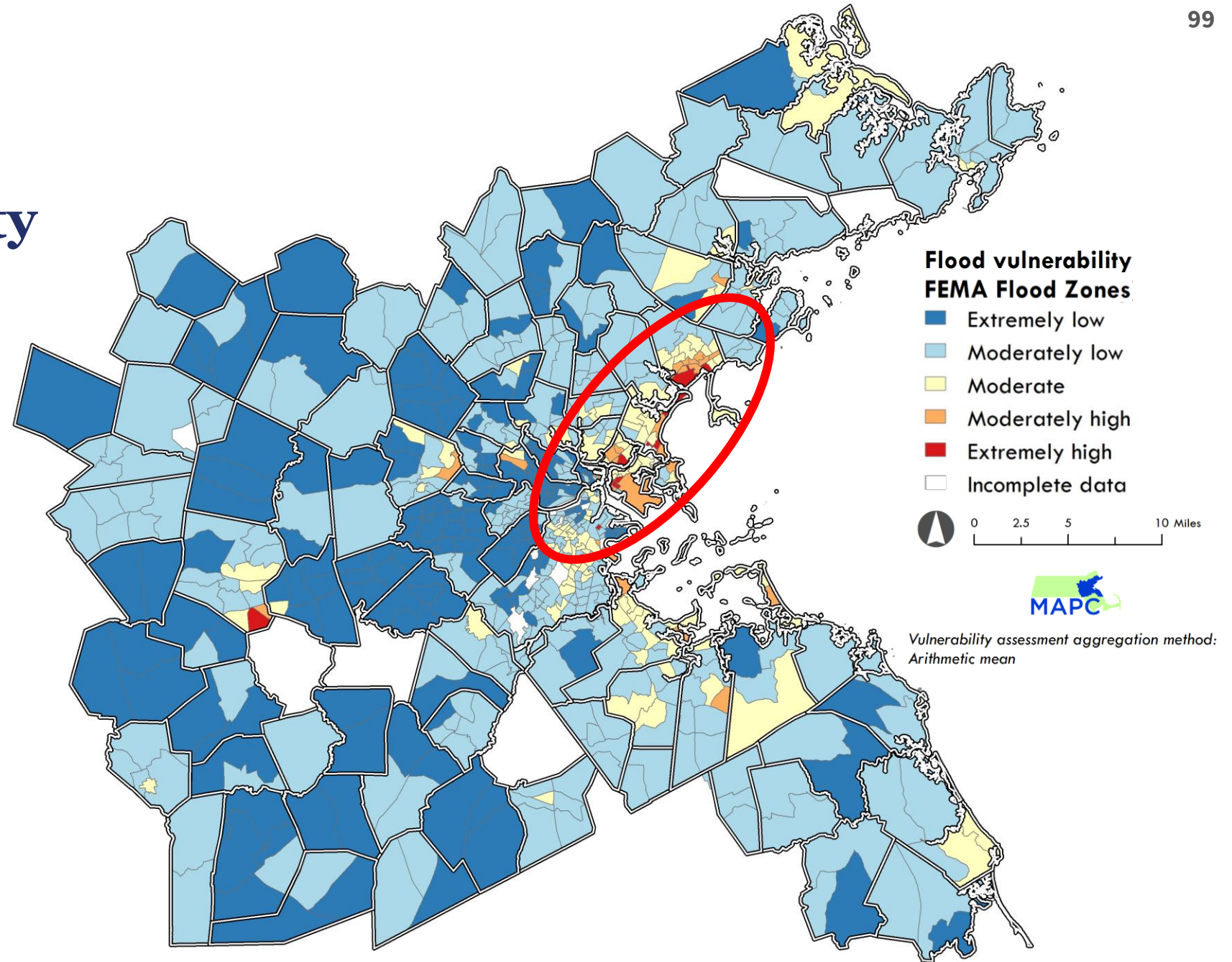
METHODS AND RESULTS

Flood Vulnerability



Flood Vulnerability

High adaptive capacity of many suburban communities reduces vulnerability to flood zone risks



METHODS AND RESULTS

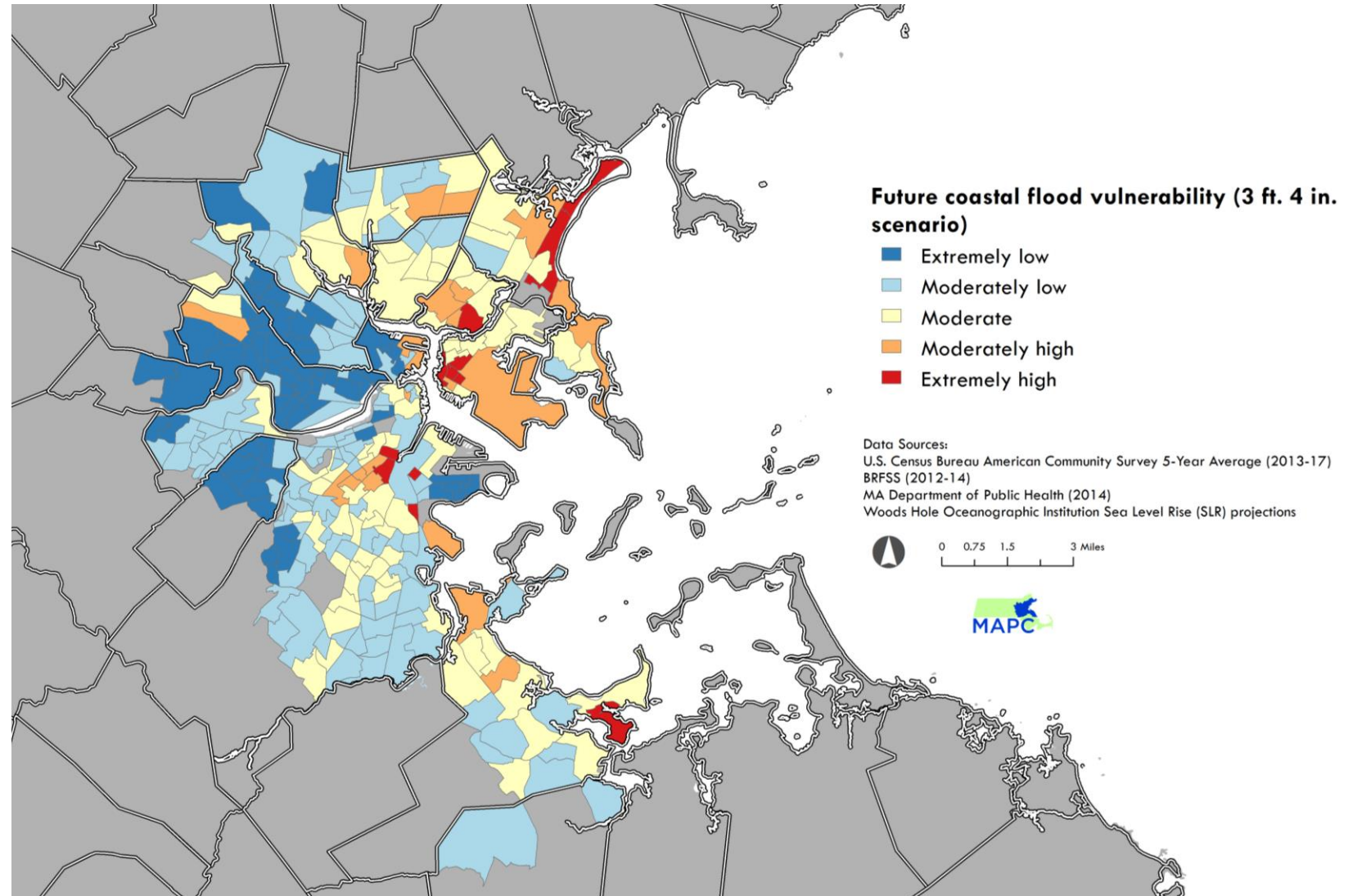
Future Coastal Flood Vulnerability



METHODS AND RESULTS

Future Coastal Flood Vulnerability

Highest relative social vulnerability to future coastal flooding (sea level rise + storm surge) in Boston Harbor region may be in Revere, Winthrop, Chelsea, East Boston and Quincy.



MAJOR TAKEAWAYS

Climate vulnerability is more than exposure. All three dimensions are important.

Socially vulnerable populations can be found in every city and town.

Making the built environment more resilient is key. Investing in social infrastructure is just as critical.

Next steps



Inform our MetroCommon 2050 process



Use the analysis to inform MAPC's climate work



Work with cities and towns for more local vulnerability analyses



Help us take action:
Explore the maps and download the data at
climate-vulnerability.mapc.org

Thank you!

MetroCommon × 2050

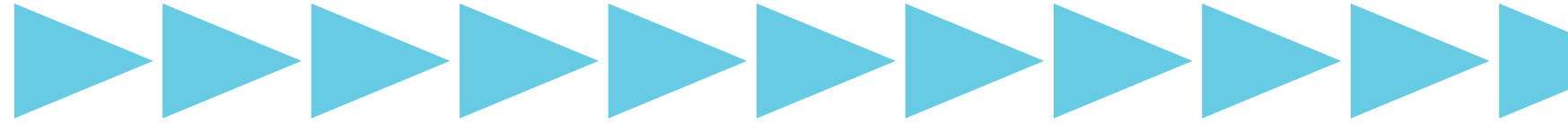
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References



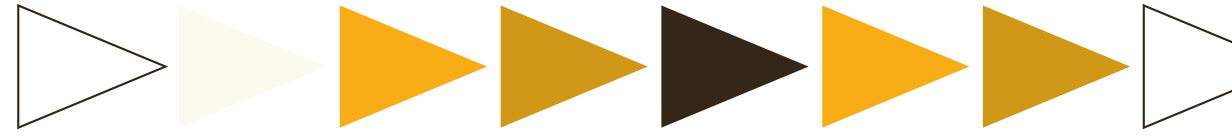
Dow, K. (1992). Exploring differences in our common future(s): The meaning of vulnerability to global environmental change. *Geoforum*, 23(3), 417-436. doi:10.1016/0016-7185(92)90052-6

Tonmoy, F. N., El-Zein, A., & Hinkel, J. (2014). Assessment of vulnerability to climate change using indicators: a meta-analysis of the literature. *WIREs Climate Change*, 5, 775-792. doi:10.1002/wcc.314

Füssel, H.-M., & Klein, R. J. (2006). Climate change vulnerability assessments: An evolution of conceptual thinking. *Climatic Change*, 75, 301-329. doi:10.1007/s10584-006-0329-3

Menezes, J. A., et al. (2018). Mapping human vulnerability to climate change in the Brazilian Amazon: The construction of a municipal vulnerability index. *PLoS One* 13(2): e0190808. <https://doi.org/10.1371/journal.pone.0190808>

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Share your ideas!



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Creating Access to Quality Jobs on Our Pathway to Zero

Five x Five Panel



Climate Equity × MetroCommon × 2050

#ClimateEquity #MetroCommon2050



Rouwenna Altemose
All In Energy



Steve Sullivan
ABC MA Chapter



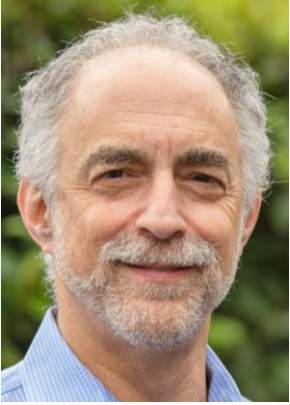
Danilo Morales
Codman Square NDC



Lesly Melendez
Groundwork Lawrence



Daryl Wright
Boston Contractor Academy



Adam Parker
Boston Contractor Academy



— ALL IN —
ENERGY

Rouwenna Altemose, Co-Founder



Mission

Accelerate an inclusive clean energy economy



Our approach

We bring energy efficiency and renewable energy to underserved communities



We bring diverse talent to careers in the clean energy industry

Here is how our model works



We do community outreach



We hire diverse staff and partner with community organizations and cities



We work with energy efficiency and renewable energy companies

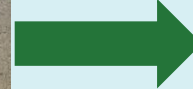
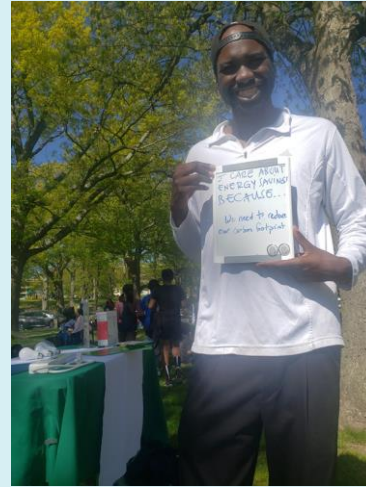


We do co-branded outreach campaigns to educate the community face-to-face



We help residents access programs and products that save money and energy

We prepare our staff for careers



By doing outreach,
our team learns
how to talk to
customers

We then introduce them to
careers in the industry

This prepares our
staff for their next
role in the clean
energy industry

When our staff join
other companies,
they diversify the
industry and help to
serve our
communities better

Our success thus far



We have recruited a diverse team

We work with partners, community colleges, and field team to find talent

57% People of Color, 52% women, 48% multilingual

Current Staff



Current & Past Interns



We have launched clean energy careers

8 of 12 former interns have found next position in industry



We are piloting a pathway to energy advisor



Jean Alofan
Rental Property Energy Advisor
Fluent in English, Portuguese, French



In partnership with Neeeco, a Mass Save certified home performance contractor

We have helped residents save energy



1,639 Residents Educated



396 Home Energy Assessments Completed

89 Renter Assessments Completed or Pending

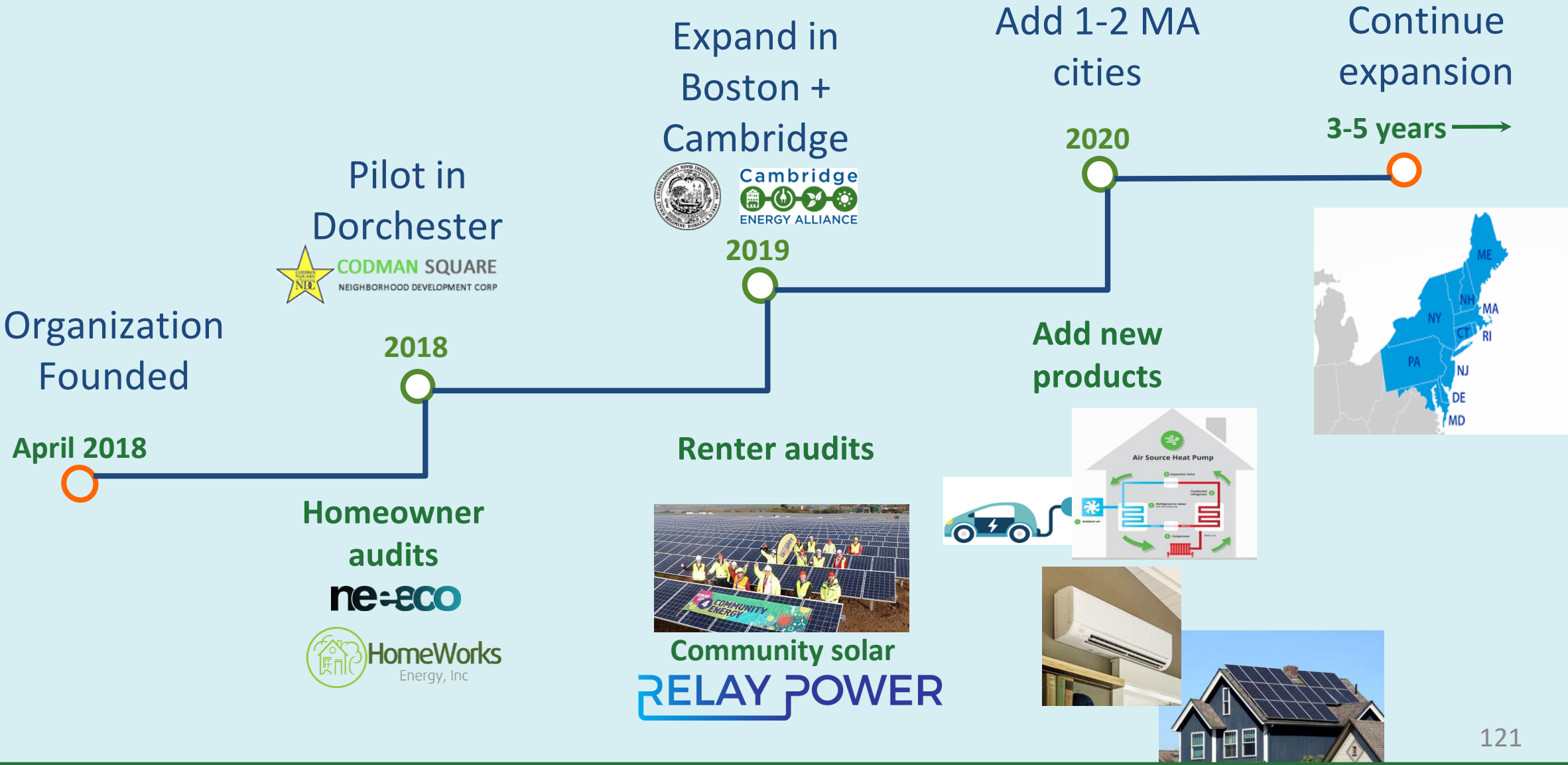


122 Weatherization Jobs



Est. Total Savings/Year:
\$250,098
697,752 kWh
48,211 Therms

We've been growing and plan to continue



We would love to partner with you



Contact for more information

Rouwenna Altemose

Co-Founder

rouwenna@allinenergy.org

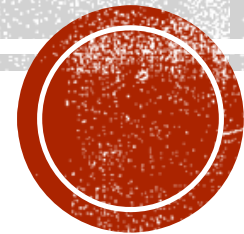
(617) 863-7768

allinenergy.org



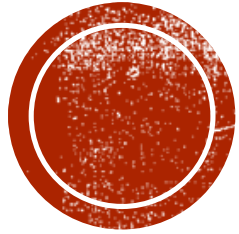
CAREERS IN GREEN CONSTRUCTION...

Steven R. Sullivan, MSPA
Director of Workforce Development
Building Mass Careers



GOING GREEN IN CONSTRUCTION...





GREEN CERTIFICATION...

GREEN BUILDINGS...

GREEN CONSTRUCTION SITES...

GREEN CONSTRUCTION TOOLS...

GREEN CONSTRUCTION VEHICLES...

“Green construction is the practice of erecting buildings and using processes that are environmentally responsible and resource efficient. Green buildings limit their environmental impact by conserving as much energy and water as possible and are constructed of recycled or renewable materials in order to achieve maximum resource efficiency.” Bureau of Labor Statistics



BATTERY OPERATED POWER TOOLS...

**No more fossil fuels
and oils...**

**No more wired
electricity...**

Noise reduction...

Solar powered...





BATTERY OPERATED NAIL GUN...

**No more fossil
fuels and oils...**

Ergonomic...

Noise Reduction...

Lite weight...

Portable...





Battery Operated Flood Lights



VOLVO LX2 COMPACT WHEEL LOADER USES A LITHIUM-ION BATTERY AS ITS SOLE POWER SOURCE FOR DRIVE AND HYDRAULIC FUNCTIONS.





SOLAR

**GAS POWERED TO
SOLAR
POWERED...**

**Green
Buildings are
popping up all
around us...**



WIND FARM CONSTRUCTION

[HTTPS://VIMEO.COM/145120251](https://vimeo.com/145120251)



LEED (Leadership in Energy and Environmental Design) is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

<https://youtu.be/tlVseOWToL4>



WHAT IS LEED? LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN

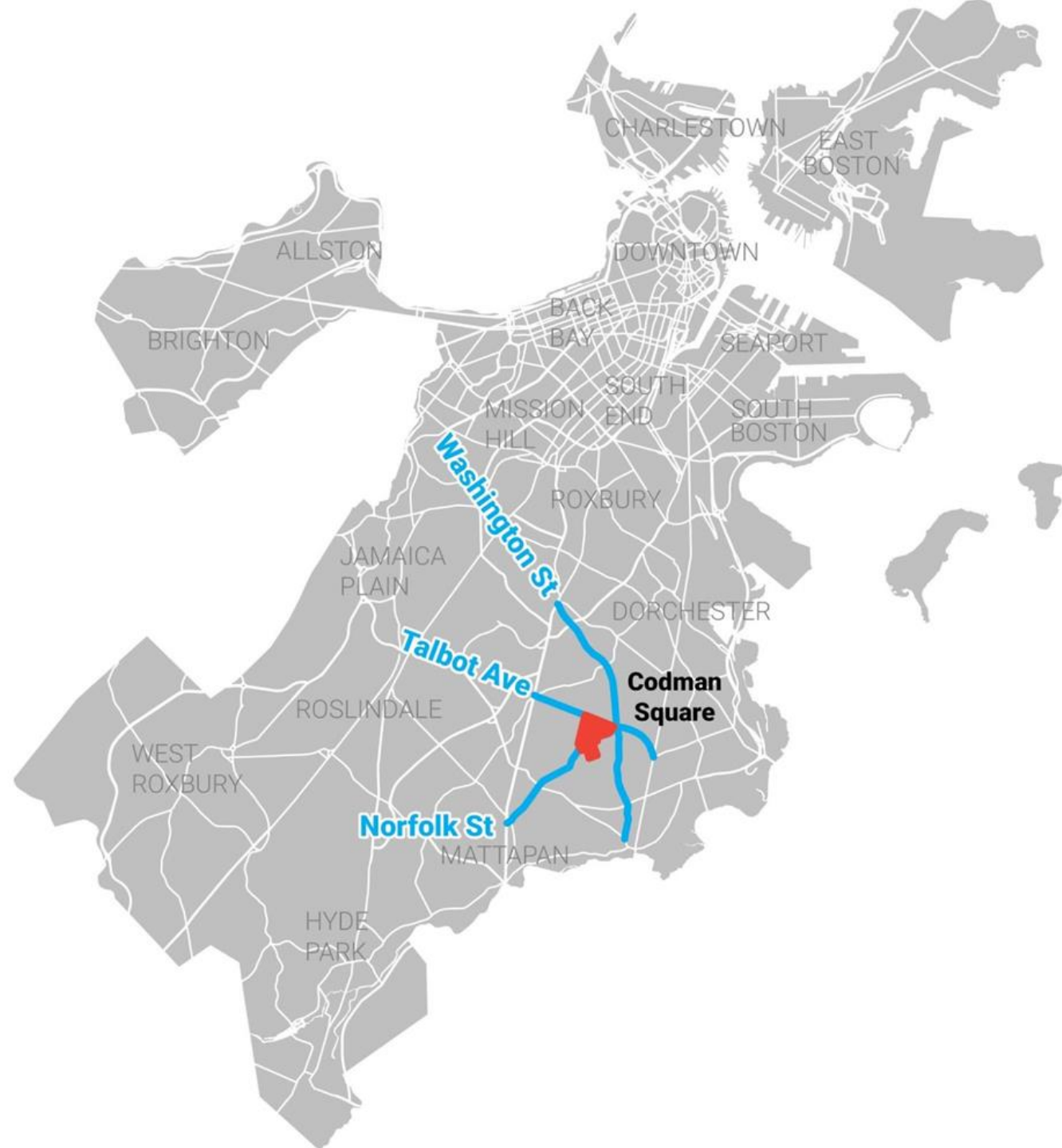
WHAT IS



Good Jobs + Green Neighborhoods = Resilient Cities

**CSNDC Pathways to Green Infrastructure, Workforce
Development,
Sustainability and Resilience**

**Danilo Morales - Eco-Innovations
Codman Square Neighborhood Development Corporation
December 11, 2019**



CHARLESTOWN

EAST BOSTON

ALLSTON

DOWNTOWN

BRIGHTON

BACK BAY

SEAPORT

MISSION HILL

SOUTH END

SOUTH BOSTON

ROXBURY

JAMAICA PLAIN

DORCHESTER

Talbot Ave

Codman Square

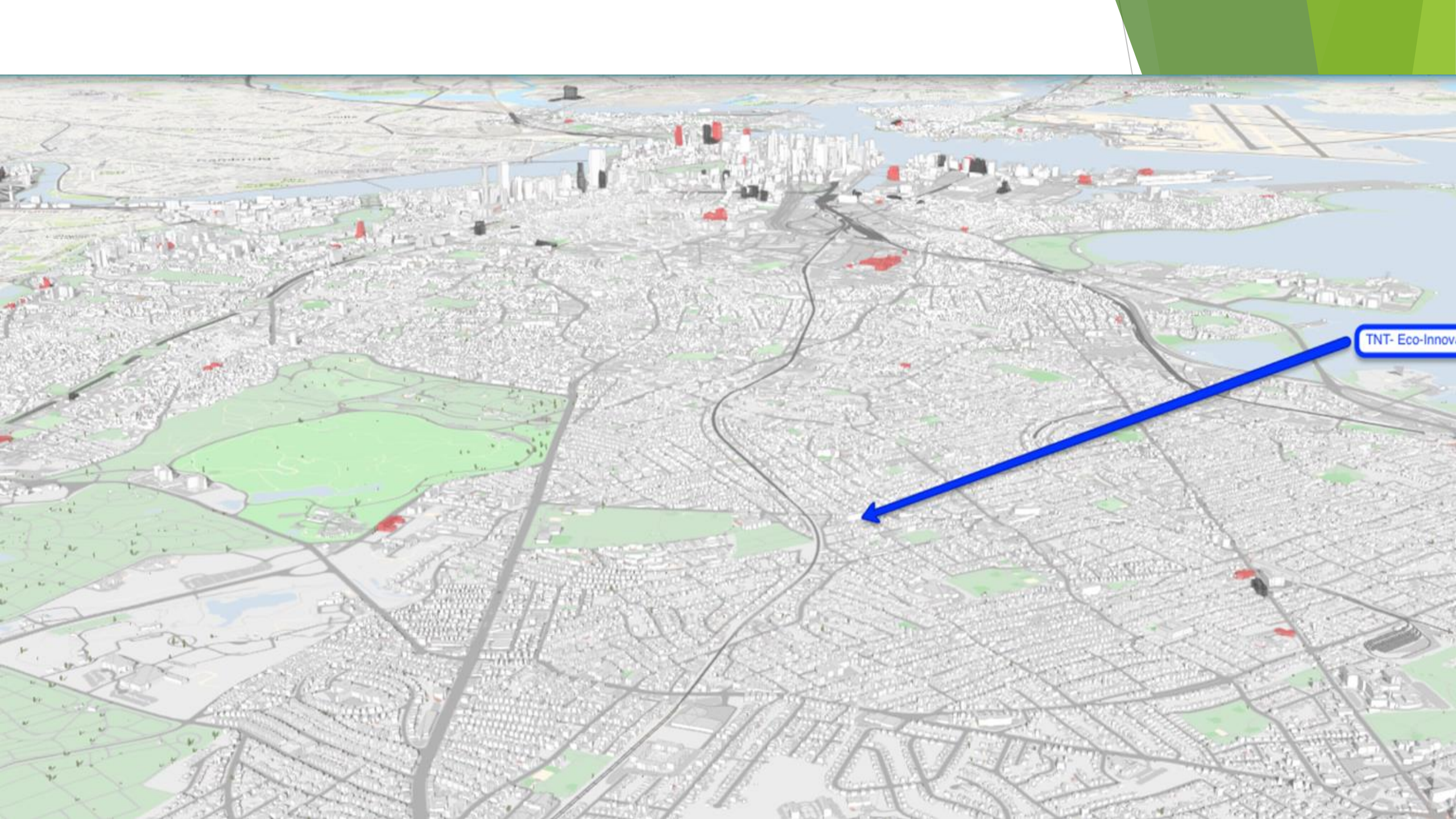
ROSLINDALE

WEST ROXBURY

Norfolk St

MATTAPAN

HYDE PARK



TNT- Eco-Innov

The Eco-Innovation District By the Numbers...

- **46 acres, 268 homes, 13 blocks**
- **1,500⁺ residents, in approximately 525 families**
- **30% of residents live under the poverty line (\$23,850 for a family of four); 33% more live just at the poverty line**
- **Unemployment rate for young men of color is nearly 50%**
- 400⁺ children and youth under the age of 18
- 30 small businesses are located in TNT
- 80% of residents are renters, 20% homeowners
- 78% identify as African-American, 8% other race, 5% White,
- 5% are two or more races, 2% American Indian, 2% Asian
- 20% report as Hispanic/Latino ethnicity

Metrics....

- Three green roofs on bus stops as part of EPA's ***Soak Up the Rain*** Campaign
- 32 rain barrels installed in 2015
- 35% of homes retrofit with new insulation; new goal of 50%
- 1 passive park, 1 active park, 1 community garden, 1 urban ag site
- 200 Ornamental and fruit trees planted since 2018; included trainings by TNC
- More... trees, green roofs, rain gardens, parks, green infrastructure...

Focus Areas

★ **Transit-Oriented Development**

- Create new rental, ownership and business opp's near transit station
- ID opportunities to create complete streets project near transit
- ID and set aside community open space that meets community needs
- Develop sustainable and architecturally interesting designs for the above

★ **Energy Retrofits**

- Work with residents (renters and owners) to do home energy assessments and home weatherization
 - Reach out to 100% of TNT residents re: assessments in Year 1
 - 15% of eligible TNT residents complete weatherization in Year 1; to 35% in Year 2;
 - Engage more local businesses in NSTAR Small Business Energy Efficiency Program
 - Measure impact of outreach campaign and resources leveraged through use of case studies

Focus Areas

★ Local Energy Generation

- ID parcels and locations that can be used to generate energy (solar, anaerobic digestion, etc.)
- Create a pilot or demo project that supports the E-I District and neighborhood

★ Green Infrastructure

- Focus on walkability, bikeability, street level and other quality of life amenities, including:
 - Street trees
 - Bike lanes
 - Commercial space
 - Traffic calming
 - Branding via signage and destination creation
 - **Green infrastructure related workforce development**

TNT - LEED ND V4



TNT Eco-Innovation District

SLLc: Preferred Locations

Option 1: Infill Site also Previously Developed Site (5 points)

LEGEND

- PROJECT BOUNDARY
- PREVIOUSLY DEVELOPED PARCELS
- UNDEVELOPED PARCELS

Previously developed : At least 75% of the land within the project is previously developed. *Parcels <1acre that were previously developed count as a whole but those >1ac. must be separated out dev vs undeveloped.*

100 FT



TNT EcoDistrict



Image Landsat

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google earth

Green Infrastructure WFD Timeline

2017		2018		2019	
Month	Event	Month	Event	Month	Event
January	Partnership: The Trust for Public Land (TPL)- The Nature Conservancy (TNC)	February	Tree Care Training - TNC - CSNDC	February	Tree Care Training for WOW - TNC - CSNDC
July	Tree Care Training: CSNDC + TNC + TNT-Neighborhood + 2 men of color	March	EID-Trees caliper data entry	April	Trees planted for WOW - Ballou farm
September	Tree Care Training: CSNDC + TNC + TNT-Neighborhood + 2 men of color	April	Engage West of Washington Neighborhood (WOW)	May	Identified GI-WFD potential
October	Trees planted - EID - CSNDC	May	Tree Care Training - TNC for WOW	July	TNC starts Green Paper - GI - WFD
November	Trees planted - EID - CSNDC	May	Trees planted at Ballou farm	August	Dave - Danilo - NGICP - Certification
				November	GI-WFD Green Paper first draft

Questions Addressed in Green Paper

1. How did organizations decide on their paths to green infrastructure workforce development programs and determine the appropriate business model and employment strategy (e.g., cohort training only or direct employment, professional growth or lower-skill work)?
2. What local government agencies did programs partner with? How were relationships with local government established?
3. How did organizations diversify to address the issue of seasonality/unpredictability and identify opportunities to broaden the context for green infrastructure work?
4. What types of organizations are potential partners for “soft skills” trainings?
5. Where do green infrastructure jobs currently exist?
6. What are the benefits of green infrastructure workforce development for underserved and marginalized communities?

Sneak Peak...

- How did organizations decide on their paths to green infrastructure workforce development programs and determine the appropriate business model?
Worker-owned cooperatives, utilities, public-private partnerships, consortia.
- What types of organizations are potential partners?
 - Local government agencies
 - Nonprofits
 - Workforce development organizations, government agencies,
 - businesses, and colleges.

CSNDC - Goals for 2020

Train and graduate three cohorts:

- First cohort - Spring = 15 NGICP Graduates
- Second cohort - Summer = 15 NGICP Graduates
- Third cohort - Fall = 15 NGICP Graduates

Thanks - Gracias !

Education & Job Training



Green Team's Mission is to:

Impart and instill the core values surrounding one's personal responsibility to the greater common good; the pursuit of environmental, economic and social justice; and the duty of each American to become and remain an engaged citizen for one's entire life



Education & Job Training

Green Team provides a full spectrum of opportunities for youth to develop the skills, knowledge and confidence to pursue higher education and find meaningful employment upon graduation from high school.

Education & Job Training



Education & Job Training



Who, What, Where & How



- ✓ WHO: High school aged youth
- ✓ WHAT: The opportunity to serve their community while providing on-the-job training through hands-on environmental projects, workshops and field trips.
- ✓ WHERE: Target Area
- ✓ HOW: The Green Team is an intensive and academically rigorous year-round program focused on environmental leadership and community advocacy.

WHY



- ✓ Need for employment
- ✓ Importance of investing in youth
- ✓ Helping youth develop skills
- ✓ Cultivating: social justice, leadership skills
- ✓ Informing our work
- ✓ Nurturing engaged citizens

HOW

- ✓ Good Planning
- ✓ Partnerships
 - ✓ Guy Shepard – Local Arborist
 - ✓ Urban Ecology Institute
 - ✓ AMC YOP
 - ✓ Mass Audubon
 - ✓ Local banks
 - ✓ Farm school
- ✓ Our staff - Connecting to our work
- ✓ Family engagement



REALIZE

Boston Contractor Academy

Increasing equity
and inclusion in
Energy Efficiency
and Renewable
Energy

MAPC

December 11, 2019



Emerald
COLLEGE

Creating a Multi- Stakeholder Table



 **EVERSOURCE**  **NAESCO** National Association of Energy Service Companies   **Emerald Cities COLLABORATIVE** *Active engagement.*

CONTRACTORS SPECIALIZING IN MECHANICAL, ELECTRICAL, PLUMBING, CARPENTRY & INSULATION

Register: <https://rmi.org/our-work/buildings/realize/boston-contractor-academy/>

REALIZE Boston Contractor Academy

1. **Forecast** municipal and utility Energy Efficiency/Renewable Energy Projects going out to bid in 2020.
2. **Learn** new energy efficiency and retrofit construction standards that are now included in RFPs
3. **Hear** from project owners about procurement, bid processes and joint venture opportunities.
4. **Build** your business

Here!


For additional information
email: wrightdary407@gmail.com

REALIZE Boston Academy Advisory Committee

 **MetroBTC**
Building & Construction Trades Council of the Metropolitan District

 **YouthBuild Boston**
Strengthening Youth, Rebuilding Communities.

 **INORDER**
BUSINESS DEVELOPMENT SOLUTIONS

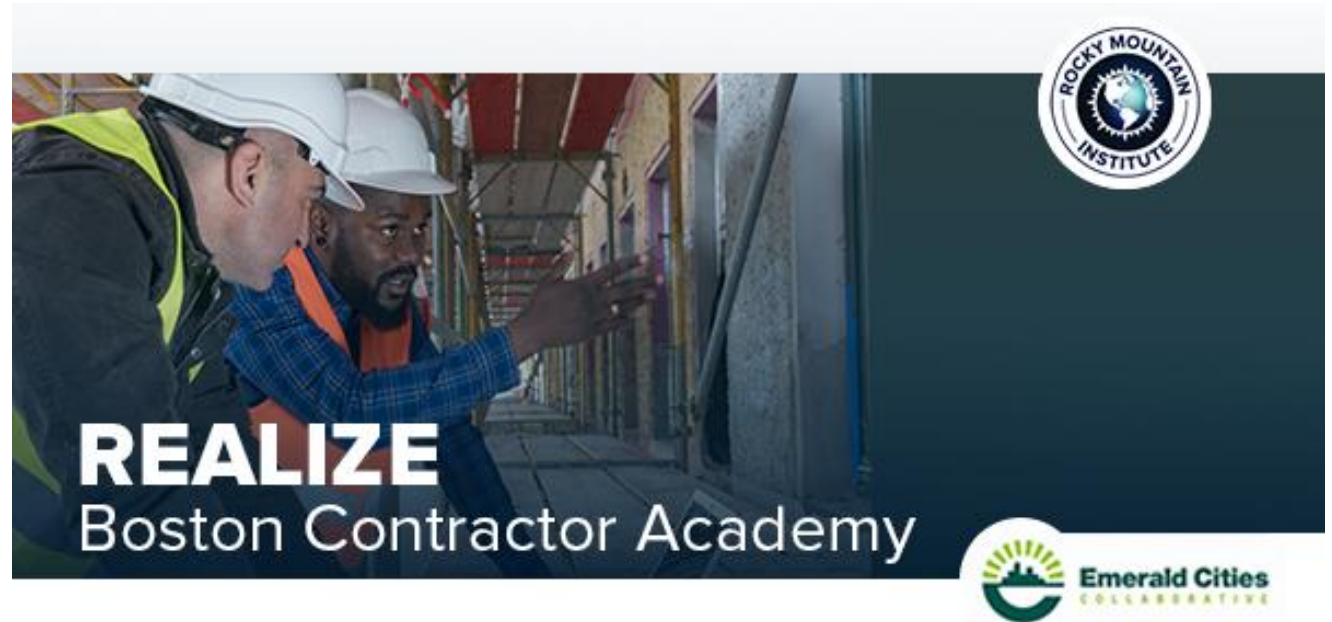
 **SUFFOLK**  **build smart**

 **Mayor's Office of Economic Development**
EQUITY & INCLUSION

 **Madison Park**
Est. 1975
Technical Vocational High School

Lessons Learned

- Tactics can promote equity
- Policies drive accountability towards diversity, equity and inclusion



Climate Equity × MetroCommon × 2050

#ClimateEquity #MetroCommon2050



Rouwenna Altemose
All In Energy



Steve Sullivan
ABC MA Chapter



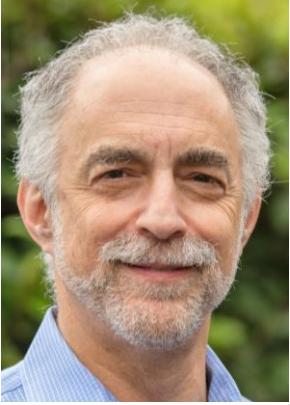
Danilo Morales
Codman Square NDC



Lesly Melendez
Groundwork Lawrence



Daryl Wright
Boston Contractor Academy

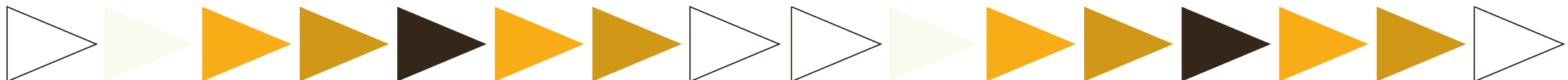


Adam Parker
Boston Contractor Academy

Stay tuned...

- ▶ Framework for Equity (December 2019)
- ▶ Greenhouse Gas Inventory Guide and Tool (February 2020)
- ▶ **Net Zero Playbook:** Compendium of impactful strategies and actions to achieve net zero in your community (2020/2021)
 - ▶ Net Zero Buildings
 - ▶ Zero Emission Mobility
 - ▶ Clean Energy Supply
 - ▶ Climate-Smart Permitting and Zoning

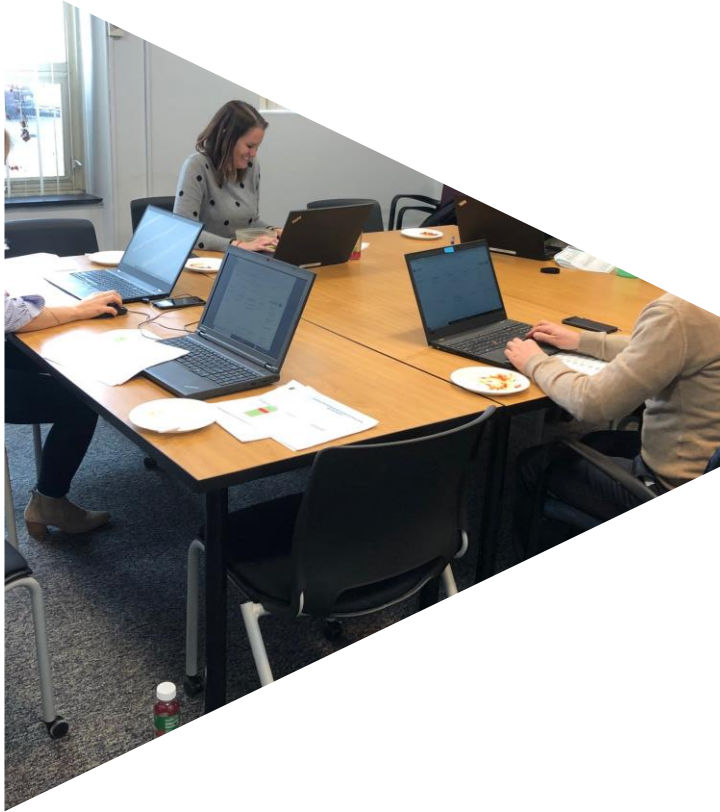
Visit www.mapc.org/net-zero for today's materials and future resources!



Climate Equity × MetroCommon × 2050

#ClimateEquity #MetroCommon2050

...and stay in touch!



Sign up for our monthly newsletter at www.mapc.org/our-work/expertise/clean-energy