

## Risks and Opportunity Markets: Climate Change and the Housing Crisis

# WELCOME

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# INTRODUCTION & MODERATOR

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Conservation Law Foundation*

# Keynote Presentation: Climate Change and ESG at the Federal Housing Finance Agency

**Daniel E. Coates**

*Deputy Director  
Division of Research and Statistics  
Federal Housing Finance Agency*



Federal Housing Finance Agency

# Climate Change and ESG at the Federal Housing Finance Agency

**Daniel E. Coates, Ph.D.**

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Deputy Director,  
Division of Research and Statistics

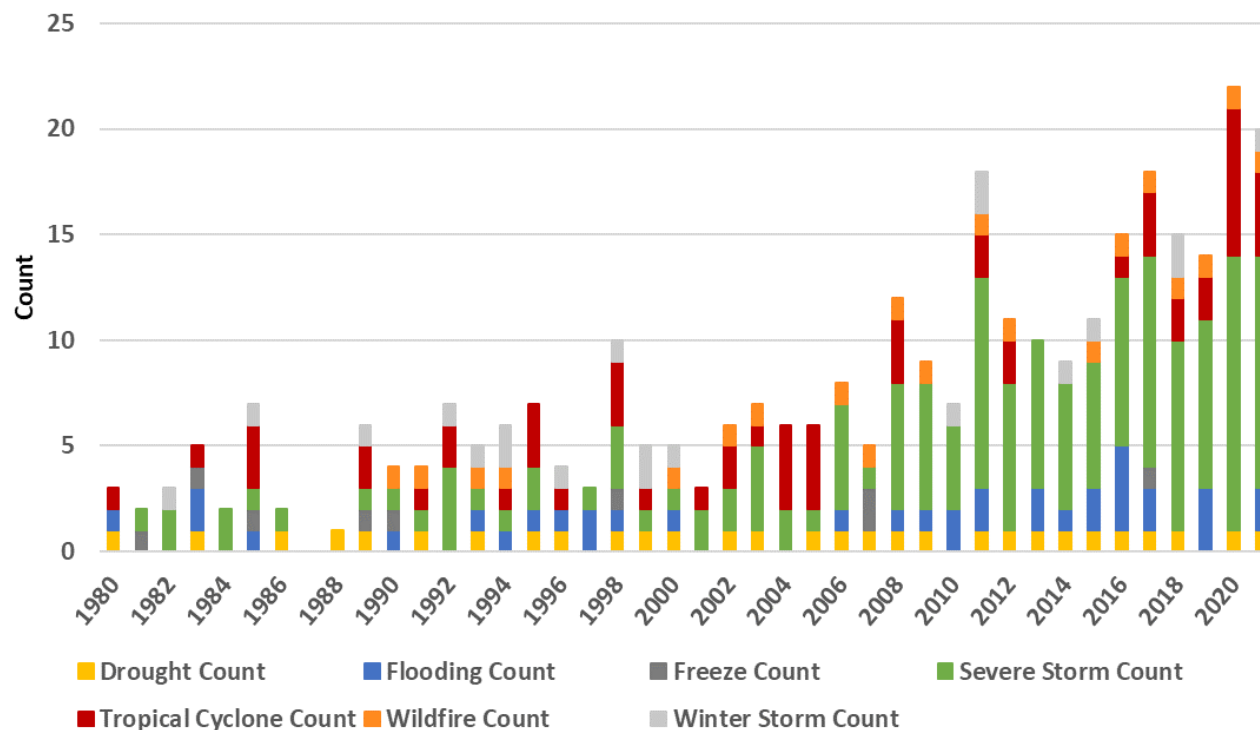
Executive Sponsor,  
Climate Change and ESG Working Group

Chair,  
Climate Change and ESG Steering Committee  
Federal Housing Finance Agency

This presentation is prepared by staff of the Federal Housing Finance Agency (FHFA) and is a preliminary product circulated to stimulate discussion and critical comment. The analysis and conclusions are those of the authors alone, and should not be represented or interpreted as conveying an official FHFA position, policy, analysis, opinion, or endorsement. Any errors or omissions are the sole responsibility of the authors. References to FHFA presentations (other than acknowledgment) should be cleared with the authors to protect the tentative character of these presentations.

Climate change – observable in rising temperatures, melting glaciers, rising sea levels, and changing frequency, severity, and duration of extreme weather events – imposes costs on the public and the US economy.

**Counts of NOAA Billion-Dollar Events by Disaster Type**



Data: <https://www.nci.noaa.gov/access/monitoring/billions/time-series>

Notes: Costs are CPI adjusted and events shown must reach at least a billion dollars in estimated costs. Flooding captures river basin or urban flooding from excessive rainfall events.

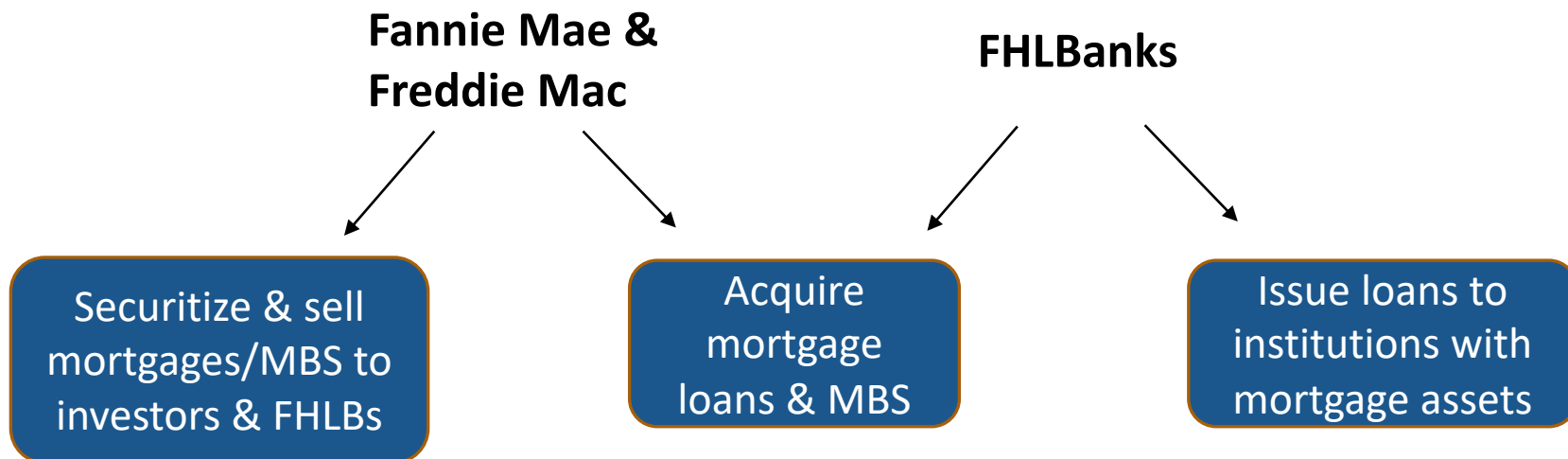


- Climate change can affect borrowers, homeowners, and renters by jeopardizing:
  - Physical health and safety
  - Physical sustainability of homes
  - Financial condition
  - Wealth/value of homes
- Climate change can affect the housing finance market through several avenues
  - Increasing physical damage to properties/physical collateral
  - Increased insurance costs
  - Policy and technological transition toward carbon emission reduction
  - Consumer and investor sentiment
  - Financial risks to institutions through several transmission channels
    - Credit risk (e.g., mortgage defaults)
    - Market risk (e.g., asset repricing)
    - Liquidity risk (e.g., cash withdrawals for recovery)
    - Operational risk (business continuity)



## What is FHFA's role?

- FHFA's regulated entities are large players in the secondary housing market. They serve as sources of liquidity for housing finance and thus can be influential
- They have exposure to climate risk through the mortgage assets they purchase
- The regulated entities also have programs aimed at promoting affordable and energy efficient housing that may have potential to integrate more climate solutions that incentivize more resilient and energy efficient homes





### What is FHFA's role?

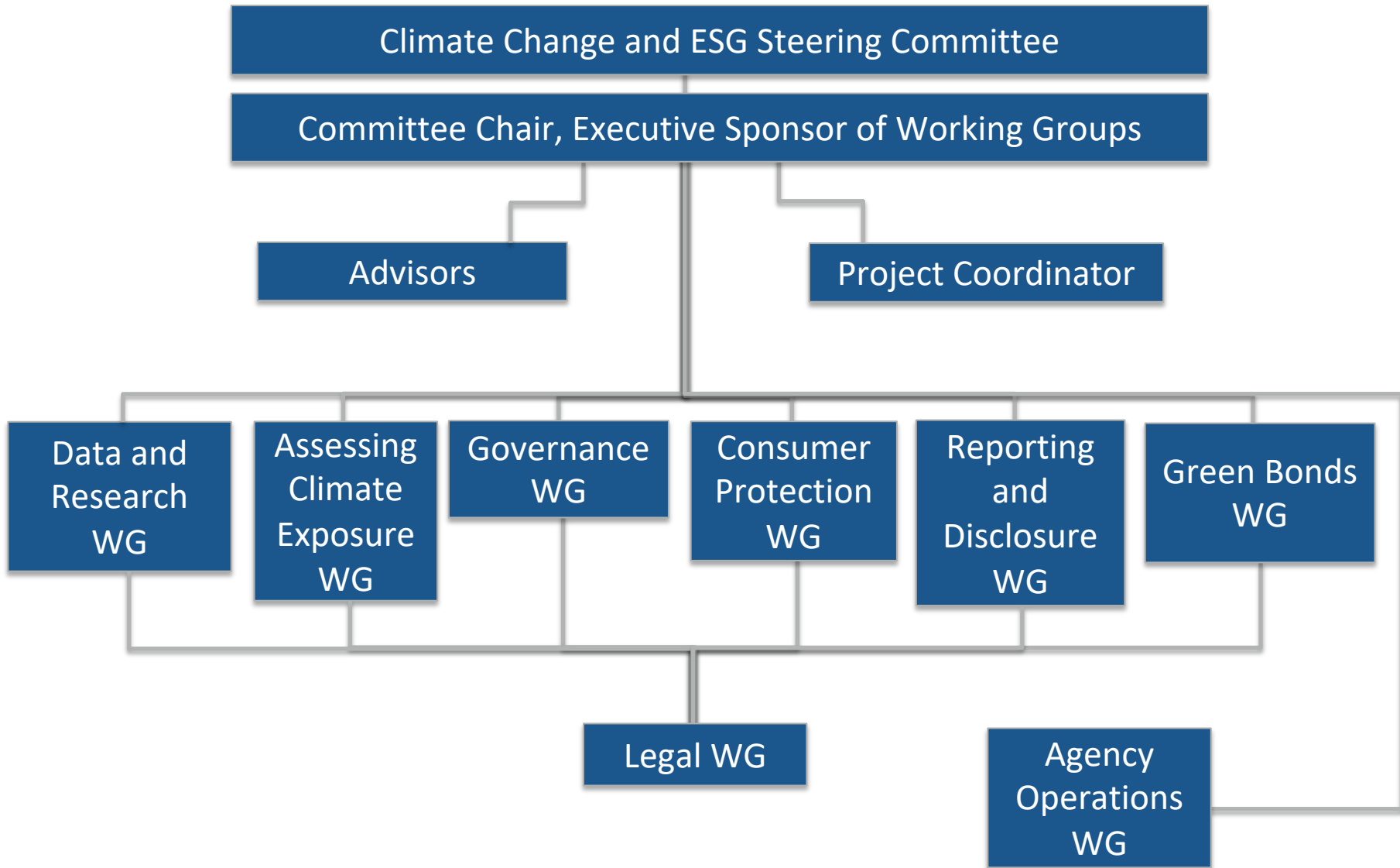
- Consistent with our statutory duties and authorities and the Enterprises' statutory missions, FHFA aims to:
  1. Ensure the regulated entities are operating in a safe and sound manner so that they can serve as reliable sources of liquidity and funding for housing finance and community investment
  2. Foster housing finance markets that promote equitable access to affordable and sustainable housing
- This effort includes:
  1. Ensuring FHFA integrates climate risk into our regulatory oversight and that our regulated entities understand and manage their climate-related risk exposures
  2. Ensuring the regulated entities foster equal access to affordable and climate-resilient housing



## What FHFA has done so far

- For years, FHFA's Disaster Response Team has coordinated with our regulated entities, government agencies, and external stakeholders to provide temporary relief to homeowners and renters in the immediate aftermath of a natural disaster
- Last year, FHFA issued a RFI on Climate and Natural Disaster Risk Management and received input from several industry participants. The input emphasized:
  - Establishing climate risk committee/structure and consulting with other regulators
  - Identifying and measuring risk
    - Highlighted data needs (e.g., flood risk data and property level data)
  - Risk mitigation and supervision
    - Highlighted insurance adequacy and “green” standards
  - Built environment
    - Highlighted investments/incentives that lower costs of retrofitting homes
  - Disclosures
    - Highlighted need for transparent and consistent disclosures
  - Equity and fairness
    - Highlighted concern around disproportionate effects on minority and low-income communities and need for consumer education

## This year, FHFA established a Climate Change and ESG Steering Committee with Eight Supporting Working Groups



## What are the Climate Change and ESG Working Groups doing?

While much of our work is non-public, this year, FHFA's working groups are collaborating with other agencies and are working closely with the Enterprises to better understand climate-related risks and opportunities of their climate-related risks and advance solutions.



## FHFA Climate Change and ESG Website

Link: [FHF Climate Change and ESG Website](https://www.fhfa.gov/climate-change-and-esg)



The screenshot shows the FHFA Climate Change and ESG website. The header includes the FHFA logo and navigation links: About Us, Supervision & Regulation, Conservatorship, Data & Tools, Policy, Programs & Research, and Mortgage Translations. The main banner features the text "CLIMATE CHANGE" in large blue and green letters, with a graphic of a landscape with trees and a river. To the right of the banner, it says "CLIMATE CHANGE AND ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG)".

**CLIMATE CHANGE AND ESG**

Home / Policy, Programs & Research / Programs / Climate Change and ESG

**Policy**

**Programs**

- 2022 Duty to Serve Public Listening Sessions
- Affordable Housing & Community Investment
- Climate Change and ESG**
- Duty to Serve Program
- Enterprise Housing Goals
- Fair Lending Oversight Program
- Financial Technology
- Fraud Prevention
- Housing Finance Examiner Commission Program
- Loss Mitigation
- National Mortgage Database Program
- Neighborhood Stabilization Initiative (NSI)

**Meet the Experts**

**Research**

The Federal Housing Finance Agency (FHFA) recognizes that climate change poses a serious threat to the U.S. housing finance system. FHFA's regulated entities – Fannie Mae, Freddie Mac, and the Federal Home Loan Bank System – have an important leadership role to play in addressing this issue. In its supervisory capacity over the regulated entities, as well as its role as conservator of Fannie Mae and Freddie Mac, FHFA has been actively working to ensure that the regulated entities are accounting for the risks associated with climate change and natural disasters while also overseeing the regulated entities' work related to Environmental, Social, and Governance (ESG) broadly.

To this end, FHFA established an internal Climate Change and ESG Steering Committee, consisting of the Agency's leadership, and eight working groups staffed with experts from across the agency. The eight working groups will work with FHFA's regulated entities, members of the FSOC Climate-Related Financial Risk Committee (CFRC), members of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), and other stakeholders on the following areas:

1. Data and research;
2. Assessing climate exposure;
3. ESG reporting and disclosure;
4. Governance;
5. Green bonds;
6. Consumer protection;
7. Internal agency operations; and
8. Legal.

**Disaster Response and Assistance**

In May 2019, FHFA formalized its agency-wide Disaster Response Team (DRT), which had been meeting informally for years prior. The DRT has experience coordinating with the regulated entities, other government agencies, external parties, and internal FHFA stakeholders during natural disasters. It is guided by a natural disaster response and recovery framework developed by FHFA in coordination with its regulated entities to support borrowers and renters affected by natural disasters. This framework incorporates forbearance and workout options for borrowers in areas impacted by natural disasters, tailoring options to their specific circumstances.







FHFA is an active member within interagency groups focused on climate-related financial risk

- [Climate-related Financial Risk Committee \(CFRC\)](#): subcommittee of regulators and insurance experts under Financial Stability Oversight Council (FSOC) for information/data sharing and collaboration on examination and reporting requirements
- [Network of Central Banks and Supervisors for Greening the Financial System \(NGFS\)](#): network of international central banks and supervisors for collaboration on best practices for green finance

## Considerations

- The full extent of the effects of climate change remain to be seen, but it is important to prepare
  - Historical data may not be sufficient to predict future conditions
    - Climate data collection and merging climate data with financial data is new and presents challenges
    - There may be non-linear aspects of climate systems and “tipping points”
- Understanding the risks and increasing awareness
  - Regulators and firms need to better understand climate-related risks (physical and transition) and transmission channels (through which financial risks arise), as well as risk mitigants (e.g., insurance, resiliency improvements, energy efficiency improvements)
  - Consumers need access to climate risk information, so they can make informed decisions
    - E.g., their geographical exposure to climate events and the resiliency and energy efficiency of their homes

## Considerations

- Managing the risks
  - Firms should manage climate-related financial risks as part of business practices
    - Governance structure; business strategy; risk management policies/procedures; quantitative analysis (scenario analysis/stress testing); disclosure
- Innovative solutions
  - We need develop ways to invest in and incentivize climate-conscious/climate-resilient building and retrofitting, considering the costs and benefits
- In all steps, considering consumer impacts
  - Effects of climate change may be disproportionately borne by vulnerable groups, and we should consider the consequences of climate solutions on such groups
  - Roll-out of climate solutions should be appropriately timed to ensure no one is left behind

# Climate Change and Mortgage Finance: A Role for the GSEs

**Lee Reiners**

*Policy Director*

*Duke Financial Economics Center*



# **Climate Change and Mortgage Finance: A Role for the GSE's**

Lee Reiners, Policy Director, Duke Financial Economics Center

Climate Adaptation Forum

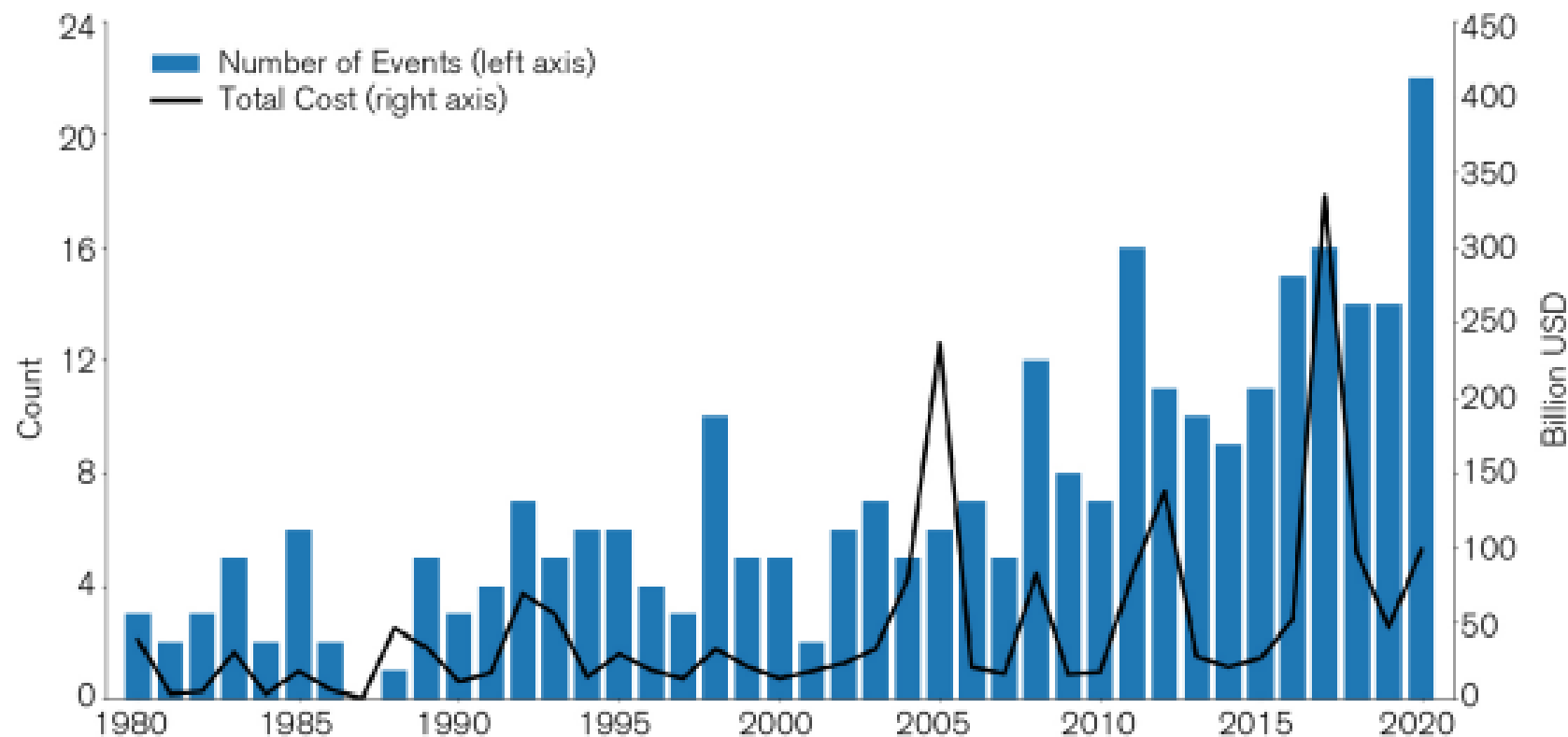
September 30, 2022

# The Issue

- October 2021: FSOC identifies climate change as “an emerging and increasing threat to U.S. financial stability.”
- Climate-related financial risks can be grouped into two broad categories: physical risks and transition risks
- Threat to housing & mortgage market principally comes from physical risks
  - Significant uncertainty and data gaps



# Billion-dollar Climate and Weather Disaster Events, US



Note: Event counts and total cost estimates reflect weather and climate disaster events with costs exceeding one billion in CPI-adjusted 2020 dollars.

Source: NOAA NCEI, "Billion-Dollar Weather and Climate Disasters."

# Climate Change Impacts the Housing Market

- [CFTC Report](#) from September 2020 Found:
  - Increased perceptions of physical risk in a local housing market depress the prices of homes exposed to sea level rise
  - Perceptions of flooding-related climate risk are currently priced into some real estate markets
  - The price of homes drops when they are designated to be in a wildfire risk zone
- Redfin [conducted](#) a 3-month randomized controlled trial involving 17.5 million users
  - Users who viewed homes with an average flood-risk score of 8.5 (severe/extreme risk) prior to the study went on to bid on homes with an average score of 3.9 (moderate risk) after gaining access to flood-risk data
  - Users who viewed homes with an average score of 8.5 before the study but did *not* get access to risk data went on to bid on homes with an average score of 8.5.
- Freddie Mac economist and co-authors [found](#) that “[a]n increase in the vacancy rates, neighborhood blight and lack of amenities will exacerbate the decline in property values.”
- Climate risks grow exponentially (feedback loops) posing dangers for long-dated assets

# Impact on Financial Market Participants

- The expected value of flood-prone properties may decrease, thereby posing risks to:
  - Real estate loans
  - Lenders that hold these mortgages on their balance sheets
  - Mortgage-backed securities
  - Profitability of firms using the property
  - Municipal finances
  - Fannie Mae and Freddie Mac
- With perfect information, the price of real-estate linked assets might already reflect these risks
  - Uncertainty in climate and financial models
  - Opacity of climate-related disclosures
- Possibility of climate disaster repricing shock could create risks to financial stability
- Major flooding of residential and commercial property over a large region could result, in a short time, in:
  - Rising mortgage delinquency and prepayment rates
  - Falling values of residential mortgage-backed securities, securitized commercial real estate (CRE) loans, the bonds of affected municipalities, and the stock of insurance companies (if insurance companies must make large payouts)

# GSEs Play a Foundational Role in Housing Market

- Fannie Mae and Freddie Mac provide financing to lenders for nearly half of current U.S. mortgages by buying the mortgages from lenders and packaging and selling them to investors.
  - Fannie and Freddie guarantee the default risk of the mortgages they securitize
  - This makes mortgages cheaper and more available across the country
- A primary statutory purpose of the GSEs is to advance affordable housing.
- In 2008, the GSEs were rescued by the federal government and placed into conservatorship with strict oversight by their regulator, the Federal Housing Finance Agency (FHFA).
- As part of the assistance plan for the GSEs, the government received stock interests in the GSEs, now valued at \$48 to \$98 billion by the CBO. The value of these assets comes from fees collected from GSE loans.
- Previous administration tried, but failed, re-privatize the GSEs
- After the 2008 financial crisis, the GSEs began transferring a meaningful portion of credit risk to the private market via Credit Risk Transfer securities, which are purchased by hedge funds, money managers, Real Estate Investment Trusts (REITs), insurance companies and pension funds

# What the GSEs Say About Climate Risk

- Freddie Mac [Annual Report](#) Downplays Climate Risk
  - Historically, our losses from natural or environmental disasters have not been significant.
  - We require all homes underlying single-family mortgages in our portfolio to have homeowner's insurance coverage throughout the life of the loan.
  - For homes located in FEMA-designated Special Flood Hazard Areas, we also require flood insurance coverage.
  - Freddie Mac's loss exposure is further limited by the geographic diversity of our mortgage portfolio, borrower equity in the properties underlying mortgage loans, relief options for borrowers affected by natural disasters, our credit risk transfer products, and community support provided by FEMA and local and federal governments for areas affected by natural disasters.
- Fannie Mae [annual report](#)
  - Single-family borrowers who obtain flood insurance generally rely on the National Flood Insurance Program ("NFIP"). If Congress fails to extend or re-authorize the program upon future expirations, FEMA may not have sufficient funds to pay claims for flood damage, and borrowers may not be able to renew their flood insurance coverage or obtain new policies through the NFIP.
  - The amount of losses we incur can also be affected by the extent that a disaster impacts the region, especially if it depresses the local economy, and by the availability of federal, state, or local assistance to borrowers affected by a disaster.
  - We do not generally require property insurance to cover damages from flooding in areas outside a Special Flood Hazard Area
  - As of December 31, 2021, 2.9% of loans in our single-family guaranty book of business and 6.3% of loans in our multifamily guaranty book of business were located in a Special Flood Hazard Area, for which we require flood insurance.

# Risks to the GSEs

- Fannie Mae and Freddie Mac do not currently price or decline to buy mortgages based on climate risk, aside from guidelines that prohibit them from securing loans that are located in special flood hazard zones that are not insured by the NFIP.
- Flood maps do not capture the universe of climate risks.
- Potential for substantial information asymmetries, as banks can sell the worst climate risk to Fannie and Freddie.
- GSEs are undercapitalized.
- The federal guarantee of the GSEs suggests that U.S. taxpayers may ultimately be on the hook for default risks associated with the impacts of physical risks on collateral values
- If they were private entities, would the GSEs price climate risk?
  - Why should it be any different under conservatorship?



# What the GSEs Could Do w/ Help from FHFA

- Invest in high-quality, asset-level data on all sources of climate risk, including floods, wildfires, sea-level rise, and others.
- Once this data is available, it should be made public and used to update FEMA's flood risk maps, so that they reflect the probability of future risks, not just historical risks.
- Stress tests and scenario analysis conducted as part of a climate risk assessment should underpin analysis of capital adequacy to assess GSE safety and soundness and their ability to withstand climate risk
- Fannie and Freddie charge lenders guarantee-fees (g-fees) when they acquire their single-family loans.
- G-fees cover four important costs of providing the credit guarantee.
  1. the expected costs of default
  2. a small (10 basis points) fee that goes to the Treasury
  3. the costs of administrative expenses, and
  4. the costs of holding the capital necessary to protect against the potential of catastrophic losses from loan defaults.
- FHFA could include climate risk in capital requirements, carrying this risk through to g-fees, and therefore prices.

# Tradeoffs

- Ensuring that mortgage pricing reflects climate risk will begin the process of adaptation and retreat, in part by decreasing the cost of purchasing in areas with the lowest climate risk
- Hard to do this without decreasing prices (i.e., lowering equity) for many homeowners
- Homeowners in flood prone areas are disproportionately minorities
- Congress should consider establishing a frontline equity redistribution and investment program for homeowners willing to relocate
  - Government could buy homes above market rate

# Questions?

# MODERATOR

**Gabriela Boscio Santos**

*Forum Organizer*

*Associate Director, Sustainable Solutions Lab  
University of Massachusetts Boston*

# Laudato Si: Building a Sustainable Home

## David Downs

*Vice President of Catholic Charities POP (Progress of Peoples) Development Corporation  
Catholic Charities of Brooklyn & Queens*



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# **Laudato Si**

## **Building a Sustainable Home**

***Climate Adaptation Forum***

***Risks and Opportunity Markets:***

***Climate Change and the Housing Crisis***

**September 30, 2022**

[www.ccbq.org](http://www.ccbq.org)

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Catholic Charities  
Peter J. DellaMonica  
Older Adult Center  
23-11 31st Pl., Astoria, NY 11006  
Hours of Operation:  
Monday - Friday  
9:00am - 5:00pm  
Saturday  
9:00am - 12:00pm

23-11













# Laudato Si Action Platform

## On Care for Our Common Home

- Combating climate change & protecting the environment
- Our responsibilities for the earth and humanity







# Laudato Si - Phase One Pilot

- Three-building pilot
- Self-financed; revolving loan fund
- 150 kW Community Solar
- 2019 start; 2022 operational





# Mission Impossible?

## Phase Two: Non-Profit Solar + Storage Mission

- Scale Laudato Si solar across portfolio
- 11 new solar photovoltaic projects (675 kW)
- Stand-alone battery storage demonstration project



## RESILIENCE, ACTIVE AND PASSIVE SURVIVABILITY

- 1 SENIOR CENTER DOUBLES AS AREA OF REFUGE FOR THE COMMUNITY
- 2 ON-SITE RENEWABLE ENERGY (SOLAR PANEL ARRAY)
- 3 BATTERY STORAGE DESIGN ENABLES GRID INTERACTIVITY
- 4 STORM WATER STORAGE CISTERN COLLECTS ALL ROOF STORMWATER, PROVIDING IRRIGATION WATER FOR LANDSCAPED AREAS
- 5 REDUCED STORMWATER RUNOFF FROM BUILDING DETENTION TANK, DECREASE NEIGHBORHOOD FLOOD HAZARD
- 6 PERMEABLE PAVING AND BIOSWALE INCREASING EVAPOTRANSPIRATION

## CARBON NEUTRAL ATTRIBUTE AND ENERGY EFFICIENCY

- 7 PASSIVE HOUSE STANDARD BUILDING ENVELOPE
- 8 FULL-ELECTRIC BUILDING, INCLUDING HVAC, DOMESTIC HOT WATER PRODUCTION, ELECTRIC DRYERS, AND KITCHENS.
- 9 SOLAR PANEL ARRAY COUPLES BATTERY STORAGE SYSTEM
- 10 INDUCTION STOVES IN BOTH SENIOR CENTER KITCHEN AND IN APARTMENT UNITS. (10% MORE ENERGY EFFICIENT THAN ELECTRIC RESISTANCE STOVE)
- 11 DAYLIGHTING AND BI-LEVEL OR OCCUPANCY SENSOR CONTROL IN ALL COMMON SPACES AND CORRIDORS
- 12 ENERGY STAR QUALIFIED APPLIANCES
- 13 ALL HIGH EFFICACY LED LIGHTING
- 14 LOW FLOW AND WATER SENSE PLUMBING FIXTURES

## WELLNESS AND HEALTHY LIVING DESIGN

- 15 ELEVATOR AND STAIR CORE ON EVERY FLOOR DESIGNED WITH VIEW AND NATURAL SUNLIGHT
- 16 APPX. 6,500SF OF LANDSCAPED PLAZA AND TERRACES PROMOTING SOCIAL WELLBEING AND ACTIVE LIVING
- 17 2ND REFUSE CHUTE FOR RECYCLING USE
- 18 AMENITY AND LAUNDRY ROOM TO ENCOURAGE SOCIALIZATION OF TENANTS
- 19 DAYLIT STAIR ADJACENT TO ELEVATOR LOBBIES ENCOURAGES STAIR USAGE AND ACTIVE LIVING

## COST REDUCTION STRATEGIES

- 20 GRID INTERACTIVITY WITH BATTERY STORAGE, SELL BACK ENERGY STORED TO THE GRID AT EVENING PEAK HOURS
- 21 ELIMINATING GAS INFRASTRUCTURE COST
- 22 ENERGY SAVING ON HIGH-PERFORMING SYSTEMS AND ENVELOPE
- 23 EFFICIENT INTERIOR LAYOUT AND BUILDING FORM

## EMBODIED CARBON REDUCTION

- 24 ELIMINATION OF FOSSIL FUEL USE ENTIRELY, PROPOSING BATTERY STORAGE TO REPLACE THE GAS GENERATOR.



Embodied Carbon Reduction Strategies



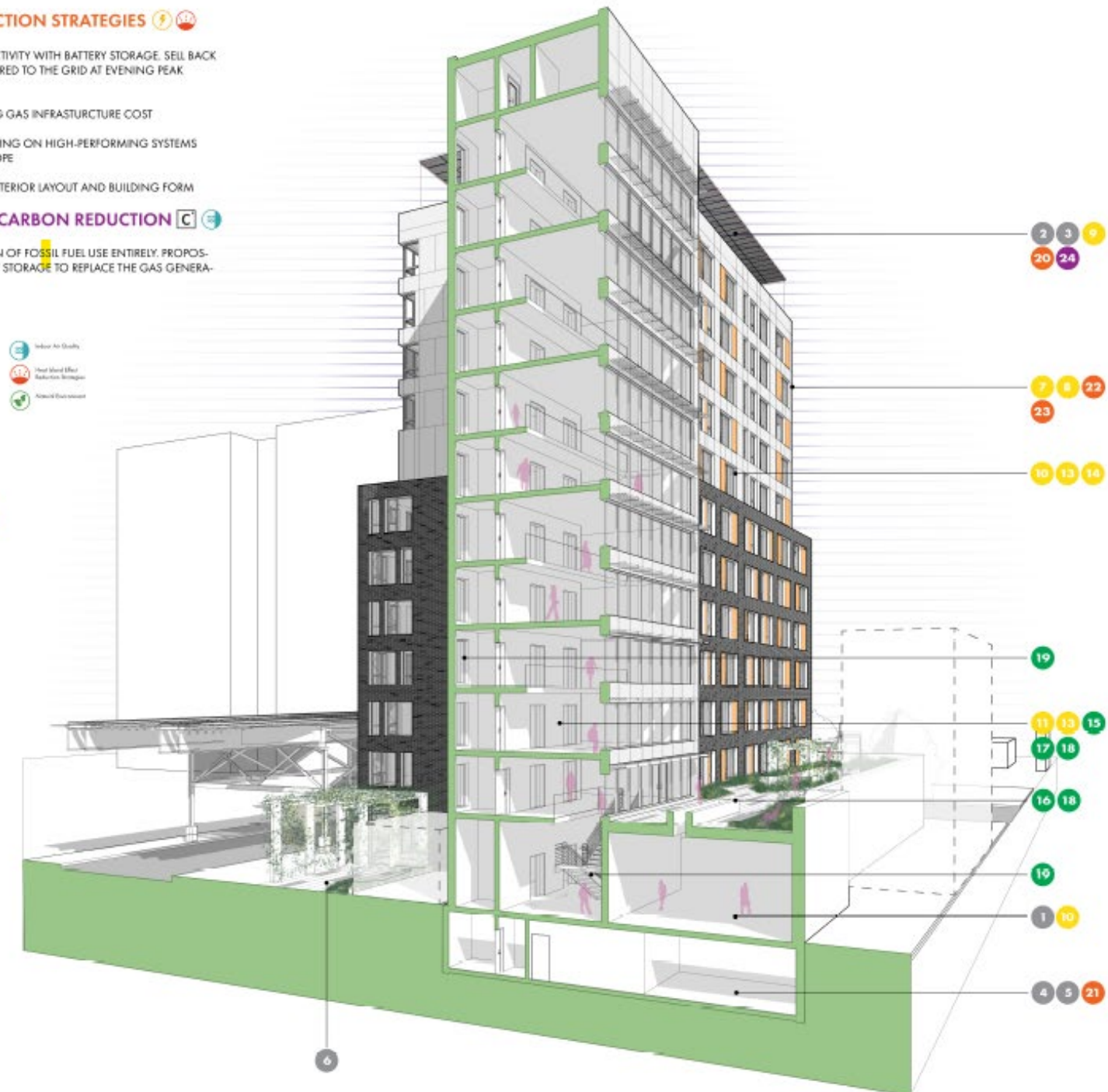
Energy & Power Strategies

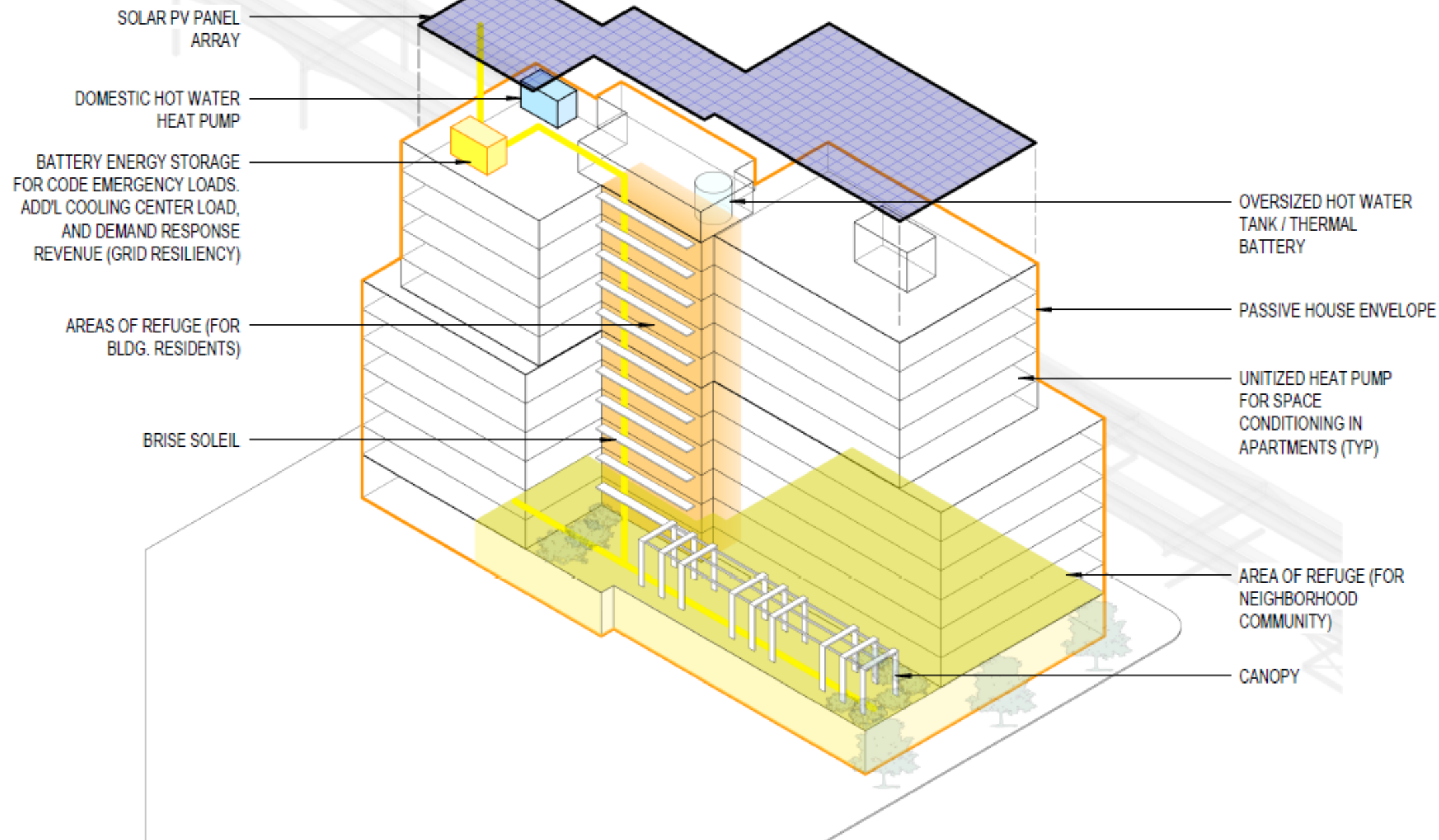


Water Conservation Strategies



Healthy Living Strategies







# Mission + ROI

- Operational savings (retrofit and new construction)
- Operational & maintenance savings (staffing)
- Insurance savings (mitigation)





# Next steps for Laudato Si

- Financing mechanisms
- Regulatory barriers
- Implementation and commitment



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## **Laudato Si**

### **Building a Sustainable Home**

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# Financing Climate Risk Mitigation and Adaptation

**Laurie Schoeman**

*Director, Climate & Sustainability  
Capital Enterprise Community Partners*



# Climate Safe Housing

September 2022



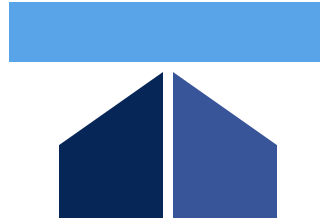
# Enterprise Community Partners

We focus on the greatest need – the massive shortage of affordable rental homes – to achieve three goals:



Increase Housing Supply

Preserve and produce  
good homes  
that people can afford



Advance Racial Equity

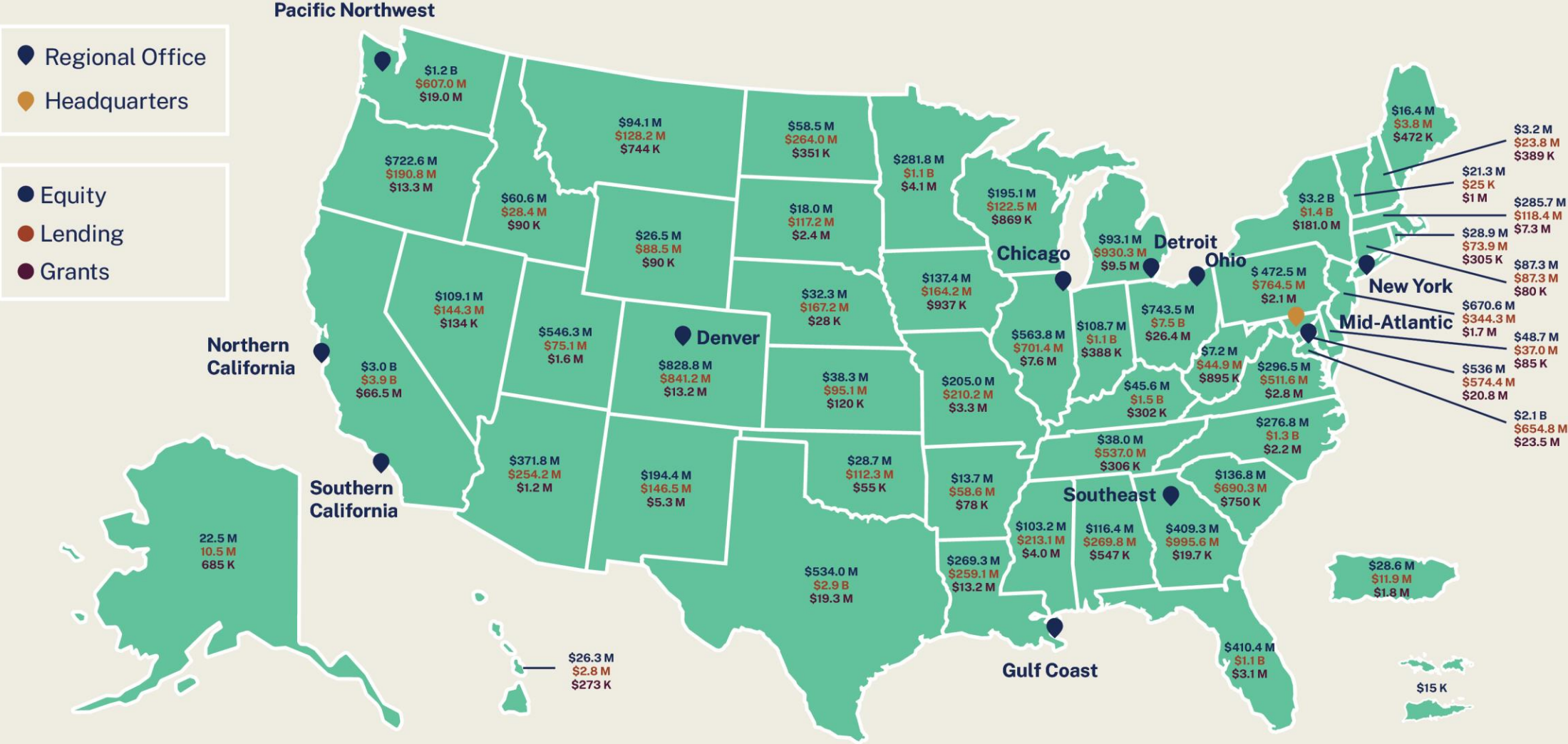
After decades of  
systematic  
racism in housing



Build Resilience & Upward Mobility

Support residents and  
strengthen communities  
to be resilient to the  
unpredictable

# Investing In Communities, 1983-2021





**Climate Change is  
not the Problem,  
We Are**



# Climate Risk Reduction Platform for Affordable Housing



Identify your hazard exposure



Assess your risks



Determine your resilience strategies



Implement resilience strategies




# Climate Safe housing- Strategies for Resilience

## Protection

Strategies to reduce a building's vulnerability to extreme weather

- 1 Wet Floodproofing
- 2 Dry Floodproofing
- 3 Site Perimeter Floodproofing
- 4 Resilient Elevators
- 5 Backwater Valves
- 6 Sump Pumps



## Adaptation

Strategies that improve a facility's ability to adapt to changing climate conditions


- 7 Envelope Efficiency
- 8 Elevated Equipment
- 9 Elevated Living Space
- 10 Surface Stormwater Management
- 11 Window Shading
- 12 Distributed Heating and Cooling



## Backup

Strategies that provide critical needs for when a facility loses power or other services


- 13 Maintaining Backup Power to Critical Systems
- 14 Emergency Lighting
- 15 Access to Potable Water



## Community

Strategies that encourage behavior which enhances resilience

- 16 Building Community Ties
- 17 Creating Community Resilience Spaces
- 18 Developing an Emergency Management Manual
- 19 Organizing for Community Resilience







# KEEP SAFE

A GUIDE FOR RESILIENT  
HOUSING DESIGN IN  
ISLAND COMMUNITIES



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# MANTÉNGASE SEGURO

UNA GUÍA PARA EL DISEÑO DE VIVIENDAS  
RESILIENTES EN COMUNIDADES ISLEÑAS



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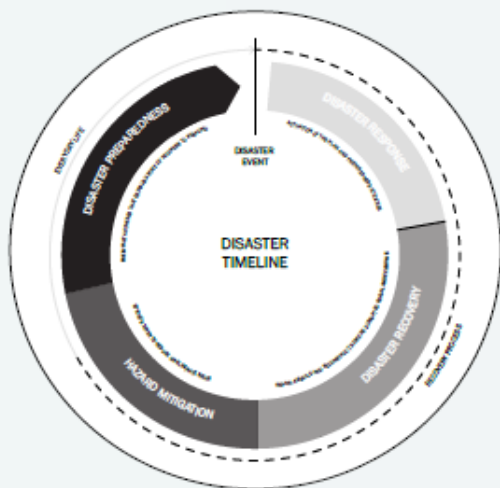
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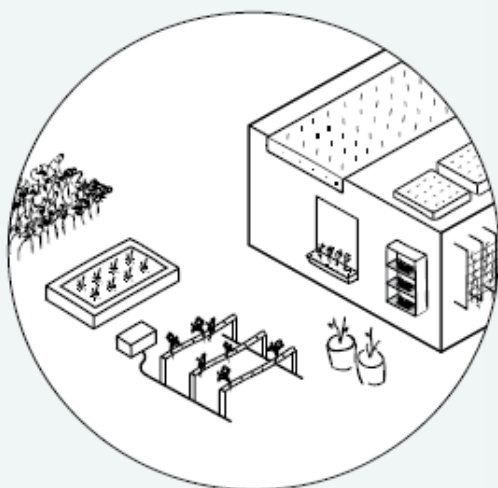




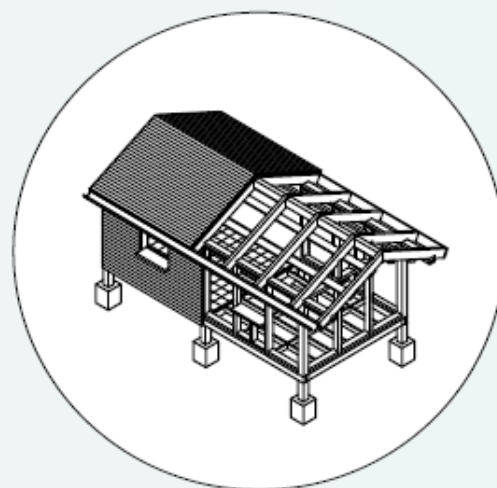
# KEEP SAFE



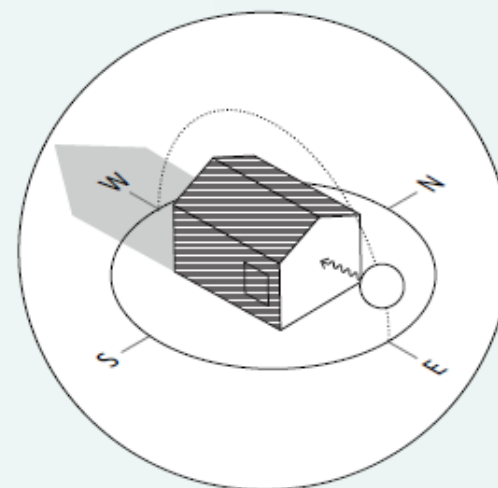
**Introduction**



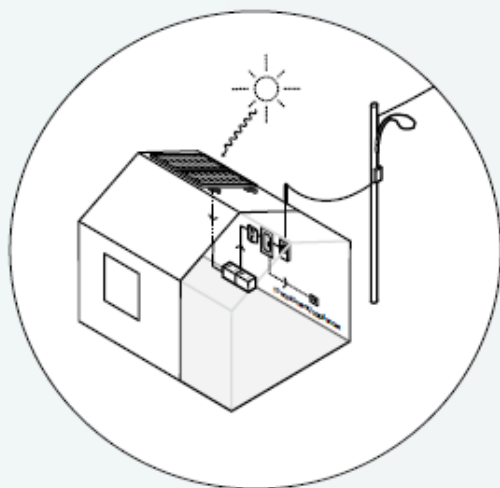
**Chapter 1: A Safer Site**



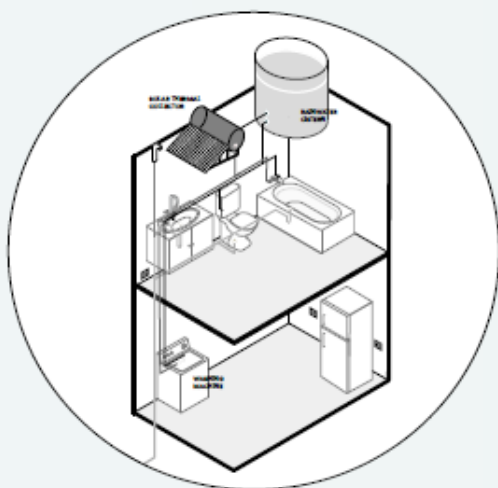
**Chapter 2: Building Protection**



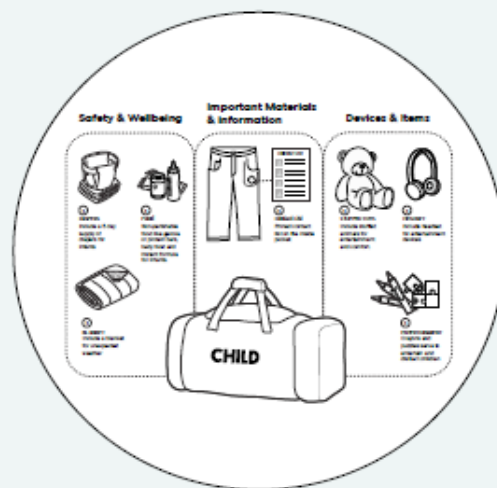
**Chapter 3: Passive Habitability**



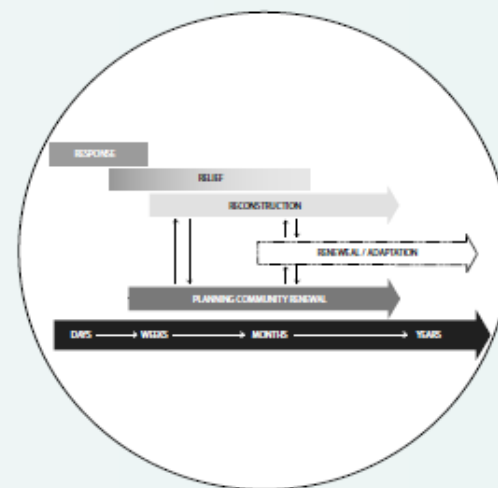
**Chapter 4: Energy Generation**



**Chapter 5: Water Management**



**Chapter 6: Household Preparedness**



**Chapter 7: Community Engagement**



KEEP  
SAFE  
FLORIDA

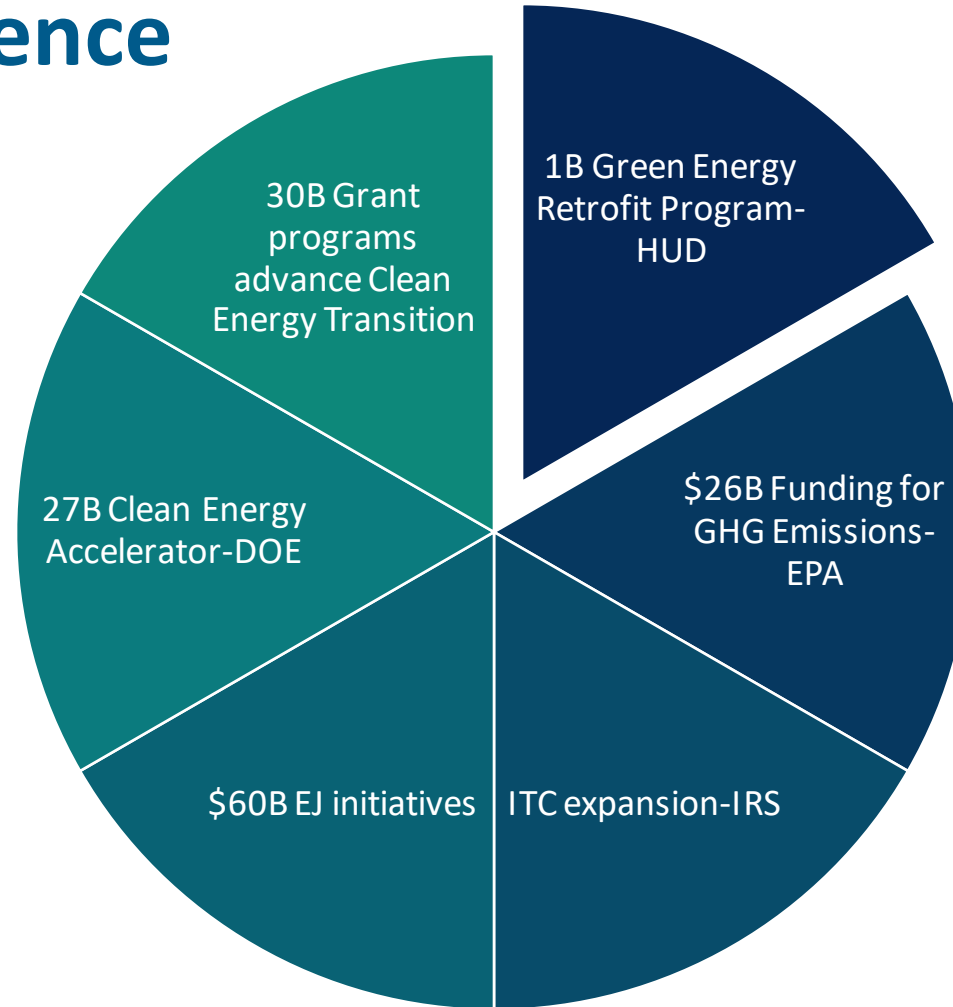




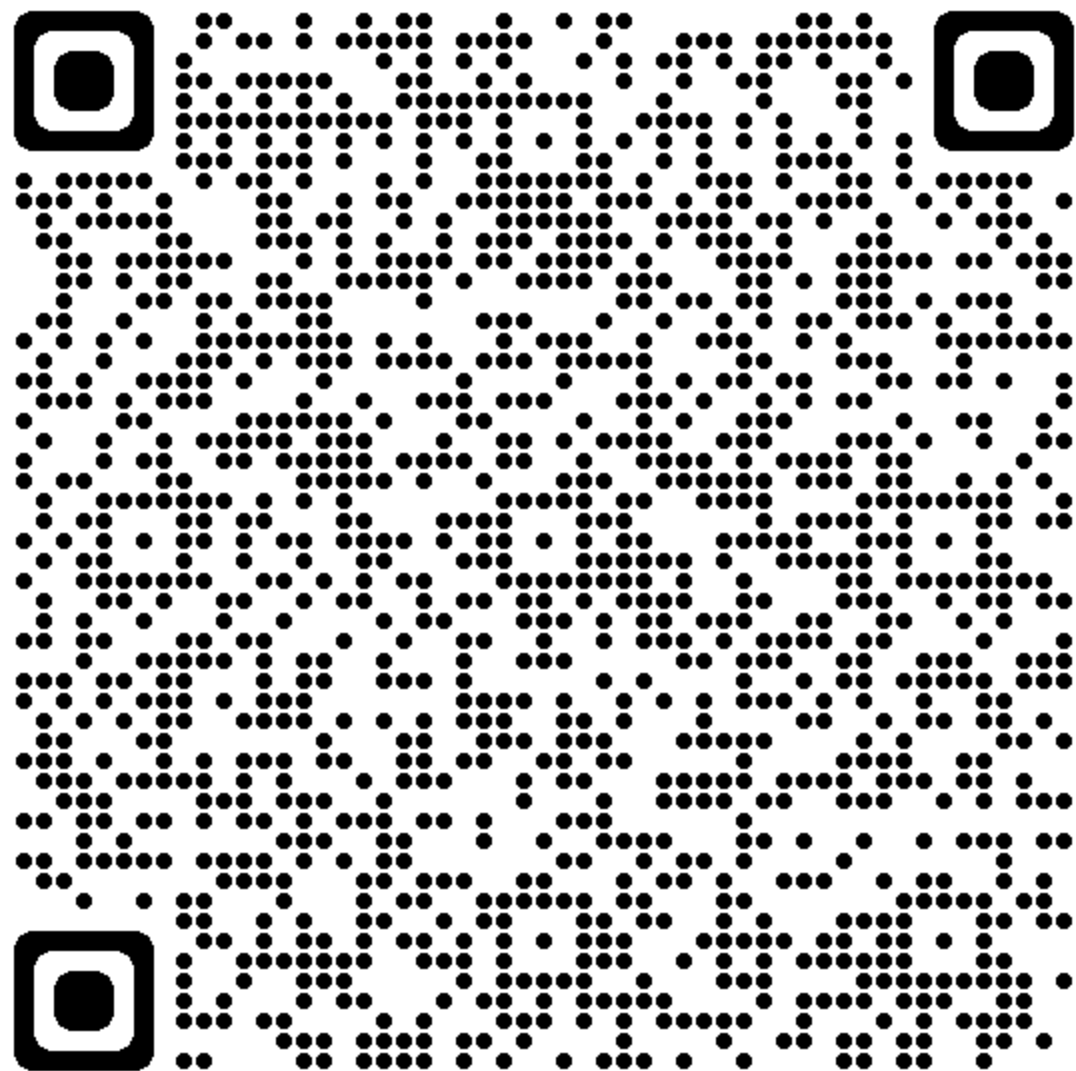
# Driving Investment

- **Rising Utility Costs**
- **Insurance Volatility**
- **Modernization of the Community Reinvestment Act**
- **Environmental, Social, Governance**
- **Asset Management**

# Financing Resilience



**\$369 billion** for climate and clean energy provisions and will curb the country's carbon emissions by roughly 40% by 2030.





# HRI Climate Resiliency Initiatives

**Jane Carbone**

*Director of Development  
Homeowner's Rehab Inc.*

A low-angle photograph of a modern multi-story building. The facade features horizontal wood slats in a warm brown tone, interspersed with light green vertical panels. Several windows with dark frames are visible. A prominent entrance canopy with a wooden roof and green pillars is in the lower left, with the address '675' in large yellow numbers. A security camera is mounted on the wall to the right. The sky is blue with scattered white clouds.

# HRI Climate Resiliency Initiatives

**Climate Adaptation Forum  
September 30th, 2022**





**Creating and Preserving  
Affordable Housing Opportunities**

HRI is a local non-profit affordable housing organization that develops and preserves affordable, high-quality rental housing, with robust resident services for individuals and families throughout our portfolio.

We have a strong focus on responsible and sustainable development and asset management practices for our portfolio to reduce our carbon footprint and to create healthy and comfortable homes for our residents.

280 Franklin Street  
Cambridge, MA 02139  
[www.homeownersrehab.org](http://www.homeownersrehab.org)  
617-868-4858

# HRI Resiliency Framework

## **Mission**

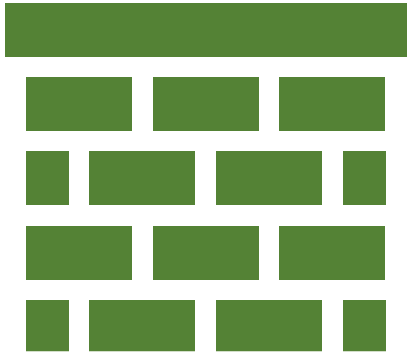
To increase awareness of, planning for, and response to current, ongoing, and future climate change impacts – including but not limited to water infiltration, heat events, and snow – that impact the physical and social infrastructure of HRI portfolio and surrounding community.

## **Objective**

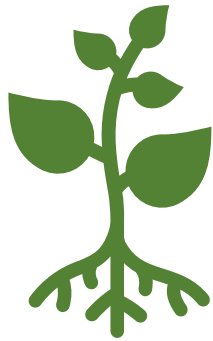
To develop a 5-year framework to incorporate resiliency planning as part of the ongoing HRI Green Sustainability Initiative for new construction and preservation/rehabilitation of affordable housing, building operations and maintenance, and resident services.



# Climate Resilience Goals



**Hardening**



**Adaptation**



**Redundancy**



**Behavioral  
Changes**



# SUSTAINABILITY

## **Efficiency Upgrades**

Insulation, heating system replacements, water efficiency upgrades, and retrofit opportunities

## **Always Learning New Building Technologies**

Striving to implement the best sustainability design, construction techniques, financing programs, and certification programs



# Solar PV Program

HRI's **Solar PV program**, started in 2008, has installed solar PV arrays on 10 buildings across the HRI portfolio. In partnership with Resonant Energy, HRI will install **23 more solar PV arrays** over the next year.

Funding comes from an internal **Green Loan**, and HRI looks forward to using funding from the **Inflation Reduction Act** to take advantage of direct grant money.

Current solar PV arrays on HRI properties generate a total of **261.29 kW** of energy. The Planned solar PV arrays will add 114.6 kW, for a total of **375.45 kW** across the portfolio.

## Finch Cambridge Roof Solar PV





# 171-173 Columbia Street

Triple decker property in the Port which suffered a fire in 2020. It is a **gut rehab, deep energy retrofit**, with input from the Cambridge Historic Commission and the **MassCEC Triple Decker Challenge**.

HRI is working to ensure this rehab is certified by **Enterprise Green Communities**, with a focus on sustainable insulation features, electrifying the building, high quality finishes, and upgraded floor plan.

Architect ZED (Zero Energy Design)





# 808-812 Memorial Drive

808-812 Memorial Drive is due to complete construction this fall.

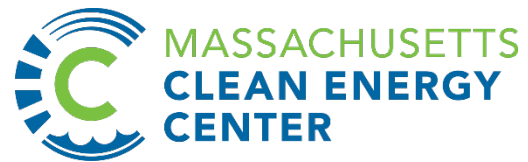
**Two buildings:** one residential, one mixed use residential-commercial.

**Recladding** exterior to make it airtight and more energy efficient. **Interior renovations** including upgraded kitchens, baths, and HVAC systems.





# Finch Cambridge



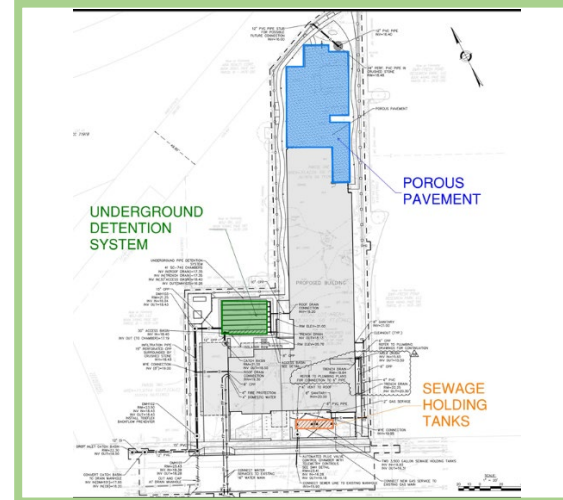
# Finch Cambridge: Resiliency Features



Podium Structure/no living space at ground level



"Shelter in Place"  
Communal Areas/ Quiet study rooms



Landscaping Plan -  
designed to capture  
stormwater runoff



Sewage Retention tank



# Finch Cambridge: Passive House Features



## Envelope/Air Sealing

- 2x6 + 2x8 wall cavity with blown in fiberglass
- Siga Air Barrier



## Insulation

- 2" mineral wool insulation at exterior
- Triple glazed windows
- PH doors



## Heating/Cooling/ Ventilation

- 2 ERVs/VRF
- 100KW solar PV
- DHW – gas condensing water heaters



## Compartmentalization

- GWB interior taped/sealed penetration

# Craft – Envelope Airtightness Continuity

**Air Barrier Taping from Exterior**



**Window Flashing from Interior**





# Craft – Pipe/Penetration Airtightness


**First Try – Not Approved**




**Second Try - Approved**



# Increasing heat: Warmer averages, greater extremes, more heat waves

 Above 90°F  
 – Low Scenario

 Above 100°F  
 – Low Scenario

\*Summer is considered to be 91 days of June through August.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

1971 - 2000  
(Baseline)

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

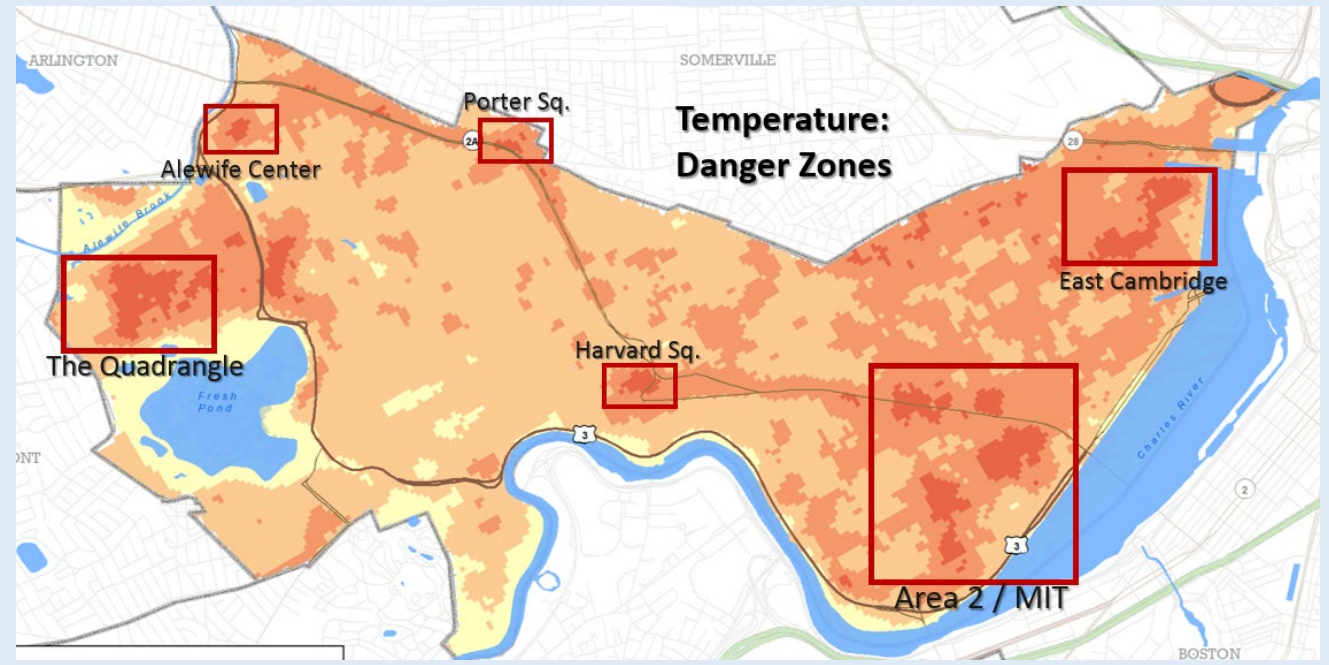
2015 - 2044  
(2030)

By 2030, number of days above 90°F could triple.

- Stress on human health
- Stress on Infrastructure

## Urban Heat Island Effect Magnifies Ambient Temperature

- Darker impervious surfaces – pavement & roofs -- absorb heat
- Areas with large amounts of impervious surface and lacking tree canopy tend to be heat islands



# Carbon Reduction /Sustainable Timeline

LATE 1990s

EARLY 2000s

2014 - PRESENT

FUTURE

- EnergyStar
- C&D Waste Management
- Low VOC materials
- Green Specs
- Energy Audits
- Green CNAs
- Energy Conservation Measures
- Healthy Materials

- Greening Portfolio Focus on Designing Energy Efficient Envelope.
- High efficiency condensing boilers
- Water Conservation
- Renewable Energy Solar PV, Solar domestic hot water
- Tracking results

- Health and Wellness Goals for residents
- Implementation of strategies to achieve close to Net Zero and or Passive House
- Reduce Operating Expenses
- Align with City's Carbon Reduction Goals
- More Data collection

- Strengthening connections between sustainability, resiliency, and resident health
- Net Zero/Mainstream Passive House
- All electric- Zero Over Time reports
- Advocate on Climate Goals in affordable housing



# Partnerships

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wegowise



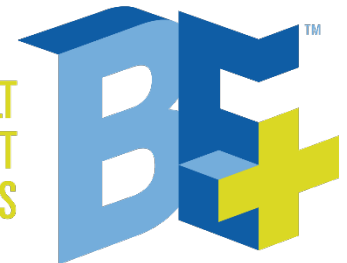
Lean Multifamily



Enterprise  
green  
communities<sup>SM</sup>



BUILT  
ENVIRONMENT  
PLUS





# Thank you

[www.homeownersrehab.org](http://www.homeownersrehab.org)



# CLOSING REMARKS

**Kelly Knee**

*Forum Co-Chair*

*Executive Director Ocean Science*

*RPS North America*

# SAVE THE DATE!

## Next Climate Adaptation Forum

December 9, 2022 | Nature Based  
Solutions