Multifamily Meet-Up Agenda

- **Part 1**
  - Welcome!
  - Update from HUD's Office of Multifamily Housing Programs
  - The Year Behind and 2019 Data Drive Results
  - Multifamily Sector Partner Recognition and Awards
  - Goal Achiever Showcase: Cambridge Housing Authority
  - Goal Achiever Showcase: Tenderloin Neighborhood Development Corporation
Multifamily Meet-Up Agenda

- Part 2
  - Multifamily Housing Resilience Panel:
    - The DC Multifamily Resilience and Solar Assessment Tool (Enterprise Community Partners)
    - Opportunities for Combined Heat and Power (CHP) in the Multifamily Sector (U.S. Environmental Protection Agency)
    - Stormwater Management Pilot in Queens, New York (NYCHA)
  - Q&A: Small group discussion
  - Closing Announcements: Better Buildings Healthy Housing Accelerator
Ask an Expert Lounge

Wednesday 3:00-3:30pm
- Building Data Analytics (*Eliot Crowe, LBNL*)
- Data Centers (*Dale Sartor, LBNL*)
- Energy Data (*Hanaa Rohman, ICF*)
- Residential Data Tools (*Maddy Salzman, DOE*)
- Smart Labs (*Rachel Romero & Otto VanGeet, NREL*)
- Zero Energy (*Shanti Pless, NREL*)

Thursday 10:30-11:00am
- 50001 Ready/ISO 50001 (*Peter Therkelsen, LBNL*)
- Energy Assessment: Approaches, Equipment, and Software (*Thomas Wenning, ORNL*)
- Smart Labs (*Monica Witt, LANL*)
- Utility Incentive Programs (*Miles Hayes, NREL*)

Thursday 3:30-4:00pm
- City/Utility-Scale Modeling (*Eric Wilson, NREL*)
- Energy Assessment: Approaches, Equipment, and Software (*Thomas Wenning, ORNL*)
- Energy Data (*Hanaa Rohman, ICF*)
- Industrial Processes Heating and Waste Heat Recovery (*Sachin Nimbalker, ORNL*)
- Lighting (*Michael Meyer, PNNL*)
- Zero Energy (*Paul Torcellini, NREL*)
Don’t Miss Wednesday’s Multifamily Events

- 12:30-1:30pm  Lunch
- 1:30-3:00pm  Getting Your Money's Worth: Making Sure Retrofits Reach Expected Savings
- 3:30-5:00pm  Healthy Housing: Quantifying the Non-Energy Benefits of Energy Efficiency Upgrades
- 6:00-7:00pm  Summit Reception
- 7:15pm  Multifamily Sector Dinner at Federico Ristorante Italiano (see sign-up sheet)
Thursday’s Multifamily Events

- 9:00-10:30am  Resilience Applications for Low-income Communities
- 11:00am-12:30pm  New Tools for Your Multifamily Retrofit Toolbox
- 12:30-2:00pm  Lunch Plenary & Goal Achiever Recognition - Hearing from the Experts: Emerging Technologies & Things to Watch
- 2:00-3:30pm  Getting to 100%: Overcoming Barriers to Tenant Data Collection
Update from HUD's Office of Multifamily Housing Programs

By: Robert Iber, Senior Advisor
The Year Behind and 2019 Data Drive Results: Multifamily Sector Update
By: Josh Geyer, HUD
Multifamily Sector Partners

105 Multifamily Partners
Highlighted Partners

8 Nationwide Partners
Mercy Housing
Jonathan Rose Companies
National Church Residences
Retirement Housing Foundation
The EL Good Samaritan Society
Volunteers of America
WinnCompanies
Wishrock Investment Group

8 of the Top 10 PHAs
New York City
Puerto Rico
Newark
Cuyahoga
Washington DC
Philadelphia
Baltimore
Boston

All 13 Stewards of Affordable Housing (SAHF) Partners
Bridge Housing
CommonBond Communities
Community Housing Partners
Homes for America
Mercy Housing
National Church Residences
National Housing Trust
Preservation of Affordable Housing
Retirement Housing Foundation
The Community Builders
The EL Good Samaritan Society
The NHP Foundation
Volunteers of America
BBC Housing Units by Subsector

- Affordable Housing Units: 32%
- Market-Rate Housing Units: 23%
- HUD Public Housing Units: 45%
BBC Partners by Sector

Number of Partners

- Multifamily
- Local Government
- Industrial
- K-12 Schools
- Retail, Food Service, and...
- Commercial Real Estate
- Higher Education
- Data Centers
- Healthcare
- State Government
- Hospitality
Multifamily Sector Partner Statistics

- **750,000** Housing Units
- **620 Million** Square Feet
- **10 Trillion+** BTUs Saved
- **$144 Million** Cumulative Cost Savings
$144 million Reported Cost Savings since 2013

72 partners reporting in 2018 showed $143.8 million cost savings

Pie chart showing:
- Public Housing 72%
- Affordable Housing 15%
- Mixed Rate 13%
BBC Multifamily Sector Growth by Year

Number of Partners

Square Feet Committed

Partners

Square Feet Commited
2019 Data Drive Update

Goal Achievers 🏆 🏆 🏆 🏆
(≥ 95% Whole Building data & > 20% energy savings, Implementation Model, and Showcase)

• Cambridge, MA Housing Authority – 23% energy (2019)
• Keene Housing – 29% water (2019)
• Tenderloin Neighborhood Development Corporation – 21% energy and 21% water (2019)
• Jersey City Housing Authority – 26% energy (2018)
• 2LifeCommunities – 24% energy (2017)

Near Goal Achievers

• Caritas Communities, Inc. – 15% energy
• Trinity Housing Corporation of Greeley, Colorado – 15% energy
• San Buenaventura, CA, Housing Authority – 13% energy
• Denver Housing Authority, CO – 12% energy
• Foundation Communities – 12% energy
2019 Partner Reporting Progress

Number of Multifamily Partners

# of Partners

# Submitting Data

# Publishing Displays

Reporting Period

2015 2016 2017 2018 2019

5 13 34 61 72

89 111 111 103 105

5 27 85 80 86

0 20 40 60 80 100 120
Square Footage Reporting Progress (millions of sq. ft.)

- **Committed Sq. Ft. (Million)**
- **Sq. Ft. Shared**
- **Sq. Ft. Published**

<table>
<thead>
<tr>
<th>Reporting Period</th>
<th>Millions of Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>8</td>
</tr>
<tr>
<td>2016</td>
<td>175</td>
</tr>
<tr>
<td>2017</td>
<td>260</td>
</tr>
<tr>
<td>2018</td>
<td>275</td>
</tr>
<tr>
<td>2019</td>
<td>297</td>
</tr>
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</table>
Multifamily Sector – Case Studies

65 Showcase Projects have been published by current partners to date

24 Implementation Models have been published by current partners to date

The portion of current partners that have already written at least 1 case study is 56%
Better Buildings Showcase Project

205 JONES STREET APARTMENTS

SECTOR TYPE
Multifamily

LOCATION
San Francisco, California

PROJECT SIZE
29,000 Square Feet

ANNUAL ENERGY USE
(Source EUI)

Baseline (2016)
117 kBtu/sq.ft.

Actual (2018)
91 kBtu/sq.ft.

ENERGY SAVINGS:
22%

ANNUAL ENERGY COST

Baseline (2016)
$45,000

Actual (2018)
$39,000

COST SAVINGS:
$6,000
BBC Multifamily Energy & Water Efficiency Resources at HUD Exchange

- Utility Benchmarking
- Building and Product Standards
- Retrofit Planning
- Operations and Maintenance
- Resident Engagement
- Retrofit Finance
Multifamily Sector Recognition
2019 Better Buildings Summit
Christian Church Homes

- Builds affordable housing for the growing senior population.
- Served over 100,000 residents in the course of 50 years.
- Manages over 50 communities housing over 5,000 residents in six states.
BBC Multifamily Partners that Published a Showcase Project this Year

- Boston Housing Authority
- Cambridge, MA Housing Authority
- Caritas Communities
- Codman Square Neighborhood Development Corporation
- Danville Development
- East Bay Asian Local Development Corporation
- Eden Housing
- Jonathan Rose Companies
- Mercy Housing, Inc.
- Philadelphia Housing Authority
- REACH CDC
- Tenderloin Neighborhood Development Corporation
- WinnCompanies
BBC Multifamily Partners that Published an Implementation Model this Year

- Jamaica Plain Neighborhood Development Corporation
- Lucas Metropolitan Housing Authority
- Trinity Management
BBC Multifamily Partners with a Published Showcase Project AND Implementation Model

- Aeon
- Balfour Beatty Communities
- Corcoran Management
- Cuyahoga Metropolitan Housing Authority
- Jamaica Plain Neighborhood Development Corporation
- Jersey City Housing Authority
- LINC Housing Corporation
- Mercy Housing
- New York City Housing Authority
- National Housing Trust Communities
- Preservation of Affordable Housing
- REACH CDC
- Rockford Housing Authority
- Tampa Housing Authority
- Tenderloin Neighborhood Development Corporation
- The Economic Development Authority of the City of Mankato, MN
- The Housing Authority of the City and County of Denver
- Trinity Management
- Village of Hempstead Housing Authority

Total = 19 partners
**Bold** = Accomplished for the first time this year
BBC Multifamily partners who shared data and achieved a partial display this year

- Aeon
- Beacon Communities
- **Boston Housing Authority**
- BRIDGE Housing Corporation
- CommonBond Communities
- **Community Housing Partners**
- Corcoran Management
- Cuyahoga Metropolitan Housing Authority
- East Bay Asian Local Development Corporation
- Fort Wayne Housing Authority
- Gary Housing Authority
- **Highland Commercial Properties**
- **Homes for America**
- Housing Authority of Baltimore City
- **Housing Authority of Knox County, IN**
- Jamaica Plain Neighborhood Development Corporation
- Jonathan Rose Companies
- **Kier Property Management**
- Korman Residential Properties
- Lucas Metropolitan Housing Authority
- Mercy Housing
- National Church Residences
- NHT Communities
- Peabody Properties, Inc.
- Preservation of Affordable Housing
- Retirement Housing Foundation
- Satellite Affordable Housing Associates
- Tampa Housing Authority
- The Community Builders, Inc.
- The Evangelical Lutheran Good Samaritan Society
- The NHP Foundation
- The Renaissance Collaborative
- The Silver Street Group and Housing Management Resources
- Trinity Management
- **Truth or Consequences Housing Authority**
- Utica Municipal Housing Authority
- Windsor Locks Housing Authority
- Wishrock Investment Group

Total = 38
**Bold** = Achieved for the first time this year
BBC Multifamily partners who shared a full data display this year

- 2Life Communities
- AHEAD, Inc.
- Angola (IN) Housing Authority
- Atlanta Housing Authority
- Cambridge, MA Housing Authority
- Capitol Hill Housing
- Caritas Communities, Inc.
- Cascap, Inc.
- Cion Housing Services
- Cleveland Housing Authority
- **Codman Square Neighborhood Development Corporation**
- Danville Development
- Foundation Communities
- Gateway Management Services, LLC
- Helena (MT) Housing Authority
- **Housing Authority of the City of San Buenaventura**
- Jersey City Housing Authority
- Keene Housing
- King County Housing Authority
- **Michigan City Housing Authority**
- Minneapolis Public Housing Authority
- **Multi-Family Mission Ministries**
- New Bedford Housing Authority
- New York City Housing Authority
- Palatka (FL) Housing Authority
- Schochet Companies
- Tenderloin Neighborhood Development Corporation
- The Economic Development Authority of the City of Mankato, MN
- The Housing Authority of the City and County of Denver
- Trinity Housing Corporation of Greeley, Colorado
- Village of Hempstead Housing Authority
- Vistula Management Company
- Washington, DC Housing Authority
- **Wesley Housing Corporation**

Total = 34

**Bold** = Achieved for the first time this year
Met the BBC goal of 20% reduction in portfolio-wide energy consumption, achieving 23% savings in four years.
Meet the BBC goal of 20% reduction in portfolio-wide energy and water consumption, achieving 21% savings in energy and 21% in water in six years.
Met the BBC goal of 20% reduction in portfolio-wide water consumption, achieving 29% savings in four years.
Thank You!
Goal Achiever: Cambridge Housing Authority

Tina Miller, Energy Manager
CHA Mission Statement

- Cambridge Housing Authority (CHA) provides long-term rental housing and rental assistance to more than 7,000 low-income families, elders and disabled individuals, or 12% of the city population.

- CHA's mission is to develop and manage, safe, good quality, affordable, housing for low-income individuals and families in a manner which promotes citizenship, community and self-reliance in one of the most expensive housing markets in the country.

- CHA's built housing portfolio includes a range of low rise family developments and high rise housing primarily for elders and disabled individuals in a range of configurations from hundreds of units on a site to individual condo settings throughout the City.
CHA joined the Better Buildings Challenge in 2014 and has successfully reduced energy intensity by 23% within four years. This success is largely attributable to CHA’s MTW status, track record of successful energy retrofits and the infusion of capital provided by the transition from public housing to the RAD program.

CHA achieved a 23% reduction in just 4 years largely thanks to the RAD modernization work in addition to comprehensive LED lighting retrofits.
Enterprise Green Communities Certification for all substantial renovation and new construction
CHA employs three Energy Tracking systems to monitor progress and track building performance.
## Tracking Progress via Portfolio Manager

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property GFA</th>
<th>2014</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ENERGY STAR Score</td>
<td>Site EUI (kBtu/ft²)</td>
<td>Source EUI (kBtu/ft²)</td>
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<tr>
<td>Manning Apartments</td>
<td>160,580</td>
<td>3</td>
<td>72.3</td>
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<tr>
<td></td>
<td></td>
<td>+92</td>
<td>24%</td>
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<tr>
<td>Washington Elms</td>
<td>200,075</td>
<td>23</td>
<td>112.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+39</td>
<td>28%</td>
</tr>
<tr>
<td>Putnam Gardens</td>
<td>126,002</td>
<td>15</td>
<td>124.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+83</td>
<td>65%</td>
</tr>
<tr>
<td>Newtowne Court</td>
<td>275,666</td>
<td>34</td>
<td>102.6</td>
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<tr>
<td></td>
<td></td>
<td>+56</td>
<td>39%</td>
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<tr>
<td>Total</td>
<td>762,323</td>
<td>NA</td>
<td>102.4</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>39%</td>
</tr>
</tbody>
</table>
The Results at Manning Apartments

Reducing annual utility costs by $350,000 annually.

Adding a 60 kwh co-generation unit to generate electricity.

Providing central A/C to residents and a new ventilation system significantly improving resident comfort.

Funded over $66M in improvements:

• New building envelope eliminating significant and water infiltration and adding insulation to the building

• Replace electric resistance baseboard heat and domestic hot water system with gas hydronic system

• Replace brittle, failing portable, sanitary and storm water piping in the building

• New kitchen and bathrooms and other interior refurbishments

• Add 6 new units to the building
The Results at Manning

Before

After
The Results at Manning Apartments

Pre-retrofit concrete exterior

Completed metal clad exterior
Co-gen plants -- CHA has 420 kw of co-gen at 4 properties with 3 additional properties in planning. Savings from co-gen have help CHA offset electrical consumption from central AC and increased ventilation.

Co-gen is generally sited at developments with central boiler plants delivering heat and hot water to a minimum of 120 units. Cogen runs in lead providing thermal energy for heat and hot water. Cogen also relieves grid congestion, lowers local emissions and provides Alternative Energy Credits which offset maintenance costs.

Solar arrays provide lower cost renewable power while lowering local emissions. CHA has both direct ownership and power purchase agreements within our portfolio. 5% of CHA's electricity is provided by on site solar.

CHA enters into long term contracts for retail gas and electricity supply which provides a stable budget base as well as cost savings for the agency.
Challenges Ahead:

- Managing complex financial transactions with multiple stakeholders.
- Preparing Operations and Maintenance staff for new technology and Building Management Systems.
- Preparing for electrification as we work to support the Cambridge City goal of net zero by 2050.
- Managing regulatory change in the Solar Industry and various incentive programs.

A rendering of the future Millers River Apartments currently undergoing a $100 million reconstruction.
Goal Achiever: Tenderloin Neighborhood Development Corporation

Ruchi Shah, Senior Sustainability Manager
Thank You!
Multifamily Meet-Up
Part 2
‘I’m Cold and I’m Afraid’: Across Midwest, Homeless Await Deep Freeze

A man sat at the corner of Michigan Avenue and Wacker Drive in Chicago on Tuesday as temperatures fell. Nolis Anderson for The New York Times

The Polar Vortex: Cold Hard Facts

You could get frostbite in as little as five minutes. It will be warmer in Antarctica than it is in Des Moines. It could feel like minus 65 in Minneapolis.

A Coastal Enclave Faces Unimaginable Tragedy. And Rain Is in the Forecast.

- Mudslides left Montecito, Calif., in ruins, and rescuers were racing on Sunday to find four people still missing.

Commuters in Chicago braved snow and wind on Monday.
Baked Alaska: It’s beach time as a heat wave hits cities across the state

RICHARD READ
REPORTING FROM ANCHORAGE
July 5 at 7:40 PM ET

Bears and moose are seeking relief in garden sprinklers. Stores are out of ice. Kids are lamenting the cancellation of Independence Day fireworks — not that pyrotechnics show up all that well anyway under the midnight sun.

Anchorage, and much of Alaska, is shattering temperature records amid a heat wave accompanied by...
Harvey marks the most extreme rain event in U.S. history

By Jason Samenow  August 31 at 2:09 PM

The rain from Harvey is in a class of its own. The storm has unloaded over 50 inches of rain east of Houston, the greatest amount ever recorded in the Lower 48 states from a single storm. And it’s still raining.

John Nielsen-Gammon, Texas state climatologist, said a rain gauge in Mont Belvieu, about 40 miles east of Houston, had registered 51.1 inches of rain through early Tuesday afternoon. This total exceeds the previous record of 48 inches set during tropical cyclone Amelia in Medina, Texas in 1978.
Air attack saves homes near Malibu Canyon, but winds pose a threat

BY SARAH PARVINI, BENJAMIN ORESKES, JAMES QUEALLY, ALENE TCHEKMDYIAN AND JACK DOLAN

Los Angeles County fire engineer Scott Pishe stood guard outside several multimillion-dollar homes Sunday as air tankers and helicopters bombarded the fire-ravaged slopes of nearby Malibu Canyon with fire retardant and water.

Earlier in the day, flames threatened to make a run into a chute by the canyon, but the aggressive air attack kept the fire there at bay.

“If it had gotten into that chute, we would’ve been in trouble,” Pishe said from the southeastern flank of the blaze, which had claimed two lives and forced

Forecast wind gusts
Officials warn that strong wind gusts are expected in some fire zones Monday afternoon.

- Up to 30 mph
- 30-40 mph
- More than 40 mph

More bodies are found in Butte County; over 200 people still missing

BY LOUIS SAHAGUN, JOSEPH SRENA AND HAILEY BRANSON-POTTS

PARADISE, Calif. — The death toll from the Camp fire raging in Butte County rose to 29 on Sunday as authorities continued their search for victims amid the ruins of the Sierra foothills town of Paradise.

Five additional victims were found in their homes, said Butte County Sheriff-Coroner Kory Honea. Another was found in a vehicle.

The number could continue to grow. On Sunday, authorities said, there were 228 people whose whereabouts were unknown. The search has been hampered by the active fire still burning in the area. Through much of the weekend, the ground remained too hot for cadaver
The DC Multifamily Resilience and Solar Assessment Tool
Laurie Schoeman, Enterprise Community Partners, Inc.
Better Building Summit
Multifamily Meetup
July 10 10:30
Enterprise: Who We Are

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

Policy
- CDBG-DR Standing Allocation
- National Flood Insurance Program
- Local Advocacy
- Code

Solutions
- Technical Assistance
- Developing Guidance Tools for Resilient Housing
- Piloting Housing Innovation models

Capital
- Grants for Recovery
- Grants for Resilience
- Loan Capital
- Investment
“People who are already vulnerable, including lower-income and other marginalized communities, have lower capacity to prepare for and cope with extreme weather and climate-related events and are expected to experience greater impacts”
-National Climate Assessment 2019
What is at Stake if we Stand still?
# Faces of Resilience

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>The extent of personal discomfort, harm, injury, or loss of life.</td>
</tr>
<tr>
<td>Physical Assets</td>
<td>Loss or damage to structural and architectural building components, MEP and IT equipment, utilities, landscaping, contents.</td>
</tr>
<tr>
<td>Operations</td>
<td>Disruption to building operations and functionality, occupancy, egress/ingress, critical systems, or lab activities.</td>
</tr>
<tr>
<td>Revenue</td>
<td>Loss of revenue due to business interruption, specifically in relation to tenants.</td>
</tr>
<tr>
<td>Reputation</td>
<td>Negative media attention or impact on industry reputation in the aftermath of an impactful shock or stress.</td>
</tr>
</tbody>
</table>
Resilience Tools

Multifamily Housing Resiliency Toolkit

DC Resilience Capital Needs Assessment

Financial Lender Resiliency Toolkit

Keep Safe Resilience Guide For Island Communities

Participatory Planning Mitigation Tool
Framework for Resilient Investments and Return Opportunities

- More Efficiency in Operations and Asset management
- Utility Savings
- Insurance and Risk Reduction
- Co-Benefits
  - Health
  - Safety
  - Co2 reductions
  - Branding
Strategies for Multifamily Housing Resilience

**Community**
Strategies that encourage behavior which enhances resilience.

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

**Protection**
Strategies to reduce a building's vulnerability to extreme weather.

**Backup**
Strategies that provide critical needs when a facility loses power or other services.
Determine your Resilience Strategies

<table>
<thead>
<tr>
<th>Resilience Strategies Decision Matrix</th>
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<tr>
<td>Protection</td>
</tr>
<tr>
<td>Dry Positioning</td>
</tr>
<tr>
<td>Water Designing</td>
</tr>
<tr>
<td>Fire Protection</td>
</tr>
<tr>
<td>Access to Essential Services</td>
</tr>
<tr>
<td>Backup</td>
</tr>
<tr>
<td>Recovery</td>
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<tr>
<td>Building Resilience</td>
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</tr>
<tr>
<td>Recovery</td>
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<tr>
<td>Building Resilience</td>
</tr>
</tbody>
</table>

Legend:
- **Building Ultra-CM**: Represents Building Ultra-CM Resilience, Vol. 1
- **Building CM**: Represents Building Resilience, Vol. 1
- **Building Standard**: Represents Building Standard Resilience, Vol. 1

<table>
<thead>
<tr>
<th>Units</th>
<th>Hours</th>
<th>Your Role</th>
<th>Impact</th>
<th>Resistance</th>
<th>Duration</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Strategies for Multi-Hazard Building Resilience, Vol. 1
Flood Prevention – High Cost
Dry Floodproofing

1. Seal cracks or openings in walls and foundation.
2. Install flood gates to prevent water from coming through entryways.
3. Install backflow preventers in floor drains.
4. Install a waterproof sidewalk hatch.
5. Protect against seepage by installing a sump pump.
6. Flood-proof equipment which cannot be elevated.
7. Flood doors are engineered to keep water out.

Strategies not pictured:
Protect any electrical equipment with waterproof enclosures.

Only permitted in residential buildings with commercial on the first floor or non-residential buildings. Egress must be maintained to the public way. Appendix G requires a flood emergency plan when dry floodproofing is installed in a building. See Floodplain Zoning Regulations in the appendix of this presentation and Building Code Appendix G for additional requirements.
Flood Prevention – High Cost

Elevated Equipment
Hey New York, are you flood-ready?

TECHNICAL ASSISTANCE MODEL
FLOOD HELP NYC
Multifamily Housing Resilience Tool to Support Preservation of Capital’s Affordable Housing Stock
The Tool

- Pre Assessment
- Walk Through
- Report Generation
- Counsel
- Implementation
Existing Building Case Study
Washington, DC

Year Built: 1963
Most Recent Year Rehabbed: 2000
Total Square Feet: 118,716
Total # Apartments: 202
Total # Bedrooms: 329
Total # Stories: 2 and 3
Basement? Conditioned?: Yes, yes
Water Meter Configuration: 1 meter per building
Electric Meter Configuration: 220 tenant, 16 common meters
Existing Building Case Study
Washington, DC
Because of hydrostatic pressure, component floodproofing barriers should be designed to a maximum of 3 ft.

Image: Colin Hayes.

Dry component floodproofing is often an effective solution for equipment that cannot be elevated or relocated out of basements.

Image: MAP Architects, New York Engineers.
### Recommendations

<table>
<thead>
<tr>
<th>Recommended Measure</th>
<th>Estimated Cost</th>
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<tbody>
<tr>
<td>Elevated Electrical Equipment</td>
<td>$50,000</td>
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<tr>
<td>Mold Remediation</td>
<td>$75,000</td>
</tr>
<tr>
<td>Sump Pumps</td>
<td>$3,000</td>
</tr>
<tr>
<td>Backwater Valves</td>
<td>$55,000</td>
</tr>
<tr>
<td>Building Floodproofing</td>
<td>$640,000</td>
</tr>
<tr>
<td>Cool Roof</td>
<td>$225,000</td>
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<tr>
<td>Surface Stormwater Management</td>
<td>$165,000</td>
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<tr>
<td>High Efficiency Ventilation</td>
<td>$1,315,000</td>
</tr>
<tr>
<td>Develop Emergency Management Manual</td>
<td>O&amp;M</td>
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Framework for Resilient Investments and Return Opportunities

- More Efficiency in Operations and Asset management
- Utility Savings
- Insurance and Risk Reduction
- Co-Benefits
  - Health
  - Safety
  - Co2 reductions
  - Branding
Giving Power and Teeth to the Tool

• Carrot V. Stick
  • Funding Incentives
  • Regulation
• Waiver of Administrative Burden
• Assurance of Importance and Risk Reduction
KEEP SAFE

A GUIDE TO RESILIENT HOUSING DESIGN IN ISLAND COMMUNITIES
**STAGE 01**

**REINFORCE SITE WITH INFRASTRUCTURE**

**STEP 3 - IMPLEMENT GREY INFRASTRUCTURE ON SITE**

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

---

**RETAINING WALLS**

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

**NATURAL HAZARDS IT PREVENTS**
- Flooding
- Landslides
- Erosion
- Heat

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

---

**DRY WELLS**

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

**NATURAL HAZARDS IT PREVENTS**
- Flooding
- Erosion

---

**FRENCH DRAIN**

A French drain system slowly drains surface water and runs. Different grades of sand and gravel and other water-porous materials are used as “drain stones” to avoid flooding and percolate slowly into the soil, instead of solid pavement that reduces the area of the terrain that naturally percolates water.

**WHAT YOU NEED TO KNOW**
- A simple dry well is a 4"-8" deep and 3" diameter pit filled with gravel or aggregate covered with topsoil.

---

**DITCH**

Ditches are channels that are used to drain water flow from natural tendency. Projects have been to "in-can" or "in-channel" to avoid flooding, but in recent years communities are adapting to "drain water" rather than channelizing it off site by allowing water to flow through sites.

**WHAT YOU NEED TO KNOW**
- A simple dry well is a 4"-8" deep and 3" diameter pit filled with gravel or aggregate covered with topsoil.

---

**PERMEABLE SURFACES**

Permeable surfaces consist of a layer of gravel, concrete, or other paving material that allows water to pass through and percolate slowly into the soil, instead of solid pavement that reduces the area of the terrain that naturally percolates water.

**WHAT YOU NEED TO KNOW**
- Usually made of asphalt, concrete, or paved surfaces.
- Areas with permeable pavement are usually utilized as an amenity for non-motorized access for recreation.

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**NATURAL HAZARDS IT PREVENTS**
- Flooding
- Heat
Opportunities for Combined Heat and Power (CHP) in the Multifamily Sector

Neeharika Naik-Dhungel, EPA CHP Partnership
Opportunities for Combined Heat and Power (CHP) in the Multifamily Sector

Neeharika Naik-Dhungel,
EPA CHP Partnership
July 10, 2019
Overview

• Multifamily Report Overview and Key Takeaways
  • CHP MF Statistics
  • Opportunities for CHP in the Multifamily Housing Sector

• CHP Resiliency Value
  • Owners
  • Low Income Multifamily
  • Resources
Report Overview

Purpose

1. Identify and communicate the benefits, opportunities, and challenges of multifamily CHP to owners, developers, policy makers, and all other relevant stakeholders.

2. Quantify the opportunities for multifamily CHP from both a technical and economic perspective.

<table>
<thead>
<tr>
<th>Multifamily CHP Report Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Report purpose and organization</td>
</tr>
<tr>
<td>CHP in the Multifamily Housing Sector</td>
<td>Multifamily building characteristics conducive to CHP</td>
</tr>
<tr>
<td>Energy Use and CHP Sizing in Multifamily Buildings</td>
<td>Energy-use characteristics of CHP in multifamily buildings</td>
</tr>
<tr>
<td>Quantifying the Opportunities for Multifamily CHP</td>
<td>Overall CHP market potential in multifamily buildings</td>
</tr>
<tr>
<td>Opportunities and Challenges for Multifamily CHP</td>
<td>Stakeholder perspectives</td>
</tr>
</tbody>
</table>
Current Trends in Multifamily CHP

CHP Installations by Prime Mover Type

- Reciprocating Engine: 346
- Microturbine: 40
- Fuel Cell: 4
- Boiler/Steam Turbine: 3
- Other: 2
Multifamily CHP Installations by State

CHP Systems by State and CHP Size Range

![Graph showing the number of sites by state and CHP size range.]
Identifying Opportunities for Multifamily CHP

Building characteristics

Building Size
Electricity Metering
Central Water Heating
Additional Building Loads
Unit Ownership
Building Ownership

Does the building have more than 50 housing units?

- Yes
- No

Does the building have central water heating?

- Yes
- No

Is the building master-metered for electricity?

- Yes
- No

Does the building have electricity metering?

- Yes
- No

Building may be too small for CHP

CHP may not be applicable – limited potential for thermal utilization

Analyze DHW and common area electric loads, model CHP cost and performance

Size CHP system to supply DHW loads to maximize efficiency

Size CHP system to supply common area electric loads, use thermal energy for DHW + space heating

Compare costs and benefits

- 0.15 kW per 1000 sq ft
- 0.2 kW per 1000 sq ft
- 0.3 kW per 1000 sq ft

Compare costs and benefits

- 0.7 kW per 1000 sq ft
Multifamily Building Owner Perspective

• For owners, the following factors represent both a challenge and an opportunity when implementing CHP:
  • One of the main challenges when implementing CHP projects at multifamily buildings is the **knowledge of CHP and the decision-making process** in considering CHP
  • The **economics and financing** of CHP are a prime driver in pursuing CHP projects at multifamily buildings
  • **Resilience to extreme weather conditions** can be a leading driver in regions where storms and natural disasters pose a regular threat to the electric grid
# Multifamily Building Owner Example

## The Brevoort – New York City

<table>
<thead>
<tr>
<th>System Size</th>
<th>300 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Date</td>
<td>April 2015</td>
</tr>
<tr>
<td>Heat Recovery</td>
<td>Cooling, Heating, &amp; DHW</td>
</tr>
<tr>
<td>System Benefits</td>
<td>Reduced energy costs, increased apartment affordability, enhanced resilience, reduced carbon footprint</td>
</tr>
</tbody>
</table>

“I know that if ConEdison fails, that this building will not. I know that I don’t have to worry about people who are 80 or older climbing multiple stairs to get to their apartments. I don’t have to worry about anybody not having water. So for me personally, the cogen system is really a safeguard and it gives me, as the president of this board, a tremendous piece of mind.”

- Diane Nardone, Board President, The Brevoort

Two of the three CHP units at the Brevoort East complex.
Low Income Multifamily Perspective

Beneficial Characteristics for Low Income Multifamily CHP

- Predominantly rental housing – Owners are the decision makers, and may be quicker at adopting CHP compared to tenant-run condominium or cooperative boards
- Typically larger buildings with higher electric and thermal requirements
- Many are master-metered, allowing for above average CHP sizing
- Can provide resilience and cost savings to critical buildings and vulnerable populations

Additional drivers for CHP in affordable multifamily buildings

- Utility programs that promote clean energy, specifically in affordable and public housing
- Public sector-sponsored lending institutions for green retrofits, such as the Connecticut Green Bank
- Building operator training, a need that applies to all multifamily buildings, not just affordable developments
Low Income Multifamily Examples

<table>
<thead>
<tr>
<th>Affordable Housing Unit, NYSERDA sponsored New York City CHP</th>
<th>Year CHP implemented</th>
<th>Generation capacity</th>
<th>Estimated annual energy or carbon savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Park West</td>
<td>2010</td>
<td>150 kW</td>
<td>$69,000</td>
</tr>
<tr>
<td>Concord Court Apartments</td>
<td>2012</td>
<td>100 kW</td>
<td>50% energy savings</td>
</tr>
<tr>
<td>Roosevelt Landings</td>
<td>2014</td>
<td>300 kW</td>
<td>1600 tons CO2</td>
</tr>
<tr>
<td>Times Square Apartments</td>
<td>2017</td>
<td>200 kW</td>
<td>$116,000 projected</td>
</tr>
<tr>
<td>Grace Towers</td>
<td>2017</td>
<td>70 kW</td>
<td>Data unavailable</td>
</tr>
<tr>
<td>Remeeder Houses Apartments</td>
<td>2017</td>
<td>35 kW</td>
<td>Data unavailable</td>
</tr>
</tbody>
</table>

“Affordable multifamily housing providers are strapped, both in terms of funding and financing and staff time and capacity they can devote to thinking about making their buildings more efficient. The ones that do pay attention to upgrades tend to be on the larger side, with more resources, or they’ve been approached by an incentive program to help them incorporate CHP. This is one reason why people are more familiar with CHP in New York... state incentive programs like NYSERDA’s can have a big impact.”

- Stefan Samarripas, American Council for an Energy-Efficient Economy
CHP Resiliency Attributes and Features

• Allows building to serve as a critical infrastructure that provides shelter in place
• Technology can integrate with renewables to create a local microgrid
• Features that create a resilient CHP system:
  - Black start capability
  - CHP electric generator capable of operating independently of the utility grid
  - Ample carrying capacity
  - Parallel utility interconnection and switchgear control:
Resources/Contact

Combined Heat and Power (CHP) for Resiliency Accelerator
Guide to Using Combined Heat and Power for Enhancing Reliability and Resiliency in Buildings

Neeharika Naik-Dhungel, U.S. EPA CHP Partnership
Naik-Dhungel.Neeharika@epa.gov
Technical and Economic Potential for MF CHP

<table>
<thead>
<tr>
<th>Technical Potential Estimate Type</th>
<th>Potential (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Technical Potential: Potential assuming that all multifamily buildings have the ability to size a CHP system to the full building, including tenant loads</td>
<td>4.4 GW</td>
</tr>
<tr>
<td>Achievable Technical Potential: Potential that is reasonably achieved with current multifamily building design limitations (central water heating, direct/master-metered)</td>
<td>1.7 GW</td>
</tr>
<tr>
<td>Economic potential estimates were calculated for all applicable building types using state average energy prices, with a &lt;10 year payback period criteria, using state average energy prices</td>
<td>0.5 GW</td>
</tr>
</tbody>
</table>

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[Diagram showing Technical and Economic Potential for MF CHP]
CHP Developer Perspective

• Key Challenges for Developers
  • Identifying building candidates with a strong technical fit and a good economic case
  • Educating building owners on the benefits (technical and economic) that CHP can provide

• Successful CHP Installations
  • Are typically led by engaged cooperative boards with technical and engineering experience
  • Involve educating and performing outreach to potential CHP hosts (site tours, expos, activities with other building managers, etc.)
CHP Policy Advocate Perspective

• Supportive policy environments for CHP are consistently found in areas of high multifamily CHP deployment
  • **State and local policies** can support CHP deployment through financial incentives and education – NYSERDA CHP Program
  • **Environmental policies** can contribute to the growth of CHP in multifamily buildings – Local Law 43 in NYC (oil to NG fuel switching)
  • **Utility policies and incentives** can assist multifamily customers in receiving grant funding (or similar) for projects – EmPower MD (PEPCO)
CHP Program Example

NYSERDA CHP Program: Outreach and Education

• Incentivized the installation of CHP and was one of the most successful programs in the country at encouraging CHP in the multifamily sector

• From 2014-2017, NYSERDA issued purchase orders in support of 129 CHP projects, of which 102 were located at multifamily buildings (or mixed-use buildings – ground-level commercial with upper-level multifamily residential) for an aggregated capacity of more than 25 MW

• Created a Packaged CHP Catalog, allowing customers to easily select from a set of pre-engineered CHP modules supplied by approved vendors – also included educational materials and sizing strategies for end-users
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Stormwater Management Pilot in Queens, New York

Delma Palma, NYCHA
Green Infrastructure at the New York City Housing Authority

Delma Palma, AIA
Design Innovation Fellow
NYCHA
Introduction to NYCHA

Who is NYCHA?

79,000 SENIORS
62 YEARS OLD OR OLDER

107,000 CHILDREN
UNDER 18 YEARS OLD

38% OF HEADS OF HOUSEHOLDS ARE 62 YEARS OLD OR OLDER

25% OF NYCHA EMPLOYEES ARE RESIDENTS OF PUBLIC HOUSING

$24,000 AVERAGE HOUSEHOLD INCOME

54% ARE EMPLOYED (OF NON-DISABLED, WORKING AGE ADULTS)

41% ON FIXED INCOME (SOC. SEC., SSI, PENSION, OTHER)

13% RECEIVE PUBLIC ASSISTANCE
324 developments made up of 2,400 buildings that consist of 176,000 apartments containing over 173 million square feet of space.

60% of NYCHA's buildings are 50+ years old.

The largest development: a 26-building apartment complex with 7,000 residents.

The smallest development: a single-story senior building with 13 residents.
NextGeneration NYCHA

Comprehensive Sustainability Agenda

NYCHA’s commitment as a landlord to create healthy and comfortable homes that will withstand the challenge of climate change

An invitation to residents and surrounding communities to work with NYCHA to realize a shared long-term vision of equity, sustainability, and resiliency

Strategy S11: Build green infrastructure for stormwater management
A September 2004 storm flooded 9th Street in Brooklyn.

Credit: Seth Wenig/The New York Times
NYCHA HAS OVER 2,400 ACRES OF LAND
80% OF IT IS OPEN SPACE
Combined Sewer Overflow (CSO)

About 60% of NYC’s sewers are combined, which means they carry both storm and sanitary flows. During stormy weather, the sewer system hits full capacity allowing a mixture of rain water and sewage to dump directly into our rivers and streams.
NYC Green Infrastructure Program

DEP’s $1.5 Billion Program:

- City Sidewalks
- City Streets
- Grant Program for Private Property Owners
- Public Property Retrofits
Green Infrastructure at NYCHA

Phase 1:
- 3 SITES COMPLETED
- 1 Site IN CONSTRUCTION

Phase 2:
- 20+ PROJECTS IN DESIGN
- Including South Jamaica Houses

Phase 3:
- 30+ PROJECTS IN CONSIDERATION
“Cloudburst” Planning

“Multi-functional spaces are key elements in the plan, such as parks and playgrounds that can be flooded during heavy rainfall but in dry weather serve as recreational spaces for the citizens.”

-Ramboll Group
“In 2016, the second year of the partnership, New York began a cloudburst study in southeastern Queens, where storm water drains into Jamaica Bay. Now in the planning stages is a pilot program at the South Jamaica Houses, a public-housing project that dates to when Fiorello H. La Guardia was mayor.”
• $700k Match grant to do stormwater management, water-metering, and waste management strategies at South Jamaica Houses

• $100k dedicated solely to Resident Engagement around the Green Infrastructure
Why South Jamaica Houses?
1. CULTURE OF SUSTAINABILITY
2. ACTIVE NETWORK OF LOCAL RESOURCES
3. STRONG RESIDENT LEADERSHIP
103rd Precinct | Positive Project 40 Day | Bridging The Gap
NYC Councilmember Adrienne Adams | Coalition Kids

**AUGUST 25TH**
**11 AM - 3 PM**

**BACK TO SCHOOL BASH**

**Ready**

**Set**

**Engage**

**Jamaica Playground**
160th St & 110th Ave

**COMMUNITY FUN DAY**

- Backpack & Supply Giveaways
- Kids vs Cops Basketball Games
- Free Food & Live Performances
- PS4 & XBOX Game Trucks | Bouncy Houses | Water Slides
- Giveaways, Music, Family Fun & MORE!

**SATURDAY OCT. 20**

**12:00PM - 3:00PM**

**DESIGN CHARRETTE**

**JOIN US!**

**SADAY SEP. 22**

**12:00PM - 3:00PM**

**Our Vision for NextGeneration NYCHA**
SAFE, CLEAN, AND CONNECTED COMMUNITIES

Please come out to discuss potential changes to the BASKETBALL COURT & surrounding green areas.

We want to hear your vision and ideas for the common outdoor space in the family area. Please join us!

Join us for this Charrette to learn more about the award-winning designs and complete for the South Jamaica Basket Court.

The designs you vote on will be used as part of the resilience effort. Your input will directly impact the redesign of your outdoor common areas.
AREA 2, NEAR 109TH ST

Please use a sticky to indicate which option would you prefer for Area 2? Why?

OPTION A: SHALLOW GRASSY LANDSCAPE
A shallow landscape will hold less water. It can allow for grassy spaces with pathways.

OPTION B: SUNKEN LANDSCAPE/CENTRAL PARK
A sunken landscape is deeper so can hold more water. In return, it can provide opportunities for more features. In this option, a portion of the community garden is relocated to allow for a large "central park" type concept.

Which features would you like to see in your preferred option? Pick any 3. Use a blue dot for Option A and a red dot for option B.

- Planting - Flowers
- Planting - Grasses
- Seating Bench
- Paving/Wall
- Steps
- Natural Seating

Existing condition - Near 109th Street
**OPTION B: SUNKEN LANDSCAPE/CENTRAL PARK**

A sunken landscape is deeper so can hold more water. In return, it can also provide opportunities for more features. In this option, a portion of the community garden is relocated to allow for a large ‘central park’ type concept.

**OPTION C: SUNKEN; 18 INCH DEEP**

A deeper basketball court can hold more water above grade. This option provides for a new basketball court with more seating and varying stepped features along the periphery. There will be an underground tank in this option to.
Schematic Design

AREA 1
EXISTING
Community Garden

AREA 2
Sunken Landscape

AREA 3
Basketball Court

AREA 4

159th Street

Community Garden

Long Island Railroad
Timeline

- First Resident engagement meeting April 2018
- Continued Engagement and Schematic Design Development
- Charrette results December 2018
- Design Development process 2019
- Resident Meeting to present final designs Spring 2020
- Estimated Construction start Spring 2021
- Estimated Construction completion Fall 2022
Thank you! Questions?

Delma Palma, AIA
Design Innovation Fellow
Department of Design | Capital Projects Division
Email: Delma.Palma@nycha.nyc.gov
Q&A
Q&A

- **Housing providers:**
  - To what extent are you addressing resilience in your housing portfolio?
  - What are the weather hazards you are dealing with?
  - How would you rate the organization on a scale of 1-10, being prepared for the next big weather event?
  - What are the barriers you’ve encountered/anticipate encountering to being better prepared?
  - What kind of support would be helpful through the BBC and/or from HUD/DOE?

- **Stormwater management:**
  - What are your biggest challenges in implementing stormwater management practices?
  - What resources do your locations provide to incentivize innovation in stormwater management?
A Healthy Housing “Accelerator”

- We are considering launching a HH Accelerator over the next year.
- We would like a small planning group to help design the Accelerator.
Why a Healthy Housing Accelerator?

- Strong evidence that indoor home environment is a significant factor in resident health
- IAQ especially important when tightening buildings due to energy upgrade
- 36% of renters, 24% report some healthy housing concerns
- Air quality issues most prevalent: dust, mold and moisture, lack of sufficient ventilation
- Other concerns include water quality, pests, concerns about physical structure.
- Good progress in new construction but continuing barriers to paying for and adopting healthy housing measures in existing structures
Approach

- Convene 25 stakeholders to foster collaboration among state and local agencies, housing or home performance providers, hospitals, managed care providers, and other interested stakeholders.
- Host 1 to 2 one-day convenings of interested stakeholders
- Healthy Housing Accelerator workshop at next year’s summit
- Hold up to 10 open calls and/or webinars between convenings
Potential Outcomes

- Expand Medicaid financing for healthy housing assessments, and community benefits funding for healthy housing improvements.
- Improve coordination of lead hazard, affordable housing, weatherization and other resources to deliver comprehensive energy plus health building upgrades.
- Expand adoption of combined health housing and energy audit/assessment tools
- Expand partnerships of managed care providers, hospitals, and housing owners/operators to implement comprehensive energy plus healthy housing interventions.
If Interested...

- If interested, let us know!
- Sign up for the Accelerator Planning Team.
- Contact: Michael.freedberg@hud.gov or Leslie.Zarker@icf.com
Thank You!