Better Buildings Residential Network Peer Exchange Call Series: *Multifamily Smart Tech, Health, and Utility Data – A Joint Call with NEWHAB & the DOE Better Buildings Residential Network*

May 4, 2017

Call Slides and Discussion Summary

Agenda

- Agenda Review and Ground Rules
- Opening Polls
- Brief Residential Network Overview and Upcoming Call Schedule
- Featured Speakers
  - **Faith Graham**, Managing Director, The Network for Energy, Water and Health in Affordable Buildings (NEWHAB)
  - **Edward Connelly**, President, LEED AP, New Ecology
  - **Allison Manuel**, Community/ Education Organizer, Northwest Bronx Community and Clergy Coalition
  - **Maggie Tishman**, Local Director, Emerald Cities Collaborative
- Discussion
  - What is your experience with leveraging smart tech, health and/or utility data to increase participation in multifamily energy efficiency programs?
  - What types of multifamily partnerships has your organization established to increase program participation?
  - Other questions/issues related to multifamily upgrade programs?
- Closing Poll

Better Buildings Residential Network

Better Buildings Residential Network: Connects energy efficiency programs and partners to share best practices and learn from one another to increase the number of homes that are energy efficient.

Membership: Open to organizations committed to accelerating the pace of home energy upgrades.

Benefits:

- Peer Exchange Calls 4x/month
- Tools, templates, & resources
- Recognition in media, materials
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- Residential Program Solution Center guided tours

Commitment: Provide DOE with annual number of residential upgrades, and information about associated benefits.

For more information or to join, email bbresidentialnetwork@ee.doe.gov, *or go to* energy.gov/eere/bbrn *and click Join*

Peer Exchange Call Series

We hold one Peer Exchange call the first four Thursdays of each month from 1:00-2:30 pm ET

Calls cover a range of topics, including financing & revenue, data & evaluation, business partners, multifamily housing, and marketing & outreach for all stages of program development and implementation

Upcoming calls:

- May 11: Are You Ready? Opportunities and Challenges of Home Energy Management Systems
- May 18: Innovation Station: The Latest Advances in Energy Efficiency Technology
- May 25: No call
- June 1: No call
- June 8: Expanding Your Reach: Creating Sustainable Energy Communities
- June 15: Home Improvement Catalyst: HVAC Installations That Deliver

Send call topic ideas to peerexchange@rossstrategic.com

See the Better Buildings Residential Network Program website to register

The Network for Energy, Water and Health in Affordable Buildings (NEWHAB)

U.S. DEPARTMENT OF ENERGY

ENERGY EFFICIENCY FOR ALL

ENERGY FOUNDATION
building a new energy future

NATIONAL HOUSING TRUST

NRDC

ELEVATE ENERGY

"To significantly improve resident quality of life in affordable, multifamily housing by increasing funding for energy efficiency, water savings, green space development, renewable energy, and health-improvement efforts, and to ensure that owners of affordable multifamily buildings are sufficiently encouraged to take advantage of these new opportunities."

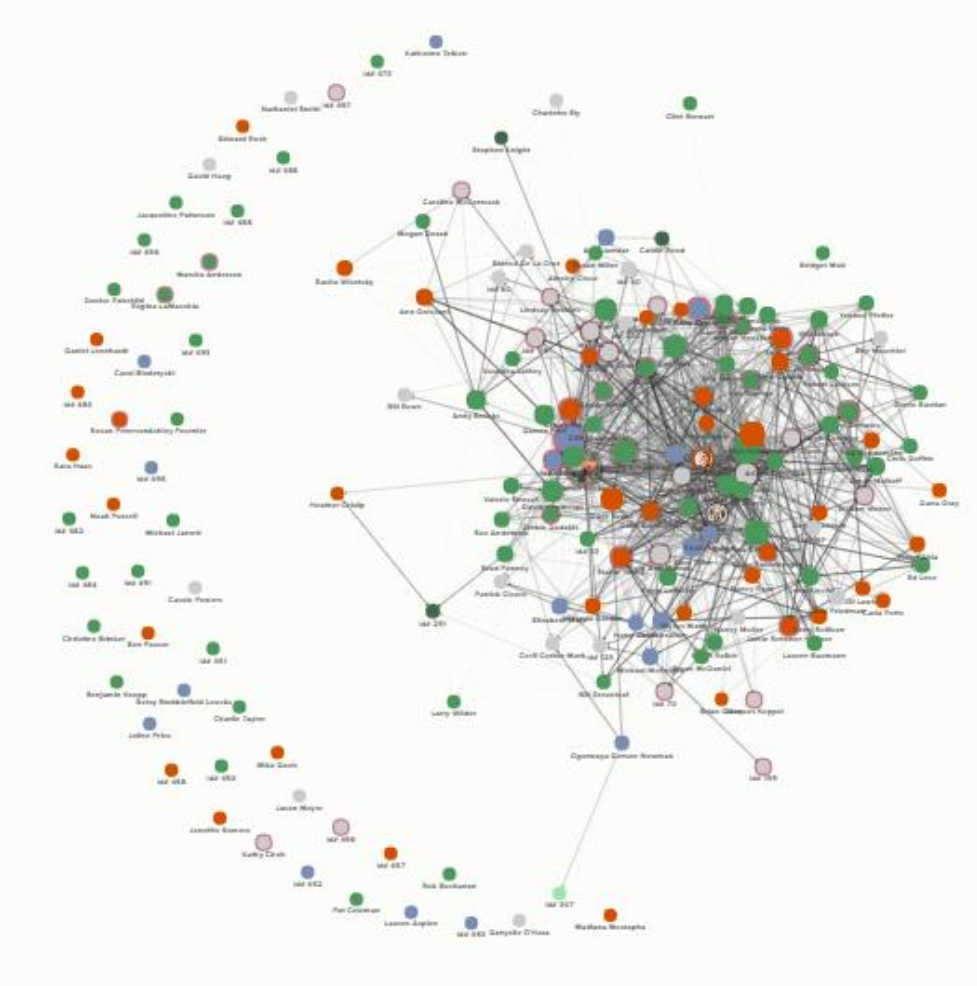
Network for Energy, Water and Health in Affordable Buildings

The Network for Energy, Water, and Health in Affordable Buildings (NEWHAB) is a national social impact network that lives in tandem with EEFA efforts.

NEWHAB expands healthy, efficient housing for all by leveraging relationships between individuals, sectors, and policies.

Through NEWHAB's learning network, members leapfrog beyond current policies, programs and partnerships to build solutions together.

Over 100 members and 220 allies from the sectors of energy, health, affordable housing, water, renewables, and community-based organizations.



Network for Energy, Water and Health in Affordable Buildings

NEWHAB offers a variety of ways to get connected to other members of the network:

Challenge Groups are a five-month long discussion series that fosters exchange on complex challenges, develops new innovations and resources, and explores lessons learned in the field.

Webinars are held bimonthly on a variety of themes to provide the membership with learning opportunities.

Meet-ups (in-person) are held a few times a year in cities where NEWHAB has a core group of members, providing a chance for relationship development and growing the membership.

Lightning Rounds are one-time events have a theme and 10-12 presenters. Each person gets a short amount of time to share content on the theme, followed by a short time for questions.

ONLINE Web Community: LEAPSource Communities are virtual spaces where people can gather to discuss a common interest, collaborate on a project, organize an event, or further their knowledge about some topic.

Annual Convening (in-person) brings together NEWHAB members, EEFA Grantees, and allies to connect, align, and strategize solutions for multiple sectors.

Presentation highlights: NEWHAB

- **NEWHAB acts as a connectivity and learning network**, aiming to drive greater affordability and better health for residents in affordable multifamily housing.
- **NEWHAB's diverse membership addresses various challenges and solutions for multi-family housing** through work groups, peer exchanges, and annual conventions.
- **Some of the issues on which the NEWHAB "challenge groups"** work on are health, financing options including on-bill financing, utility allowances and adjustments to utility allowances to justify efficiency projects.

Program Experience: New Ecology

U.S. DEPARTMENT OF ENERGY

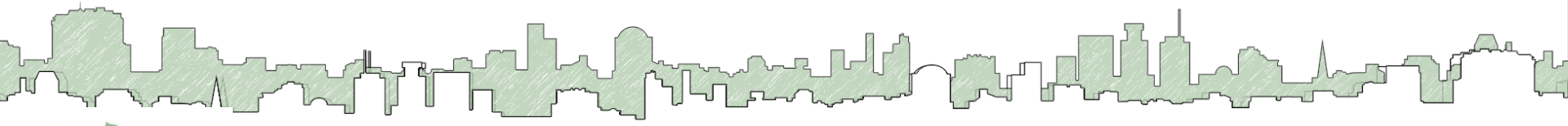
NEW ECOLOGY

Community-Based Sustainable Development

Data-Driven Optimization of Multifamily Buildings

Better Buildings Residential Network Peer Exchange Call
May 4, 2017

Edward F. Connelly
President
New Ecology, Inc.



About New Ecology

"New Ecology's work is to bring the benefits of sustainable development to the community level, with a concerted emphasis on underserved populations. A mission-driven non profit, we seek to address global environmental and equity issues by making the built environment more efficient, healthy, durable, and resilient."

This is manifested in our core work to:

- test and implement new approaches to sustainability, resiliency, healthy environments and energy efficiency;
- diagnose and solve operational and building performance issues;
- remotely monitor and optimize building operations;
- help design, build and operate high performance buildings;
- improve the performance of existing buildings;
- develop and implement plans to enhance resiliency;
- manage green rating and certification processes, like LEED, Passive House and Energy Star;
- secure utility rebates and identify financing options.

A Few Key Questions

1. Are installations of more efficient equipment operating as efficiency as they should be? (Are owners getting what they paid for?)

2. Can utility use be reduced by optimizing settings on existing heating and hot water systems? By how much?

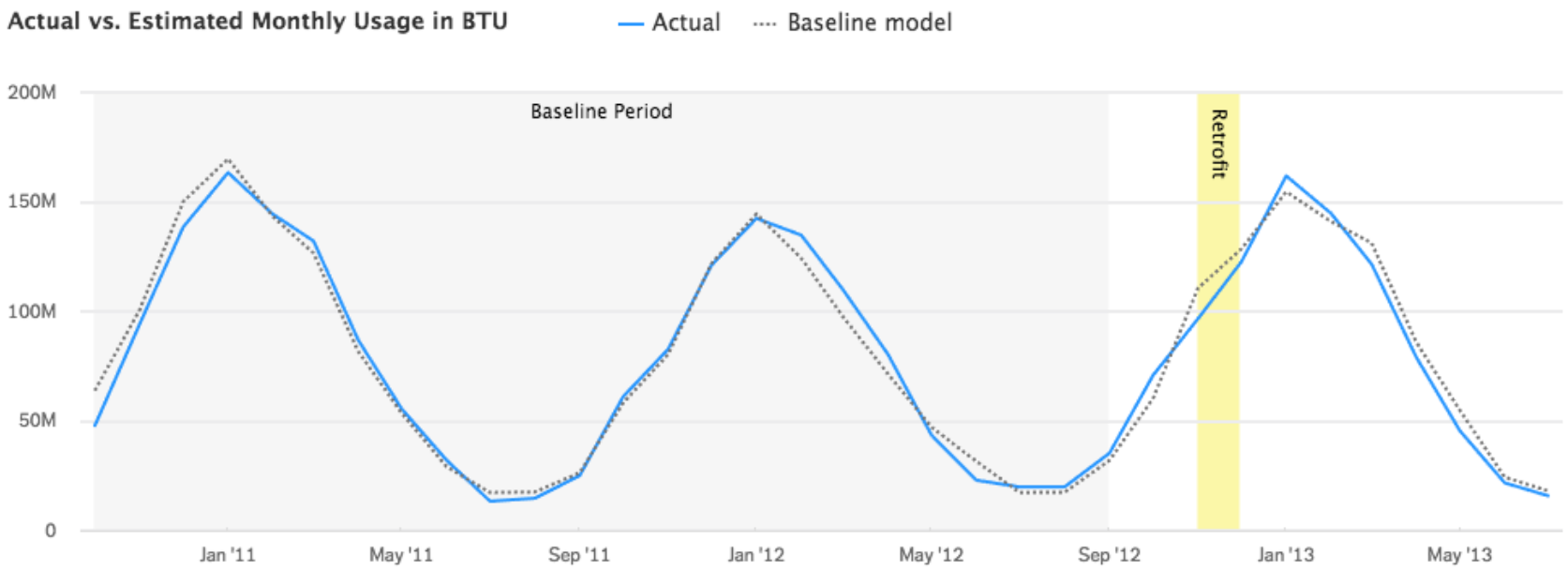
3. What are the limits of collection and analysis of monthly bills? When do you need more information? How do you analyze and act on even more data?

4. What's all this about the Internet of Things - and what does it have to do with operating a MF building?

The Story of Robert McBride House

17 apartments, 6 stories
Boston, MA

6% Savings



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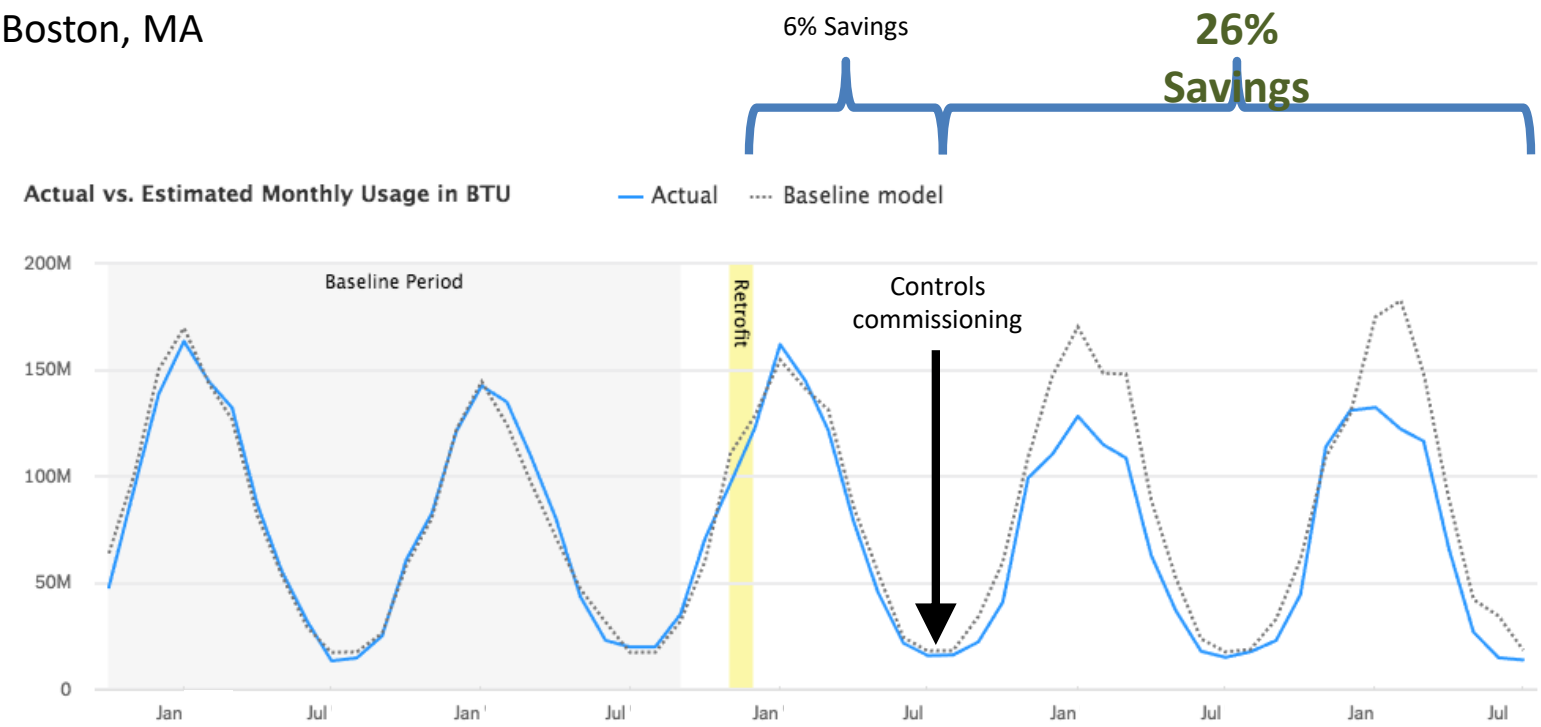
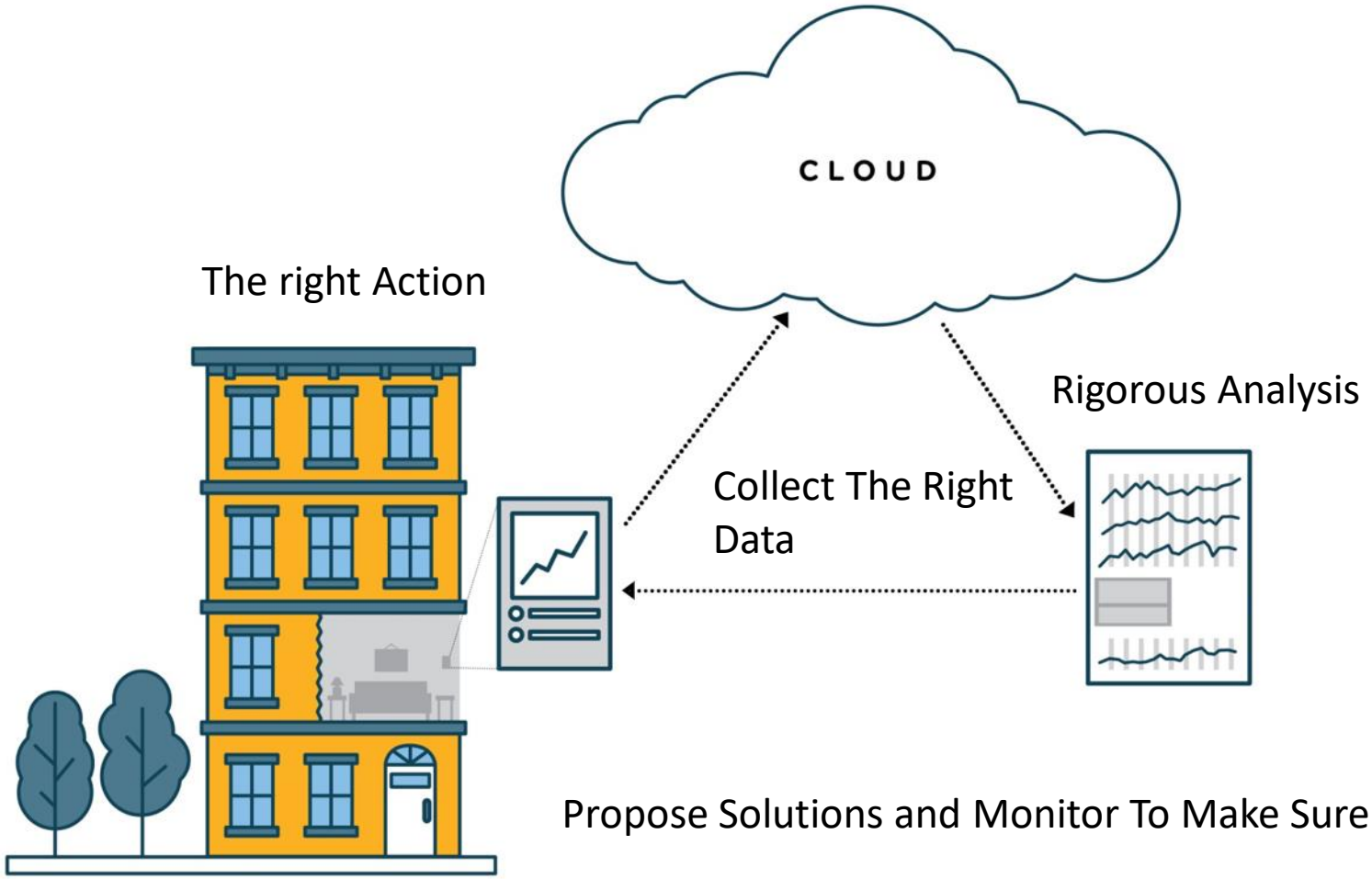


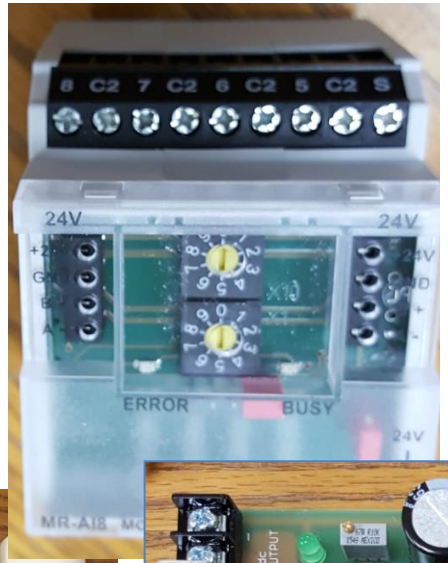
What We Learned Early On

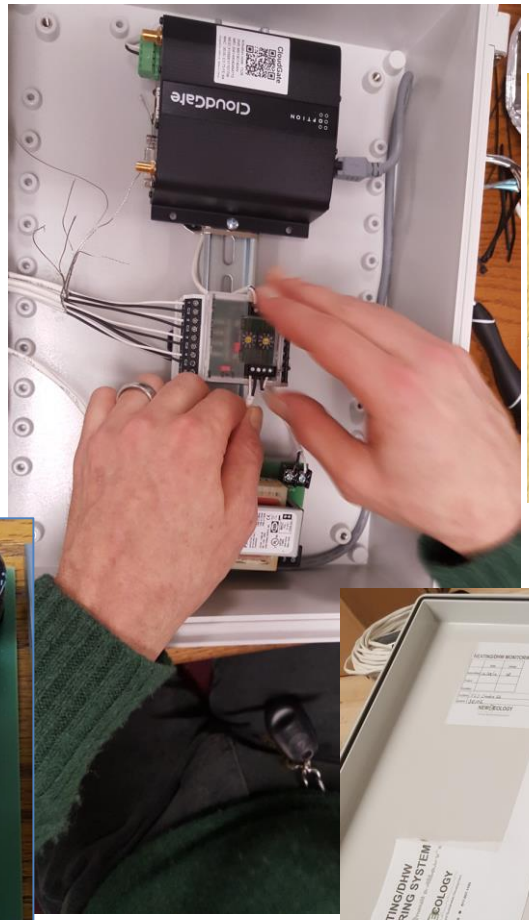
- Utility Data Is Insufficient
- Typical Third-Party Controllers Are Problematic
- Retro-Commissioning Is An Expensive Solution
- Traditional BEM Systems Are Expensive and Not Useful in Much of This Market
- Lots of Players Exploring This Market
- Being Able To Act On Data is the Key

What New Ecology & Elevate Are Installing



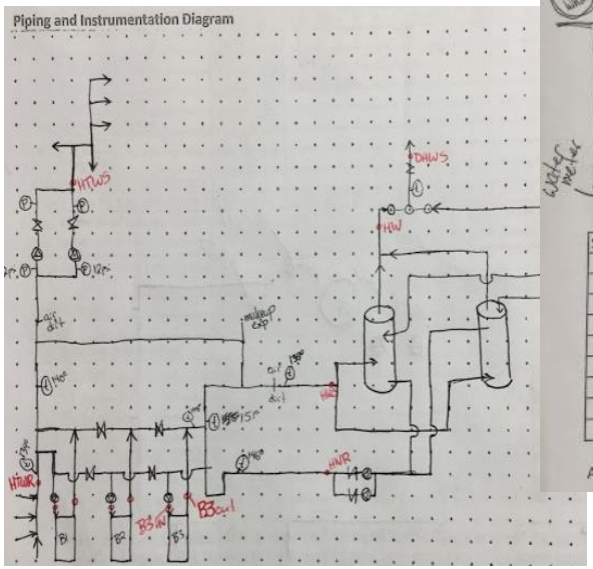
Low-cost, Off The Shelf Components

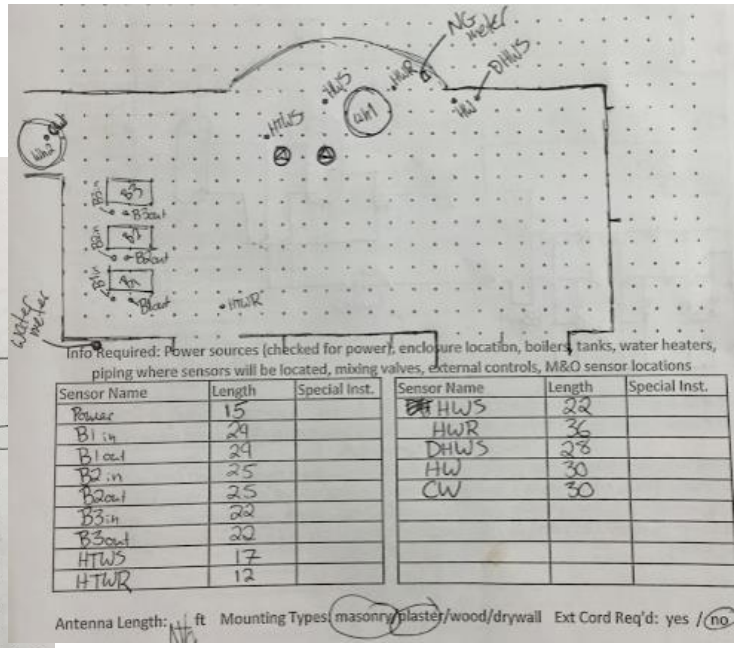




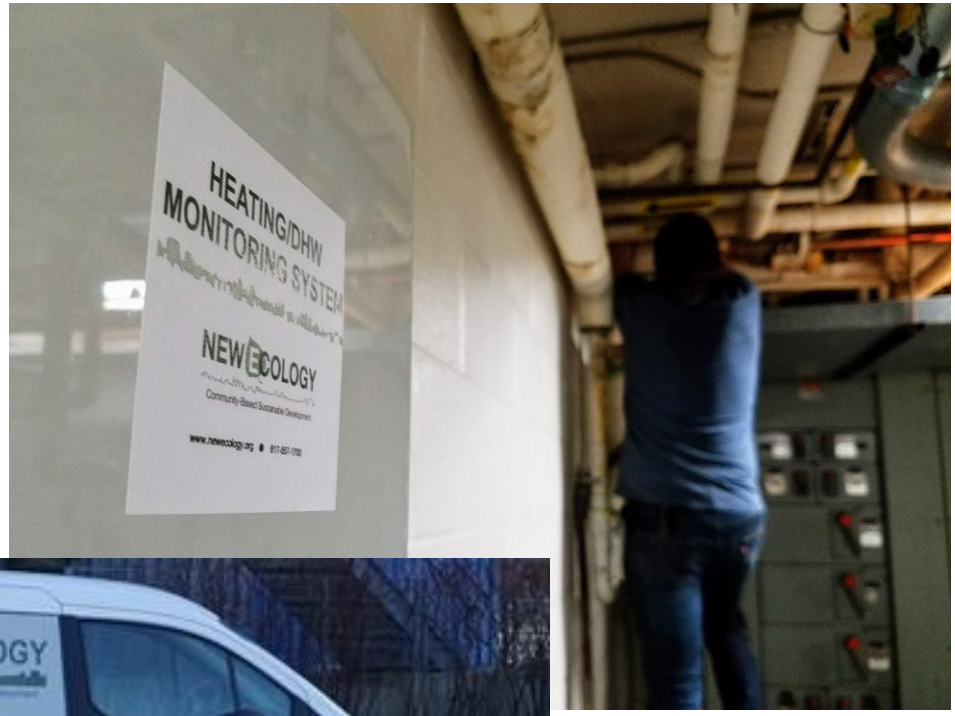
Screening/Assessment

- Safety and Suitability Questions
- Documentation Site Visit





Installation/Set-Up



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analytics	✓
cableLength	30
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dqmax	190 °F
dqmin	70 °F
equipRef	15 Court Square Analog Input Module 1 [Choose] [Id]
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his	✓
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importedHis	✓
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kind	Number
leaving	✓
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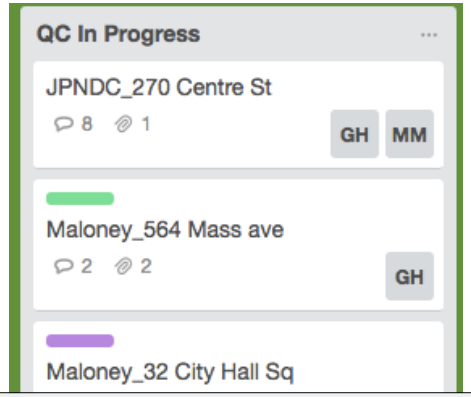
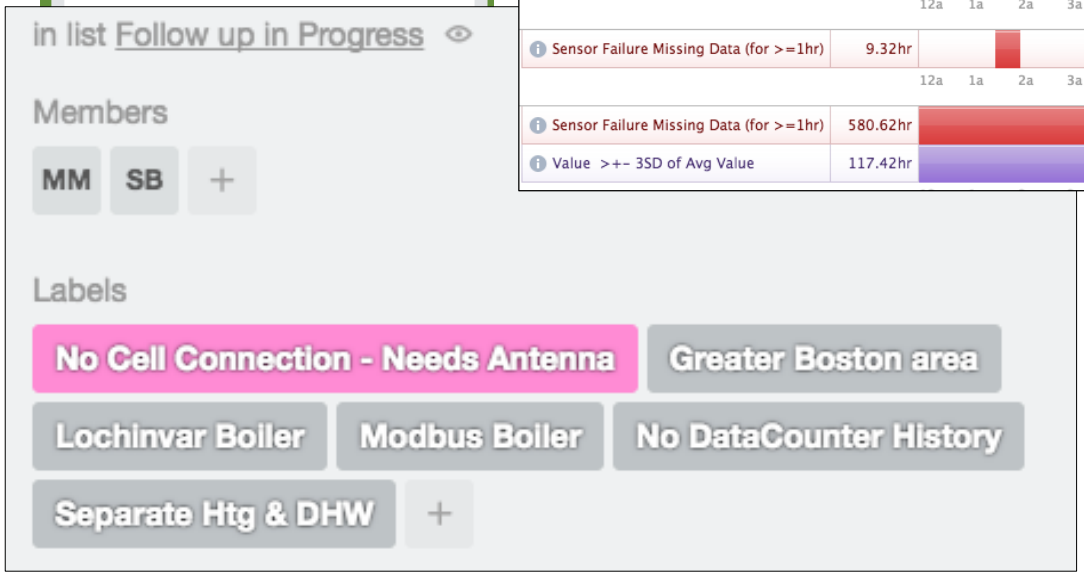
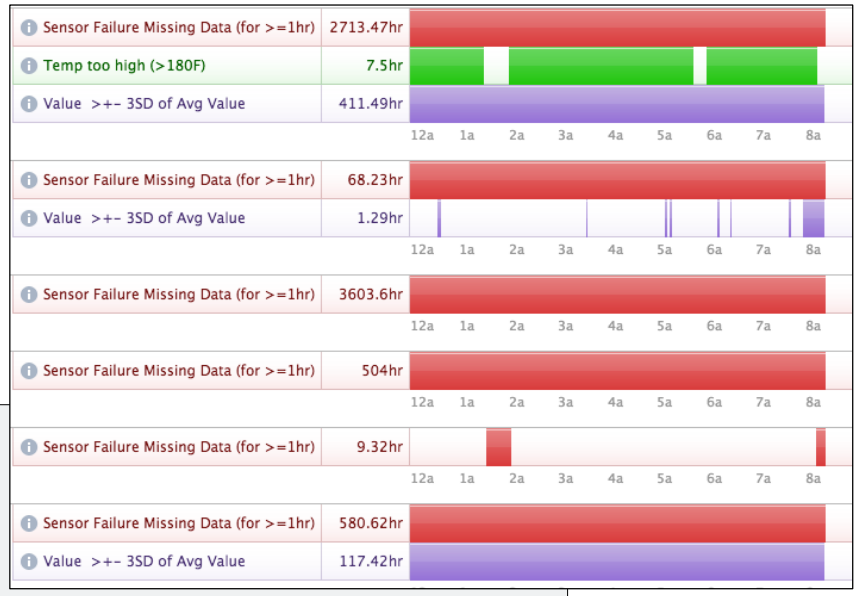
Quality Assurance and Control

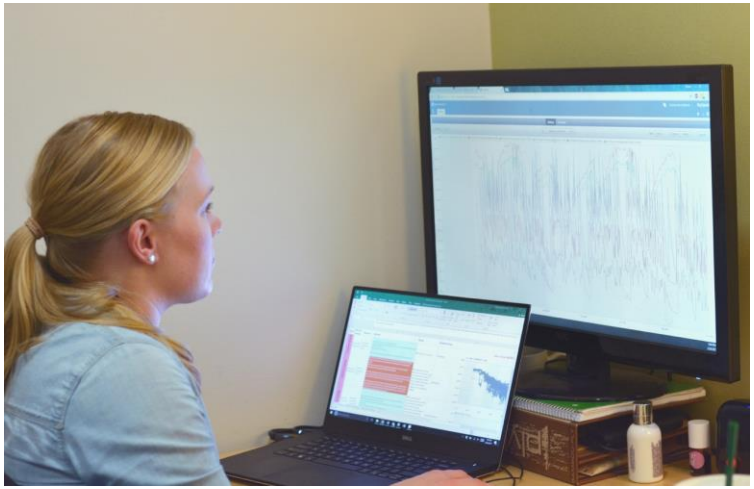




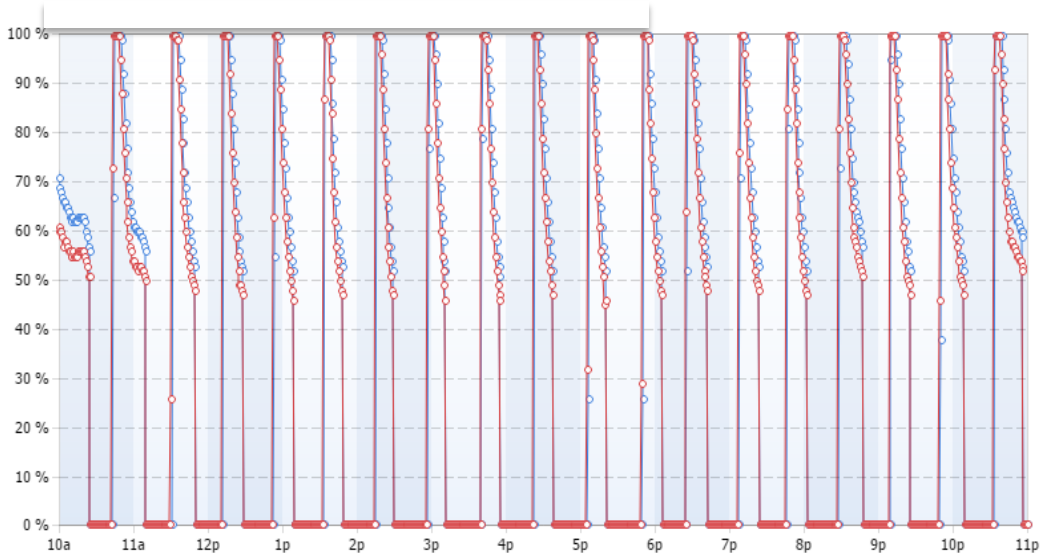


Analysis: Sample Measures

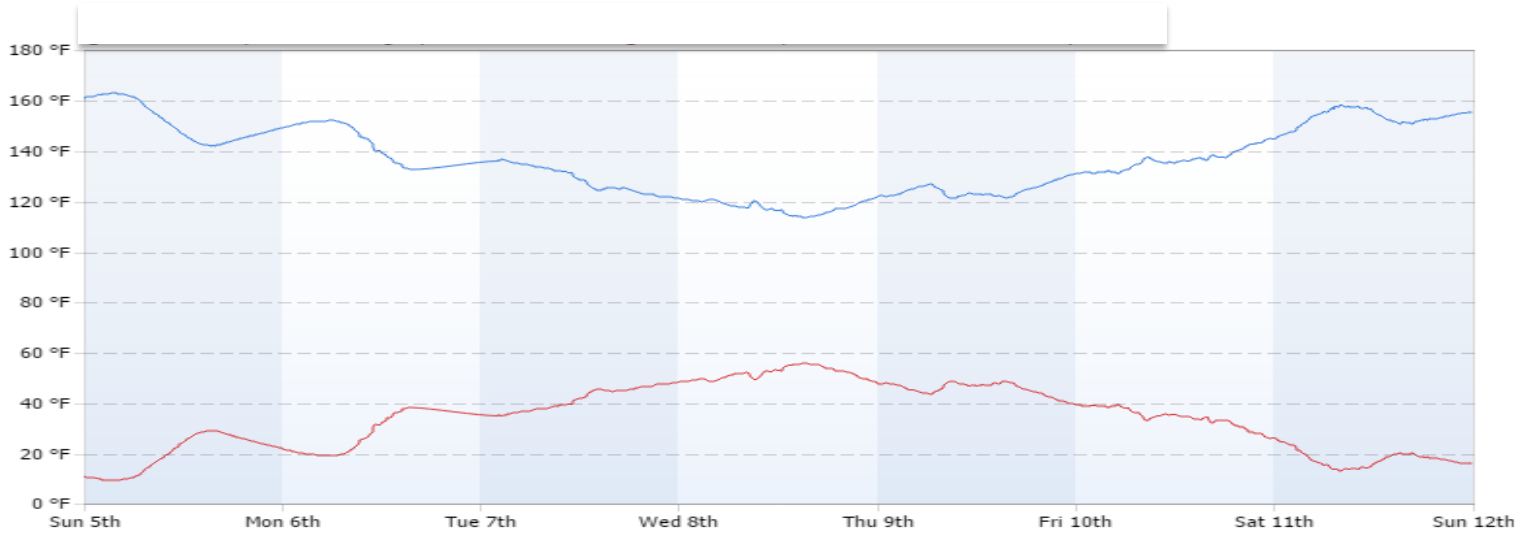
- Hydronic Heating
  - Implement/optimize outdoor air reset
  - Operate in Condensing mode more often
  - Implement summer/winter switch
  - Optimize Warm Weather Shutdown
  - Reduce firing rates
- Domestic Hot Water
  - Adjust temperature differentials
  - Limit firing rates
  - Adjust target temperatures
  - Replace Aquastat with Tank Sensor

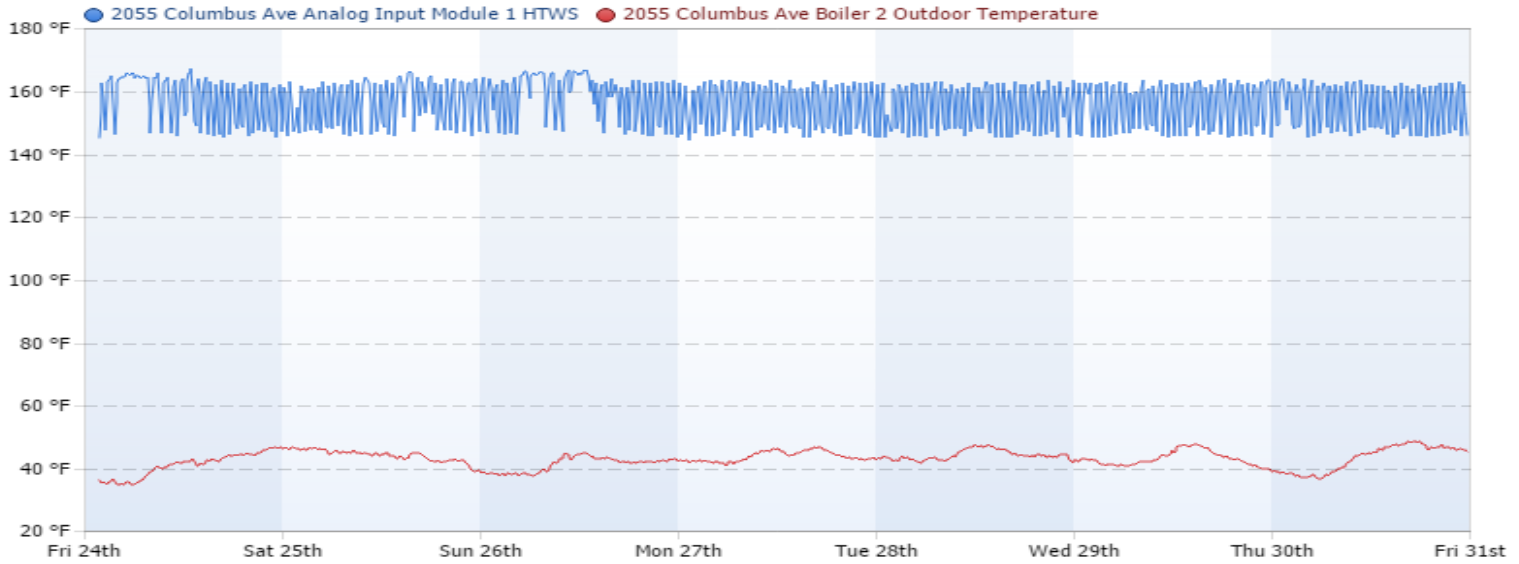


Firing Rates

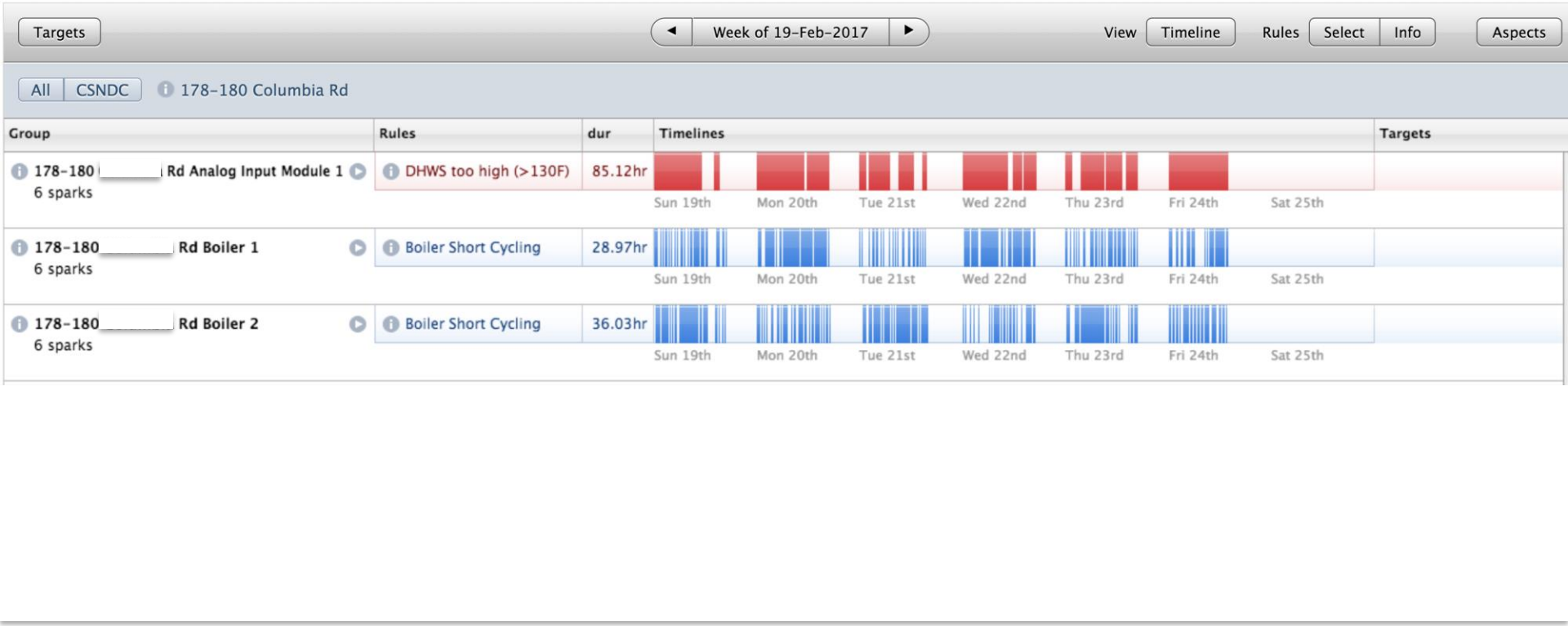


Outdoor Temp Sensors





High DHW Temperatures



Preliminary Results

Installed systems in 115 Buildings in MA and RI

Anticipated 5-20% Reduction in Heating Gas Use

So Far: 20%+ Reductions in Heating Gas Use

Much More To Come

- Analysis of All Pilot Buildings
- Standard Methodology
- Hot Water Savings
- Other Equipment Types
- Water Meter Monitoring
- Health Monitoring

NEW ECOLOGY

Community-Based Sustainable Development

Thanks!

Ed Connelly
New Ecology, Inc.

Presentation Highlights: New Ecology (1 of 2)

- **Internet of Things can deliver granular data** that helps optimize the performance of energy products based on the actual conditions in the buildings.
  - By looking at the in-depth data generated from temperature sensors and data loggers, New Ecology, Inc. (NEI) found that the boiler upgrade installed at the Robert McBride House fired at 100% capacity rather than modulating to match demand, which didn't decrease the building's consumption as expected. The building's gas performance improved dramatically after the boiler's set points and firing rates were lowered.
- **Scalable and replicable**: NEI's project was done based on low-cost technology that can be easily replicated, such as temperature sensors, cell modems, and controllers.
  - Moving forward, NEI will develop a methodology based on their data-driven approach that could be used by utility energy programs.

Presentation Highlights: New Ecology (2 of 2)

- **NEI developed WegoWise software platform** to assess the performance of multifamily housing through utility tracking and energy benchmarking.
- Some of the NEI's lessons learned when trying to collect real-time data are:
  - **Monthly utility data** does not provide the level of detail necessary to fully depict a building performance.
  - **Inaccuracies in data collection** can often arise especially when building equipment is not well maintained or properly set.
  - **Retro-commissioning** can be an expensive option and offers only a point-in-time fix.
  - **The traditional building energy management systems are rarely used in multifamily buildings** due to their high cost and need for constant monitoring.

Program Experience: Northwest Bronx Community and Clergy Coalition

U.S. DEPARTMENT OF ENERGY

Bronx Healthy Buildings:

a strategy to improve health & energy efficiency

A project of the Northwest Bronx Community and Clergy Coalition
& Emerald Cities New York

prepared for the Better Buildings Residential Network Peer Exchange
05.04.2017

Northwest Bronx Community & Clergy Coalition

Unites diverse people and institutions to work for racial and economic justice through intergenerational community organizing that transforms the Bronx and beyond.

Bronx Healthy Buildings

A cross-sector initiative to promote holistic community health by addressing the upstream causes of asthma-related emergency room visits and hospitalizations in the Bronx.

Partners:

- Northwest Bronx Community and Clergy Coalition
- Montefiore Medical Center
- Emerald Cities New York
- MIT Community Innovators Lab
- NYC Department of Health and Mental Hygiene
- MIT Community Innovators Lab
- New York Lawyers for the Public Interest
- BUILD Health Challenge
- NYC Department of Housing Preservation & Development
- a.i.r. nyc
- Enterprise Community Partners

Bronx Healthy Buildings

The Bronx outranks other urban areas in:

- sensitivity to aeroallergens
- household exposure to cockroaches, rodents, nitrogen dioxide, and mold
- parents' pessimistic attitude
- parents' psychological stress

Program goals

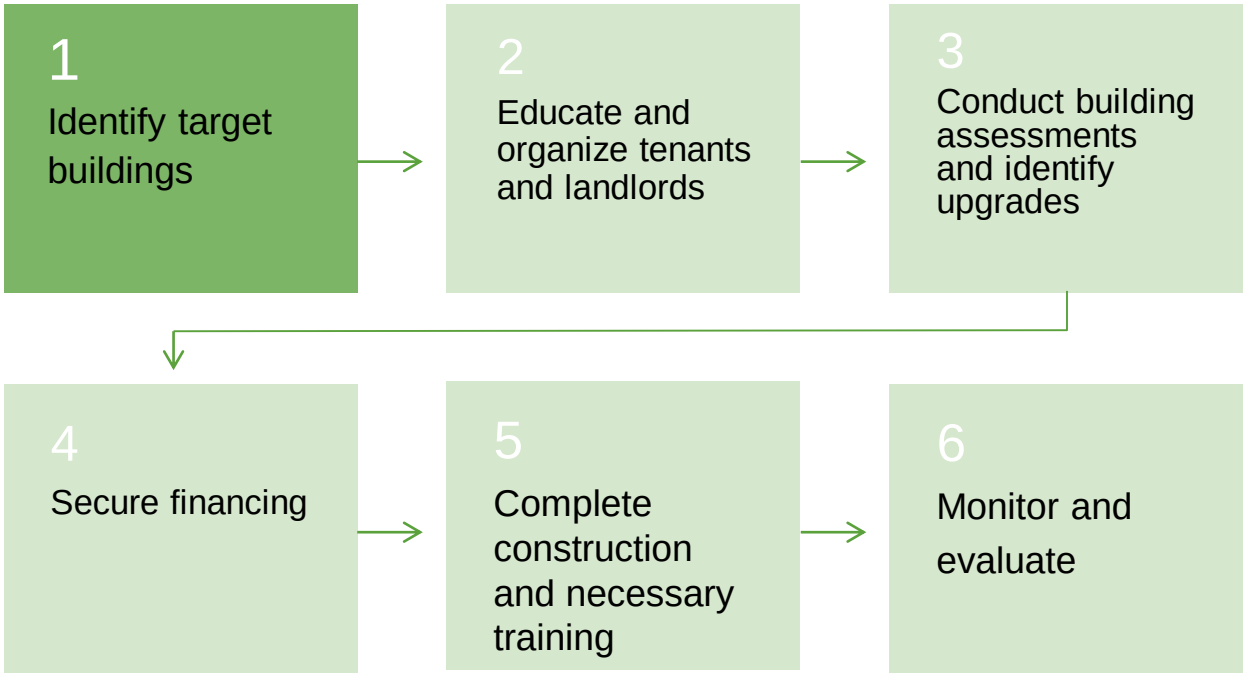
Reduce exposure to asthma triggers in apartment buildings through environmental assessment, education, and remediation

Lower residents' monthly energy bills by performing energy and water conservation upgrades alongside the health-related remediation efforts

Help residents build community power and leadership through tenant organizing and training about the social determinants of health

Create jobs and wealth in the community by contracting with Bronx-based construction firms and holding contractors to high-road community workforce standards and ecologically sustainable practices

Program design



Community, hospital & public health office roles

- Leading program design and implementation
- Identifying target buildings
- Organizing tenants and landlords
- Prioritizing local hiring
- Monitoring, evaluation, and co-publication

Montefiore

- Providing ER and hospitalization data
- Matching $250,000 grant through Medicaid reform payments
- Leveraging mandates to expand asthma home-based self-management programs
- Supporting monitoring, evaluation, and co-publication

NYC Department of Health

- Implementation of Integrated Pest Management
- Lead paint remediation through Healthy Homes program

Presentation Highlights: Northwest Bronx Community and Clergy Coalition

Northwest Bronx Community and Clergy Coalition's integrated approach to addressing upstream causes of poor health:

- **Identifying and assisting buildings based on data from:**
  - The Building Indicator Project (BIP) database, which helps identify NYC multifamily properties in physical and/or financial distress
  - The NYC list of boiler conversions, which identifies buildings that are in need of converting their boiler to less toxic burning fuel
  - Asthma-related emergency room data
  - On-the ground information from tenants and tenant associations
- **Educating:**
  - About asthma triggers and pest management
  - About potential building upgrades and energy efficiency programs, including the Weatherization Assistance Program
- **Training** around energy savings and health measures.
- **Evaluating** based on utility data collection, emergency room visits, surveys on the ground.

Program Experience: Emerald Cities Collaborative

U.S. DEPARTMENT OF ENERGY

Emerald Cities Collaborative

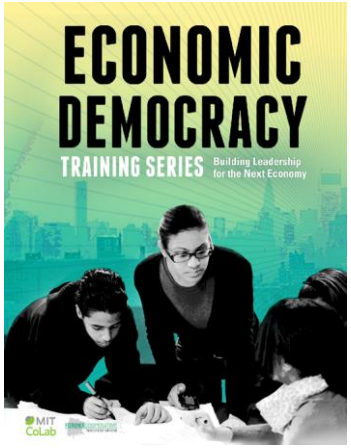
A national organization working to green our cities, create economic opportunities for all, and strengthen our democracy.

Emerald Cities
NEW YORK CITY
America empowered.

Bronx Cooperative Development Initiative

A network of grassroots organizations, anchor institutions, labor unions, and finance entities working to end generational poverty in the Bronx by:

- engaging residents in holistic planning for the borough's future
- leveraging existing assets to address social, economic and environmental challenges



Our anchor partners

From left to right, top to bottom: Montefiore Medical Center, the Bronx Zoo, Hostos Community College, Fordham University, New York Botanical Gardens, New York City Housing Authority, Bronx Community College

Financial sustainability & economic inclusion

Borrowing from Emerald Cities' experience elsewhere, we are working to:

- Create a predevelopment financing mechanism that can cover the cost of customer acquisition and reduce barriers to participation

- Connect to local and MWBE contractors and local workers

EMERALD CITIES RENEW MULTI-FAMILY HOUSING

E-CONTRACTOR ACADEMY

BRONXCHANGE

What’s unique about our approach

- Data-driven strategy for targeting buildings
- Integrating energy and health
- Tailored to multifamily buildings
- Focus on economic inclusion and affordability
- Sustainable financing strategy
- Holistic evaluation

Presentation Highlights: Emerald Cities Collaborative (1 of 2)

- **From a need-based to an asset-based framework:** building conditions in Bronx represent under-utilized assets that can become economic opportunities once upgraded.
- **Emerald Cities Collaborative's** pre-development financing support takes a tiered approach to reduce risk and increase program participation through:
  - An initial WegoWise sign-up, as a first step for landlords to assess the viability of retrofits in their building
  - Preliminary building assessment (at ~$2000)
  - Project development
- **When a building owner moves forward with the project**, he'll pay only the WegoWise subscription, the rest being rolled over into the total project financing. Those that do not move forward will pay a minimum amount.

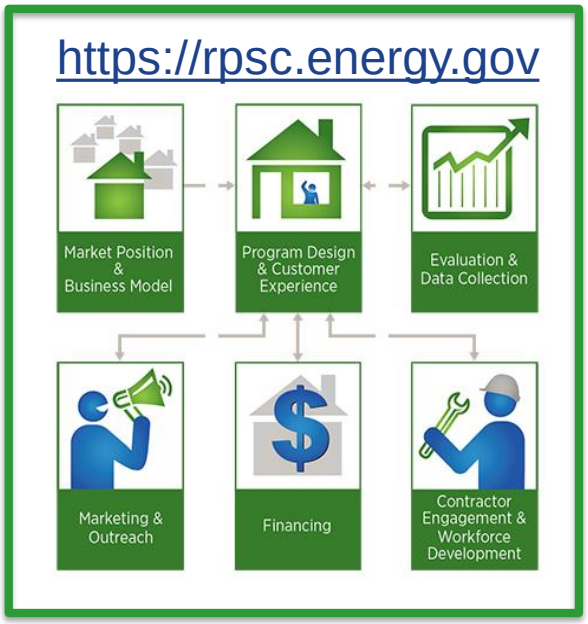
Presentation Highlights: Emerald Cities Collaborative (2 of 2)

- **Community workforce**: through the Bronx Exchange, a local e-commerce platform, the project connects a trained local workforce to various energy programs, including the Weatherization Assistance Program (WAP).
  - Sometimes it can be difficult to find local contractors able to work on this type of energy programs, mainly due to the long payment period (e.g. for WAP, this can take up to 6 months). Providing invoice financing will be key to opening this up to small contractors as well.

Related Resources in the Residential Program Solution Center

Explore resources related to multifamily smart technology, health, and utility data:

- Read recommendations for multifamily program administrators and implementers in this California Home Energy Retrofit Coordinating Committee report.
- Learn about strategies that have achieved deep energy savings in the multifamily sector in this Residential Energy Efficiency Organizations report.
- Explore this BBRN case study of 2 members – Elevate Energy in Chicago & ICAST in Colorado – that developed EE solutions for multifamily & affordable housing communities.



- Check out the latest Proven Practices post on Keeping the Program Simple.
- The Solution Center is continually updated to support residential energy efficiency programs—**member ideas are wanted**!

GET SOCIAL WITH US

Stay engaged and connected with the Better Buildings Residential Network and our partners from the residential and multifamily sectors!

Follow us to plug into the latest Better Buildings news and updates!

Share with us your top stories on how your organization is accelerating energy savings through efficiency upgrades, strategies, and investment!

Better Buildings Twitter with #BBResNet

Better Buildings LinkedIn

We can't wait to hear from you!

U.S. Department of Energy Solar Decathlon

Oct 5-15, 2017 DENVER

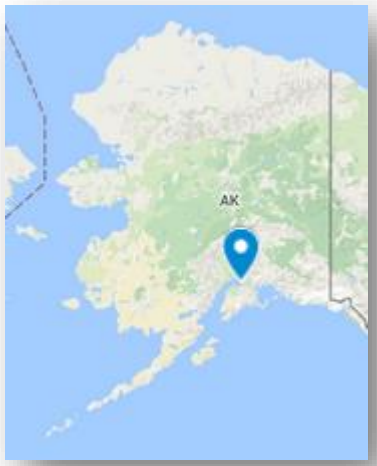
- 13 Collegiate teams compete in 10 contests
  - New for 2017: Innovation and Water
- Winning team best blends technology, market potential, design excellence with smart energy solar production and maximum energy and water efficiency.
- Large free public event – showcases best of clean energy technology
- Denver location: new, mixed use smart community on transit line near Denver International Airport
- Sponsorship Opportunities
- Info: www.SolarDecathlon.Gov

Solar Decathlon 2015 Teams in Irvine, Calif.
Credit: Thomas Kelsey/U.S. Department of Energy Solar Decathlon

Addenda: Attendee Information and Poll Results

U.S. DEPARTMENT OF ENERGY

Call Attendee Locations



Better Buildings
U.S. DEPARTMENT OF ENERGY

U.S. DEPARTMENT OF ENERGY

Call Attendees: Network Members (1 of 2)

- AppleBlossom Energy Inc.
- Arlington County Government
- American Council for an Energy Efficient Economy (ACEEE)
- BlueGreen Alliance Foundation
- Boulder County (CO)
- Build It Green
- City of Berkeley (CA)
- City of Plano (TX)
- CLEAResult
- Connecticut Green Bank
- Elevate Energy
- FMC Facility Management Consultores
- Fujitsu General America Inc.
- Group14 Engineering Inc.
- International Center for Appropriate and Sustainable Technology (ICAST)
- Institute for Market Transformation (IMT)
- Local Energy Alliance Program (LEAP)

Call Attendees: Network Members (2 of 2)

- Midwest Energy Efficiency Alliance (MEEA)
- National Grid (MA)
- Northeast Energy Efficiency Partnerships (NEEP)
- North Carolina Building Performance Association
- New York State Energy Research & Development Authority (NYSERDA)
- Optimal Energy, Inc.
- Stewards of Affordable Housing for the Future
- Seventhwave
- Southeast Energy Efficiency Alliance (SEEA)
- TRC Energy Services
- Vermont Energy Investment Corporation (VEIC)

Call Attendees: Non-Members (1 of 3)

- Association for Energy Affordability
- CalCERTS Inc.
- Center for EcoTechnology
- City of Ann Arbor (MI)
- City of Bloomington (MN)
- Cook County (IL)
- COWS
- California Public Utilities Commission
- El Paso Electric
- Emerald Cities Collaborative
- Enbridge Gas Distribution Inc.
- EnergyWorks
- Environmental and Energy Study Institute
- Environmental Design / Build
- Eversource
- Fraunhofer USA
- GoodCents
- Greater Minnesota Housing Fund

Call Attendees: Non-Members (2 of 3)

- Rheem Manufacturing Company
- Rhode Island Housing
- Richmond Region Energy Alliance
- ROCIS (Reducing Outdoor Contaminants in Indoor Spaces)
- Rothschild Doyno Collaborative
- Seattle City Light
- Snohomish County (WA)
- Solar Habitats, LLC
- Southern Energy Management
- Southwest Energy Efficiency Project (SWEEP)
- Tempo Partners
- Texas Energy Poverty Research Institute (TEPRI)
- The Network for Energy, Water and Health in Affordable Buildings (NEWHAB)
- The Renaissance Collaborative
- Utility Cost Management LLC

Call Attendees: Non-Members (3 of 3)

- VCenergy.org
- Green and Healthy Homes Initiative
- Healthy Building Research
- Honeywell Smart Energy
- U.S. Department of Housing and Urban Development
- ICF
- Institut de recherche d'Hydro-Québec (IREQ)
- Local Government Commission (LGC)
- Massachusetts Department of Energy Resources
- Mid Michigan Community Action Agency
- Minnesota Housing
- State of Minnesota
- NANA Regional Corporation
- New Ecology, Inc.
- Northwest Bronx Community and Clergy Coalition
- People for Community Recovery
- Purdue University

Opening Poll #1

- Which of the following best describes your organization's experience with multifamily smart tech, health, and utility data?
  - Some experience/familiarity – ***43%***
  - Limited experience/familiarity – ***33%***
  - Very experienced/familiar – ***21%***
  - No experience/familiarity – ***3%***
  - Not applicable – ***0%***

Closing Poll

- After today's call, what will you do?
  - Seek out additional information on one or more of the ideas – ***71%***
  - Consider implementing one or more of the ideas discussed – ***29%***
  - Make no changes to your current approach – ***0%***
  - Other (please explain) – ***0%***