



Better Buildings

U.S. DEPARTMENT OF ENERGY

New Technical Resources to Enhance Energy Efficiency in Multifamily Housing: Green Physical Needs Assessments and Tools

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U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

DOE Multifamily Energy Upgrade Technical Tools and Resources



Better Buildings Summit
May 9, 2014

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Weatherization Assistance Program

WAP Multifamily Energy Upgrade Process

Building Selection, Eligibility Assessment, & Owner Participation Evaluation

Pre-Site Visit Activity

- Owner and Staff Interviews
- Pre-Site Visit Data Collection
- Utility Bill Analysis, Determination of Baseline, Benchmarking
- Determine Incentive Qualifications and Program Resources

Site Visit

- Building and Equipment Data Collection
- Diagnostic Measurements
- Confirmation/Update of Pre-Site Visit Information
- Resident Interviews
- Facilities Manager Interview

Energy Modeling & Data Analysis

- Energy Modeling & Calibration
- Energy & Cost Savings Analysis
- Economic Calculations

Intake & Analysis

Work Scope & Audit Report

- Measure Selection & Audit Specifications
- Owner Follow-Up
- Construction, Inspection, & Training Guidelines

Work & Follow Up

Contract Requirements

- Contract Development
- Implementation Roles & Responsibilities
- Engineering Specification Development

Perform Work

- Contractor Selection
- Measure Installation
- Staff Training
- Tenant Education

Final Inspection & Quality Assurance

Post-Construction Monitoring & Tracking

- Monitor System Performance
- Verify Energy Savings

The WAP Multifamily Energy Upgrade Core Principles

Select the correct improvements for the individual building to maximize energy savings and ensure occupant comfort and health

...Doing the Right Things

Ensure that the selected improvements are installed by qualified contractors according to nationally accepted standards

...Doing Things Right

- ✓ Defining the Work.
- ✓ Communicating Expectations of the Work.
- ✓ Inspecting the Work.
- ✓ Training Individuals to do the Work.

The screenshot shows the NREL website for the Standard Work Specifications Tool. The page features a navigation menu with categories: Health & Safety, Air Sealing, Insulation, Heating & Cooling, Ventilation, and Baseload. The main content area is titled "Standard Work Specifications for Home Energy Upgrades" and includes a search bar, a "Learn" button with a wrench icon, and a "Read" button with a book icon. Below the main content are three sections: "Get Certified" with a link to "Home Energy Professional Certifications", "News & Updates" with two news items dated September 9, 2013 and August 26, 2013, and "Download the Documents" with three links for "SWS for Single Family Homes", "SWS for Manufactured Housing", and "SWS for Multifamily Homes", each with an "En Español" link. The footer contains the NREL logo and contact information.

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Standard Work Specifications Tool

Search All Topics [Go]

Health & Safety | Air Sealing | Insulation | Heating & Cooling | Ventilation | Baseload

Standard Work Specifications for Home Energy Upgrades

Standard Work Specifications (SWS) define the minimum requirements to ensure that the work performed during energy upgrades in single-family, multifamily, and manufactured homes is effective, durable, and safe. The SWS can be used as an industry guide for workers, training instructors, homeowners, and program administrators involved in the home performance industry.

Learn
how to use this tool

Read
an introduction to the Standard Work Specifications

Get Certified
[Home Energy Professional Certifications](#)
A Certification Program Established by the [U.S.](#) Department of Energy

News & Updates
September 9, 2013
Using the SWS Online Tool Webinar - Now Available

August 26, 2013
Enhanced Print Functionality Now Available
[Read all News & Updates](#)

Download the Documents

- [SWS for Single Family Homes](#)
- [En Español](#)
- [SWS for Manufactured Housing](#)
- [En Español](#)
- [SWS for Multifamily Homes](#)
- [En Español](#)

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Built Upon Years of Experience. The SWS synthesize more than 30 years of Weatherization Assistance Program (WAP) building science expertise within the WAP and the broader home performance industry. The SWS combine original content and relevant codes and standards to identify desired outcomes of quality home energy upgrades.

Engaging Hundreds of Industry Leaders. The project engaged more than 400 subject matter experts including weatherization professionals, industry technical leaders and other highly qualified individuals to develop the SWS. During this process, more than 2,000 public comments regarding the SWS were reviewed.

Provides an Industry Baseline. The SWS serve as a universal resource for the home energy upgrade industry, giving residential contractors, utilities, homeowners, investors and others a baseline for quality in residential energy upgrades.

Regular Maintenance. The SWS Maintenance Committee will meet in April, 2014 and continue to provide regular updates to the SWS based on industry feedback.

Once we know what the work is...

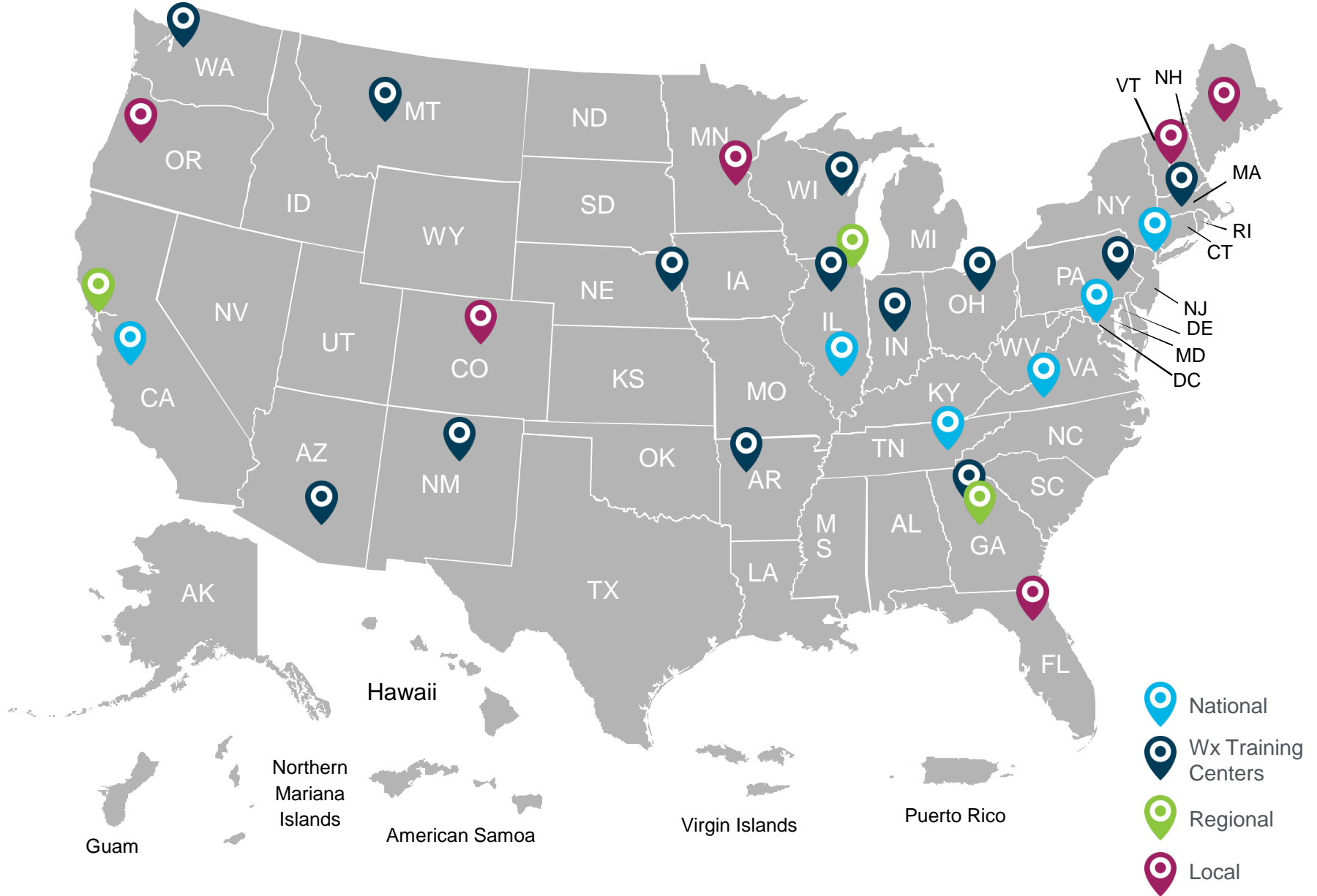
**...we can figure out what a worker
needs to know to do the job right**

Multifamily Energy Auditor
Multifamily Building Operator
Multifamily Retrofit Project Manager
Multifamily Quality Control Inspector

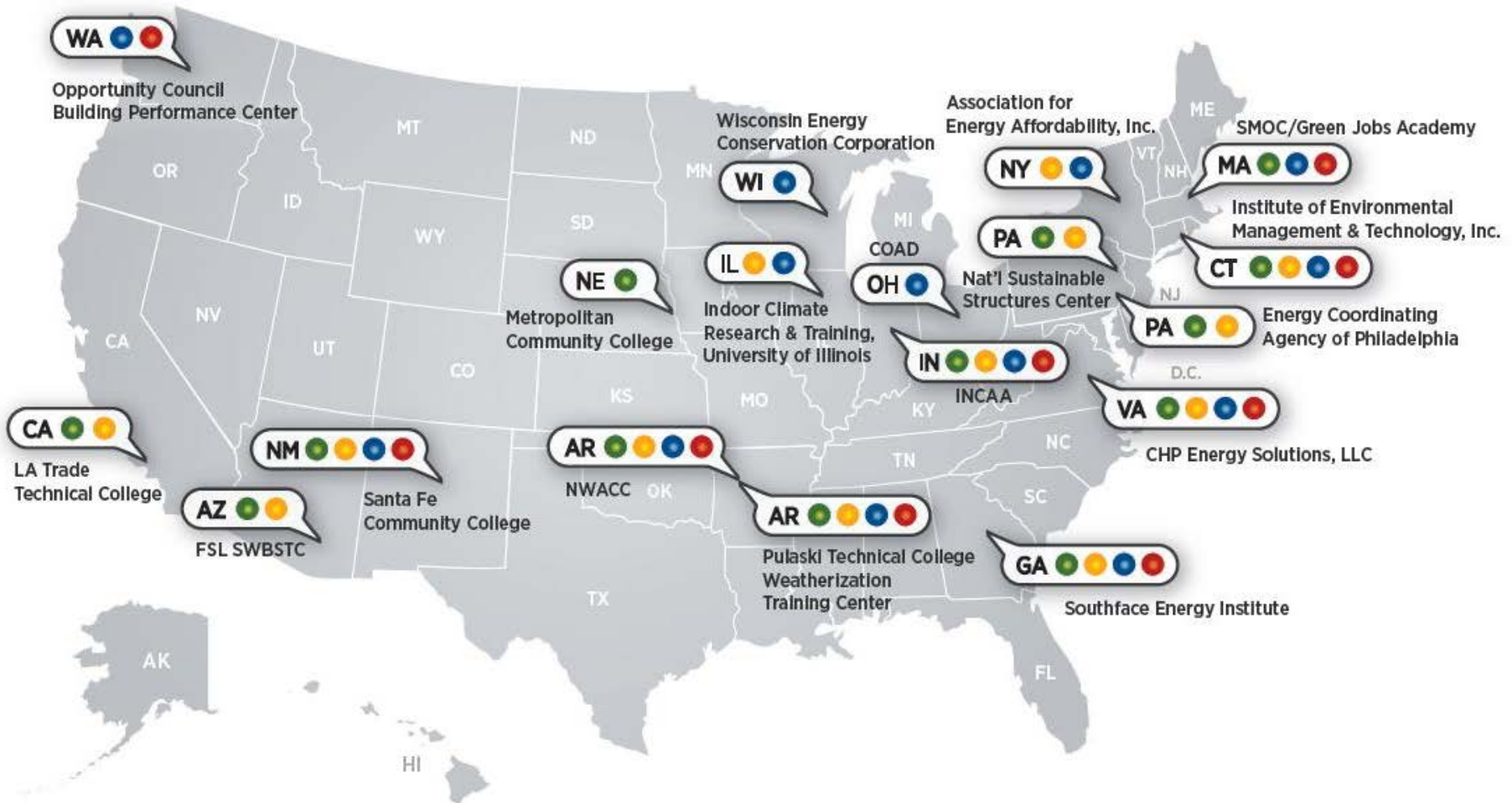
Knowledge,
Skills, Abilities

Job Task
Analysis

MULTIFAMILY TRAINING AND DELIVERY RESOURCES



ACCREDITED WEATHERIZATION TRAINING CENTERS



ACCREDITED WEATHERIZATION TRAINING CENTERS - AREAS OF EXPERTISE:

- Retrofit Installer Technician
- Energy Auditor
- Quality Control Inspector
- Crew Leader



Goal: Collaborate with industry to develop the tools needed for a high-quality residential energy upgrade industry, supported by accredited training programs and a skilled and credentialed workforce.

Define the Work

- SWS define the minimum requirements for high-quality, safe, and durable installations
- References to industry technical standards and codes

Validate the Training

- JTAs for four common single-family and multifamily job classifications
- Outlines key tasks and knowledge, skills, and abilities needed
- Voluntary training program accreditation through IREC

Certify the Worker

- Certifications accredited under ANSI ISO 17024 standard – Energy Auditor, Crew Leader, Quality Control Inspector, Installer
- Based on JTAs and KSAs; also incorporates SWS
- BPI selected to initially administer certifications
- Competency-based; only home energy upgrade certifications supported by DOE accredited by ANSI

Learn more at wip.energy.gov/guidelines.html

Summary: Available Now!

Standard Work Specifications for Multifamily Energy Upgrades

- The SWS are a detailed and comprehensive catalog of energy efficiency upgrade measures containing the minimum technical specifications required for those measures to achieve their intended outcomes.
- <http://sws.nrel.gov>

Multifamily Job Task Analyses (JTA)

- Retrofit Project Manager, Energy Auditor, Building Operator, and Quality Control Inspector.
- <http://www.energy.gov/eere/wipo/guidelines-home-energy-professionals-accredited-training>

Home Energy Professional (HEP) Certifications: Single-Family

- The only home performance certifications that meet American National Standards Institute (ANSI) accreditation under ISO 17024
- <http://www.energy.gov/eere/wipo/guidelines-home-energy-professionals-certifications>

Weatherization Training Centers

- <http://www.waptac.org/State-WAP-Training-Centers.aspx#State>

Accredited Multifamily Training

- <http://www.energy.gov/eere/wipo/guidelines-home-energy-professionals-accredited-training>

Resources: Coming Soon!

Multifamily Tool for Energy Audits (MulTEA)

- MulTEA will produce an investment grade audit (ASHRAE Level 2) and provide auditors with an improved energy simulation and weatherization measure selection tool for multifamily buildings.
- A major innovation of the tool is building energy use can be calibrated against historical weather data that prevailed during that utility billing period.

Technical Guidelines for Multifamily Building Energy Audits

- The Technical Guidelines tell the energy auditor what the data-gathering and energy-auditing process should entail.
- The guidelines facilitate uniformity in multifamily energy audit methods, to lead to more accurate predictions of energy and cost savings.

Multifamily Certification Schemes

- Retrofit Project Manager and Quality Control Inspector.
- License template for ANSI-Accredited certifying bodies.

The Guidelines project is a collaboration between DOE and the home energy performance industry that empowers the WAP and private industry to deliver consistent, high-quality work that results in reduced energy costs and improved comfort in homes across America.

"The fact that there is an online resource that includes very detailed work specifications, and to be able to just click and choose whichever ones we want to use and then include them in our handbook, is just phenomenal for us. This cut our workload considerably — maybe by more than half."

- Jaime Gomez, Coordinator for Austin Energy's Multifamily Rebate Program

"I do a lot of tech work on a daily basis. I want to get better at what I do, so I can deliver the best work for my customers. It's great that the Home Energy Professional Energy Auditor certification recognizes that. It will give people in the industry a higher bar to reach for."

- Building Analyst with TerraLogos Energy Group in Baltimore, Maryland

"Southface Energy Institute is dedicated to providing best-in-class learning experiences to building professionals through classroom, hands-on, and in-field training in weatherization and energy efficiency techniques. The IREC ISPQ Accreditation provides both a method to demonstrate this commitment and a standard by which continuous improvements can be tracked."

- Dr. Sydney G. Roberts, Home Services Program Manager for Southface Energy Institute

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2014 Better Buildings Summit: Fannie Mae Multifamily High Performance Building Module

May 9, 2014

Fannie Mae Mission and Portfolio

- Fannie Mae provides liquidity, stability and affordability to the secondary mortgage market
- Fannie Mae's Multifamily Portfolio contains loans having an aggregate unpaid principal balance of \$199B as of YE 2013
- Our portfolio includes 36,000 multifamily properties, representing 3.6M rental units
 - Includes Market Rate, Affordable Subsidized and Affordable by Area Median Income (AMI) properties
- We hold 20% of U.S. Multifamily Mortgage Debt outstanding¹

Fannie Mae Multifamily has provided liquidity, stability and affordability to the multifamily market for over 25 years.

¹ Based on the Federal Reserve's December 2013 mortgage debt outstanding release, the latest date for which the Federal Reserve has estimated mortgage debt outstanding for multifamily residences.

Typical Energy & Water cost savings opportunities

SAVING MEASURES FOR ALL MULTIFAMILY PROPERTIES



HEATING FUEL SAVING MEASURES

- Upgrade roof insulation
- Seal and balance central exhaust ventilation system
- Air seal the whole building
- Upgrade DHW controls
- Upgrade heating controls



ELECTRICITY FUEL SAVING MEASURES

- Install combined Heat & Power (CHP) systems*
- Upgrade common area lighting
- Upgrade common area laundry equipment
- Upgrade apartment lighting
- Upgrade appliances in apartments



WATER SAVING MEASURES

- Install low-flow fixtures
- Install low-flow toilets
- Install water metering configuration
- Install leak detection

HPB Module: Energy & Water Audit Requirements

- HPB firms must conduct an ASHRAE Level II-compliant building audit and assess for both energy and water saving measures in the:
 - ❑ Building Envelope
 - ❑ Heating, Ventilation, and Cooling Systems
 - ❑ Domestic Hot Water Systems
 - ❑ Lighting Systems
 - ❑ Appliances
 - ❑ Domestic Water and Irrigation Systems
 - ❑ Other energy-consuming and water-consuming systems or components

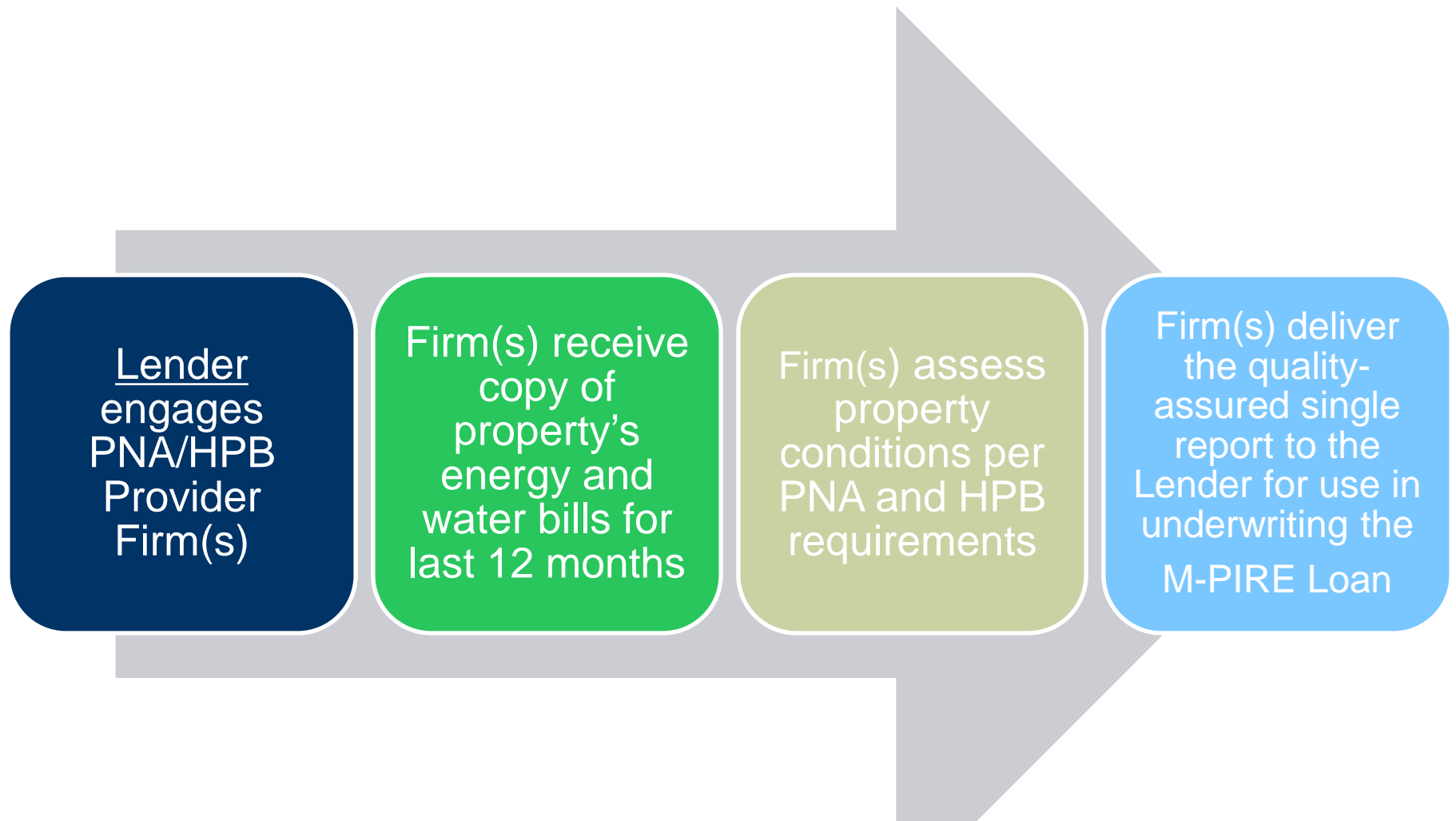
PNA/HPB firms must ensure that the Lender clearly understands the capital costs associated and cost savings with each cost-saving measure for loan sizing and underwriting purposes.

Detailed Energy & Water Efficiency Measures (EWEMs)

- The following data points must be included for each EWEM:
 - Projected Annual Energy or Water Cost Savings
 - For the Property
 - For the Owner
 - For the Tenant's
 - Installed Cost of measure
 - Include development, design and other soft costs as appropriate
 - Include costs for commissioning and verification
 - Owner's Return on Investment (using owner's projected savings)
 - Simple Payback (using owner's projected savings)
 - Estimated Use Life of EWEM
 - Life Cycle Cost Analysis (show calculation and inputs)

PNA/HPB firms must follow the Instructions document's templates for reporting EWEM information.

Provider Timeline



Once the firm(s) is engaged, the combined PNA and HPB report is expected to be delivered within 3-5 weeks.

Fannie Mae's Available Green Financing: GRP & M-PIRE

Terms	Green Preservation (GPP)	NYC Multifamily Property Improvements to Reduce Energy (M-PIRE)
Benefits	<ul style="list-style-type: none"> ▪ Provides up to 4-5% in additional loan proceeds ▪ Max LTV: up 85% 	<ul style="list-style-type: none"> ▪ Provides up to 4-5% in additional loan proceeds ▪ Max LTV: up 85% ▪ Maintains 1.25x DSCR by underwriting up to 50% of projected energy and water savings
Underwriting	<ul style="list-style-type: none"> ▪ Requires PNA and High Performance Building Module (ASHRAE Level II Energy Audit) 	
Asset Management	<ul style="list-style-type: none"> ▪ Complete retrofits within 12 months of loan close ▪ Report annual energy and water cost/consumption in ENERGY STAR 	
Securitization	<ul style="list-style-type: none"> ▪ All loans securitized. MBS is disclosed to investor as "Green MBS". 	
Restrictions	<ul style="list-style-type: none"> ▪ Multifamily Affordable Housing only 	<ul style="list-style-type: none"> ▪ Limited to NYC's 5 boroughs ▪ Conventional, Affordable and Coops allowed; no military or student housing



Better Buildings Summit

Ted Toon

Director, HUD/FHA Multifamily Production

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New Technical Resources to Enhance Energy Efficiency in Multifamily Housing: Green Physical Needs Assessments

At HUD:

- “CNA eTool” is in development
- Interagency effort: Rental Policy Working Group
 - U. S. Departments of HUD, USDA, Treasury
- Standard template, use by multiple agencies and programs
- Free and publicly available
- Builds off best practices of CNAs in use today

CNA eTool

- Other HUD CNAs, including M2M >>> GRP >>> RAD
- Electronic collection and submission, published data standard
- Baseline utility consumption data collection, benchmarking
- ASHRAE Level II energy audit incorporated, where required
- Analytics on cost/benefit, payback, early replacement
- Data, analytics, recommendations = better choices

CNA eTool

- Potential incentives as part of implementation:
 - Underwriting of projected savings
 - Potential impact on property valuation
- Independent study on 200 GRP properties:
 - Overall utility savings in excess of 20%, on average
 - Allowed underwriting at 50% of projected savings
 - Achieved 64% of projected savings
 - Energy-saving measures savings-to-investment ratio of 1.2 (discounted life cycle savings divided by initial investment)
 - Actual vs projected savings consistent with Deutsche Bank's

CNA eTool

- CNA eTool currently in development
- Testing over the summer
- 9/30/2014 completion
- HUD Multifamily programs requiring CNAs will migrate to use of CNA eTool
 - FHA Mortgage Insurance applications
 - Multifamily Asset Management Programs
 - Preservation Programs (Mark to Market, Rental Assistance Demonstration (RAD))

New Technical Resources to Enhance Energy Efficiency in Multifamily Housing: Green Physical Needs Assessments

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