Heat Pump Demonstration Study Workshop

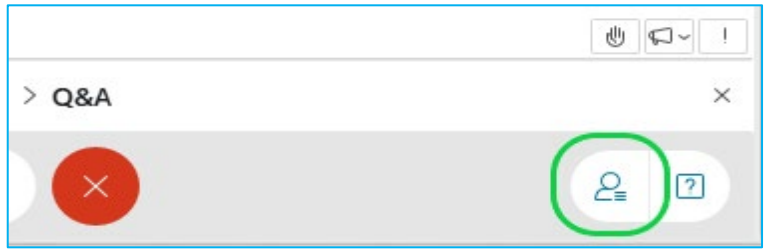
NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Meeting Procedures

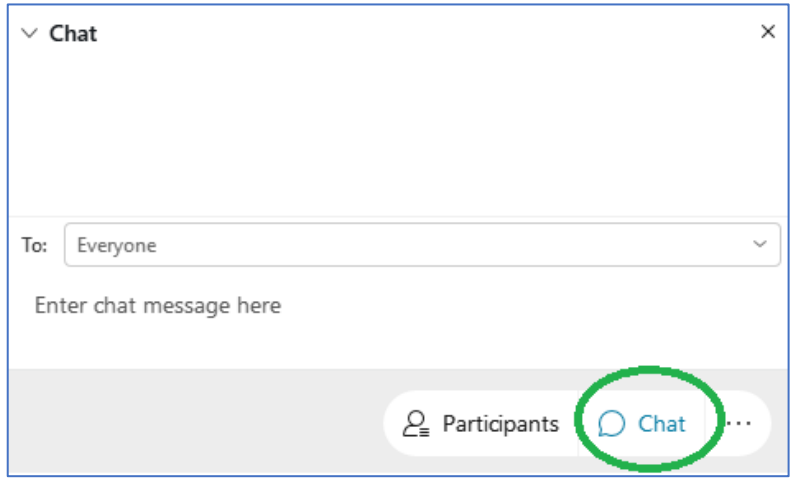
Before beginning, a few reminders to ensure a smooth discussion:

- The session will be recorded.
- If you want to ask a question, please submit one to the panelists in the Q&A feature. Questions submitted through Q&A are only visible to panelists. We will address questions at the end.
- The Chat feature is also open and visible to all attendees and panelists.
- Slides will be distributed to all providers after the webinar.

Q&A



Chat



Program Process

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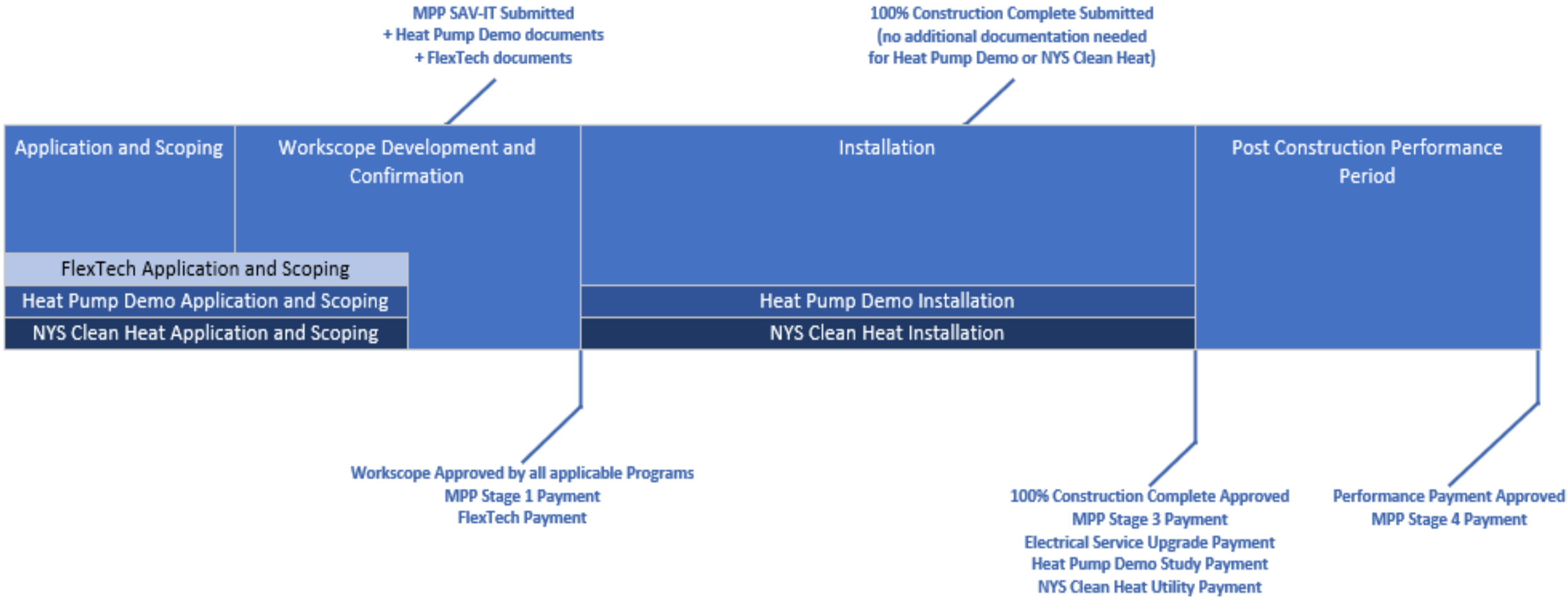
Snapshot of HPDS Process



Additional Submittals

The following submittals are required in addition to the normal MPP requirements.

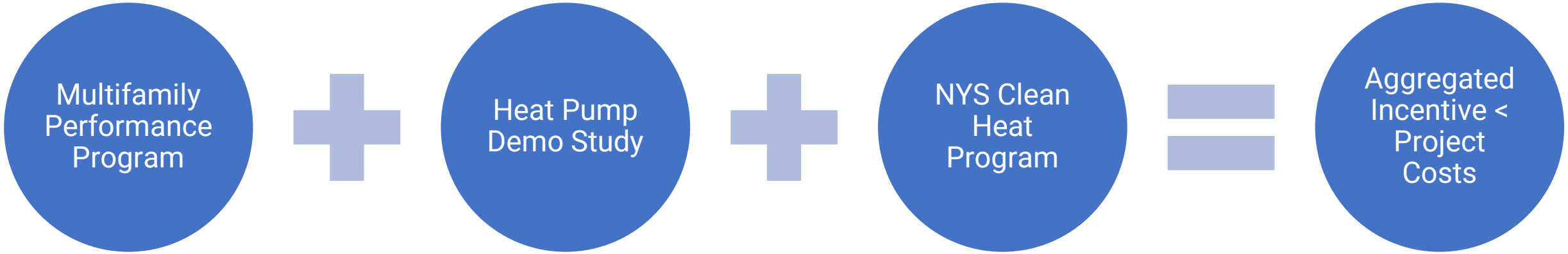
- Application
  - Electrical Service Upgrade – NEC Panel Sizing Calculator
- Stage 1 Workscope Development
  - Required Measure Evaluation worksheet
  - Energy Savings and Rent Affordability Plan
  - Pre-construction Rent Roll
- Stage 2 & 3 Construction
  - Post-construction Rent Roll
  - Required Measure documentation
  - Heat pumps must be installed by Participating Contractor in NYS Clean Heat Program

Heat Pump Demo Study Funding

Heat Pump Technology	Funding (per dwelling unit)
ASHP	$2,000
GSHP	$4,000
HPWH	$900
Electric Service Upgrade (optional)	$1,500

Projects can qualify for multiple heat pump incentives

Stackable Incentives



Heat Pump Demo Study Workshop

NEC Panel Sizing Calculation Worksheet

PRESENTED BY:
IAN M, SHAPIRO, PE, FOUNDER
MYRON J. WALTER, PE, SENIOR ELECTRICAL ENGINEER

TAITEM ENGINEERING, PC
ITHACA, NY

Taitem

Certified B Corporation

This is not meant take the place of professional design services

It's a good estimate so it will help understand these buildings and provide solid assumptions, but it does not take the place of a design professional.

Goals

Purpose of the study

Educational & Informative

- This will help us understand these buildings better and provide guidance to upgrade service and/or panels.

Screening for incentives

- The sheet will help to determine financial incentives
- Everyone will be required to fill out the sheet

SAMPLE WORKSHEET

APARTMENT SUMMARY AND LOAD CALCULATIONS

Sample worksheet

NYSERDA

Multifamily Performance Program
Electrification Electrical Service Worksheet

NYSERDA'S REVIEW/APPROVAL OF THE PROVIDED PROJECT INFORMATION AND CALCULATIONS DOES NOT IMPLY APPROVAL OF THE DESIGN, BUT IS RATHER JUST TO ASSESS QUALIFICATION FOR THE ADDED ELECTRICAL INCENTIVE. EACH PROJECT SHOULD ENSURE THAT ITS DESIGN COMPLIES WITH THE NATIONAL ELECTRICAL CODE, STATE, AND LOCAL CODES.

THE MINIMUM NUMBER OF APARTMENTS REQUIRED TO QUALIFY FOR THIS INCENTIVE IS FIVE. THE PROJECT CAN CONSIST OF A SINGLE BUILDING, OR MULTIPLE BUILDINGS. IF THE PROJECT DOES CONSIST OF MULTIPLE BUILDINGS THE APPLICANT MUST PROVIDE A SEPARATE PROJECT INFORMATION ENTRY FOR EACH BUILDING.

APPLICANT TO FILL IN YELLOW SHADED CELLS (TAB or SHIFT TAB to move to next/previous cell)

NAME OF PERSON COMPLETING THIS FORM	James Cedar			DATE	8/23/21
BUILDING NAME	Living Apartments				
STREET	1234 Main St.				
CITY STATE ZIP	Anytown	NY	12345		

Sample worksheet

GENERAL BUILDING INFORMATION

TOTAL BUILDING AREA :	24,000	S.F.
TOTAL NUMBER OF APARTMENTS:	32	
ADDITIONAL NON-APT SPACES?:	Y	

NOTE: IF ANSWER IS "Y" PROVIDE LIST OF SPACES WITH DESCRIPTION OF USE AND AREA (sf) IN AREA BELOW.
(IE: INTERIOR CORRIDORS, LAUNDRY ROOM, STORAGE SPACES, COMMUNITY LOUNGE, ETC.)

Building Manager/Rental Office -700sf, Tenant storage - 1200sf, Laundry - 500sf (8 washing machines, 6 gas clothes dryers), Mechanical room- 300sf, Corridors/Stairs

MAXIMUM ELECTRIC DEMAND FOR BUILDING COMMON SPACES (HOUSE METER) KW

DOES BUILDING HAVE AN ELEVATOR/S: N

IF SO, QUANTITY OF ELEVATORS:

PROVIDE ELECTRICAL DATA FOR EACH ELEVATOR (MOTOR HP, FLA) WHEN SUBMITTING THIS FORM

BUILDING ELECTRICAL INFORMATION

EXISTING ELECTRICAL SERVICE SIZE:	800	AMPS
ELECTRICAL SERVICE VOLTAGE:	208	VOLTS
PHASES:	3	Ø

APARTMENT ELECTRICAL INFORMATION

APARTMENT VOLTAGE :	208	VOLTS
APARTMENT PHASES:	1	Ø

Apartment Name/#	Existing Apartment Panel Size (A)	Apartment Area (SF)	Existing Electric Heat (W)	Existing Air Conditioning (W)	**New Heat Pump Load (W)**	Electric Cooking Appliances (W)	Electric Water Heater (W)	Dishwasher (W)	Laundry Load (Washing Machine) (W)	Clothes Dryer (W)	Existing Supplemental Elecric Heat To Remain (W)	Existing Supplemental Air Conditioning To Remain (W)
101	90	579	4,250	1,200	3,650						500	
102	90	579	4,250	1,200	3,650						500	
103	90	579	4,250	1,200	3,650						500	
104	90	579	4,250	1,200	3,650						500	
105	90	579	4,250	1,200	3,650						500	
106	90	579	4,250	1,200	3,650						500	
107	90	996	4,250	1,200	3,854	9,000					500	

Sample panel feed

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Multifamily Performance Program
Electrification Worksheet

NYSERDA'S REVIEW/APPROVAL OF THE PROVIDED PROJECT INFORMATION AND CALCULATIONS DOES NOT IMPLY APPROVAL OF THE DESIGN, BUT IS RATHER JUST TO ASSESS QUALIFICATION FOR THE ADDED ELECTRICAL INCENTIVE. EACH PROJECT SHOULD ENSURE THAT ITS DESIGN COMPLIES WITH THE NATIONAL ELECTRICAL CODE, STATE, AND LOCAL CODES.

0	EXISTING APARTMENT PANEL(S) ARE NOT ADEQUATELY SIZED.
4	EXISTING APARTMENT PANEL(S) ARE MARGINALLY SIZED (ADEQUATE FOR ADDED LOADS, BUT WITH LESS THAN 10% SPARE CAPACITY).
28	EXISTING APARTMENT PANEL(S) ARE ADEQUATELY SIZED

APT NUMBER	EXISTING PANEL SIZE ADEQUATE?		
	NO	MARGINAL	YES
101			1
102			1
103			1
104			1
105			1
106			1
107		1	
108		1	

APT NUMBER	EXISTING PANEL SIZE ADEQUATE?		
	NO	MARGINAL	YES
-			
-			
-			
-			
-			
-			
-			
-			

APT NUMBER	EXISTING PANEL SIZE ADEQUATE?		
	NO	MARGINAL	YES
-			
-			
-			
-			
-			
-			
-			
-			

FINDINGS TO DATE

Summary of Findings

Site	# of Apts.	Electric Heat	AC	Cooking	Water Heater	Dish/clothes washer/dryer	Panel Size	Service to bldg.
1	8	0	1225	0	0	0	OK	OK
2	35	0	1200	0	0	0	OK	OK
3	62	2250	1200	602	0	0	OK	OK
4	8	0	815	10700	0	0	NOT OK	NOT OK
5	12	0	1800	0	0	0	OK	OK
6	25	0	2400	0	0	0	NOT OK	NOT OK
7	88	700	800	8000	0	0	OK	OK
8	69	2700	740	8000	0	0	NOT OK	NOT OK
9	12	5750	0	10800	4500	7100	OK	OK

IN WATTS (W)

6 OUT OF 9 SYSTEMS DO NOT NEED UPGRADE

ELECTRIC STOVES

If buildings start adding other electric appliances, like electric stoves, it could tip things over the edge.

SUMMARY OF FINDINGS

Unusual situations

Example:

- master metered
- all electric
- vertical circuits
- electric resistance

We won't use the spreadsheet unusual situations like these.
These situations will be evaluated case by case.

Presenters

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Taitem Engineering, Ithaca, New York

Additional considerations

> The calculator is intended for buildings that have panels in each apartment.

> It could also be used for buildings that don't have panels in each apartment, but the apartments do have electric stoves.

> For all other building configurations, we need supplemental information from electrical engineer to confirm need for electric service upgrade and will evaluate on case by case basis.

> Common area space should also be included.

> The calculator assumes that the only additional electric load to the building will be the heat pump. If other measures in the scope of work also increase electric load (such as, electric stoves), please notify the Project Manager.

> Panels will be upgraded to prepare building for full electrification.

FAQ

- What additional information can/should be provided with the worksheet?
  > *A description/sf-area of all non-apartment spaces fed from the electrical service, and a list of all electrical loads for each space, or the maximum electrical kW demand for each space.*
- Do we need to submit the NEC Panel Sizing Calculator Worksheet even if we don't need to upgrade the panels?
  > *Yes, NYSERDA is collecting data to study the actual conditions of buildings*
- If the project is composed of different buildings, can we use one panel calculator for all the buildings?
  > *Every building needs to have a NEC Panel Sizing Calculator*
- Is there a difference in the panels size calculation if the project is going to install GSHP instead of ASHP?
  > *If the GSHP is a configuration where one heat pump is in each apartment, then we would use the same calculator. But if there's a big central GSHP on the house meter (or multiple GSHP's on the house meter), then it's a non-standard situation and would be reviewed on a case-by-case basis.*

Energy Savings and Rent Affordability Plan

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Overview of Plan

- This Plan template was developed so building owners can inform us how they intend to avoid shifting heating costs to LMI tenants
- Building owners should identify changes to rent, utility allowances or vouchers in response to heat pump or other upgrades in SOW
- Certify that rents won't be raised for 2 years post construction due to increased utility costs or increased value of unit
- Comply with plan for 2 years post construction
- Performance payment dependent on compliance with Plan

MPP HEAT PUMP DEMONSTRATION STUDY

Energy Savings and Rent Affordability Plan

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SECTION 1. OVERVIEW

Participants (building owners/developers) applying for the NYSERDA Multifamily Performance Program (MPP) – Heat Pump Demonstration Study are required to prepare and submit this Energy Savings and Rent Affordability Plan (the Plan). The purpose of the Plan is to describe how you will prevent an increase in housing costs (rent and utilities) for tenants beyond cost of living increases, particularly with respect to heating costs associated with the heat pump shifting to the tenants.

SECTION 2. BUILDING INFORMATION

Participant First Name | MI | Last Name | Date

Project Name

Building Address 1

City | State | Zip

Number of Total Dwelling Units | Number of Affordable Units[1]

SECTION 3. DEMONSTRATE RENT AFFORDABILITY

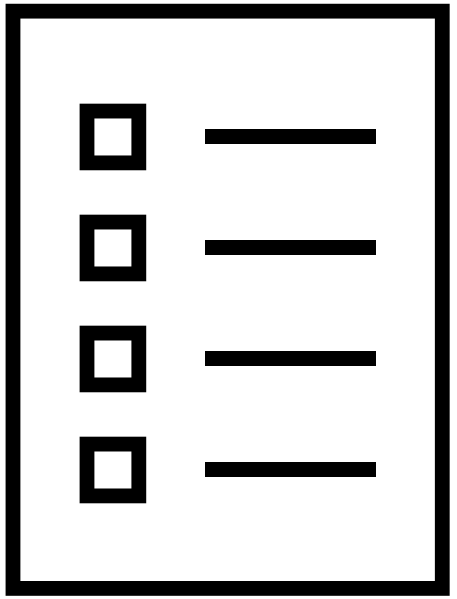
Components of Plan

> **Building Information**

> **Demonstrate Rent Affordability**

- Affordable housing verification
- How to prevent passing on electrified heating costs to tenants
- What information could be provided to measure rent maintenance
- How will the information on rent affordability in the Plan be shared with tenants

> **Signature**



FAQ

- When to submit the Energy Savings & Rent Affordability Plan and the Required Measures Evaluation Worksheet?
  - *We expect to receive these documents with the SAV-IT rev0 package.*
  - *Approved documents will be sent with complete package – SAV-IT approved + HPDS documents approved*
- Does the completion of the plan or signing of the T&C prevent any increases to tenant rent to recoup the funding, for instance through Major Capital Improvement and Individual Apartment Improvement regulations?
  - *No, it does not.*
- If property is a condo or co-op where tenants own their units, does a Plan still need to be completed?
  - *No, it is not needed.*

Required Measures Evaluation

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Required Measures to be Evaluated

- Envelope
  - Air Sealing (including weather stripping)
  - Insulation - Roof Deck or Attic
  - Windows - High Efficiency Windows and/or Storm Windows (when single-pane windows are present)
- HVAC
  - Distribution - Insulate All Hot Surfaces (condensate tank, steam & HW piping)
- In-Unit
  - ENERGY STAR Refrigerators
  - ENERGY STAR Dishwashers
  - High Efficacy Hardwired or Linear Fixtures (CFL, LED)
  - DHW - Low-flow Showerheads and Sink Aerators

Required Measures Evaluation Review

- Each of the measures in the Required Measures Evaluation should be evaluated OR an explanation of why a measure was not evaluated should be provided.
- Some acceptable reasons measures were not evaluated include:
  - If the measure was recently completed in the building or is not relevant for the building
  - If the building owner requests the measure not be evaluated
- All evaluated measures should be part of the scope of work detailed in the SAV-IT

SAV-IT Tool Tips

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SAV-IT Reporting Tips

- Describe the energy efficiency improvement to be installed in the Measure Descriptions tab
  - Provide a detailed description providing the key elements of the work scope, such that a contractor or designer would understand the intent and an inspector would be able to verify that the improvement was implemented as designed. This should include:
    - Descriptions of All Installed Equipment
    - Quantities
    - Capacity
    - Efficiency
    - Proposed make/model if available
    - Operating Assumptions
    - Modeling Assumptions

Avoiding SAV-IT Review Comments

- Review tabs which have flags prior to submission
  - QC Checks tab
    - Flags if any tabs contain required cells that are omitted
  - Measure QC tab
    - If a flag is populating in column J (circled below), the reviewer will likely ask for a model or external calculations to be submitted. Please consider submitting the projects model or external calculations for these measures to preemptively avoid a comment regarding this flag.
  - MPP Provider Portal
    - Tech Tips
      - Choosing Air Source Heat Pumps for Multifamily Buildings

	Measure Classification	Measure Name	Cost	Site Energy Savings	Source Energy Savings	Source Energy Savings	Comment
9	Split System AC/HP	Air Source Heat Pumps	$1,184,444	1,082	2,758	21.1%	This measure is being flagged as either falling outside of the cost, site energy savings, or source energy savings typical values. Please refer to the guidance in the above instructions and respond accordingly.

NYS Clean Heat Program

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NYS Clean Heat Program Overview

> Heat Pump Demo Study projects must apply to the NYS Clean Heat Program

> Incentives for the Study will not be released without pre-approval for project from NYS Clean Heat

> Projects must submit their applications before starting construction

> Latest version of Program Manual released October 2021

> Information about Program, https://saveenergy.ny.gov/NYScleanheat/.

Interaction with Heat Pump Demo Study

> Heat Pump Demo Study defers to the NYS Clean Heat Program Technology Requirements
  - All projects in the study should meet the requirements of the Clean Heat Program

> Incentives from MPP + Heat Pump Demo Study + NYS Clean Heat Program may be layered for heat pump measure
  - Incentives must not exceed project costs

> Heat Pump Demo Study projects will go through MPP inspection process

NYS Clean Heat Program Categories

- Cold Climate Air Source Heat Pumps
  - All ccASHPs in multifamily buildings are in **category 2**, regardless of heating capacity
  - Multifamily new construction or gut renovation that plan to install Minisplit Heat Pump or Central ccASHP systems are eligible for **category 4**, regardless of system capacity
- Ground Source Heat Pumps
  - All Multifamily buildings with retrofit GSHP systems are eligible for **category 3** regardless of heating capacity
  - Multifamily new construction or gut renovation that plan to GSHP are eligible for category 4, regardless of system capacity
- **Category 4** – Custom Space Heating Applications
- **Category 4A** – Heat Pump + Envelope
  - Category 2 or 3 multifamily retrofit projects + envelope improvements are eligible
- Heat Pump Water Heater
  - **Category 6** – Custom application for systems with storage capacities greater than 120 gallons

FAQ

> What is the process with the NYS Clean Heat Program? Does NYSERDA need to receive a notification of technology approval from that program to approve and release HPDS funding?
  - *Providers and Participants must apply to the NYS Clean Heat Program separately from MPP. NYS Clean Heat program application entails:*
    - *Select approved participating contractor*
    - *Select technology*
    - *Depending on category chosen, may need to show projected energy savings*
  - *Applicants should receive a written notification of approval from utilities. That should be shared with NYSERDA and with this approval, HPDS funding can be released after installation is completed.*

> Is there a deadline to submit the NYS Clean Heat Program application?
  - No, but we should receive the pre-approval letter from the utilities before construction starts.

> Can the Heat Pumps be installed before NYS Clean Heat or NYSERDA HPDS approval?
  - *No, the Heat Pumps need to be approved by NYS Clean Heat Program before installation or risk not being funded if the technology is not approved.*

Heat Pump Education Materials

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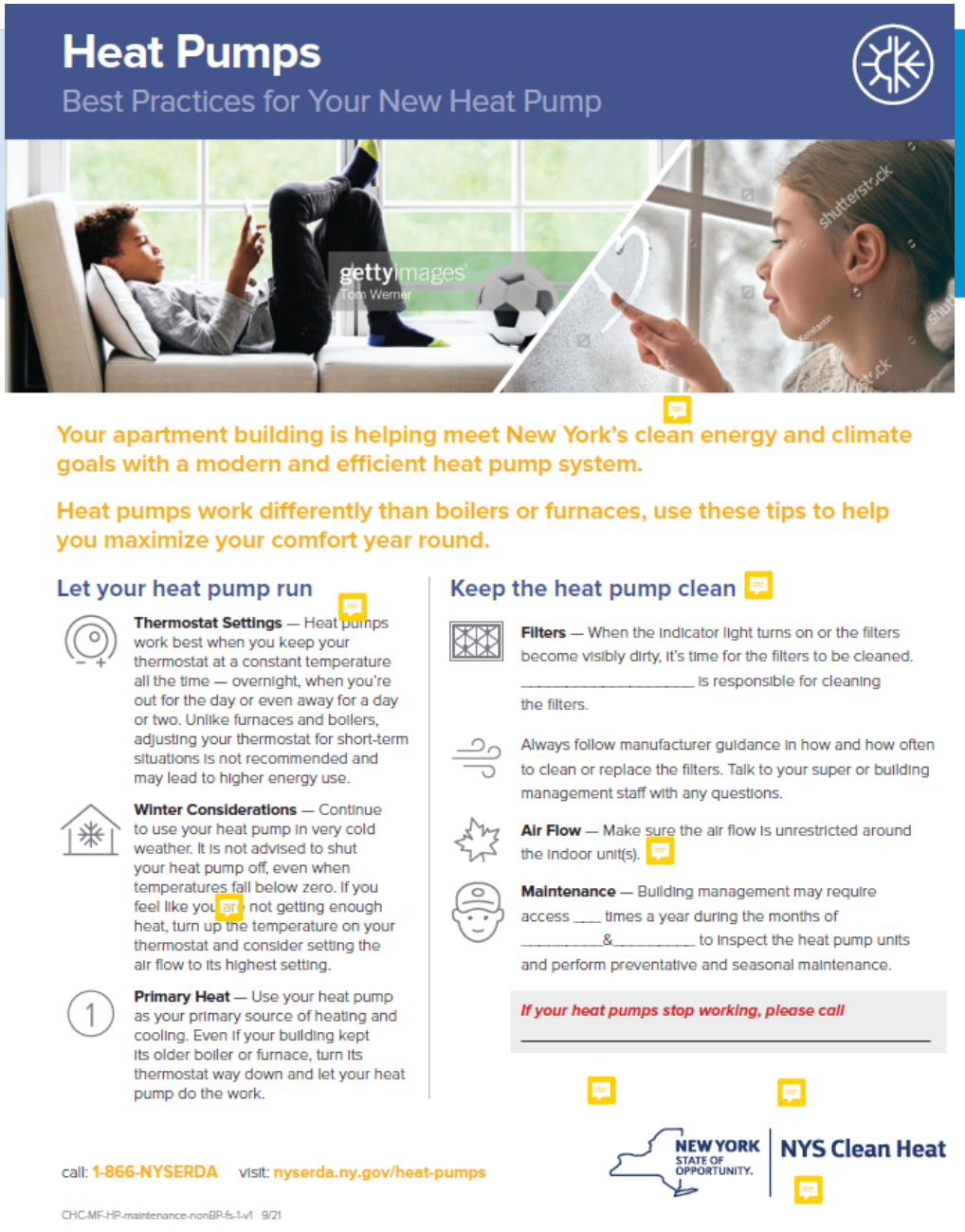
Tenant Materials

- NYSERDA is preparing educational materials for tenants with heat pumps.
- Materials are undergoing stakeholder review
- Materials consist of best practices for optimizing use of heat pumps
- The materials will be shared with building owners to be customized and distributed to tenants. Customizable features include maintenance contact info and who's responsible for cleaning filters.



Heat Pumps

Best Practices for Your New Heat Pump

Your apartment building is helping meet New York's clean energy and climate goals with a modern and efficient heat pump system.

Heat pumps work differently than boilers or furnaces, use these tips to help you maximize your comfort year round.

Let your heat pump run

Thermostat Settings — Heat pumps work best when you keep your thermostat at a constant temperature all the time — overnight, when you're out for the day or even away for a day or two. Unlike furnaces and boilers, adjusting your thermostat for short-term situations is not recommended and may lead to higher energy use.

Winter Considerations — Continue to use your heat pump in very cold weather. It is not advised to shut your heat pump off, even when temperatures fall below zero. If you feel like you are not getting enough heat, turn up the temperature on your thermostat and consider setting the air flow to its highest setting.

Primary Heat — Use your heat pump as your primary source of heating and cooling. Even if your building kept its older boiler or furnace, turn its thermostat way down and let your heat pump do the work.

Keep the heat pump clean

Filters — When the indicator light turns on or the filters become visibly dirty, it's time for the filters to be cleaned. _____ is responsible for cleaning the filters.

Always follow manufacturer guidance in how and how often to clean or replace the filters. Talk to your super or building management staff with any questions.

Air Flow — Make sure the air flow is unrestricted around the indoor unit(s).

Maintenance — Building management may require access ___ times a year during the months of _____&_____ to inspect the heat pump units and perform preventative and seasonal maintenance.

If your heat pumps stop working, please call _____

call: 1-866-NYSERDA visit: nyserda.ny.gov/heat-pumps

NEW YORK STATE OF OPPORTUNITY. NYS Clean Heat

CHC-MF-HP-maintenance-nonBP-fs-1-v1 9/21

Contacts

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General MPP questions – multifamilyprograms@nyserda.ny.gov

Information on Heat Pump Demo Study Requirements available on MPP Provider Portal.

NYS Clean Heat Program – Reference Slides

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Category 2 – ccASHP

Eligibility

Cold Climate Air Source Heat Pump - Full Load Heating

> **Eligible Technologies**

- Minisplit Heat Pump (“MSHP”)
- Central Cold Climate Air Source Heat Pump

> **Eligibility Criteria**

- Each unit in system must be on the NEEP Product List
- Total heat pump system heating capacity must be <300,000 Btu/h
  - Exception: for existing multifamily buildings, all retrofit ASHP systems shall be eligible for Category 2 regardless of heating capacity
- For central ASHPs installed with a back-up furnace in the same cabinet, the back-up furnace must have capacity <225,000 Btu/h
- Total heat pump system heating capacity satisfies at least 90% of the building’s design heating load (BHL)

Category 2 - ccASHP

Incentive Structure

- $/10,000 Btu/h of maximum heating capacity at 5°F, as documented on the NEEP Product List
- Total incentive to be limited to 120% of the building's design heating load (BHL)

Central Hudson	Con Edison	National Grid	NYSEG/RGE	Orange & Rockland
$1,300	$2,000	$1,000	$1,000	$1,600 a. Plus integrated controls (inclusive): $2,400 b. Plus decommissioning (inclusive): $2,400

Category 3 - GSHP

Incentive Structure

- $/10,000 Btu/h of full load heating capacity as certified by AHRI
- Total incentive to be limited to 120% of the building's design heating load (BHL)

Central Hudson	Con Edison	National Grid	NYSEG/RGE	Orange & Rockland
$2,000	$5,000	$1,500	$1,500	$2,000

Category 4A – Heat Pump + Envelope

Eligible Measures

Must meet category 4 requirements + include significant envelope upgrade

Eligible Category 4 Heat Pump Technologies:

- Central Cold Climate Air Source Heat Pumps
- Mini Split Heat Pumps
- Commercial Unitary Systems/Large Commercial ASHPs
- Air Source Variable Refrigerant Flow Heat Pumps ("VRF")
- Ground Source Heat Pumps
- Packaged Terminal Heat Pumps ("PTHPs")

Eligible Envelope Measures:

- Window replacements, window film
- Wall insulation, continuous insulation, window walls, curtain walls exterior façade
- Air leakage sealing, air barrier continuity
- Roof insulation

Category 4A – Heat Pump + Envelope

Eligibility Criteria

- **Total heat pump system heating capacity must be ≥300,000 Btu/h at design heating temperature unless:**
  - If under 300,000 Btu/h, contains equipment that is three-phase or contains equipment that meets or exceeds the NEEP cold climate air-source heat pumps specifications but is not NEEP listed
  - MF new construction projects are eligible for Category 4, regardless of installed heating capacity
- **Projects shall be for full-load heating systems and Installed systems must satisfy the dominant HVAC load for the building, per applicable code**
- **The envelope upgrade must produce a quantifiable impact on the heat pump sizing**
- **For scenarios in which custom project eligibility is not clearly defined, the program guidelines provide additional information on how to determine eligibility for Category 4 applications**
  - Fossil fuel energy consumption must be reduced by the new electric technology or application and
    - Must not increase the overall annual site energy consumption
    - Shall be market ready and can meet or exceed applicable minimum efficiency specifications

Category 4A - Heat Pump + Envelope

Incentive Structure

- $/MMBtu of annual energy savings
- Tier 1 for Existing: 5% - 30% reduction in dominant load compared to baseline
- Tier 2 for Existing: >30% reduction in dominant load compared to baseline

Central Hudson	Con Edison	National Grid	NYSEG/RGE	Orange & Rockland
Tier 1: $80 Tier 2: $100	Tier 1: $200 Tier 2: $400	Tier 1: $80 Tier 2: $100	Tier 1: $80 Tier 2: $100	Tier 1: $80 Tier 2: $160

Category 6: Custom Hot Water Heating Applications

Incentive Structure

$/MMBtu of annual energy savings

Central Hudson	Con Edison	National Grid	NYSEG/RGE	Orange & Rockland
$80	$200	$80	$80	$80