Specifications For Clean Heat for All Challenge Cold Climate Packaged Heat Pump Solution

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NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

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1. General

1.1. Definition and Acronyms

The terms "**Manufacturer / Distributor**", "**Vendor**", or "**Engineering Firm**" are defined as the entity that will provide services as defined in these specifications.

The terms "**Authority Customer**" or "**Customer**" are defined as the owner where services are being performed.

The term "**Minimum Requirements**" is defined as the items that must be demonstrated within the proposal to the satisfaction of the RFP review committee to be awarded an agreement.

The term "**Additional Design Targets**" is defined as the items that are highly desired but not Minimum Requirements. Proposed products will be scored based on how well they meet the targets, and the highest score will be a major factor in the selection of a heat pump vendor.

ASHP – Air Source Heat Pump

ccASHP – Cold Climate Air Source Heat Pump

GHG – Green House Gas

GWP – Global Warming Potential

COP – Coefficient of Performance

PWHP – Packaged Window Heat Pump

PTHP – Packaged Terminal Heat Pump

VRF – Variable Refrigerant Flow

BACnet – Building Automation and Control (BAC) networks

1.2. Introduction

The New York Power Authority (NYPA), in collaboration with the New York Housing Authority (NYCHA) and the New York State Energy Research and Development Authority (NYSERDA) is seeking proposals for a cold climate rated packaged heat pump that can be installed through a typical window opening.

As multifamily buildings across the State consider converting to air source heat pumps (ASHP), many will hesitate to do so because of the high cost and major disruption associated with installing split systems. The need to penetrate the exterior walls, roofs, and floors to run refrigerant linesets and condensate drains, the additional cost of soffits for the interior lineset runs, the exterior space required for outdoor units, and the requirement of 208 VAC operation are just a few of the many barriers to conversion.

Add to these the likely future shortage of capable HVAC technicians, and the potential for refrigerant leaks (and their corresponding GHG harm) the problem becomes almost impossible to address cost-effectively.

While improved PTHP technology is promising for buildings with existing PTAC sleeves, many more buildings do not have this option and will face prohibitively high barriers to installing VRF or smaller residential-type split systems. A new type of heat pump solution is needed to ensure that all buildings can afford a heat pump conversion.

The solution NYPA, NYCHA and NYSERDA are seeking through this RFP is a standalone, unitary Packaged Window Heat Pump (PWHP) that can be installed in occupied apartments with limited resident disruption and does not require extensive refrigerant piping, major electrical upgrades, or skilled labor to install.

1.3. Goals

NYPA seeks to improve the performance and value proposition of heat pump technologies by accelerating the development and commercialization of a product meeting the following design requirement:

- Plug into a standard three-prong household wall socket (e.g., 115VAC +/- 10%, single phase, 60Hz socket on a 15amp circuit breaker).
- Does not require a plumber or other skilled labor for installation, and does not require a mechanical contractor with certifications such as “EPA 608” (refrigerant management).
- Provide adequate heating at the coldest anticipated outdoor air temperatures for buildings located in climate zones 4 and 5 that cover the vast majority of the continental U.S.
- Installation does not require drilling through walls.
- Installation can be done by property management staff within a few hours.
- Can be installed through a standard apartment window opening with no degradation to the existing thermal envelope.
- A form factor that is aesthetically pleasing and is not cumbersome or intrusive in tenant spaces.
- Operate quietly enough to not disrupt tenants.

Additionally, the ability to integrate wirelessly into BACnet-compatible building management systems would be a highly desirable optional feature. Minimal new technology would be needed to develop such a unit; existing hardware could be re-packaged to achieve all design goals.

The heat pump is intended to be a cost-effective electrification retrofit option for multifamily residential buildings in the Northeast and other cold climate regions.

1.4. Market Opportunity and Demand Aggregation

Initial Purchase Agreement: Under this RFP, NYPA may award up to two (2) purchase agreement(s) with the winning Vendor(s). Each purchase agreement shall have a minimum of 10,000 and a maximum of 12,000 units. Alternatively, NYPA may choose to award one purchase order agreement to a single winning Vendor totaling up to 24,000 units. Please see Section 1.7 for details. Estimated Future NYCHA Demand: Looking ahead, NYCHA estimates a need for approximately 156,000 units over the next 5-10 years in its efforts to meet New York City and State mandated emissions targets. NYCHA provides affordable housing to 358,675 authorized residents in over 168,100

apartments throughout the five boroughs of New York City through the conventional public housing program. Together, NYCHA public housing residents and Section 8 voucher holders occupy 11.6% of the city's rental apartments. Of NYCHA's 285 developments, 60% are fifty years old or older and 100% of NYCHA's cooling is currently provided by resident-owned window air conditioners.

In 2019, New York City passed local law 97 (LL97) which committed NYCHA to reducing its greenhouse gas emissions (GHG) 80% by 2050. This can only be achieved through rapid electrification of the space and hot water heating, which currently accounts for the majority of NYCHA's emissions. NYCHA's current 5-year capital plan commits approximately $1.9 billion to heating plan replacements and upgrades. Many of these replacements are still in-kind steam plants; however, NYCHA is also allocating a significant portion of this commitment to electrification and intends to greatly expand this effort in the next 5-year capital cycle beginning in 2024.

An Emerging North American Market: Beyond NYCHA, such a product would be broadly applicable to existing occupied buildings in cold climates that must rapidly decarbonize by electrifying their heating systems, particularly for large portfolio managers. New York State alone offers a large market of both low-to-moderate-income and market-rate housing with several million multifamily units, as well as potentially in commercial buildings. Buildings that lack central cooling, and which presently meet cooling needs using window ACs would be especially well suited for electrification using this type of packaged heat pump. It is estimated there are over 50 million room air conditioners installed in the U.S. currently.

Additionally, these new type of heat pumps could be used for net zero carbon retrofits under NYSERDA's RetrofitNY initiative. Through the RetrofitNY Pledge, building owners have already pledged to install cost effective net zero retrofit solutions in over 400,000 dwelling units when they become available.

Demand Aggregation: To accelerate the development of a large market, NYCHA, NYSERDA and NYPA have developed the Clean Heat for All Expression of Interest (see Exhibit 3) that portfolio managers who are interested in applying this new type of heat pump solution in their buildings as well as providers of retrofit solutions who are interested in including the product in their offering can sign to signify potential demand. NYCHA, NYSERDA and NYPA are conducting outreach in the U.S. and Canada to aggregate for potential demand through the Expression of Interest.

At the time of release of this RFP, the following organizations had signed the Clean Heat for All Expression of Interest:

Organization	Number of buildings in portfolio	Number of dwelling units in portfolio
Jersey City Housing Authority (NJ)	74	1,634
King County Housing Authority (WA)	700+	12,000+
Boston Housing Authority (MA)	541	10,282
NYC Department of Housing Preservation & Development		10,00+

Willdan Energy Solutions	Energy Services Provider
Engie Services U.S.	Energy Services Provider
Johnson Controls	Energy Services Provider
Ameresco	Energy Services Provider

1.5. Scope

The scope of work shall consist of developing, testing, and furnishing a cold climate Heat Pump product that complies with Minimum Requirements of these specifications as well as any Additional Design Targets the Vendor may wish to include for a higher score in their proposal. The intent is to use the heat pump as the primary means of heating and cooling in NYCHA's residential building apartments as well as other occupied multifamily building apartments where no PTAC sleeve currently exists. The proposed solution is intended to be capable of meeting the space heating loads for a minimum of 90% of NYCHA's residential rooms without need for supplemental heat sources, see **Exhibit 1 - Typical Site Conditions**.

Vendor shall be capable of providing up to 30 prototypes within 18 months of contract award for a test installation to demonstrate compliance with the Minimum Requirements and proposed Additional Design Targets.

1.6. Product Selection Criteria

In order to be considered, Vendor must demonstrate, through their RFP response, that the proposed product meets all the requirements described in the **Minimum Requirements section.** Qualified products will then be scored by the Evaluation Committee consisting of representatives from NYPA, NYCHA and NYSERDA based on the scoring criteria described in Section 2.3 and in **Attachment D – Additional Design Target Sheet**. NYPA may award up to two contracts to the proposals, that meet the Minimum Requirements and score the highest in the Additional Design Targets section.

1.7. Purchase Agreement Award and Timeline

NYPA may award up to two (2) purchase agreement(s) with the winning Vendor(s). Each purchase agreement shall have a minimum of 10,000 and a maximum of 12,000 units. Alternatively, if one proposal stands above the rest, NYPA may choose to award one purchase order agreement to a single winning Vendor with a minimum of 20,000 and a maximum of 24,000 units. The awardee(s) will then have up to the allotted time listed below to produce the required units. Upon final acceptance, these units will be installed at six NYCHA developments to serve as the primary heating system for approximately 7,900 apartments.

Development Phase (up to 18 months)

Upon receipt of award, Vendor will be given up to 18 months to develop the proposed product and produce units for testing and demonstration. NYPA will purchase up to 30 units for testing and demonstration purposes. Vendor shall follow the requirements specified in Section 2.2. to provide an overall schedule of major tasks and deliverables.

Demonstration Phase (8-12 months)

The demonstration phase is expected to last one full heating season, from October through May. The demonstration units will be installed at NYCHA designated apartments by a contractor procured by NYCHA under the supervision of the Vendor or their local representative. Upon completion of installation and approval of the Vendor or their representative, the demonstration units will be commissioned by a third-party commissioning agent and a Measurement and Verification study will be conducted over the course of the demonstration phase.

Demonstration Assessment (up to 4 months)

At the end of one heating season, as defined by the period of October 1st to May 31st, or at a time prior to May 31st when enough data has been collected to properly assess the performance of the demonstration units, a third-party consultant will submit a Measurement and Verification report to NYPA, NYCHA and NYSERDA. The report will provide a comprehensive evaluation of the units and their performance relative to the Vendor's RFP proposal. In the event that the demonstration units fail to meet the Minimum Requirements and/or the Vendor's proposed design targets, the Vendor shall have up to three (3) months to cure the deficiencies and demonstrate conformity with proposed specifications. If the Vendor is unable to cure the deficiencies after this period, NYPA reserves the right to terminate the contract at that point with no penalties.

Full Purchase Order

Upon final acceptance of the demonstration units by NYPA, the program will move into the Full Purchase Order Phase, where the remainder of the agreed number of units will be procured. NYPA also reserves the right to procure more units at the contract price. Additionally, the full purchase order agreement shall include a price match guarantee, whereby other entities not in privity to the agreement can purchase units from the Vendor at the same price offered to NYPA.

1.8. Submittals

Vendor shall submit the following documents for consideration and subsequent evaluation:

a. **Attachment A - Submission Checklist** – It provides an overview of the Vendor Qualification, Minimum Design Requirements and Additional Design Targets.

b. **Attachment B - Vendor Qualification Form** – Vendor shall provide all the requested information on this form.

c. **Attachment C - Product Details Sheet** – Vendor shall provide all requested data for its proposed product. During the Demonstration Phase, the testing units will be benchmarked against the provided data. Alternatively, Vendor can choose to use its own form to provide the requested data.

d. **Attachment D - Additional Design Targets Sheet** – Vendor shall try its best to complete as many items as possible on this sheet. Any incomplete items will have zero point. Vendor is encouraged to attach separate sheets, drawings or supporting documents to better describe design approaches or technical

solutions. Same as Product Details Sheet, the testing units will be benchmarked against the provided data on this sheet.

1.9. Reference Standard

UL Standard 60335-2-40

UL Standard 484

EPA 608

AHRI Standard 350

1.10. Quality Assurance

Vendor shall meet the following quality assurance requirements for consideration and subsequent evaluation.

a. Products shall be manufactured in ISO 9001 registered facilities.

b. Vendor’s certified quality assurance and test check lists at time of shipment.

c. In the event that more than 10% of the ordered quantities failed during the installation period or first year of operation, NYPA reserves the right to request the Vendor to replace all units (with new including material and labor), at no cost to the owner. If temporary cooling/heating is needed due to the failure of the units, Vendor shall provide the required equipment and labor at no additional cost.

1.11. Delivery, Storage and Payment

Storage of Material

Vendor shall provide all specified equipment as authorized by NYPA. Equipment constructed or received prior to authorization, shall be stored at the Vendor’s warehouse and at the Vendor’s expense until the material is delivered and accepted by NYPA and NYCHA.

Delivery Schedule

NYPA may require equipment to be delivered as a single shipment or in regular (typically weekly) installments to the designed project site. The Vendor shall be notified in writing of the specific quantities of equipment to be delivered. The Vendor shall coordinate all deliveries with NYPA's and NYCHA’s designated representatives.

Notice of Shipment

All equipment shall be shipped free on board (FOB) destination of delivery to the locations designated by NYPA and NYCHA. The Vendor shall give the NYPA and NYCHA designated representatives at least forty-eight (48) hours’ notice of the anticipated hour of delivery. NYPA and NYCHA shall not be obligated to accept equipment not delivered at the appointed time. Incomplete deliveries or drop shipments from Vendor shall not be accepted.

Payment

The Vendor shall submit an invoice for payment after equipment is accepted by the NYPA and NYCHA representative for the amount delivered. The Vendor shall include a copy of the signed packing slip by NYPA or NYCHA designated representative for all invoices. Invoices received without the signed packing slip shall be rejected.

1.12. Warranty

Vendor shall warrant its equipment to be free of defects in material and workmanship under normal use, service, and maintenance for the periods listed below. Any repaired or replaced component or part shall be warranted for the remainder of the original limited warranty period or thirty (30) days after shipment of replacement part, whichever is longer.

Parts – For a period of five (5) years beginning on the date of installation acceptance by NYPA and NYCHA representatives, and verified by an installer's invoice or proof of purchase. Vendor shall supply, either new, or like kind replacement Parts. "Parts" are defined as integral components of unit's condenser, evaporator or refrigerant branch boxes.

Compressors – For a period of seven (7) years beginning on the date of installation acceptance by the NYPA and NYCHA representatives and verified by an installer's invoice or proof of purchase, Vendor shall supply, either new, or like kind compressor(s).

2. Product

2.1. Vendor Qualification

Proposing firms shall at a minimum have the following qualifications. Vendors shall provide written narrative, demonstrating such experience in **Attachment B - Vendor Qualification Form**.

a. Provide an Organization Chart showing key members who will be responsible for delivering the project, including all titles and roles.

b. Provide resumes for key project members, including but not limited to the Project Manager and any other staff responsible for delivering key elements of the product.

c. Describe Vendor's experience in fabricating prototypes of heating and cooling equipment that have been tested to meet national efficiency standards.

d. Provide evidence that Vendor has its own engineering division that has performed both factory and field acceptance testing; prepared record documentation; done quality assurance of the work; and completed associated engineering tasks.

e. Provide narrative description, referencing past and currently available similar products, demonstrating Vendor's experience designing heat pumps for cold climate areas.

f. Demonstrate financial resources sufficient to produce prototypes and production heat pumps for the quantities referenced in this RFP.

g. Please describe:

• Your access to variable speed compressors, the type of compressor and speed control, and experience using them.

• Your approach for defrost and defrost control.

• Your experience with refrigerants other than R410a.

• Your vision for this product beyond this procurement.

The Vendor shall provide one Project Manager to be the primary interface between the Vendor, NYPA and NYCHA for the duration of the project. The Vendor's Project Manager shall be responsible to:

- Plan, structure, and balance the workload.
- Coordinate all skills, associated trades, laboratory testing, manufacturing and supply chain needs to maintain approved schedules.
- Ensure all work complies with this specification and related procedures.
- Coordinate the roll up of all drawings and cost estimates.
- Interact with the NYPA Project Manager on a quarterly basis to assess and report the status of the project, review estimates, conduct design/documentation and submittal reviews and assist in equipment testing and startup.

The Vendor shall provide one Installation Technician on an as needed basis to be the primary interface among the Vendor, NYPA and NYCHA during testing period. The Vendor's Installation Technician shall be responsible to:

- Supervise the installation of all test units.
- Troubleshoot and resolve any field related problems.
- Ensure all supplied test units are fully functional.
- Complete all required NYCHA staff training.

2.2. Minimum Requirements

Each item specified in this section must be demonstrated within the proposal to the satisfaction of the RFP review committee to be awarded an agreement.

a. Retail price shall not exceed $3,000 per unit.

b. Run at 115 VAC +/-10%, single phase, 60 Hz, and plug into a standard 3-prong outlet, 15 amp.

c. Shall operate down to 0 °F or below and shall publish capacity and efficiency at the lowest temperature at which it is approved to operate.

d. Shall not use backup electric resistance heat for space heating. (See Additional Design Targets below for use of electric resistance for purposes other than space heating.)

e. Condensate pump (if needed) shall be internal to the unit. Drainage for both condensate in summer and defrost meltwater in winter shall not require a plumber for installation. In Vendor's response to this section, describe the approach to water disposal to avoid risk of freezing or clogging, and to avoid dripping or freezing on other units below or on the building façade. Describe any prior testing of this approach.

f. All refrigerant piping shall be permanently and hermetically connected within the unit to minimize risk of refrigerant leaks.

g. Shall not require drilling through exterior wall. Describe how the unit will be installed without exterior core drilling.

h. Heating Capacity of 9,000 Btu/hr (+ 0 Btu/hr / - 700 Btu/hr, in other words 8,300-9,000 Btu/hr) at 17 °F outdoor temperature and 70 °F indoor temperature. The cooling capacity at 95 °F shall be equal to or greater than its rated heating capacity at 17 °F. This cooling capacity requirement also applies to the smaller unit if it's proposed.

i. Dimensional constraints: the unit shall have a form factor that will minimize the obstruction to the window in which the PWHP will be mounted, as well as minimize the protrusion to the indoor space. Acceptable form factors include but are not limited to "L shaped" units with the main unit under the window, "saddle" shape with part of the unit inside the apartment and part of the unit outside, and rectangular form factors like more typical window air-conditioner units. For all form factors, the part of the unit inside the apartment must not exceed the following dimensions:

    - Length of the unit below the windowsill: 19"
    - Height from the windowsill to the top of the unit: 16"
    - Width of the unit: 26"
    - Depth: The proposed unit shall not protrude into the living space more than 12" from the interior windowsill edge.

    For "L shaped" and "saddle" shape units, the unit shall not protrude more than 20" from the outdoor wall on the outside of the building.

    For rectangular units, the full depth of the unit must not exceed 29" including the parts both inside and outside of the apartment.

    For saddle shaped units or units that hang on the interior wall, allow for sill heights as low as 20".

    Additional points will be awarded to proposed form factors that minimize window light obstruction. See point-scoring under Additional Design Targets Section.

j. Maximum time to install a unit: 2 hours. Provide description of installation process indicating approximate staff hours for each step described.

k. The proposed product shall have a variable speed compressor.

l. Minimum efficiency shall be 1.85 COP at 17 °F outdoor temperature and 70 °F indoor temperature in heating mode, at rated capacity.

m. Vendor shall deliver 30 units within 18 months upon receipt of purchase order. See Additional Design Targets below for evaluation of proposals for delivery on an accelerated timeline. These 30 units shall be certified to UL safety standards, including but not limited to UL Standard 484.

n. Should be permanently installed and airtight around its perimeter without any degradation to the overall R-value or infiltration of the building envelope. That is, the unit shall not serve as a thermal bridge to the outdoors.

   Installation instructions and materials provided for filler panels (if needed) shall result in a professional appearance around the unit, with a finished interior (smooth white), and air-sealing at the junction between the unit and the window frame/sill/sash. The filler panel assembly shall have a maximum U-value of 0.3. Filler panel materials, sealing materials, and instructions shall be provided with the unit. Permanent sealing between filler panels and window frame is anticipated, and gasketed sealing between the filler panels and the heat pump is anticipated in order to allow removal for service/replacement. Traditional collapsing/flexible/corrugated wing panels are not acceptable.

   The assembly shall be considered permanent but shall allow the window heat pump to be removed easily for service or replacement. For the proposal, provide proposed installation instructions and a description of materials to be supplied with the unit.

o. Installation shall not result in an increase of more than 4.5 cfm @ 75pa as demonstrated by field test of the demonstration units.

   For heat pumps where the outdoor coil is located indoors, ensure that the outdoor coil section and any ducting/plenum between the outdoor coil and outdoors is fully air sealed to prevent air infiltration into the room.

p. 50 dB(A) maximum indoor sound level (A-weighted sound power) on low fan setting in heating mode per AHRI Standard 350.

q. Portable units, such as units on wheels or that rest loosely on the floor, are not acceptable.

r. Shall not require an installer with EPA 608 certification for installation.

s. Controls shall meet the requirements of the New York State Energy Conservation Construction Code and the New York City Energy Conservation Construction Code. These include but are not limited to:

- Off-hour controls for systems exceeding 6,800 Btu/hr, down to 55ºF in heating and up to 85˚F in cooling mode. Controls shall allow NYCHA to set highest temperature limits in heating mode and lowest temperature limits in cooling mode.
- Minimum 5-degree dead band between heating and cooling.
- When transitioning from setback to occupied temperature setpoint, unit shall not default to maximum power draw but rather operate at the highest power draw at which it can still operate at its highest heating COP. Additional points will be awarded to units equipped with "Advanced Temperature Controls". Please see Section 2.3.o. for details.

t. Provide an overall schedule of the project and timing of major tasks and deliverables, including but not limited to 100% design (cabinet size, compressor selection, heat exchanger sizes such as height/width/rows, type of orifice such as EXV/TXV/capillary, defrost approach), testing, documentation (installation instructions), prototype delivery. Presentations on progress will be made on a quarterly basis.

2.3. Additional Design Targets

The following targets are highly desired but not required. Proposed products will be scored, and the highest score will be a major factor in the selection of a heat pump vendor. Note that different targets carry different possible point scores, and so are weighted differently. Scores will be tabulated by a technical evaluation panel, on the basis of information provided, unless specific scoring criteria are provided. Please provide information about proposed design approach and completed test results, etc. wherever possible. Vendors who propose Additional Design Targets in this section are expected to deliver these targets in the product for final acceptance by NYPA.

a. Shape that minimizes window light obstruction. For example, an "L-shaped" or "saddle" configuration that would rest on the windowsill. The average window height is 52". Please provide height requirements for proper installation. 1 point for every two inches less than 16"

   Up to 8 points.

b. Provide an additional model with nominal rated capacity of between 4,500 – 6,000 btu/h at 17°F outdoor temperature and 70°F indoor temperature. Please use product detail sheet to provide product information.

   15 points.

c. Describe proposed approach to insulation and proposed approach to minimize conductive losses through entire assembly to no more than 0.3 Btu/hr/SF/°F (5 points). Provide Therm modeling, or equivalent modeling, to demonstrate compliance with this maximum conductive target. Please use ANSI/NFRC 100 to determine indoor/outdoor temperature test conditions. (up to 10 points).

   Up to 15 points.

d. Provide details on proposed air-sealing within the unit and air-sealing between window and unit, including materials list and installation instructions (5 points). Commit to perform field testing of window assembly including installed unit to demonstrate no additional air leakage from baseline measurement. (10 points).

   Up to 15 Points.

e. Minimize or avoid use of electric resistance heat for purposes such as preventing formation of ice in the base pan when running in defrost mode at low outdoor air temperatures, compressor crankcase heat, etc. Up to 10 points for description on approaches to avoid use of electric resistance heat and proposed testing to prove successful avoidance of electric resistance heat OR up to 5 points for description on proposed controls that will minimize the use of such electric resistance heat.

   Up to 10 points.

f. During demonstration phase, Vendor shall provide testing results to demonstrate indoor sound level at low fan setting in heating mode to be quieter than 50 dB(A) (A-weighted sound power) per AHRI Standard 350.

   40-49 dB (A) – 1 point

   30-39 dB (A) – 2 points

   <30 dB (A) - 3 points

   Up to 3 points.

g. R-410A is an acceptable refrigerant (0 points). The use of refrigerants with a lower global warming potential (GWP) is encouraged: R-32 (4 points); R-744 (CO^2) (8 points); other refrigerants up to 8 points based on GWP, toxicity, flammability, and other chemical characteristics.

   Up to 8 points.

h. Include wireless BACnet-compatible module for building management system (BMS) integration with no external proprietary cloud software required. Describe prior experience with BACnet - up to 10 points. Demonstrate wireless BACnet compatible module in existing products - up to 10 points. Provide wireless-mesh-network capability for each unit – up to 10 points.

   Up to 30 points.

i. Estimated useful life of at least 20 years, as indirectly indicated by compressor warranty: 5 points for 8-10 years compressor warranty. 10 points for over 10 years compressor warranty.

   Up to 10 points.

j. Ease of service, particularly for routine maintenance such as outdoor coil cleaning, or removability from the window despite semi-permanent installation, without disturbing insulation/air-sealing. Describe your approach.

   Up to 10 points.

k. Describe your experience with designing and manufacturing high-efficiency heat pump and air conditioning products (e.g., efficiency rating examples of existing products, certifications such as ENERGY STAR, NEEP ccASHP, CEE, etc.). Describe your proposed approach to maximizing the efficiency of the proposed heat pump. List your target COP at 17 ºF Up to 5 points for experience as demonstrated by existing products. Additional 2 points (to a maximum of 10 points) for each 0.1 COP above 1.85 COP at 17 ºF with evidence to show how it will be achieved (heat exchanger size goals, compressor efficiency, etc.)

   Up to 15 Points

l. Accelerated delivery schedule of 30 prototype units:

   - 9 months from issuance of purchase order – 15 points;
   - 12 months from issuance of purchase order – 10 points;
   - 15 months from issuance of purchase order – 5 points.

   Delivery of production units is expected within 12 weeks of order, at any time after 6 months following delivery of first prototypes. Submit a description of milestones planned to meet the proposed schedule.

   Up to 15 points.

m. Provide lowest operating temperature for the proposed unit. During demonstration phase, Vendor shall provide lab testing results to show capacity and efficiency data at the approved lowest operating temperature. 1 point for every 3 ºF below 17 ºF.

   Up to 10 points.

n. The evaluation committee will conduct a life cycle cost analysis based on the information provided in the bid proposal.

	Heating Mode				Cooling Mode	
(Outdoor Dry Bulb Temp)	@ Lowest Operating Temp	0 ºF	17 ºF	47 ºF	82 ºF	95 ºF
Minimum Capacity (btu/hr)						
Input Power at Min. Capacity (kw)						
COP at Min. Capacity						
Intermediate Capacity (btu/hr)						
Input Power at Intermediate Capacity (kw)						
COP at Intermediate Capacity						
Maximum Capacity (btu/hr)						
Input Power at Max. Capacity (kw)						
COP at Max. Capacity						

   Up to 10 points

o. Provide advanced temperature controls when transitioning from setback to occupied temperature setpoint. The unit with advanced temperature control shall be able to optimize compressor operating speeds based on indoor, outdoor temperature, and temperature setpoints so as to minimize energy consumption.

   Up to 10 points

Exhibit 1

Existing Window Dimensions in NYCHA Buildings

The following information is provided for reference only.

Double hung window height (inches) in a sample of NYCHA buildings

Max	72.0
Min	38.6
Average	55.7

Double hung window width (inches) in a sample of NYCHA buildings

Max	57.3
Min	24.4
Average	40.0

Sill height (inches) in a sample of NYCHA buildings

Max	45.1
Min	20.5
Average	30.8

Exhibit 2

Heat Loss Reference

We examined a large number of rooms randomly selected from different NYCHA properties.

Rooms are either bedrooms or are living rooms, and include the heat loss of adjacent spaces (hallways, kitchens, bathrooms, etc.).

A summary of the heat loss calculations:

	Stories	Building Area (SF)	Units	Room Area[1]	Room Heat Loss (Btu/hr)[2]
Maximum	21	227,100	226	344	10,300
Minimum	3	1,110	1	37	1,200
Average	8	66,785	72	195	6,000

Notes: 1. Room Area includes adjacent areas such as halls, bathrooms, or kitchens.
2. The 10,300 Btu/hr maximum is an outlier, a living room with unusually large windows. NYCHA does not seek a window heat pump that will meet the heat loss of all of its rooms, but has chosen a capacity, 9,000 Btu/hr, that will meet the full heat loss of the vast majority of its rooms.

Assumptions:

Assumptions are intentionally conservative (high window U-factor, low wall R-value, etc.), in order to ensure that heat pump capacity is sufficient without backup heat.

		Notes
Window U-factor	0.87	Metal frame, double pane (or single pane with storm window)
Wall R-value	4	Buildings generally do not have insulated walls
Roof R-value	30	Buildings generally have insulated roofs
Infiltration (ACH)	0.9	Natural air changes per hour
Winter design temp.	15	NYC winter design temperature, per ACCA Manual J and Manual N
Indoor design temp.	72	Conservative estimate, higher than required by code

Exhibit 3

Clean Heat for All Expression of Interest

Expression of Interest in the Clean Heat For All Challenge
A Packaged Heat Pump Solution

The purpose of this document is to collect and convey market demand for a new line of cold climate heat pump products to enable rapid, low-cost electrification of heating and cooling in existing buildings.

Background

With states and localities adopting ambitious emissions reductions and timelines to address the climate crisis, the lack of an efficient and affordable electrification solution for heating in cold climates remains one of the primary hurdles, especially for tall residential buildings. Building owners and portfolio operators seeking to eliminate fossil fuels from their buildings, for example to comply with new legislation, have focused attention on air source heat pumps (ASHPs) given their demonstrated energy efficiency and reliability. Advances in heat pump technology over the past decade have produced cold climate heat pumps that operate at temperatures as low as -14°F while maintaining coefficients of performance above 1.

As multifamily buildings across the US consider converting to ASHPs for heating and cooling, many will hesitate to do so because of the high cost and major disruption to residents associated with installing variable refrigerant flow or split systems. The need to penetrate the exterior walls to run refrigerant pipes and condensate drains, the additional cost of soffits for the interior pipes runs, the exterior space required for outdoor units, and the requirement of 208 VAC (volts alternating current) operation instead of the more common 110 VAC are just a few of the many barriers to conversion.

Add to these the likely future shortage of capable Heating, Ventilation and Air Conditioning (HVAC) technicians and the potential for refrigerant leaks and their corresponding greenhouse gas emissions harm, and the problem becomes very challenging to address cost-effectively with currently available products.

While improved Packaged Terminal Heat Pump (PTHP) technology is promising for buildings with existing through-wall sleeves, many more buildings do not have this option and will face prohibitively high barriers to installing variable refrigerant flow or split heat pump systems.

A third option is needed to ensure that all buildings can afford a heat pump conversion. The proposed solution is a standalone, unitary Packaged Window Heat Pump (PWHP) that can be installed in occupied apartments with limited resident disruption. Such a product would not require extensive refrigerant piping, major electrical upgrades, or skilled labor. To accelerate the development of this new type of solution, the New York City Housing Authority (NYCHA), the New York Power Authority (NYPA) and the New York State Energy and Research Authority (NYSERDA are challenging the HVAC industry to design, test and commercialize a new product that will meet the specifications below.

Market Opportunity

Initial Purchase Order: Under an initial procurement, to be awarded in 2022, NYCHA, NYPA and NYSERDA will purchase 24,000 units that meet the specifications below. These units will be installed at six NYCHA developments to serve as the primary heating system for approximately 7,900 apartments. Looking ahead, NYCHA estimates a need for approximately 156,000 units over the next 5-10 years in its efforts to meet New York City and State mandated emissions targets.

A Broader National Market: Beyond NYCHA, New York City and New York State offer large markets in both low- to moderate-income and market-rate housing with several million multifamily units, as well as potentially in commercial

buildings. The solution specified below will also be applicable to buildings located in several climate zones that cover the Northeast and most of the continental U.S.

Solution Specifications

The specifications below are for a unitary PWHP solution that can meet the demand outlined in the Market Opportunity section above. Requirements for the envisioned PWHP solution are:

- Plug into a standard three-prong household wall socket (e.g., 115VAC, single phase, 60Hz socket on a 15amp fuse).
- Does not require a plumber or other skilled labor for installation.
- Provide adequate heating at the coldest anticipated outdoor air temperatures for buildings located in climate zones 4, 5 and 6 that cover the vast majority of the continental U.S.
- Installation does not require drilling through walls.
- Installation can be done by property management staff within a few hours.
- Can be installed through a standard apartment window opening with no degradation to the existing thermal envelope.
- A form factor that is aesthetically pleasing and is not cumbersome or intrusive in tenant spaces.
- Operate quietly enough to not disrupt tenants.

Sign on Now

We are interested in a PWHP solution for multifamily buildings in our portfolio that meets criteria listed in the Solution Specifications section above.

Organization name: JERSEY CITY HOUSING AUTHORITY

Number of buildings in portfolio: 74 BLDGS.

Number of dwelling units in portfolio: 1,634 D.U.

Reason this is important to our organization: WE ARE LOOKING TO REDUCE THE JCHA'S CARBON FOOTPRINT THAT ALIGNS W/ DOE'S BBC GOAL.

Authorized signatory: Stephen F. Cea Date: 12/2/2024

Name of signatory: Stephen F. Cea

Title of signatory: ~~Director of Development~~ In-House Counsel

SCEA@JCHA.US

Disclaimer

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Expression of Interest in the Clean Heat For All Challenge
A Packaged Heat Pump Solution

The purpose of this document is to collect and convey market demand for a new line of cold climate heat pump products to enable rapid, low-cost electrification of heating and cooling in existing buildings.

Background

With states and localities adopting ambitious emissions reductions and timelines to address the climate crisis, the lack of an efficient and affordable electrification solution for heating in cold climates remains one of the primary hurdles, especially for tall residential buildings. Building owners and portfolio operators seeking to eliminate fossil fuels from their buildings, for example to comply with new legislation, have focused attention on air source heat pumps (ASHPs) given their demonstrated energy efficiency and reliability. Advances in heat pump technology over the past decade have produced cold climate heat pumps that operate at temperatures as low as -14°F while maintaining coefficients of performance above 1.

As multifamily buildings across the US consider converting to ASHPs for heating and cooling, many will hesitate to do so because of the high cost and major disruption to residents associated with installing variable refrigerant flow or split systems. The need to penetrate the exterior walls to run refrigerant pipes and condensate drains, the additional cost of soffits for the interior pipes runs, the exterior space required for outdoor units, and the requirement of 208 VAC (volts alternating current) operation instead of the more common 110 VAC are just a few of the many barriers to conversion.

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We are interested in a PWHP solution for multifamily buildings in our portfolio that meets criteria listed in the Solution Specifications section above.

Organization name: King County Housing Authority

Number of buildings in portfolio: 700+

Number of dwelling units in portfolio: 12,000+

Reason this is important to our organization: Energy-efficieint and low-maintenance multifamily heating and cooling options are a growing need in our portfolio and will be essential to the health and well-being of residents in the future.

Authorized signatory: Daniel R Watson Date: 12/1/2021

Name of signatory: Daniel Watson

Title of signatory: Deputy Director - Chief Development Officer

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Sign on Now

We are interested in a PWHP solution for multifamily buildings in our portfolio that meets criteria listed in the Solution Specifications section above.

Organization name: Boston Housing Authority

Number of buildings in portfolio: 541

Number of dwelling units in portfolio: 10,282

Reason this is important to our organization: We see great potential for PWHPs to assist in achieving near and long term GHG reduction goals (50% by 2030, 100% by 2050) in a cost effective manner.

Authorized signatory:  Date: 12/2/2021

Name of signatory: Kathryn Bennett

Title of signatory: Administrator and CEO

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Expression of Interest in the Clean Heat For All Challenge
A Packaged Heat Pump Solution

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Sign on Now

We are interested in a PWHP solution for multifamily buildings in our portfolio that meets criteria listed in the Solution Specifications section above.

Organization name: ENGIE Services U.S. Inc.

Number of buildings in portfolio: "Not yet identified"

Number of dwelling units in portfolio: "Not yet identified"

Reason this is important to our organization: Although we do not own a portfolio of multifamily buildings we do infrastructure improvements within the multi-family housing market. We see this as a potentially viable solution for our multifamily housing customers to achieve electrification with this solution. We would consider this solution as we work towards electrification with our current and future customers."

Authorized signatory: Alekso Stankoski Date: December 9, 2021

Name of signatory: Alekso Stankoski

Title of signatory: Vice President, Business Development

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Expression of Interest in the Clean Heat For All Challenge
A Packaged Heat Pump Solution

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Background

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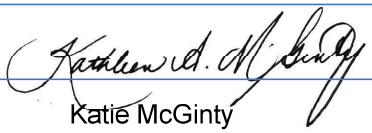
Sign on Now

We are interested in utilizing the PWHP solution for multifamily buildings application in our ESCO Electrification and Decarbonization projects that meets criteria listed in the Solution Specifications section above.

Organization name: Johnson Controls

Number of Units: We have roughly 5,000 units in our first IDIQ with NYCHA and several other large PHAs that are looking for the same solution. Potential could be over 10,000 Units per year.

Reason this is important to our organization: To help multi family building performance with technology that is capable of delivering significant energy savings, cost effective solutions, resident comfort and a corresponding drop in CO2 emission, while also ensuring that outcomes will help the planet . Re-imagine a Fossil Fuel Free Living Space.

Authorized signatory:  Date: 12/07/2021

Name of signatory: Katie McGinty

Title of signatory: VP & Chief Sustainability, External & Government Relations Officer

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Expression of Interest in the Clean Heat for All Challenge

Creating a Packaged Heat Pump Solution

The purpose of this document is to collect and convey market demand for a new line of cold climate heat pump products to enable rapid, low-cost electrification of heating and cooling in existing buildings.

Background

With states and localities adopting ambitious emissions reductions and timelines to address the climate crisis, the lack of an efficient and affordable electrification solution for heating in cold climates remains one of the primary hurdles, especially for tall residential buildings. Building owners and portfolio operators seeking to eliminate fossil fuels from their buildings, for example to comply with new legislation, have focused attention on air source heat pumps (ASHPs) given their demonstrated energy efficiency and reliability. Advances in heat pump technology over the past decade have produced cold climate heat pumps that operate at temperatures as low as -14°F while maintaining coefficients of performance above 1.

As multifamily buildings across the US and Canada consider converting to ASHPs for heating and cooling, many will hesitate to do so because of the high cost and major disruption to residents associated with installing variable refrigerant flow or split systems. The need to penetrate the exterior walls to run refrigerant pipes and condensate drains, the additional cost of soffits for the interior pipes runs, the exterior space required for outdoor units, and the requirement of 208 VAC (volts alternating current) operation instead of the more common 110 VAC are just a few of the many barriers to conversion.

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A Broader Market: Beyond NYCHA, New York City and New York State offer large markets in both low- to moderate-income and market-rate housing with several million multifamily units, as well as potentially in commercial buildings.

The solution specified below will also be applicable to buildings located in several climate zones that cover the Northeast and most of the continental U.S. and select parts of Canada.

Solution Specifications

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- Installation does not require drilling through walls.
- Installation can be done by property management staff within a few hours.
- Can be installed through a standard apartment window opening with no degradation to the existing thermal envelope.
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- Operate quietly enough to not disrupt tenants.

Sign on Now

We are interested in a PWHP solution for multifamily buildings in our portfolio that meets criteria listed in the Solution Specifications section above.

Organization name: NYC Department of Housing Preservation & Development

Number of applicable buildings in portfolio:

Number of applicable dwelling units in portfolio: *More than 10,000 privately owned dwelling units per year in multifamily buildings were preserved by HPD under the Housing New York Plan. Of these, approximately 10% replaced heating systems. As laws around fossil-fuels and cooling evolve, we expect the number of full heating system replacements and phased system replacements to rise significantly.*

Reason this is important to our organization: *Current technologies are invasive, costly, contain long refrigerant lines, and don't allow smart, phased electrification. In addition, current technologies may have high replacement costs at end-of-life that could be minimized with a modular system like this product would allow*.

Authorized signatory:  Date: 12/08/2021

Name of signatory: Jennifer Ieone

Title of signatory: Chief Sustainability Officer

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Expression of Interest in the Clean Heat For All Challenge
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- Installation can be done by property management staff within a few hours.
- Can be installed through a standard apartment window opening with no degradation to the existing thermal envelope.
- A form factor that is aesthetically pleasing and is not cumbersome or intrusive in tenant spaces.
- Operate quietly enough to not disrupt tenants.

Sign on Now

We are interested in a PWHP solution for multifamily buildings in our portfolio that meets criteria listed in the Solution Specifications section above.

Organization name: Willdan Energy Solutions, Inc.

Number of buildings in portfolio: Engineering Consultant recommending energy upgrades to Multifamily, schools, and as built environments

Number of dwelling units in portfolio:

Reason this is important to our organization:

This solution would assist our customers with upgrades that would be electric and allow ready adoption.

Authorized signatory:  Date: 12-7-2021

Name of signatory: Frank J. Evans

Title of signatory: Senior Vice President

Disclaimer

By signing this Pledge, you grant the New York State Energy and Research Authority (NYSERDA, the New York Power Authority (NYPA) and the New York City Housing Authority (NYCHA) permission to publicly share the information provided above for purposes including but not limited to sharing with manufacturers as well as other marketing efforts and social media posts.

Expression of Interest in the Clean Heat For All Challenge
A Packaged Heat Pump Solution

The purpose of this document is to collect and convey market demand for a new line of cold climate heat pump products to enable rapid, low-cost electrification of heating and cooling in existing buildings.

Background

With states and localities adopting ambitious emissions reductions and timelines to address the climate crisis, the lack of an efficient and affordable electrification solution for heating in cold climates remains one of the primary hurdles, especially for tall residential buildings. Building owners and portfolio operators seeking to eliminate fossil fuels from their buildings, for example to comply with new legislation, have focused attention on air source heat pumps (ASHPs) given their demonstrated energy efficiency and reliability. Advances in heat pump technology over the past decade have produced cold climate heat pumps that operate at temperatures as low as -14°F while maintaining coefficients of performance above 1.

As multifamily buildings across the US consider converting to ASHPs for heating and cooling, many will hesitate to do so because of the high cost and major disruption to residents associated with installing variable refrigerant flow or split systems. The need to penetrate the exterior walls to run refrigerant pipes and condensate drains, the additional cost of soffits for the interior pipes runs, the exterior space required for outdoor units, and the requirement of 208 VAC (volts alternating current) operation instead of the more common 110 VAC are just a few of the many barriers to conversion.

Add to these the likely future shortage of capable Heating, Ventilation and Air Conditioning (HVAC) technicians and the potential for refrigerant leaks and their corresponding greenhouse gas emissions harm, and the problem becomes very challenging to address cost-effectively with currently available products.

While improved Packaged Terminal Heat Pump (PTHP) technology is promising for buildings with existing through-wall sleeves, many more buildings do not have this option and will face prohibitively high barriers to installing variable refrigerant flow or split heat pump systems.

A third option is needed to ensure that all buildings can afford a heat pump conversion. The proposed solution is a standalone, unitary Packaged Window Heat Pump (PWHP) that can be installed in occupied apartments with limited resident disruption. Such a product would not require extensive refrigerant piping, major electrical upgrades, or skilled labor. To accelerate the development of this new type of solution, the New York City Housing Authority (NYCHA), the New York Power Authority (NYPA) and the New York State Energy and Research Authority (NYSERDA are challenging the HVAC industry to design, test and commercialize a new product that will meet the specifications below.

Market Opportunity

Initial Purchase Order: Under an initial procurement, to be awarded in 2022, NYCHA, NYPA and NYSERDA will purchase 24,000 units that meet the specifications below. These units will be installed at six NYCHA developments to serve as the primary heating system for approximately 7,900 apartments. Looking ahead, NYCHA estimates a need for approximately 156,000 units over the next 5-10 years in its efforts to meet New York City and State mandated emissions targets.

A Broader National Market: Beyond NYCHA, New York City and New York State offer large markets in both low- to moderate-income and market-rate housing with several million multifamily units, as well as potentially in commercial

buildings. The solution specified below will also be applicable to buildings located in several climate zones that cover the Northeast and most of the continental U.S.

Solution Specifications

The specifications below are for a unitary PWHP solution that can meet the demand outlined in the Market Opportunity section above. Requirements for the envisioned PWHP solution are:

- Plug into a standard three-prong household wall socket (e.g., 115VAC, single phase, 60Hz socket on a 15amp fuse).
- Does not require a plumber or other skilled labor for installation.
- Provide adequate heating at the coldest anticipated outdoor air temperatures for buildings located in climate zones 4, 5 and 6 that cover the vast majority of the continental U.S.
- Installation does not require drilling through walls.
- Installation can be done by property management staff within a few hours.
- Can be installed through a standard apartment window opening with no degradation to the existing thermal envelope.
- A form factor that is aesthetically pleasing and is not cumbersome or intrusive in tenant spaces.
- Operate quietly enough to not disrupt tenants.

As a leading multifamily service provider, Ameresco appreciates the aim of the Challenge to accelerate the development of a new type of efficient and affordable heat pump solution. We also believe in this type of competition, having staff that worked alongside NYPA, NYSERDA and NYCHA on similar competitions, notably 20 years ago on the super-efficient apartment-sized refrigerator program which succeeded in bringing a unit to market that beat the efficiency standard established by the Department of Energy (DOE) with tens of thousand of installations. We will watch this Challenge with the interest of benefiting our customers.

Authorized signatory: Peter Christakis Date: 12/15/2021

Name of signatory: Peter N Christakis SVP

Title of signatory: Senior Vice President

Disclaimer

By signing this Pledge, you grant the New York State Energy and Research Authority (NYSERDA, the New York Power Authority (NYPA) and the New York City Housing Authority (NYCHA) permission to publicly share the information provided above for purposes including but not limited to sharing with manufacturers as well as other marketing efforts and social media posts.

Attachment A

Submission Checklist

Cold Climate Packaged Heat Pump Submission Checklist

This checklist provides an overview of the Minimum Design Requirements and Additional Design Targets. All proposed solutions must achieve compliance with the mandatory design requirements in order to be considered for further evaluation. Eligible solutions will then be scored based on the performance detailed in Additional Design Targets section.

	Vendor shall submit the following documents	
☐	**Attachment A - Submission Checklist**	
☐	**Attachment B - Vendor Qualification Form**	
☐	**Attachment C - Product Details Sheet**	
☐	**Attachment D - Additional Design Targets Sheet**	

2.2 Minimum Design Requirements

	Each item specified in this section must be demonstrated within the proposal to the satisfaction of the RFP review committee to be awarded an agreement. Use "Attachment A - Product Details" for detailed explanation of Minimum Requirements where Applicable.	Please provide explanation, if you circle "No" or "Other"
a.	Retail price shall not exceed $3,000 per unit.	Yes / No / Other
b.	Run at 115 VAC +/-10%, single phase, 60 Hz, and plug into a standard 3-prong outlet, 15 amp.	Yes / No / Other
c.	Shall operate down to 0 °F or below and shall publish capacity and efficiency at the lowest temperature to which it is approved to operate.	Yes / No / Other
d.	Shall not use backup electric resistance heat for space heating. (See Additional Design Targets below for use of electric resistance for purposes other than space heating.)	Yes / No / Other
e.	Condensate pump (if needed) shall be internal to the unit. Drainage for both condensate in summer and defrost meltwater in winter shall not require a plumber for installation. In Vendor's response to this section, describe the approach to water disposal to avoid risk of freezing or clogging, and to avoid dripping or freezing on other units below or on the building façade. Describe any prior testing of this approach.	Yes / No / Other
f.	All refrigerant piping shall be permanently and hermetically connected within the unit to minimize risk of refrigerant leaks.	Yes / No / Other
g.	Shall not require drilling through exterior wall. Please describe how the unit will be installed without drilling through exterior walls.	Yes / No / Other

h.	Capacity of 9,000 Btu/hr (+0 / -700 Btu/hr, in other words 8,300-9,000 Btu/hr) at 17 °F outdoor temperature and 70 °F indoor temperature. The cooling capacity at 95 °F shall be equal to or greater than its rated heating capacity at 17 °F. This cooling capacity requirement also applies to the smaller unit if it's proposed.	Yes / No / Other
i.	Dimensional constraints: the unit shall have a form factor that will minimize the obstruction to the window in which the PWHP will be mounted, as well as minimize the protrusion to the indoor space. Acceptable form factors include but are not limited to "L shaped" units with the main unit under the window, "saddle" shape with part of the unit inside the apartment and part of the unit outside , and rectangular form factors like more typical window air-conditioner units. For all form factors, the part of the unit inside the apartment must not exceed the following dimensions: • Length of the unit below the windowsill: 19" • Height from the windowsill to the top of the unit: 16" • Width of the unit: 26" • Depth: The proposed unit shall not protrude into the living space more than 12" from the interior windowsill edge. For "L shaped" and "saddle" shape units, the unit shall not protrude more than 20" from the outdoor wall on the outside of the building. For rectangular units, the full depth of the unit must not exceed 29" including the parts both inside and outside of the apartment. For saddle shaped units or units that hang on the interior wall, allow for sill heights as low as 20". Additional points will be awarded to proposed form factors that minimize window light obstruction. See point-scoring under Additional Design Targets Section.	Yes / No / Other
j.	Maximum time to install a unit: 2 hours. Provide description of installation process indicating approximate man hours for each step described.	Yes / No / Other
k.	The proposed product shall have a variable speed compressor.	Yes / No / Other
l.	Minimum efficiency shall be 1.85 COP at 17 °F outdoor temperature and 70 °F indoor temperature in heating, at rated capacity.	Yes / No / Other
m.	Vendor shall deliver 30 units within 18 months upon receipt of purchase order. See Additional Design Targets below for evaluation of proposals for delivery on an accelerated timeline. These 30 units shall be certified to UL safety standards, including but not limited to UL Standard 484.	Yes / No / Other
n.	Should be permanently installed and airtight around its perimeter without any degradation to the overall R-value or infiltration of the building envelope. That is, the unit shall not serve as a thermal bridge to the outdoors. Installation instructions and materials provided for filler panels (if needed) shall result in a professional appearance around the unit, with a finished interior (smooth white), and air-sealing at the junction between the unit and the window frame/sill/sash. The filler panel assembly shall have a maximum U-value of 0.3. Filler panel materials, sealing materials, and instructions shall be provided with the unit. Permanent sealing between filler panels and window frame is anticipated, and gasketed sealing between the filler panels and the heat pump is anticipated in order to allow removal for service/replacement. Traditional collapsing/flexible/corrugated wing panels are not acceptable. The assembly shall be considered permanent but shall allow the window heat pump to be removed easily for service or replacement. For the proposal, provide proposed installation instructions and a description of materials to be supplied with the unit.	Yes / No / Other
o.	Installation shall not result in an increase of more than 4.5 cfm @ 75pa as demonstrated by field test of the demonstration units. For heat pumps where the outdoor coil is located indoors, ensure that the outdoor coil section and any ducting/plenum between the outdoor coil and outdoors is fully air sealed to prevent air infiltration into the room.	Yes / No / Other
p.	50 dB(A) maximum indoor sound level (A-weighted sound power) on low fan setting in heating mode per AHRI Standard 350.	Yes / No / Other
q.	Portable units, such as units on wheels or that rest loosely on the floor, are not acceptable.	Yes / No / Other
r.	Shall not require a mechanical contractor with EPA 608 certification for installation.	Yes / No / Other

s.	Controls shall meet the requirements of the New York State Energy Conservation Construction Code and the New York City Energy Conservation Construction Code. These include but are not limited to: • Off-hour controls for systems exceeding 6,800 Btu/hr, down to 55 oF in heating and up to 85°F in cooling. Controls shall allow NYCHA to set highest temperature limits in heating mode and lowest temperature limits in cooling mode. • Minimum 5-degree dead band between heating and cooling. • When transitioning from setback to occupied temperature setpoint, unit shall not default to maximum power draw but rather operate at the highest power draw at which it can still operate at its highest heating COP. Additional points will be awarded to units equipped with "Advanced Temperature Controls". Please see Section 2.3.o. for details.	Yes / No / Other
t.	Provide an overall schedule of the project and timing of major tasks and deliverables, including but not limited to 100% design (cabinet size, compressor selection, heat exchanger sizes such as height/width/rows, type of orifice such as EXV/TXV/capillary, defrost approach), testing, documentation (installation instructions), prototype delivery. Presentations on progress will be made on a quarterly basis.	Yes / No / Other

2.3 Additional Design Targets

The following targets are highly desired but not required. Proposed products will be scored, and the highest score will be a major factor in the selection of a heat pump vendor. Note that different targets carry different possible point scores, and so are weighted differently. Scores will be assigned on a sliding scale by a technical evaluation panel, on the basis of information provided, unless specific scoring criteria are provided. Please provide information about proposed design approach and completed test results, etc. wherever possible. Vendors who propose Additional Design Targets in this section are expected to deliver these targets in the product for final acceptance by NYPA.		**Points**
a.	Shape that minimizes window light obstruction. For example, an "L-shaped" or "saddle" configuration that would rest on the windowsill. The average window height is 52". Please provide height requirements for proper installation. 1 points for every two inches less than 16" in height.	Up to 8 points
b.	Provide an additional model with nominal rated capacity of between 4,500 – 6,000 btu/h at 17°F outdoor temperature and 70°F indoor temperature. Please use product detail sheet to provide product information.	15 points
c.	Describe proposed approach to insulation and proposed approach to minimize conductive losses through entire assembly to no more than 0.3 Btu/hr/SF/°F (5 points). Provide Therm modeling, or equivalent modeling, to demonstrate compliance with this maximum conductive target. Please use ANSI/NFRC 100 to determine indoor/outdoor temperature test conditions. (up to 10 points).	Up to 15 points
d.	Provide details on proposed air-sealing within the unit and air-sealing between window and unit, including materials list and installation instructions (5 points). Commit to perform field testing of window assembly including installed unit to demonstrate no additional air leakage from baseline measurement. (10 points)	Up to 15 points
e.	Minimize or avoid use of electric resistance heat for purposes such as preventing formation of ice in the base pan when running in defrost mode at low outdoor air temperatures, compressor crankcase heat, etc. Up to 10 points for description on approaches to avoid use of electric resistance heat and proposed testing to prove successful avoidance of electric resistance heat OR up to 5 points for description on proposed controls that will minimize the use of such electric resistance heat.	Up to 10 points

f.	During demonstration phase, Vendor shall provide testing results to demonstrate indoor sound level at low fan setting in heating mode to be quieter than 50 dB(A) (A-weighted sound power) per AHRI Standard 350. 1 point for 40-49 dB(A) 2 points for 30-39 dB(A) 3 points for below 30 dB(A)	Up to 3 points
g.	R-410A is an acceptable refrigerant (0 points);The use of refrigerants with a lower global warming potential (GWP) is encouraged: R-32 – 4 points; R-744 (CO_2) – 8 points; Other refrigerants up to 8 points based on GWP, toxicity, flammability, and other chemical characteristics	Up to 8 points
h.	Include wireless BACnet-compatible module for BMS integration with no external proprietary cloud software required. Describe prior experience with BACNET - up to 10 points Demonstrate wireless BACnet compatible module in existing products - up to 10 points Provide wireless-mesh-network capability for each unit – up to 10 points.	Up to 30 points
i.	Estimated useful life of at least 20 years, as indirectly indicated by compressor warranty: 5 points for 8-10 years compressor warranty 10 points for over 10 years compressor warranty	Up to 10 points
j.	Ease of service, particularly for routine maintenance such as outdoor coil cleaning, indoor filter changing, and replacement without disturbing insulation/air-sealing. Describe your approach for ease of service.	Up to 10 points
k.	Describe your experience with designing and manufacturing high-efficiency heat pump and air conditioning products (e.g., efficiency rating examples of existing products, certifications such as ENERGY STAR, NEEP ccASHP, CEE, etc.). Describe your proposed approach to maximizing the efficiency of the proposed heat pump. List your target COP at 17 ^{o}F Up to 5 points for experience as demonstrated by existing products. Additional 2 points (to a maximum of 10 points) for each 0.1 COP above 1.85 COP at 17 ^{o}F with evidence to show how it will be achieved (heat exchanger size goals, compressor efficiency, etc.).	Up to 15 points
l.	Accelerated delivery schedule of 30 prototype units 9 months from issuance of purchase order – 15 points 12 months from issuance of purchase order – 10 points 15 months from issuance of purchase order – 5 points Delivery of production units is expected within 12 weeks of order, at any time after 6 months following delivery of first prototypes. Submit a description of milestones planned in order to meet the proposed schedule.	Up to 15 points
m.	Provide lowest operating temperature for the proposed unit. During demonstration phase, Vendor shall provide lab testing results to show capacity and efficiency data at the approved lowest operating temperature. 1 point for every 3 ^{o}F below 17 ^{o}F. Up to 10 points.	Up to 10 points
n.	The evaluation committee will conduct life cycle cost analysis based on the information provided in the bid proposal.	Up to 10 points
o.	Provide advanced temperature controls when transitioning from setback to occupied temperature setpoint. The unit with advanced temperature control shall be able to optimize compressor operating speeds based on indoor, outdoor temperature, and temperature setpoints so as to minimize energy consumption.	Up to 10 points

Attachment B

Vendor Qualification Form

Vendor Qualification Form (Use additional pages as needed)

General Information

Legal Business Name: _____ Taxpayer ID #: _____

Address: _____

City, State, Zip: _____

Contact: _____ Title: _____

Email: _____ Phone: _____

Web Address: _____

Company Information

Business Type: _____ Years in Business: _____

Total number of Employees: _____ Duns & Bradstreet # (If has): _____

Experience

2.1.a. Please attach an organization Chart showing key members who will be responsible for delivering the project, including all titles and roles.

_____

_____

_____

_____

_____

_____

2.1.b. Please provide resumes for key project members, including but not limited to the Project Manager and any other staff responsible for delivering key elements of the product.

_____

_____

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_____

2.1.c. Please describe your experience in fabricating prototypes of heating and cooling equipment that have been tested to meet national efficiency standards.

_____

_____

_____

_____

_____

2.1.d. Please provide evidence that you have your own engineering division that has performed both factory and field acceptance testing; prepared record documentation; done quality assurance of the work; and completed associated engineering tasks.

2.1.e. Please provide narrative description, referencing past and currently available similar products, demonstrating your experience in designing heat pumps for cold climate areas.

2.1.f. If your company isn't registered with D&B, please demonstrate financial resources sufficient to produce prototypes and production heat pumps for the quantities referenced in this RFP.

2.1.g. Please describe:
• Your access to variable speed compressors, the type of compressor and speed control, and experience using them.
• Your approach for defrost and defrost control.
• Your experience with refrigerants other than R410a.
• Your vision for this product beyond this procurement

Attachment C

Product Details Sheet

Product Details Sheet (Attach additional pages as needed)

Please provide the following information for proposed unit

Voltage: _____ Phase: _____

Minimum Circuit Ampacity: _____

Cooling Capacity @ 95 °F: _____

Heating Capacity @ 17 °F: _____

Heating Efficiency @ 17 °F _____

Heating Capacity @ 0 °F: _____

Heating Efficiency @ 0 °F: _____

Lowest Operating Temperature: _____

Heating Capacity @ Lowest Operating Temperature: _____

Heating Efficiency @ Lowest Operating Temperature: _____

Unit Dimension (W x L x H): _____

Unit Weight (lbs) _____

Variable Speed Compressor: _____

Estimated time to deliver first 30 testing units: _____

Indoor dB(A) Level (@ High/Mid/Low/Sleep Settings): _____

Parts Warranty: _____ Compressor Warranty: _____

Please provide retail price for the proposed unit. It shall not exceed $3,000 per unit.

Condensate pump (if needed) shall be internal to the unit. Drainage for both condensate in summer and defrost meltwater in winter shall not require a plumber for installation. In Vendor's response to this section, describe the approach to water disposal to avoid risk of freezing or clogging, and to avoid dripping or freezing on other units below or on the building façade. Describe any prior testing of this approach

Please describe how the unit will be installed without exterior core drilling.

Please describe installation process indicating approximate man hours for each step described.

Please provide proposed installation instructions and a description of materials to be supplied with the unit.

Please describe design approach for controls to meet the requirements of the New York State Energy Conservation Construction Code and the New York City Energy Conservation Construction Code.

Provide an overall schedule of the project and timing of major tasks and deliverables, including but not limited to 100% design (cabinet size, compressor selection, heat exchanger sizes such as height/width/rows, type of orifice such as EXV/TXV/capillary, defrost approach), testing, documentation (installation instructions), prototype delivery. Presentations on progress will be made on a quarterly basis.

Attachment D

Additional Design Targets Sheet

Additional Design Targets (Use additional pages as needed)

a. Shape that minimizes window light obstruction. For example, an “L-shaped” or “saddle” configuration that would rest on the windowsill. The average window height is 52". Please provide height requirements for proper installation. 1 points for every two inches less than 16". Up to 8 points.

b. Provide an additional model with nominal rated capacity of between 4,500 – 6,000 btu/h at 17°F outdoor temperature and 70°F indoor temperature. Please use product detail sheet to provide product information.
15 points.

c. Describe proposed approach to insulation and proposed approach to minimize conductive losses through entire assembly to no more than 0.3 Btu/hr/SF/°F (5 points). Provide Therm modeling, or equivalent modeling, to demonstrate compliance with this maximum conductive target. Please use ANSI/NFRC 100 to determine indoor/outdoor temperature test conditions. (up to 10 points).
Up to 15 points

d. Provide details on proposed air-sealing within the unit and air-sealing between window and unit, including materials list and installation instructions (5 points). d.Commit to perform field testing of window assembly including installed unit to demonstrate no additional air leakage from baseline measurement. (10 points).
Up to 15 Points.

e. Minimize or avoid use of electric resistance heat for purposes such as preventing formation of ice in the base pan when running in defrost mode at low outdoor air temperatures, compressor crankcase heat, etc. Up to 10 points for description on approaches to avoid use of electric resistance heat and proposed testing to prove successful avoidance of electric resistance heat OR up to 5 points for description on proposed controls that will minimize the use of such electric resistance heat.
Up to 10 points.

f. During demonstration phase, Vendor shall provide testing results to demonstrate indoor sound level at low fan setting in heating mode to be quieter than 50 dB(A) (A-weighted sound power) per AHRI Standard 350.
1 point for 40-49 dB(A)
2 points for 30-39 dB(A)
3 points for below 30 dB(A)
Up to 3 points

g. R-410A is an acceptable refrigerant (0 points); The use of refrigerants with a lower global warming potential (GWP) is encouraged.
R-32 – 4 points;
R-744 (CO^2) – 8 points;
Other refrigerants will be given up to 8 points based on GWP, toxicity, flammability, and other chemical characteristics
Up to 8 points in total

h. Include wireless BACnet-compatible module for BMS integration with no external proprietary cloud software required.
Describe prior experience with BACnet - up to 10 points
Demonstrate wireless BACnet compatible module in existing products - up to 10 points
Provide wireless-mesh-network capability for each unit – up to 10 points.
Up to 30 points in total

i. Estimated useful life of at least 20 years, as indirectly indicated by compressor warranty:
5 points for 8-10 years compressor warranty
10 points for over 10 years compressor warranty
Up to 10 points in total

j. Ease of service, particularly for routine maintenance such as outdoor coil cleaning, indoor filter changing, and replacement without disturbing insulation/air-sealing. Describe your approach for ease of service.
Up to 10 points

k. Describe your experience with designing and manufacturing high-efficiency heat pump and air conditioning products (e.g., efficiency rating examples of existing products, certifications such as ENERGY STAR, NEEP ccASHP, CEE, etc.). Describe your proposed approach to maximizing the efficiency of the proposed heat pump. List your target COP at 17 ^{o}F
Up to 5 points for experience as demonstrated by existing products.
Additional 2 points (to a maximum of 10 points) for each 0.1 COP above 1.85 COP at 17 ^{o}F with evidence to show how it will be achieved (heat exchanger size goals, compressor efficiency, etc.)
Up to 15 points in total

l. Accelerated delivery schedule of 30 prototype units
9 months from issuance of purchase order – 15 points
12 months from issuance of purchase order – 10 points
15 months from issuance of purchase order – 5 points
Delivery of production units is expected within 12 weeks of order, at any time after 6 months following delivery of first prototypes. Submit a description of milestones planned in order to meet the proposed schedule.
Up to 15 points in total

m. Provide lowest operating temperature for the proposed unit. During demonstration phase, Vendor shall provide lab testing results to show capacity and efficiency data at the approved lowest operating temperature.
1 point for every 3 ^{o}F below 17 ^{o}F
Up to 10 points

n. The evaluation committee will conduct life cycle cost analysis based on the information provided in the bid proposal. In order to better calculate life cycle cost, Vendors needs to used the table below to provide unit's capacity, input power and COP at minimum, intermediate and maximum capacities respectively. Vendors can use modeled predictions if no test data is available.
Up to 10 points

	Heating Mode				Cooling Mode	
(Outdoor Dry Bulb Temp)	@ Lowest Operating Temp	0 °F	17 °F	47 °F	82 °F	95 °F
Minimum Capacity (btu/hr)						
Input Power at Min. Capacity (kw)						
COP at Min. Capacity						
Intermediate Capacity (btu/hr)						
Input Power at Intermediate Capacity (kw)						
COP at Intermediate Capacity						
Maximum Capacity (btu/hr)						
Input Power at Max. Capacity (kw)						
COP at Max. Capacity						

o. Provide "Advanced Temperature Control" when transitioning from setback to occupied temperature setpoint. The unit with advanced temperature control shall be able to optimize compressor operating speeds based on indoor, outdoor temperature, and temperature setpoints so as to minimize energy consumption. .
Up to 10 points