NYSERDA Solicitation:
Program Opportunity Notice (PON) 4614
Community Heat Pump Systems
ATTACHMENT B.2

Category B: Site-specific design study

Report Stage
(Final Report for Category B Instructions part 2)

Instructions

Completion of this data spreadsheet is required as part of the **Category B Site-Specific Design Study final report**. This report-stage spreadsheet updates the data previously collected by the Applicant, and includes new data collected during the design study.
Green shaded cells indicate data that were submitted at the Solicitation Stage. **If previously reported data were updated during the design study, enter only the updated responses.**
Yellow shaded cells indicate new information compiled or collected during the detailed design study.

If your application is for a different Category (**Category A** - Site-Specific Scoping Study, or **Category C** - Site Specific Implementation Project),
please download and provide information in the relevant Category spreadsheet.

Data to be provided by applicants are grouped into 3 main areas : ***District Characteristics , Systems and Technology, and Business Model.*** There is one worksheet tab for each sub-category.
Please fill in information for all 3 worksheets

District Characteristics worksheet instructions

CA1 Location & Site Area
Provide the requested system location data.

CA2 Building Cluster Scale & Type
Characterize the scale of the proposed system.

CA3 Building Construction/Retrofit
Identify whether buildings to be served are new construction, retrofit or both. Also indicate if building heating/cooling systems will be replaced.

CA4 District System Construction/Retrofit
Identify whether the proposed district energy distribution system will be new construction, retrofit of an existing system, or both. Indicate distribution system type (high- or low- temp hot water, steam)

CA5 Building Address, Type, Size, Conditioned Area, Age
Provide information for each building to be served by the district system including address, conditioned space, new construction, major building renovation, or retrofit of heating/cooling system.
Indicate building age of existing buildings to be served by the system.

CA6 Estimated Building Loads
Provide information regarding building loads.

CA7 If Retrofit - Energy Systems of Existing Buildings
For existing buildings, identify the primary heating and cooling energy sources, annual energy consumption data from utility bills, and type of heating and cooling system.

CA8 If Retrofit - Building Conversion Related Information
For existing buildings, identify whether heat pumps are used and the year the heating and cooling systems were last upgraded or replaced.

CA9 Energy Use from Existing Facilities
Calculate the total energy use for all existing buildings to be served by the system.

CA10 Conditioned Space, Loads and Energy Use
Calculate the total conditioned area for heating and for cooling for all existing buildings to be served by the system.

Systems and Technology worksheet instructions

CA11 Proposed Thermal Capacity from Geothermal Resource
The data requested in this section is thermal capacity supplied from the ground heat exchanger (GHX), not supplied to the buildings.

CA12 Other Thermal Resources Proposed as a (% of Total Thermal Resource)
Identify renewable or waste heat thermal resources that will be used to supplement the heat provided from the GHX.

CA13 Ground Heat Exchanger
Identify the proposed Earth-coupling method(s).

CA14 Heat Pumps
Provide information on proposed heat pumps including COPs, entering water temperatures, refrigerant, and equipment information.

CA15 Pilot Borehole(s)
Provide information regarding test bores or wells that were installed during the scoping study or detailed design study.

CA16 Onsite Electric Generation / Storage
Identify type and capacity of other renewable power sources or energy storage proposed for the project.

CA17 Community Distribution Piping Proposed
Indicate whether the community distribution system will be a 2-pipe (e.g., ambient loop) or 4-pipe (e.g., separate chilled and hot water piping) system.
Provide community distribution system information including pipe size, insulation, and length for 2- and 4-pipe systems.

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DISTRICT CHARACTERISTICS

Applicant:	Watchtower Bible and Tract Society of New York, Inc.

CA1 Location & Site Area

District Street Address	155 Sterling Mine Rd	**City/Town, Zipcode**	**Sloatsburg, NY 10974**
District site area (acres)	248	Latitude, Longitude	41.1517, -74.2163

CA2 Building Cluster Scale & Type	**Indicate all that apply**	**CA3 Building Construction/Retrofit**	**Indicate all that apply**	**CA4 District System Construction/Retrofit**	**Indicate all that apply**
b. MEDIUM e.g. college campus or multifamily residential complex consisting of multiple buildings, an office or medical park, etc.		**a. New Construction**		**a. New Construction**	
				Indicate present & proposed distribution system type (e.g., steam, High-temp hot water, etc.)	Chilled water (42 /58) Hot water (128 /98)

CA5 Building Address, Type, Size, Conditioned Area, Age

CA6 Estimated Building Loads

Building Number	**Street Address**	**Building Type** *(select from drop down list)*	**Building Size (square feet)**	**Conditioned Area to be Served - *COOLING*** *(square feet)*	**Conditioned Area to be Served - *HEATING*** *(square feet)*	**Type of Construction** *(New Construction, Major Renovation, Retrofit of Heating and Cooling Systems)*	**If Major Renovation or Retrofit Building Age** *(years)*	**Summer Peak Total Cooling Load** *(kBtu/hr)*	**Winter Peak Total Heating Load** *(kBtu/hr)*	**Process Heating Load - Steam or Hot Water** *(e.g. swimming pool, hotel, autoclaves, lab animal cage washing, Other- Specify) (MMBtu/hour)*	**Process Cooling Load** (*data centers, lasers etc.*) *tons)*
Building 1 - Residential	TBD	Residential - Multi family	85,921	73,025	73,025	New Construction		862	1,884		
Building 2 - Residential	TBD	Residential - Multi family	64,033	52,960	52,960	New Construction		642	1,404		
Building 3- Residential	TBD	Residential - Multi family	74,976	62,080	62,080	New Construction		752	1,644		
Building 4- Residential	TBD	Residential - Multi family	85,921	73,025	73,025	New Construction		862	1,884		
Building 5- Residential	TBD	Residential - Multi family	74,976	62,080	62,080	New Construction		752	1,644		
Building 6 - Residential	TBD	Residential - Multi family	74,976	62,080	62,080	New Construction		752	1,644		
Building 7 - Residential	TBD	Residential - Multi family	74,976	62,080	62,080	New Construction		752	1,644		
Building 8 - Residential	TBD	Residential - Multi family	85,921	73,025	73,025	New Construction		862	1,884		
Building 9 - Residential	TBD	Residential - Multi family	85,921	73,025	73,025	New Construction		862	1,884		
Building 10 - Residential	TBD	Residential - Multi family	64,033	52,960	52,960	New Construction		642	1,404		
Building 11 - Office	TBD	Large Office	324,000	252,750	252,750	New Construction		4,552	4,125		
Building 12 - Events	TBD	Other - Specify	163,631	163,631	163,631	New Construction		2,760	2,300		
Building 13 - Audio Video	TBD	Other - Specify	225,000	225,000	225,000	New Construction		5,288	6,150		
Building 14 - Visitors Center	TBD	Other - Specify	15,000	15,000	15,000	New Construction		1,040	650		
Building 15 - Fitness Center	TBD	Other - Specify	106,000	106,000	106,000	New Construction		1,600	938		
Building 16 - Central Energy Plan	TBD	Other - Specify	9,640	9,640	9,640	New Construction		424	488		
TOTALS				**1,418,361**	**1,418,361**			**23,405**	**31,567**		

CA9 Energy Use from Existing Facilities

a. Total for All Buildings - Annual Gas Consumption from Utility Bills for Heating and Cooling (MMBTU)	0
b. Total for All Buildings - Annual Oil Consumption from Utility Bills for Heating (gal)	0
c. Total for All Buildings - Annual Electricity Consumption from Utility Bills for Heating and Cooling (kWh)	0

CA10 Conditioned Space, Loads and Energy Use

a. Total for All Buildings -Conditioned Area Served - *Cooling* *(square feet)*	1,418,361
b. Total for All Buildings Conditioned Area Served - *Heating* *(square feet)*	1,418,361

	CA7 If Retrofit - Energy Systems of Existing Buildings									CA8 If Retrofit - Building Conversion Related Information		
Domestic Hot Water *(gpm)*	**Primary Energy Source Currently Used for Heating** *(Oil, Gas, Propane, ConEd Steam, Electricity, Other)*	**Primary Energy Source Currently Used for Cooling** *(Electricity, Gas, ConEd Steam, Other)*	**Annual Gas Consumption from Utility Bills** *(MMBTU)*	**Annual Fuel Oil Consumption from Utility Bills** *(gal)*	**Annual Electricity Consumption for cooling from Utility Bills** *(kWh)*	**Annual Electricity Consumption for heating from Utility Bills** *(kWh)*	**Are annual electricity use data metered for cooling and heating systems or are they estimated from building totals?**	**Existing Heating System** (Steam, Hot water, *Forced air, Radiators, baseboard, hydronic, Other-specify)*	***Existing Cooling System*** (Window A/C, Central A/C, *Forced air, hydronic, Other-specify)*	**Heat Pumps Currently Used?** *(Y/N)*	**Year HEATING System Last Installed or Replaced**	**Year COOLING System Last Installed or Replaced**
29.2												
21.3												
25.2												
29.2												
25.2												
25.2												
25.2												
29.2												
29.2												
21.3												
7.4												
Local ASHP												
15.4												
Local ASHP												
Local ASHP												
Local Electric												
283												

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SYSTEMS AND TECHNOLOGY

Applicant:	Watchtower Bible and Tract Society of New York, Inc.

CA11 Proposed Thermal Capacity from Geothermal Resource

	Summer Peak	**Winter Peak**	**Diversified District Summer Peak**	**Diversified District Winter Peak**
Heating *(MBtu/hour)*	Heat Recovery	31,651	Heat Recovery	22,600
Cooling *(tons)*	1,950	Heat Recovery	1,664	Heat Recovery
Domestic Hot Water *(GPM)*	283	283	266	266
Process Heating (*MBtu/hour)*	In Heating	In Heating	In Heating	In Heating
Process Cooling *(tons)*	In Cooling	In Cooling	In Cooling	In Cooling

CA12 Other Thermal Resources Proposed as a (% of Total Thermal Resource)

Solar thermal	-
Sewer waste heat recovery	13%
Waste heat from Data Center	-
Biomass	-
Other - Events Center kitchen exhaust and freezer/cooler condenser recovery	1.5%

CA13 Ground Heat Exchanger Type

Closed loop *(horizontal or vertical) - (bores or energy piles)*	Vertical closed loop bores
Open loop *(dedicated injection well or seasonal reversal)*	-
Standing column wells (specify design bleed %, if any)	-
Surface water coupled *(lake/pond, river/stream, or marine)*	-
Other - *specify*	-
GHX Balancing	
Are seasonal GHX loads balanced?	No
Antifreeze used in GHX piping?	Yes
GHX Land Area	
Area needed for GHX (SF)	175,000
Percentage of property area	Less than 2%
Closed Loop Systems - vertical	
Number of bores (closed loop - vertical)	280
Depth of closed-loop borehole heat exchangers (ft)	800
Closed-loop borehole heat exchanger grout thermal conductivity (W/m°K)	1.92
Closed-loop antifreeze design temperature (°F)	29
Thermal response test results - thermal conductivity (Btu/*h*ft*ºF))	1.37
Thermal response test results - thermal diffusivity (ft^2/day)	0.91
CAPEX of closed-loop boreholes ($)	8,230,000
CAPEX of closed-loop horizontal pipe and manifolding ($)	250,000
Closed Loop Systems - horizontal	
Length of horizontal closed-loop heat exchanger trench (ft)	-
Horizontal closed-loop heat exchanger depth below grade (ft)	-
Horizontal closed-loop heat exchanger construction (e.g., slinky, # pipes per tren	-
CAPEX of horizontal closed-loop heat exchanger ($)	-
Open-Loop Systems	
No. of open-loop wells	-
Depth of open-loop wells (ft)	-
Open-loop well borehole and screen diameter (in)	-
Design open-loop well extraction rate (gpm/well)	-
Design open-loop well injection rate (gpm/well)	-
Open -loop system configuration (ATES or dedicated injection well)	-
Open-loop well drilling method	-
Open-loop well screen length (ft)	-
CAPEX of open-loop well system ($)	-
Standing-Column Well Systems	

Standing-Column Well Systems	
No. of standing column wells	-
Depth of standing column wells (ft)	-
Standing column well design bleed rate (%, gpm/well)	-
Standing column well design thermal diffusivity (m^2/s)	-
CAPEX of standing column wells ($/ft)	-

CA14 Heat Pumps

Heat Pump Configuration (centralized, distributed or both)	Centralized

For distributed heat pumps, complete for each type

Heat Pump Type	Make & Model	Number	Heating Capacity (kBtu/hr) Full/Part	Heating COP Full/Part	Heating COP EWT (°F)	Cooling Capacity (tons) Full/Part	Cooling EER (Btu/wh) Full/Part	Cooling EER EWT (°F)
CENTRIFUGAL	TRANE AGILITY	1	4,394	3.84	35 evap, 111 cond	370	17.67	56 evap, 88 cond
CENTRIFUGAL	TRANE AGILITY	2	4,394	3.84	35 evap, 111 cond	370	17.67	56 evap, 88 cond
CENTRIFUGAL	TRANE AGILITY	3	4,394	3.84	35 evap, 111 cond	370	17.67	56 evap, 88 cond
CENTRIFUGAL	TRANE AGILITY	4	4,394	3.84	35 evap, 111 cond	370	17.67	56 evap, 88 cond
HELICAL ROTARY	TRANE RTWD	1	2,229	3.20	35 evap, 114 cond	200	14.13	56 evap, 88 cond
HELICAL ROTARY	TRANE RTWD	2	2,229	3.20	35 evap, 114 cond	200	14.13	56 evap, 88 cond
HELICAL ROTARY	TRANE RTWD	3	2,229	3.20	35 evap, 114 cond	200	14.13	56 evap, 88 cond

CA15 Pilot Borehole(s)

No. of pilot boreholes	1
Proposed pilot well use	None
Additional value / use of pilot well(s)	None
Ground surface elevation *(ft)*	779
Geophysical logging conducted?	Yes
Thermal response testing conducted?	Yes
Aquifer pumping test conducted?	Yes
Groundwater sampling conducted?	No
Soil sampling conducted?	Yes
Measured ambient ground water temperature (°F)	50.5
Subsurface contamination potential?	Unlikely
Drilling method	Air rotary
Borehole Depth *(ft)*	499
Groundwater Depth *(ft)*	20
Borehole Diameter *(in)*	5-3/4"
Geologic conditions in target formation *(bedrock, surficial/glacial, coastal plain)*	Bedrock

CA16 Onsite Electric Generation / Storage

Solar PV	Yes
Solar PV capacity (kW)	3,200
Wind Turbine	-
Wind turbine capacity (kW)	-
Battery Storage	Yes
Battery Storage Capacity (MW-hr)	10,000

CA17 Community Distribution Piping Proposed

No. of distribution pipes (2 or 4)	4

2 pipe

Pipe Material	Pipe Diameter (inches)	Insulation Type
-	-	-

4 pipe

Chilled Water		
Pipe Material	**Pipe Diameter (inches)**	**Insulation Type**
Schedule 40 Steel	3" to 12"	2" polyeurothane foam
Hot Water		
Pipe Material	**Pipe Diameter (inches)**	**Insulation Type**
Schedule 40 Steel	4" to 12"	2" polyeurothane foam

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BUSINESS MODEL

Applicant:	Watchtower Bible and Tract Society of New York, Inc.

Ownership

C18 Building Ownership

Buildings all owned by a single entity	Buildings all owned by a single entity
Buildings having unrelated owners	-
Buildings owned by a cooperative or association	-
Other - Specify	-

C19 Proposed System Ownership & Operation

System owned/operated by a private entity	System owned/operated by a private entity
System owned/operated by a public entity (municipality)	-
System owned by a public entity and operated by a private entity	-
System owned/operated by a utility	-
System owned by a private or public entity and operated by another private entity	-
System owned/operated by a public-private partnership.	-
Other - Specify	-

C20 Key Assumptions used for 25 year NPV Life Cycle Cost Analysis

Economic Factors

Economic Discount Rate or Hurdle Rate	8.0%	
General Inflation Rate	5.0%	/year
Electricity Escalation Rate	2.0%	/year
Useful life of Ground Heat Exchanger Loop	50	years
Useful life of GSHP	25	years

Building Types
Classroom
Research Lab
Data Center
Dormitory
Large Office
Medium Office
Small Office
Residential- Single family
Residential - Multi family
Residential - Multi floor
Warehouse
Stand Alone Retail
Strip Mall
Primary School
Secondary School
Supermarket
Quick Service Restaurant
Full Service Restaurant
Hospital
Outpatient Health Clinic
Small Hotel
Large Hotel
Midrise Apt
Other - Specify

Type of Construction
New Construction
Major Renovation
Retrofit of Heating and Cooling Systems

Primary Energy Source Currently Used for Heating
Oil
Gas
Propane
ConEd Steam
Electricity
Other

Primary Energy Source Currently Used for Cooling
Electricity
Gas
ConEd Steam
Other

Yes
No

Drilling Method
Air rotary
Mud rotary
Dual rotary
DTH air hammer
DTW water hammer
Sonic
Auger
Other

Subsurface contamination potential
Unknown
Known contaminated
Known uncontaminated
Unlikely
Likely

Geologic conditions in target formation
Bedrock
Surficial / glacial deposits
Coastal plain deposits