ENERGY STAR® Program Requirements for Geothermal Heat Pumps

Partner Commitments

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified geothermal heat pumps. The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on geothermal heat pumps and specifying the testing criteria for geothermal heat pumps. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;

- comply with current ENERGY STAR Logo Use Guidelines, describing how the ENERGY STAR labels and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;

- qualify at least one ENERGY STAR labeled geothermal heat pump model within one year of activating the geothermal heat pumps portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Tier 1 or 2) in effect at that time;

- provide clear and consistent labeling of ENERGY STAR qualified geothermal heat pumps. The ENERGY STAR label must be clearly displayed in product literature (i.e., user manuals, spec sheets, etc.) and on the manufacturer's internet site where information about ENERGY STAR qualified models is displayed. It is also recommended that the label appear on the top/front of the product and on the product packaging;

- offer and encourage training to distributors and/or contractors on the following issues: proper equipment installation and hookup, distribution systems and their effect on performance, proper domestic water heater connection for desuperheater or demand water heating, code compliance, and proper use of the Manual J calculation, or other equivalent calculation, in order to encourage proper sizing of equipment. In addition, Partner should strive to use contractors or loop installers who have received training on the design and installation of the ground heat exchanger and that provide warranty protection for the integrity and performance of the ground heat exchanger for at least two years. Ground heat exchanger training may be provided by Partner or a well regarded training program such as the International Ground Source Heat Pump Association's. Partner shall focus its ENERGY STAR marketing efforts in regions where contractors and loop installers have received training and provide warranties**;**

- offer a means to provide some or all of the domestic water heating through the use of a desuperheater, integrated demand water heater, or stand-alone demand water heating model. Partner will strive to ensure that customers, distributors, and contractors are aware of the benefits of using a geothermal heat pump system to provide water heating in its marketing materials, installation manuals, and training programs;

- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying geothermal heat pump models. Once the Partner submits its first list of ENERGY STAR labeled geothermal heat pump models, the Partner will be listed as an ENERGY STAR Partner. Partner must provide annual updates in order to remain on the list of participating product manufacturers;

- provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified geothermal heat pumps shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., capacity, size, speed, or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted to EPA, preferably in electronic format, no later than the following March and may be provided directly from the Partner or through a third party. The data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner;

- notify EPA of a change in the designated responsible party or contacts for geothermal heat pumps within 30 days.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures and should keep EPA informed on the progress of these efforts:

- consider energy efficiency improvements in company facilities and pursue the ENERGY STAR label for buildings;

- purchase ENERGY STAR labeled products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR labeled product information to employees for use when purchasing products for their homes;

- ensure the power management feature is enabled on all ENERGY STAR qualified monitors in use in company facilities, particularly upon installation and after service is performed;

- provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR labeled product models;

- feature the ENERGY STAR label(s) on Partner Web site and in other promotional materials. If information concerning ENERGY STAR is provided on the Partner Web site as specified by the ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on the ENERGY STAR Web site at www.energystar.gov), EPA may provide links where appropriate to the Partner Web site;

- provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to

coordinate, communicate, and/or promote Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones that Partner would like EPA to be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR labeled products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the Web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;

- provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.

ENERGY STAR® Program Requirements for Geothermal Heat Pumps

Eligibility Criteria

Below is the Version 3.0 product specification for ENERGY STAR qualified geothermal heat pumps. A geothermal heat pump model must meet all of the identified criteria if it is to be labeled as ENERGY STAR by its manufacturer.

1) **Definitions:** Below is a brief description of a geothermal heat pump and other terms as relevant to ENERGY STAR.

   A. Geothermal Heat Pump (GHP): A GHP uses the thermal energy of the ground or groundwater to provide residential space conditioning and/or domestic water heating. A GHP model normally consists of one or more factory-made assemblies that include indoor space conditioning and/or domestic water heating heat exchanger(s), compressor(s), and a ground-side heat exchanger. A GHP model may provide space heating, space cooling, domestic water heating, or a combination of these functions and may also include the functions of liquid circulation, thermal storage, air circulation, air cleaning, dehumidifying or humidifying. A GHP system generally consists of one or more GHP models, the ground heat exchanger(s), the air and/or hydronic space conditioning distribution system(s), temperature controls, and thermal storage tanks.

   B. Single-Stage: GHP models that are designed to operate at only one stage and one capacity.

   C. Multi-Stage: GHP models that are designed to operate at more than one stage of capacity through the use of technologies such as multiple-stage compressors, dual compressors, variable-speed compressors, etc. Multi-stage models are more efficient while running at lower capacities, but have the capability to supply more heating or cooling using higher capacities when required.

   D. Ground Heat Exchanger: The method by which heat is exchanged with the ground, groundwater or surface water. GHP systems may use any form of ground heat exchange, which includes horizontal, vertical or submerged surface water closed loops; open loops using ground water, reclaimed water, or surface water; or direct refrigerant-to-ground heat exchange.

   E. Closed Loop: A ground heat exchange method in which the heat transfer fluid is permanently contained in a closed piping system. Also called a ground-loop system.

   F. Open Loop: A ground heat exchange method in which the heat transfer fluid is part of a larger environment. The most common open loop systems use ground water, reclaimed water, or surface water as the heat transfer medium. Also called a ground-water system.

   G. Water-to-Air: A GHP model that provides space conditioning primarily by the use of an indoor air heat exchange coil. Water-to-air models may also provide domestic water heating and hydronic space heating by using desuperheater and/or demand water heating functions.

   H. Water-to-Water: A GHP model that provides space conditioning and/or domestic water heating by the use of indoor refrigerant-to-water heat exchanger(s). Water-to-water

models may provide domestic water heating by using desuperheater and/or demand water heating functions.

I. Direct Geoexchange (DGX): A GHP model in which the refrigerant is circulated in pipes buried in the ground, rather than using a secondary heat transfer fluid, such as water or antifreeze solution in a separate closed loop.

J. Desuperheater: A partial heat recovery system that captures heat from the hot refrigerant gas as it leaves the heat pump compressor and transfers it to the domestic hot water. Desuperheaters provide hot water only while the heat pump is providing space conditioning.

K. Demand Water Heating: Demand water heating models provides all or nearly all of the domestic hot water needs even when space conditioning is not required. This may be accomplished by either stand-alone domestic water heating models or models that use the same compressor for both space conditioning and domestic water heating. Also sometimes referred to as dedicated or full-time water heating.

L. COP: Coefficient of Performance - A measure of efficiency in the heating mode that represents the ratio of total heating capacity to electrical energy input. For the purpose of this specification, COP will be calculated for Closed Loop and Open Loop systems in accordance with the International Standards Organization (ISO) Test Standard 13256-1 or 13256-2 as stated in Section 4 below. For DGX systems, COP will be calculated in accordance with the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) 870 conditions.

M. EER: Energy Efficiency Ratio - A measure of efficiency in the cooling mode that represents the ratio of total cooling capacity to electrical energy input. For the purpose of this specification, EER will be calculated for Closed Loop and Open Loop systems in accordance with ISO 13256-1 or 13256-2 as stated in Section 4 below. For DGX systems, EER will be calculated in accordance with AHRI 870 conditions.

N. Manufacturer Limited Warranty: Manufacturer limited warranty is an assurance by the Partner that purchased equipment is warranted for a certain required period of time. The exact terms of the limited warranty, given the minimum requirements, shall be determined by the Partner.

2) **Qualifying Products:** For the purposes of ENERGY STAR, GHP models include the following: open loop, closed loop, and DGX that are powered by single phase current. The specifications in Section 3 apply to single-stage models. Multi-stage models may be qualified based on EER=(highest rated capacity EER+lowest rated capacity EER)/2; and COP=(highest rated capacity COP+lowest rated capacity COP)/2.

3) **Energy-Efficiency Specifications for Qualifying Products:** Only those models listed in Section 2 that meet the criteria below qualify as ENERGY STAR.

A. Partner must provide, as standard, a manufacturer limited warranty for its ENERGY STAR qualified GHP models for all parts and labor for a minimum of two years. The major refrigerant circuit components, including the compressor(s), heat exchanger(s), and expansion and reversing valve(s) must be warranted for parts and labor for a minimum of five years.

TIER 1
Energy-Efficiency Criteria for Qualified Geothermal Heat Pumps

Product Type	EER	COP
Closed Loop Water-to-Air	16.1	3.5
Open Loop Water-to-Air	18.2	3.8
Closed Loop Water-to-Water	15.1	3.0
Open Loop Water-to-Water	19.1	3.4
DGX	15.0	3.5

TIER 2
Energy-Efficiency Criteria for Qualified Geothermal Heat Pumps

Product Type	EER	COP
Closed Loop Water-to-Air	17.1	3.6
Open Loop Water-to-Air	21.1	4.1
Closed Loop Water-to-Water	16.1	3.1
Open Loop Water-to-Water	20.1	3.5
DGX	15.0	3.5

4) **Test Criteria:** Manufacturers are required to perform tests and certify those product models that meet the ENERGY STAR guidelines with the Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

   A. Closed Loop Systems: Closed loop systems shall qualify under rating conditions in accordance with ISO 13256-1 for water-to-air models or ISO 13256-2 for water-to-water models.

   B. Open Loop Systems: Open loop systems shall qualify under rating conditions in accordance with ISO 13256-1 for water-to-air models or ISO 13256-2 for water-to-water models.

   C. DGX Systems: DGX systems shall qualify under rating conditions in accordance with AHRI 870.

   It is EPA's intention to utilize the AHRI Directory of Certified Products to determine which equipment qualifies for ENERGY STAR.

5) **Effective Date:** The date that manufacturers may begin to qualify products as ENERGY STAR under the Version 3.0 specification will be defined as the *effective date* of the agreement. The ENERGY STAR Version 3.0 GHP specification is effective on September 1, 2009 and replaces all previous versions.

A. Qualifying and Marketing Products under Tier 1 of the Version 3.0 specification: Tier 1 of the Version 3.0 specification shall commence on **September 1, 2009**. All models, including those originally qualified under Version 2.0, with a **date of manufacture** on or after **September 1, 2009** must meet the new Tier 1 Version 3.0 requirements in order to qualify for ENERGY STAR.

B. Qualifying and Marketing Products under Tier 2 of the Version 3.0 specification: The second phase of this specification, Tier 2, shall commence on **January 1, 2013**. All models, including those originally qualified under the Tier 1 Version 3.0 specification, with a **date of manufacture** on or after **January 1, 2013** must meet Tier 2 Version 3.0 requirements in order to qualify for ENERGY STAR.

6) Future Specification Revisions: ENERGY STAR reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions.