FORM EIA-902
ANNUAL GEOTHERMAL HEAT PUMP MANUFACTURERS SURVEY

GENERAL INFORMATION AND INSTRUCTIONS

I. Purpose

Form EIA-902 is designed to provide the data necessary for the Energy Information Administration (EIA), U.S. Department of Energy (DOE), to carry out its responsibilities for tracking heat pump shipments in the geothermal heat pump manufacturing industry and for providing information concerning the size and status of the industry. The data collected will be published in the Renewable Energy Annual and also be available through EIA's Internet site at http://www.eia.doe.gov/fuelrenewable.html .

II. Who Should Respond to This Survey

This report is mandatory and required pursuant to the authority granted to the Department of Energy (DOE) by the Federal Energy Information Administration Act of 1974 (Public Law 93-275. Form EIA-902 is to be submitted by companies (1) that manufactured and shipped (including exporting) geothermal heat pumps and/or (2) that imported and shipped geothermal heat pumps during the survey year. If you are completing this survey form for the first time but were active in the industry during the previous survey year, please photocopy the entire form and provide us with data for the previous year also.

III. Where to Submit Completed Forms

Submit your data electronically using EIA's Internet Data Collection (IDC) system. All respondents for whom EIA has an e-mail address will be notified of the procedure for submitting using the IDC system.

If you need an alternate means of filing your response or have questions about the data requested on Form EIA-902, please contact Susan Henry at susan.henry@eia.doe.gov or (202) 586-1427.

Please retain a completed copy of this form for your files.

IV. When to Submit Completed Forms

The survey year is from January 1 through December 31 each year. Respondents have **60** days from receipt of notification to comply to submit the Form EIA-902.

V. Sanctions

The timely submission of Form EIA-902 by those required to report is mandatory under Section 13(b) of the Federal Energy Administration Act of 1974 (FEAA) (Public Law 93-275), as amended. Failure to respond may result in a penalty of not more than $2,750 per day for each civil violation, or a fine of not more than $5,000 per day for each criminal violation. The government may bring a civil action to prohibit reporting violations, which may result in a temporary restraining order or a preliminary or permanent injunction without bond. In such civil action, the court may also issue mandatory injunctions commanding any person to comply with these reporting requirements. **Title 18 U.S.C. 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdictio**n.

VI. Provisions Regarding Confidentiality of Information

The information reported on this form will be protected and not disclosed to the public to the extent that it satisfies the criteria for exemption under the Freedom of Information Act (FOIA), 5 U.S.C. §552, the Department of Energy regulations, 10 C.F.R. §1004.11, implementing the FOIA, and the Trade Secrets Act, 18 U.S.C. §1905.

The Federal Energy Administration Act requires the EIA to provide company-specific data to other Federal agencies when requested for official use. The information reported on this form may also be made available, upon request, to another component of the Department of Energy (DOE); to any Committee of Congress, the Government Accountability Office, or other Federal agencies authorized by law to receive such information. A court of competent jurisdiction may obtain this information in response to an order. The information may be used for any nonstatistical purposes such as administrative, regulatory, law enforcement, or adjudicatory purposes.

Disclosure limitation procedures are applied to the statistical data published from Form EIA-902 survey information on the dollar value of shipments and complete systems to ensure that the risk of disclosure of identifiable information is very small.

For all other data published from the Form EIA-902, disclosure limitation procedures are not applied. Thus, there may be some statistics that are based on data from fewer than three respondents, or that are dominated by data from one or two large respondents. In these cases, it may be possible for a knowledgeable person to estimate the information reported by a specific respondent.

VII. Filing Forms with Federal Government and Estimated Reporting Burden

Respondents are not required to file or reply to any Federal collection of information unless it has a valid OMB control number. Public reporting burden for this collection of information is estimated to average 4.5 hours per response including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to the Energy Information Administration, Statistics and Methods Group, EI-70, 1000 Independence Ave., S.W., Washington, D.C. 20585-0670, and the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503.

SPECIFIC INSTRUCTIONS

Item Instruction

1.1 Enter the responding company's principal business office address and preparer's office address.

1.2 Provide the name, title, and contact information for the principal people in your company to whom questions should be addressed regarding this submission.

2.1 (a-d) Mark as appropriate the manufacturing activity conducted by your company during the current reporting period. If you answer "**Yes**" to any one of item 2.1 (a) through (d) please begin with Item 3.0 and complete the remainder of this form. If you answer "**No**" to all of item 2.1 (a) through (d) please complete only items 2.2 and 7.0.

2.2 If you answer "**No**" to all of items 2.1 (a) through (d), please report whether your company plans to manufacture, import, or ship geothermal heat pumps in the future and, if yes, in what year.

3.1 (a-i) Report only on activities that are geothermal heat pump-related.

3.2 (a-e) Mark as appropriate the planning to introduce a new geothermal heat pump-related product. A new geothermal heat pump-related product is differentiated from a modified existing product if the "new" product is different enough to warrant a new model number and requires retesting or recertification under existing industry standards.

3.3 Enter the total number of person-years expended on solar-related activities during the survey year. (See glossary of "Person Year" on page 8.)

3.4 "Geothermal heat pump-related activities" includes all activities listed in Item 3.1.

4.1 Enter the number of heat pumps, in whole numbers (i.e., no decimals), by type shipped for final consumption or to another organization for resale (including exports and imports) in the appropriate heat pump type column. Total (column f) should be the total number of geothermal heat pumps of all heat pump types in that row except column a, ARI-320.

4.2 Enter the total rated capacity in tons (not the number of geothermal heat pumps), in whole numbers (i.e., no decimals), of geothermal heat pumps by type shipped for final consumption or to another organization for resale (including exports and imports) in the appropriate heat pump type column. Total (column f) should be the total rated capacity of all collector types in that row.

4.3 Enter the total value received for the total geothermal heat pump shipments in Item 4.2 by type. The value reported should be the total value received for geothermal heat pumps only at your company's net billing price, freight-on-board factory, including charges for cooperative advertising and warranties. Do not include excise taxes, freight, or transportation. Report values to the nearest dollar. Total (column f) should be the total value of all heat pump types in that row.

4.4 Enter the average cooling also referred to as the energy efficiency ratio (EER). EER ratio is calculated by dividing the cooling capacity in Btus per hours (Btu/h) by the power input in watts at a given set of rating conditions, expressed in Btu/h per watt. If the capacity of a heat pump is 48,000 Btu/h, and the compressor, fan and pumps consume 3,430 watts, the EER is 48,000 / 3,430 = 14.0

4.5 Enter the average heating also referred to as the coefficient of performance (COP). COP ratio is calculated by dividing the total heating capacity provided by the heat pump, including circulating fan heat but excluding supplementary resistance heat (Btus per hour), by the total electric input (watts) x 3.412. If the capacity of a heat pump is 48,000 Btu/h, and the compressor, fan and pumps consume 3,430 watts, the COP is 48,000 / (3,430 x 3.412) = 4.1

4.6 For each appropriate sector, enter the total rated capacity of domestic shipments (total shipments minus exports) by heat pump type as precisely as possible.

The sector categories in Item 4.6 are:

4.6 (1) Residential – Geothermal heat pump applications related to any building used for residential occupancy that has a system for heating or cooling, or both.

4.6 (2) Commercial - Geothermal heat pump applications for use in businesses where services (rather than products) are provided, such as wholesale and retail trade or health and educational services.

4.6 (3) Industrial - Geothermal heat pump applications for use in businesses where products (rather than services) are provided, such as the manufacture and processing of goods and basic materials.

4.6 (4) Electric Power - Shipments of Geothermal heat pumps to electric power sector for use in power generation or for experimental applications (includes gas and electric utilities). Includes central stations, decentralized systems or experimental applications.

4.6 (5) Transportation - Shipments of Geothermal heat pumps to transportation sector for use in transportation purposes such as railroads and railways.

4.6 (6) Total domestic shipments by sector - Sum sector quantities and enter a total for each row [4.6 (1)-(5)] in column e. Next, sum columns b through i and enter a total in row 4.4 (6) for each column. These column totals should equal shipment totals entered under Item 4.2 by column minus exports.

4.7 For each end use, enter the total rated capacity of domestic shipments (total shipments minus exports) by heat pump type as precisely as possible.

The end-use categories in Item 4.7 are:

4.7 (1) Hot Water - Domestic shipments of geothermal heat pumps used only for water heating.

4.7 (2) Ice Melt - Domestic shipments of geothermal heat pumps used only for ice melting.

4.7 (3) Pool Heating - Domestic shipments of geothermal heat pumps used only for swimming pool.

4.7 (4) Process Hot and Cold Water - Domestic shipments of geothermal heat pumps used in process water heating and water cooling.

4.7 (5) Space Heating and Cooling - Domestic Shipments of geothermal heat pumps used for space heating and for space cooling (air conditioning).

4.7 (6) Triple Function: Heating, Cooling, and Hot Water - Domestic shipments of geothermal heat pumps are used in combination for space cooling, space heating, and for water heating.

4.7 (7) Total end use - Sum end-use quantities and enter a total for each row [4.7 (1) - (7)] in column e. Next, sum columns b through d and enter a total in row 4.7 (7) for each column. These column totals should equal shipment totals entered under Item 4.2 by column minus exports.

4.8 Enter the total rated capacity by heat pump type. This amount represents the portion of total geothermal heat pump shipments entered in Item 4.2 that were imported and shipped by your company.

4.9 Enter the total rated capacity by heat pump type. This amount represents the portion of total geothermal heat pump shipments entered in Item 4.2 that were manufactured for export and shipped (sold) to another country.

4.10 List the country(ies) from which geothermal heat pumps reported in Item 4.7 were imported, and total rated capacity of imports in Item 4.7 for each country listed.

4.11 List the country(ies) to which geothermal heat pumps reported in Item 4.8 were exported, and total rated capacity of exports in Item 4.8 for each country listed.

4.12 For each customer type, enter the total rated capacity of domestic shipments (total shipments minus exports) by heat pump type as precisely as possible.

Report in total rated capacity, and the recipients of geothermal heat pumps immediately following manufacturing or warehousing. If recipients overlap (for example, the recipient is both a wholesale distributor and an installer) report the recipients in the higher category (i.e., a is higher than b, b is higher than c, etc.).

5.1 Enter number of complete systems shipped from the total in Item 4.2 (e).

5.2 Of the collectors reported in Item 4.2 (e), enter the total rated capacity that was sold as complete

systems. (Complete system is defined as unit with all the necessary functional components, except for installation materials. These include geothermal heat pump, heat exchanging (also known as a chiller) portion, packaged systems, or system kits.)

5.3 The value reported should be total value received for the complete systems at your company's net billing price, freight-on-board factory, including charges for cooperative advertising and warranties. (It should include the value of associated collectors.) Do not include excise taxes, freight or transportation charges, or installation charges. Report values to the nearest dollar.

6.1 Please check the box for each State/U.S. territory or possession in which you manufactured. If you imported geothermal heat pumps also mark the "Imported" (Code 00) box. Then report the total rated capacity of your company's geothermal heat pumps manufactured/imported. Report the total rated capacity of your company's geothermal heat pumps manufactured in the State/U.S. territories listed below under Code 01-78. If some geothermal heat pumps were imported from another country, please indicate under Code 00 the total rated capacity and report details about the country of import in Item 4.10.

6.2 Please check the box for each State/U.S. territory or possession to which you shipped. If you exported geothermal heat pumps also mark the "Exported" (Code 00) box. Then report the total rated capacity of your company's geothermal heat pumps shipped/exported. Report the total rated capacity of your company's geothermal heat pumps shipped in the State/U.S. territories listed below under Code 01-78. If some geothermal heat pumps were exported from another country, please indicate under Code 00 the total rated capacity and report details about the country of export in Item 4.11.

7.0 This item provides additional space for comments. For clarification purposes, identify item, line number and column (if applicable) for each comment.

GLOSSARY

ARI certified: certification by the Air-Conditioning and Refrigeration Institute (ARI) that a pump has been tested using procedures stipulated in ARI standards and that it meets the manufacturer's certified published performance rating.

ARI Standards 320, 325, 330, and 870 refer to a rating system for testing performance of a geothermal heat pump when installed under four different conditions.

Geothermal heat pumps refer to systems where the unit uses the earth or natural body of water as a heat sink. There are typically four types of geothermal systems:

1. A water source heat pump rated under standard ARI-320 is typically installed in a commercial application where several heat pumps are installed in series, with a central chiller or boiler supplying the heating or cooling of the fluid.

2. A ground water source system is a standard ARI-325 installation, and is an open-loop system that uses a natural body of water for the exchange of heat. An open-loop heat pump system is a heat pump system that directly utilizes water from a well or water body, pumps it through a pipe for use as a heat exchanger and returns it back to the environment.

3. A ground source system is a standard ARI-330 installation, and is a closed-loop system that uses water or a water/glycol solution to exchange heat. The system employs extensive tubing which is buried fairly deep in the ground. A closed-loop heat pump system is a geothermal heat pump system that uses water/anti-freeze in a buried pipe loop as a heat exchanger. The water/anti-freeze in the loop never leaves the system. Loop piping can be installed vertically or horizontally

in the earth, a lake, a channel or the ocean.

4. A direct expansion system under standard ARI-870 is a geothermal heat pump system that uses refrigerant in a buried pipe loop as a heat exchanger. The refrigerant in the loop never leaves the system. A direct expansion system is a ground source system with a closed-loop which uses refrigerant throughout the system rather than a water/glycol solution to exchange heat.

ISO 13256-1 (International Standards Organization) is a certification standard for water-source heat pumps used in the following applications:

1. Water Loop Heat Pump (WLHP)

2. Ground Water Heat Pump (GWHP)

3. Ground Loop Heat Pump (GLHP)

Since 2003, ARI has adopted ARI/ISO standar-13256-1 as the basis for its certification programs in lieu of standards 320, 325 and 330. These standards may be viewed and downloaded at ARI website http://www.ari.org/ .

Coefficient of performance (COP): A measure of efficiency in the heating mode that represent the ratio of total heating capacity to electrical energy input. The ratio is calculated by dividing the total heating capacity provided by the heat pump, including circulating fan heat but excluding supplementary resistance heat (Btus per hour), by the total electric input (watts) x 3.412.

Commercial sector: An energy-consuming sector that consists of service-providing facilities and equipment of: businesses; Federal, State, and local governments; and other private and public organizations, such as religious, social, or fraternal groups. The commercial sector includes institutional living quarters. It also includes sewage treatment facilities. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a wide variety of other equipment. *Note:* This sector includes generators that produce electricity and/or useful thermal output primarily to support the activities of the above-mentioned commercial establishments.

Electric power sector: An energy-consuming sector that consists of electricity only and combined heat and power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public--i.e., North American Industry Classification System 22 plants. See also **Combined Heat and Power (CHP) Plant** and **Electricity Only Plant**.

Energy efficiency ratio (EER): A measure of efficiency in the cooling mode that represents the ratio of total cooling capacity to electrical energy input. The ratio is calculated by dividing the cooling capacity in Btus per hours (Btu/h) by the power input in watts at a given set of rating conditions, expressed in Btu/h per watt.

Exports: Shipments of goods from within the 50 States and the District of Columbia to U.S. possessions and territories or to foreign countries. **Note: For the purpose of analyzing activity of the U.S. geothermal heat pump manufacturers in the EIA-902 survey, shipments to foreign countries from the 50 States and DC, and shipments from U.S. possessions and territories to foreign countries are included together as exports.**

Geothermal heat pump: A pump which uses the earth as a heat sink during warm weather and as a heat source during colder weather. It also referred to as a ground-source, earth-coupled, or ground-water heat pump.

Heat sink: A substance into which heat is injected or is absorbed. Substances can be gas, liquid or solid like air, water and earth.

Heat source: A substance from which heat is received or radiates. Substances can be a gas, liquid or solid like air, water and earth.

Industrial sector: An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. The industrial sector encompasses the following types of activity: manufacturing (NAICS codes 31-33); agriculture, forestry, fishing and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); and construction (NAICS code 23). Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting. Fossil fuels are also used as raw material inputs to manufactured products. Note: This sector includes generators that produce electricity and/or useful thermal output primarily to support the above-mentioned industrial activities. Various EIA programs differ in sectoral coverage-for more information see http://www.eia.doe.gov/neic/datadefinitions/Guideforwebind.htm.

Person-year: One whole year, or fraction thereof, worked by an employee, including contracted manpower. Expressed as a quotient (to two decimal places) of the time units worked during a year (hours, weeks, or months) divided by the like total time units in a year. For example: 80 hours worked is 0.04 (rounded) of a person-year; 8 weeks worked is 0.15 (rounded) of a personyear; 12 months worked is 1.0 person-year. Contracted manpower includes survey crews, drilling crews, consultants, and other persons who worked under contract to support a firm's ongoing operations.

Rated capacity: The maximum output of a geothermal heat pump unit under specified conditions as designated by the manufacturer, generally measured in tons.

Residential sector: An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. The residential sector excludes institutional living quarters. *Note*: Various EIA programs differ in sectoral coverage. Click here for further information on the variations of the residential sector used by EIA systems.

Ton: A measure of the amount of Btu's (British thermal units) needed to melt one ton of ice in a 24- hour period. One ton equals 12,000 Btu's/hour available to heat and/or cool space.

Transportation sector: An energy-consuming sector that consists of all vehicles whose primary purpose is transporting people and/or goods from one physical location to another. Included are automobiles; trucks; buses; motorcycles; trains, subways, and other rail vehicles; aircraft; and ships, barges, and other waterborne vehicles. Vehicles whose primary purpose is not transportation (e.g., construction cranes and bulldozers, farming vehicles, and warehouse tractors and forklifts) are classified in the sector of their primary use. *Note*: Various EIA programs differ in sectoral coverage. Click here for an explanation of the variations of the transportation sector used by EIA system(s).