

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

**PRESENTATION**

**ON**

***GEO THERMAL***

***BY***

***“ECONOMIA”***

**PRESENTED BY**

**MUHAMMAD ASLAM AZAD**

**MANAGING DIRECTOR OF AGE CO (PVT) LTD.**

**MEMBER OF ASHRAE**

**(AMERICAN SOCIETY OF HEATING, REFRIGERATING & AIR-CONDITIONING ENGINEERS, INC)**



## TOPIC OF PRESENTATION

- ❖ Introduction of Company.
- ❖ Technology of Geothermal.
- ❖ Structure / Placing of Geothermal Hot Water Geyser.
- ❖ Structure / Placing of Geothermal Hot Water Boiler for Central Heating system.
- ❖ Structure / Placing of Geothermal Split A/C.
- ❖ Structure / Placing of Geothermal Self Contained Package A/C.



**THE PIONEER OF  
RISKLESS & ENERGY SAVING  
CENTRAL HEATING SYSTEM**

**INTRODUCTION OF COMPANY**

- ❖ The company was established with the name of “**AGECO**” in 1980.
- ❖ Registered as **AGECO (Pvt.) Ltd**, In 1988.
- ❖ We have completed **50 HVAC Projects** in Government and Semi Government sectors all over the country till 1996.
- ❖ We are The Pioneers in Introducing Designing and Manufacturing of “**ECONOMIA**” Riskless & Energy Saving Central Heating System in Pakistan Since **1997** and to adopt same pattern of heating which has been used in Europe and other Countries in the World.
- ❖ We have since installed this system successfully more than **25000** Locations including **Defence Offices, Hospitals, Commercial Buildings, Guest Houses, Hotels & Residences** all over the country where ambient temp is up to (-)25 °C and altitude up to 14000ft.
- ❖ We have extended our manufacturing range:
  - in 2004 Central Air Conditioning Chiller up to 30 TR, AHU up to 50 TR and FCU Decorative/Concealed etc.
  - in 2006 Clean Room HVAC System for pharmaceutical industries.
  - in 2009 Solar Street Light, Solar Garden Light and Solar home System.
  - in March 2011 Vertical Axial Wind turbine from 2 KW to 10 KW 100% indigenous.
  - in July 2011 Geothermal Heat Pump Units.
    - \* Hot Water Geyser.
    - \* Central Heating Boiler.
    - \* Free Discharge/Duct Type Self Contained Package A/C Unit.
    - \* Split A/C Unit.
- ❖ **Future focus to introduce other green energy technology to support Pakistan and people of Pakistan.**



# TECHNOLOGY OF GEOTHERMAL

We are pleased to introduce newly developed Geothermal Unit which is 100% indigenous and locally manufactured by ECONOMIA.

### How it Works.

The unit uses ground energy, the weather effect from (+)50 °C to (-)40 °C is nil below 5ft ground surface and from (-)5 to 20ft below ground level the temperature remains at 25 °C (±)2 °C all around the year. To provide heating/hot water through refrigeration cycle requires 8 °C to meet the nominal design capacity. When using ground energy at 25 °C (±)2 °C electric running cost reduce up to 80% and there is no de-rating factor upon change of ambient condition. The operation cycle is shown on literature.

Egg Geothermal Heating and Cooling uses the earth's constant temperature to achieve EER's (Energy Efficiency Ratings) in the 30's. The heating COP (Coefficient of Performance) is approaching 5. A 5 COP indicates that the Egg geothermal systems are producing 5 units of energy for one unit of electricity consumed and other 4 come from earth. That's why this technology is called "renewable".

The geothermal pump system reaches fairly high coefficient of performance (CoP), 3-6, on the coldest of winter nights, compared to 1.75-2.5 for air-source heat pumps on cool days. Ground source heat pump (GSHPs) are among the most energy efficient technologies for providing HVAC and water heating. Actual CoP of a geothermal system which includes the power requires to circulate the fluid through the underground tubes that can be lower than 2.5. The setup costs are higher than for conventional systems, but the difference is usually returned in energy savings up to 3 years. System life is estimated at 25 years for inside components and 50+ years for the ground loop. As of 2004, there are over a million units installed worldwide providing 12 GW of thermal capacity, with an annual growth rate of 10%.

### How much Energy saving by Geothermal Vs Existing System

**Example-1:** Hot Water Geysers 30 Gallon in Winter Season.

Natural Gas	LPG	Wood/Oil	New Proposed Geothermal System
Rs.1,000/- to Rs.2,000/- per month.	Rs.1,500/- to Rs.3,000/- per month.	Rs.2,000/- to Rs.10,000/- per month	Rs.150/- to Rs.300/- per month



**Example-2:** Hot Water Boiler capacity 60,000 BTU for Heating System 12 Hrs usage.

Natural Gas	LPG	Kerosene/Diesel	Electricity	New Proposed Geothermal System
Rs.8,000/- to Rs.10,000/- per month.	Rs.10,000/- to Rs.16,000/- per month.	Rs.12,000/- to Rs.25,000/- per month ½ ltr/hr x 12 hrs = 6 ltr x Rs.100/ltr = Rs.600/day x 30 days = Rs.18,000/- per month	60,000 BTU/3,400 = 17 KW x Rs.10/KW = Rs.170/hr x 12 Hrs = Rs.2,040/day x 30 days = Rs.61,200/- per month	660 W/hr x 12 hrs = 7,920 W = 7.9 KW x Rs.10/KW = Rs.79/day x 30 days = Rs.2,370/- per month

**Example-3:** Split A/C for Cooling capacity 18000 BTU.

Existing Air Cooled Split Nominal Capacity 1.5 TR at 35 °C ambient.					Geothermal Split A/C Maintain 25 °C (±) 2 °C at (-)30 ft Ground Level		
Ambient	35 °C	40 °C	45 °C	48 °C	Ground Temp.	25 °C (±) 2 °C	No de-rating as ground temperature below 5 ft ground level remain same at all ambient (+)50 to (-)40 °C.
Cooling Capacity	18000 BTU	17000 BTU	16000 BTU	12000 BTU	Cooling Capacity	18000 BTU	
Amps	8.5	9	10.5	12	Amps	4.1	

## 1<sup>ST</sup> WORLD TECHNOLOGY VS LOCAL TECHNOLOGY

<p><b>1<sup>st</sup> world requirement is 100% Heating and 0 - 40% Cooling</b></p>	<p><b>Local requirement is 100% cooling and 10 – 100% Heating</b></p>
<p><b>1<sup>st</sup> world placing of geothermal heat exchanger normally 5 KW to 20 KW for one central unit using PE pipe horizontally below 5 ft ground level as shown in below picture.</b></p>	<p><b>Local requirement mostly cooling and to meet the requirement vertical S.S heat exchanger perform better below 5 ft to 150 ft depend on type and size of unit maximum to 5 KW as shown in below picture.</b></p>
<p style="text-align: center;"><u><b>Proposed for Heating System</b></u></p> <div style="text-align: center;">  <p style="text-align: center;"><b>A 3-ton slinky loop prior to being covered with soil. The three slinky loops are running out horizontally with three straight lines returning the end of the slinky coil to the heat pump</b></p> </div> <p>Horizontal closed loop field is composed of pipes that run horizontally in the ground. A long horizontal trench, deeper than the frost line, is dug and U-shaped or slinky coils are placed horizontally inside the same trench. Excavation for horizontal loop field is about half the cost of vertical drilling, so this is the most common layout used wherever there is adequate land available. For illustration, a detached house needing 10kW (3 ton) of <b>heating capacity</b> might need 3 loops 120 to 180 m (390 to 590 ft) long of NPS ¾ (DN 20) or NPS 1.25 (DN 32) polyethylene tubing at a depth of 1 to 2 m (3.3 to 6.6 ft).</p>	<p style="text-align: center;"><u><b>Proposed for Cooling / Heating</b></u></p> <div style="text-align: center;">  </div> <p>Direct exchange systems are significantly more efficient and have potentially lower installation costs than closed loop water systems. Copper's high thermal conductivity contributes to the higher efficiency of the system, but heat flow is predominantly limited by the thermal conductivity of the ground, not the pipe. The main reasons for the higher efficiency are the elimination of the water pump (which uses electricity), the elimination of the water heat exchanger (which is source of heat losses), and most importantly, the latent heat phase change of the refrigerant in the ground itself.</p> <p>While they require much more refrigerant and their tubing is more expensive per foot, a direct exchange loop is shorter than a closed water loop for a given capacity. A direct exchange system required only 15 to 30% of the length of tubing and half the diameter of drilled holes, and the drilling or excavation costs are therefore lower. Therefore, direct expansion is more feasible in smaller size only.</p> <p>However, we have selected S.S direct heat exchanger instead of copper in vertical refrigerant loop to avoid oxidation on copper pipe and where copper heat exchanger being used are treated with epoxy and final layer of lacquer to avoid oxidation.</p>



# GEOTHERMAL HOT WATER GEYSER

## GEOTHERMAL HOT WATER GEYSER



### Ground Energy Source Models:

- ECO-GES/GEY-30 30 GLN
- ECO-GES/GEY-50 50 GLN
- ECO-GES/GEY-100 100 GLN

### Wall Energy Source Models:

- ECO-WES/GEY-30 30 GLN
- ECO-WES/GEY-50 50 GLN
- ECO-WES/GEY-100 100 GLN

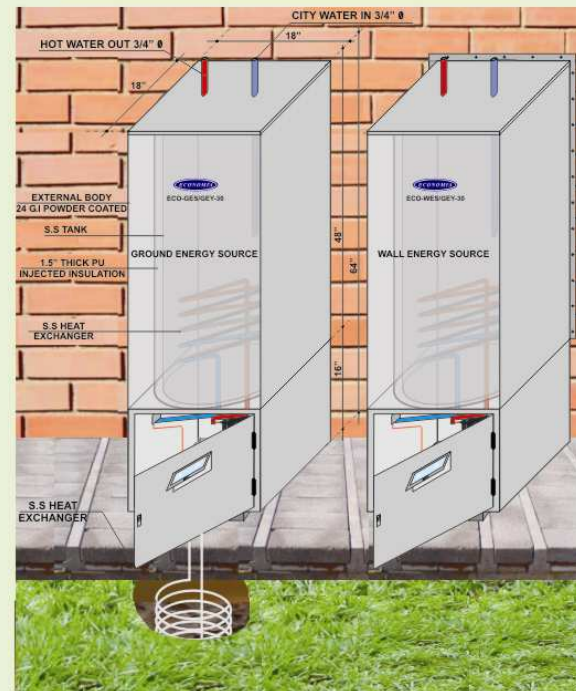
Manufacturer:



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## PLACING OF GEOTHERMAL HOT WATER GEYSER



### Geothermal Hot Water Geyser Specification

Model		ECO-GES/GEY-30	ECO-GES/GEY-50	ECO-GES/GEY-100
Storage Capacity	Gallon	30	50	100
Hot Water Output	Gallons/Day	150	250	500
Compressor	Capacity	HP	1/12	1/8
	Running Current	Watts	50 - 65	90 - 125
	Refrigerant	Type		R134a
Automation			Digital Temperature Controller	
Material	Tank Body		Stainless Steel	
	External Body		GI Powder Coated	
	Tank Heat Exchanger		Stainless Steel	
	Insulation		PU Injection	
Dimension	HxWxD	64" x 18" x 18"	64" x 24" x 24"	64" x 36" x 36"
Water Connection	inch	3/4"	1"	1.25"
Ground/Wall Source Heat Exchanger				
Material			Stainless Steel	

Note: 1. The Nominal Capacity is based on 25°C (±2°C Temperature at (-) 5 - 20 Ft. below Ground level.  
2. Per day output can increase by increasing size of compressor (optional).



# GEOHERMAL CENTRAL HEATING BOILER

PIONEER IN PAKISTAN

## GEOHERMAL HOT WATER HEATING BOILER



Manufacturer:



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## PLACING OF GEOHERMAL HOT WATER HEATING BOILER



## GEOHERMAL HOT WATER HEATING BOILER SPECIFICATION

Model		ECO-GEOTH-60	ECO-GEOTH-90
Nominal Heating Capacity	BTU/Hr	60000	90000
Running Current	Amps	4	6
Power Source	V/Ph/Hz	220/1/50	220/1/50
Refrigerant type		R22	
Control		Capillary Tube	
Unit Dimension	Height	mm/in	1200/48
	Width	mm/in	600/24
	Depth	mm/in	450/18
Unit Weight	Kg		
Sound Pressure Level	dBA	58	
<b>Compressor</b>			
Stage of Capacity Control (BTU/Hr)		One Stage (Optional 0-100 with VFD)	
<b>Hot Water Heat Exchanger</b>			
Heat Exchanger Type		Shell & Coil Type	
Pump	Water Flow Rate	GPM	6
Piping	Installation Pipe Connection	mm/in	25.4/1
<b>Ground Source Heat Exchanger</b>			
Material		S.S Tube Coil	
Temperature Controller	Type	Digital Microprocessor based	
Monitoring	Type	GSM / GPRS (Optional)	

**Note:** The Nominal Capacity is based on 25°C (±2°C) Temperature at (-) 5 - 20 Ft. below Ground level.



# GEOHERMAL SPLIT A/C

PIONEER IN PAKISTAN  
**GEOHERMAL SPLIT TYPE UNIT**  
 HEATING AND COOLING  
 ATTACHABLE WITH CEILING, WALL AND FLOOR MOUNTED INDOOR UNIT



Manufacturer:



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### PLACING OF GEOHERMAL SPLIT TYPE UNIT



#### Geothermal Split Type Unit Specification

Model		ECO-GEO-SCP-12		ECO-GEO-SCP-18	
Nominal Capacity	Cooling	BTU/Hr	12000	18000	
	Heating	BTU/Hr	24000	36000	
Running Current	Cooling	Amps	3.1	4.2	
	Heating	Amps	4.0	5.3	
Power Source	V/Ph/Hz		220V/1 PH/50 Hz		
Refrigerant type	R-22/R410a				
Control	Capillary Tube				
Unit Dimension	Height	mm/in	400/20	400/20	
	Width	mm/in	750/30	750/30	
	Depth	mm/in	300/12	300/12	
Unit Weight	Kg				
Sound Pressure Level	dBA		58		
<b>Compressor</b>					
Stage of Capacity Control (BTU/Hr)		One Stage (Optional 0-100 with VFD)			
<b>Ground Source Heat Exchanger</b>					
Material		S.S tube Coil			
Temperature Controller	Type	Digital Microprocessor based			
Monitoring	Type	GSM / GPRS (Optional)			

**Note:** The Nominal Capacity is based on 25°C (±2°C Temperature at (-) 5 - 20 Ft. below Ground level.





# GEOHERMAL SELF CONTAINED PACKAGE A/C

PIONEER IN PAKISTAN  
**GEOHERMAL SELF CONTAINED PACKAGE UNIT**  
 HEATING AND COOLING



**Duct Type Unit**



**Free Discharge Unit**

Manufacturer:

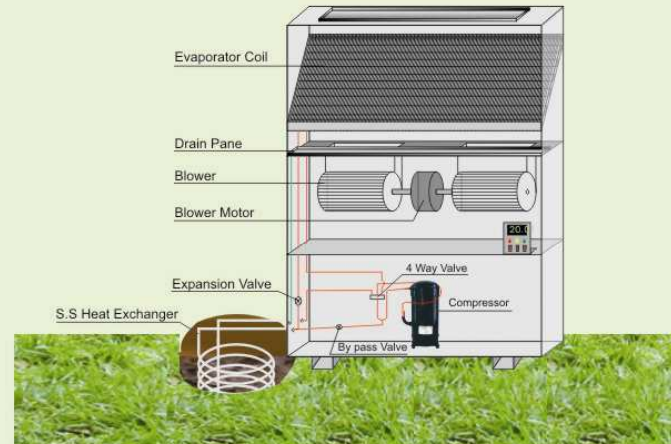


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## PLACING OF GEOHERMAL SELF CONTAINED PACKAGE UNIT



### Geothermal Self Contained Package Unit Specification

Model			ECO-GEO-SCP-12	ECO-GEO-SCP-18
Nominal Capacity	Cooling	BTU/Hr	12000	18000
	Heating	BTU/Hr	24000	36000
Running Current	Cooling	Amps	3.1	4.2
	Heating	Amps	4.0	5.3
Power Source	V/Ph/Hz		220V/1 PH/50 Hz	
Refrigerant type	R-22/R410a			
Control	Capillary Tube			
Unit Dimension	Height	mm/in	1200/48	1200/48
	Width	mm/in	600/24	600/24
	Depth	mm/in	300/12	300/12
Unit Weight	Kg			
Sound Pressure Level	dBA		58	
<b>Compressor</b>				
Stage of Capacity Control (BTU/Hr)	One Stage (Optional 0-100 with VFD)			
<b>Ground Source Heat Exchanger</b>				
Material	S S Tube Coil			
Temperature Controller	Type	Digital Microprocessor based		
Monitoring	Type	GSM / GPRS (Optional)		

Note: The Nominal Capacity is based on 25°C (±2°C Temperature at (-) 5 - 20 Ft. below Ground level.



**Comments to be Added**



**Thank You!**