



# **AIEA Presentation**

## **Geothermal Heatpumps Systems**

[www.aiea.ie](http://www.aiea.ie)




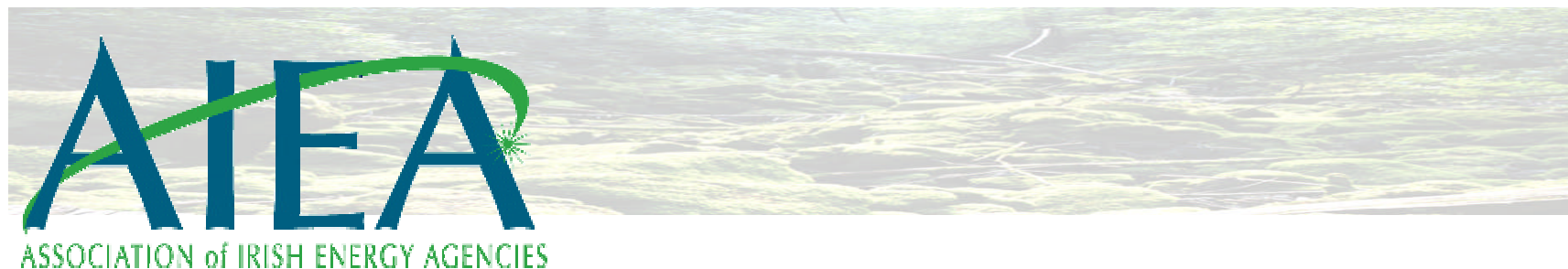
## Introduction to the AIEA

-  16 Local Energy Agencies in Ireland, including 3 in Northern Ireland.
-  Association of Irish Energy Agencies (AIEA) formed in November 1998.



## Central Aim of the AIEA

-  The overall common aim of the constituent member of the Association is to promote renewable energy, energy efficiency and the rational use of energy, to improve the quality of the environment and to contribute to sustainable development.



## ***Mission Statement:***

**“The Association of Irish Energy Agencies (AIEA) is an All-Ireland body assisting the development and implementation of energy policy and best practice in an impartial and effective manner at local, national and EU level, through its own actions and by strengthening the capabilities of its members”**

## **Structure of the AIEA**

**The AIEA is a self-governing organisation, which provides both a critical mass and a sense of continuity for its constituent member energy agencies. It can also provide a coherent and coordinated voice at local, national and European levels**

**Current officers include**

- ✍ Chairman**
- ✍ Secretariat**
- ✍ Treasurer**
- ✍ PR Team**
- ✍ Training Officer**

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## Local Energy Agency Activities

-  Energy awareness and dissemination to the general public
-  Energy management services to the Local Authorities
-  Involvement in Local, National and European Energy Projects
-  Sustainable energy training
-  Energy Policy Development

SEANCE Project



**AIEA**  
ASSOCIATION of IRISH ENERGY AGENCIES



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## **Heat Pump Systems**

Renewable energy heating systems

-  *How do heat pump systems work?*
-  *How can a heat pump system heat my home?*
-  *What is the COP?*
-  *Types of Collectors*
-  *What other components are needed?*
-  *Maintenance and operation*






## How do heat pump systems work?



All types of heat pump systems function similarly. Low grade heat is collected from the ground, water or air, and compressed by the heat pump to a higher temperature heat, suitable for space heating and domestic hot water pre-heating.

## **How can a heat pump system heat my home?**

-  With a ground or water source heatpump, the heat is best distributed using an underfloor heating system or fan-coil radiators.
-  Air source collectors can directly heat the air in a ducted air heating/ventilation system. It can also heat water using an integrated air to water heat exchanger for underfloor or fan-coil heating.
-  Heat pump systems are generally not suitable for direct replacement of conventional radiator based heating systems as these require water temperatures of 80-90°C; higher than most heat pumps can efficiently generate.

## What is the COP?



The efficiency of a heat pump is usually expressed as the Coefficient of Performance (COP). This relates to the amount of heat energy provided for each unit of electricity used to run the pump.

$$\text{CoP} = \frac{\text{Heat output}}{\text{Electricity consumption}} = \frac{4}{1} = 4$$



A heat pump should provide between 3 and 5 kWh of heat for each kWh of electricity consumed. The measurement of CoP should comply with European Quality Standard EN255.

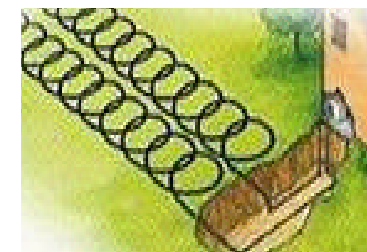
## Types of Collectors

- ✍ Ground Source Horizontal collectors
- ✍ Ground Source vertical collectors
- ✍ Water (Well) to Water
- ✍ Air Source



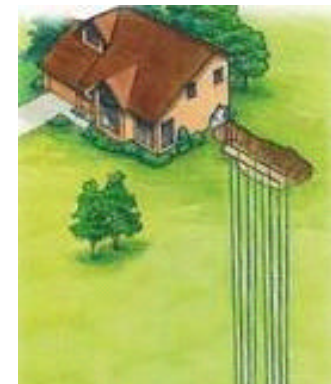
## Ground Source Horizontal collectors

- ✍ Ground Source Horizontal collectors are currently the most common collector type for heat pump systems. The pipes are buried in the soil at a depth of between 1 – 2m.
- ✍ A direct expansion (DX) system requires an area of approximately 25m<sup>2</sup> per kW installed.
- ✍ Where overlapping coils known as Slinky pipes are used, an area of 10m x 0.3m per kW installed is necessary.



## Ground Source vertical collectors

- ✍ Vertical collectors are used where land area is limited. They are inserted as U-tubes into pre-drilled boreholes generally 100 - 150mm diameter, 5m apart and between 15 - 120m deep. About 30m of pipe is necessary per kW installed
- ✍ Vertical collectors are more expensive than horizontal ones but have higher efficiency and require less overall pipe length and pumping energy.



## **Water (Well) to Water**

- ✍ A Water to Water collector uses ground water from a conventional well as a heat source. A well must be able to deliver about 6 litres of fresh water per minute per kW installed.
- ✍ Water source systems can offer better efficiency and lower installation cost than ground source systems but are limited to where a suitable ground water source is available.

## Air Source

- ✍ Air source heat pumps recover heat from outside air, notably the moisture in the air, rather than from the ground or water.
- ✍ They are also ideal as part of a ventilation with heat recovery system.
- ✍ While slightly less efficient than ground or water source collectors when taking air from outside, air source heat pumps have the advantage of being cheaper and more straightforward to install and have a faster response time.



## What other components are needed?

- ✍ Most systems require a buffer tank (60-150L) to optimise running time and reduce wear on the compressor by preventing rapid on/off cycling.
- ✍ Heat pumps can efficiently heat water to about 40°C. To bring DHW up to 65°C, the normal temperature for DHW storage, most heat pump systems incorporate an immersion heater. However, some advanced systems can now achieve temperatures of 65°C with minimal CoP reduction.





## Maintenance and operation

- ✍ Heat pump systems have relatively few mechanical components resulting in little maintenance requirements. Servicing is recommended one a year as per conventional boiler systems.
- ✍ The life expectancy of a typical heat pump is around 20 years while a collector system can have a lifetime of many times this.



**Thank you for your time**

For more information on the AIEA or your local energy agency  
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[www.aiea.ie](http://www.aiea.ie)

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