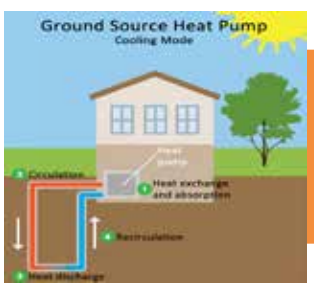
مدينة الملك عبد الله للطاقة الذرية والمتجددة
K·A·CARE

Technology Overview

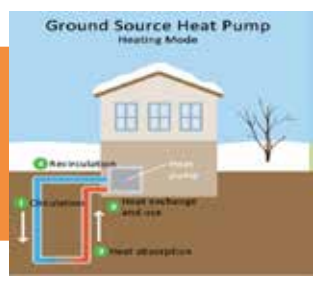
SHALLOW GEOTHERMAL APPLICATIONS

Geothermal cooling using heat pumps is an effective technology to reduce electricity demand associated with cooling loads in KSA



Geothermal cooling is a concept using the stable earth temperature as a natural resource.

Geothermal heating is a concept using the stable earth temperature as a natural resource.



DESCRIPTION OF THE TECHNOLOGY

The earth is a poor heat conductor. Throughout the world, the temperature underground is much more stable and constant than at the surface. This source of heat can be used to meet the cooling and heating requirements of enclosed spaces during summer and cold winter periods.

Geothermal Cooling: Use of shallow geothermal heat pumps offers an opportunity to improve cooling efficiency with a well-known technology that utilizes the earth as a renewable resource.

Geothermal Heating: Geothermal heating systems employ the same type of systems used for cooling and can be employed for hot water supply and space heating during the winter months.

WHAT ARE THE BENEFITS?

- Manage peak summer electrical demand loads
- Reduce intensity of energy use for cooling purposes
- Reduce operational expenditure associated with cooling and heating of enclosed spaces

WHAT IS DRIVING ADOPTION?

- Rising electricity tariffs
- Rising urbanization driving demand for cooling and heating solutions
- Growing demand for energy efficiency and energy management practices
- Climate change mitigation

PATENT AND INNOVATION TRENDS – KEY AREAS OF RESEARCH

Some of the important areas of patent filing include:

1. Flow control of liquid refrigerant in heat pumps
2. State change of refrigerants for compression type refrigeration systems
3. Hot water central heating systems using heat pumps for domestic and space heating

PROMINENT COUNTRIES/ TECHNOLOGY PROVIDERS

KEY APPLICATION AREAS

- Residential establishments – Independent houses and multi storey buildings
- Government buildings and public sector institutions like schools, universities, hospitals etc.
- Commercial buildings and office spaces

OPPORTUNITIES FOR KSA LOCALIZATION

Manufacturing of the following technology components:

- Heat Exchangers
- Piping, spiral tubes and coil
- Storage Tanks
- Heat Pumps
- Valves, flanges and fittings
- Pumps and Pumping Systems

CHALLENGES TO SCALING IN KSA

1. High initial/ CAPEX investment associated with infrastructure
2. Competition from traditional air conditioners which incur a lower investment
3. Subsidized electricity tariffs affect financial viability of renewable energy technologies like shallow geothermal cooling
4. Limited assessment of existing geothermal potential in the Kingdom
5. Absence of financial incentives and subsidies to improve payback periods and ROI