GROUND SOURCE HEAT PUMPS AND SHARED GROUND LOOP ARRAYS

Kensa Contracting
A KENSA GROUP COMPANY

The UK's leading ground source heat pump manufacturer and installation contractor

THE KENSA GROUP

- **Kensa Heat Pumps** remains the UK's only manufacturer of ground source heat pumps since 1999. It provides products and technical support to an extensive network of plumbing contractors.

- **Kensa Contracting** is a specialist ground source heat pump installation business which focusses on large-scale new build and social housing retrofit programmes. It benefits from unrivalled experience and expertise and has delivered the UK's largest installations in the residential sector. Kensa Contracting is the UK's specialist delivery partner for Fifth Generation District Heating networks featuring Ground Source Heat Pumps and Shared Ground Loop Arrays

- **Kensa Utilities** is an infrastructure asset company which funds, owns and maintains shared ground loops that serve ground source heat pump installations. It utilises subsidy support to provide these assets at zero cost to the housebuilder or social landlord.

Part owned by Legal and General Capital

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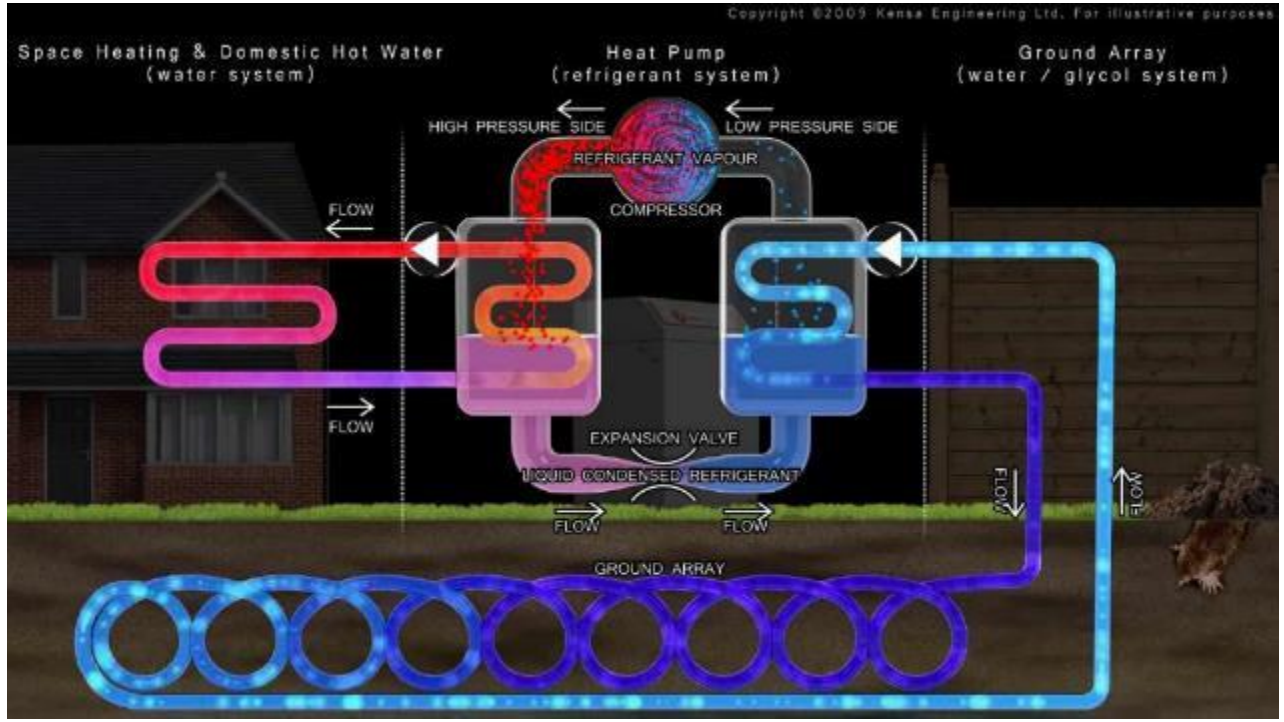
HOW A GSHP WORKS

The basics:

- Non combustion heating system
- Produces 3-4 times more energy than it consumes
- Ground provides a highly efficient source of heat
- Unaffected by air temperature
- Recharged by solar energy and rainfall
- Ground type (thermal conductivity) needs to be factored into sizing calculations
- Correct sizing is important to avoid over extraction



https://www.kensaheatpumps.com/how-a-ground-source-heat-pump-works/

WHY GROUND SOURCE?

Enhanced efficiency and performance

- Unaffected by air temperature and humidity. Because the UK is in a maritime climate Air Source Heat Pumps frosts up more often thereby reducing their efficiency.
- Consistent inlet temperature delivered to the heat pump even in winter (when heating is required most)
- Highest efficiency and therefore lowest running costs and lowest CO2 emissions of any low carbon heating technology
- Reduced grid impact of electrification and therefore considerable grid upgrade savings (50% less than air source according to a recent study). Less energy generation and less grid infrastructure costs.
- Can be integrated with smart controls and time of use tariffs to offer local demand shifting and further reduce running costs
- Offers both cooling and heating zero emission solutions to domestic and non-domestic users
- Flexible and can be used with water source or waste heat applications

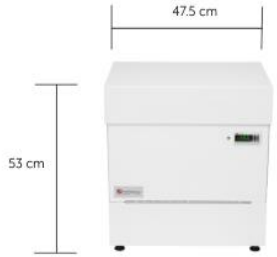
Other benefits

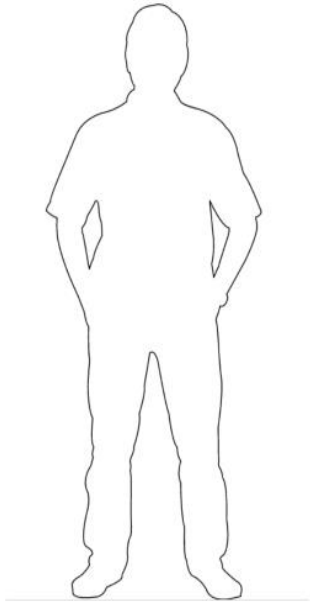
- Long product life – internal heat pump unit lasts 20-25 years, borehole lasts 100 years +, DHW cylinder 30 years, glycol antifreeze in the ground array 20-25 years, manifold 30 years +, ground side circulation pumps (in each GSHP) 7-10 years
- Easier to site, no visual impact, no noise from fans
- No metering or billing
- Less maintenance required
- Lower operating cost to occupant and system owner

KENSA SHOEBOX HEAT PUMPS

The smallest and quietest, multi-award winning ground source heat pump on the market.

- 3kW & 6kW models
- Space heating & hot water
- No electric back up
- Temperatures up to 65°C
- Small, compact, space-saving
- Perfect for flats and smaller homes
- Pair with micro-district heat networks
- Integrated groundside pump
- Genesis energy monitor





NATIONAL HEAT PUMP AWARDS WINNER 2013

SOUTH WEST GREEN ENERGY AWARDS 2013 WINNER

ErP A+ ENERGY EFFICIENCY

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DISTRIBUTION SYSTEM & CONTROLS

- Distribution system sized to 45°C flow temperature
- Radiators oversized
- Timeclock
- Central thermostat
- TRV on radiators
- Hot water priority
- 60°C stored hot water
- Local hot water cylinder

CLOSED LOOP BOREHOLES

For developments with multiple properties, vertical boreholes are typically used to extract heat energy and are linked together to form a shared ground array.

- Closed loop pipework in vertical hole
- Drilled through any type of bedrock
- High Density Poly Ethylene (HDPE) pressure tested pipework
- Thermal conductive grout
- Filled with water and glycol mix
- Can be installed on sites with mine workings, contamination and in urban environments
- Typically 100-250m deep and 150mm diameter
- Space efficient and quick (2 BH/week/rig)
- >100 year borehole life expectancy

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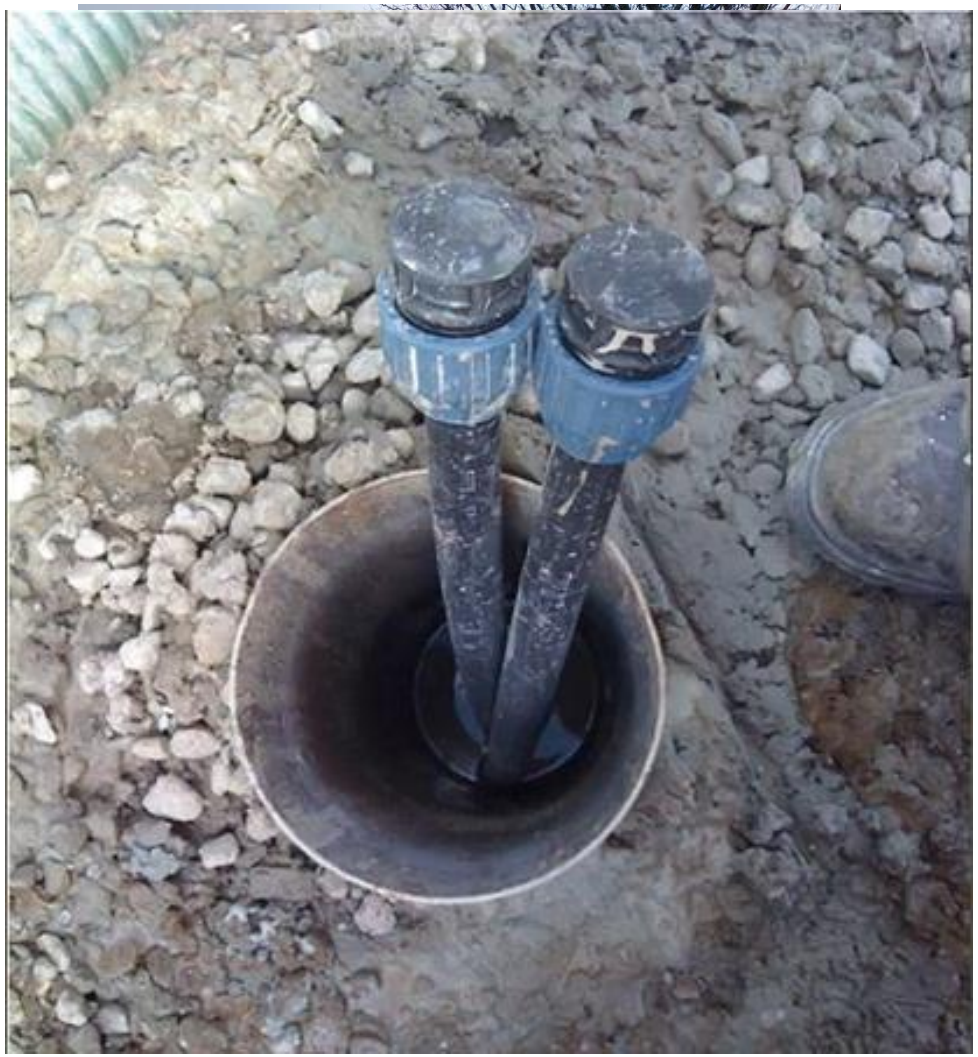
BOREHOLE INSTALLATION



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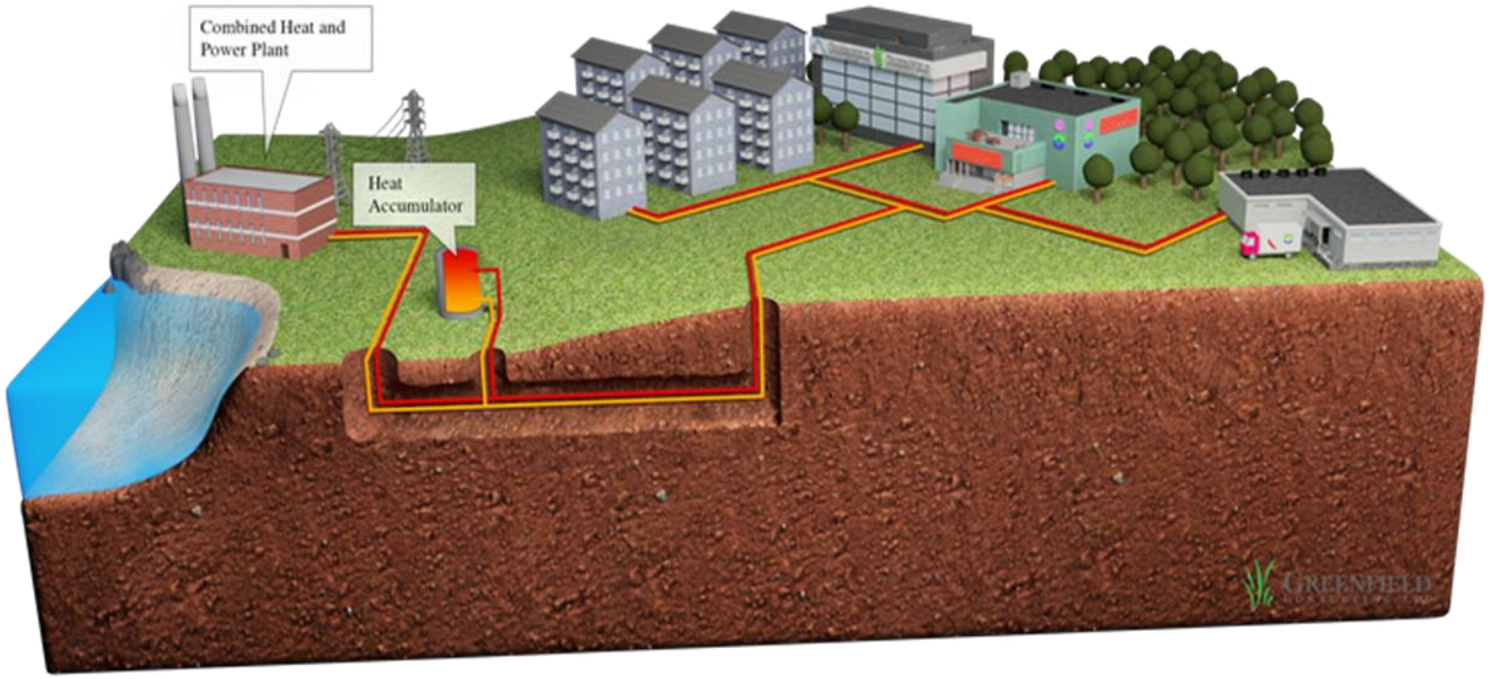
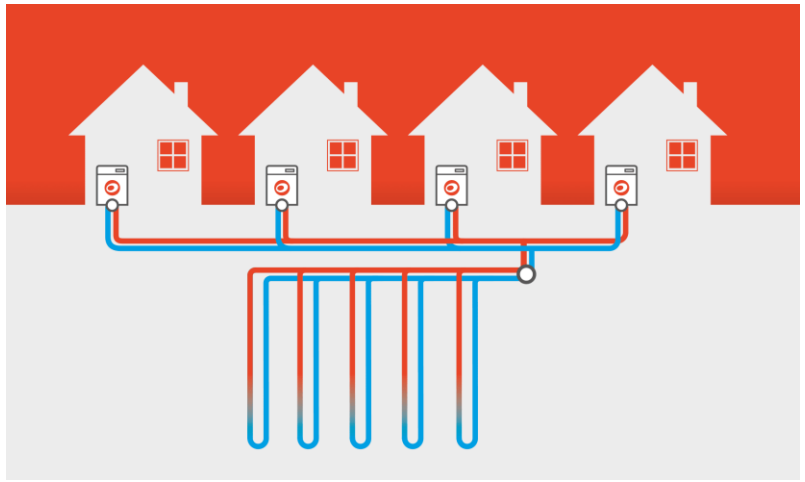
DISADVANTAGES OF TRADITIONAL CENTRALISED DISTRICT HEATING

Main disadvantages:

- Central heat plant which requires fossil fuel back up. If offline all end users are without heating or hot water.
- High temp heat network 50-90°C. Heat loss through pipework which reduces efficiency resulting in higher GHG emissions and higher operating cost
- Each end user has a Heat Interface Units (HIU) which requires regular servicing and maintenance
- Requires Heat Metering and Heat Billing which is onerous and results in high operating costs and consumer protection issues.



Shared ground loop arrays are a form of ultra-low temperature heat network connecting Kensa ground source heat pumps inside individual dwellings.



- Simple, flexible and infinitely scalable solution for large developments
- Ambient temperature network: -5-20°C – no heat losses
- Mimics a traditional gas framework. Boreholes last 75-100 years +
- Individual heat pump in each dwelling – no billing or metering
- No external plant – no visual impact
- No energy centre, central plant or pumps, no pre-insulated pipework or HIUs – low operational requirements
- No sale of heat, no heat metering and no heat billing required. Hassle free low cost operation
- Applicable to all housing and building types.

https://www.kensacontracting.com/services/fifth-generation-district-heating-cooling/shared-ground-loop-arrays/

SHARED GROUND LOOP ARRAY SUMMARY

- Individual Kensa shoebox GSHP in each flat connected to household electricity supply with radiators, hot water tank and simple controls
- Shared communal ground array with an ambient temperature loop rising through the apartment block
- No heat loss through network (0-20°C)
- No plantroom or energy centre, No HIUs, no external pumps
- No expensive, insulated distribution pipework
- No heat metering or billing required
- Consumer free to shop around for their preferred electricity tariff
- Low operating cost to the housing provider
- Extremely low householder running costs (30-50% savings versus existing electric heating)
- 70-90% saving on CO2 compared with mains gas combi boiler

Kensa Contracting offers flexible service delivery options depending on the level of project management required.

This can include:

- feasibility studies, geological surveys & financial modelling
- ground array sizing, design & installation
- heat pump selection, installation & commissioning handover
- integration with existing or upgraded heat emitters
- integration with existing or upgraded heating controls
- sub-contractor management
- tenant liaison and householder education
- support with RHI & ECO grant funding applications
- warranty & after sales support

https://www.kensaheatpumps.com/the-technology/installation-fullfilment/kensa-contracting-ltd/

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MATTHEW BLACK

MOBILE: 07984 274 164

EMAIL: matthew.black@kensacontracting.com

WEB: www.kensacontracting.com