Ground Sourced Heat Pumps

Our experiences and where to next

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MHP

- National RSL managing 26,000 homes
- Build 1,500-2,000 homes/yr
- Interested in Renewable Energy for reasons of Carbon reduction, reduced operating costs, increasing affordability for customers
- Reliance on Gas with 97% of our stock has gas heating
- Interested in "Future proofing " our stock (in the long game)

Our experiences of GSHP

- Started back in 1999 at Raleigh Square, Nottingham
- 20,000 ft2 office
- 30 x 70m boreholes for heating and cooling
- Geoscience/PWP as system designers
- Very successful despite one exploding chiller and a leak

Domestic installations

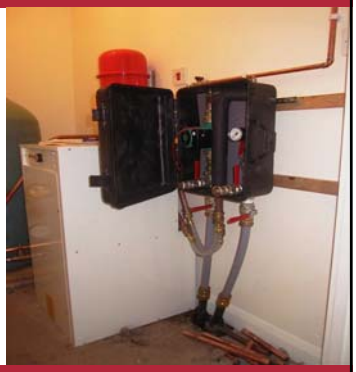
- **Started in 2001**
- **By 2005 we have 72 completed**
- **Formed a partnership with Powergen, Calorex and Geoscience(Earth Energy)**
- **Calorex designed and built the worlds first GSHP that provided full DHW (65 oC) and space heating in 6 months !**
- **Powergen provided start up grants, monitoring and organisation**
- **Also installed 300 Exhaust Air HP and 2 Air sourced HP**

Early problems

- Boreholes are messy , unpredictable and with variable costs
- Delays
- Lack of knowledge and desire not to learn in M&E sub contractors and main contractors
- Need a well trained, experienced team to avoid the problems
- A plan to avoid interference with construction works

- Powergens Heat plant package is a good way to minimise the site installation problems and risks
- Still need a intelligent M&E subi to install the domestic side and connect up
- Contractor care to protect the ground loops
- All this is possible, as recent installations have shown

The Heatpump



Our experiences of the installed Heat pumps

- Today's units are ultra reliable
- Various manufactures recommended – Powergen, NIBE, Viessman
- Three month post installation pressure top up
- Mains pressurised DHW is best
- With low temp space heating under floor heating works best (carpets and laminate floors) , radiators not as reliable and with some customer problems
- Needs to be part of a well insulated home design

Why Ground Sourced Heat Pumps?

- Renewable Energy Source (solar energy).
- Excellent Environmental Performance- Low C02 emissions, 30-40% better than gas (insulation)
- Highly efficient COP 3.4(1m hrs monitoring)
- Low running costs for residents (similar to gas all energy costs).
- Long component life - 50 years+ ground loop, 20- 25 years heat pump.
- No gas or annual maintenance.
- Best whole life cost, 10% better than gas
- Over 1m installations worldwide

Costs today

- Installation costs for pressurised DHW, under floor heating, 3.5 kw HP:
- £7,750 in a “On” gas area
- £6,750 in a “Off” gas area
- This compares to a condensing gas combi boiler system using under floor heating at around ***£4500***
- Running costs of the heat pump system can be 1/2 that of the best gas system, if fitted in a super insulated home with 40% reduction in carbon emissions (c.to Bld. Reg. Home)

Other experiences

- Tried successfully intrench “slinky “ solutions (need large land area)
- 4 pipe boreholes (shorter boreholes)
- In foundation slinky with short in garden slinky (need low heat loss home and deep foundation trench)
- WHVHR with recovered heat put into ground loop to provide preheat

The Future

- Build to Passive House Standards (heat loss 1-3 kw eg. Upton)
- Critical to reduce electrical load further through insulation and by
- Achieving higher COP, 4-5 is a good target (DHW 55 c)
- In foundation trench slinky heat collector pipe
- Utilise faster drilling techniques eg. Roger Bullivants
- Use Lankelma push probes in soft ground (300m/day, £1k saving)
- Reduce cost of heat pump plant through mass production
- Make installation idiot proof with complete preplumbed packages
- Combine with onsite Micropower generation to give near Carbon neutrality
- Target cost £5,500 , reduce cost barrier

Conclusion

- Heat pumps and especially GSHP, have a big future within new homes and well insulated existing stock retrofits
- Further advances in GS installation techniques and heat pump efficiency can give us the competitive edge needed
- We now have proof of how well GSHP perform
- Use well trained installation teams
- Keep the publics confidence by installing what works

Abbey Park, Leicester