THE GROUND SOURCE HEAT PUMP ASSOCIATION
Research Seminar

11:40	Case History Performance	Chair: Phil Moore Recorder: Chris Robinson
11:45	Replacing oil fired boilers by GSHP pumps in existing school buildings in Reading	Rayner Mayer
11:55	Keble College energy piles	Natasha Kefford
12:05	Discussion	
Questions 1	**Q.** What type of windows were present in the school **A.** Single glazed steel framed, which were replaced as part of the overall refurbishment strategy. Cost of replacing windows is reduced due to £30K scaffolding being required for roof replacement (When looking at building performance it is important to consider the entire fabric of school not just a single element). **Comment.** Arup have looked at a number of old properties, primary improve insulation, radiator system – one of parameters is GSHP/biomass etc. system consideration **Q.** With the need to change from oil to GSHP will this increase electricity demand – will this introduce problems in the energy systems (e.g. the National Grid / UK generation capacity) else where? **A.** Refer to 2005 study – electricity Generation in a carbon sustainable world after 20505 Loads will decrease in some areas Loads will increase in other areas, e.g. electric cars, heat pumps Utility companies are aware of load demand changes. De-carbonisation of the National Grid is the UK government's direction.	Nick Kelly – Strathclyde University Duncan Nicholson – Arup Martin Preene, Golders
2	PhD research project has looked at 3 closed loop systems and 1 closed loop system. Heat pump efficiency affects temp most. **Q.** How was the Keble college system monitored for system performance etc. **A.** Natasha didn't have details of the electricity meter type used at Keble College.	Jane Dickson – Buro Happold

	Nick Kelly (Strathclyde University) commented that KWh meter gives continuous power system characteristics Current transducers can be useful to look at system performance / costs. **Q.** How was ground temp monitored? **A.** In & out fluid temp only At Keble Arup looked at energy usage to compare design vs actual. **Comment.** At one of the Reading schools the GSHP in cold weather switched off when temp were as low as -2^{o}C since internal gains exceeded heat losses (i.e. building was getting too hot). This is primarily due to the refurbished building being extremely well insulated (building regs + 250mm insulation) This highlights the need to look at building usage/occupancy and design the system accordingly. Install sufficient instrumentation to tune the building and monitor. **Q.** Would Arup re-visit modelling if designing today? **A.** Arup didn't design the system at Kebel College but are keen to learn.	Tony Amis – G0 Geothermal Rayner Mayer – Reading University Robin Curtis – Earth Energy
12:15	Recorder Summary	