

Southampton District Energy Scheme Features

District heating is cost-effective, environmentally acceptable, flexible and locally-based

CHP energy means reductions in CO₂ emissions and the generation of heat and electricity

Geothermal energy is non-polluting

Since the pioneering launch of the initial geothermal project in 1986, Southampton's district heating scheme has employed up-to-the-minute technology and a host of ground-breaking features. Over the years, the most important development has been the addition of the combined heat and power (CHP) generators to the geothermal network.

The ability of CHP to make electricity from conventional fuels and distribute the otherwise wasted heat adds considerable flexibility to energy planning. The promotion of CHP systems in the public sector is now very much in vogue. Southampton's successful and long-established operation is held up as an example to follow.

District Chilling - system chilled water for air conditioning is a feature of Southampton's five-star De Vere Grand Harbour Hotel - connected in 1994. The chilling system circulates cooled water from the heat station through additional insulated mains which serve the hotel at West Quay. Waste heat from CHP generation is utilised by the absorption heat pump technology - in the winter, with the geothermal well; in the summer, to supply the district chilling system. A three fold increase of the chilling system is already underway to serve major new developments at West Quay. An innovative ice storage system will be added to meet peak loads from this development. The ice store will be filled with ice at night using electricity from CHP and cooling drawn off during the day.

Heat Distribution System - A closed loop of high-tech pipes distributes heat from all Southampton's energy sources around the city centre. For each user, a pair of pipes, with isolating valves and a heat meter, replace a conventional boiler. This amounts to a highly significant saving in space for customers. At ASDA's Southampton store, it is the difference between a modestly-sized cupboard and a boiler room of substantial proportions.

The district heating scheme in Southampton closely resembles a huge domestic central heating system. Hot, treated water circulates

underground from the heat station to a growing number of customers in the city centre and is then returned for re-heating. Hot brine from the geothermal well today provides only 18% of the total district heating mix. Fuel oil (10%) and natural gas (70%) account for the remainder.

Southampton's well is more than a mile deep. The temperature of the water is 76°C at its source and two degrees less by the time it reaches the surface.

The water rises naturally in the well to within 100 metres of the surface. It is then pumped to the heat station. The hot brine is passed through a heat exchanger, working in conjunction with an absorption heat pump. The heat exchanger transfers the heat to clean water. The cooled brine, at about 28°C, runs out to the sea. The power

Power for the downhole circulation pumps and plant is generated at the heat station by CHP. The heat from the CHP generators is fed into the district heating scheme. Surplus power is sold to the National Grid.

The station

The schematics show how we provide heating and chilling from a variety of energy sources.

At the heat station, heat transfers from the brine to the hot water heat distribution system.

The station houses the heat exchanger, brine and water filters, heat distribution pumps, a CHP generator to meet the systems electricity demand, plus control and data monitoring equipment.

During periods of exceptionally high demand, extra heat can be provided by back-up boilers.