

# Geothermal heat pumps reduce energy costs at wastewater plants

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(PhysOrg.com) -- Can sinking geothermal heat pumps into waste water treatment plant aeration ponds provide heating and cooling to lower the plant's energy costs?

Two University of Illinois at Chicago engineers will test two types of heat pump at the Metropolitan Water Reclamation District of Great Chicago's James C. Kirie plant in Des Plaines, Ill.

The project, to be conducted over the coming year, "will determine the feasibility of harnessing energy from the effluent water," said Sohail Murad, professor and head of chemical engineering at UIC and the project's principal investigator.

Murad said the [demonstration project](#) could determine which system can reduce the plant's heating and cooling energy needs by 20 percent. Further refinements could reduce energy use even more.

Both "open" and "closed"-loop geothermal heat pump systems will be tested.

Heat pumps collect heat during winter through fluid circulating in pipes called loops, placed below ground or in a body of water. The circulating fluid carries ground or water-stored heat indoors. In summer, the loop draws away indoor heat and carries it underground or under water, where it is absorbed. In a closed loop system, the circulating water or other suitable fluid stays within the pipes. In an open loop, water from the

pond is used directly instead of the circulating fluid. It is pumped in and out of the system.

"Open and closed-loop pond systems are not very common, so development work has to be done to establish optimal operating parameters," said Murad, who specializes in thermodynamics. "We'll also test if the treated water leads to any corrosion or fouling issues in the pipe in the open system," he said.

The project will use treated water that exits the plant into adjacent aeration ponds.

Catherine O'Connor, the Metropolitan Water Reclamation District of Great Chicago's assistant director of monitoring and research, said the project is novel and there is no documentation of a side-by-side comparison of an open versus closed-loop system that recovers heat from reclaimed water effluent.

"The open system promises to be more efficient, but may prove to require excess maintenance," O'Connor said.

Kirie ranks in the middle for capacity among the MWRD's seven water-reclamation plants, at about 46 million gallons of effluent daily. It is the district's newest plant.

"Heating and cooling plant buildings are a significant cost to the district," O'Connor said. "Plant buildings include office space and buildings that house process control and the filters."

Provided by University of Illinois at Chicago

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