

Ground Source Fact Sheet for Schools

- If every US school district that needed to replace heating and cooling systems over the next 10 years decided to install a ground source system, the total energy savings over that time would exceed \$11 billion.
- Schools now using ground source systems save more than \$25 million in energy costs -- funds that can be reallocated for books, computers, teacher salaries and other needs.
- Since ground source systems burn no fossil fuels, and use much less electricity than other technologies, their use slashes greenhouse gas emissions. The 600 U.S. schools that have already adopted ground source have helped reduce annual emissions by:
 - close to 120 million pounds of carbon dioxide (CO₂);
 - more than 900,000 pounds of sulfur dioxide (SO₂); and
 - more than 425,000 pounds of nitric oxide (NO_x).
- The electricity required to power one million homes for one year would be saved, if every school that could use ground source did so.
- New Jersey's Richard Stockton College is home to the world's largest operating closed-loop ground source system. This 1,600-ton installation heats and cools college classrooms and administrative buildings.
- When finished, the American Hebrew Academy will become the largest closed-loop ground source system, at 3,200 tons. The system will heat and cool 39 separate buildings on the school's campus in Greensboro, NC.
- Austin (Texas) Independent School District was the nation's first school district to install ground source heating and cooling systems on a large scale. Since 1989, virtually all heating and cooling installations have been ground source, replacing standard heat pumps and boiler/chiller systems as the new system of choice. In fact, about 60% of Austin's 100 schools employ ground source systems. Energy savings are estimated at 25 percent, compared to the schools with conventional systems.
- Replacing conventional equipment with ground source systems, in all applicable schools, would provide benefits equal to:
 - planting 8 million acres of trees;
 - reducing the need for 61 million barrels of oil;
 - converting 37 million cars to zero-emission vehicles; and
 - saving 2.6 billion gallons of gasoline.

Straight A's for Ground source

Ground source earns high marks across the board:

Lower operating and maintenance costs. Operating and maintenance costs are substantially lower with a ground source system. A study in Austin, Texas, for example, determined that ground source systems are the most financially beneficial heating and cooling choice for schools, resulting in a decision to convert 54 schools to the technology.

Kentucky Utilities data estimate the operating and maintenance savings of ground source systems to be 12 to 19 percent over 20 years. A study by Lincoln (Nebraska) Electric System yielded similar results. Moreover, the EPA suggests that, depending on a number of variables, savings of 40 percent or more on annual heating and cooling costs are not uncommon.

Maintenance costs also are reduced because of the innate simplicity and reliability of ground source. Routine maintenance is primarily the replacement of air filters. Because these tasks can be done by the school custodial staff, ground source requires no in-school HVAC technicians.

Classroom comfort and user satisfaction. Because ground source systems use several relatively small heat pumps, each teacher can control the climate in his or her classroom.

Larger spaces, such as gymnasiums and auditoriums, are controlled by their own individual heat pumps. So, there is no need to heat or cool other areas of the school when only these spaces will be

utilized for after-hours or weekend activities.

Design flexibility "in"--rooftop repairs "out." Because most ground source systems eliminate the need for outdoor or rooftop equipment, schools are no longer limited to flat roof design, allowing for broader architectural ideas and reducing the need for rooftop repairs. Moreover, ground source systems occupy less physical space than conventional heating and cooling equipment, leaving additional space for other uses.

Safety. Some combustion-based systems present a hazard if the storage or delivery of fuel is not carefully controlled. Since these systems require a flame to operate, the potential of fire hazard exists. Furthermore, incorrectly installed combustion-based systems, blocked chimneys or downdrafting can cause carbon monoxide to remain inside a building. Ground source uses no combustion, requires no fuel storage and delivery, and produces no indoor pollutants. And since the earth connection is installed beneath the ground, children are not tempted to play on dangerous outdoor equipment.

Environmental awareness--and action. As the most energy-efficient system available, ground source takes the important message of stewardship of the earth and puts it into action for students today--and for generations to come.