

SmartRooms

Thermal Comfort Systems by *Therma-Ray*

SmartRooms Earth Storage - Case Study



Overview

Location: Elk River, MN

7,600 Sq.Ft. Single-Level, slab on grade with R19 walls and R38 Ceiling - 12 foot Sidewalls.

Inside Design Temperature – (70°F) / Outside Design Temperature – (-10°) - 7,811 Actual Degree Days

Electric Program - \$.029 per Kwh Rate on 8 Hour Off-Peak Program

Data Collection Dates = Sept. 1st 2004 – August 31st 2005 / Energy Consumption = 41,653 Kwh

Total Cost to Operate - \$ 1,207.93 @ \$.029/Kwh

This retail building is open 7 days a week with considerable walk-in traffic along with two large shop doors located in the service bay that are opened frequently throughout the day.

Recovery time is much faster with Radiant Heating system due to the fact that Radiant Heat warms the walls, floors, objects and people first, which in turn gently warms the air. Convection style heating systems heat the air first and then try to warm the area. The convection heated air escapes at any given opportunity, while the walls, floors and objects of a Radiant heated area remain and continue to transfer heat.

Cost Comparison of Heating Sources

		Rates	
Name:	Case Study - Earth Storage	Heating Oil:	\$3.01 per Gallon
Project:	7,600 Sq.Ft. - Slab on Grade Building 8 Hour Off-Peak Program 70° Inside Design Temperature -10° Outside Design Temperature 7,811 Actual Degree Days	LP Gas:	\$1.89 per Gallon
		Natural Gas:	\$1.39 per Therm
		ETS - Electricity:	\$0.029 per kWh
		Dual Fuel - Electricity:	\$0.031 per kWh
		Electric Resistance:	\$0.065 per kWh
		Yearly Heating Load :	275,000,000 BTU's

	Efficiency Rating	Total Gallons Needed	Price / Gallon	Cost of Operation
Heating Oil	60%	3321	3.01	\$9,996.98
	70%	2847	3.01	\$8,568.84
	80%	2491	3.01	\$7,497.74

	Efficiency Rating	Total Gallons Needed	Price / Gallon	Cost of Operation
LP Gas	70%	4294	\$1.89	\$8,114.75
	80%	3757	\$1.89	\$7,100.41
	90%	3339	\$1.89	\$6,311.48

	Efficiency Rating	Total Therms Needed	Price / Therm	Cost of Operation
Natural Gas	70%	3929	\$1.39	\$5,460.71
	80%	3438	\$1.39	\$4,778.13
	90%	3056	\$1.39	\$4,247.22

	Efficiency Rating	Total kWh Needed	Price / kWh Rates	Cost of Operation
Electric Resistance	100%	80598	\$0.065	\$5,238.86

	Efficiency Rating	Total kWh Needed	Price / kWh Rates	Cost of Operation
ASHP Air Source Heat Pump	200%	40299	0.065	\$2,619.43

	Efficiency Rating	Total kWh Needed	Price / kWh Rates	Cost of Operation
GSHP Ground Source Heat Pump	300%	26866	0.065	\$1,746.29

	Total kWh Needed	Price / kWh Rates	Cost of Operation
ETS Electric Thermal Storage	41653	0.029	\$1,207.93

	Total kWh Needed	Price / kWh Rates	Cost of Operation
ERC Electric Radiant Ceiling	50532	0.031	\$1,566.48

Oil=138,000 BTU/gal., LP=91,500 BTU/gal., NG=100,000 BTU/Therm, Electricity=3412 BTU/kWh
 Heating load is approximate but must stay constant for all fuel sources

**Cost of Operation for Earth Storage System is actual. Comparison costs are an estimate.
 Actual costs will vary depending upon rates and programs offered.**