

AB 1103 - 2007

- ❑ Applies to non-residential building >5000 sq. ft.
- ❑ Requires owners to rate their buildings using Energy Star Software (Portfolio Manager)
- ❑ Must disclose “Statement of Energy Performance” to the CEC.
- ❑ Latest rules:
 - July 1, 2013 for buildings >50,000 sq. ft.
 - July 1, 2013 for buildings 10,000-49,999 sq. ft.
 - January 1, 2014 for buildings 5,000 – 9,999 sq. ft.

Good News for California

Los Angeles Leads U.S. in Energy Star Buildings

WASHINGTON—For the fifth consecutive year, Los Angeles ranked first in the U.S. Environmental Protection Agency's (EPA) list of U.S. cities with the most Energy Star commercial buildings. L.A. had 528 such buildings last year.

Washington, D.C., placed second for the fourth consecutive year with 462 buildings earning the Energy Star label. The other top metro areas, in descending order, are Chicago, New York, Atlanta, San Francisco, Houston, Dallas-Fort Worth, Phoenix and Boston. To earn the Energy Star seal, commercial buildings must perform in the top 25% of similar buildings. According to EPA, there were more than 20,000 Energy Star commercial buildings in 2012.



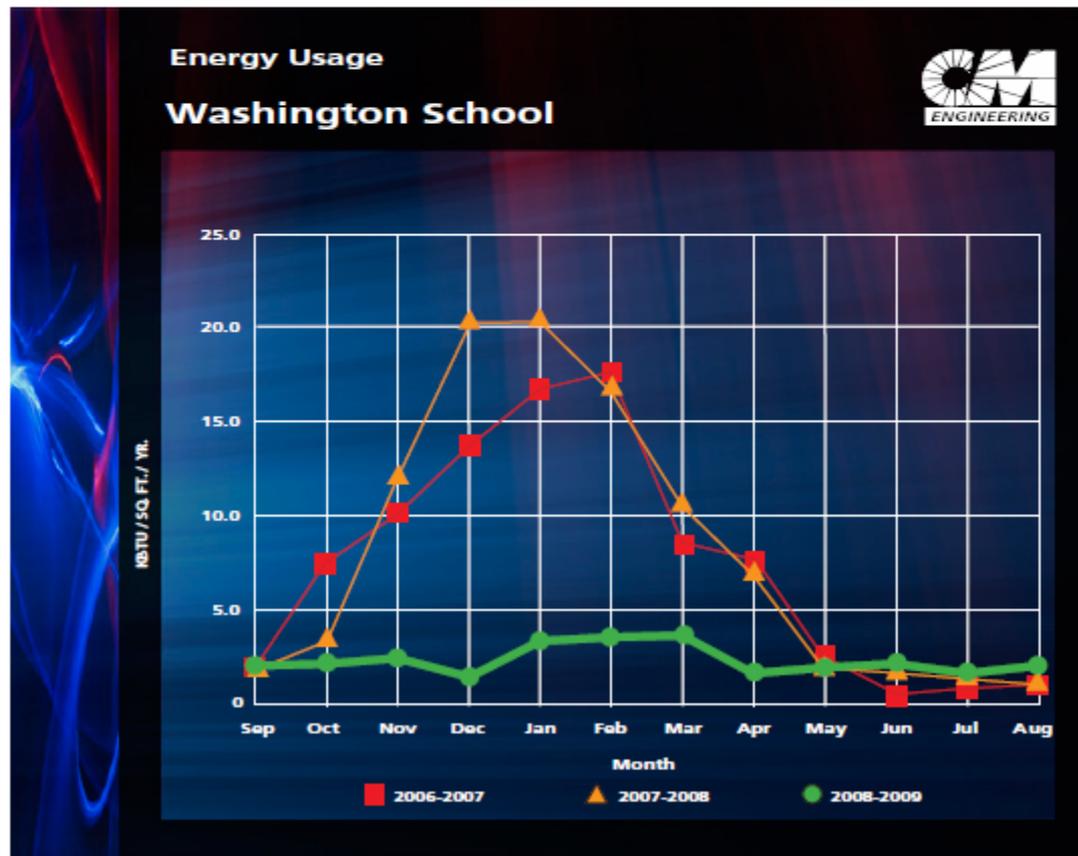
Washington Elementary School suffered high spikes of energy consumption during the winter months.

During the summer break of 2008, we installed our One-pipe geo-exchange heating and cooling system. Digital controls were added to all spaces and a classroom lighting was retrofitted. Energy recovery ventilation was added to the building, ensuring a healthier and more comfortable indoor environment.

These retrofits resulted in immediate energy savings as demonstrated by the chart below and \$64,000 of *COST SAVINGS* annually.

Retrofit of existing school

- Air conditioning added to every room
- Ground source geo-exchange system
- One-pipe design
- 92,000 square feet
- 60 Classrooms
- Approximately 836 students ('08-'09)
- Energy recovery ventilation
- Digital temperature controls in every space
- Lighting retrofit in classrooms
- VRF (Variable Refrigerant Flow) in office area
- Retrofit cost \$26.16 / sq. ft.
- Energy use BEFORE retrofit: 86 KBTU / sq. ft.
- Energy use AFTER retrofit: 24 KBTU / sq. ft.
- Annual cost savings: \$64,000
- 2012 Energy Star rating: 97



The green tracing above shows measured energy consumption



Community College of San Francisco



Bay Area Residence



- ❑ Pool Heating
- ❑ Forced air heating/air
- ❑ Domestic hot water



Federal Bureau of Prisons

- Federal Prison Camp
 - Camp Housing
 - Camp Core
- 87 tons
- 34,000 sq.ft.
- 108 vertical loops

Mendota, CA



Historic Hotel & Restaurant



- ❑ Forced air heating and cooling
- ❑ Domestic hot water
- ❑ Pool and spa heating

Pond Loop - Winery



- ❑ Forced air heating and cooling
- ❑ Radiant in-floor heating
- ❑ Chilled water for process
- ❑ Hot water for process

So. Lake Tahoe Office Building



10,000 s.f. - Forced air heating and cooling



Visitor's
Center Rancho
Mirage, CA
April 2009

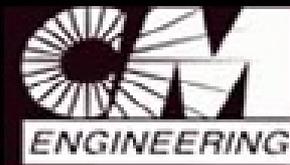


Visitor's Center February 2011



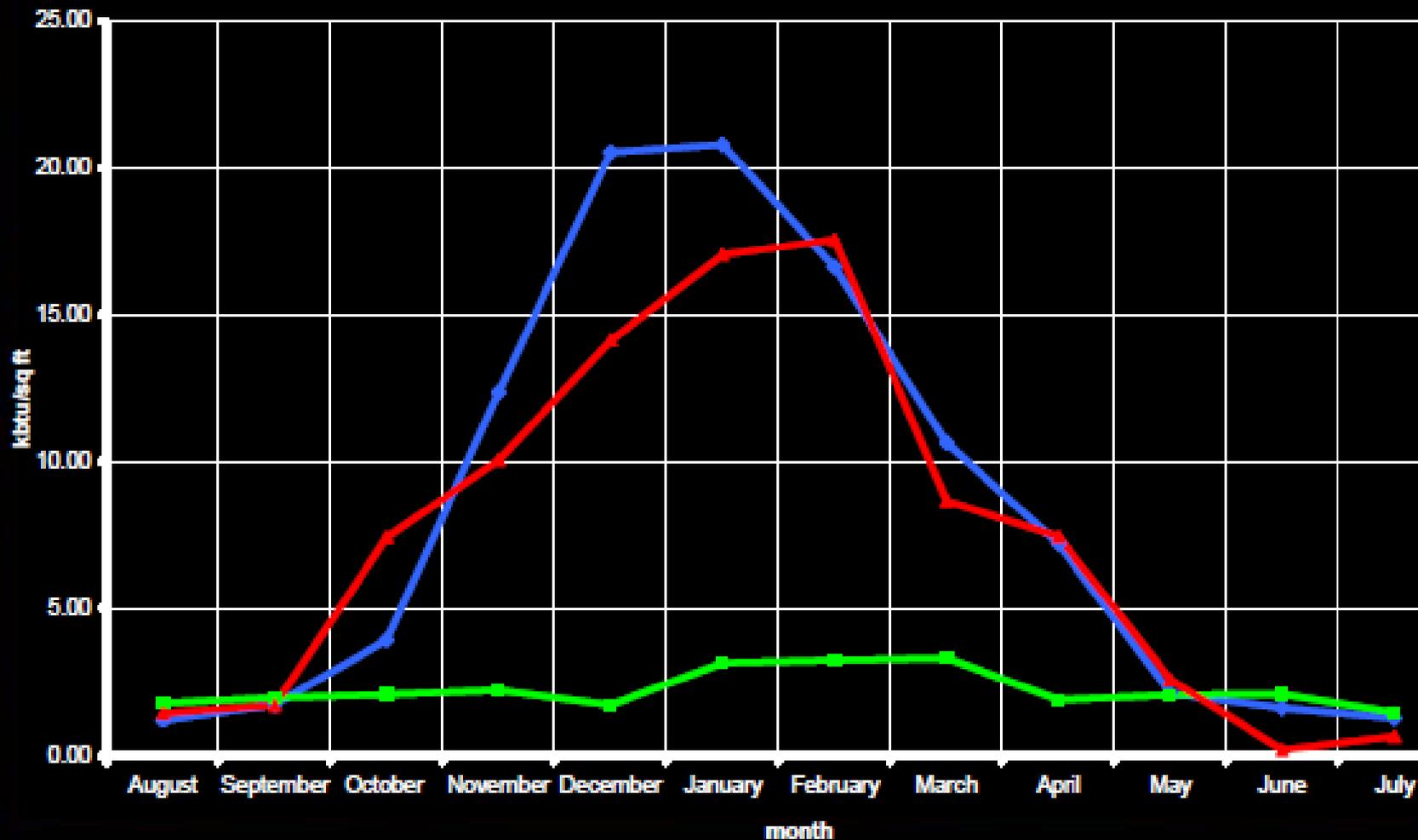
Geothermal Construction

CM Engineering



Washington Elementary Belvidere Illinois

— 2008 — 2009 — 2007



Why EnergyStar?

- ❑ Compliance with AB 1103
- ❑ Straightforward approach to collecting data on ‘how GHP systems are performing in California’
- ❑ Benchmark buildings with GHPs against similar buildings with more conventional designs
- ❑ Create a format for featuring these projects (refer to ASHRAE Article) on the CaliforniaGeo website
- ❑ Make all this information available to the public to assist them in making informed choices on mechanical systems, design engineers and installing contractors.

The Engineering Portfolio – Individual Building Description



Westside Elementary is a 38,000 ft², two-story structure opened in 1929. A 2008 renovation included a geothermal heat pump (GHP) system, lighting upgrade, window replacement, and an energy recovery ventilation system. Energy performance has exceeded expectations as indicated by the EPA ENERGY STAR rating of 98. The GHP installation cost was \$863,210 and energy savings indicate a 5-year payback. Occupants rate comfort, air quality, lighting, acoustics, and maintenance at 3.9/5.0 (Satisfied). Client contact to verify results: John Smith (jsmith@school.edu)

Building Details	Floor area = 38,000 ft ² , 500 occupants, 10-month operation			
	Energy Use: 307,800 (8.1 kWh/ft ²), Demand: 118 kW (3.1 W/ft ²), Energy Cost: \$30,475 (\$0.80/ft ²)			
HVAC Equipment	32 water-to-air heat pumps (90 tons), 36 pumps (5.5 hp total), four 2500-cfm energy recovery units			
Ground Loop	88 vertical bores at 225 ft. each, 1-inch HDPE U-tubes, individual circuits to each heat pump			
Installation Costs	HVAC		Ground Loop	
Total HVAC & Loop \$863,210 \$22.72/sq. ft.	Heat pumps (32)	\$128,000	Drilling/Installation	\$158,400
	Pumps (36)	\$19,800	HDPE U-tubes	\$29,700
	ERUs (4)	\$120,000	Exterior Headers	\$27,000
	Ductwork	\$144,000	Thermal Grout	\$18,810
	Interior Piping	\$56,000		
	Controls	\$66,500	Cost per bore ft.	\$11.81
	Electrical Upgrade	\$95,000		
	Total	\$629,300		\$233,910
	Total per sq. ft.	\$16.56		\$6.16
Occupant Satisfaction	Cooling Comfort	3.7/5.0	Heating Comfort	4.4/5.0
	Indoor Air Quality	3.9/5.0	Lighting	4.4/5.0
	Acoustics	3.7/5.0	Ability to Control	3.1/5.0
	Maint. Frequency	4.2/5.0	Maint. Response	3.5/5.0
Maintenance Staff Satisfaction	Serviceability	3.0/5.0	Quality of Installation	3.5/5.0
	Quality of Design	4.0/5.0	Quality of Equipment	2.5/5.0