

Overview of Baseboard Heating

If you live in an apartment equipped with a baseboard heating system, please take a moment to review the following sections so that you can better understand how your heating system works and what you can do to keep your heating costs as low as possible.

- [How Does Baseboard Heating Work?](#)
- [How Does The Time-Temperature Monitor In My Home Work?](#)
- [How Is My Heat Cost Allocation Bill Calculated?](#)
- [What Can I Do To Keep My Baseboard Heating Bill To A Minimum?](#)

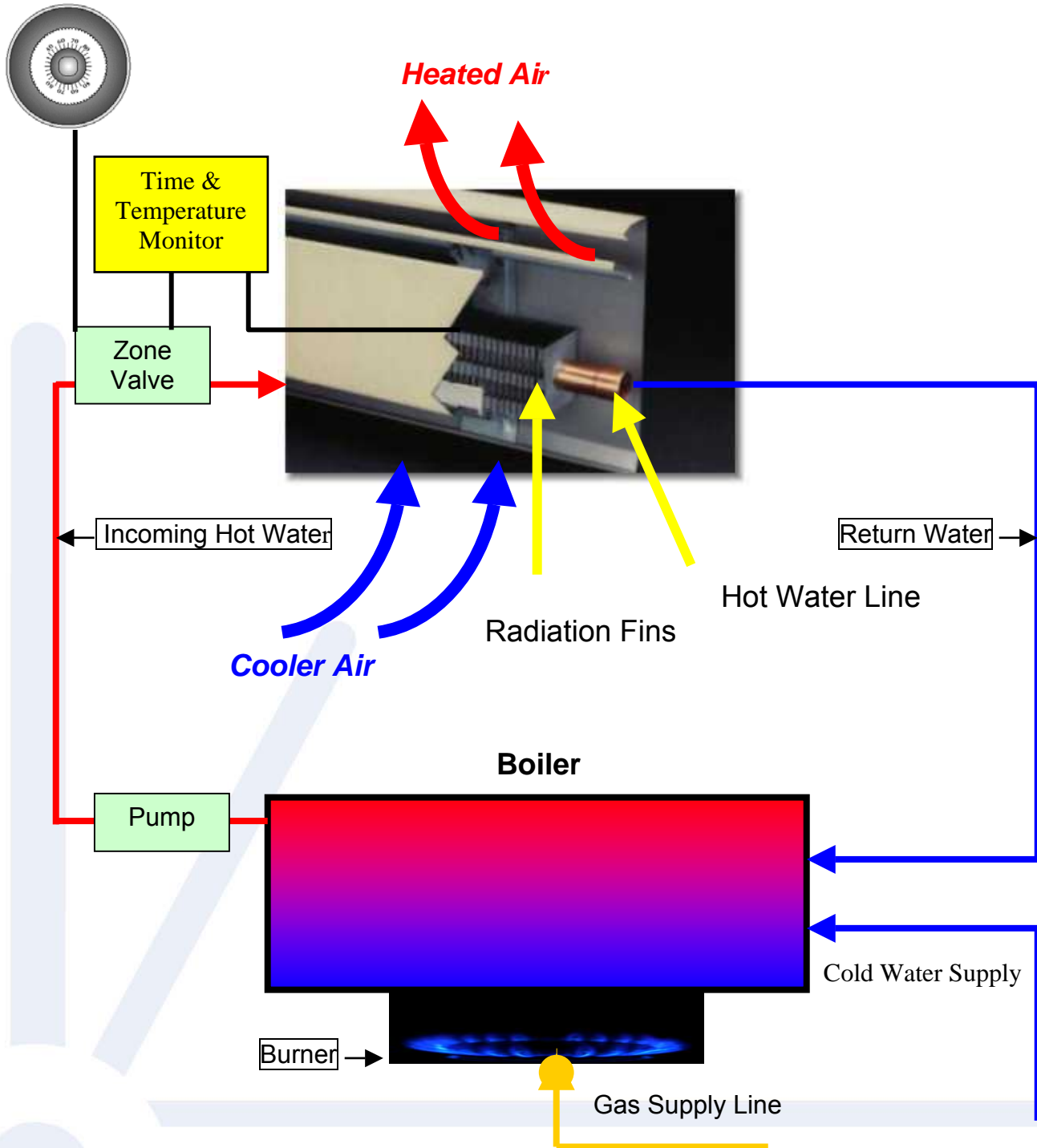
How Does Baseboard Heating Work?

Please refer to the diagram below which illustrates a typical hydronic baseboard heating system. As the diagram shows, water is heated in a boiler to 160°-200°. The boiler fuel source is generally gas or oil. A circulating pump distributes heated water throughout the building. Copper water lines are used to carry the heated water from the boiler to the baseboards.

Each dwelling unit has an individual thermostat. When the air temperature in the unit drops below the thermostat setting, the zone valve is activated allowing heated water to circulate through the water lines to heat emitters like the radiation fins depicted in the illustration. As cooler room air passes over the radiation fins, the air absorbs heat from the fins and distributes the heated air by natural convection. When the room air temperature reaches the desired setting, the thermostat closes the zone valve. The colder return water is then delivered back to the boiler and reheated. This cycle repeats as room temperatures in the apartment units fluctuate.

Baseboard Heating Diagram

Thermostat (controls opening and closing of zone valve)



How Does The Time-Temperature Monitor In My Home Work?

The Time-Temperature Monitor installed in your home measures the time that your zone valve is open each month and the corresponding water temperature in your baseboard heating system. A microprocessor in the monitor records and stores individual time-temperature units during the billing period. The monitor also detects system malfunctions including any system disconnections. Time-temperature units and system monitoring data are then transmitted by radio frequency to an on-site data collector. The data collector relays system information on a daily basis to Guardian's billing center.

How Is My Heat Cost Allocation Bill Calculated?

Baseboard heating systems emit heat at the rate of about 700 BTU's* per hour for every lineal foot of baseboard fin dimension. To calculate your monthly heat bill, we multiply the lineal feet of baseboard fins in your unit by 700. We then convert your BTU's to an equivalent heat unit by multiplying your BTU's by the number of time-temperature units measured in your apartment during the billing period. Your bill also includes a base energy allocation that represents the energy costs associated with domestic hot water, boiler efficiency and distribution heat emission as hot water passes through the delivery system on the way to your unit.

Please refer to the following page for a detailed description of how we calculate your heat cost allocation bill.

* BTU (British Thermal Unit) is the amount of heat needed to raise the temperature of one pound of water by one degree Fahrenheit (F) at or near 32.9°F.

Detailed Calculation Of A Baseboard Heat Cost Allocation Bill

Guardian uses the following billing formula to compute resident baseboard heat allocation. A sample bill calculation is shown on the following page.

Definitions:

NB	=	Net Billable amount from master bill
\$	=	Total charges shown on monthly master bill
CA	=	Amount of master bill attributed to Common Area usage
HW	=	Amount of master bill attributed to Hot Water usage
NB	=	$[(\\$) - (CA) - (HW)]$

HU_i	=	Heat Units of usage for dwelling unit i during the billing period
TTU_i	=	Time-Temperature Units for Dwelling Unit i during the billing period
LF_i	=	Lineal Feet of baseboard in Dwelling Unit i
BTUH_i	=	BTU's per hour in Unit i
BTUH_i	=	700 x LF _i
HU_i	=	$\frac{(BTUH_i) \times (TTU_i \times 36)}{3,600}$
		1,000

B_i	=	Base heating costs allocated to any unit i
B	=	Base heating costs (domestic hot water, distribution losses, efficiency losses)
CF	=	Cubic Feet of usage shown on monthly master bill
B	=	$NB - (\sum [(HU_i \times \$/CF)] [i = 1...n])$
N	=	Number of dwelling units
B_i	=	B/N

Billing Formula:

MHC_i	=	Monthly Heat Cost allocated to Dwelling Unit i
HC_i	=	B_i + (HU_i x \$/CF)

Sample Heat Cost Calculation

Building Summary:

Master Bill \$	=	\$3,266.92
Master Bill CF	=	206,200
Cost Multiplier (\$/CF)	=	.01584
Common Area 10%	=	\$326.69
Domestic Hot Water	=	\$614.98
Number of Units (N)	=	36
Total HU's (all 36 units)	=	55,738.6
Cost of HU's (all 36 units)	=	(55,738.6 x .01584) = \$882.90
Net Billable (NB)	=	(\$3,266.92 - \$326.69 - \$614.98) = \$2,325.25
Base Energy (B)	=	(NB - (Cost of HU's)) = (\$2,325.25 - \$882.90) = \$1,442.35

Example Apartment:

Fin Length	=	35'
TTU's during billing period	=	20,413
HU's during billing period	=	$(700 \times 35) \times (20,413 \times 36) / 3,600$
(see formula above)		1,000
HU's during billing period	=	5,001
Base Energy Allocation	=	(\$1,442.35 / 36) = \$40.07

Heat Cost Bill For Apartment "A":

Heat Cost Bill	=	Base Energy	+	(Heat Units x Cost Multiplier)
\$119.29	=	\$40.07	+	(5,001 x .01584)

What Can I Do To Keep My Baseboard Heating Bill To A Minimum?

To maximize the efficiency of your baseboard heating system and keep heating costs to a minimum, we recommend the following:

- Baseboard fins should be periodically straightened and vacuumed to maximize heat radiation.
- Make sure there is proper airflow through baseboard convectors.
- Furniture, draperies, carpeting and other obstructions in front of baseboards will restrict heat radiation and increase resident heating costs. Residents should consider repositioning furniture and removing obstructions to maximize heating efficiency. Draperies should be at least 6" above the baseboard. Any furniture with a full skirt should be at least 6" from the baseboard.
- Set your thermostat to 67°-68° during the winter while you're home during the day. Lower it at night or while you're away to 60°. Please note that people with medical problems may require a higher setting.
- Thermostats should not be installed near a heat source (e.g., computer) or cold air draft.
- During winter months, keep shades and blinds open during the day to allow sunlight and heat into your home.
- At night close shades and blinds to slow heat loss through the glass.
- Replace damaged weather stripping around doors and windows.
- Seal windows with plastic film to keep out drafts.
- Run dishwashers only when they are full. This will help reduce water and energy heating expenses.
- Whenever possible, wash clothes in cold water. Most laundry detergents work effectively in cold water.
- Insulate water lines where needed to minimize heat loss. Make sure pipes that run through unheated areas are insulated.
- Boiler, circulating pump, piping and controls should be inspected annually.