



A wholly owned subsidiary of



What is the difference between a condensing water heater and a non-condensing water heater?

- Efficiency
- Price
- Physical size
- Venting
- Maintenance

Efficiency

- Condensing water heaters removes the latent heat from the flue gasses.
- Condensing occurs when the flue gasses drop below the dew-point (typically below 135 degrees)
- 1 pound of condensed flue gasses is equal to 970 BTU's.
- Condensing appliances range in efficiency from 87% to 98%.
- Modulating water heaters are more efficient at the lowest input rate.
- Condensate has a ph of 3.5 to 3.7 (acidic)

2000 ASHRAE Systems and Equipment Handbook

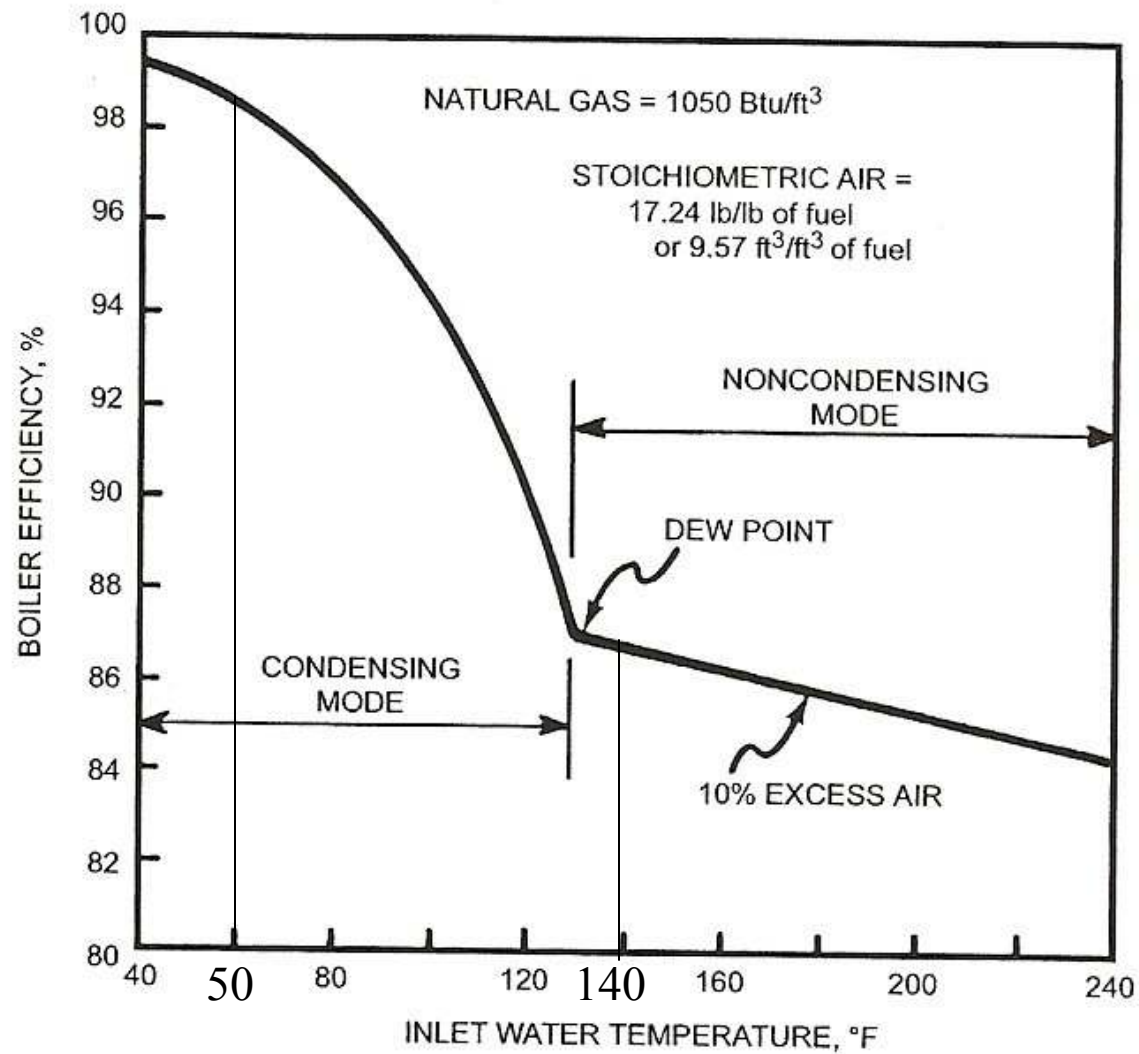
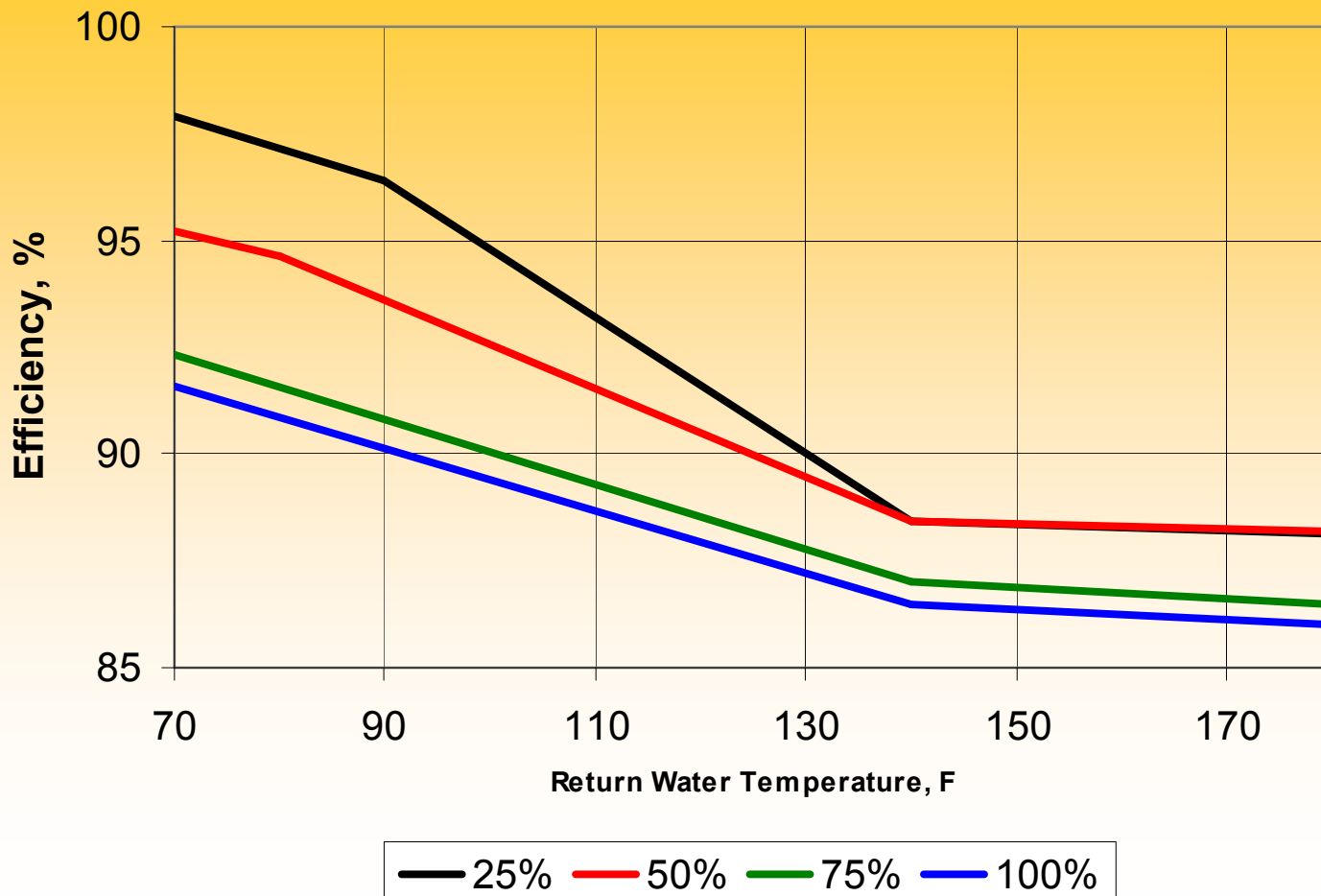


Fig. 5 Effect of Inlet Water Temperature on Efficiency of Condensing Boilers

Modulating Water Heater Efficiency



Price

- 100 gallon 199k BTU tank type water heater (non condensing) list price is \$3,780.00
- 100 gallon 199k BTU tank type water heater (condensing) list price is \$4,613.00 (122% more)
- 1.2 million non condensing copper-finned tube water heater list price is \$10,553
- 1.2 million condensing copper-finned tube water heater list price is \$35,139 (332% more)

Physical Size

- Tank type condensing water heaters are only slightly larger than non condensing water heaters
- Condensing copper-finned tube water heaters have significantly smaller footprints than non condensing water heaters. (1,925 sq. ft. versus 3,564 sq. ft) not including service and combustible clearances.

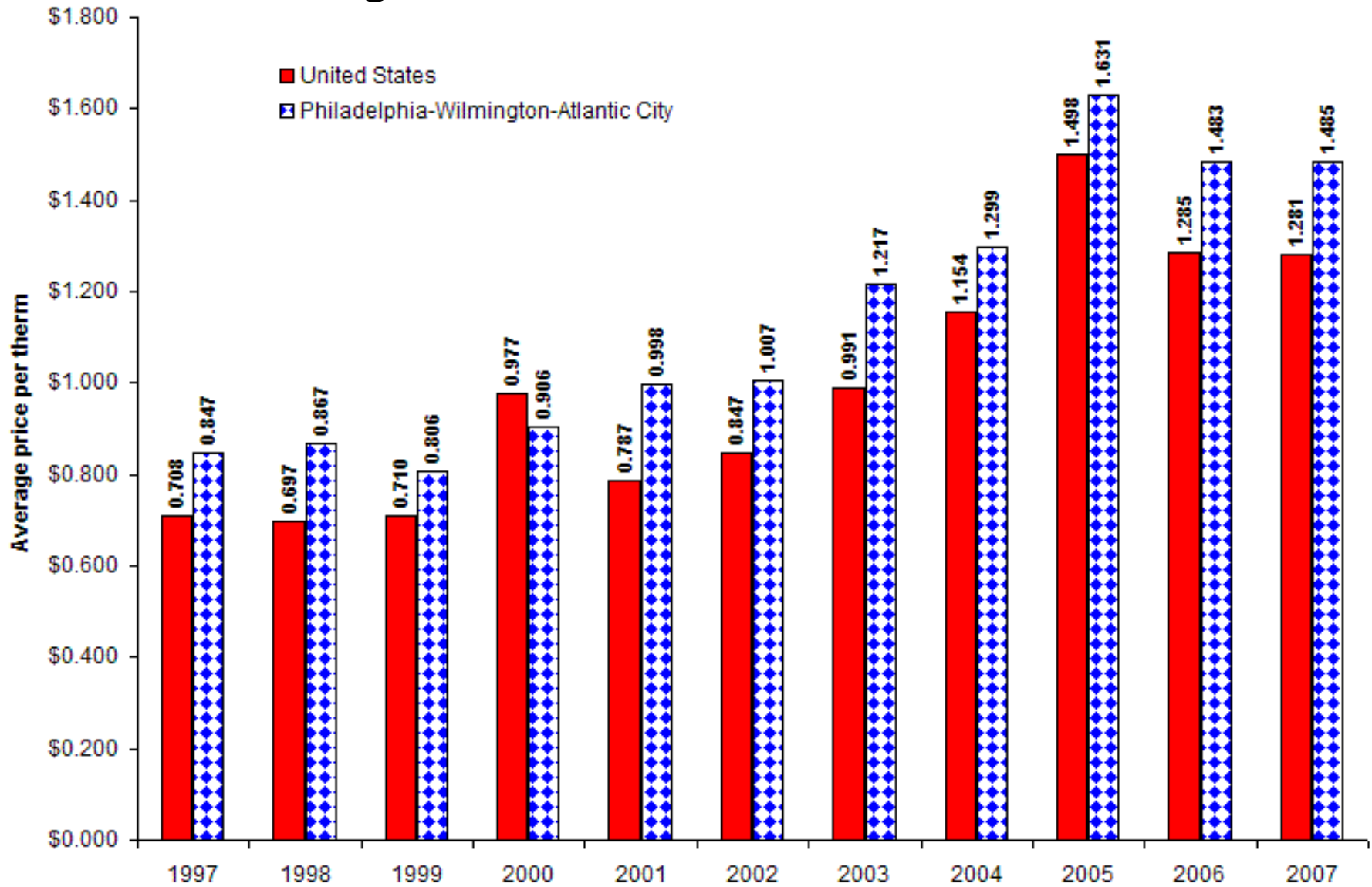
Venting

- All condensing appliances are category 4 positive pressure vents.
- Most tank type condensing appliances use PVC or CPVC venting materials
- Larger condensing appliances use AL29-4C stainless venting materials
- All condensing appliances have the capability to have combustion air ducted directly into the appliance.

Maintenance

- All condensing appliances have a combustion fan and pressure proving switch(s),
- Most have digital controllers.
- Most have variable speed fans with variable input gas valves.
- NONE of these controls are on an 82% efficient water heater.
- Condensate drains

80% gas cost increase from 1997 to 2007



What information do you need to do a payback analysis?

- Installed cost of standard efficiency equipment.
- Installed cost of condensing equipment
- Cost to operate standard efficiency equipment.
- Cost to operate condensing equipment.

Installation costs

- Besides the difference in equipment cost, other installation items must be taken into account for this analysis to be accurate.
- Don't forget to re-look at BTU input size.
- Must consider cost of venting (+ or -).
- Must consider cost of combustion air (usually a -)
- Consider cost of space (usually a -)
- Gas piping (usually a -)
- Don't forget cost of condensate drain (usually a +)

Men's Dormitories		Maximum
		Hourly
		1.9
Number of Students	300	570
BTU's (output) Required		284,886
BTU input required @ 82%		347,422
BTU input required @ 85%		335,160
BTU input required @ 90%		316,540
BTU input required @ 95%		299,880

What is the largest hot water load
in ANY commercial building?

- Showers
- Showers
- Showers

Table 7 Hot-Water Demands and Use for Various Types of Buildings^a

Type of Building	Maximum Hourly	Maximum Daily	Average Daily
Men's dormitories	3.8 gal/student	22.0 gal/student	13.1 gal/student
Women's dormitories	5.0 gal/student	26.5 gal/student	12.3 gal/student
Motels: Number of units ^a			
20 or less	6.0 gal/unit	35.0 gal/unit	20.0 gal/unit
60	5.0 gal/unit	25.0 gal/unit	14.0 gal/unit
100 or more	4.0 gal/unit	15.0 gal/unit	10.0 gal/unit
Nursing homes	4.5 gal/bed	30.0 gal/bed	18.4 gal/bed
Office buildings	0.4 gal/person	2.0 gal/person	1.0 gal/person
Food service establishments			
Type A: Full-meal restaurants and cafeterias	1.5 gal/max meals/h	11.0 gal/max meals/day	2.4 gal/average meals/day ^b
Type B: Drive-ins, grills, luncheonettes, sandwich, and snack shops	0.7 gal/max meals/h	6.0 gal/max meals/day	0.7 gal/average meals/day ^b
Apartment houses: Number of apartments			
20 or less	12.0 gal/apartment	80.0 gal/apartment	42.0 gal/apartment
50	10.0 gal/apartment	73.0 gal/apartment	40.0 gal/apartment
75	8.5 gal/apartment	66.0 gal/apartment	38.0 gal/apartment
100	7.0 gal/apartment	60.0 gal/apartment	37.0 gal/apartment
200 or more	5.0 gal/apartment	50.0 gal/apartment	35.0 gal/apartment
Elementary schools	0.6 gal/student	1.5 gal/student	0.6 gal/student ^b
Junior and senior high schools	1.0 gal/student	3.6 gal/student	1.8 gal/student ^b

^aData predate modern low-flow fixtures and appliances.^bInterpolate for intermediate values.^cPer day of operation.

170 days

Go to Excel Spreadsheet

Questions?