Energy Efficient Water Heating – A Manufacturer's Perspective

June 23, 2005

Jeff Mahoney

Jim Cika

Rheem Water Heaters

Topics of Discussion

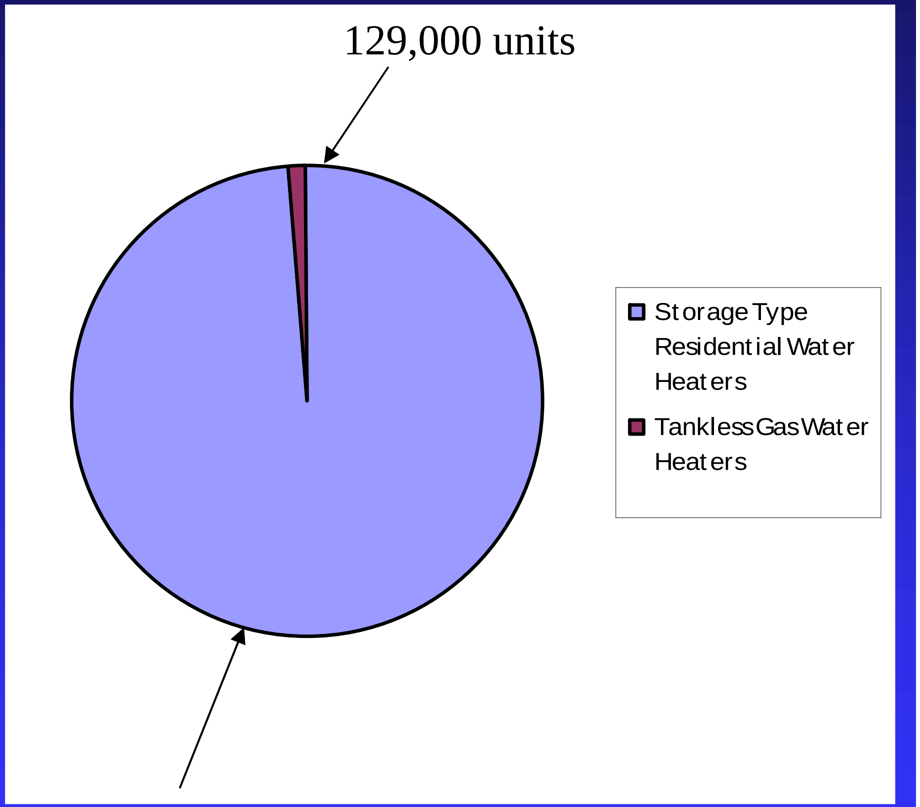
- Overview of US Water Heater Market
- Regulatory Changes / Effect on the major tank type water heater manufacturers
- Trends
  - "Conventional" tank water heaters
  - Tankless water heaters
  - Solar Water Heaters
- Energy Star and Water Heaters
- How builders can help encourage high performance water heating
- Final Thoughts
- Questions

Overview of US Water Heater Market

- **"Conventional" Water Heaters**
  - Total US Market – 11 million units annually
    - 53% gas
    - 47% electric
  - Replacement vs. new construction
    - 9.2 million replacement units (84%)
    - 1.8 million new construction units (16%)
  - Major US Water Heater Manufacturers
    - Rheem
    - AO Smith (includes State Industries)
    - Bradford White
    - American Water Heaters

Overview of US Water Heater Market

- **Tankless Gas Water Heaters**
  - US Market 2004:
    - 2004 US Market: 129,000 units
    - Industry up 57% through May 2005 (Storage water heater market flat at 1% annual growth)
  - Major tankless gas manufacturer's that sell in the United States
    - Paloma (Rheem)
    - Rinnai
    - Takagi
    - Noritz
    - CEC/Bosch



11,000,000 units

Overview of US Water Heater Market

- **Solar Water Heater Manufacturers**
  - No accurate numbers of market size available. Best estimate from industry sources is 15,000 systems/year
  - 90%+ active systems, remainder passive
  - Virtually no new construction market outside of Hawaii
  - Solar storage tank and collector manufacturers

Solar Storage Tanks	**Solar Collectors ***
Rheem	Solahart (Rheem)
AO Smith / State	SunEarth
Bradford White	Alternate Energy Technologies
American	Heliodyne
Vaughn	Radco

* = ***Flat plate, glazed***

Recent Regulatory Changes and their effect on the major water heater manufacturers

- **Flammable Vapor Ignition Resistance (FVIR)**
  - New safety technologies created by the Water Heater Consortium
  - Affects the majority of residential gas storage waters
  - Staggered rollout by product type. Began 7/1/2003 and will end 1/1/2007
  - Most significant changes to affect water heaters in over 50 years. Significant capital investment by all manufacturers
- **National Appliance Energy Conservation Act II (NAECA II)**
  - Affects all residential storage water heaters
  - Raised minimum Energy Factors (EF's) 5 points on gas models and 4 points on electric models
  - Became effective 1/20/2004.
  - Significant capital investment by all manufacturers.

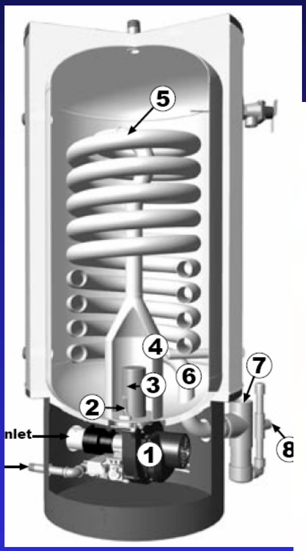
Major Water Heater Manufacturers have recently been forced to focus on what we are mandated to develop as opposed to what we'd like to develop

Trends – Storage Type Water Heaters

- **Current Trends**
  - More storage capacity, higher BTU's
  - Low NOx burners
  - Powered Direct Vent / Sealed Combustion
  - Boiler w/indirect fired water heaters (geographically limited)

Trends – Storage Type Water Heaters

- **Future Trends**
  - Condensing gas
    - Thermal efficiencies of up to 96%
    - Standby losses of 1%
  - Combined systems
    - Domestic hot water and space heating in one application
  - Heat Pump Water Heaters
    - Poor consumer impression of reliability
    - Japanese technology major innovation drivers

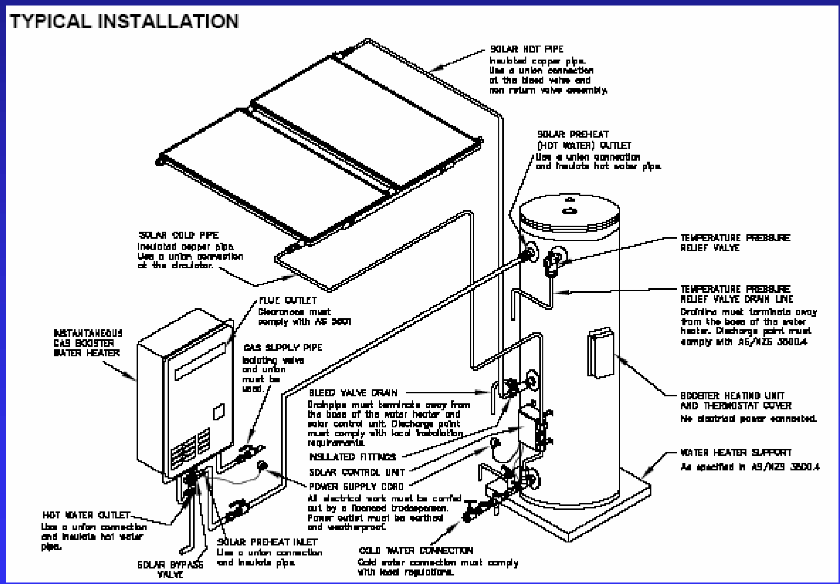


Trends – Tankless Water Heaters

- **Product Trends**
  - Direct vent/sealed combustion
  - Higher BTU's (200K+)
  - Condensing units w/higher thermal efficiencies
    - 95%+
    - High first cost
  - Combination units

Trends – Tankless Water Heating

- **Application Trends**
  - Zero Energy Homes (ZEH)
  - Combination domestic water and space heating
  - “Split” systems for new homes
  - Solar “booster” applications
  - D’mand type pump systems



Solar Booster Application

Trends – Solar Water Heating

- Virtually no new construction activity outside of Hawaii involving SDHW
- Solar water heating still has a negative public perception
  - Sales of solar pool panels and PV arrays greatly exceed SDHW
  - First costs of solar thermal systems a deterrent – ironic!
- Most solar installations are replacements or retrofits
- Worldwide, solar is still an incentive driven product
- Million Solar Roofs Initiatives

Trends – Solar Water Heating

- "Active" Systems
  - 90+% of overall solar market
  - "Drain back design": preferred system design for freeze protection
- Solar / tankless combinations – ideal for ZEH applications
- Polymer solar water heaters
  - Still in R&D
  - Reduction in manufacturing and first cost of systems
- Aesthetics

Solar / tankless Combination

Solar Drainback System

Energy Star and Water Heaters

- January 6, 2004: DOE decided not to establish Energy Star criteria for domestic water heaters
  - Incremental savings between best and worst performing conventional water heaters would not justify the awarding of Energy Star designation (differentiation narrowed due to 2004 NAECA revisions)
  - Purchasers of “non-conventional” products (ie – tankless, solar) would not recover their incremental investment within a reasonable time period (DOE analysis showed a payback range of 3.6 to 19 years)
  - Product availability and infrastructure for “non-conventional” products is not yet broad based
- Major water heater manufacturer’s supported in principle an Energy Star program for water heaters
  - Agreed with DOE conclusion on points 2 and 3 above
  - Objected to a proposal excluding electric water heaters entirely as well as proposed implementation date
- May make more sense to emphasize high efficiency water heating as a key component of an Energy Star home than to further pursue product criteria

How Builders Can Promote High Efficiency Water Heating

- Offer options or packages; illustrate benefits like performance, energy and operating cost savings. "Rough-in" plumbing for solar and tankless for future installation
- Sell water heating and indoor comfort systems like other upgrades, such as high efficiency windows, security systems, surround sound. Give the homebuyer choices
- Promote the existence / availability of Energy Efficient home loans
- Keep ZEH affordable and within the reach of the average homebuyer
  - Ideal Homes in Norman OK is introducing ZEH options for under $200K

Final Thoughts, From a Manufacturer's Perspective

- Water Heater Manufacturer's R &D resources have been stretched thin due to regulatory changes and requirements
- Builders and water heater manufacturer's need to communicate better on product needs and desires
- Rising energy costs, rebates/incentives and future regulatory requirements will continue to be major drivers towards higher efficiency water heating products being developed by the water heater manufacturers.

Questions???

Thank You!!!