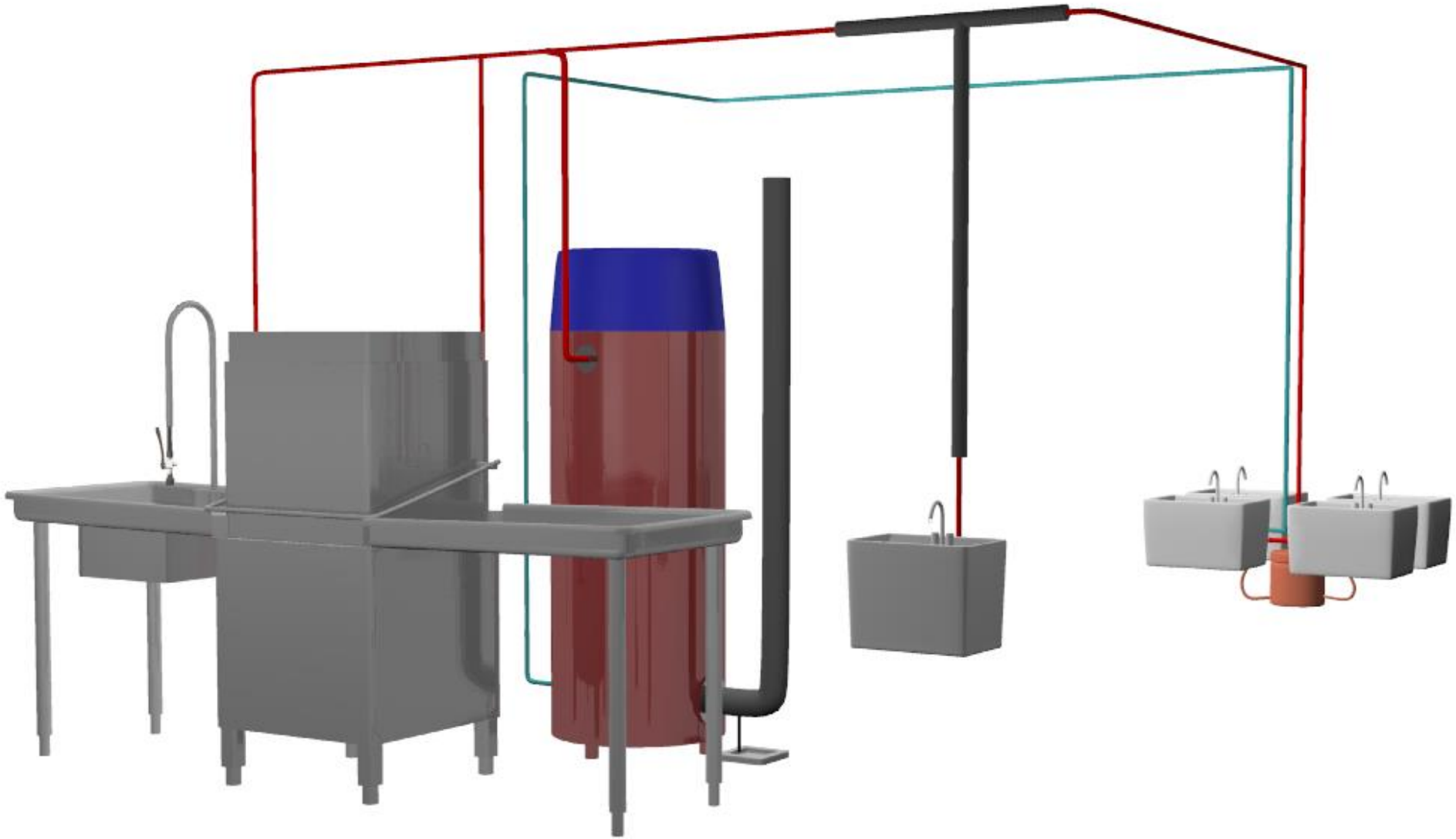
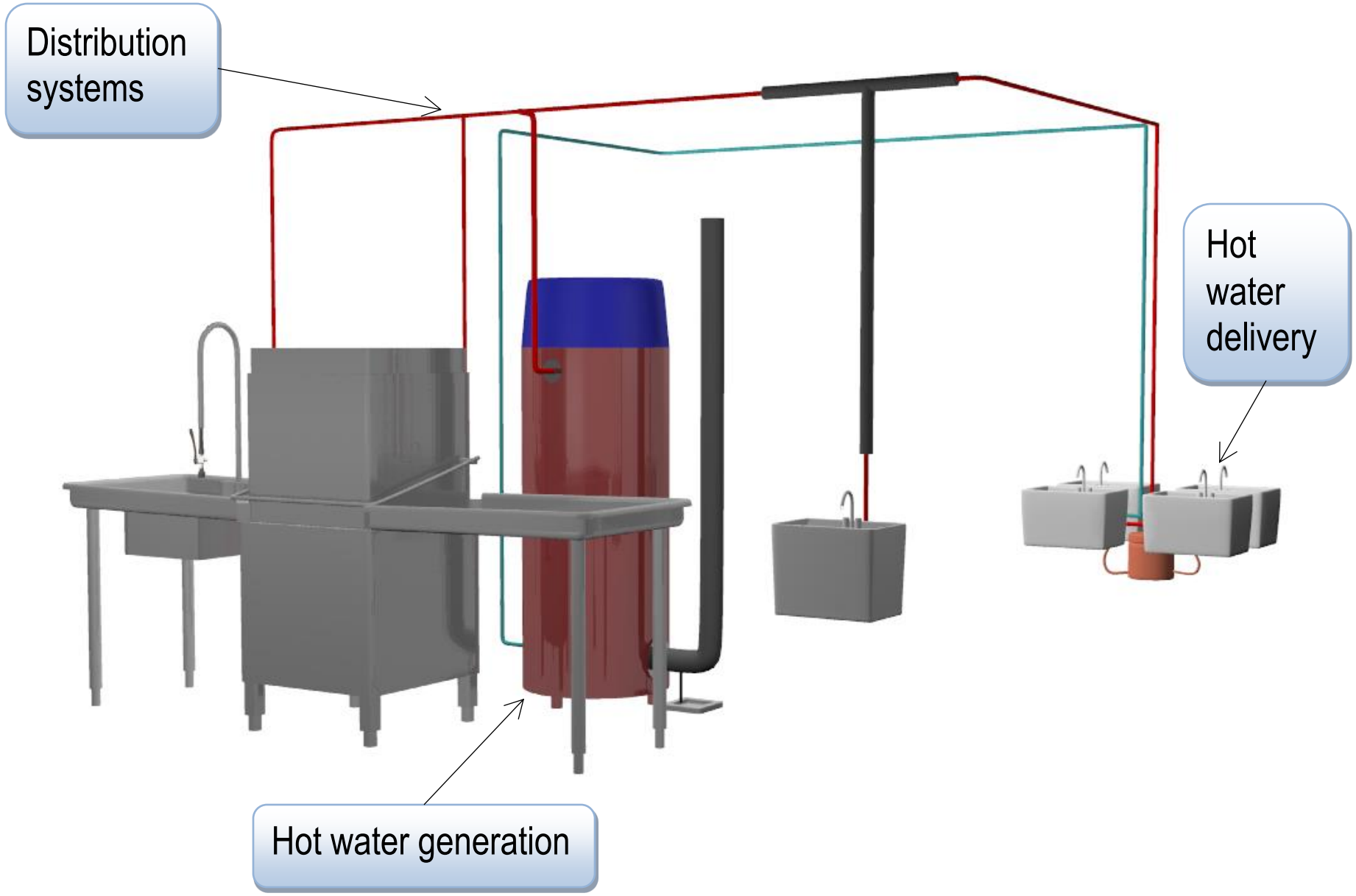
Water Heaters

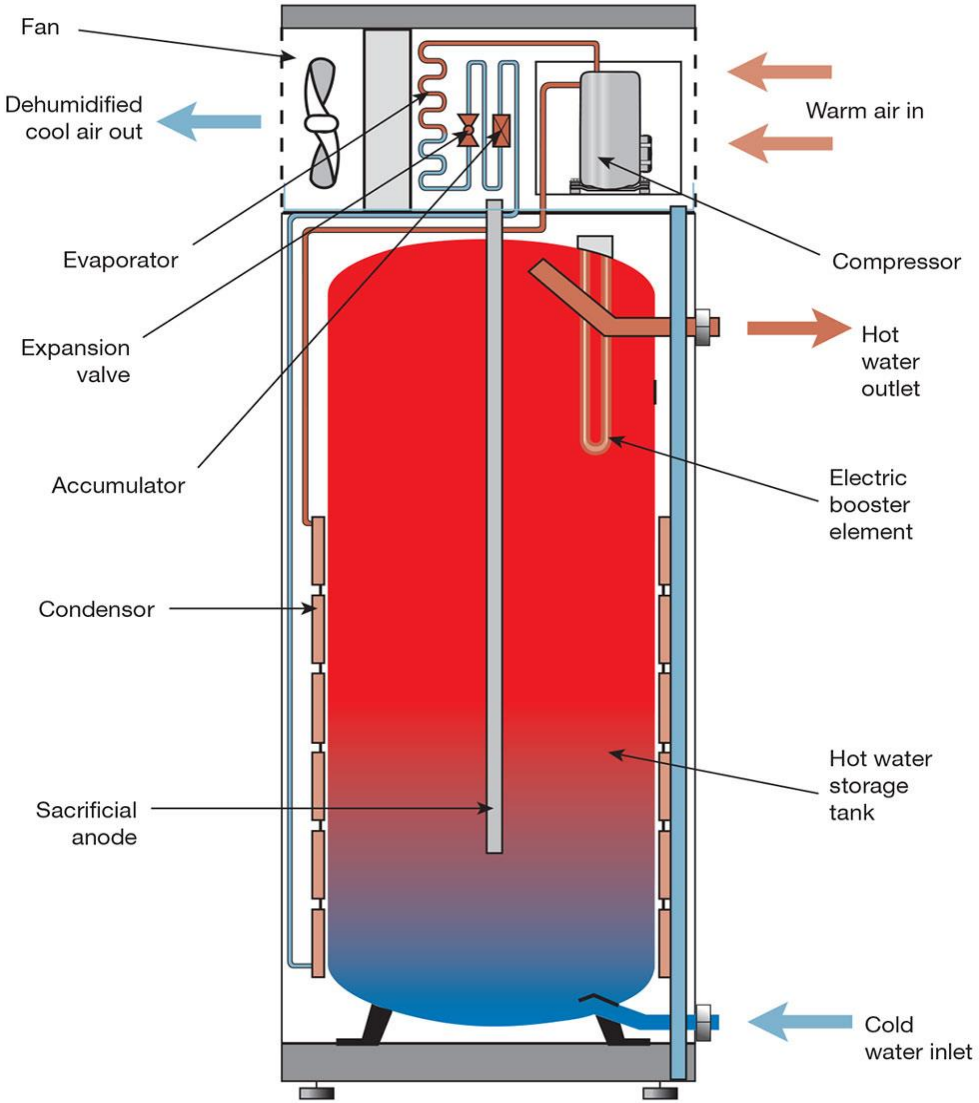
Think of hot water supply as a System



Improving System Efficiency

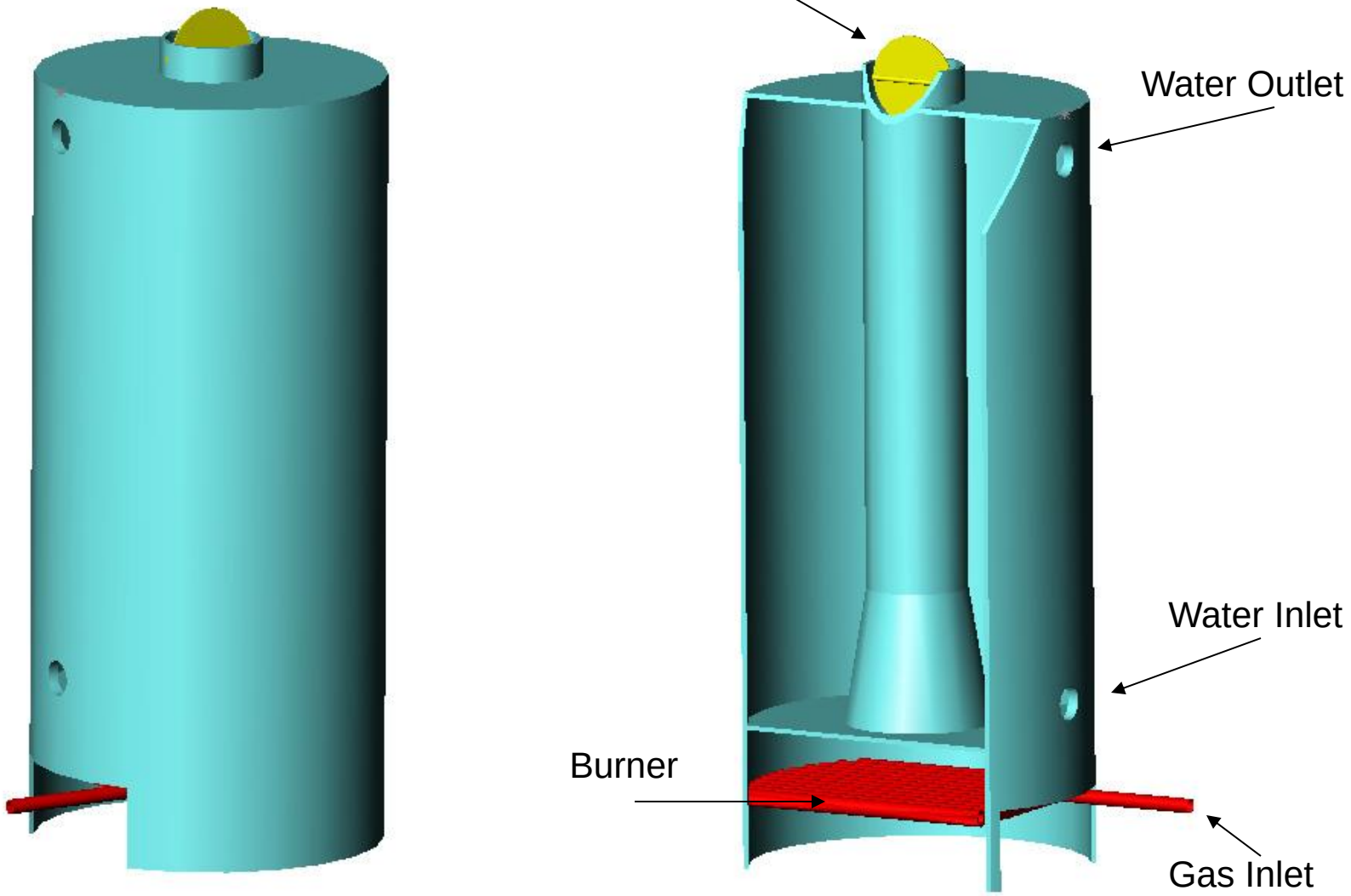


Heat pump water heaters



estimated to reduce energy consumption in an all-electric house by to 10 to 15% of the energy used by a resistance electric water heater

Standard Efficiency Tank-Type



Standard Efficiency

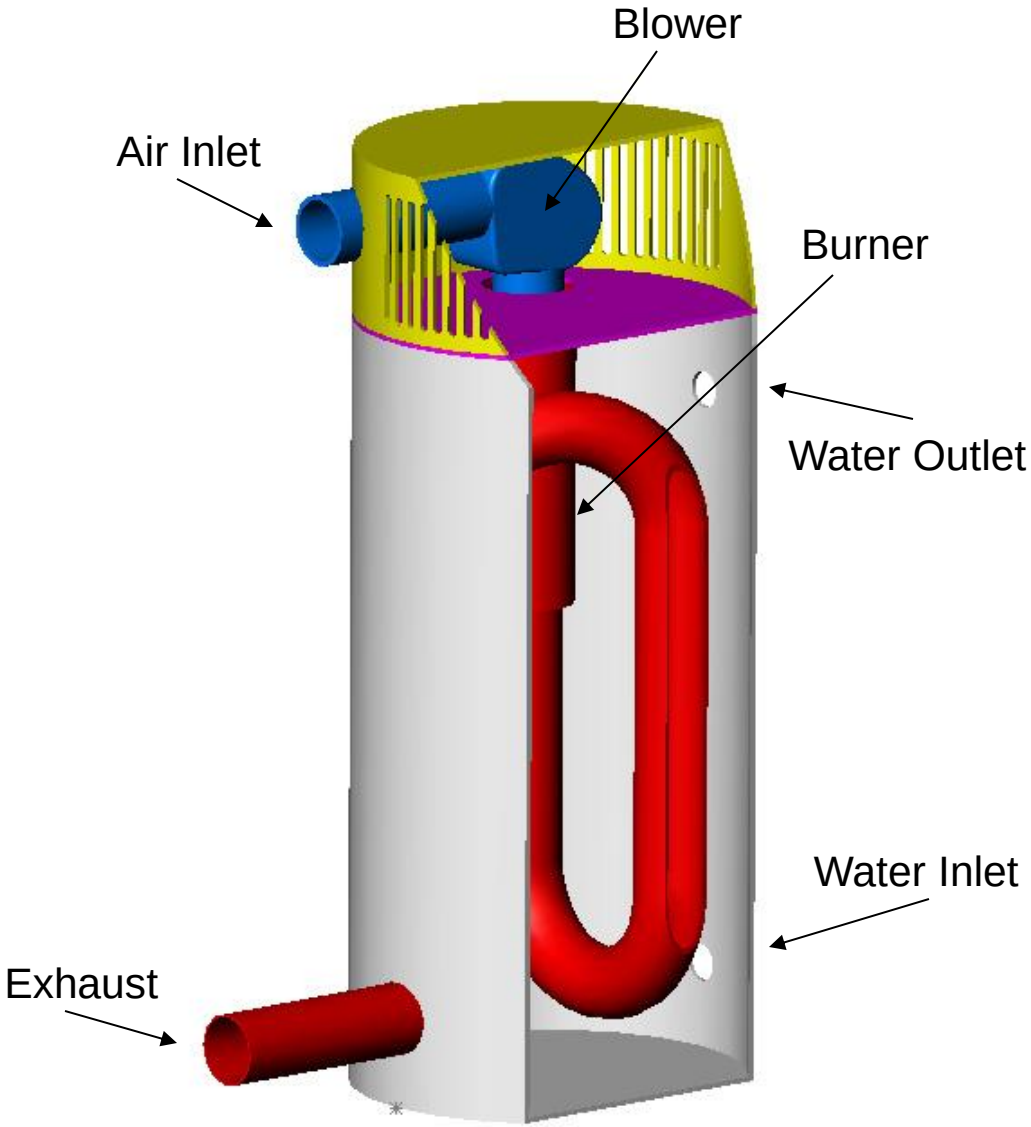
Pros

- Simple
- Robust
- Low cost
- Industry standard
- Easy to specify
- Easy to fix
- Easy to replace

Cons

- 80% thermal efficiency
- Standby loss (100 gal): 1000 – 1300 Btu/h

High Efficiency (Condensing) Tank-Type



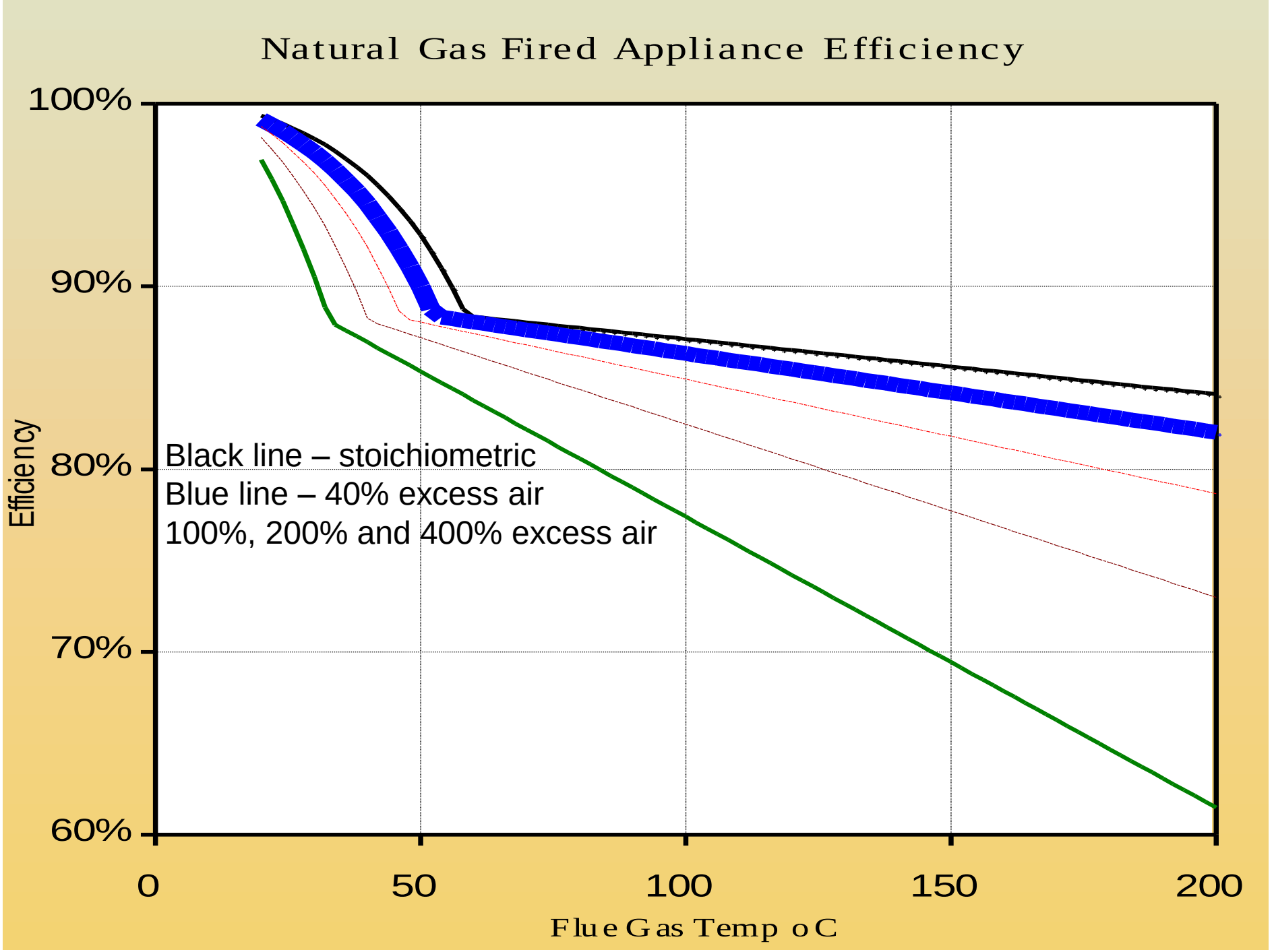
High Efficiency

Pros

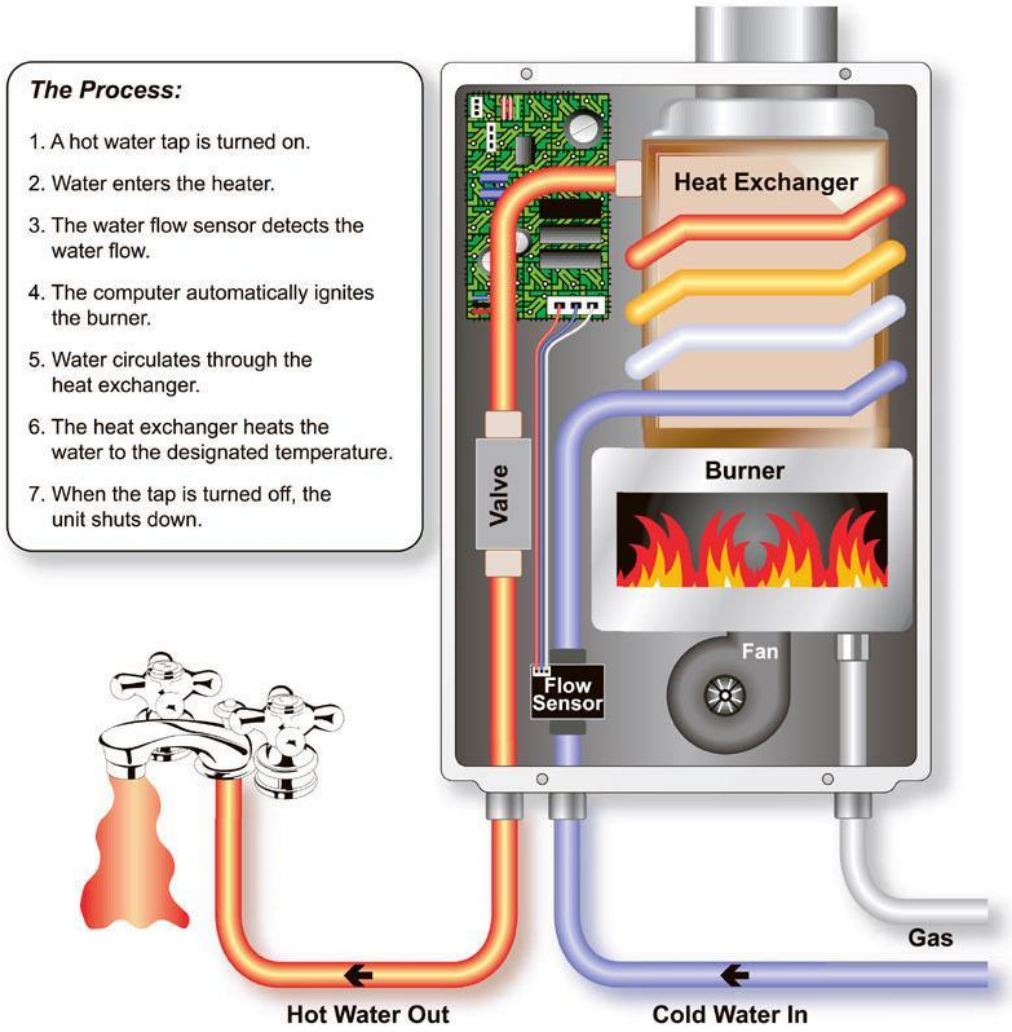
- Condensing
- 95% efficiency
- Standby loss: 600 – 1000 Btu/h
- Potentially lower cost of installation

Cons

- Manage Condensate
- More complex
- Not the standard
- Higher first cost


Natural Gas Fired Appliance Efficiency
100%
90%
80%
70%
60%
Efficiency
Black line – stoichiometric
Blue line – 40% excess air
100%, 200% and 400% excess air
0
50
100
150
200
Flue Gas Temp oC

Tankless (On Demand)



Takagi Industrial Co. USA Inc.

Tankless

Pros

- Smaller footprint
- Outside installation possible
- Minimal standby loss

Cons

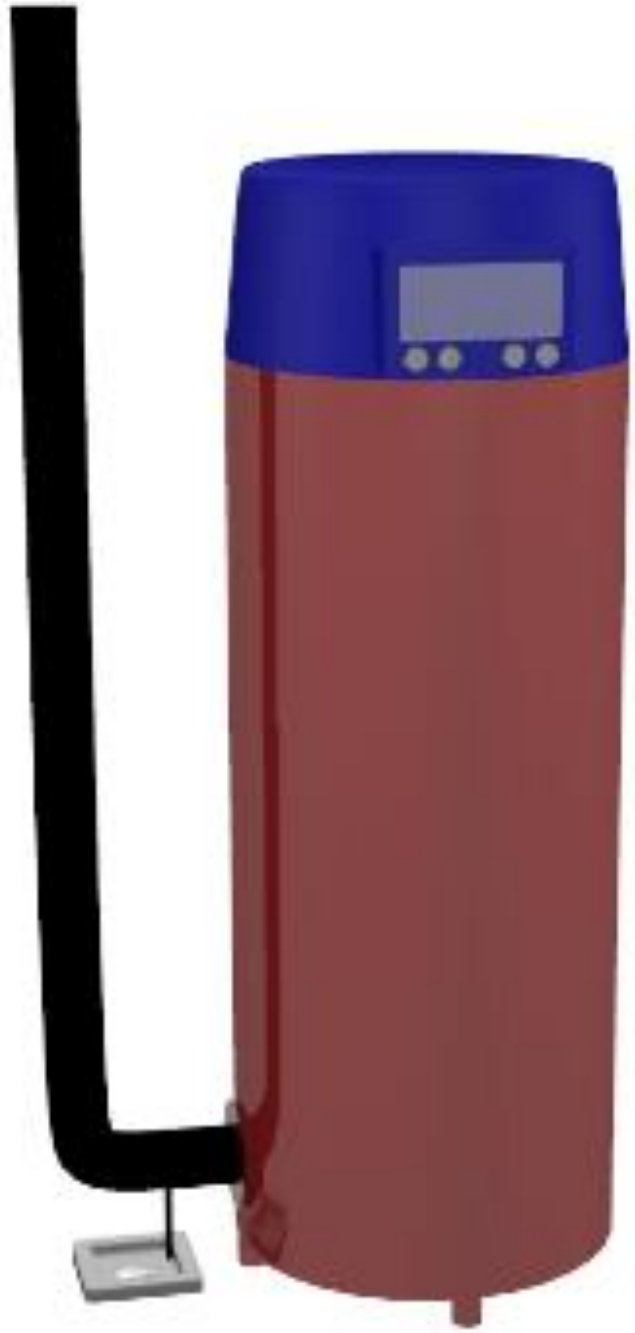
- 80 - 84% thermal efficiency
- Minimum water flow limits
- May need multiple units
- Special installation required (stainless steel venting)
- Maintenance may be higher

High efficiency condensing models are available

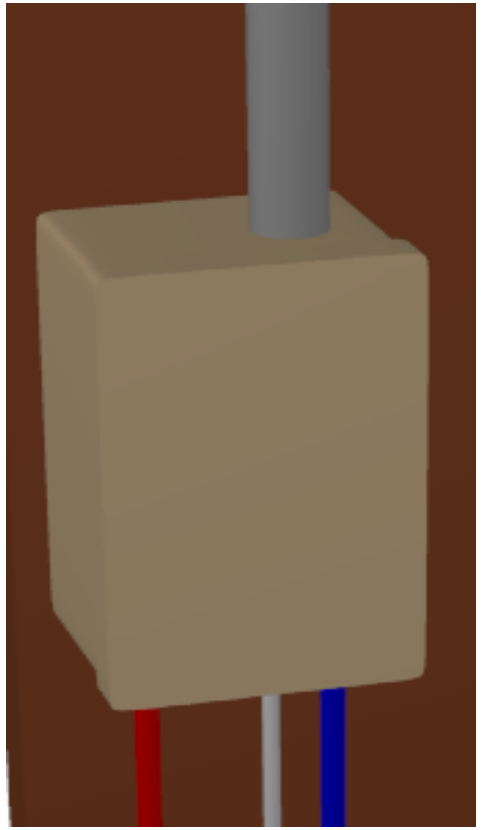
Limitations

Storage

- Can run out of hot water during heavy usage if undersized



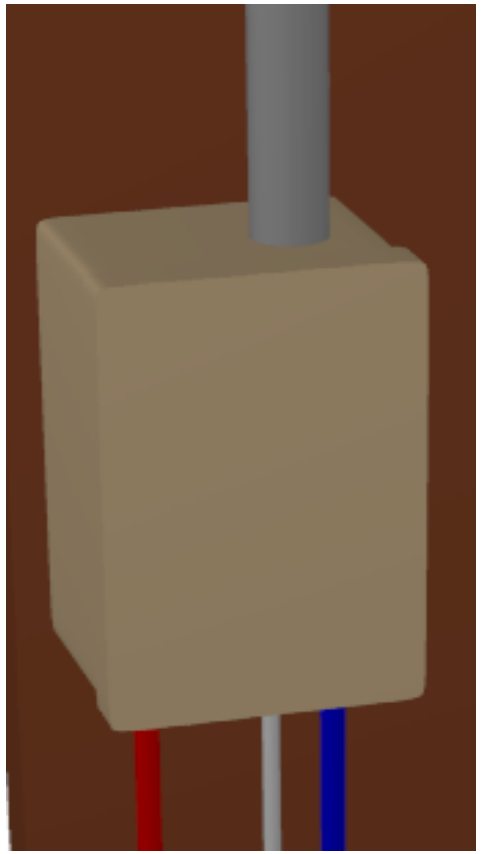
Limitations



Tankless

- Startup sequence creates an additional lag in hot water delivery
  - A couple of seconds before it “wakes up”
  - 10-30 seconds before its close to set temperature
- Cold water sandwich effect
- Difficulty working with door-type dishwashers and low flow aerators on hand-washing sinks

Limitations



Tankless

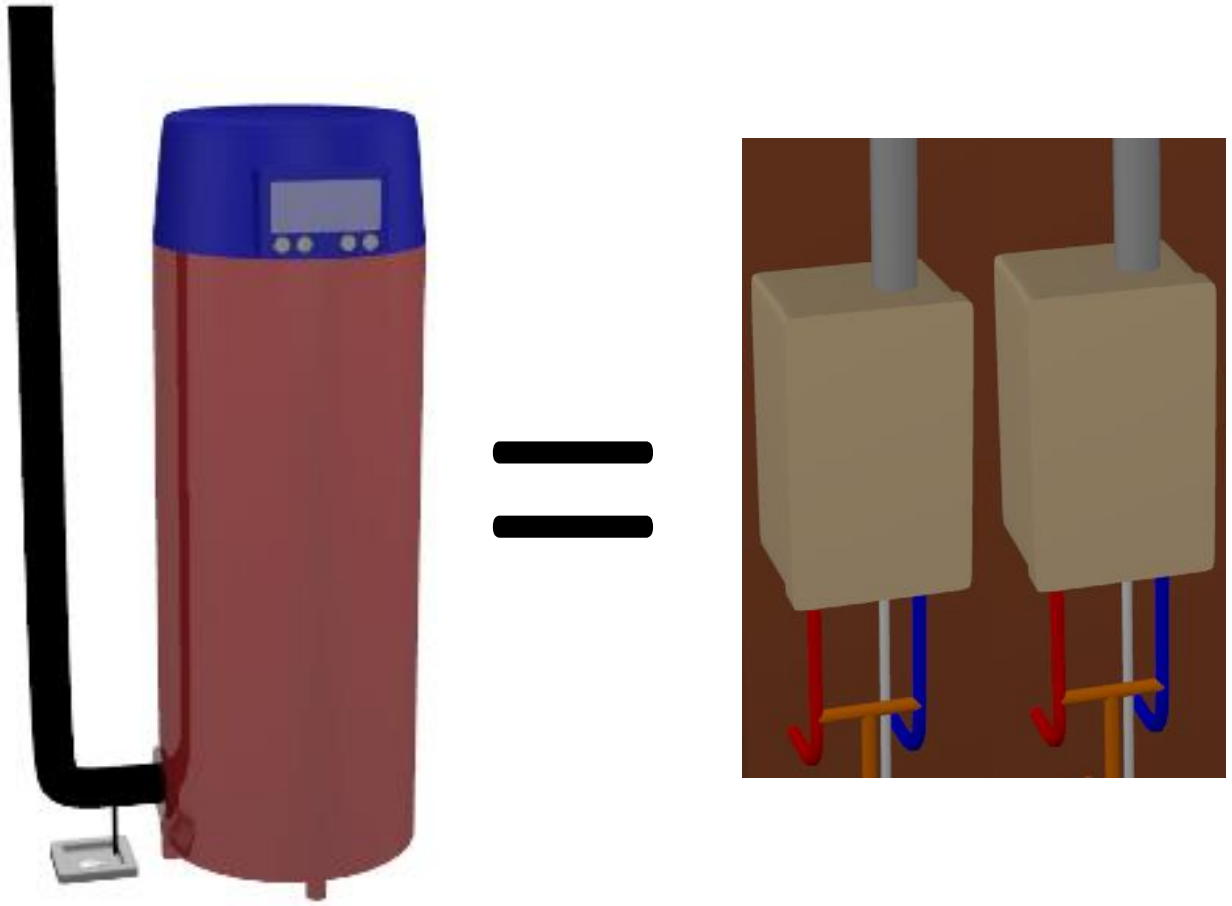
- Doesn’t work well with recirculation systems w/o expansion of system
  - Most heaters are not designed to modulate down to accommodate a 5 to 15°F temp rise
  - May nullify or shorten manufacturer’s warranty
  - Making it work requires additional investment
- Plumbing recirculation line to one sacrificial unit in a multi-unit system may be an option

Limitations

Filling a 3-compartment sink

- Faucets flow at 5 to 15 gpm
- Tank-type may fill two 40-gal sinks in 4 minutes
- One standard eff. tankless takes 25 min in winter
- The additional fill time can affect user behavior
- Several 199,000 Btu/h tankless units are needed to meet demand, each with max flow of 2 to 4 gpm

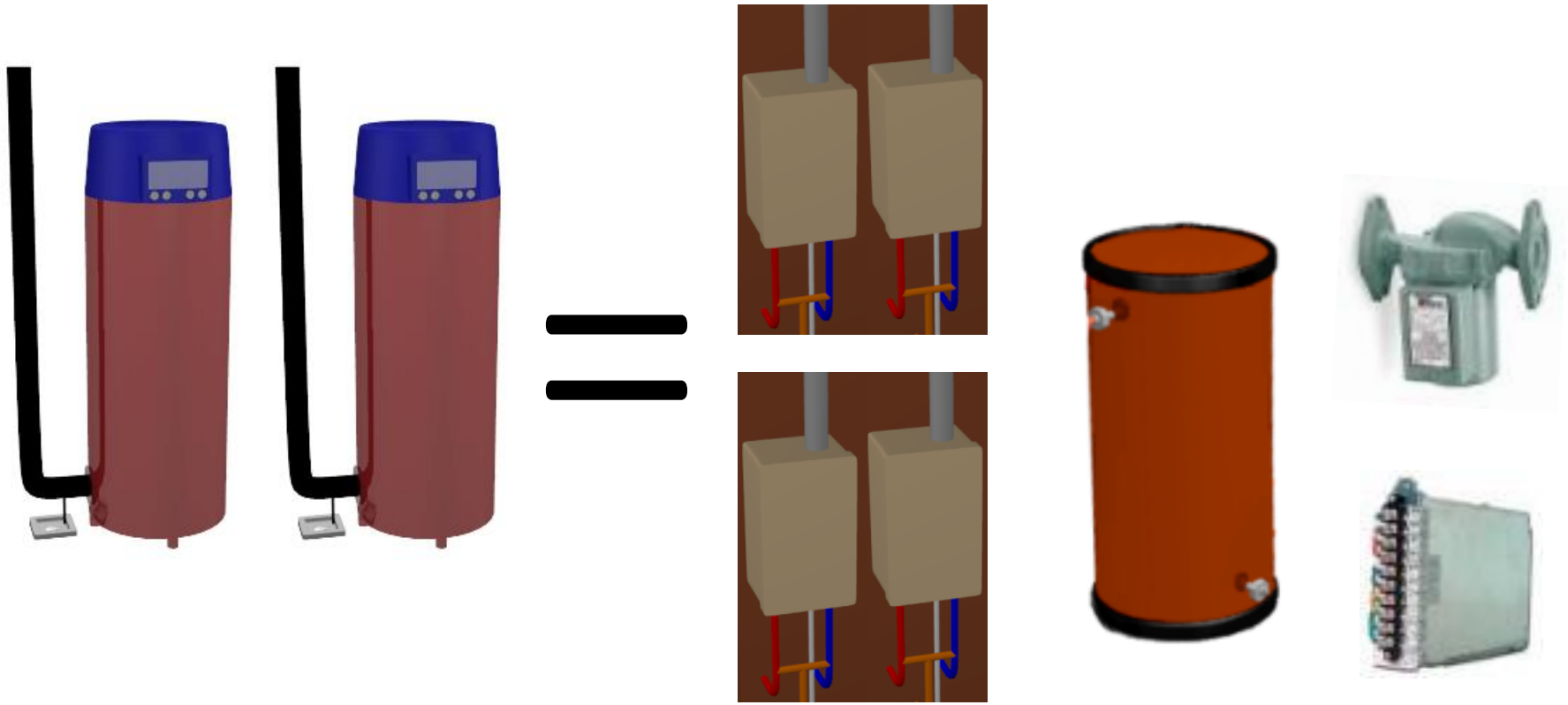
Tank vs. Tankless



1 condensing tank = 2 condensing tankless

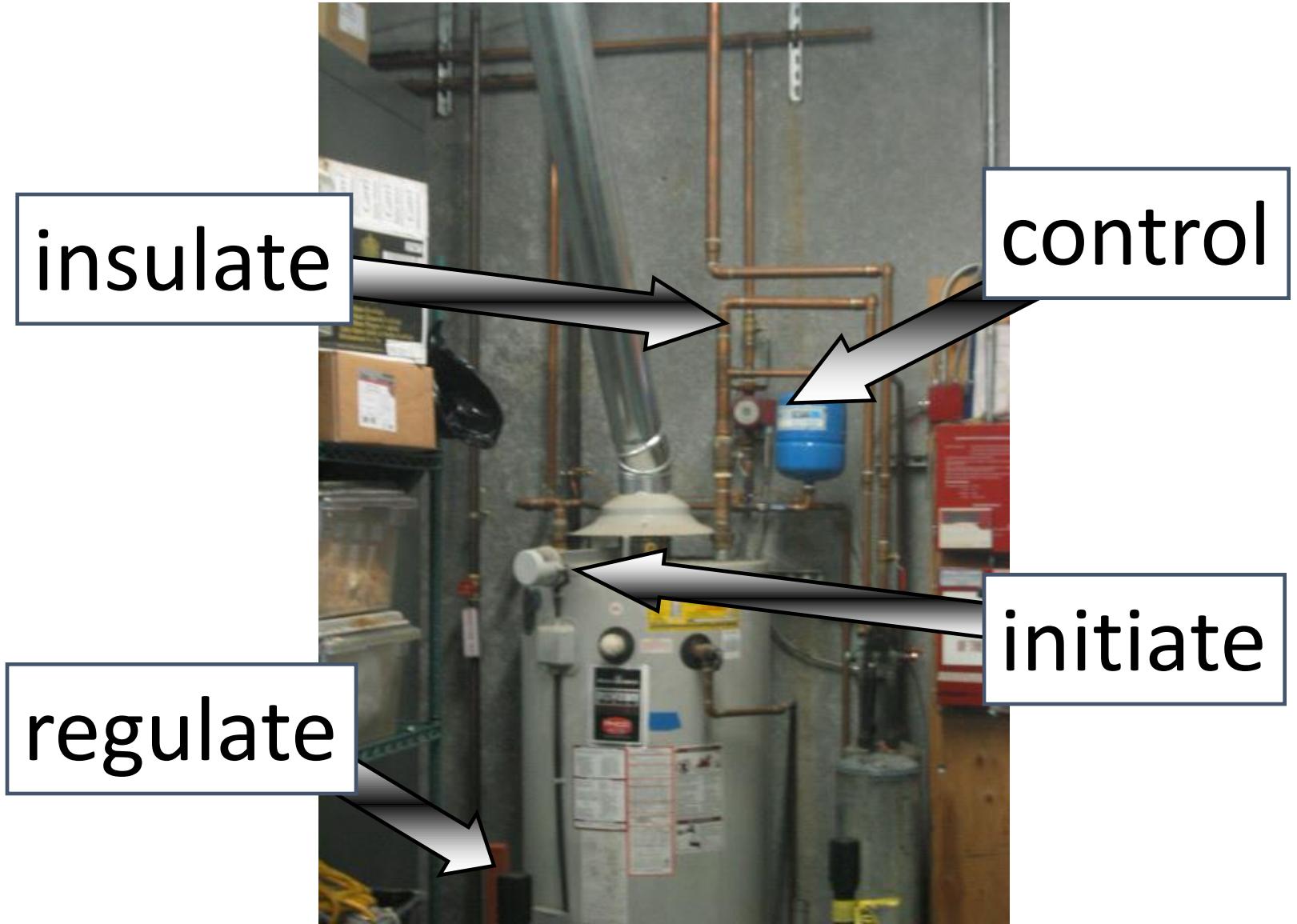
Without recirc system → QSR

Tank vs. Tankless in high draw applications



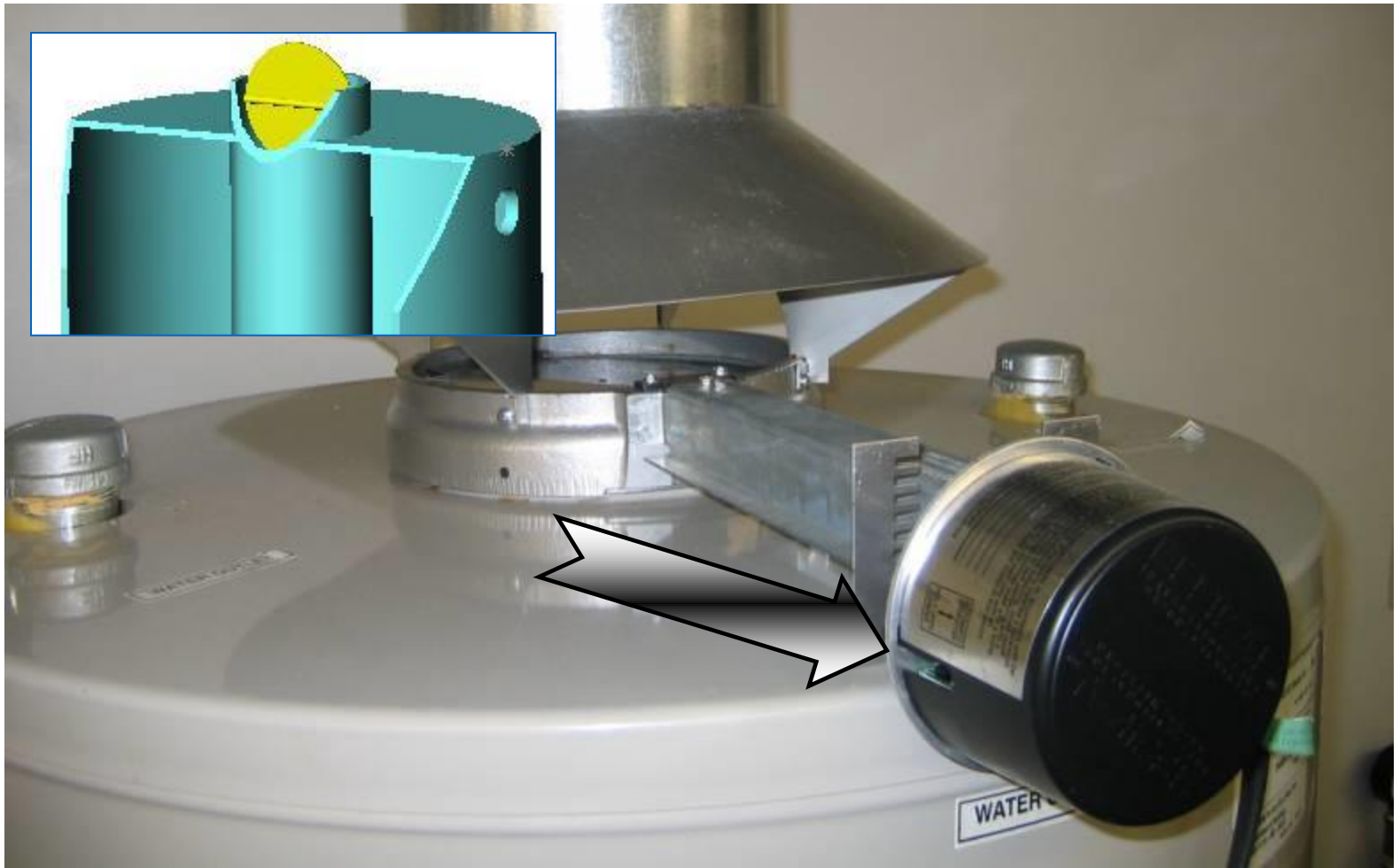
2 tanks = 4 tankless+storage tank+pump+controller

4 Hot Water Heater “Must-Do’s”

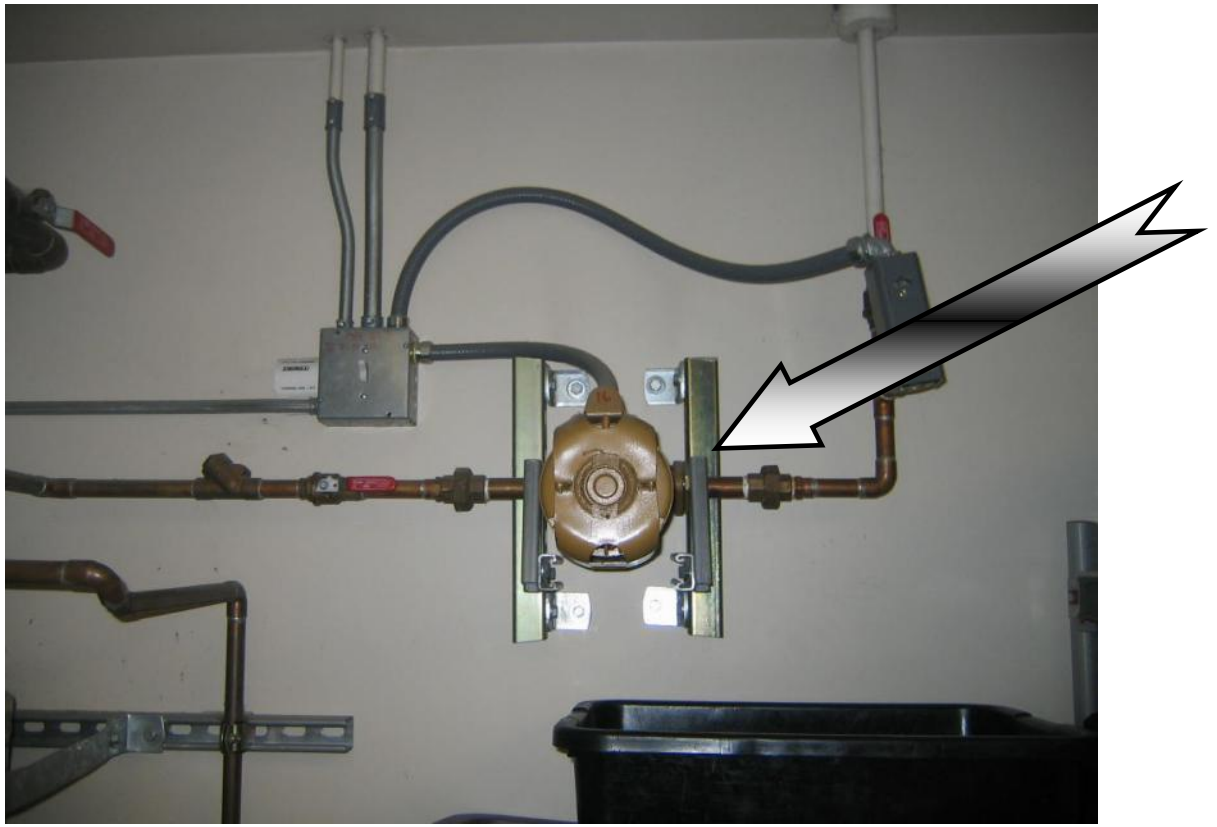


Insulate all accessible hot water lines.

Turn on the automatic damper control.



Control the recirculation pump: use a timer to turn it off when not needed.



Regulate the tank temperature by properly setting the thermostat.