The Taxonomy of Hot Water Circulation Systems

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The Key Components of a Hot Water System

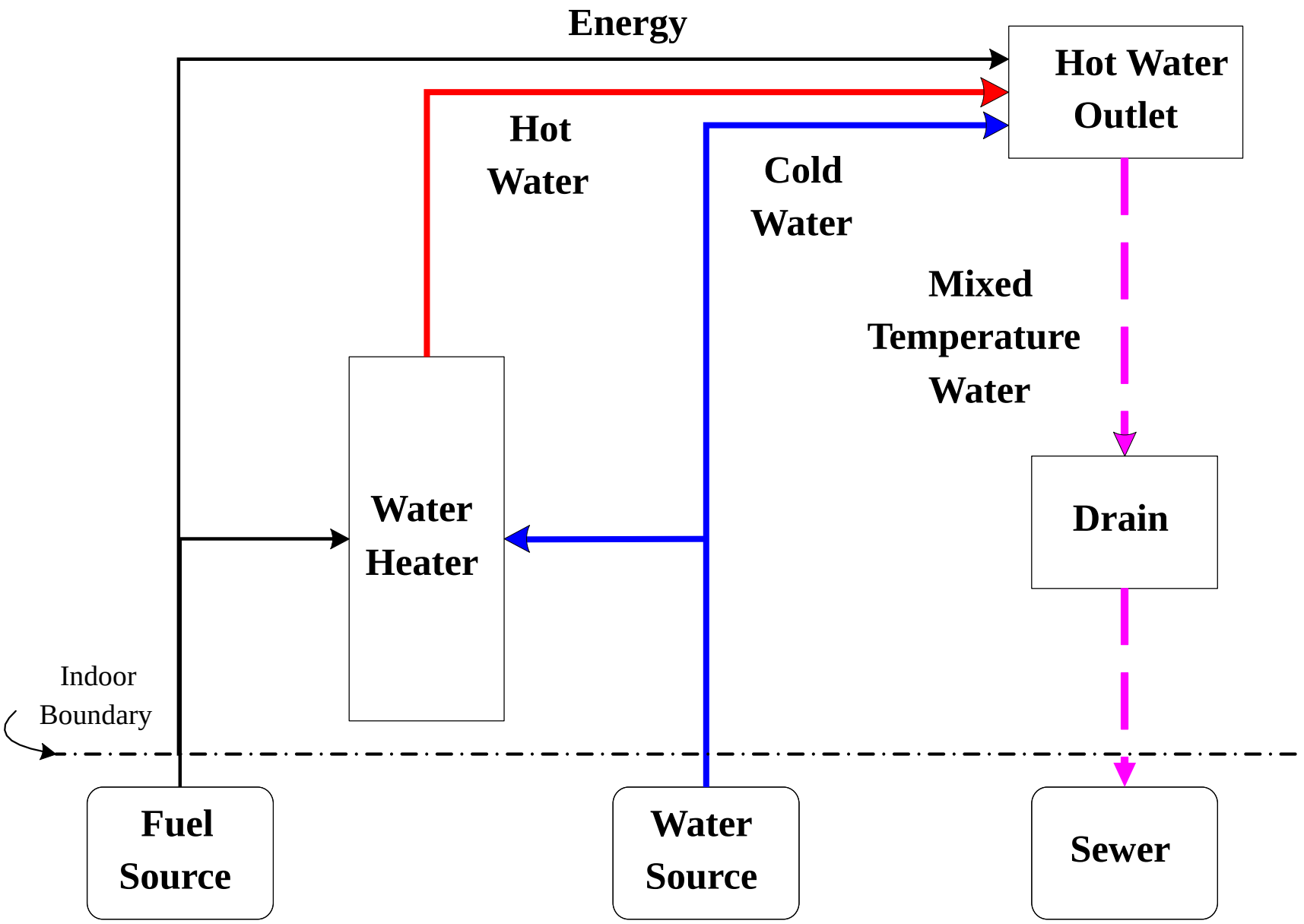
The Hot Water System

- Treatment and Delivery to the Building
- Use in the Building
  - Water Heater
  - Piping
  - Fixtures, Fittings and Appliances
  - Behavior
  - Water Down the Drain
- Waste Water Removal and Treatment

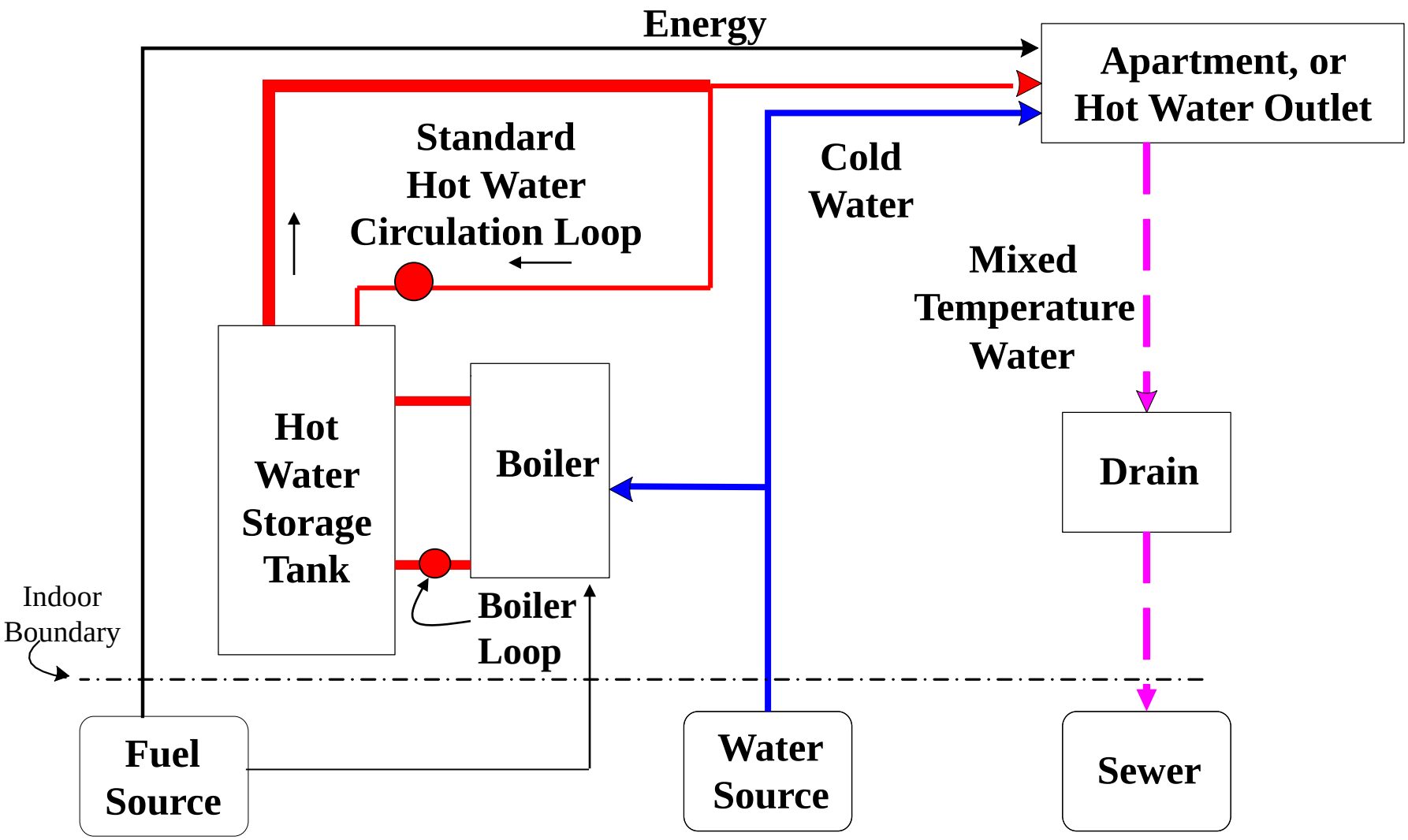
Which is the biggest ***variable*** in determining water and energy use?

How do the ***interactions*** among these components affect ***system*** performance?

Typical “Simple” Hot Water System



Typical Central Boiler Hot Water System



Hot Water Circulation Systems

There are six control strategies for circulation systems:

- Thermosyphon (gravity convection with no pump),
- Continuously pumped systems,
- Timer controlled,
- Temperature controlled,
- Time and temperature controlled (includes learning)
- Demand controlled.

Given the same plumbing layout,
all of these systems will waste the same amount
of water at the beginning of a hot water event.

The difference in these systems
is in the ***energy*** it takes to keep the trunk line
primed with hot water.

Defining Terms

Circulation loops

- Supply portion (with branches)
- Return portion (no branches)
- Control strategy

Simple loops

1 path, 1 pump (control strategy)

Complex loops

Many paths, 1 pump (control strategy)

What causes hot water to fill all paths? (balancing)

How is the Piping Configured

Number of Stories

- Low-rise
- Mid-rise
- High-rise

Pipe Diameter

- Supply
- Return
- Risers (branches)

Current configurations?

Potential Improvements?