Our Environment in Hot Water: Comparing Water Heaters

A Life Cycle Approach Comparing Tank and Tankless Water Heaters in California

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Introduction

- Energy usage of household water heaters
- Tank vs. Tankless Debate

Source: EERE

or

Source: Takagi
Life Cycle Approach

- **Scope and Boundaries**
  - Gas-fired water heaters in California
  - Northern California vs. Southern California
Methodology

- Manufacturing and End-of-Life Phase
  - Data taken from European Union’s “EcoDesign of Water Heaters”
- Transportation Phase
  - Found factory information; divided Northern California and Southern California
- Use Phase
  - Usage Data from 2001 U.S. Department of Energy Residential Energy Consumption Survey (DOE RECs)
  - Calculated with EPA’s Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)
- Embedded Energy in Water
  - California’s Water-Energy Relationship—California Energy Commission
Results

Total Energy Use

Global Warming Potential

VOCs

Eutrophication

Total Waste

NOx

- Use
- Embedded Energy in hot water
- Manufacturing, Transportation, End-of-Life
Conclusions

- Impacts dominated by Use-phase
- Tankless—more environmentally friendly on average
- Points to consider
  - Limited parameters
  - High barriers to entry in water heater market
Further Research

- Other Phases
  - Manufacturing Phase—U.S. water heaters
  - Maintenance phase, Installation phase
- Use Phase
  - Electricity-powered Water Heaters
  - Tankless Water Heater Draw Patterns
Thank you!

- Questions?
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