



ELECTRIC POWER  
RESEARCH INSTITUTE

# Heat Pump Water Heaters: Demonstration Project

**Presentation at the ACEEE Forum on  
Water Heating and Use**  
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# Electric Power Research Institute

Collaboration.....Technical Expertise....Thought Leader



- Not for profit, independent, unbiased, collaborative electricity research organization with more than **450 participants in over 40 countries**
- U.S. utilities placed approximately **72% of their R&D investment** with EPRI in 2007.
- Independent electricity research in:
  - Generation
  - Environment
  - Power Delivery & Energy Utilization
  - Nuclear
- 1600+ R&D projects annually, ~\$300M R&D funding, more than **400 engineers and scientists**

# EPRI's Living Laboratory



**Evaluating and testing energy efficiency technology**

# Advancing the Use of Smart and Efficient Devices

## Programmable Communicating Thermostats



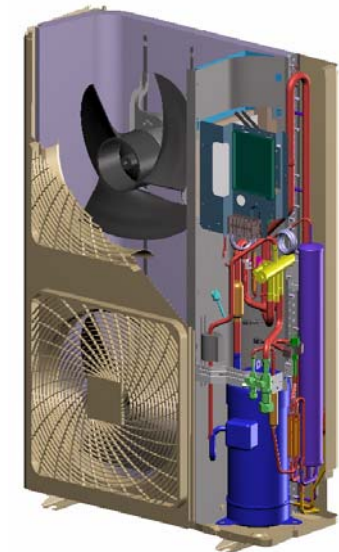
## Direct Energy Feedback Devices



## Lighting

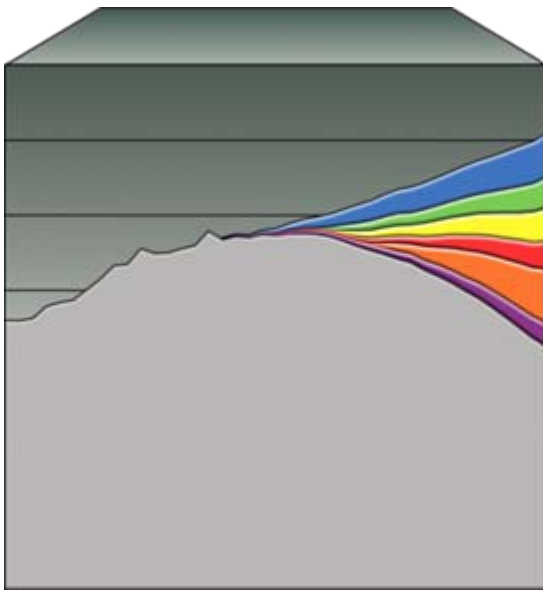


## Heat Pumps

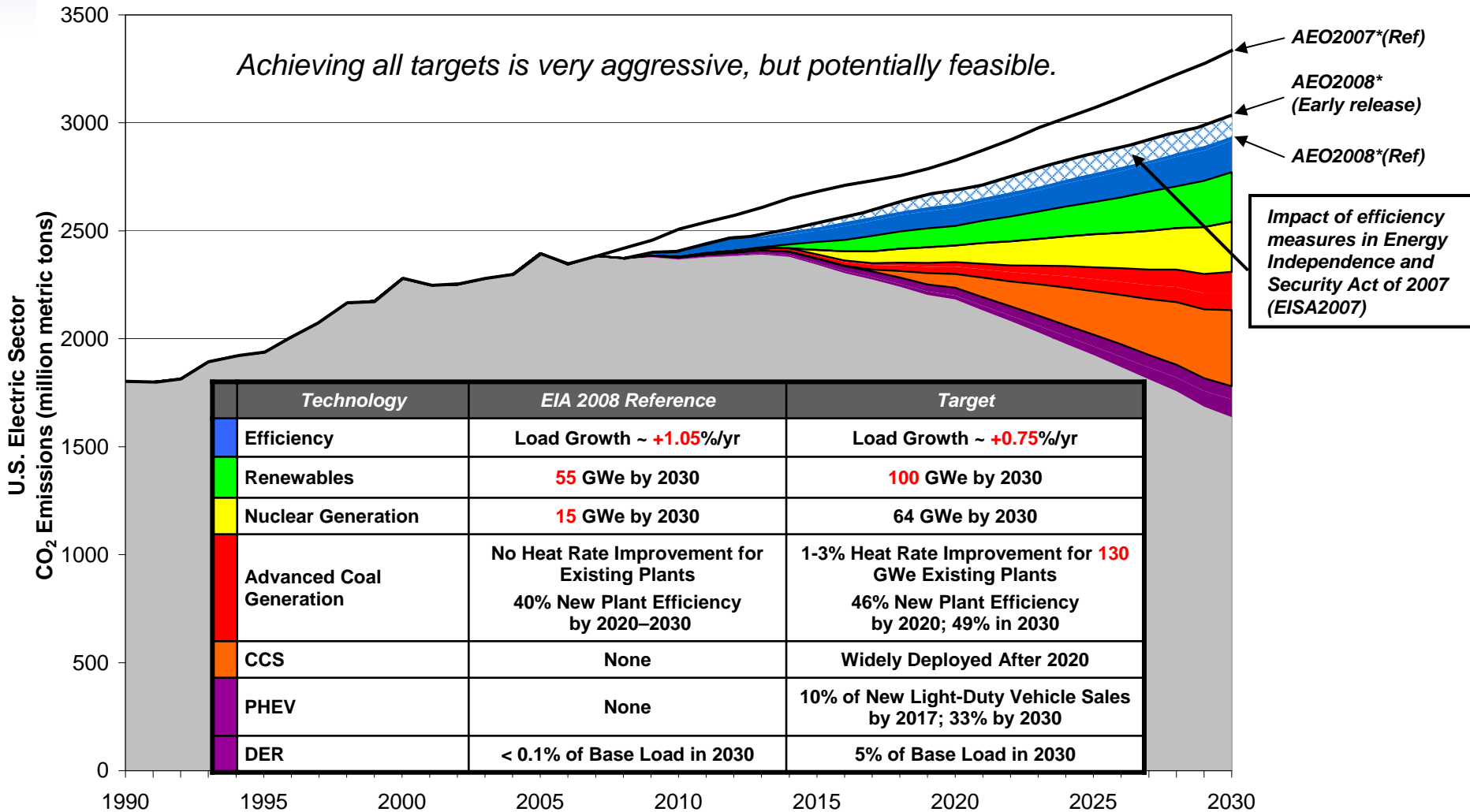


# EPRI's PRISM Analysis

*Assess what technologies will be required to slow ... stop ... and reverse the increase in CO<sub>2</sub> emissions forecast by the Energy Information Administration (EIA) in United States*

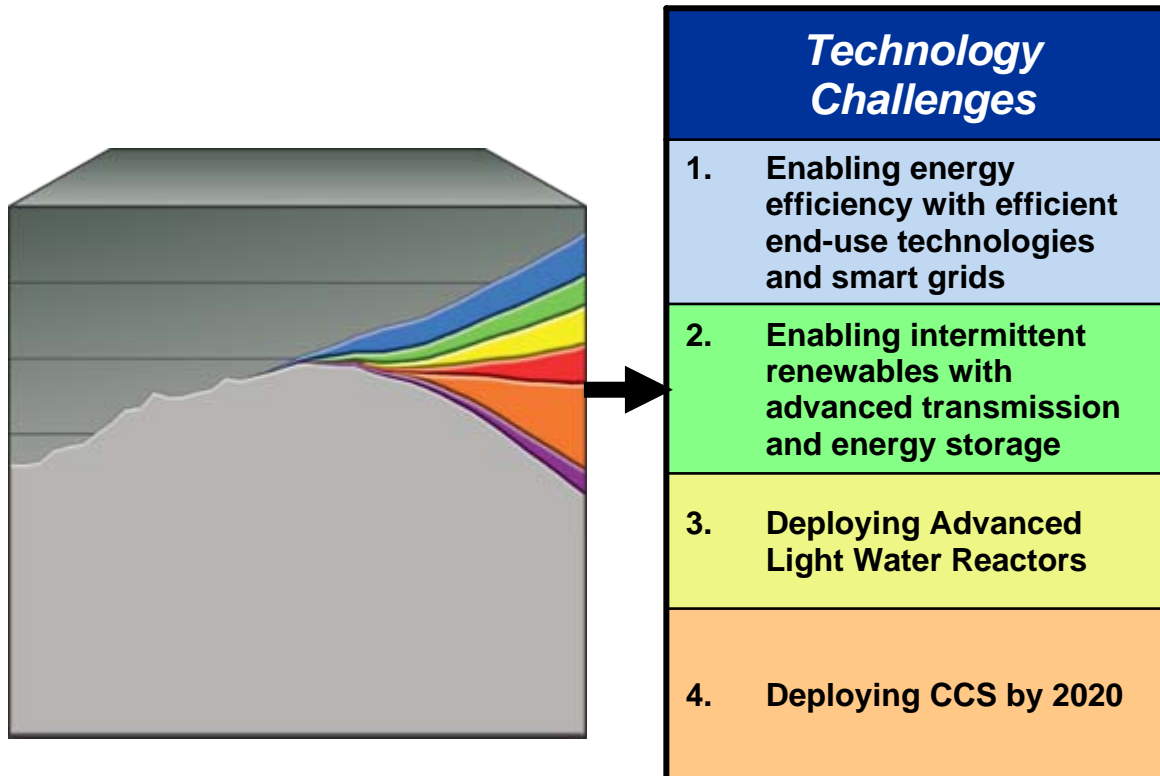


# 2008 Prism...Technical Potential for CO<sub>2</sub> Reductions



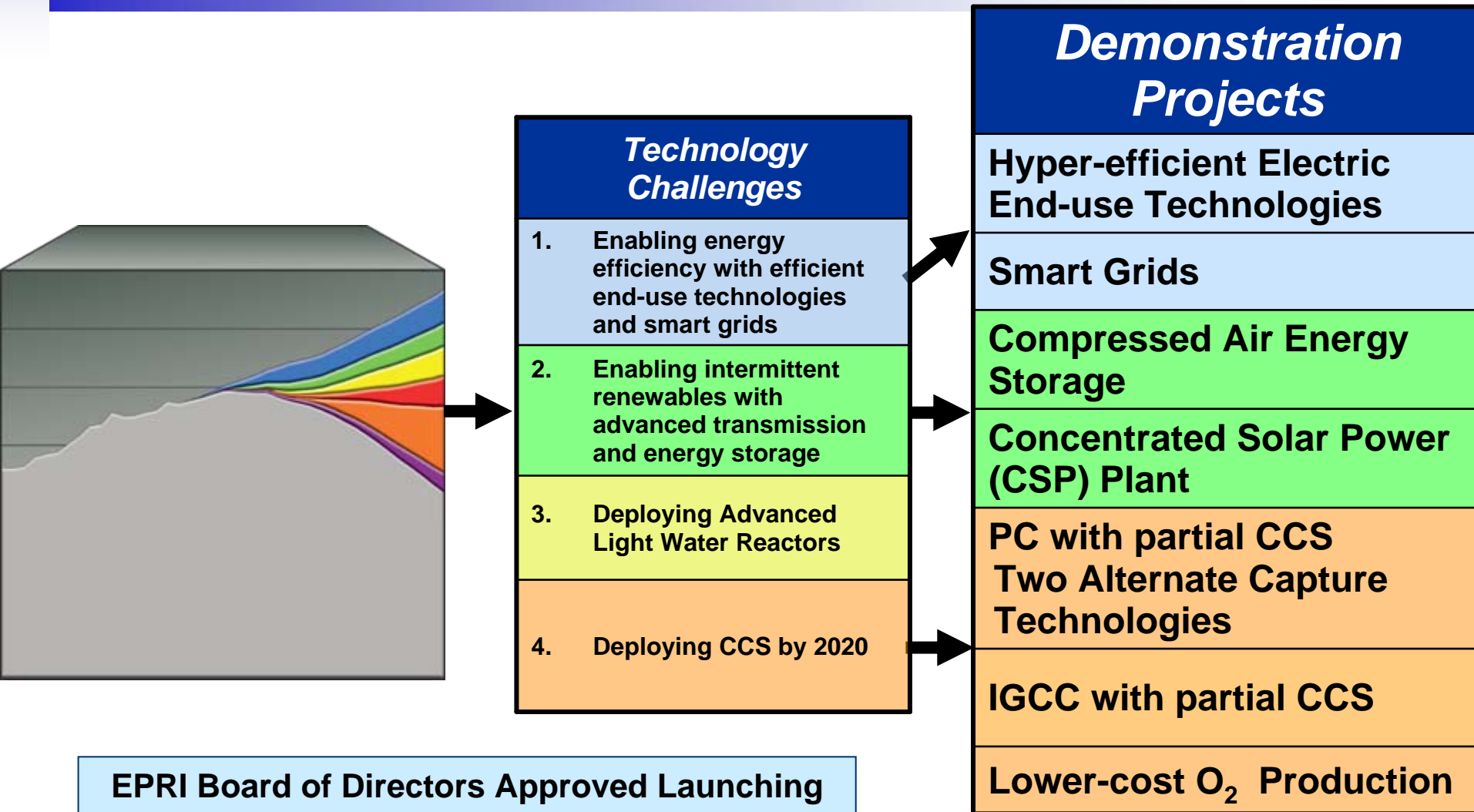
\*Energy Information Administration (EIA) Annual Energy Outlook (AEO)

# Key Technology Challenges to Achieving CO<sub>2</sub> Reductions



# 2008 EPRI Priority...Analysis to Action

## Large Scale International Technology Demonstration



EPRI Board of Directors Approved Launching of Demonstration Projects in April, 2008

*Currently in Planning Stage*

# Hyper-Efficient Technologies Demonstration: 2008-2010



**Variable Refrigerant Flow  
Air Conditioning**



**Ductless Residential Heat  
Pumps and Air Conditioners**



**LED Street and  
Area Lighting**



**Heat Pump Water Heaters**



**Efficient Data Centers**

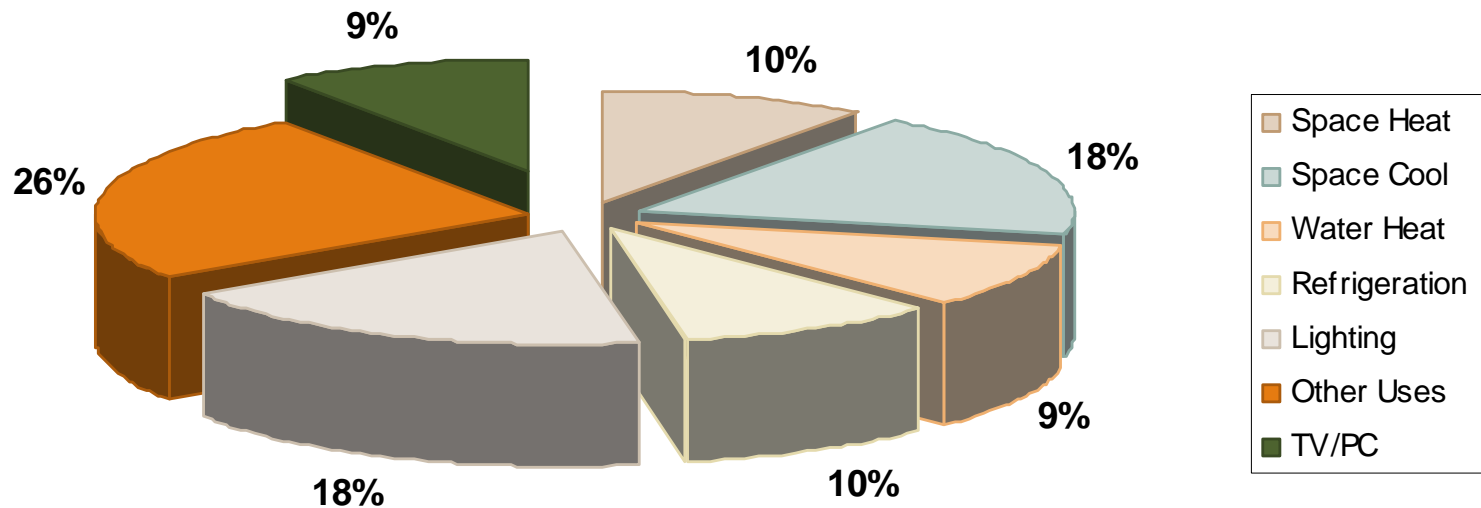


**Hyper-Efficient  
Residential Appliances**

**Currently in Planning Stage**

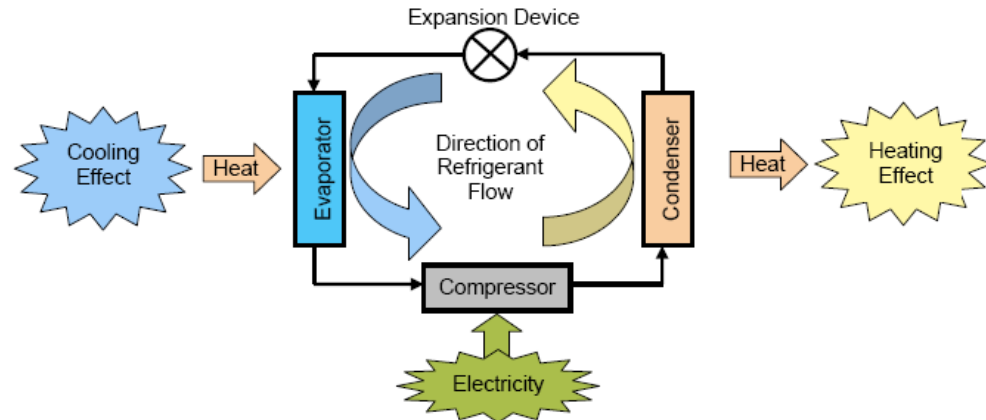
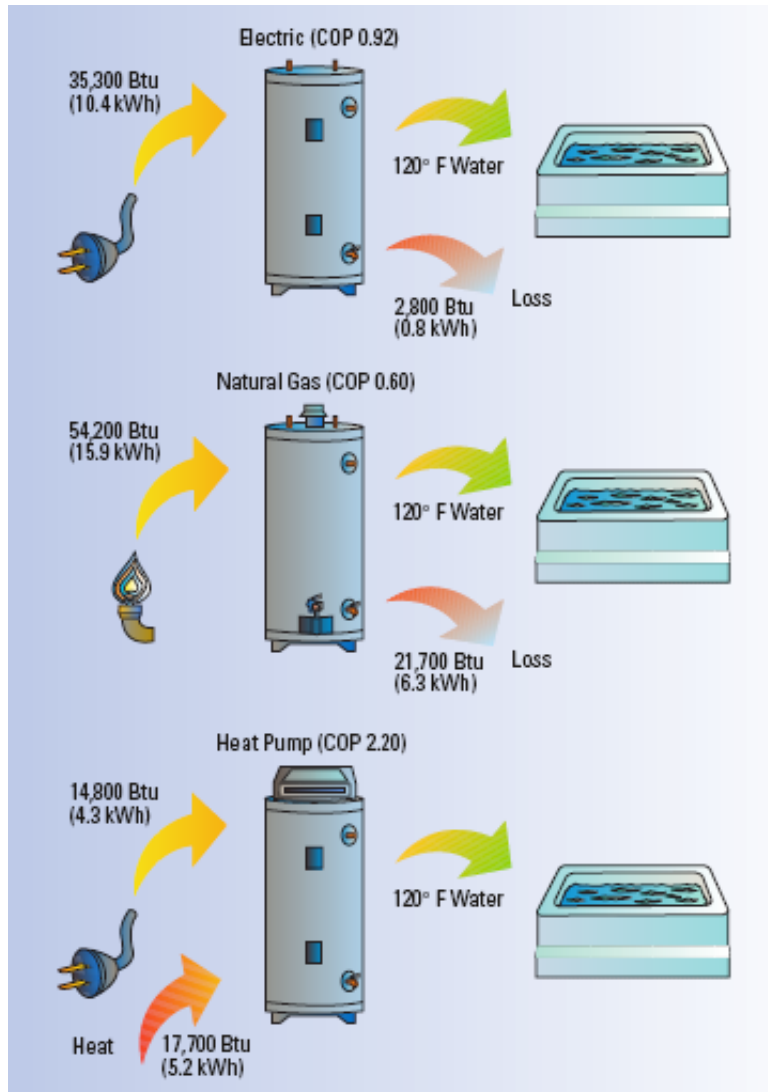
# Water Heating – Residential Energy Use in the USA

Residential Electricity Use by End Use - 2005



- Water heating accounts for about 11% of total energy use (both electric and gas)
- Electric water heating – about 9% of total electricity use

# Why Heat Pump Water Heaters?



- Lower energy use (reduce energy use by 50% or more)
- Lower peak electrical demand (reduce WH peak diversified elec. demand by 50% or more)
- Free cooling & dehumidification byproduct

# EPRI's Plans in HPWH Deployment

- Core Program (currently underway)
  - Technology testing in the Living Laboratory
    - Systems from leading developers in USA
    - Eco Cute systems from Japan
- Demonstration Project (in planning stage)
  - Testing and validation in members' service territories
    - Validation of technology reliability
    - Clear metrics on energy and demand savings
    - Clear metric on CO<sub>2</sub> reduction
    - Economic and payback analysis
  - Provide technical support to member utilities who may want to move forward

# Tasks, Schedule and Costs

- Tasks
  - Select sites in participants' service territories
  - Develop test protocols for testing HPWHs at the sites
  - Provide HPWHs for testing at the site
  - Evaluate data collected during the site testing
  - Final report(s) and workshop(s)
- Schedule
  - 2 year program
  - January 2009 to December 2010
  - *Currently in planning stage*
- Costs
  - Collaborative project; funded by member utilities

# Questions?

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