



EPRI

ELECTRIC POWER
RESEARCH INSTITUTE

Energy Efficient Appliances and Consumer Electronics

Home Energy Management Technology Forum

AQMD

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

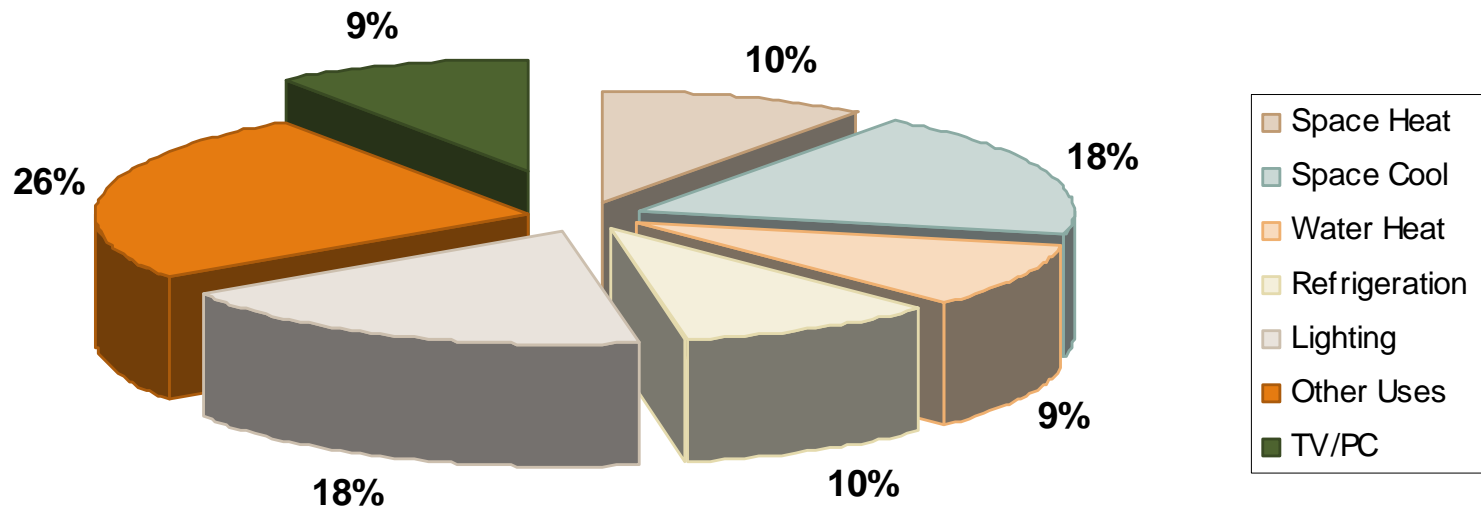


- Not for profit, independent, unbiased, collaborative electricity research organization with more than **450 participants in over 40 countries**
- U.S. utilities placed approximately **72% of their R&D investment** with EPRI in 2007.
- Independent electricity research in:
 - Generation
 - Nuclear
 -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

Rapid Growth in Energy Efficiency

Residential Electricity Use by End Use - 2005

Residential Electricity Use by End Use - 2005



EPRI's Living Laboratory (Knoxville, TN)



Evaluating and testing energy efficiency technology

Living Laboratory Overview

- Screen new technologies in a laboratory setting before they are readied for deployment in field demonstrations
- Unbiased & Vendor Neutral
- Collaborative Hub and a Clearing House - Driving Innovation, Standards, Interoperability and Adaptation of Technologies
- Residential Technologies – Heat Pump Water Heaters, New Air Conditioners, PCTs, Lighting, Electronic Appliances etc.
- Field Demonstrations designed To Validate Functionality, Identify Requirements, Issues, Lessons Learned and Mitigate Implementation Risks in Utilities' Own Environment



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



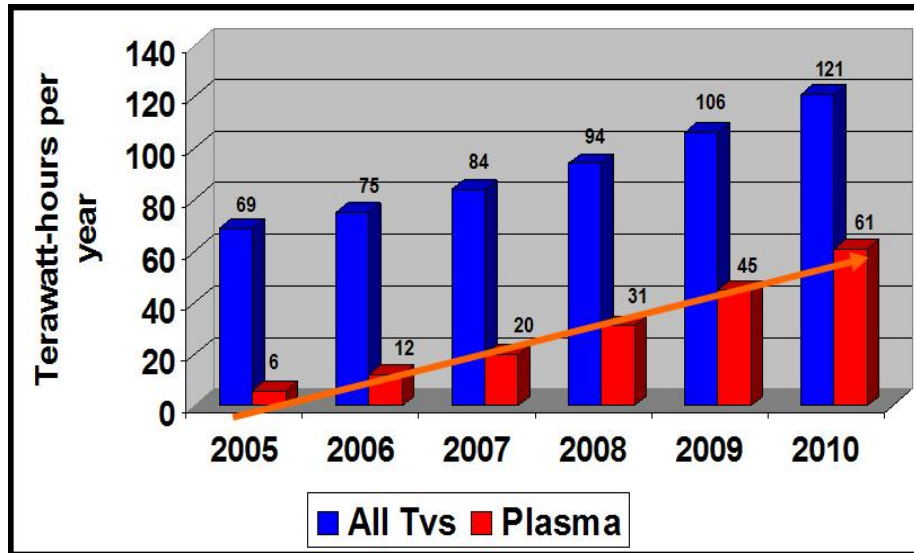
Efficient Data Centers



**Hyper-Efficient
Residential Appliances**

Three Technologies in Residential

Trends in Consumer Electronics – Large Screen TV

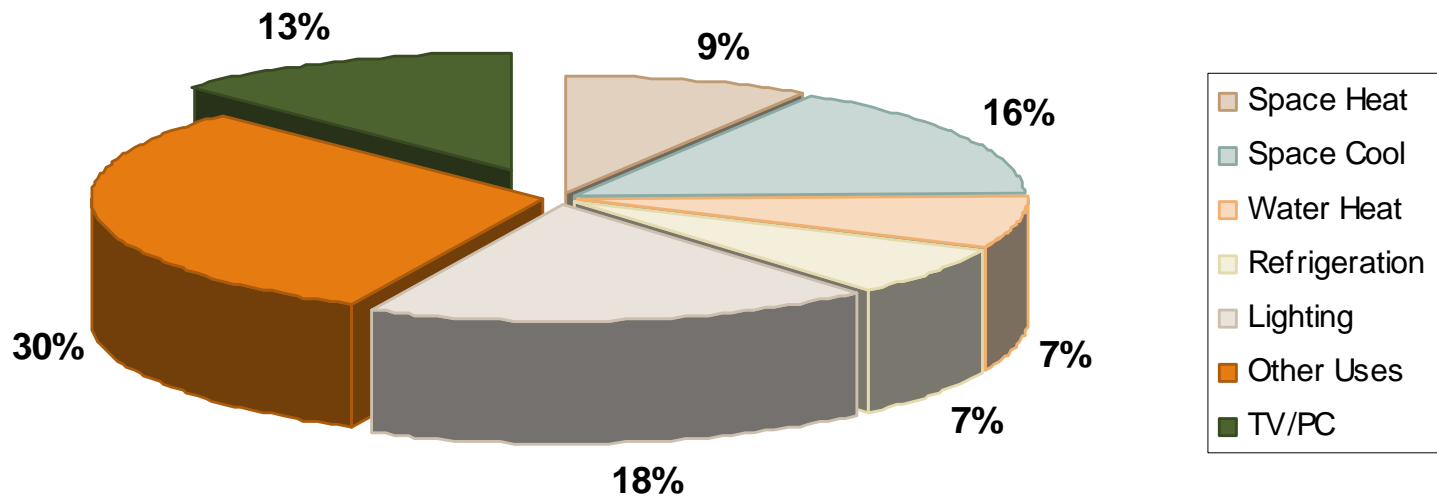


300W, ~5.5 hrs/day

- A 46" Plasma TV consumes 300W of power or 602 kWh of energy per year (assuming an average daily viewing time of 5.5 hours)
- A old 36" CRT consumes 133 W of power or 267 kWh of energy per year (assuming an average daily viewing time of 5.5 hours)
- Power consumption of Plasma is about three times as much as CRT. This is not surprising because the viewing area of the Plasma TV is about three times larger.

Residential Electricity Use by End Use - 2030

Residential Electricity Use by End Use - 2030



By 2030 TV/PC and Other Use Combined Could Account for More than 40% of US Residential Electricity Consumption

Making PC and Server Power Supplies More Efficient

Computer Power Supplies



Climate Savers Initiative



Advancing the Use of *Smart* and Efficient Devices

Programmable Communicating Thermostats



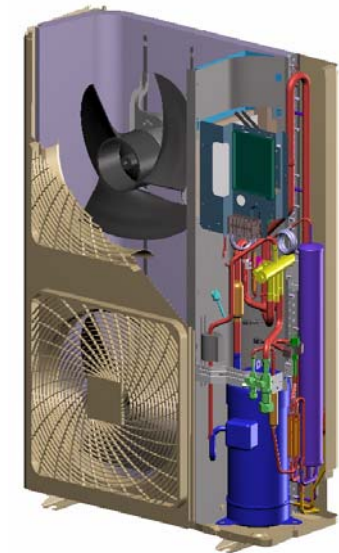
Direct Energy Feedback Devices



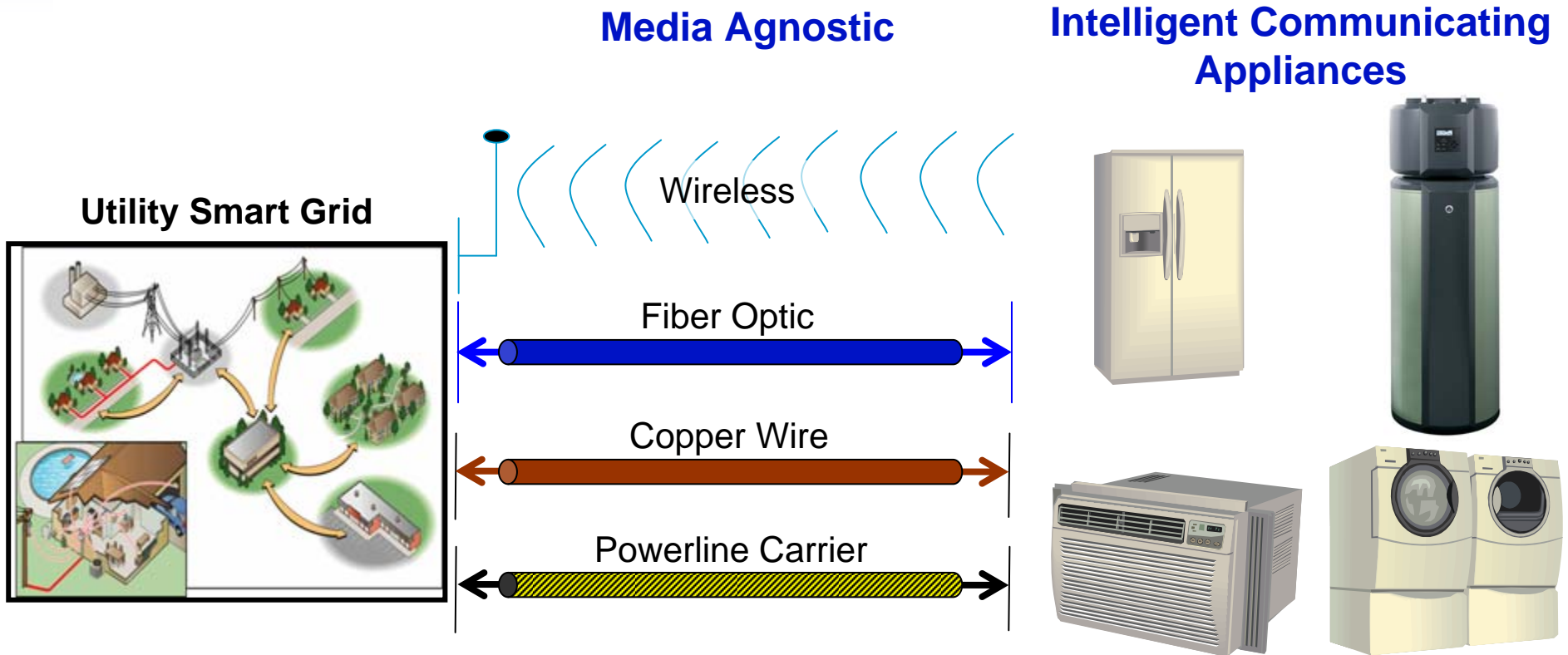
Lighting



Heat Pumps

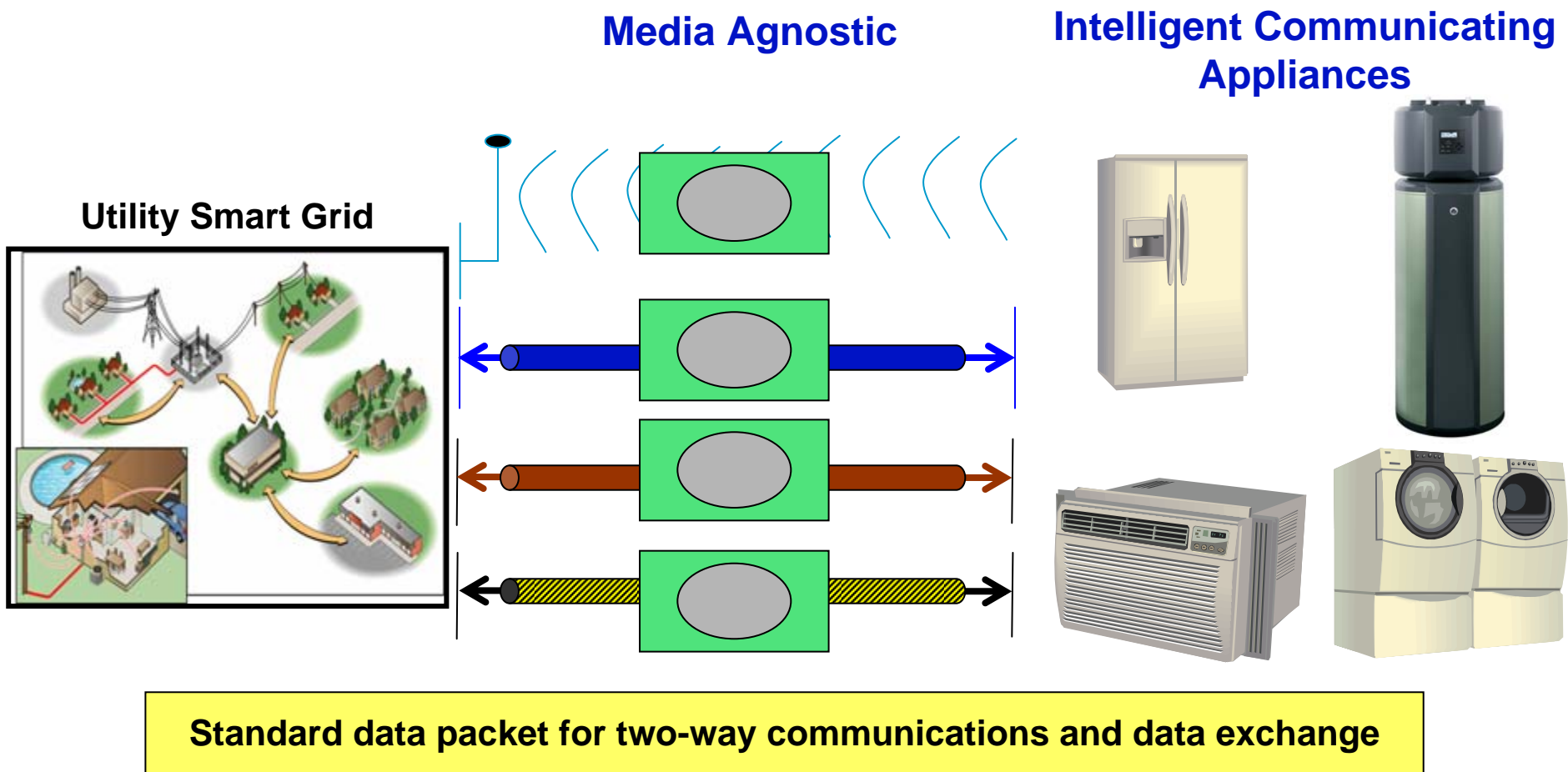


Smart Grid Enabling Demand Response Through Demand Response (DR) Ready Appliances



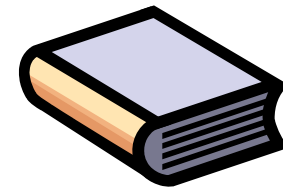
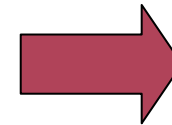
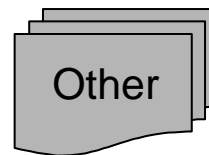
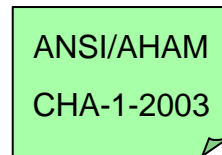
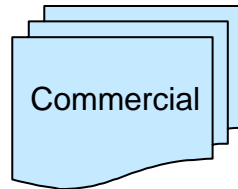
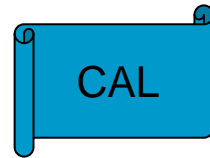
Designation & Certification to Encourage Manufacturers to Develop DR-Ready Products
Barriers: Standards for DR Interface & Market Transformation to Embed DR Interface

Technical Challenge: Develop standards for exchanging information with smart appliances



EPRI's IntelliGrid Common Language Concept

- EIA 721 Generic Common Application Language
 - Trane, Panasonic, Others
- ASHRAE/ANSI 135 BACnet
- DALI (Lighting)
- Association of Home Appliance Manufacturers
 - Whirlpool, Maytag, GE, LG, Sub Zero, Emerson, Sharp, Samsung, Others
- Consumer Electronics
 - Sony, Panasonic, Others
- Automotive
 - SAE, Major Automobile Mfrs



Proposed Industry Level Language for Customer Communications

In Conclusion....

- Energy efficiency in US is poised for rapid growth
- Electric utilities are significantly increasing their spending on energy efficiency programs
- There is a need for new and more efficient technologies
 - Demonstrations of technologies
- Next generation smart technologies are on the horizon
 - Need for interoperability
- EPRI's unbiased and objective assessment can lead to a win-win situation for EPRI, electric utilities, manufactures and consumers.

Thank You

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