A decorative diagonal border runs from the top-left corner to the bottom-left corner of the slide. It is composed of several overlapping rectangular images: a landscape with trees, orange flowers, a water droplet hitting a surface, a green leaf with a central vein, a mountain range with a lake, a green field with a tree, another water droplet, another green leaf, another orange flower, another mountain range, and another green field with a tree.

**USEA Global Energy Efficiency Workshop**  
**Washington, DC**  
**March 9, 2010**  
**Carol Mulholland and Susan Komornik**  
**The Cadmus Group**

# Cadmus Energy Services

- Cadmus founded in 1983
  - Water
  - Energy Services
  - Social Marketing and Communications
  - Green Building
  - Corporate Social Responsibility and Sustainability
  - Strategic Environmental Management, and International Development
- Quantec merger in May 2008
  - Led by Dr. M. Sami Khawaja
  - Research and analytical services in the U.S. and abroad
  - Project planning and evaluation
  - Market research and marketing

# The American Psyche (in 2 minutes)

- Understanding a little about U.S. history helps
  - Land of seemingly never ending resources - land, timber, water, fuel, animals)
  - “Free” with hard work – the harder you worked the more you got
  - Consumerism grew – visible signs of wealth and progression from basic needs to want/nice-to-have to deserve-to have

# 20<sup>th</sup> Century Awakening

- 1960's
  - Recognition of our damage to the environment
    - Toxic waster
    - Water pollution
    - Smog and health issues
- 1970's
  - New constraints never experienced
    - Water restrictions
    - Gas boycotts and long lines
    - Environmental impacts slow building of power plants and restrict nuclear energy use

# Energy Efficiency Pioneers

- 1970 Clean Air Act passed by Congress
- 1974, Arthur Rosenfeld, California icon challenged manufacturers to reduce refrigerator energy demands in 1974 and succeeded in driving down the energy use by 75% even as the average cubic foot of a refrigerator grew from 18cf to 24cf.
- *Energy savings from improved refrigerator standards from 1974 to 2008 is equal to the amount of energy used annually in Canada.*

# Multi-prong Approach

- Federal and State regulations
  - Standards established for limits on pollution, waste disposal, energy
- Voluntary Programs
  - Manufacturers
  - Retailers
  - Consumers
- Behavior Change

# Establishing Standards

- Appliance efficiency standards
  - One of the most successful policies used by state and federal government to save energy.
- Energy Efficiency standards
  - Prohibit production, import or sale of appliances less efficient than the minimum requirements.
- Standards set collaboratively with manufacturers

# Appliance Standards

- Standards save
  - Energy, reduce pollutants, improve electric system reliability, save consumers and business owners money
- Standards assure
  - A level playing field by eliminating products with high operating costs and
- Hastening the development of innovations that bring improved performance.

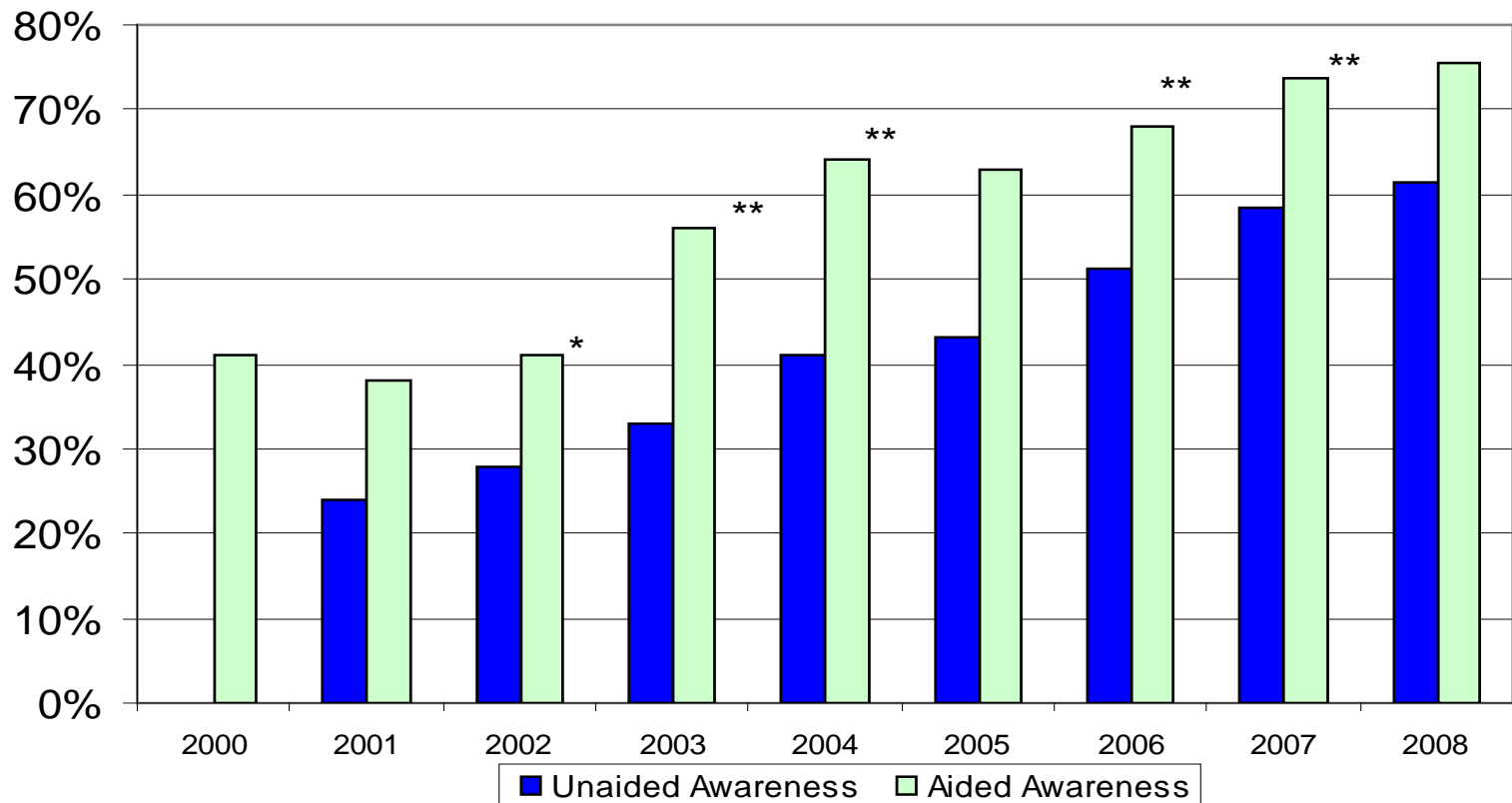


# Voluntary Approach

- Once standards set, voluntary programs for high achievers initiated
- ENERGY STAR® - Introduced by EPA in 1992 for energy-efficient computers
- Now covers over 60 products
- Awareness of brand in 2002 - 44%, 2003 – 56%, 2008 – 75%

# ENERGY STAR 2009

## Awareness of ENERGY STAR

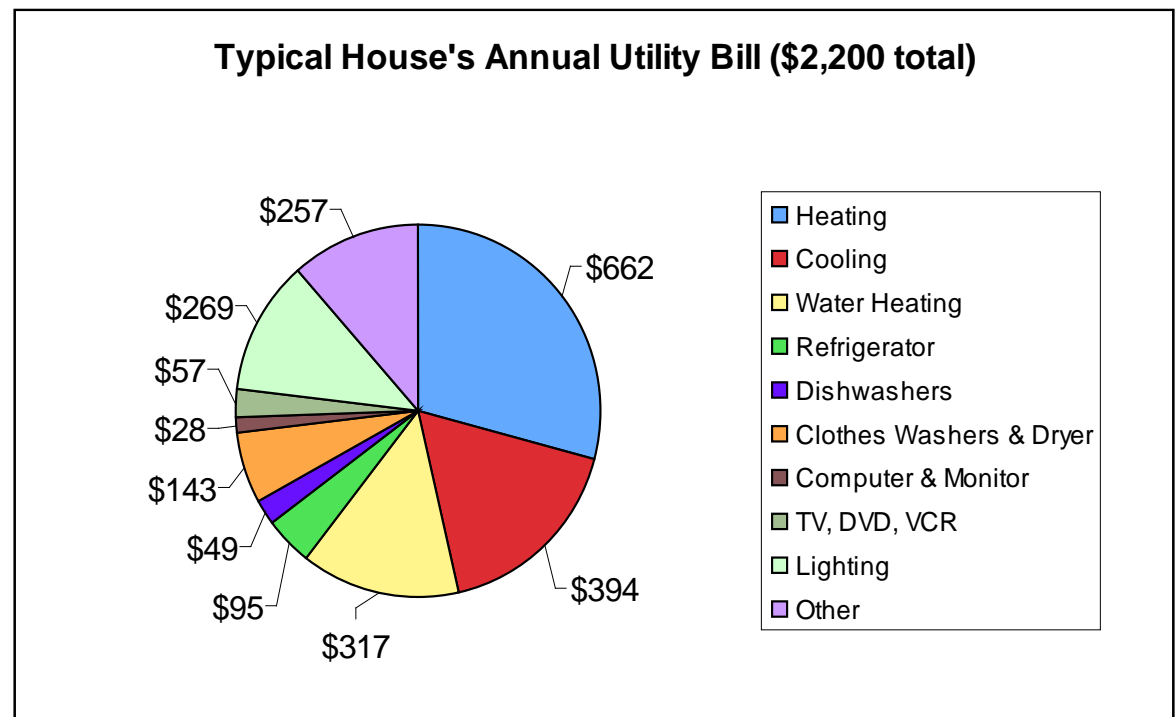


\* Unaided annual result is statistically different from the result of the prior year.

\*\* Aided and unaided annual results are statistically different from the results of the prior year.

# Residential Appliance Impacts

- More than 70% of the energy used in a household goes to appliances, refrigeration, space heating and cooling, and water heating.



# Developing Criteria

- Follows an established evaluation process
- Draws upon the expertise and resources of other stakeholders
  - Manufacturers
  - Utilities
  - Environmental groups
  - Other government agencies
- Informs decision to proceed or not with formulating or revising a product specification

# Guiding Principles of New Specifications

- Significant Energy Savings Nationally
- Does not diminish performance
- Recovery of investment in a “reasonable period of time”
- Efficiency can be achieved with several technology options
- Energy Consumption and Performance can be measured and verified
- Labeling would differentiate the product and be readily visible to purchasers.

# Specification Development Cycle

## Specification Development Cycle



# Refrigerators

- Criteria Changed 2001, 2003, 2008
- Unit sales in 2008 9.3 million –  
70% NOT ENERGY STAR
- Upgradable potential was 6.5  
million units/yr
- Per unit savings ~ 105 kWh/year =  
lost savings of 682,000MWh/year

# Using Manufacturers and Retailers to Market EE

10% off

IN-STOCK OR SPECIAL ORDER ENERGY STAR MAJOR APPLIANCES

priced \$267 or more (before taxes) includes refrigerators, dishwashers and clothes washers. Offer valid 10/9/08 - 10/13/08. Discount taken at register. Not valid on previous sales, installation and delivery fees, extended protection plans or select Fisher/Paykel and Electrolux items. See store for details.



Lowe's has the largest selection of ENERGY STAR® appliances in stock.

<b>Top-Mounts</b>	<b>Bottom-Mounts</b>	<b>Side-by-Sides</b>	<b>French Doors</b>	<b>Four-Doors</b>
from \$348 to \$1198	from \$848 to \$1598	from \$898 to \$2599	from \$1498 to \$2898	from \$2598 to \$2798



◀ Energy Efficiency
About Energy Efficiency
Energy-saving Projects
Related Products

Lowe's and ENERGY STAR® :: Energy Tax Credit :: Good For the Planet :: Earth Day 2008

Is your home leaking money?

Is your home energy "inefficient?" If so, it could be costing you hundreds of extra dollars a year. Maybe your home is drafty, or your appliances and fixtures are power- and water-wasters? A closer look might reveal you're spending more than you need to.

1 2 3 4 5





# Refrigerator Recycling

- New HE refrigerators only half the story
- Of the 9.3 million sold in 2008, 3.8 million stayed in service
  - Moved to garage or basement
  - Given away
  - Sold by homeowner
  - Taken by retailer and resold
- 1984 12% of homes had a second refrigerator vs. 26% today

# Marketing Recycling



**RETHINK. RECYCLE. REWARD.**

**IDAHO POWER**  
SUSTAINABLE ENERGY

Older refrigerators use 3-4 times more energy than newer models and cost an average of \$150 a year in higher utility bills. Why not reduce your energy bills and help keep harmful materials out of landfills? Recycle it today and we'll give you \$30 for your old unit. That's the kind of redemption you'll feel good about.

**GET \$30 FOR YOUR OLD FRIDGE**

For a free pick up call 1.800.123.1234 or visit [idahopower.com](http://idahopower.com)

**Save a little doe.**



**Save a lot of dough.**



**\$30 FOR YOUR OLD FRIDGE**

**SAVE ENERGY. SAVE MONEY. AND HELP PROTECT THE ENVIRONMENT.**

Chances are, an older refrigerator or freezer is running up your utility bills by an average of \$150 a year. But you can help lower energy use, reduce your energy bills and keep harmful materials out of the landfills. Recycle your old fridge today. We'll pick it up free and you'll pickup \$30 cash.

**Call 1-866-444-9160 or visit [www.aepohio.com](http://www.aepohio.com) for a pickup.**

**AEP AMERICAN ELECTRIC POWER**

\*No age restrictions. Refrigerators and freezers must be in working condition and must be a minimum of 30 cubic feet in size, using inside measurements. AEP Ohio contracts with JACO Environmental, an appliance recycler, to pick up and recycle refrigerators and freezers. AEP Ohio customers must own the unit(s) being recycled. Limit two units per residential address. A check will be mailed within 4-6 weeks after the appliance collection. Some restrictions apply. ♻️

# Clothes Washers

- A story of transformation success
- July 1997: ENERGY STAR qualified clothes washers announced
- 2000: Introduction of HE3t



# Dishwashers

- Dishwashers originally qualified for ENERGY STAR in June, 1996
- Specification requirements include energy and water
- Current Specification Effective Date: August 11, 2009
- Next Scheduled revision: July 1, 2011

# HE and Tankless Water Heaters

- Current Specification Effective Date: January 2009
- ENERGY STAR specifications cover high-efficiency:
  - Gas storage, gas condensing
  - Whole-home gas tankless
  - Solar and heat pump water heaters
- ENERGY STAR qualified tankless water heaters save the typical family more than \$100 per year on gas bills compared to a standard storage model.

# Central Air Conditioners

- ENERGY STAR qualified central air conditioners:
  - Have a higher seasonal efficiency rating (SEER) than standard models
  - Are about 14% more efficient than standard models
- The Consortium for Energy Efficiency (CEE) and the Air-Conditioning, Heating, and Refrigeration Institute (AHRI)
  - Developed an online database which identifies high efficiency equipment that has been tested to ARI 210/240 and verified by AHRI.

# Residential Appliances: Standard vs. ENERGY STAR

Product Type	Product Lifetime	% Annual Energy Savings Compared to	Unit Energy Consumption (kWh/year)		Unit Energy Consumption (MBtu/year)	
			Std. New	ENERGY STAR	Std. New	ENERGY STAR
<b>Residential Appliances</b>						
- Room Air Conditioners	9	7%	676	631		
- Dehumidifiers	12	15%	1,129	955		
- Air Cleaners	9	41%	835	493		
- Exhaust Fans	10	72%	78	22		
- Ceiling Fans w/ lights	10	51%	297	144		
- Dishwashers <sup>[2]</sup>	10	12%	247	217	0.55	0.48
- Refrigerators	12	19%	540	435		
- Clothes Washers <sup>[2]</sup>	11	29%	445	321	1.24	0.81
- Tankless Gas Water Heater	20	30%			26.05	18.27
- High-efficiency Gas Water Heater	13	7%			26.05	24.16

# Commercial Appliances: Standard vs. ENERGY STAR

Product Type	Product Lifetime	% Annual Energy Savings Compared to	Unit Energy Consumption (kWh/year)		Unit Energy Consumption (MBtu/year)	
<b>Commercial Appliances</b>						
- Water Coolers	10	45%	522	286		
- Commercial Refrigeration	10	37%	4,648	2,907		
<i>Commercial Refrigerator</i>	10	46%	4,300	2,332		
<i>Commercial Freezer</i>	10	27%	5,200	3,818		
- Hot Food Holding Cabinets	12	65%	10,129	3,504		
- Fryers	12	27%				
<i>Electric Fryers</i>	12	6%	18,183	17,017		
<i>Gas Fryers</i>	12	31%			163	112
- Steamers	12	50%				
<i>Electric Steamers</i>	12	53%	9,241	4,305		
<i>Gas Steamers</i>	12	35%			97	63
- Ice Machines	8	15%	7,606	6,452		
- Dishwashers	20	27%	19,516	14,365	130	92
- Vending Machines	14	42%	3,653	2,125		



# Appendix: Additional information

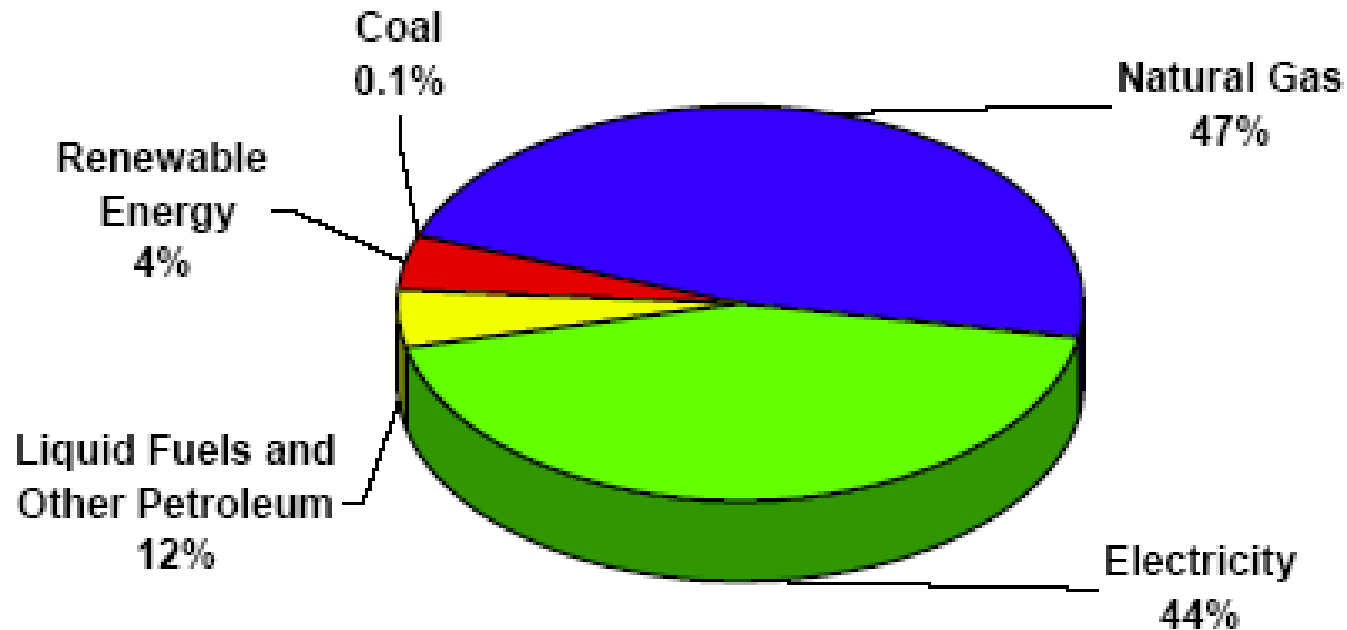
- New Appliance Standards & ENERGY STAR Levels

[http://www.eia.doe.gov/emeu/efficiency/appliance\\_standards.html](http://www.eia.doe.gov/emeu/efficiency/appliance_standards.html)

- Upcoming Appliance Revisions

[http://www.energystar.gov/index.cfm?c=revisions.revisions\\_specs](http://www.energystar.gov/index.cfm?c=revisions.revisions_specs)

# U.S. Residential End Use Energy Consumption by Fuel Type



Annual household electricity use in U.S. is 11,480 kWh