



## Energy Efficient Housing: Lighting and Appliances

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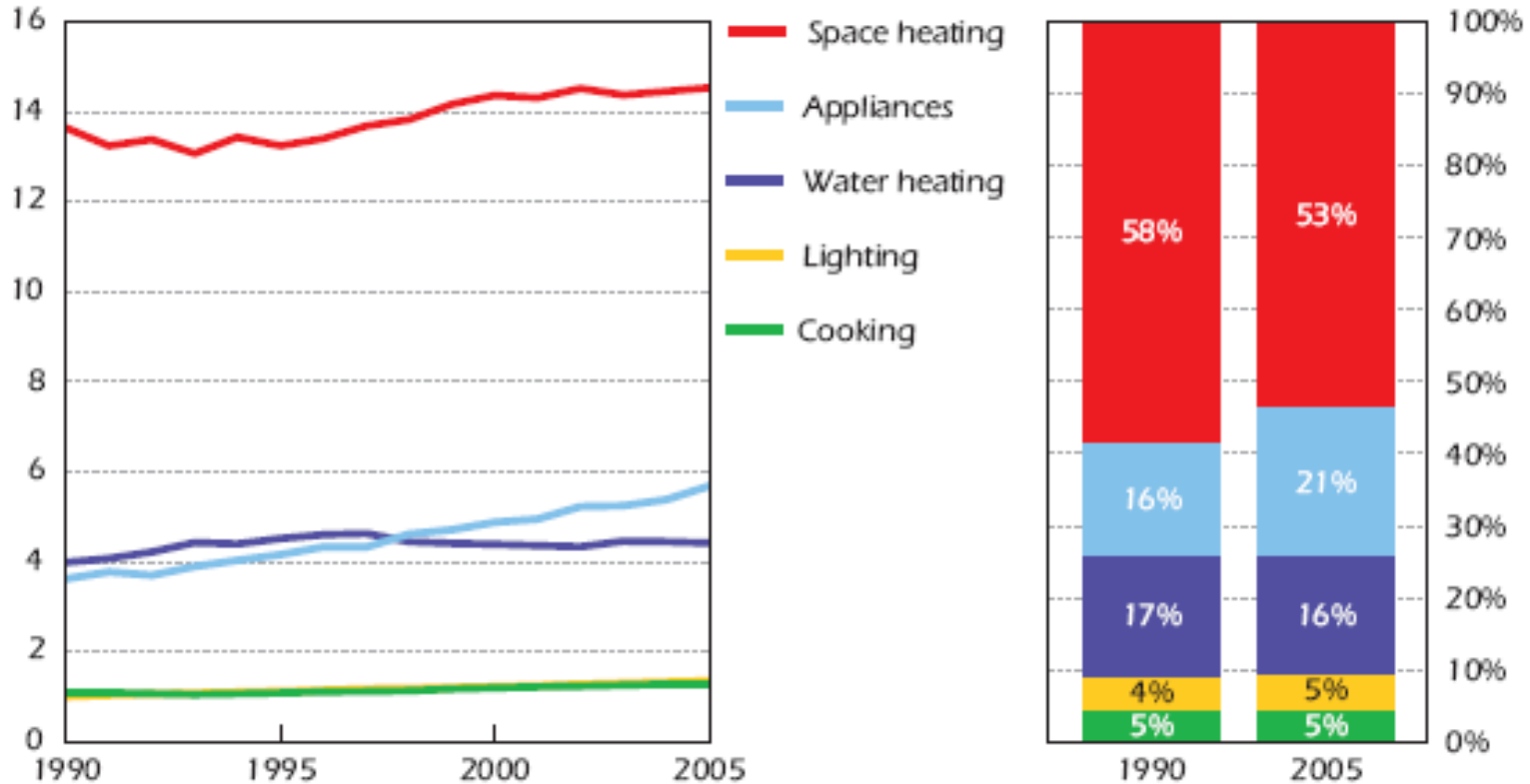
# Energy efficiency is on people's minds

Environmental activities of US citizens by age  
(April 2008, Harris Interactive)

	18-31	32-43	44-62	63+	Total
Reduced the amount of energy used in my home	61%	57%	64%	70%	63%
Purchased more energy efficient appliances	32%	42%	47%	52%	43%
Purchased more locally grown food	23%	26%	25%	35%	27%
Stopped drinking bottled water	23%	17%	19%	27%	21%
Purchased a hybrid car	3%	1%	2%	3%	2%
Purchased carbon-offsets	3%	2%	1%	1%	2%
Other	14%	20%	16%	8%	15%
Nothing	29%	31%	26%	20%	27%

# Lighting, cooking and appliances represent roughly one third of a household's energy use

## Household Energy Use



# Programs to reduce household energy use have been successful, but they are not game changers

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- Very good programs offered:
  - Mail-in rebates
  - Instant rebates
  - Tax exemptions
  - Marketing campaigns
  - Take-back programs
- With some of these, various programs still have low participation rates. For example, EcoEnergy Audits:
- Less than 5% of pre 1980 homes in GTA have conducted an energy audit. Of those, less than 20% have implemented recommendations with less than 5% any changes other than draftproofing.-BCG

# The game will change when homeowners have an internal locus of control with respect to energy use and \$

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- “Individuals with an internal locus of control believe that they can control events related to their life, whereas those with an external locus of control tend to believe that real power resides in forces outside themselves and determines their life.”

-Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

# Washing Machines: Best-in-Class Specifications

Washing Machine level	Cubic feet of laundry washed per KWh	Price
1990 estimate	~0.6	
Federal Standard	1.26	\$379
E-Star	1.80	\$699
Tier 2	2.00	\$999
Tier 3	2.20	\$1299
Top of Line	2.88	\$1599



# Dishwashers: Best-in-Class Specifications

Dishwasher/ level	KWh/ year	Price
1990 Dish	1000+	
Cheapest now	430	\$379
E-Star	324	\$799
Tier 1	307	\$899
Tier 2	295	\$1199
Top of Line	180	\$2599



# Appliances: Best-in-Class Specifications

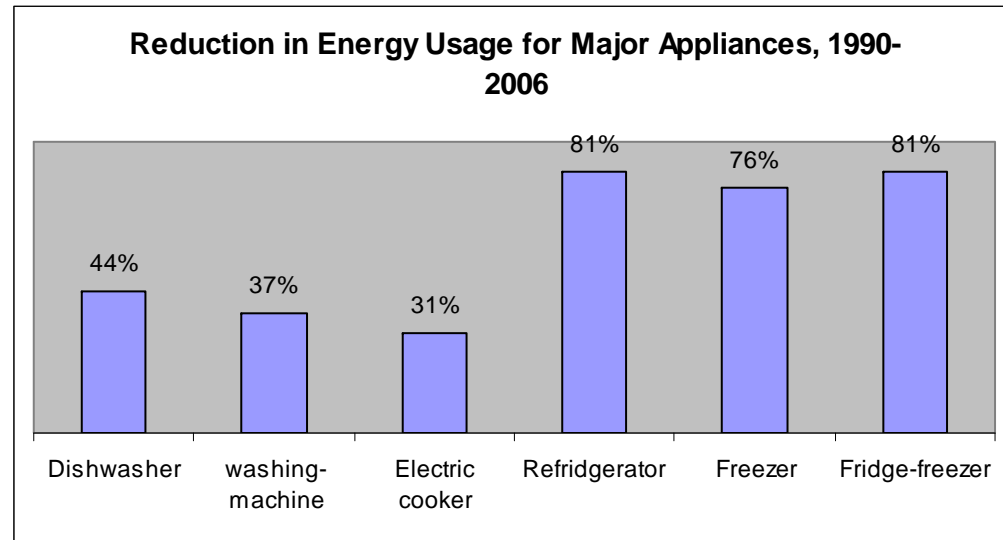
Washer/ level	% better than standard	KWh	Price
1990 estimate	-	1285	
Federal Standard		510	\$499
E-Star	20%	407	\$799
Tier 2	25%	382	\$1899+
Tier 3	30%	357	\$2000+
Top of Line	35-40%	320	\$5700



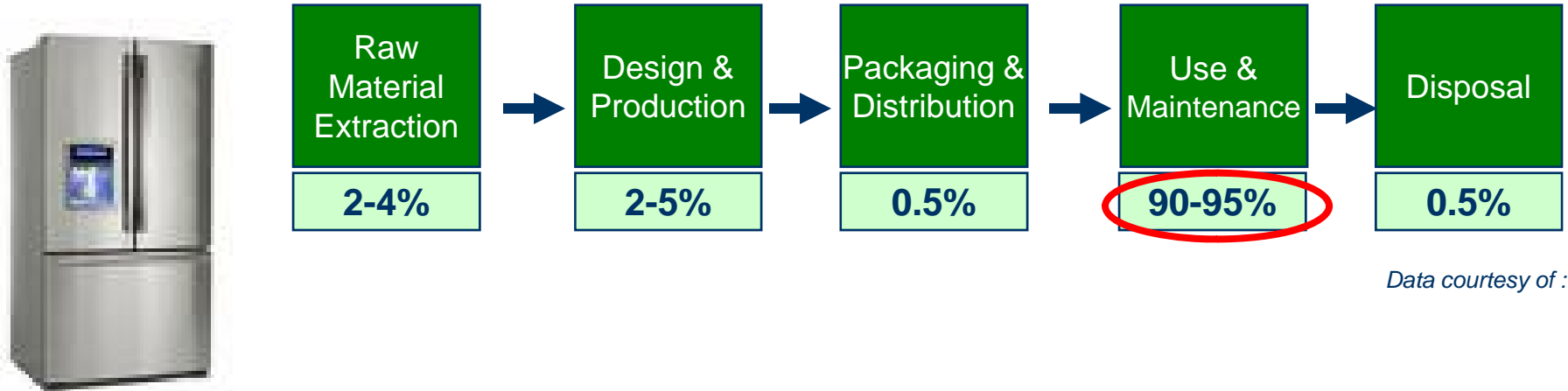
# The products are available to reduce household carbon emissions significantly

## Average Age of Appliances (EU)

Freezers	16,9
Cookers/ Ovens	15,2
Refrigerators/Fridge-Freezers	14,6
Cooker Hoods	14,3
Kitchen Machines	12,7
Washing Machines	12,2
Tumble Dryers	12,2
Dishwashers	11,7
Microwave Ovens	10,5
Colour TV / Beamer	10,5
Toaster	9,4
Video recorder	9,0
Camcorder	8,7
Vacuum Cleaners	8,2
PC / Laptop	5,9
Espresso maker	5,7
Printer	5,4



# People rarely understand an appliances footprint lies... and they keep them



## Residents can change behaviour to get efficient use of appliances, but this cannot be relied upon

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### Eco or \$ conscious users:

- Optimize temperature and amount of goods in fridge + freezer
- Only wash with full load of laundry
- Manual off-peak use
- Wash clothes in cold water
- Re-heat in microwave versus oven for small meals

# Smart Appliances are coming if standardization happens and consumers accept it...

- Whirlpool announces “a million smart-grid-compatible dryers available for public purchase by 2011”
- GE has also made major commitments
- Standard by 2015?



# People do not see the lifetime costs of lighting products



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Type	# bulbs/ house	Price/ bulb	Lifetime	Kwh/year	Annual electricity cost <sup>1</sup>	10 year total cost
Incadescent	30	\$1	1X	2000	\$200	\$2030
CFL	30	\$4	10X	600	\$60	\$720
LED	30	\$20	30X	200	\$20	\$800



1. [http://www.ec.gc.ca/EnviroZine/english/issues/48/any\\_questions\\_e.cfm](http://www.ec.gc.ca/EnviroZine/english/issues/48/any_questions_e.cfm)

## Residents can change behaviour to get efficient use of lighting, but this cannot be relied upon

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### Eco or \$ conscious users:

- Turn off lights when leave the room
- Optimize lighting for needs
- Use motion sensors and/or timers

## The game will change when homeowners have an internal locus of control with respect to energy use and \$

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- Feedback to those above social norms of energy use
- Clear economics of payback
- Be able to see savings instantly
- Be able to see environmental difference instantly
- Financing arrangements so upgrading appliances is cash neutral or positive
- Significant incentives on the major purchases

# Government incentives play a strong role in rapid adoption of energy efficient appliances

- Consumers in Italy buying a refrigerator or freezer featured A+/A++ can deduct 20% (Max 200 Euros) of the cost of the appliances from taxes since January 2007

Cooling devices in Italy, % of each energy label

