



Energy and Climate Change: Behavioral Lessons for Lawyers and Policymakers

Next Generation Energy and Law
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The Behavioral Wedge

- ❑ Viable Gap-Filler: A Fast Wedge
- ❑ Near-term and Long-term Reductions
- ❑ Low Cost and Intrusiveness
- ❑ Energy and Carbon Reductions
- ❑ Magnitude
 - ❑ US = ~ 17% below 2005 Levels by 2020
is ~280 MtC/year if no emissions
growth or 406 MtC/year if EIA
projected emissions growth
 - ❑ RAER-10 = 123 MtC if static or 132 MtC if
growth (44% or 33% of US total)

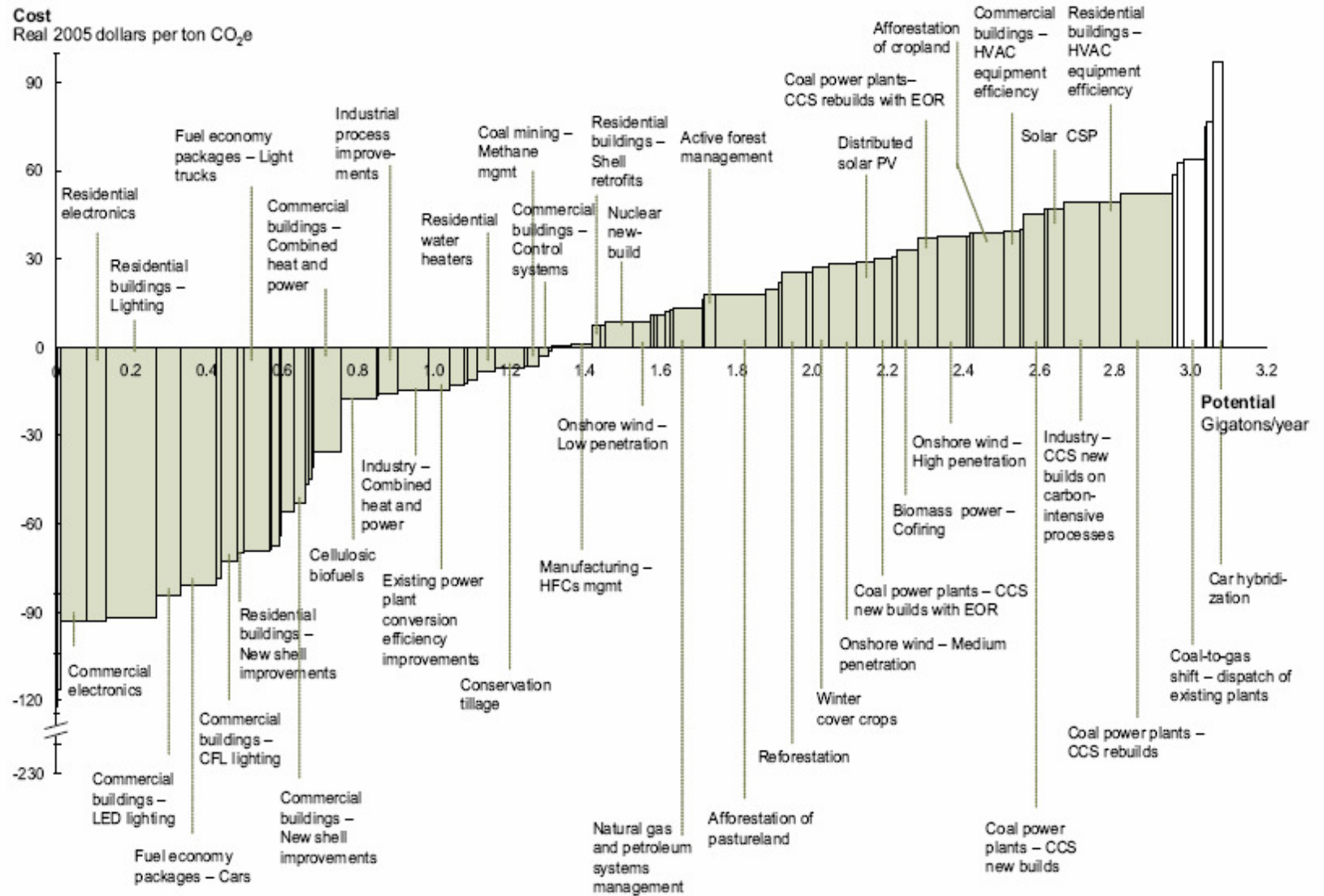
Individual Behavior: The Opportunity

Behavior Change	Category	Potential Emissions Reduction (MTC)	Behavioral Plasticity	RAER (MTC)	RAER (%/H)
Weatherization	W	25.2	90%	21.2	3.39%
HVAC Equipment	W	12.2	80%	10.7	1.72%
Low-flow showerheads	E	1.4	80%	1.1	0.18%
Efficient water heater	E	6.7	80%	5.4	0.86%
Appliances	E	14.7	80%	11.7	1.87%
LRR tires	E	7.4	80%	6.5	1.05%
Fuel-efficient vehicle	E	56.3	50%	31.4	5.02%
Change HVAC air filters	M	8.7	30%	3.7	0.59%
Tune up AC	M	3.0	30%	1.4	0.22%
Routine Auto Maintenance	M	8.6	30%	4.1	0.66%
Laundry temperature	A	0.5	35%	0.2	0.04%
Water heater temperature	A	2.9	35%	1.0	0.17%
Standby electricity	D	9.2	35%	3.2	0.52%
Thermostat setbacks	D	10.1	35%	4.5	0.71%
Line drying	D	6.0	35%	2.2	0.35%
Driving behavior	D	24.1	25%	7.7	1.23%
Carpooling & Trip-chaining	D	36.1	15%	6.4	1.02%
Totals		203	20%	123	20%

Source: Dietz et al., Household Actions Can Provide a Behavioral Wedge to Rapidly Reduce U.S. Carbon Emissions, 106 PROC. NATL. ACADEM. SCI. U.S.A. (2009)

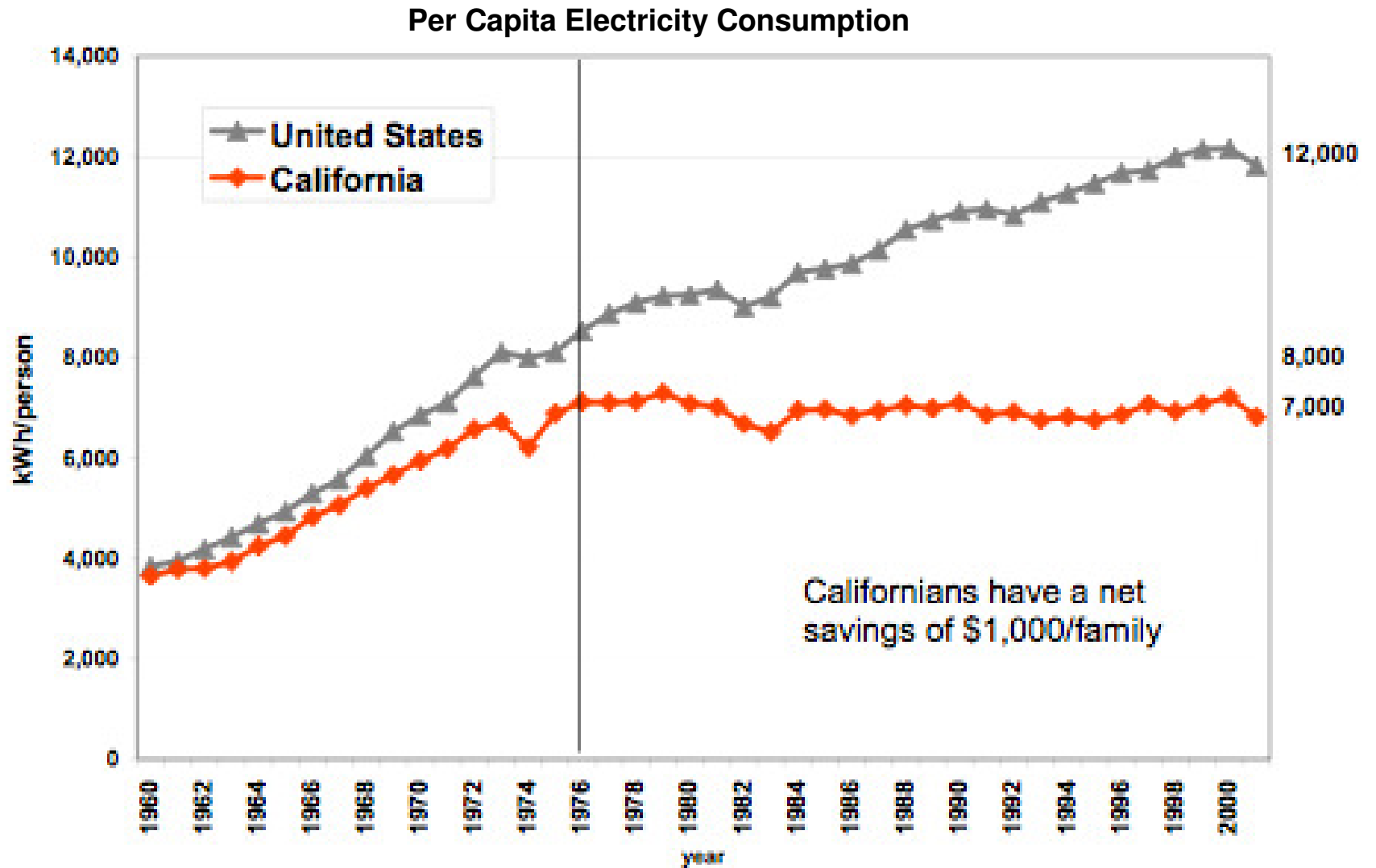
Cost-Effective Household Options

U.S. MID-RANGE ABATEMENT CURVE – 2030



Source: McKinsey (2007)

The California Example



Source: http://www.eia.doe.gov/emeu/states/sep_use/total/csv/use_csv



Integrating Social Science into Policy Frameworks

- ❑ “Policies based on careful technical and economical analysis have often been psychologically naïve or politically unrealistic. The reason for such policy failures lies in oversimplified policy analysis that has serious blind spots in the area of human behavior.” (Stern, 1992).
- ❑ Need to consider product use in addition to technical potential.
 - ❑ Energy use in identical homes can vary by as much as 300% due to behavior (Lutzenhiser, 1993).
- ❑ Need to move beyond ‘rational actor’ assumptions.
 - ❑ Efficiency gap suggests “behavioral imperfections.”



Behavioral Lessons from the Social Sciences

- ❑ Moving beyond a 'rational actor' model
 - (1) Putting price in context
 - (2) Reducing "take-back" effects
 - (3) Motivational crowding
 - (4) The energy invisibility problem
 - (5) Cognitive miscalculations
 - (6) Valuing cognitive costs
- ❑ Marketing behavior change
 - (7) Framing effects
 - (8) The attitude-behavior gap
 - (9) Communicating social norms
 - (10) The need for consistency

1. Price plays an important, but limited role

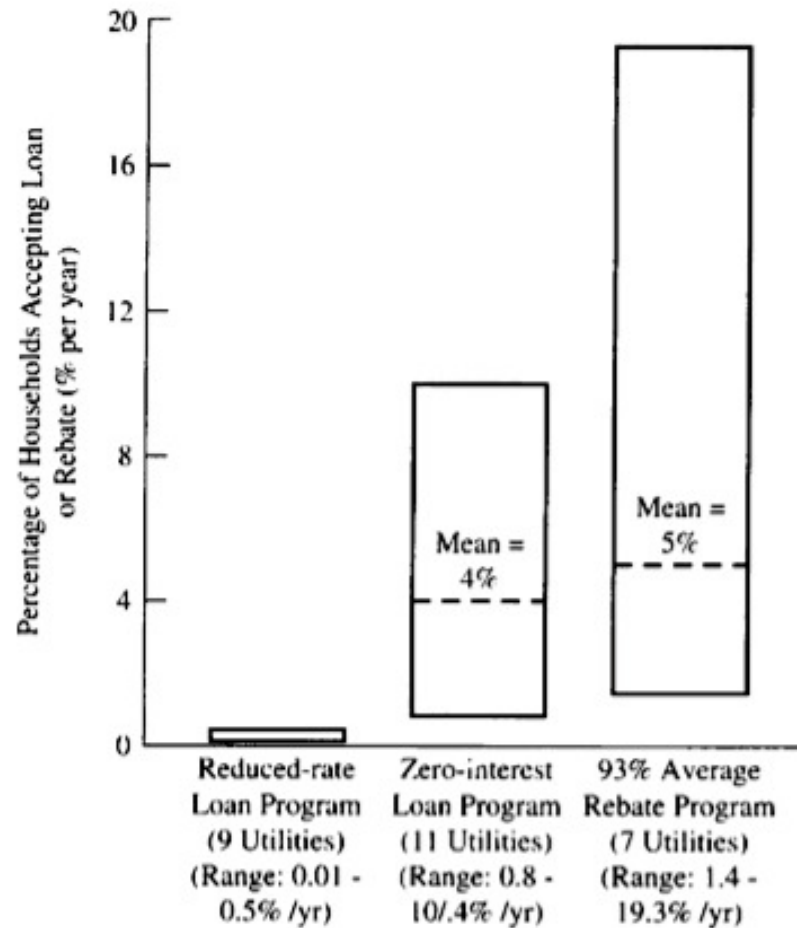


Figure 2. Effectiveness of three home energy conservation programs. *Source:* Stern et al. (1986).



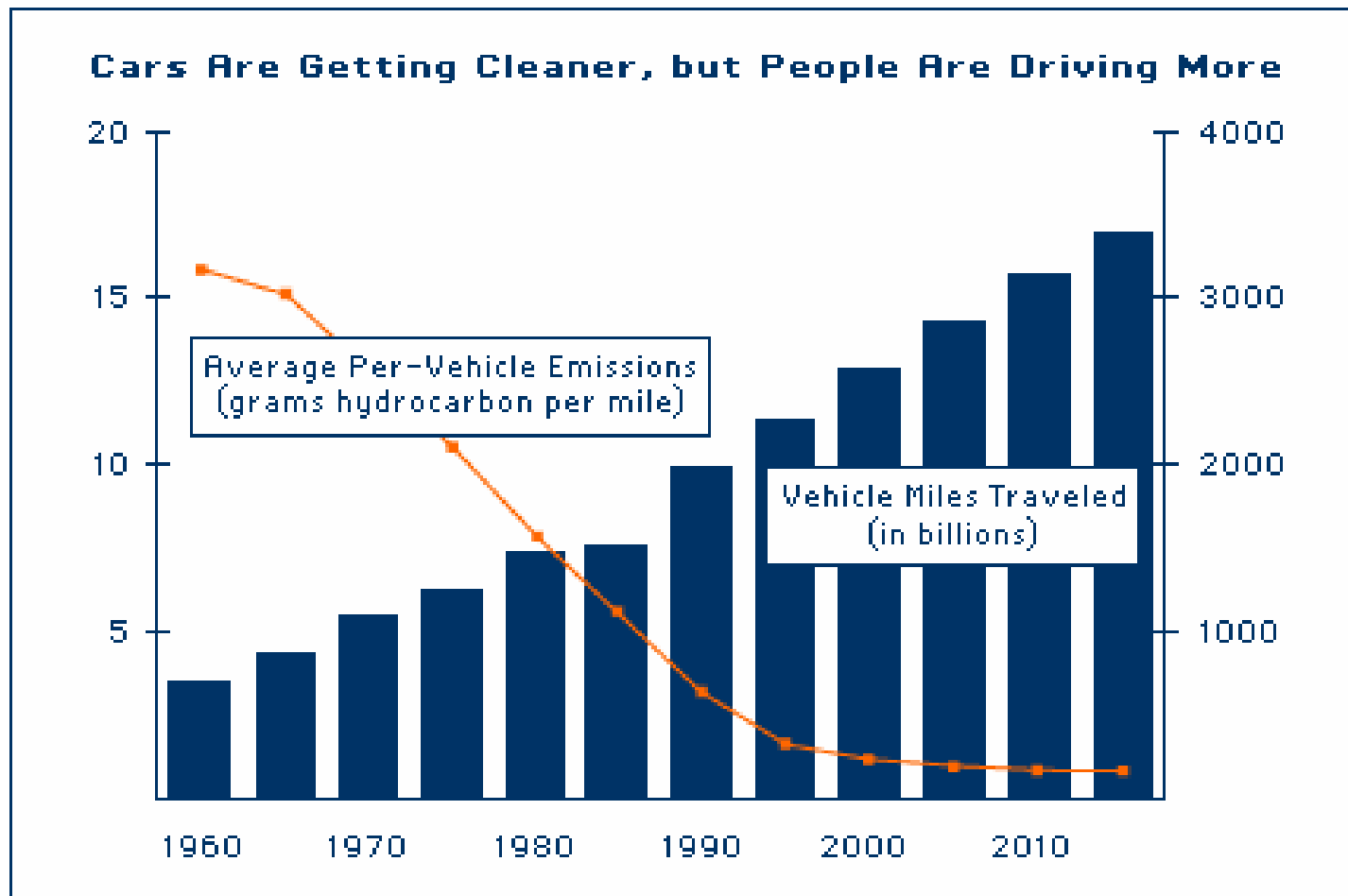
1. Price plays an important, but limited role

- An attractive incentive package is often a **necessary but not sufficient** condition for inducing action.
 - The larger the incentive, the more non-price related factors matter.

- There is a potential for successful interventions in the absence of economic incentives.
 - We should not assume programs must be linked to pricing schemes if the political will does not exist.

2. Reducing “take-back” effects

- ❑ Focusing solely on economic motivators may introduce more room for “take-back” effects.



Source: <http://www.epa.gov/oms/invtory/overview/vmt.htm>



2. Reducing “take-back” effects

- ❑ Focusing solely on economic motivators may introduce more room for “take-back” effects.
- ❑ Behavioral interventions can reduce the gap between realized efficiency gains and technologically achievable efficiency gains.
 - ❑ Goal + feedback = 10 – 15% reduction in home energy use (Seligman & Darley, 1977).

3. Economic incentives can be counterproductive

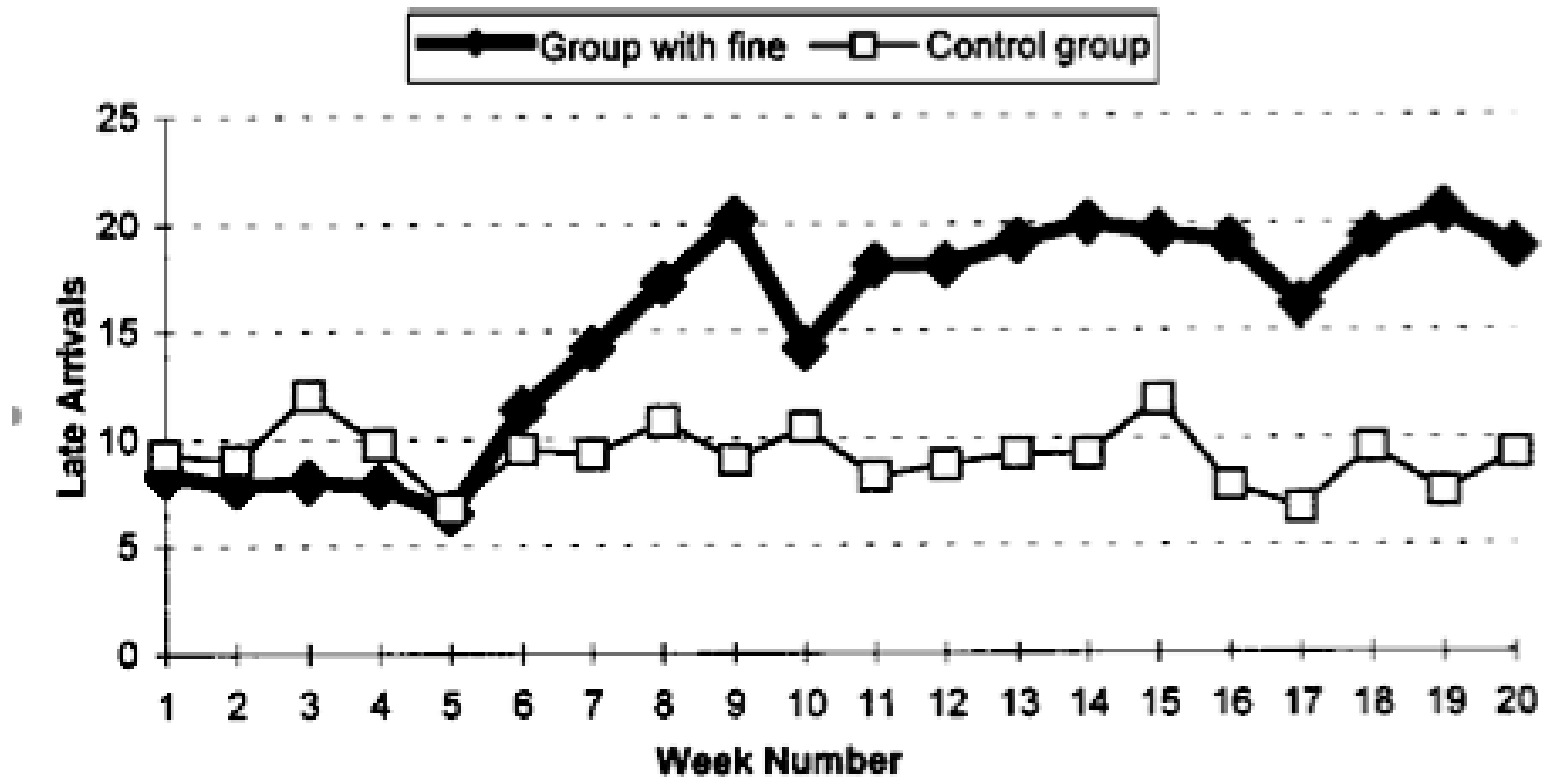


FIGURE 1.—Average number of late-coming parents, per week



3. Economic incentives can be counterproductive

- ❑ Avoid depending solely on fines/rewards to target behaviors that are otherwise governed by moral norms.
- ❑ Pairing economic incentives with public outreach (e.g., moral persuasion, normative appeals) can produce synergistic effects.

The Irish Bag Tax Example

HOME PAGE	MY TIMES	TODAY'S PAPER	VIDEO	MOST POPULAR	TIMES TOPICS
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The New York Times **Europe**

WORLD	U.S.	N.Y. / REGION	BUSINESS	TECHNOLOGY	SCIENCE	HEALTH	SPORTS	OPINION	ARTS
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AUTOS

AFRICA AMERICAS ASIA PACIFIC **EUROPE** MIDDLE EAST

Motivated by a Tax, Irish Spurn Plastic Bags



Derek Sporns for The International Herald Tribune

Reusable cloth shopping bags, like this one at a Superquinn grocery checkout in Dublin, have replaced those stretchy, crinkly plastic shopping bags, which are subject to a 33-cent tax per bag.

By ELISABETH ROSENTHAL
Published: February 2, 2008

DUBLIN — There is something missing from this otherwise typical bustling cityscape. There are taxis and buses. There are hip bars and pollution. Every other person is talking into a cellphone. But there are no plastic shopping bags, the ubiquitous symbol of urban life.

In 2002, [Ireland](#) passed a tax on plastic bags; customers who want them must now pay 33 cents per bag at the register. There was an advertising awareness campaign. And then something happened that was bigger than the sum of these parts.

SIGN IN TO RECOMMEND
TWITTER
E-MAIL
SEND TO PHONE
PRINT
SINGLE PAGE
REPRINTS
SHARE



4. The energy invisibility problem

- ❑ Largest sources of energy use are not apparent - “the energy invisibility problem”
- ❑ Misperceptions about where opportunities for reduced consumption lie.
 - ❑ Overestimate highly visible end uses (lights, appliance use).
 - ❑ Underestimate “energy stock-taking behaviors” (efficiency upgrades).
- ❑ Prevalence of “energy myths” based in inaccurate or outdated information.

4. The energy invisibility problem

- ❑ Over 80% of Americans hold inaccurate/outdated beliefs about idling.
- ❑ It is better to idle for ___ in order to:
 - ❑ Save gas: *4.7 minutes*
 - ❑ Prevent pollution: *3.6 minutes*
 - ❑ Prevent vehicle wear: *5.7 minutes*

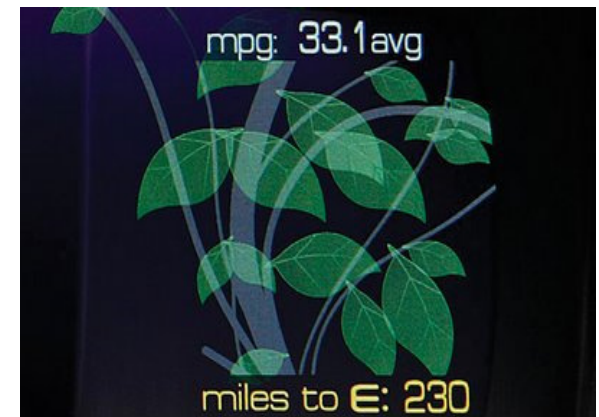
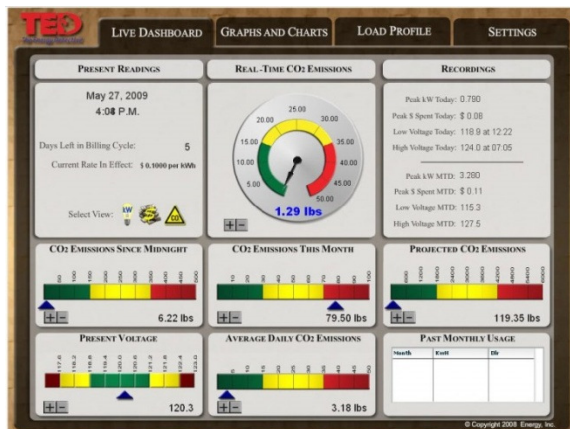
Table 3. Estimated CO2 emissions and fuel use associated with unnecessary idling in the U.S.

	Minutes /day	% of population	CO2 Emissions		Fuel Consumption	
			Daily US Emissions (million lbs / kg)	Annual US emissions (MMt)	Daily US consumption (million gallons / liters)	Annual US consumption (billion gallons / liters)
Warming	2.7	48% (91.2 million)	45.6 / 20.7	7.5	2.3 / 8.7	0.9 / 3.4
Waiting	3.1	46% (87.4 million)	50.2 / 22.8	8.3	2.6 / 9.8	0.9 / 3.4
Total			95.8 / 43.5	15.8	4.9 / 18.5	1.8 / 6.8

Source: Carrico, et al., *Costly Myths: An Analysis of Idling Beliefs and Behavior in Personal Motor Vehicles*, 37 *Energy Policy* 2881-2888 (2009)

4. The energy invisibility problem

- ❑ There is a potential for rapid, low-cost emissions reductions by updating beliefs.
- ❑ Provide information at the time of use.
 - ❑ Home energy feedback displays (5-15% reduction)
 - ❑ Product-integrated feedback mechanisms.





5. Cognitive Miscalculations

- ❑ Steep discount rates - tendency to devalue future savings relevant to up-front savings.
- ❑ Miscalculation of potential savings (Kempton et al., 1982; Kempton & Montgomery, 1982).
- ❑ Failure to consider operating costs altogether (Feiler & Sol, 2009).

Implicit Discount Rates

Table 1. Implicit discount rates calculated from data on purchases of household appliances.

Appliance	1972	1978	1980
Gas central space heater	39	51	56
Oil central space heater	52	78	127
Room air conditioner	20	22	19
Central air conditioner	19	25	18
Electric water heater	587	825	816
Gas water heater	91	146	166
Refrigerator	105	96	78
Freezer	379	307	270

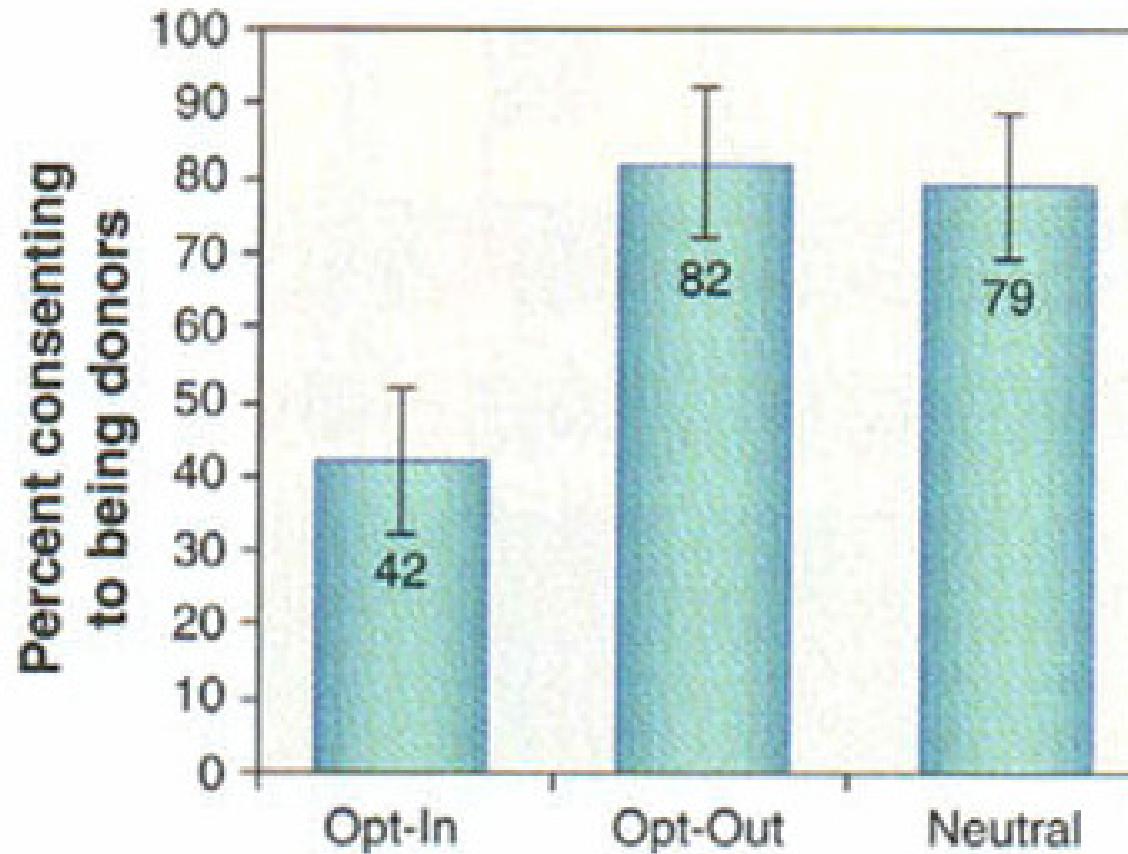
Source: Ruderman, H., Levine, M. D., and McMahon, J. E., "The Behavior of the Market for Energy Efficiency in Residential Appliances Including Heating and Cooling Equipment," *The Energy Journal*, 7 (1986) in press.



5. Cognitive Miscalculations

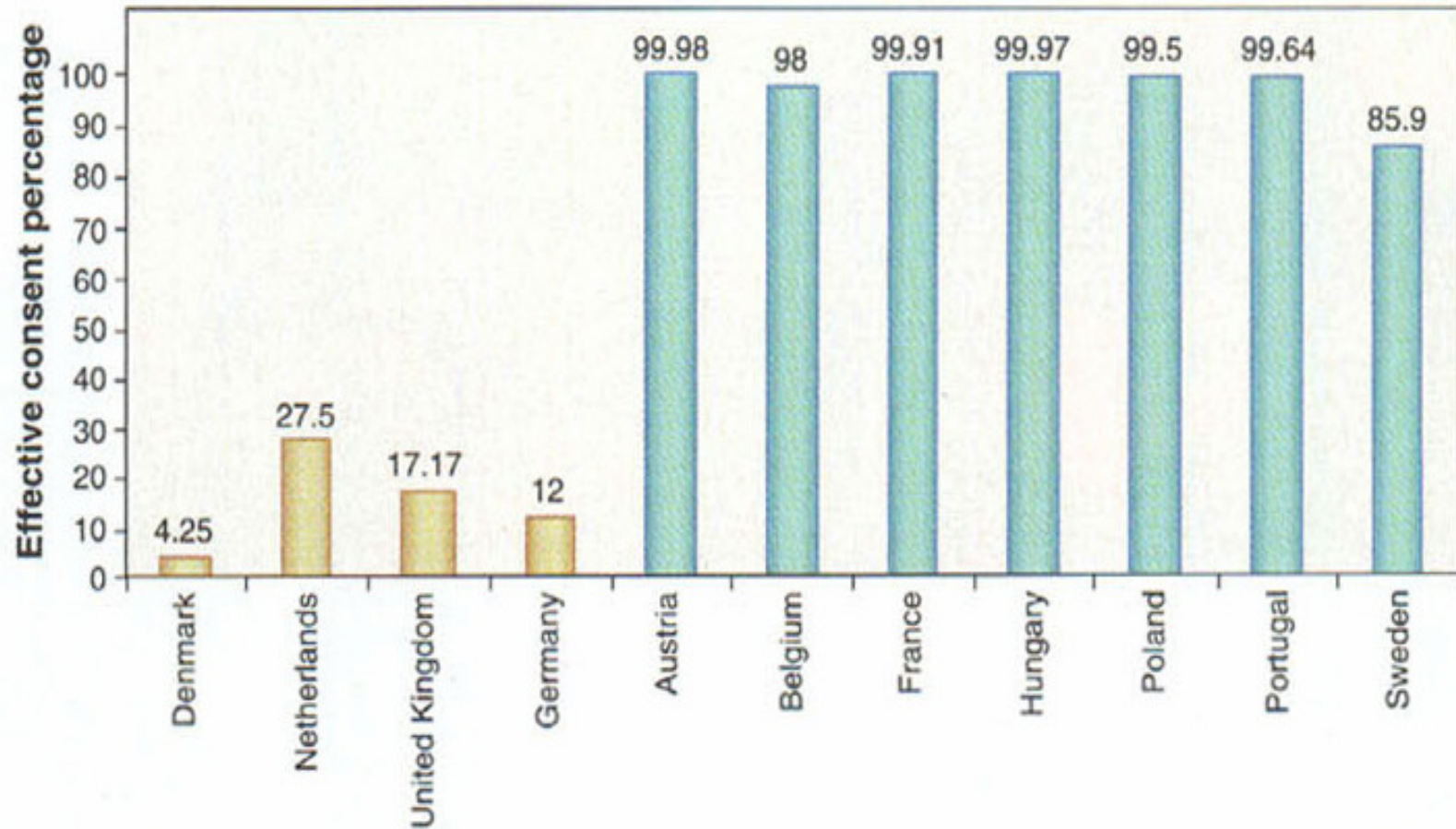
- ❑ Provide information at the point of sale that does not rely on the consumer to make cost-benefit calculations.
- ❑ Well-designed labels
 - ❑ Explicit information regarding operating costs, return on investment
- ❑ Incentivize intermediaries (e.g., appliance vendors, contractors, car dealers)

6. Cognitive costs matter



Effective consent rates, online experiment, as a function of default.

6. Cognitive costs matter



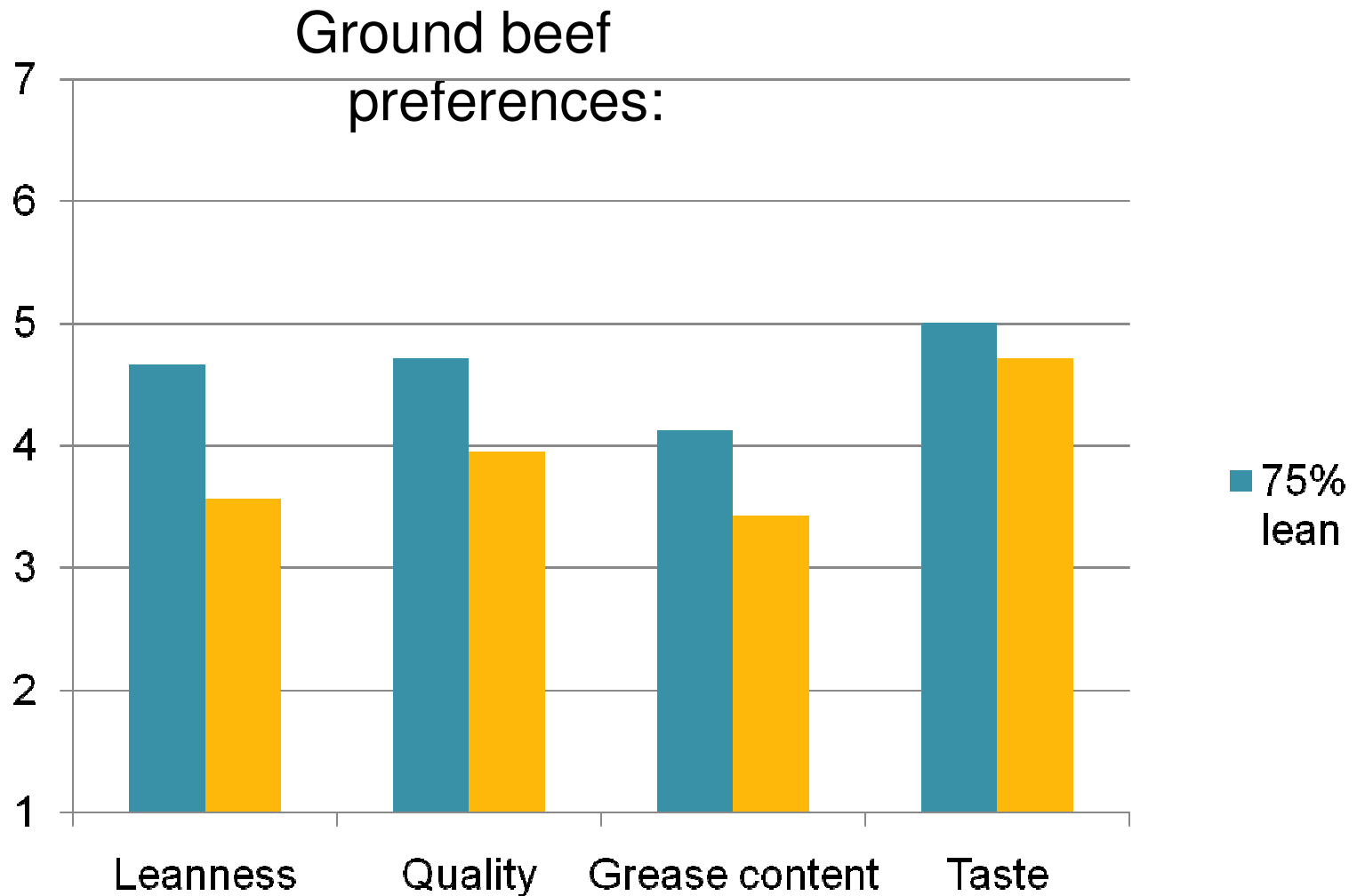
Source: Eric J. Johnson, Daniel Goldstein, Do Defaults Save Lives, 302(5649) SCIENCE 1338 – 1339. (2003).



6. Cognitive costs matter

- ❑ Leverage default settings
- ❑ Program simplicity predicts program success.
 - ❑ “One stop shopping” residential efficiency programs (Stern et al., 1983).
 - ❑ Simplified rebate mechanism (Stern et al. 1986).
- ❑ Compare “Cash for Clunkers” vs. Residential photovoltaic incentives (Stern et al., under review).
- ❑ Balance accountability and simplicity.

7. Preferences depend on context



Based on data from I.P. Levin & G.J. Gaeth, Framing of Attribute Information Before and After Consuming the Product, 15 J.CON.S. RES. 374 – 378 (1988).

7. Preferences depend on context

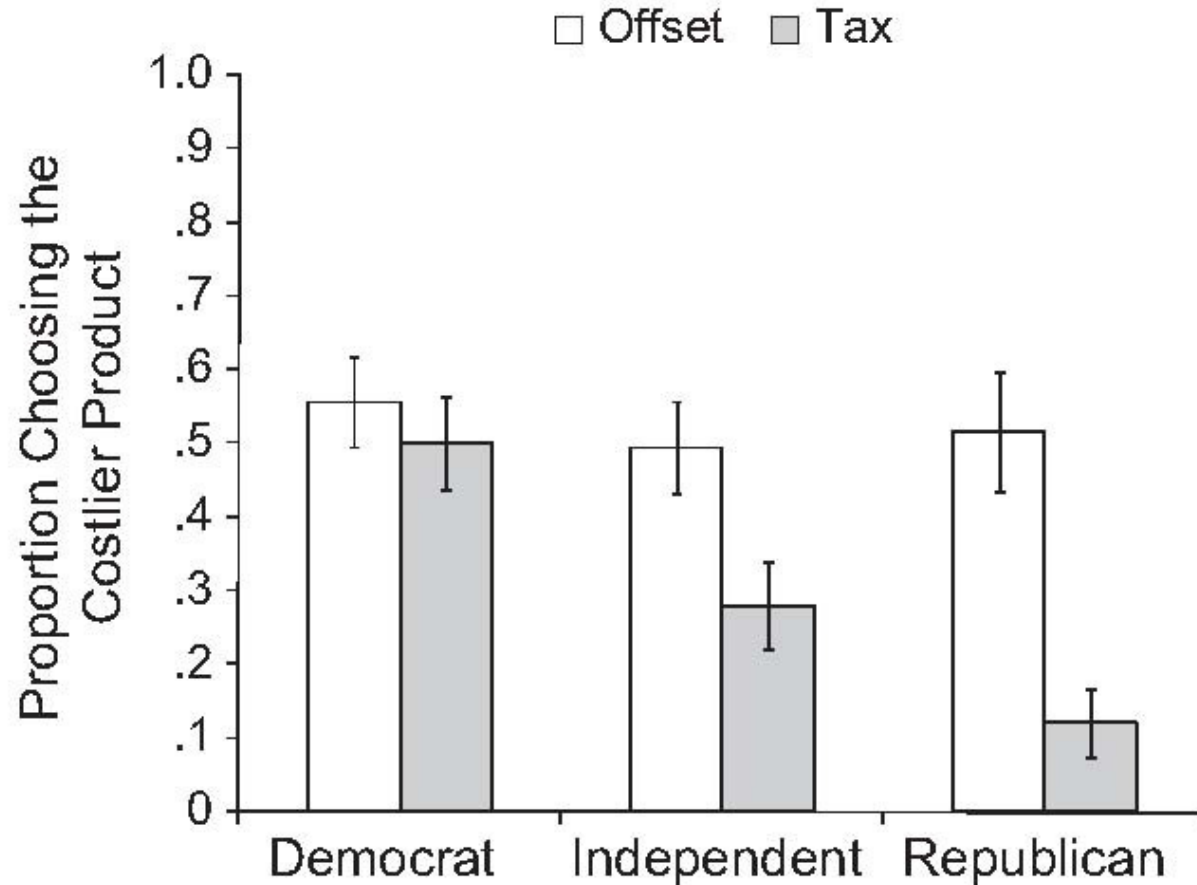


Fig. 1. Proportion of Democrats, Independents, and Republicans who chose the more expensive product, averaged across products, in the offset and tax attribute-framing conditions in Study 1. Error bars represent ± 1 SE.



7. Preferences depend on context

- ❑ Frames are unavoidable.
- ❑ Avoid policy frames that may be polarizing – preventing an audience from fully considering a proposal.
- ❑ Reframing can stimulate reconsideration of a proposal.
- ❑ Multiple frames may be necessary to reach multiple audiences.

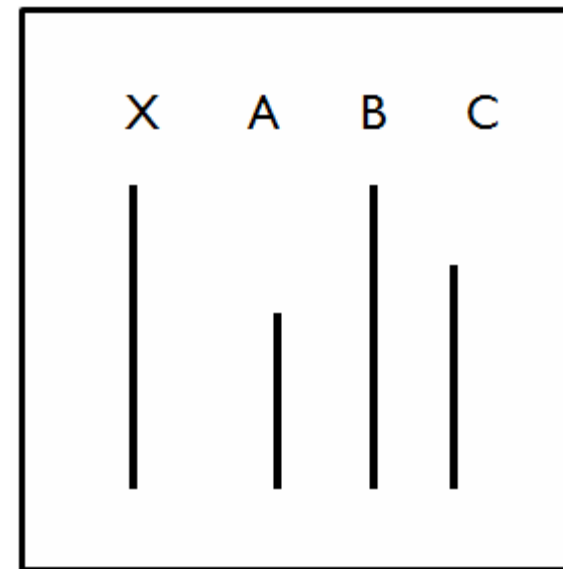


8. Attitude-Behavior Gap

- ❑ Attitudes are poor predictors of behavior.
- ❑ Product marketing vs. behavioral marketing.
- ❑ Most successful mass media campaigns go beyond informational appeals.
 - ❑ Door-to-door canvassing
 - ❑ Peer education
 - ❑ Normative persuasion
- ❑ Need to balance community-based approaches with widespread scalability.

9. Social influence often trumps other influences

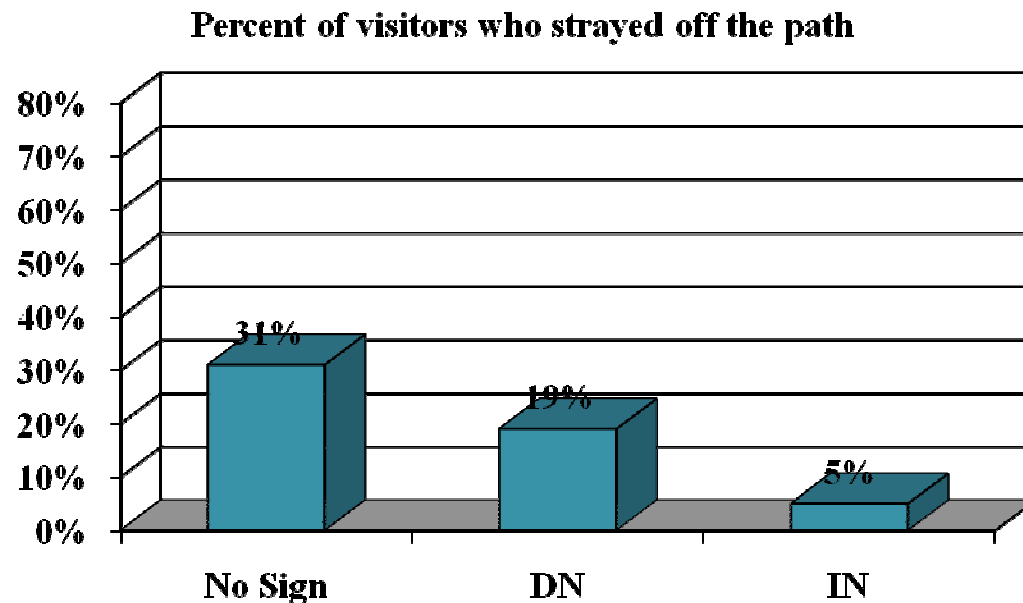
- ❑ The desire to accommodate social norms drives behavior.
 - ❑ 75% of participants gave an obviously wrong answer (Asch, 1951).
- ❑ Better to highlight what people are doing **right** rather than what they aren't doing right.



9. Social influence often trumps other influences

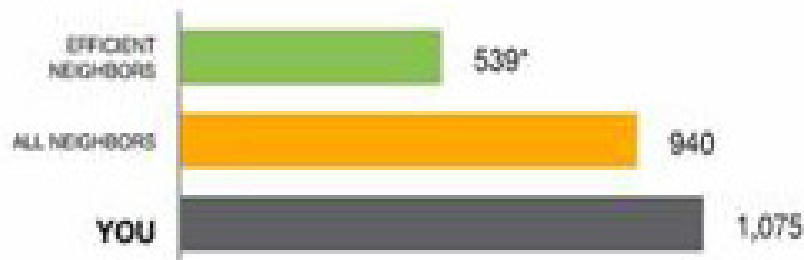
[DN] “Many past visitors have gone off the established paths, changing the natural state of the Sequoias and vegetation in this park”

[IN] “Please don't go off the established paths and trails in order to protect the Sequoias and natural vegetation in this park”



9. Social influence often trumps other influences

August Neighbor Comparison | You used **14% MORE** energy than your neighbors.



* This energy index combines electricity (kWh) and gas (therms) into a single measurement.

HOW YOU'RE DOING:

GREAT

GOOD

▶ **BELOW AVERAGE**

WHO ARE YOUR "NEIGHBORS"?

ALL NEIGHBORS

Approximately 100 occupied nearby homes that are similar in size to yours (avg 1,724 sq ft) and have both electricity and gas service.

EFFICIENT NEIGHBORS

The most efficient 20 percent from the "All Neighbors" group.



10. The need for consistency

- ❑ Cognitive dissonance = anxiety resulting from contradictory attitudes, beliefs, behaviors.
- ❑ Commitments induce greater voluntary action
 - ❑ Energy savings
 - ❑ Water use
- ❑ Appeals to attitudes/values at the time of decision making (retrieved from Roper iPoll Database, 2009).
 - ❑ 80% believe energy efficiency is a high priority
 - ❑ 75% willing to drive a smaller/more efficient vehicle
 - ❑ 62% willing to carpool/use mass transit
- ❑ Feedback indicating an attitude-behavior inconsistency can motivate behavior change.

10. The need for consistency

The Washington Post

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To really save the planet, stop going green

By Mike Tidwell
Sunday, December 6, 2009

As President Obama heads to Copenhagen next week for global warming talks, there's one simple step Americans back home can take to help out: Stop "going green." Just stop it. No more compact fluorescent light bulbs. No more green wedding planning. No more organic toothpicks for holiday hors d'oeuvres.

December should be national Green-Free Month. Instead of continuing our faddish and counterproductive emphasis on small, voluntary actions, we should follow the example of Americans during past moral crises and work toward large-scale change. The country's last real moral and social revolution was set in motion by the civil rights movement. And in the 1960s, civil rights activists didn't ask bigoted Southern governors and sheriffs to consider "10 Ways to Go Integrated" at their convenience.

Green gestures we have in abundance in America. Green political action, not so much. And the gestures ("Look honey, another Vanity Fair Green Issue!") lure us into believing that broad change is happening when the data shows that it isn't. Despite all our talk about washing clothes in cold water, we aren't making much of a difference.

For eight years, George W. Bush promoted voluntary action as the nation's primary response to global warming -- and for eight years, aggregate greenhouse gas emissions remained unchanged. Even today, only 10 percent of our household light bulbs are compact fluorescents. Hybrids account for only 2.5 percent of U.S. auto sales. One can almost imagine the big energy companies secretly applauding each time we distract ourselves from the big picture with a hectoring list of "5 Easy Ways to Green Your Office."

Source: <http://www.washingtonpost.com/wp-dyn/content/article/2009/12/04/AR2009120402605.html>



10. The need for consistency

- ❑ “Green” behavior *unlikely* to cause less other “green” behavior, “green” policy support.
- ❑ No relation between participation in opt-in green electricity programs and subsequent energy use
(Kotchen & Moore, 2008).
- ❑ Potential for spillover effect.
 - ❑ Foot-in-the-door effect (Katzew & Johnson, 1983; 1984)
 - ❑ Self-efficacy beliefs (Bandura, 1986).