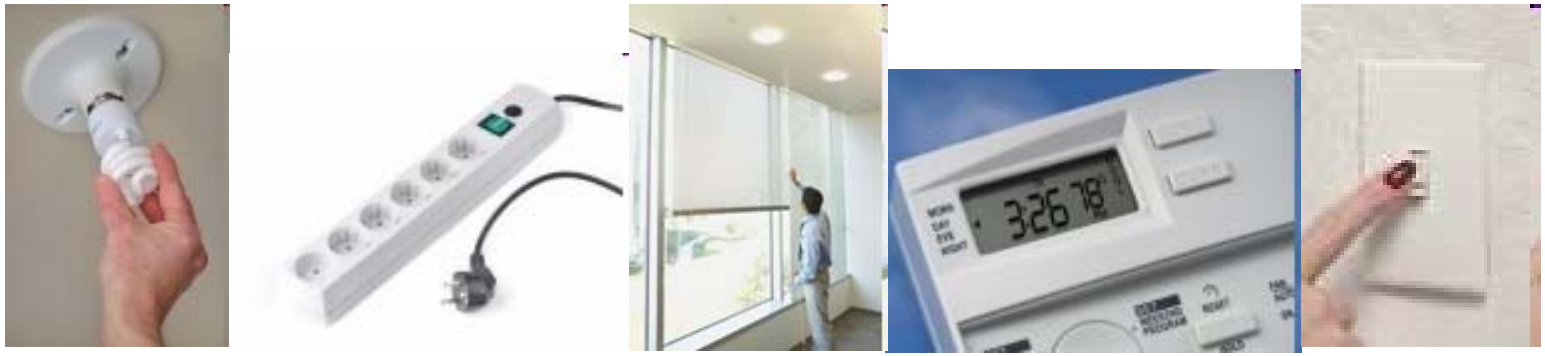
Myths and Realities of Individual and Social Behavior:

Using Social Science Insights to Reduce Energy Use in Buildings



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Myth or Reality?

1. The Federal Government will Solve Our Climate Change Problems.

December 1997 – U.S. signs Kyoto Protocol

Goal: reduce GHG emissions by 5% of 1990 levels by 2012.

Reality: Never ratified by Congress.

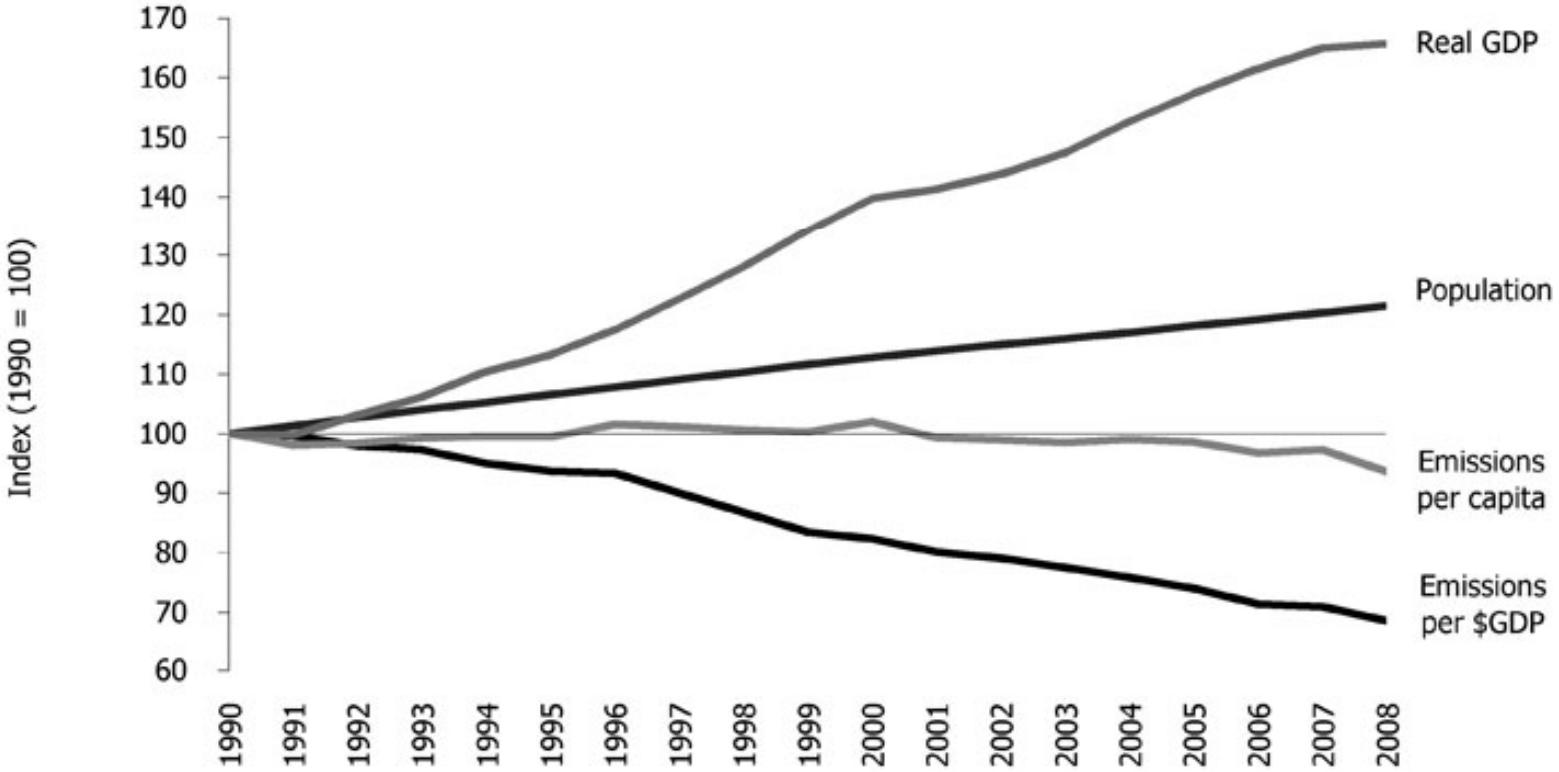
The prevailing federal climate change mitigation goal in the U.S. is to reduce the national GHG emission intensity by 18% over the 10-year period from 2002 to 2012 (U.S. EPA, 2008a).

Goal: reduce emissions per unit of GDP by 18%

Means: technology research and development and voluntary programs

Reality?

Myth or Reality?



Source: USEPA. 2011. *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2009. EPA 430-R-11-005.*

Myth or Reality?

Table ES-8: U.S Greenhouse Gas Emissions by Economic Sector with Electricity-Related Emissions Distributed (Tg or million metric tons CO2 Eq.)

Implied Sectors	1990	2000	2005	2006	2007	2008	2009
Industry	2,238	2,314	2,163	2,195	2,193	2,147	1,911
Transportation	1,548	1,936	2,022	1,999	2,009	1,896	1,817
Commercial	948	1,136	1,205	1,189	1,225	1,225	1,185
Residential	954	1,162	1,243	1,182	1,230	1,215	1,159
Agriculture	460	518	523	544	553	531	516
U.S. Territories	34	46	58	59	54	48	46
Total Emissions	**6,182**	**7,113**	**7,214**	**7,167**	**7,263**	**7,061**	**6,633**

Source: USEPA. 2011. *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2009.*

Myth or Reality?

The Federal Government will Solve Our Climate Change Problems.

MYTH

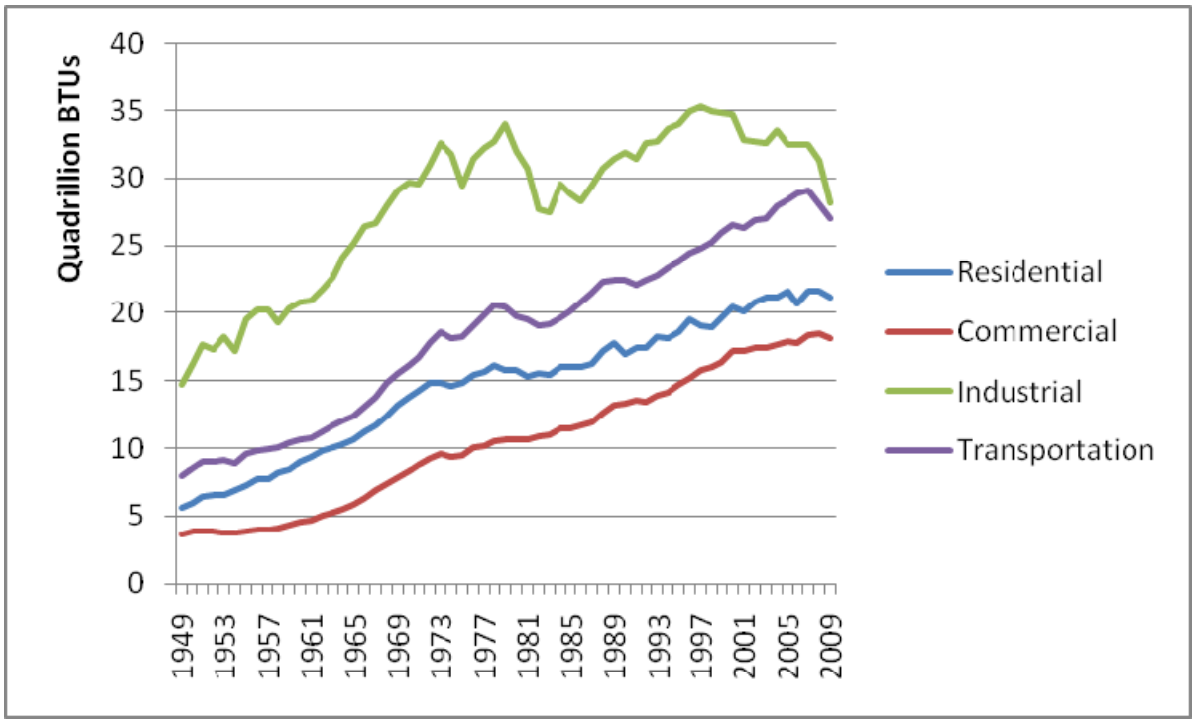
The U.S. has achieved some reductions

BUT

- They have been modest
- They are primarily due to efforts on the part of states, cities, utilities, companies, and individuals.

Myth or Reality?

2.The Potential Energy Savings from Behavior-Related Initiatives are Relatively Small.

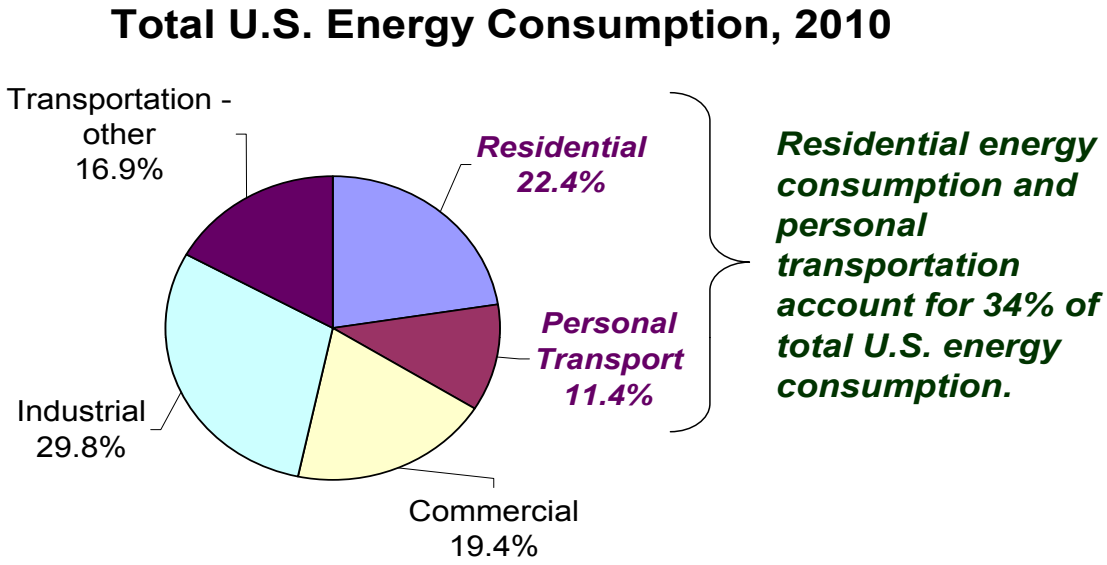


U.S. Energy Consumption by Sector 1949-2009

Total Consumption
1950 = 35 quads
Today = 100 quads

Source: EIA 2010 Annual Energy Review

The Behavior Wedge



A growing body of research suggests that the potential size of **near-term** energy savings from initiatives focused on the human dimensions of energy consumption, in the residential and personal transportation sectors alone, is likely to equal or exceed **9% of total U.S. energy demand**.

The Behavior Wedge

- **Dietz et al. (2009):**
  explores the potential energy savings from 17 household actions and suggests that a behavioral approach could save 123 million metric tons of carbon annually in year 10, representing 20% of household direct emissions or 7.4% of U.S. national emissions.
- **Laitner and Ehrhardt-Martinez (2009):**
  explores a more extensive list of household actions and suggests that changes in three types of household behaviors could result in a 22 percent reduction in household and personal transportation energy use over a 5 to 8 year period – roughly the equivalent of 9 quads per year.

The Behavior Wedge

Leighty and Meier (2010):

In crisis situations, changes in energy practices have resulted in immediate, community-wide electricity savings of 25% and post-crisis savings of 8 to10%.

Ehrhardt-Martinez et al. (2010):

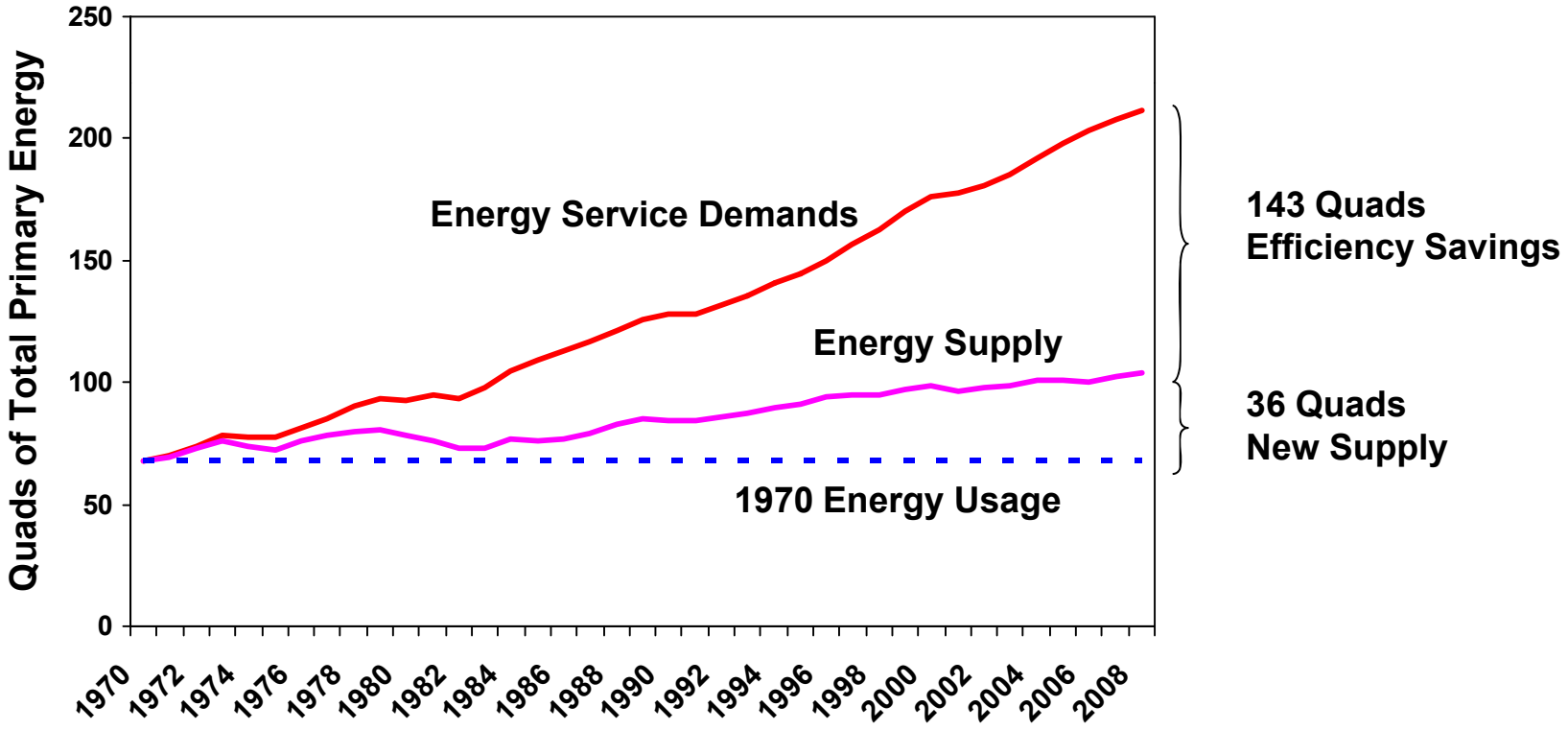
The implementation of a variety of residential feedback programs and devices have resulted in average household electricity savings of 4 to 12 percent – well-designed programs have saved as much as 15 to 20%.

The Potential Energy Savings from Behavior-Related Initiatives are Relatively Small.

MYTH

Myth or Reality?

3. Development of Energy-Efficient Technologies is Sufficient for Solving Our Climate & Energy Problems.



Myth or Reality?

Development of Energy-Efficient Technologies is Sufficient for Solving Our Climate & Energy Problems.

- The Energy Efficiency Gap

  Unrealized reductions in energy consumption = 30-60%

- The Issue of Rebound

  New energy end uses consume as much as 30% of savings.

- The Need to Establish a Culture of Sustainable Use

  Engaging people creates a culture of ***mindful*** as opposed to ***mindless*** consumption.

Types of Energy-Related Behaviors

Frequency of Action

Cost	***Infrequent***	***Frequent***
Low-cost / no cost	ENERGY STOCKTAKING BEHAVIOR Install CFLs Pull fridge away from wall Inflate tires adequately Install Weather Stripping	HABITUAL BEHAVIORS AND LIFESTYLES Slower Highway Driving Slower Acceleration Air Dry Laundry Turn Off Computer and Other Devices
Higher cost / Investment	CONSUMER BEHAVIOR New EE Windows New EE Appliances Additional Insulation New EE Car New EE AC or Furnace	

Energy Savings by Type of Behavior

Category of Actions	Potential National Energy Savings (Quads)
Conservation, Lifestyle, Awareness, Low-Cost Actions	4.9 (57% of total savings)
Investment Decisions	3.7 (43% of total savings)
Total Energy Savings	~8.6 +/- 1.5 (22% of HH energy)

MYTH

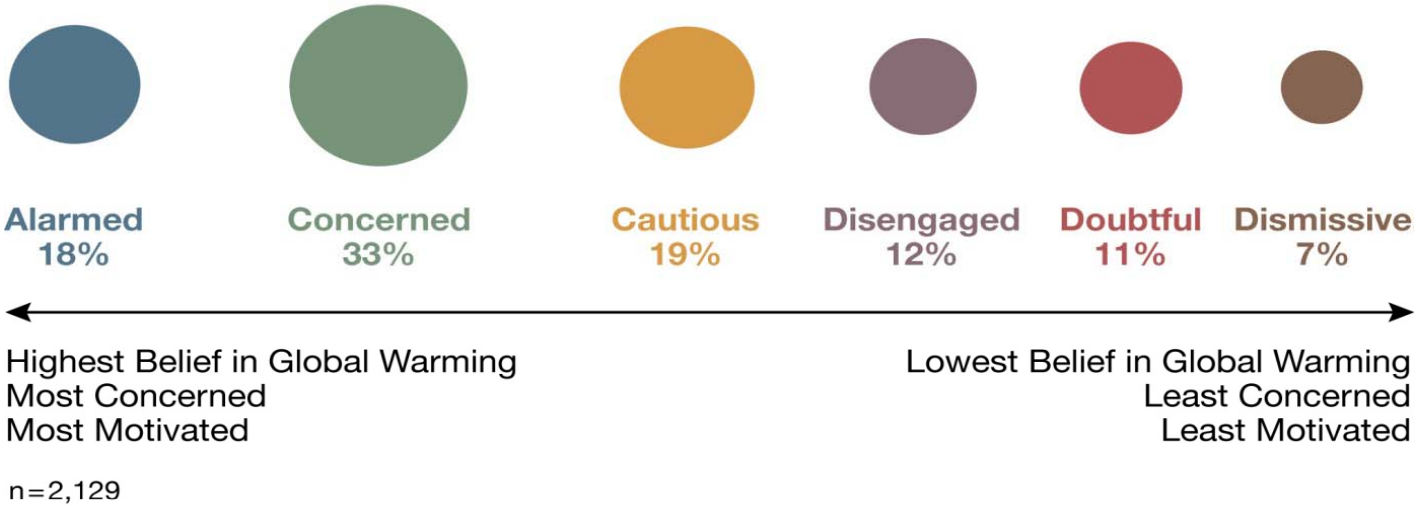
Development of Energy-Efficient Technologies is Sufficient for Solving Our Climate & Energy Problems.

Myth or Reality?

4. People Don't Care about Climate or Energy.

What do Americans Think about Climate Change?

- Clear divisions among members of the American public on the issue of climate change.



Source: Maibach et al., Ch. 8, People-Centered Initiatives for Increasing Energy Savings

What do Americans Think about Energy and Efficiency?

- Despite political differences about global warming, most Americans are indeed willing to participate in a national effort to transform the way we use energy.
- Even many of the relatively small proportion of Americans who don't believe that climate change is occurring– or are otherwise unconcerned about it – do believe that our country needlessly uses and wastes energy in harmful ways.
- Most Americans are eager to reduce their own energy use, and support a range of policies to reduce the nation's energy use.

Source: Maibach et al., Ch. 8, People-Centered Initiatives for Increasing Energy Savings

Myth or Reality?

People Don't Care About Energy Consumption.

Energy, Efficiency, and Attitudes

1. People are concerned about the availability and affordability of energy… 77%
2. People report that they should be installing a solar panel to produce energy for their home… 71%.
3. People report that they should be buying a hybrid car… 62%.
4. People report that they should be spending several thousand dollars to make their home as energy efficient as possible… 78%.

Source: Gallup 2007.

Myth or Reality?

People Don't Care About Energy Consumption.

Energy Efficiency and Reality

1. Percentage of people who reported buying CFLs… 7%

2. Percentage of people who reported upgrading to energy efficient appliances over the past year… 4%

3. Percentage of people who reported making their home more energy efficient by installing new windows, insulation, solar panels, etc… 2%

Myth or Reality?

MYTH

People Don't Care About Energy Consumption.

Energy Efficiency and Reality

- People recognize that energy resources are being needlessly wasted.
- Attitudes and behaviors are inconsistent

Myth or Reality?

5. Providing People with Information and Economic Incentives will Re-align Attitudes and Behaviors.

- Information programs may be effective in changing attitudes but are not very effective in changing behaviors.
- Economic incentives can be effective in certain situations but can also be ineffective and even counter-productive.
  - One example, when a California utility provided information about the cost of running appliances and devices, consumers were struck by **how little** they had to pay for these energy services.
    - A coffee pot – 3 cents per pot.
    - A 3-ton central AC system – 36 cents per hour

Result: some people were inspired to use **more** energy.

[Source: Schultz, Chapter 17]

Myth or Reality?

MYTH

Providing People with Information and Economic Incentives will Re-align Attitudes and Behaviors.

- Existing research also suggest that when monetary feedback is removed, consumption often returns to the prior rate (Houwell, 1989).
- The lesson: once we frame conservation as an economic transaction, all subsequent decisions about it are evaluated in that light.

Applying Social Science Insights

- **Targeting:** recognizing diversity (people, and actions)
- **Informing/Engaging:** helping people and communities to develop the capacity to be mindful of their energy in ways that are timely, meaningful, and convenient
- **Motivating:** through goals, norms, networks, commitments, and other mechanisms
- **Empowering:** removing financial and structural barriers, providing better choice sets, creating supportive communities

Based on the understanding that individual choices and behaviors are shaped by the social institutions that surround them and that people often don't act in economically rational ways.

Targeting: People and Actions

- People-centered Initiatives
  - Assess which actions are most likely to be successful within a given community and target a few
  - Assess the actions that specific actors within a community must take
  - Assess important sources of diversity across households, businesses, or institutions and how initiatives can address the variation across groups
- Community-targeted actions might include
  - Home weatherization and deep retrofits
  - Smaller homes with greater amenities
  - Purchasing decisions: PV systems, LEDs, etc
  - Transportation choices
  - And beyond

Informing: Energy Consumption, Technologies, and Programs

Energy Consumption Feedback

Residential Feedback

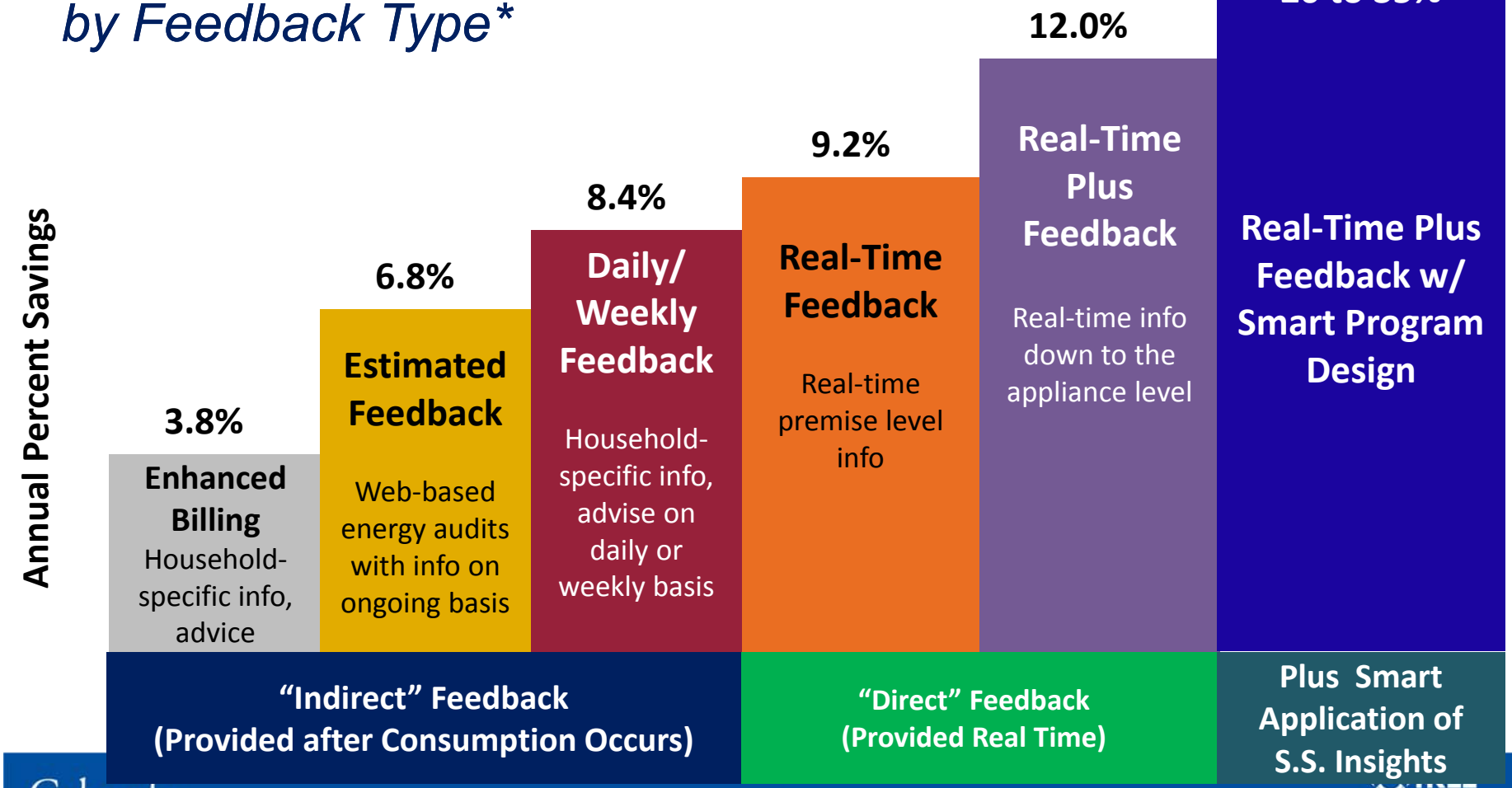
Savings: 4-12%

Savings: 20%

Cisco Mediator

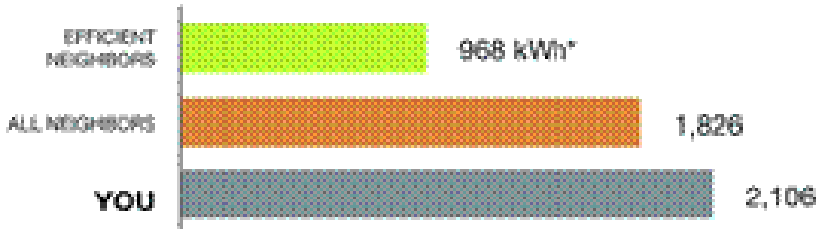
Residential Feedback Approaches

*Average Household Electricity Savings (4-12%) by Feedback Type**



Motivating: Norms, Networks, Goals, Commitments, Competitions, etc.

Last 3 Months Neighbor Comparison | You used **15% MORE** electricity than your neighbors.



* kWh: A 100-Watt bulb burning for 10 hours uses 1 kilowatt-hour.

HOW YOU'RE DOING:

You used more than average

Turn the report over to find ways to save

Personalized Action Steps

- ☐ Maintain your air conditioner
- ☐ Cool your home with a whole house fan
- ☐ Install a ceiling fan

Savings: 2.5-3.0%

Empowering: Removing Barriers and Providing Better Choices

- The Example of Choice Architecture
  - Choice architecture is about creating a context in which people are likely to make better decisions – decision that will make the choosers much better off, ***as judged by themselves.*** *(Thaler and Sunstein 2008)*
  - Overcoming inertia and the status quo bias
  - Hence, the BECC Low-Carbon Lunch Experiment

The 2009 BECC Low-Carbon Lunch

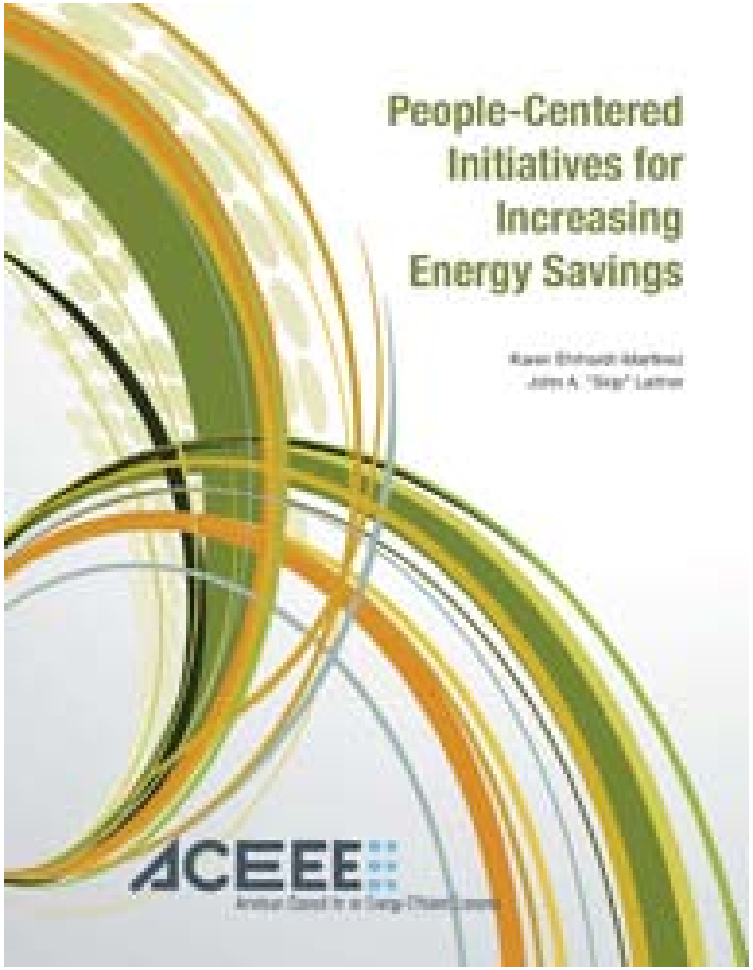
Large Indirect Savings

	ACEEE Conference Standard	BECC 2007	BECC 2009
Meat-Based Lunch	90-95%	83%	20%
Vegetarian Lunch	5-10%	17%	80%

- BECC is the Behavior, Energy, and Climate Change Conference (see www.BECCConference.org)
- Meat production is responsible for 18% of the global greenhouse gas emissions (Pew Commission 2008)
- Omnivores contribute 7 times the GHG emissions than vegans

Conclusions

1. Climate change mitigation is up to us.
2. Potential energy savings from people-centered initiatives are large. (9 quads!)
3. A focus on technological solutions alone cannot achieve the size of change that we need quickly enough. We need to engage people.
4. People do care about reducing their energy consumption.
5. Social science insights can help close the gap between attitudes and behaviors.



Available at:
http://aceee.org/people-centered-energy-savings

Behavior, Energy and Climate Change Conference

behavior, energy & climate change
becc

Call for Abstracts: until May 15th

Conference:

November 29-December 2nd, 2011
Washington, DC

More Information at:

www.BECCconference.org

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