



American Council for an Energy-Efficient Economy

The Scale and the Imperative of the Behavioral Energy Efficiency Resource

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ACEEE e-Book Webinar:

People-Centered Initiatives for Increasing Energy Savings

Washington, DC

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Some Very Critical Acknowledgements I

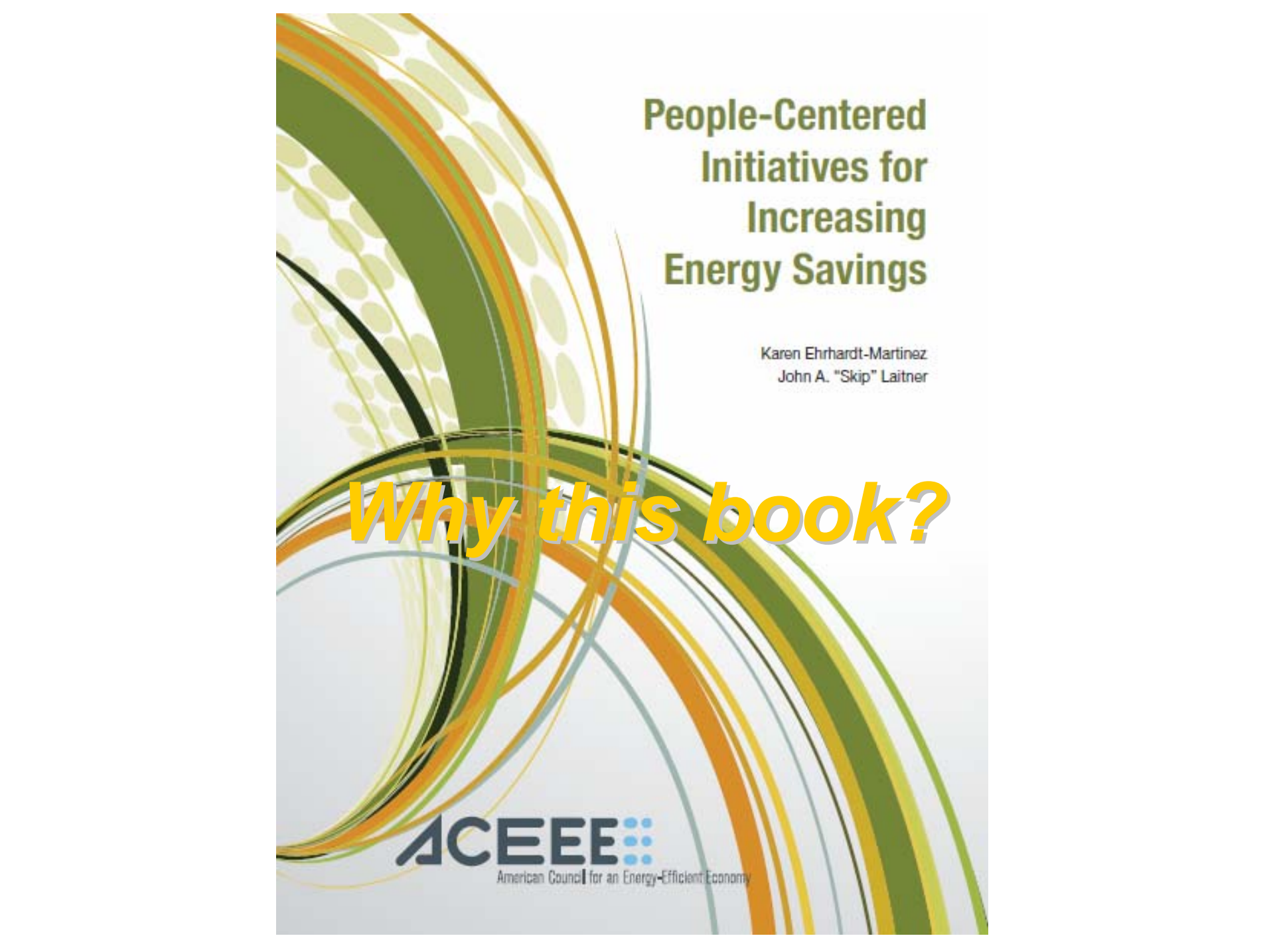
- The collaborations within this book, and the many hard questions posed here would not have been possible without the feedback, financial support, and commitment of many individuals involved in the design, development, and general success of the very first Behavior, Energy and Climate Change Conference (www.BECCConference.org). In that regard we must thank Linda Schuck and all of the members of the BECC Advisory Committee as well as all of the organizations who generously sponsored the first and successive conferences since 2007.
- We would also like thank our superb collaborators and chapter authors, including: Karen Akerlof, Moonis Ally, Sylvia Bender, Carl Blumstein, Marilyn A. Brown, Chris Calwell, Sarah Castor, Jess Chandler, Philip Degens, Linda Dethman, Rick Diamond, Thomas Dietz, Kat A. Donnelly, Jennifer Fosket, Gerald T. Gardner, Jonathan Gilligan, Seymour Goldstone, Allen Greenberg, Jeffrey Harris, Maithili Iyer, Ken Kurani, Melissa Lapsa, Anthony Leiserowitz, Loren Lutzenhiser, Ed Maibach, Laura Mamo, Alan Meier, Matthew C. Nisbet, Yael Parag, Christopher Payne, Connie Roser-Renouf, Wesley Schultz, Hans-Paul Siderius, Paul C. Stern, Deborah Strickland, Ken Tiedemann, Tom Turrentine, Michael P. Vandenbergh, and Edward Vine.

Some Very Critical Acknowledgements II

- For me personally, the many ideas that continue to evolve with this presentation have also benefited from wide-ranging discussions with a wide variety of friends, colleagues, and collaborators over the years. First and foremost is my friend and co-editor Karen Ehrhardt-Martinez, and also Jerry Dion who remains one of the more thoughtful observers in how these ideas might actually be implemented within federal programs.
- And among those not previously mentioned, include: Bob Ayres, Ben Foster, Don Hansen, Jeff Luke, Andrew Nicholls, Larry Plumb, Gwynne Rogers, Scott Stapf, Sascha von Meier, and many, many others.

Finally, we add these two important caveats:

- ***First, we make no claim about any consensus on the issues within this book (or in this presentation); rather, our suggestion is that the social sciences can contribute to new and emerging possibilities for large-scale, future energy savings.***
- ***And second, any and all mistaken views are decidedly ours (mine?) alone....***



People-Centered Initiatives for Increasing Energy Savings

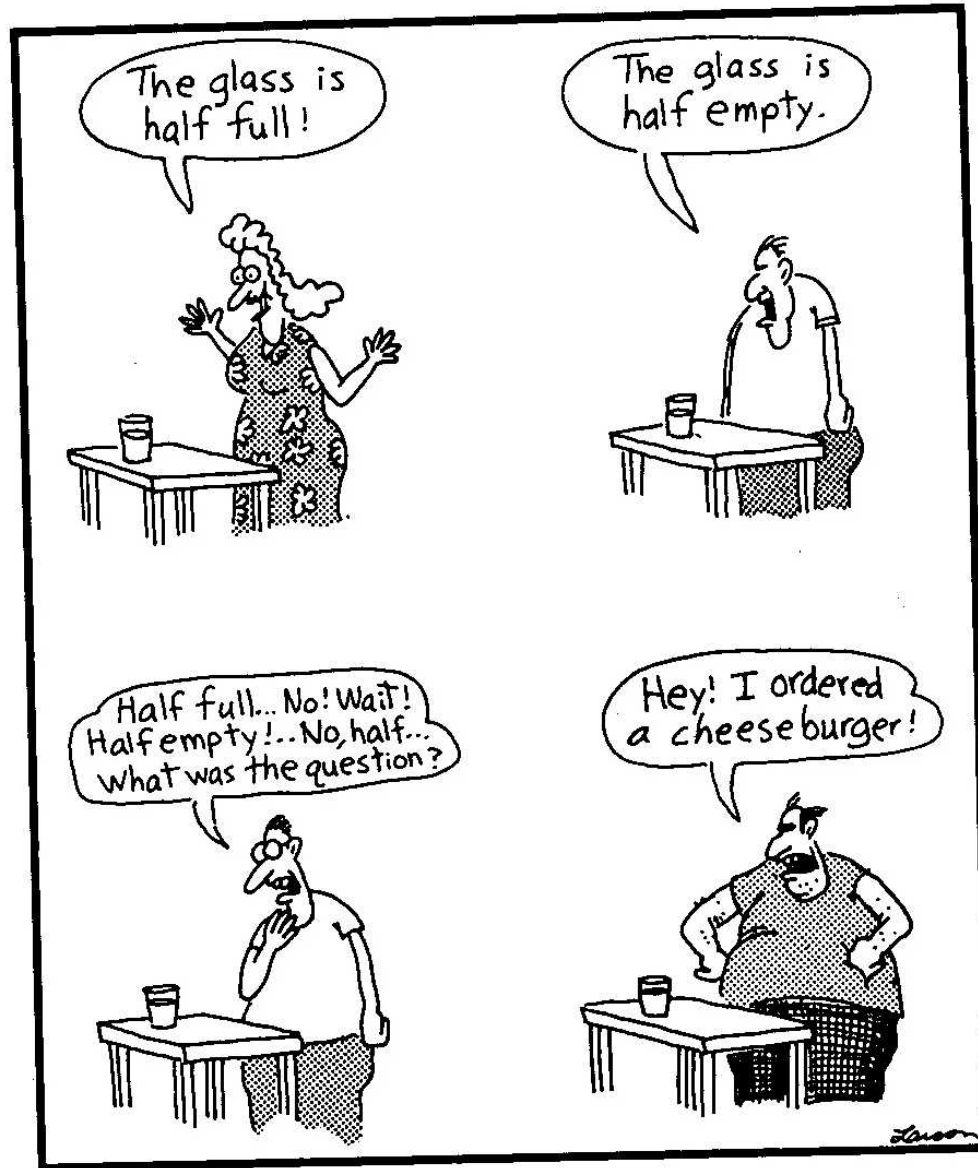
Karen Ehrhardt-Martinez
John A. "Skip" Laitner

Why this book?

ACEEE 
American Council for an Energy-Efficient Economy

“We shape the world by the questions we ask”

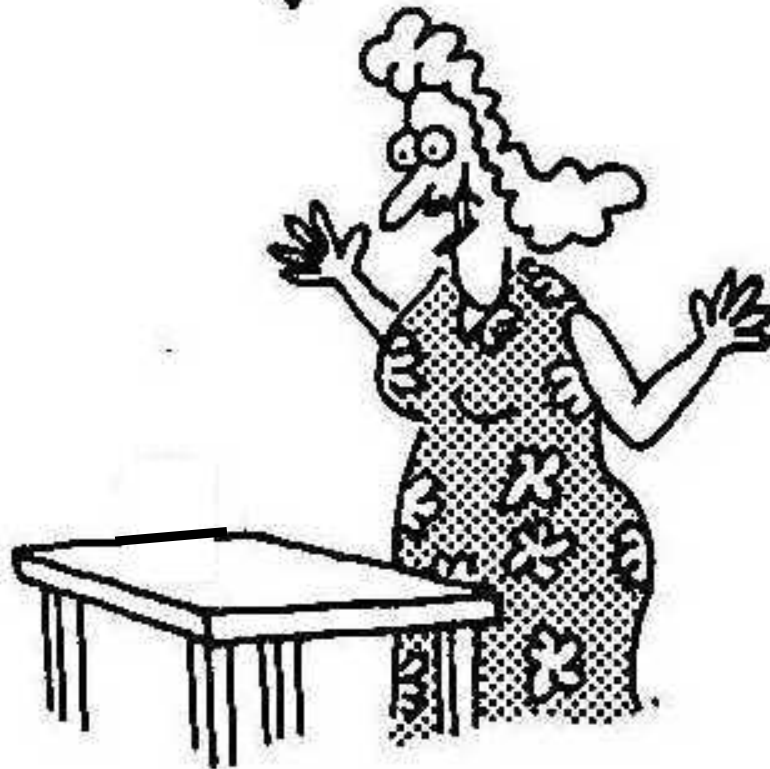
Physicist John Wheeler



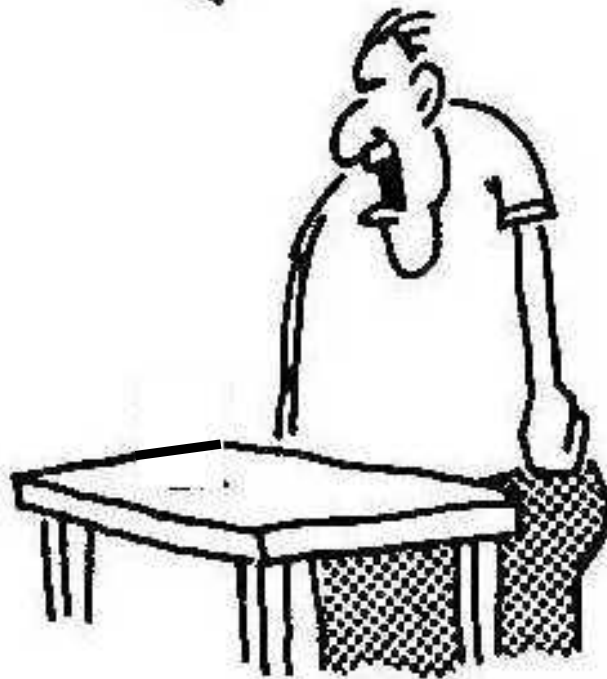
The four basic personality types

***Revisiting the same personality types,
but from an energy perspective. . . .***

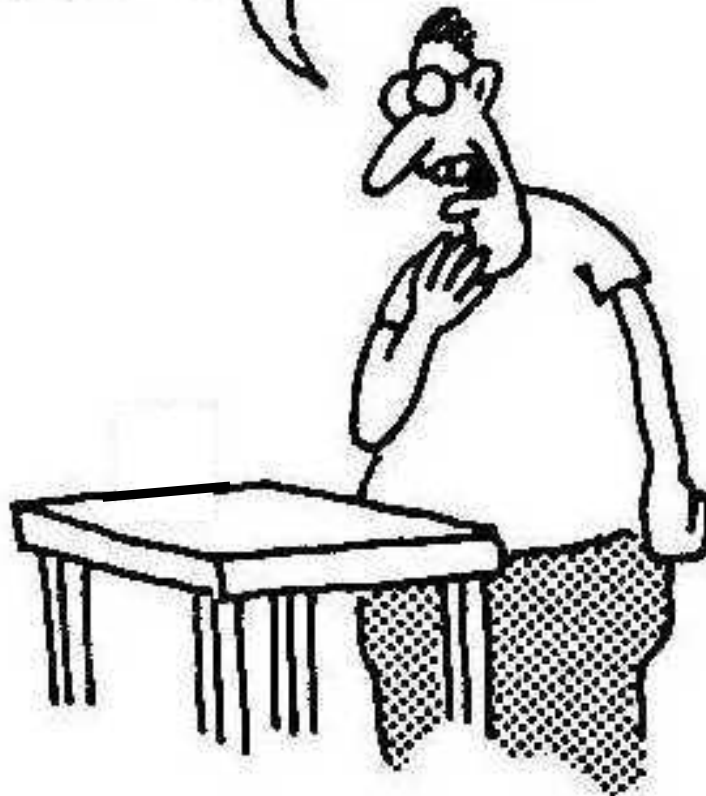
Wouldn't a behavior program do nicely here?



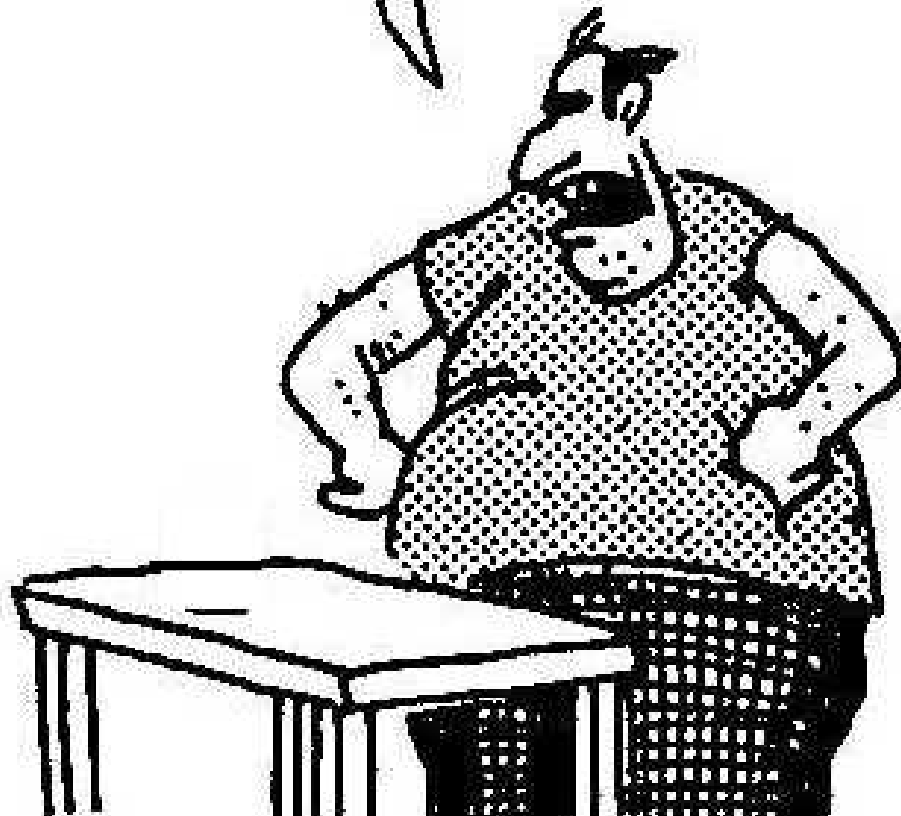
A strong regulatory regime really makes a lot of sense at this point!



Uhhh. Behavior Program?
Regulatory what? Program? Regime?
Uhhh, what was the question again?



Hey! Who said ENERGY was
a problem in the first place?



Some Opening Observations

- Energy efficiency is the farthest reaching, least-polluting, and fastest growing energy success story of the last 40 years.
- Energy efficiency has met 75 percent of the new demands for energy-related goods and services since 1970 while new energy supplies have met only 25 percent of those demands.
- But energy efficiency remains a highly invisible success story, and despite success with our energy productivity, the economy operates at a rather anemic 13% efficiency.
- The huge inefficiency (wasting 87% of all the energy we throw at the economic problem), appears to be constraining our overall productivity, and our social, economic, and environmental well-being.
- Yes. . . “Science and technology can create much better choices.” (DOE Secretary Chu 2009)
- *But we won't get there unless we bring people back into the process.*

Creating an Energy Revolution

A revolution doesn't happen when society adopts new tools, it happens when society adopts new behaviors.

Clay Shirky, Digital Guru

Examining the scale of behavior-savvy policies and the “people-centered” resource. . . .

Examining the Scale of People-Centered Initiatives (in this volume)

Thomas Dietz, Gerald T. Gardner, Jonathan Gilligan, Paul C. Stern, and Michael P. Vandenberg explore the potential energy savings from 17 household actions and suggest that a behavioral approach could save 123 million metric tons of carbon per year in 10 years – 20 percent of household direct emissions or 7.4 percent of U.S. national emissions.

Skip Laitner and Karen Ehrhardt-Martinez examine a more extensive list of household actions and suggest that changes in three types of household behaviors could result in a 22 percent reduction in household and personal transportation energy over a 5 to 8 year period – about 9 quads per year.

Alan Meier reviews a 2008 crisis event in Juneau, Alaska in which changes in energy practices resulted in immediate, community-wide electricity savings of 30 percent and post-crisis savings of 8 to 10 percent.

Examining the Scale of People-Centered Initiatives (other research)

Ehrhardt-Martinez, Donnelly, and Laitner (2010): Review 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 percent.

Friedrich et al. (2010): Profile 10 case studies of behavioral-based energy efficiency programs in the buildings, industry, utilities, and transportation sectors

Luneski (forthcoming): Looks at the behavior-based “*Continuous Energy Improvement*” program in the food processing industry in the pacific northwest and concludes non-capital projects contribute from 27 to 67 percent of total program savings.

Prindle and Finlanson (forthcoming): Examine leading-edge energy performance approaches in commercial and organizational settings, with emphasis on behavior-based energy efficiency strategies that improve performance in measurable ways.

Case Study: Comparing People-Centered Savings with Energy Bill Savings

Building Energy and Performance, Productivity and Health Savings

Energy Bill Savings	\$872,284
People-Centered Savings	\$3,569,000
Thermal Comfort – Reducing Lost Time and Productivity	\$961,500
Lighting Controls – Improved Productivity	\$2,377,000
Other Impacts Net of 30% Overlap Among Measures	\$230,500

In this specific example above, we note that people-centered savings are four times the energy bill savings. And in the tradition of Einstein's "thought experiments," might we conclude that energy savings in some cases may actually be free? If we don't at least ask the question, we may not learn the answer. . . .

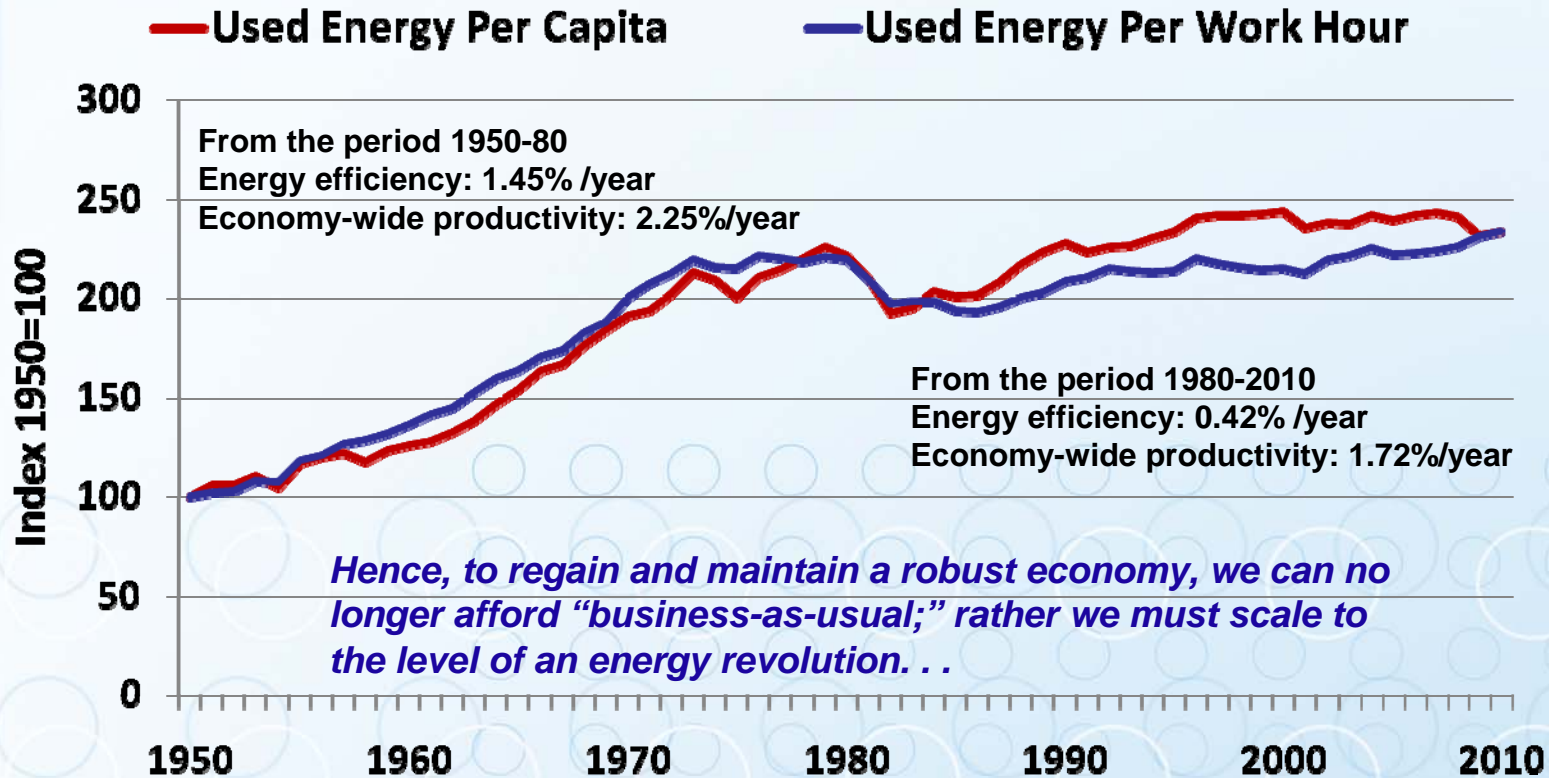
Source: Human Inquiry Case Study by M.E. Group, Conrad Duberstein U.S. Courthouse and Post Office, Brooklyn, NY, May 2010

***Examining the economic imperative
of energy efficiency and the
behavior resource. . . .***

The Economic Imperative

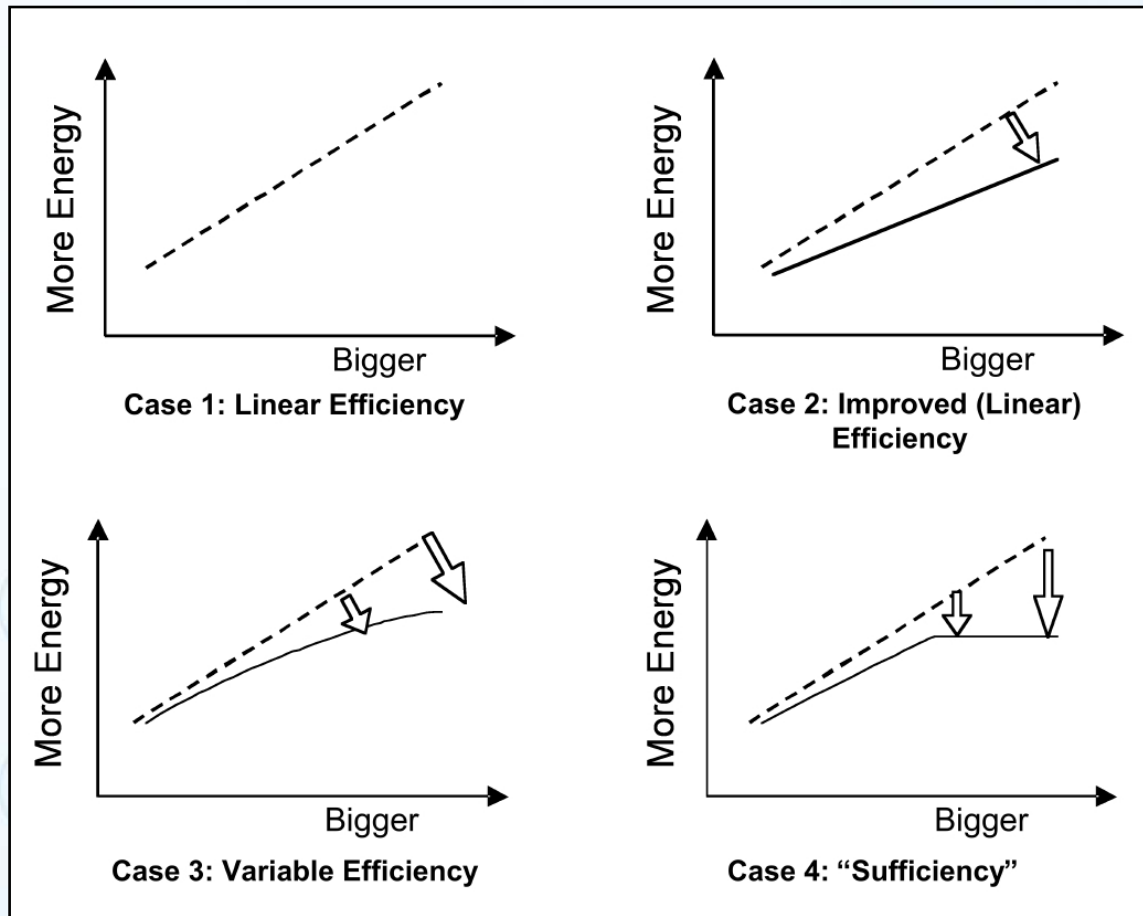
- As already noted, the evidence suggests that energy efficiency is the farthest reaching, least-polluting, and fastest growing energy success story of the last 40 years. But it is a highly invisible success story. . .
- In the United States, for example, energy efficiency services provided ~75 percent of the new demands for energy-related goods and services over the period 1970-2010. To promote long-term sustainability, however, it needs to be closer to ~120 percent or more by 2050 (perhaps 110 percent net of productivity rebound).
- The reason? New research by our colleague Dr. Robert U. Ayres and his collaborator Dr. Benjamin Warr (both at INSEAD) suggests that a nation's larger productivity is tied to the energy-efficiency of its economy.
- Generally, we are finding that the global economy will have to more than double the historic rates of energy efficiency improvements if we are to maintain a robust level of economic productivity and prosperity.
- *Thus, the need for both technology and people-centered programs...*

Emerging Insights in the Critical Role of “Used Energy” to Enhance Productivity



Source: Laitner 2011

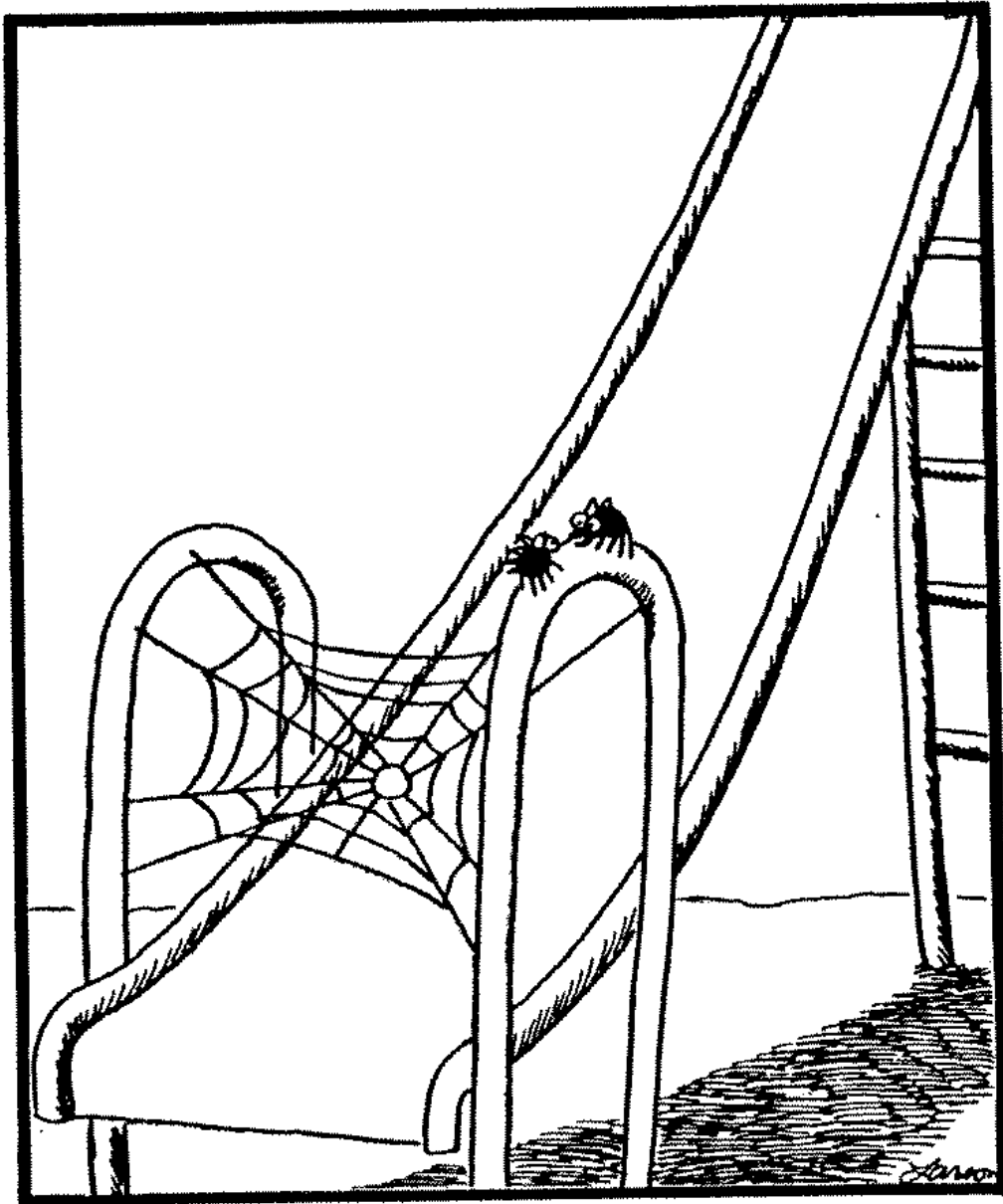
Progressive Efficiency: A Level of Energy Efficiency that Increases as the Scale of Energy Services Increase



Source: Jeff Harris et al. (in this volume)

Tasks, Conundrums, and Questions

- There is a very real need for new data that generates meaningful insights into the critical role of the energy efficiency resource – especially as it enables us to power new levels of economic prosperity.
- With that new set of economic insights, there is an equally important need to improve our understanding of how we can engage and empower people so that they can deliver efficiency resources at a scale sufficient to ensure a more prosperous and robust economy.
- And within this context, how might we integrate the many key insights (in this volume) from an array of disciplines, ranging behavioral economics as our colleague Allen Greenberg does in “Designing Usage-Based Car Insurance Products,” or as Yael Parag and Deborah Strickland explore the use of “Personal Carbon Budgets” to help individuals live in a carbon constrained world?
- Finally, we pose such questions: Is economic activity a sufficient indicator of well-being? How much is enough? How might we bring about a shift in energy culture to motivate awareness and shape decisions and policy?
- Anybody want to buy me a beer and continue this conversation?



"If we pull this off, we'll eat like kings."

***The difficulty lies not with
the new ideas, but in
escaping the old ones. . . .***

John Maynard Keynes

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And to download a copy of our new e-Book:

Karen Ehrhardt-Martinez and John A. “Skip” Laitner, Editors

People-Centered Initiatives for Increasing Energy Savings

Washington, DC: American Council for an Energy-Efficient Economy

<http://www.aceee.org/people-centered-energy-savings>



People-Centered Initiatives for Increasing Energy Savings



Karen Ehrhardt-Martinez, Ph.D.

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People-Centered Initiatives for Increasing Energy Savings

1. What scale of energy savings could be achieved?
2. What do we know about America's current energy culture and the diverse attitudes and practices that shape it?
3. What are some potential mechanisms and strategies for engaging and empowering American's to think and act differently?



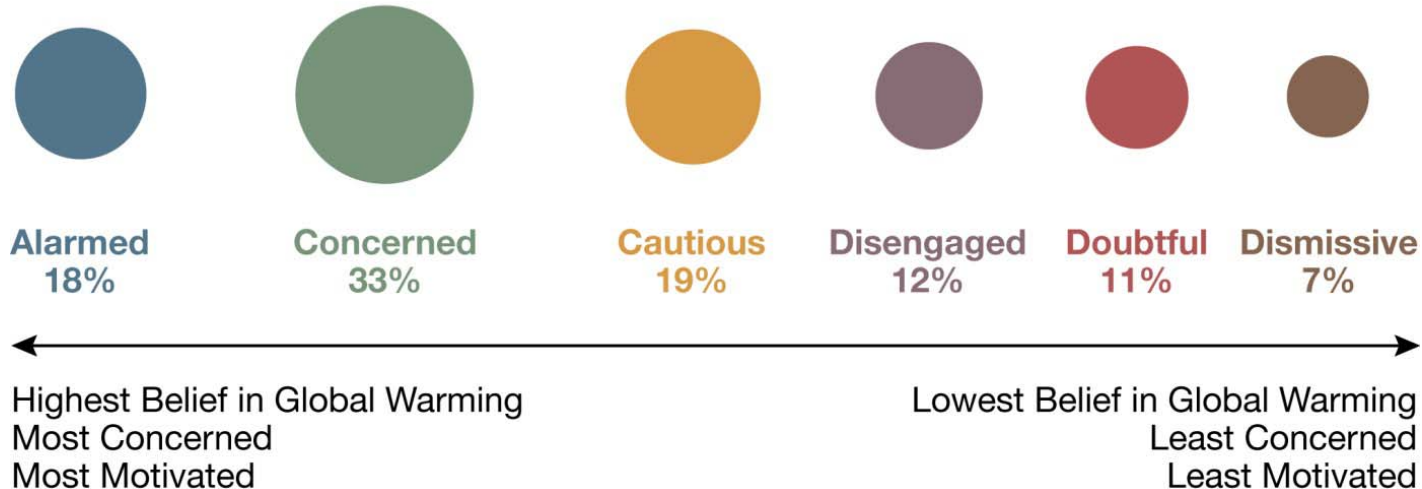
America's Energy Culture and the Diverse Attitudes within It

- What do Americans think about energy and climate?
- What motivates people to change their thinking and everyday practices?
- What factors shape the energy efficiency investment decision of Americans?
- How much diversity is there in American's energy beliefs and practices?



What do Americans Think about Energy and Climate?

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



n=2,129

Source: [Maibach et al., Chapter 8]



What do Americans Think about Energy and Climate?

- 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.



What Motivates People to Change Their Thinking and Practices?

- 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 during different periods, 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]



What Motivates People to Change Their Thinking and Practices?

- Existing data also suggest that when monetary feedback is removed, consumption often returns to the prior rate (Houwelling, 1989).
- The lesson: once we frame conservation as an economic transaction, all subsequent decisions about it are evaluated in that light.
- Providing people with **motivation** is a key to changing behavior.
- Social norms, goal setting, commitments, and competitions are among the non-economic means of motivating people.
 - OPower is using descriptive and injunctive norms in conjunction with feedback and are achieving savings of 2-4%. When combined with goals setting, savings as high as 8%.



What Motivates People to Change Their Thinking and Practices?

- Individual practices are also strongly influenced by the people that surround us and the existence of structures and designs that facilitate good practices.
- Developing social capital through communities of engagement creates:
 - community learning environments,
 - allows for the modeling of “good” behaviors, and
 - establishes contexts for experimental cultures and the establishment of new norms.

[Mamo and Fosket – Chapter 16]



Some Factors that Shape E. E. Investments

- Cost Constraints and Thrift [Maibach et al. Chapter 8]

People report that they either can't afford these investments or are averse to the ideas of getting something new when the old one still works.

- The structure of specific energy and product markets determines the choices that are available to Americans [Blumstein et al. – Chapter 20]
 - consider a consumer whose water heater has just failed. If she wants a quick repair, her choice set is typically limited to the one or two water heater models that the plumber has on hand. ,
 - Improving choice sets requires that we develop a clearer understanding of specific product markets and how they shape choices.



Some Factors that Shape E. E. Investments

- A Variety of Non-Economic Factors Strongly Shape Product Choice [Turrentine and Kurani – Chapter 20]
 - Focus: Vehicle choice
 - Consumers do not think about fuel economy in the same way as experts, nor in the way experts assume they do.
 - Almost no households tracked gasoline costs over time or analyzed their fuel costs in any systematic way.
 - Instead, research suggests that most people rely heavily on the use of heuristics or mental short cuts.
 - A common response to rising gasoline prices is not to change travel or buy more efficient vehicles, but to get angry at oil companies and drivers of largest SUVs.



The Diversity in Energy Beliefs & Practices

- The Average American and the Problem with Averages (N=1627)
[Lutzenhiser and Bender – Chapter 10]
 - The average northern CA household consumes 6750 kWh of electricity each year.
 - Averages as measures mask the variability between households and social groups.
 - In fact, consumption for some households was as low as a few hundred kWh and as high as 30,000 kWh



Diversity in Energy Beliefs and Practices

- The Average American and the Problem with Averages (N=1627) [Lutzenhiser and Bender – Chapter 10]
 - Characteristics of Households that consumed more:
 - Ownership: owner occupied households
 - Class: households with higher income levels
 - Demographics: HHs with more adults and older children
 - Latino HHs consumed considerably less electricity

A comparison of social measures and building-related measures:

Social variables	36%
Building characteristics	9%
Environmental Conditions	17%
Joint Effects	39%



People-Centered Initiatives for Increasing Energy Savings

1. What scale of energy savings could be achieved?
2. What do we know about America's current energy culture and the diverse attitudes and practices that shape it?
3. **What are some policy insights and new strategies for engaging and empowering Americans to think and act differently?**



Policy Insights and Strategies

What are some policy insights and strategies for engaging and empowering Americans to think and act differently?

- Using people-centered initiatives as a means of mitigating the rebound effect.
- Using Tools and Goals to reduce energy service demands.
- Using Policy levers to make smart energy choices easier.
- Utility Strategies



Policy Insights and Strategies

How can a people-centered approach help mitigate rebound?

- Distinguishing between direct and system-wide rebound.
- Direct rebound 10-30%; System-wide rebound 40%
- Technological approaches to E.E. tell people that we can consume our way to the solution – new products are more e.e. [message: old technology is the problem]
- People-centered approaches recognize limits to consumption and ask people to be part of the solution. [message: technology is a tool, you are the solution.]



Policy Insights and Strategies

Tools and Goals: Means of empowering HHs to take control of energy service demands

- Emerging Feedback Initiatives [Donnelly – Chapter 13]
- Personal Carbon Allowances [Parag and Strickland – Ch 15]

Cap and trade at the individual level.

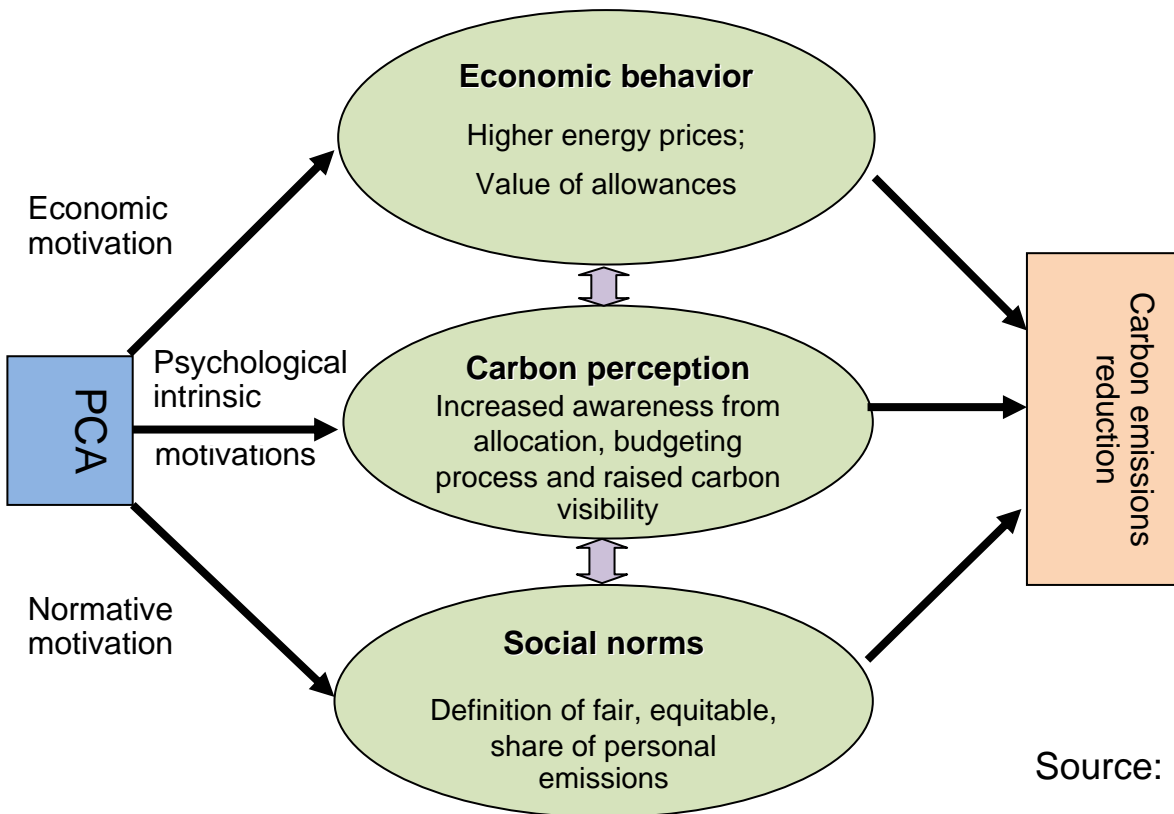


Personal Carbon Allowances

Policy instrument

Policy mechanism

Policy goal



Source: Parag and Strickland



Policy Insights and Strategies

Policy Levers: Making smart choices easier

- Progressive Efficiency Standards [Harris et al.– Chapter 6]
- Assessing Building Operating Costs [Brown et al. – Ch. 5]
- Pay-as-You-Drive Insurance Schemes [Greenberg – Ch. 12]



Policy Levers

Progressive Efficiency Standards [Harris et al.– Chapter 6]

Despite efficiency gains, total energy demand in the U.S. continues to grow.

How can we shift from efficiency to sufficiency?

Link efficiency standards to a product's scale of energy use.

Products with larger energy service demands will have more stringent efficiency standards.

Ex. Houses, TVs, refrigerators



Policy Levers

Assessing Building Operating Costs [Brown et al.– Ch 5]

People need help in assessing the operating costs of residential buildings. How can we incorporate energy efficiency into home purchasing decisions

- Develop more stringent building energy codes.
- Expand use of home energy rating systems.
- Mandated disclosure of energy performance information.



Policy Levers

Structure Insurance to Discourage Excessive Driving

[Greenberg– Ch 12]

People pay in advance for a predetermined number of miles per unit of time. People who drive more or less would either pay more or receive a rebate.

- Estimates indicate a drop in VMT of 8-20% if all fixed insurance costs were converted.
- Other benefits: reduced congestion, fatalities, infrastructure needs, and carbon emissions.
- 63% of HHs would save an average of 28% on premiums or about \$500 annually.



Policy Insights and Strategies

Utility Strategies: Programs that help Consumers

- Measures of Success [Tiedemann– Chapter21]
- Utility Program Templates for Behavior [Vine – Ch. 19]
- Potential New Utility Strategies [Brown – Ch. 18]



Utility Strategies

Measures of Success [Tiedemann– ch 21]

Insights:

- Mass media can be effective in changing knowledge and attitudes but is generally ineffective in changing behavior.
- Targeted information programs can achieve savings (8%).
- Goal setting is more effective when combined with feedback.
- While larger rewards may result in greater savings, the relationship tends to be subject to diminishing returns.
- Real-time feedback tends to be more effective than indirect.



Utility Strategies

Utility Program Templates for Behavior Programs

[Vine– Ch 19]

Integrated, program-wide utility approaches to behavior need to include a number of essential elements, including:

- Identifying important market segments.
- Using program and market logic models to statistically analyze pathways to savings.
- Assess both energy and non-energy benefits of programs.



Utility Strategies

Potential New Utility Strategies [Brown– Ch 18]

Insights:

- Provide on-bill financing options to overcome initial cost barriers to consumers who want to invest in e.e.
- Develop performance specifications for smart meters and expanded demand response to provide the means and economic motivation to encourage e. e. among consumers.
- Align the financial incentives of utilities with customers energy efficiency goals through the decoupling of utility profits with energy sales or through the use of other financial incentives



Some Lessons

- We think about and use energy in diverse ways.
- Social and cultural factors account for more variation than building characteristics.
- We are not as rational as we'd like to think.
- Non-economic incentives are often more effective than economic incentives in encouraging change.
- Feedback is a powerful tool.
- People don't operate in a vacuum. Community, culture, market structure, choice sets, program design, and policy all play a role in shaping individual behavior.



Further Information:

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