

Recent research in behavior: filling the gap unaddressed by technical measures to boost energy performance in buildings

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Learning Objectives

At the end of the this course, participants will be able to:

1. Understand why we need to pay attention to behavior in buildings
2. Recognize how occupant behavior can undermine the expectations set by design
3. Use different approaches with landlords, facilities management, lessors, and tenant employees.
4. Incorporate this work into commercial, multi-family residential and single family residential

Who I am

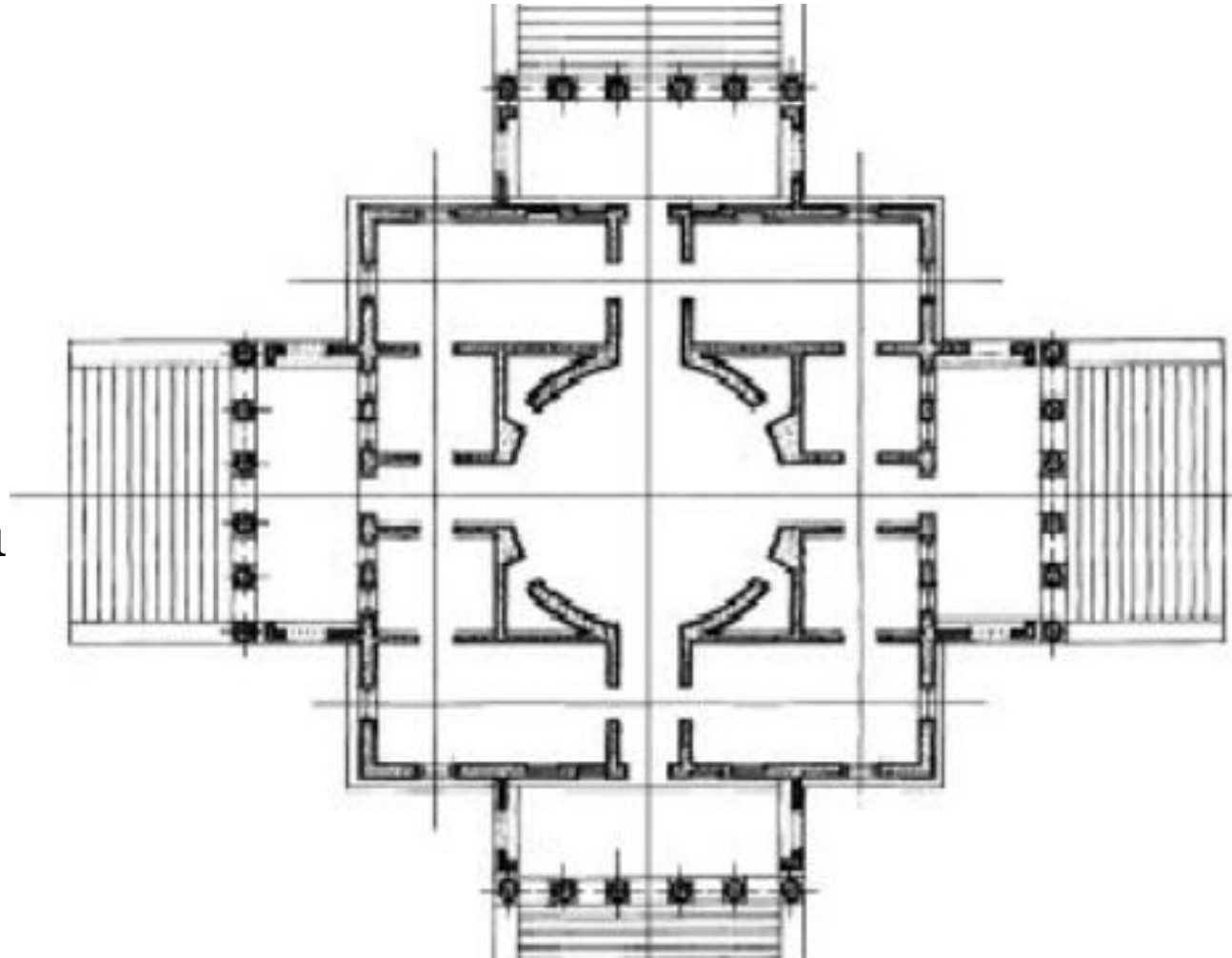
- Susan founded Indicia Consulting LLC in 2006 as a way to bring the tools and insights from cultural anthropology to a wider audience.
 - Indicia Consulting is a mission-driven social enterprise which defines its primary goal as seeking an increase in sustainability and improvement in the natural environment by engaging behavior.
 - Indicia's clients include Pacific Ethnography, Lawrence Berkeley National Laboratories, Illume, and IQ Energy.
- Susan received a Master of Arts and a Doctorate in Cultural Anthropology from the University of California, Riverside. Her dissertation research project on the former East German city of Rostock lead her down some side-alleys of interest, including:
 - How the Nazi-era removal of a 'degenerate' roof from a school building left headaches for generations to come.
 - The on-going fight between business interests and the Lutheran church over Sunday opening hours, with the stakes being the 'soul' of a city.

What I do

- Indicia Consulting's work is concerned with aspects of energy consumption and behavior change.
 - Questions of interest include the synergistic effects from combined treatments, and how small individual effects may add up to large collective impacts.
 - Similarly, how does the sequence of interventions affect outcomes and performance of measures?
 - We focus on 'engagement' in a variety of settings and sectors
 - Commercial, residential, institutional
 - Transportation, buildings, industry, and agriculture
- **Our findings are comparable, applicable, and practical.**

Why do we need to pay attention to behavior in buildings?

- I heard a possibly apocryphal story once at Lawrence Berkeley Lab -- there was an engineer who claimed that he could design a building, which would work perfectly, “if it weren’t for all the people.”



Urban pests?

- Some of you are laughing, and some of you are nodding your heads in agreement with the sentiment.
- Wherever you fall along the spectrum, from wanting to collaborate with the occupants of the buildings you commission, to viewing them as some sort of ‘urban pest’, I am here to help!



“You can design a building to the highest energy efficiency codes and specifications, but once it’s occupied, what happens to affect the baseline?”



“People who have done deep retrofits and other energy efficiency projects can find these efforts undermined if occupant behavior is not addressed. “

Behavior vs. “Widgets”



SOME THINGS ARE BETTER **HOT**
HOWEVER, LAUNDRY IS NOT ONE OF THEM!

THE TRUTH ABOUT WASHING IN COLD WATER:

- it's just as effective as washing in hot for everyday loads
- it helps your clothes last longer (hot wears them out)
- it uses 1/10th the energy needed to run a hot wash!

green.harvard.edu/green-tip
GREEN TIP OF THE MONTH
SAVING RESOURCES, WORKING SMARTER

 HARVARD UNIVERSITY OFFICE FOR
SUSTAINABILITY

Engagement programs = savings

- Workplace engagement programs can significantly increase the energy-savings in commercial buildings.
- Engagement programs can also simultaneously reduce the number of service calls from tenants in formally managed buildings of all stripes.



Stacking = savings

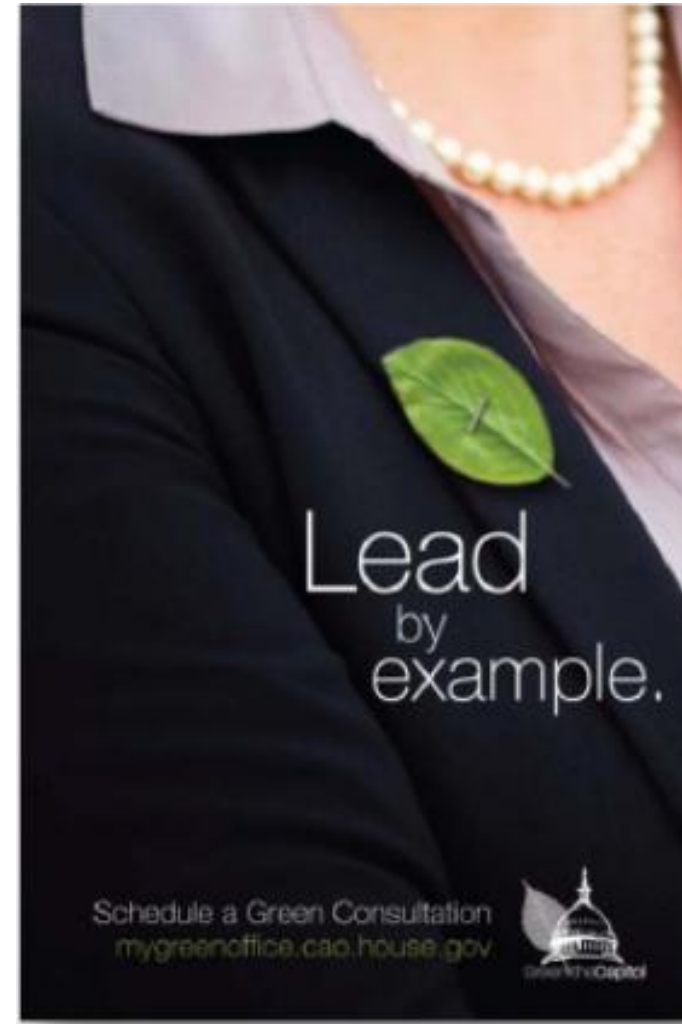
Engagement programs that were ‘stacked’ with combinations of **messaging, communications** strategies, social ‘**nudges**’, and a variety of **incentives** saved a minimum of 4%, and in the case of some individual programs, much higher.

(ACEEE, 2012)



Successful programs have many parents

- Innovative and engaging programs stem from a coalition of partners and stakeholders
- Successful programs have more than one ---
 - Channel
 - Medium
 - Message
 - Messenger



Features of successful programs

- *Tone*: one of strong support from building management
- *Channels*: including e-mail, web sites, social media and public meetings
- *Media*: posters, flyers, video
- *Message*: comfort, productivity, morale, savings, profitability
- *Messenger*: a team consisting of a stakeholder-oriented program committee and peer champions selected from building occupants.
- *Engagement techniques*: such as feedback, peer pressure, competition, and rewards

Five Energy Awareness Programs

	U.S.	Canada
Government	"Green the Capitol" at U.S. House of the Representatives	Behavior Campaign in a Provincial Governmental Building
Government-owned Utility		"Conservation Action!" at BC Hydro
Public University-owned Hospital		"TLC-Care to Conserve" at University Health Network of University of Toronto
Historical, Landmark Building	"Tenant Energy Management Program" at Empire State Building	

Case Studies: Project Savings

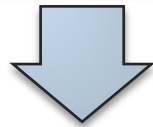


	#	Program Names	Project Savings
U.S.	1	Green the Capitol	[Total project savings] Within 18 months of its launch, there was a 74% reduction in carbon emissions through the use of energy-efficient equipment and products, changes in fuel types, and behavior changes.
	2	Tenant Energy Management Program (Empire State Building)	[Total project savings] It is estimated that the retrofit project (including tenant energy management program) will reduce energy use by 31%.
Canada	3	Conservation Action (BC Hydro)	[Savings from the energy behavior program only] The project produced a 5% reduction in electricity use by the end of the first year.
	4	Employee Engagement Program (a provincial govern. building)	[Savings from the energy behavior program only] During a week-long lighting campaign, a floor that used manual lighting switches reduced electricity consumption by 12%.
	5	TLC—Care to Conserve (a hospital)	[Savings from the energy behavior component only] The TLC case led to a 4.2% energy saving during the first two years.

I Will if You Will

Tenant engagement program inspired by WWF Earth Hour campaign

Tenants reduce
energy waste
(you will)



Shorenstein
offers reward
(I will)

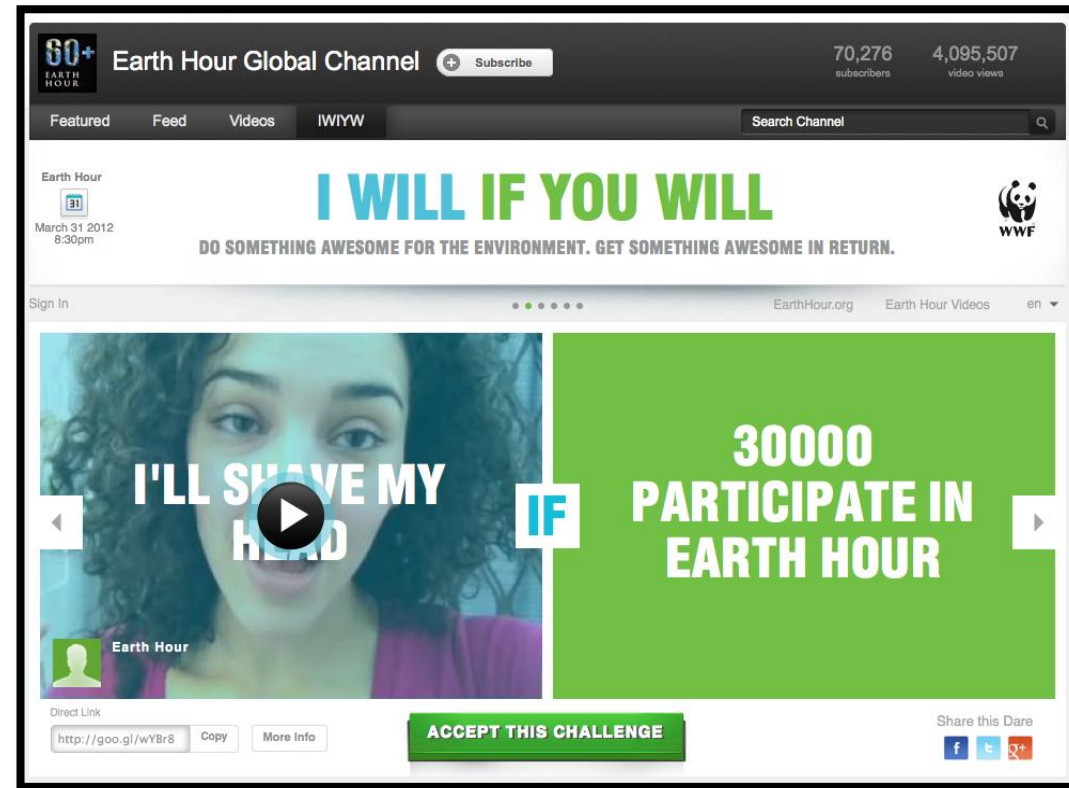
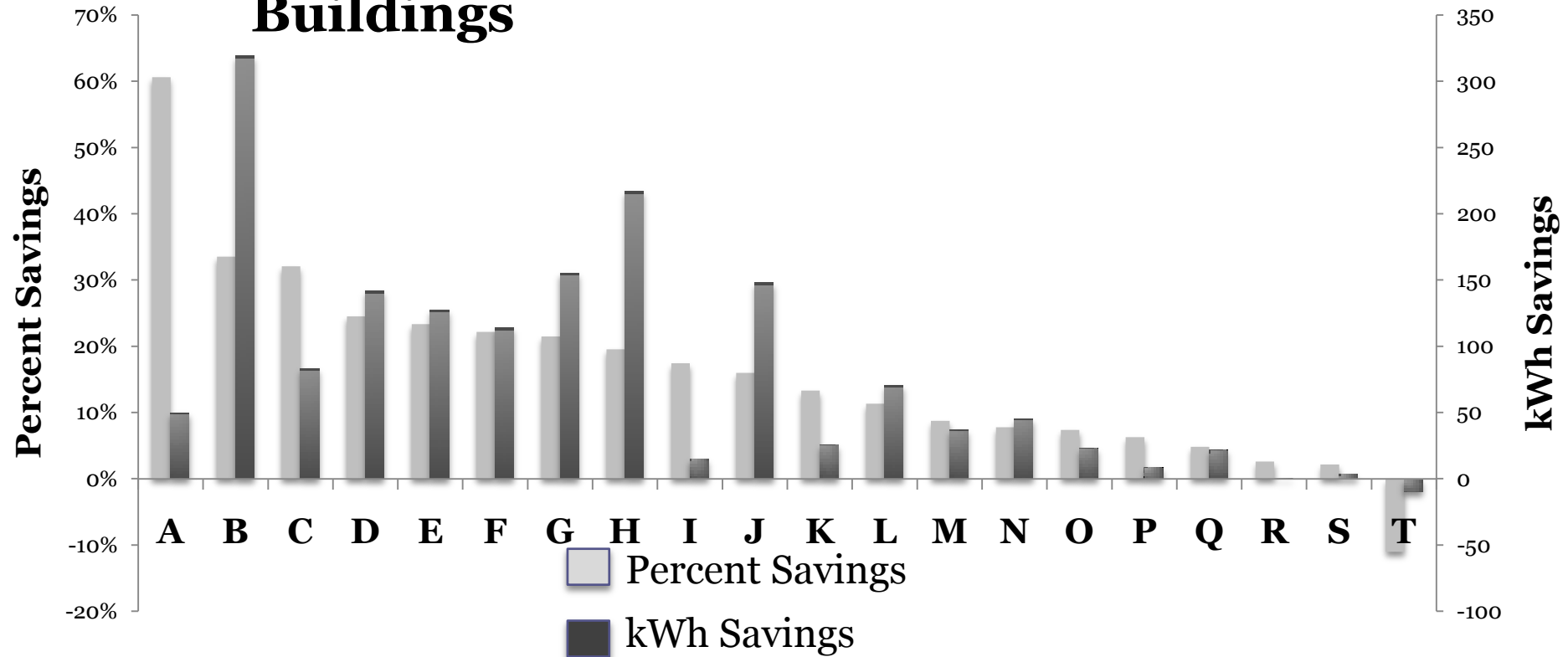


Image source: www.earthhour.org

Program Results

High variability across buildings, but generally positive trend

Electricity Savings Across all Buildings



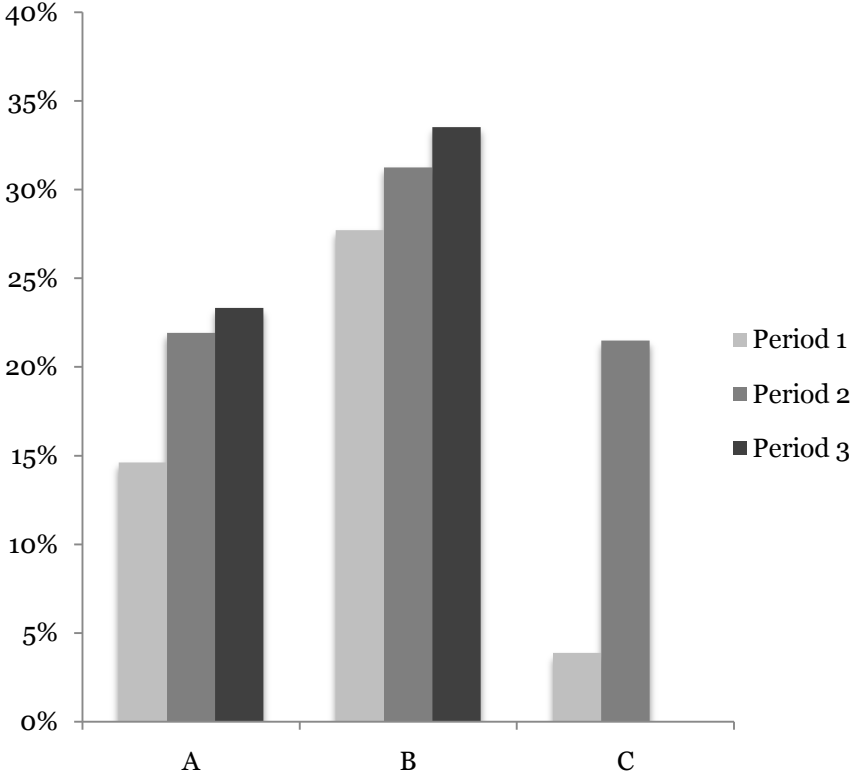
Total savings over 3 months

- 1,600 kWh reduction
- 18% below baseline use

Program Results

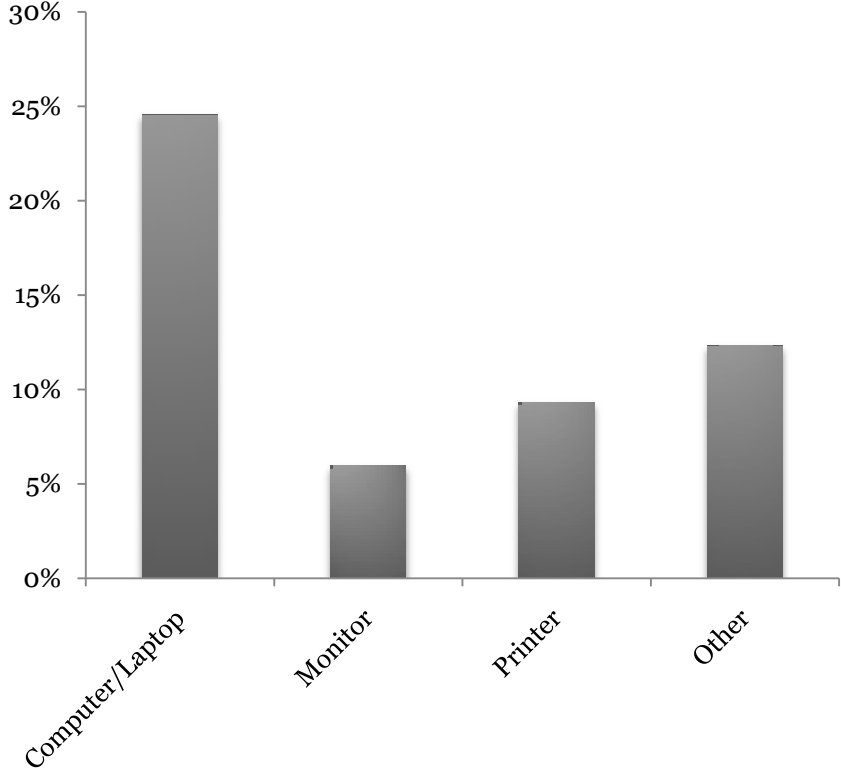
Savings persistent and target loads deliver largest reduction

Savings over 3 Periods



Preliminary results suggest savings increase during program

Savings by End Use



Computers and laptops deliver largest share of savings

Non-Energy Outcomes and Looking Forward

Outcomes



BOMA Innovative Earth Award



Industry recognition in press

Next Steps



Out-of-the-box challenge for tenants



Share program with industry

- Engagement should ideally address several stakeholder groups: landlords, facilities management, lessors, and tenant employees.
- Each of these requires a different approach that takes into account structural incentives and barriers to change.

Split Incentives and other issues

- Various stakeholders may be motivated (or not) to invest in energy efficiency.
- Depending upon who pays the actual energy costs, there may be little or no incentive to behave in a way that prioritizes efficiency.
- Building owners may simply pass on these costs as higher rents, rendering them invisible.
- Meanwhile, employees of tenants are divorced from the financial effects of their actions, and thus have no reason to mitigate their impact.
- Sometimes, barriers are physical (like no thermostats!)

Behavior in residential buildings

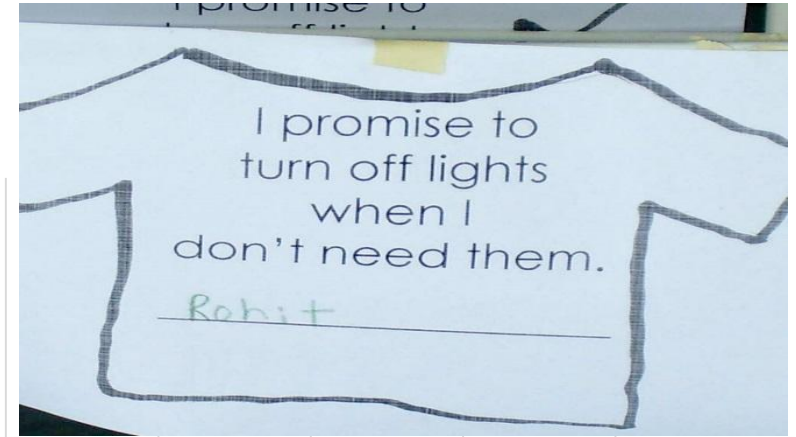
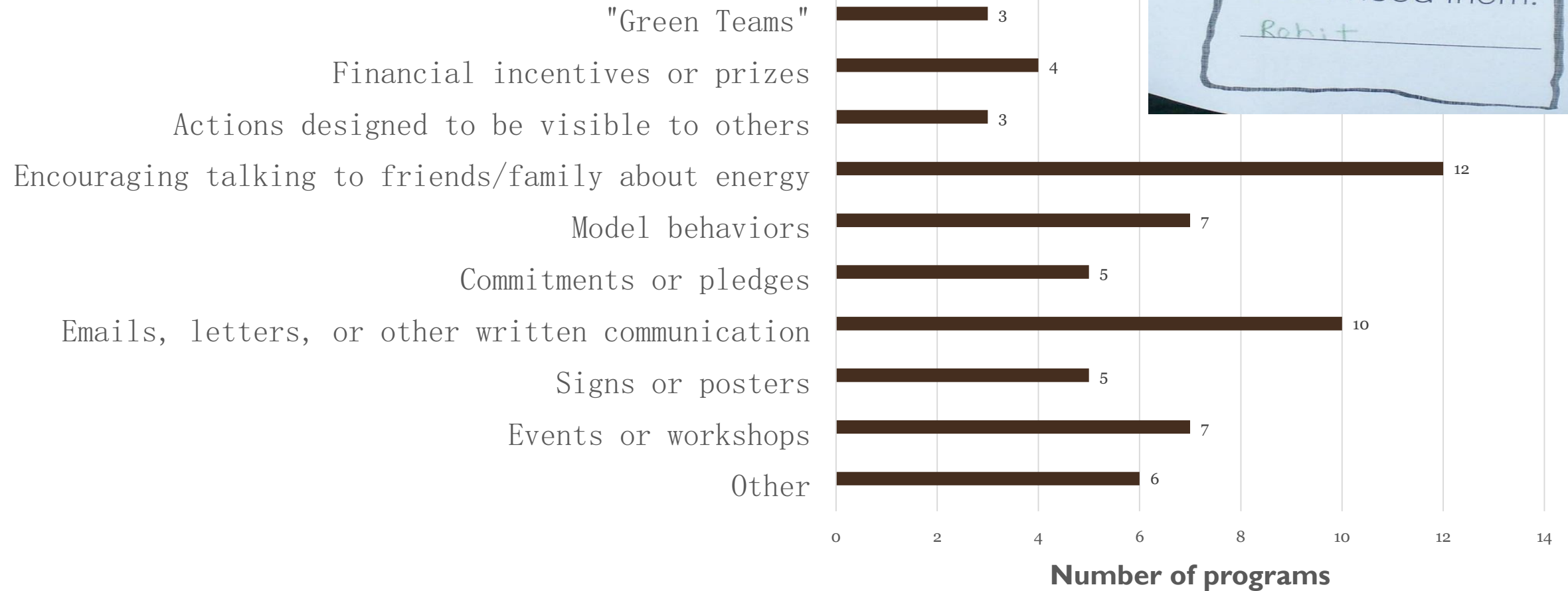


Can behavior change programs really save energy?

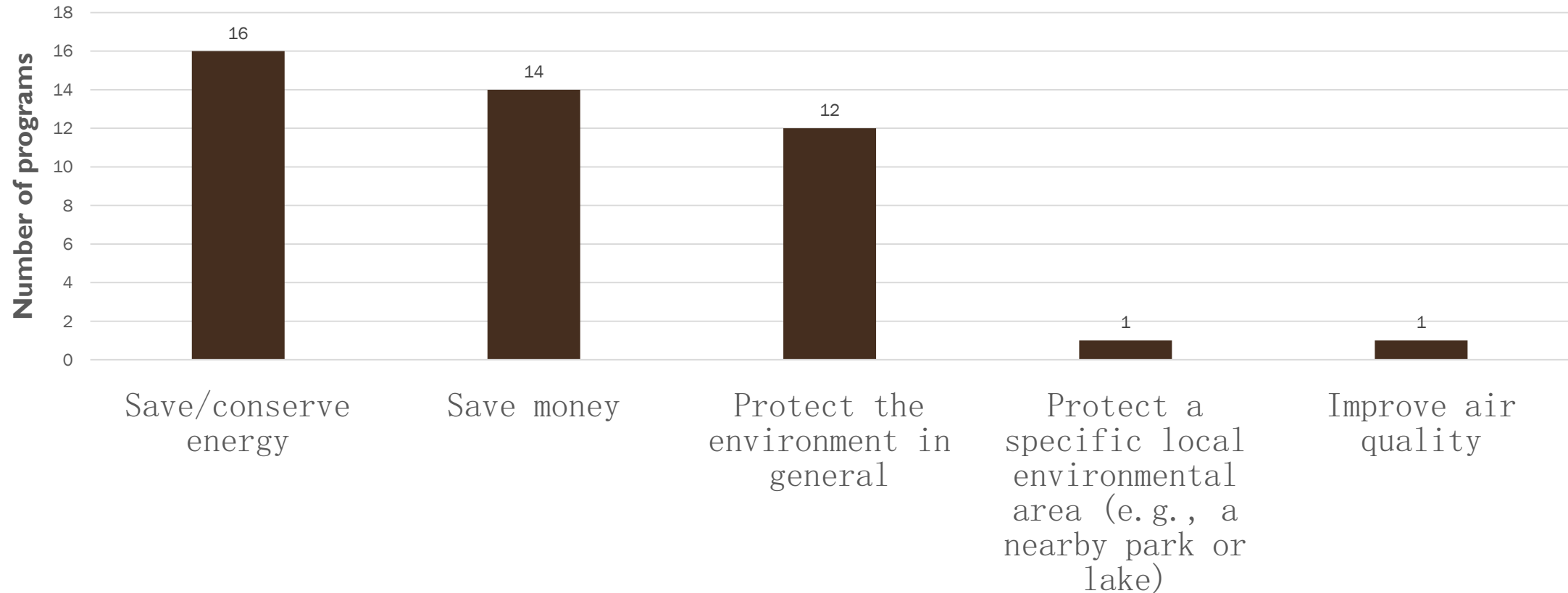
• Yes!

- Cool Choices (2013): 6–9%
- ACEEE (2010): 4–12%
- Not many programs collect data
- Utility-run programs that do collect data are cost-effective

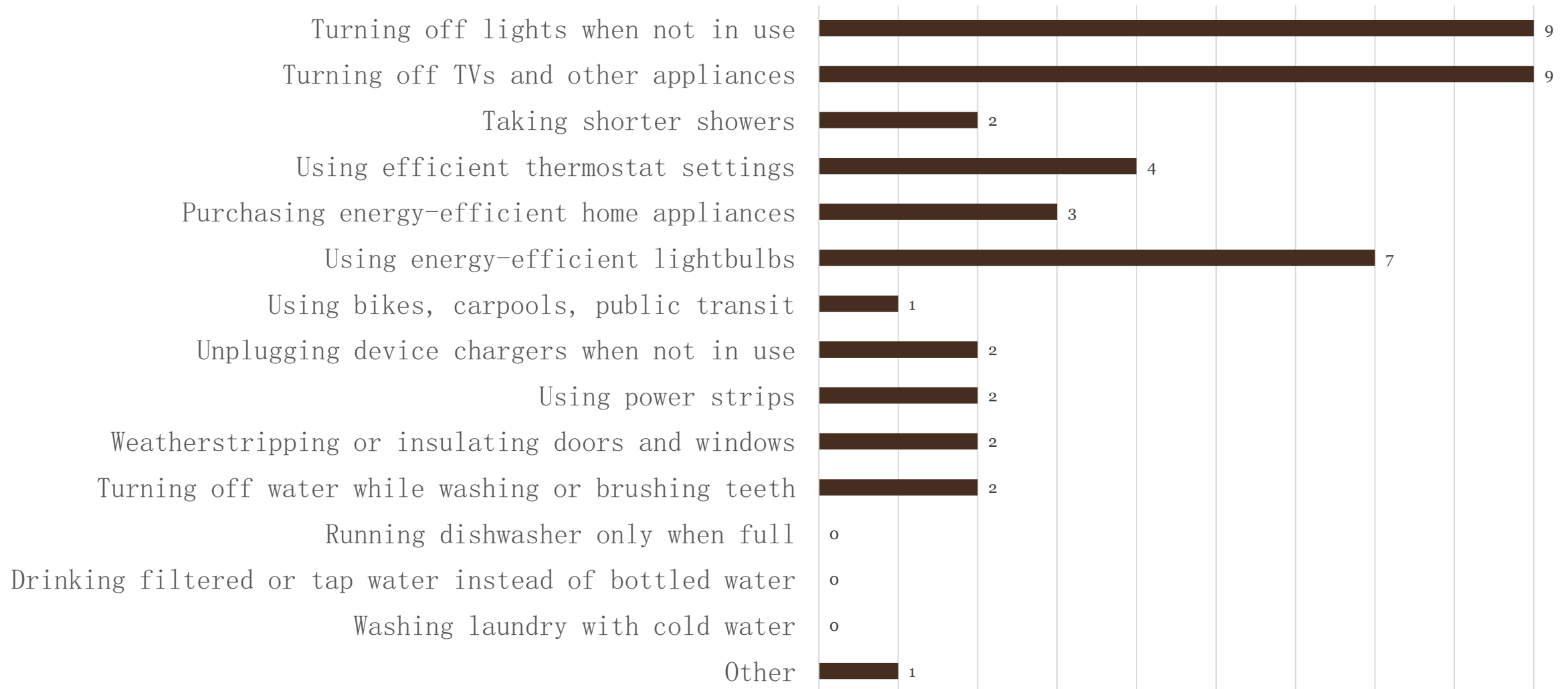
Strategies used



What were the goals of the program, as presented to tenants?



Behaviors targeted



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