Behavior Changes That Count

Designing k-12 Energy Efficiency Behavior Programs That Yield Predictable, Measurable Results
Energy Management Starts With...
• Over 1,000 k-12 CA schools since 1996
• STEM-based energy efficiency education
• Student-driven savings: 5-15% reduction in energy consumption
PowerSave Schools Program Results

• 563 schools enrolled since 2008

• 8.5% average energy reduction

• 40,044 mWhs saved

• $5.7 million in avoided costs
“Soft” Impacts of Student-Led Approach

- Fostering student leadership
- Students from disadvantaged backgrounds develop sense of agency
- Creates bonds between students/teachers and facilities staff
- On-ramp to green careers
- Engaging homes and communities
- Generate culture change
Three Elements of Behavior Program Design

• Evaluation, Measurement, & Verification (EM&V)

• Social Science

• Ease of Implementation
Evaluation, Measurement, & Verification

• Answers the question: how will/do/did you do that?
• Perception that behavior is difficult to predict/measure
• Important before, during, and after implementation
• Avoids cannibalizing savings
Theory & Logic Model (T&L)
“Working without a program logic model is akin to driving in an unknown country without an adequate roadmap; even if you are lucky enough to get to your destination, you won’t be able to trace how you got there.”  –*Paving the Way*...
Example: Student Energy Audits

Resources: Toolkit and Audit Training

Activity: Classroom Energy Audits

Output: Data report and recommendations

Short Term Outcomes: Data-based savings recommendations

Medium Term Outcome: school staff adopts recommendations

Long Term Outcome: avoided cost
Separating Treatment and Control Groups
Randomized Control Trial (RCT)
Randomized Encouragement Design (RED)

• Potential participants offered encouragement to participate (encouragement is applied at random)

• Participants may opt in or out

• May be a better fit for school districts
Measuring and Tracking Savings

International Performance, Management, and Verification Protocol (IPMVP)

- Standardized statistical approach to quantifying the effects of energy efficiency measures
- **Option C** addresses whole building analysis
  - Multi-variant regression analysis
  - Delineates plan for data collection
  - Track site changes unrelated to conservation measures
Smart Metering and Interval Data

[Graph showing hourly electricity use over a week, with red indicating unusually high use, green indicating expected use range, and black indicating actual use.]

- Unusually high use
- Expected use range
- Actual use
Social Science Research
What is Social Science?

Study of the relationships between people with use of the scientific method

Why Social Science?

Identifies most effective behavior intervention strategies that influence energy efficiency
METHODS OF DRIVING BEHAVIOR CHANGE

- FEEDBACK
- SOCIAL NORMS
- COMPETITION/REWARDS
- FOLLOW-THROUGH
- IN-PERSON INTERACTIONS
- COMMITMENT
Commitment

• Strategies that encourage commitment to executing an action by a specific date
• Goal-setting
• Begin with small commitments

Example: Energy-saving pledges
Feedback

• Strategies that involve providing frequent energy use information

• Can include periodic information about
  o Energy consumption
  o Energy costs
  o Social benchmarking

Example: Monthly Energy Savings Reports and Student Feedback
Social Norms

• Strategies that leverage the power of “normal”

• Presenting efficiency behaviors as commonly accepted and widely adopted aka peer pressure

*Example*: Energy Savings Leaderboard
Competition/Rewards

• Utilize commitment, feedback, and social norms to drive competition

• Publically reward for achieving certain goals or leading the pack

*Example:* Classroom Energy Patrols
Follow-through

• Strategies that remind individuals to make good on their stated intention or commitment

• Provide prompts or reminders

• Ask individuals to create their own energy reduction plan

*Example: Holiday Shutdown Checklist*
In-person Interactions

• Strategies include face-to-face connections between individuals and trusted members of the community

• Encourage desired behavior through credible, familiar messengers

• Model behavior and ask questions

*Example*: Student Presentations
Multi-pronged Strategies

• The most effective strategies leverage more than one type of intervention to affect behavior

• Combine frequent feedback with rewards and social comparison

• Activate cognitive dissonance via a commitment (pledge)

*Example*: PowerDown Challenge
Cognitive Dissonance

experiencing two or more *conflicting ideas*, beliefs or behaviors

*feeling of discomfort* leading to a change in order to restore balance

MY COGNITIVE DISSONANCE IS KILLING ME!
COGNITIVE DISSONANCE

BELIEF

CONTRADICTORY BELIEF

RESHAPING OF BEHAVIOR/BELIEFS

BEHAVIOR CHANGE
Cognitive Dissonance

• Dr. Richard Osbaldiston of Eastern Kentucky University
• Environmental Sustainability and Behavioral Science: Meta-Analysis of Proenvironmental Behavior Experiments
• 253 experimental treatments
• Encouraged pro-environmental behaviors (recycling, water conservation, energy efficiency, etc.)

COGNITIVE DISSONANCE WAS THE MOST EFFECTIVE TREATMENT IN CREATING ENVIRONMENTAL BEHAVIOR CHANGE
Cognitive Dissonance Examples

Do you think energy conservation is important?

Did you know we are in a drought?

Do you leave the lights on?

Do you water your lawn at 3 in the afternoon?

Do you care about having a clean community?

Do you recycle?
Student Empowerment
I could draw a picture of a bridge, but as I'm not an engineer you wouldn't want to build it.
Promoting energy conservation in the primary grades

A brief look at the Lupine Hills Powersave program

Bill Hodges
5th Grade Teacher
Lupine Hills Elementary
At the beginning of the school year:

Students presented to the faculty at a staff meeting.
YOU DON'T WANT TO BE LIKE THIS GUY

SAVE ENERGY!!!
In September through December, we saved $100. The school will get back half of the amount of money that we saved, which is $50.35. With some of the money we have saved, we can buy school supplies.
Questions?
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