

# **Metering the Unmetered Resource**

## **Evaluation Methods for Achieving Diverse Energy-Efficiency Policy Objectives**

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February 27, 2008

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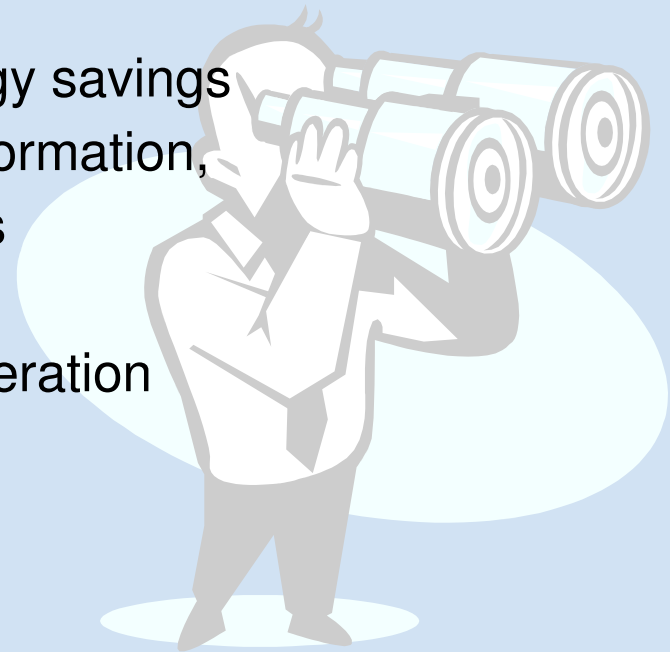
**Working Together, Advancing Efficiency**

# Logistics

- Web/phone problems: \*0
- Phones will be in “lecture mode” (mute) until end of presentation portion
  - Send questions in writing using “chat” function
- Q&A 3x during presentation and at end
  - 3:45-4:30 unmuted Q&A period (please continue to send in questions via “chat”)
- To mute/unmute phone: \*6
- There will be a break
- Webcast is being recorded
- Evaluation experts from among CEE’s membership will be available to answer questions, lend further insight

# Outline

- Overview of energy program evaluation
  - Roles, Purposes, Types
- Key issues and methods in program evaluation
  - Program theory
  - Impact evaluation/estimating energy savings
  - Estimating effects of market transformation, education and marketing programs
  - Assessing cost-effectiveness
  - Assessing program design and operation
  - Data and reliability issues
  - Evaluation resources

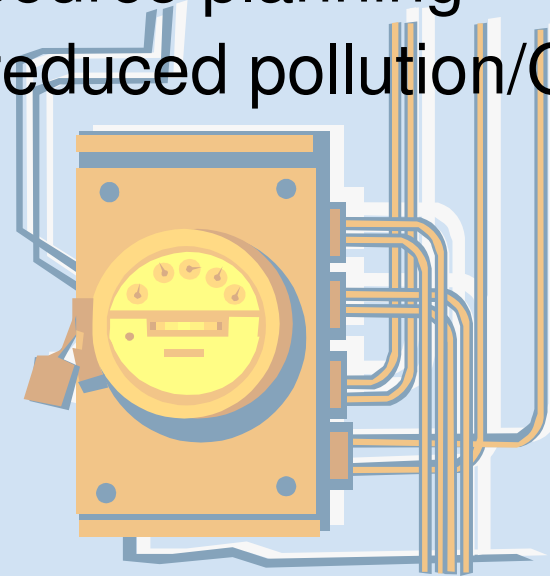


# What is Evaluation?

- Evaluation is the systematic testing in the field of the assumptions used in planning.  
*(Framework for Planning and Evaluation of Public Benefits Programs)*
- The systematic acquisition and assessment of information to provide useful feedback about some object. (Energy Trust of Oregon)
  - Independent, unbiased, credible.

# Why Evaluate? (1)

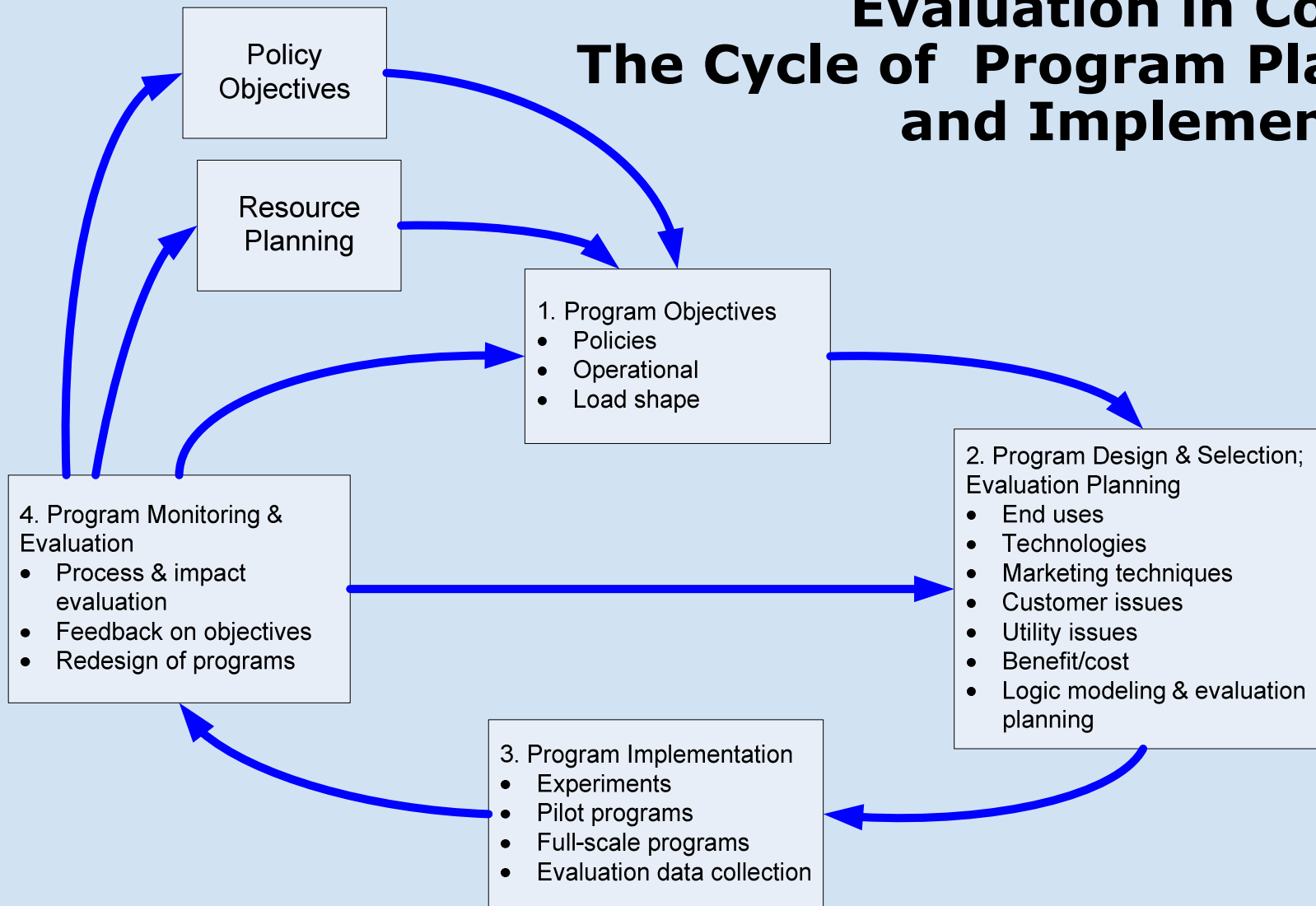
- EE evaluation as the meter for the un-metered resource
  - Measured savings for resource planning
  - Measured benefits from reduced pollution/GHG
  - Accountability
    - Both for ratepayer dollars and shareholder reward



## Why Evaluate? (2)

- Improve programs
  - More effective program design and processes
    - Increased energy savings from better design
  - More accurate savings estimates for measures
  - Basis for future EE program funding

# Evaluation in Context: The Cycle of Program Planning and Implementation



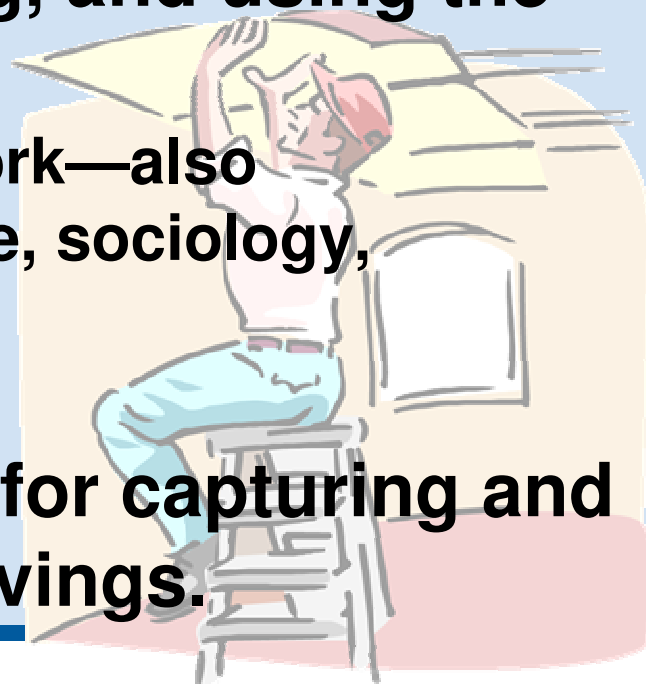
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CEE from  
Pierre Landry,  
SCE, and  
*Demand-Side  
Management,  
Vol. 4:  
Commercial  
Markets and  
Programs,*  
EPRI, 1987.

# Policy Goals & Evaluation Objectives

- Policy goals and type of program are key factors in determining the questions evaluation needs to answer.
- What is allowed in cost-effectiveness tests reflects policy goals and shapes evaluation objectives.
  - If peak load reduction is the primary goal, evaluation methods should focus on measuring demand reduction at particular times in particular places, not just energy savings.
  - If customer well-being or industrial productivity are important goals, these will be included in the cost-effectiveness tests and the choice of evaluation methods will be driven by type of program plus measurement of these additional benefits.
- The policy context should drive the questions, which should in turn drive the evaluation approach.

# Measures Don't Save Energy; People Do!

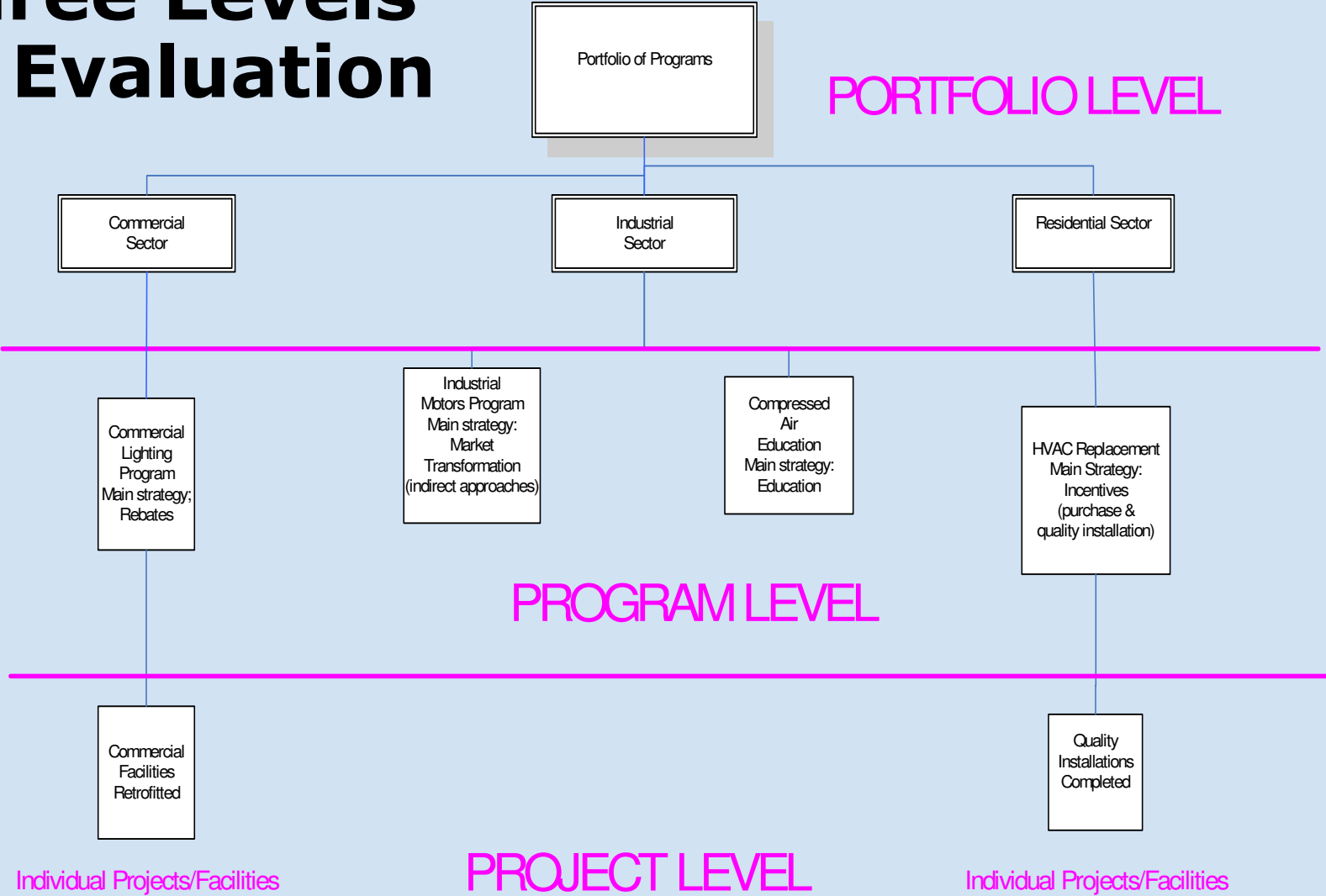
- It's programs that are evaluated, not just measures.
  - Measures sitting in a warehouse don't save energy.
- What saves energy: programs, with real people delivering, managing, installing, and using the measures.
  - Not just the laws of physics at work—also psychology, management science, sociology, education, economics . . . .
- The implications are profound for capturing and correctly measuring energy savings.



# The Big Picture: Levels, Categories & Types of Evaluation



# Three Levels of Evaluation



# Two Overarching Categories of Evaluation

- Two categories: **Formative** and **Outcomes Evaluation**
  - **Formative**: Helping program design
  - **Outcomes**: Determining program results
- Often, the two categories are blended for maximum use of information and cost reduction

# Six Types of Evaluation

Evaluation Category	Phase at which Implemented	Evaluation Type	Assessment Level
Formative	Pre-program planning phase (a priori)	1. Market assessment (includes market characterization, baseline studies)	Market and/or Program
		2. Potential or feasibility studies	Market and/or Program
	Implementation phase (post-hoc)	3. Process evaluation	Program
Outcomes	Implementation phase (post-hoc) and/or post-implementation (ex-post)	4. Impact evaluation	Program
		5. Market effects evaluation	Program & Market
		6. Cost-Effectiveness evaluation	Program or Portfolio

# Two Types of Program Strategies

Resource  
Acquisition

Market  
Transformation



Target:  
Individual  
participants  
“Direct”

Target:  
Market  
“Indirect”

Rebates &  
Incentives

Sales force  
training

Education/  
information

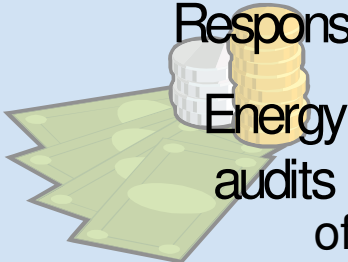
Demand  
Response

Marketing/  
outreach

Energy  
audits

Labeling

RA & MT/direct & indirect, are two ends of a continuum. They are **not** mutually exclusive.



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# KEY ISSUES AND METHODS IN PROGRAM EVALUATION



# The Role of Program Theory



# Program Theory and Evaluation

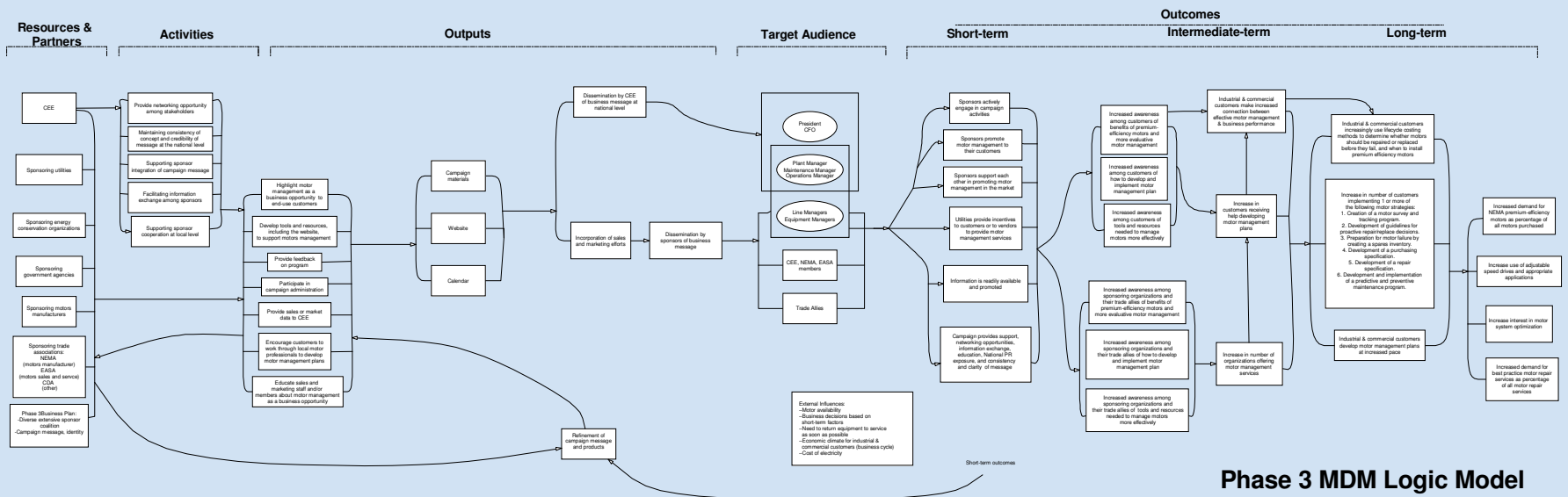
- How a program should be evaluated depends on what the program is supposed to be doing.
- Programs occur within larger structures (markets, societies). Taking a systems-focused perspective yields more robust evaluation results.
- Laying out program theory makes explicit program assumptions and other forces operating on target audiences and affecting strategies.
- Program theory makes it easy to identify what should be included in the evaluation.
  - Guidance: DOE Impact Evaluation Framework for Technology Deployment Programs



# Program Theory: Components

- Identification of the goals of a program. Visual or text.
- Detailed description of the activities the program will use to accomplish those goals and the identification of the causal relationships between the activities and the program's effects.
- Description of the market barriers that must be overcome and how the program activities are expected to overcome those barriers.
- A description of the program progress and of the metrics that should be tracked to monitor program effects and progress towards goals.
- Should include: 1. program resources, 2. program activities, 3. outputs from program activities, 4. target audiences, 5. program outcomes (short-, intermediate- and long-term).

# Example of a Logic Model (1)



# Example of a Logic Model (2)

A Generic Logic Model for NEEA’s ENERGY STAR CFL Lighting Program (Northwest ENERGY STAR)

Situation	Inputs	Activities	Outputs (=“activity indicators”)	Outcomes—Short Term (= “market progress indicators”)	Outcomes—Longer Term (= “market progress indicators”)
<i>The context and need that gives rise to an initiative</i>	<i>The resources, contributions, and investments made in response to the situation (allow for activities)</i>	<i>What you do with your inputs (lead to outputs)</i>	<i>The desired outputs (tools, materials, plans, etc.) from your activities (lead to outcomes)</i>	<i>The results and benefits</i>	<i>The results and benefits</i>
<i>Barriers &amp; Opportunities must either be shown in this column or below the chart.</i>	<i>In order to accomplish our set of activities we will need the following:</i>	<i>In order to address our problem we will conduct the following activities:</i>	<i>We expect that if completed or underway these activities will produce the following evidence:</i>	<i>We expect that if completed or ongoing these activities will lead to the following changes in 1-3 years</i>	<i>We expect that if completed or ongoing these activities will lead to the following changes in 4-6 year</i>
<p><b>Barriers:</b> Describe barriers &amp; opportunities here or below. Make sure that activities address these.</p> <p>High price (compared to incandescents)</p> <p>Limited manufacturers</p> <p>Limited availability (not in all retail stores where consumer buy light bulbs)</p> <p>Lack of awareness of benefits (long life, lower price)</p> <p>Low satisfaction—light quality, color, application etc.</p> <p><b>Market Opportunities:</b></p> <p>With limited manufacturers, have fewer points of leverage</p> <p>Huge potential for energy savings</p> <p>Frequent consumer purchase at relatively lower cost</p>	<p>Staff Program Lead (overall project planning, goal setting &amp; project management, utility communications, national coordination)</p> <p>Contractor services --retail/mfr outreach &amp; support --utility coordination --marketing &amp; promotion</p> <p>Product (the thing being “sold”)</p> <p>Market Actors - Retailers - Manufacturers - Consumers - ENERGY STAR (DOE &amp; EPA)</p> <p>Budget (for utility coordination, retail support and marketing, etc. )</p> <p>Utilities --coordinated retail promotion --consumer education</p>	<p>List all activities you will conduct to address the situation/barriers/opportunities, and which will theoretically result in the outcomes specified in the model. Include activities addressing all key market actors.</p> <ul style="list-style-type: none"> <li>■ Leverage utility incentives with manufacturers and retailers</li> <li>■ Support consumer education</li> <li>■ Support in-store merchandising and sales staff training on benefits</li> <li>■ Influence national specifications for ENERGY STAR and quality assurance/product testing efforts</li> <li>■ Track retail CFL sales</li> <li>■ Leverage retail/manufacture promotional efforts and resources</li> <li>■ Focus on mass market via big-box retail, then smaller market channels</li> </ul>	<p>Field representatives to support retailer merchandising of ENERGY STAR CFLs, coordinate in-store activities</p> <p>Offer cooperative marketing support to retailers</p> <p>Program-designed point-of-purchase in-store collateral</p> <p>Regional CFL buy-down promotion (leverages utility incentives)</p> <p>Leverage ENERGY STAR Change-A-Light national campaign in marketplace (retailers/mfrs)</p> <p>As market matures, coordinate in-store support via manufacturer representatives (natural market actor)</p> <p>Support PEARL/third-party quality testing</p>	<p>Consumers demonstrate increased awareness of CFLs</p> <p>Price points decrease</p> <p>Purchase rate reflects increased demand by early adopters</p> <p>Large volume/big-box retailers begin to offer product</p> <p>More manufacturers enter the market with new product</p> <p>Consumers indicate intent to purchase again (<i>repeat purchase</i>)</p> <p>Significant measurable kWh savings</p>	<p>Consumer satisfaction continues increase</p> <p>Market actors actively promoting ENERGY STAR CFLs as evidenced by their marketing and positioning</p> <p>CFLs are widely available in multiple/traditional retail channel</p> <p>Purchase rate increase reflects mainstream acceptance</p> <p>CFL distribution and quality improves in other parts of the country</p> <p>Industry supports and DOE adopt third-party testing QA</p>

-----As delivered/documented by Implementation----- | -----As measured/validated by Evaluation-----

- External Environment (including politics, climate, socio-economic factors, market forces):
- Green wave highlights CFLs as easy/low-cost solution
  - Lots of media attention due to Wal-Mart commitment to sell 100MM CFLs
  - Federal & state initiatives to increase efficacy levels for general purpose lighting (eg. “ban” incandescents)





# **Impact Evaluation: Estimating Program Energy Savings**

**Dimensions of the Evaluation**

# Direct Energy Savings:

- **Program participation is defined as purchasing or adopting the energy efficiency measures.**
  - That's how rebate and direct installation programs work.
- **So the first job is to estimate the energy savings achieved from those adoptions (called gross energy savings).**
- **Then the follow-up question is in which cases the program caused the purchase/installation/adoption (net energy savings; attribution; net-to-gross ratio).**

# Indirect Energy Savings:

- The program activity is intended to influence a decision to adopt efficiency measures, rather than require it as a condition for participation.
  - Examples: Energy audits, energy efficiency training, education, information, market transformation.
- So the evaluation must first determine whether the program did indeed lead to adoption of energy-efficient measures (attribution/net-to-gross ratio).
- Then, it must estimate what the resulting energy savings were.



# Estimating Gross Energy and Demand Savings



For Both Direct and Indirect Savings Programs  
and Program Components

# 1. Deciding “Who” to Measure

- Can you get good enough data for the whole population of participants? (And what is the whole population?)
- Or should you gather more detailed data for a good sample?
- Should you include a comparison or control group? (More later)

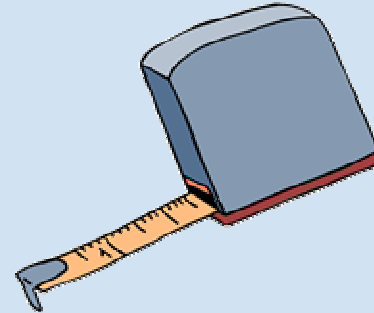


## 2a. Which Measurement & Analysis Method to Use for the Energy Savings



### Statistical Billing Analysis

- Simple billing analysis normalized for weather
- Regression analysis
- Multi-stage regressions



### Engineering Measurement and Analysis

- Pre-post measurements and engineering algorithms
- Pre-post building energy simulation models

**Sometimes, the two approaches are combined.  
We try to include economic/behavioral effects wherever possible.**

## 2b. Which Measurement & Analysis Method to Use for the Energy Savings

- Methods range from simple and direct to complex and indirect and sometimes combined.
- More complex methods generally require more detailed data and higher cost.
- Guidelines for good measurement/analysis:
  - The *Model Energy Efficiency Program Impact Evaluation Guide* covers both billing analysis/regression methods and engineering methods.
  - IPMVP (*International Performance Measurement & Verification Protocol*) is a widely recognized standard for engineering measurement and analysis approaches.

### **3. Billing Analysis Tends To Be Preferred When:**

- Both pre- and post-retrofit billing data are available.
- Expected energy savings are large enough to be statistically observable in a billing analysis (at least 10% of total usage; depends on several factors).
- Analysis can include large numbers of participants that are reasonably homogeneous.

## 4. Engineering Measurement & Analysis Tends To Be Preferred When:

- No pre-installation billing data are available (e.g., new construction).
- Expected energy savings are a small fraction of total energy usage.
- Program has a small number of participants or unique measures.
- Program itself includes substantial engineering analysis that can be built on.

## 5. What Data Will Be Collected? Sources and Methods

- What data are available for all participants?
  - Program tracking data
  - Utility customer data
    - Monthly usage
    - Interval demand for larger electric cus
  - *What else might be useful and available for all?*
- *What data should be collected through surveys? Phone or on-site?*
- *What data should be collected through metering and measurements?*



## 6. What Data May Be Needed for Estimating Energy Savings?

- Characteristics of the new measure, the old measure, and/or the alternative measure and date of installation
- Monthly energy consumption or interval energy data
- Metered or monitored energy usage and hours of operation for the measures
- Characteristics of the building, other equipment, and operations
- Weather
- *Other?*

## 7a. What Data Are Needed for Estimating Peak Demand Savings?

- What definition of peak demand are decision-makers concerned with? Examples:
  - The level of savings for each of the highest usage hours in a typical or atypical year?
  - Average demand over certain daily hours for certain months?
- Must gather the data for those times, before and after the energy efficiency change
- But there's added value in collecting the full load shape over the day, season, or year, because the value of energy saved varies over these time periods.



## 7b. What Data Must Be Collected to Estimate Peak Demand Savings?

- Pre- and post-installation measurements of interval demand, at least for a good sample
  - Decision: Is equipment submetering required or can account-level interval data be used?
- To use in engineering calculations or an interval demand billing analysis



## 7c. What's the Alternative?

- Inexpensive approaches give less reliable results.
  - Estimate from engineering algorithms or simulation models using energy consumption and weather data inputs only.
  - Assume the load shape of the energy savings is the same as the load shape of the measure's energy use.
  - Use well-measured results from other areas, if weather and other differences are accounted for.



## 8. What Would Energy Use Be in the Absence of the Program?

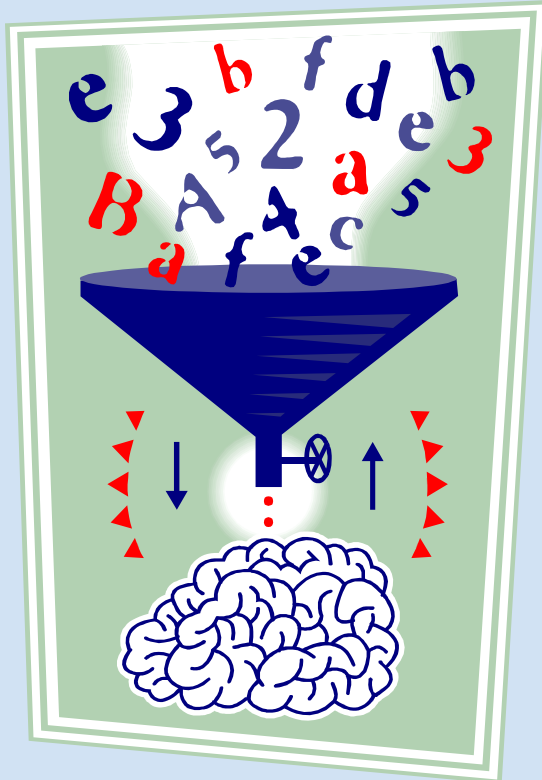
- We can measure energy use before the program.
- We can measure energy use after the program.
  - But how much of the change was due to the program?
- Conventionally, we look at this question in two dimensions:
  - One related to gross energy savings;
  - One related to attribution and net energy savings.

## 9. Gross Energy Savings Baseline:

- What technology/behavior choice was being made?
  - Pure retrofit: Early replacement or add-on
    - Then savings is prior energy use minus new energy use
  - Replacement on burnout or new construction (lost opportunity market)
    - Then savings is efficient equipment energy use minus usage of a standard efficiency new measure



# Determining Attribution, The Net-to-Gross Ratio, and Net Energy Savings



**Attribution:**

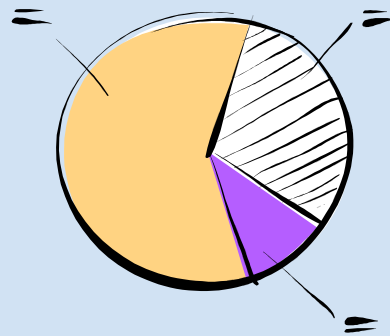
**What Energy Savings Are the  
Result of the Program, Rather  
Than Other Influences?**

# Indirect Savings Programs

- Attribution is the first question for audit, training, education, marketing, and market transformation programs.
  - Step 1: Who was actually exposed to the program?
  - Step 2: How many of those exposed to the program activities changed their behavior in energy-saving ways?
  - Step 3: Of those who changed, how much of the changes were due to the program rather than other influences?
  - Step 4: Estimate the energy savings of those changes identified as due to the program.

# Direct Savings Programs

- Attribution is usually the second question asked for rebate and direct install programs.
  - Step 1: How much energy did participants save?
  - Step 2: What fraction of participants' changes were due to the program, rather than other causes?



# The Traditional Direct Savings Approach: The Net-to-Gross Ratio

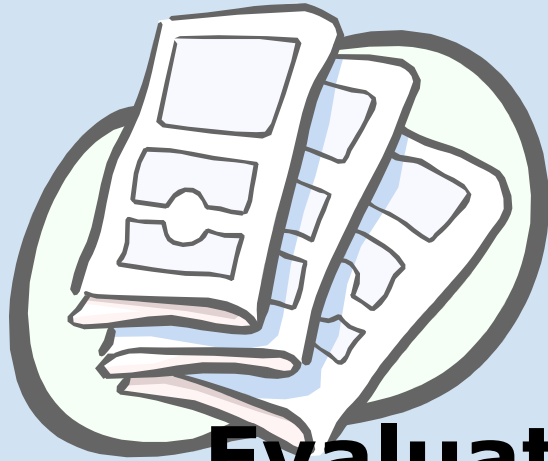
- = The fraction of the apparent program energy savings that are truly the result of the program
- *How could this be relevant in the following cases?*
  - *Program pays rebates to 100 sites that install high-efficiency lighting; program claims the energy savings of these 100 sites; 30 customers were already planning to do this.*
  - *Program gives design assistance and rebates for construction of 10 energy-efficient buildings; another 7 efficient buildings are designed by these architects but don't get rebates; program claims savings for the 10 buildings.*

# Components of the Gross to Net Adjustment: Free Riders and Spillover

- In the absence of the program, what would these customers have done about increasing their energy efficiency?
  - The same thing as done with the program? -- A free rider
  - Something, but not as much or not as soon? -- A partial free rider
  - Nothing, but because of the program, did more than was required by the program? -- Participant spillover
  - Nothing, but the program induced/enabled non-participants to do something? -- Non-participant spillover
  - *Examples?*

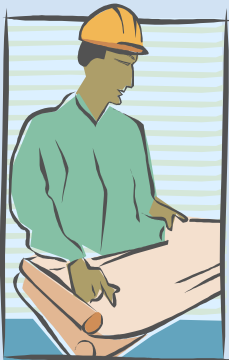
# When the Traditional Approach Doesn't Work

- When one or multiple programs have long-term effects on a market, the free rider approach doesn't tell the whole story.
- Then, we need to monitor how the market itself changes over time and try to determine how much of the change is due to the programs.
- There's more detail on this in the next section on evaluating indirect savings.



# Evaluating Indirect Savings Programs and Strategies:

Market Transformation, Audit, Training, Education, and Marketing Program Strategies

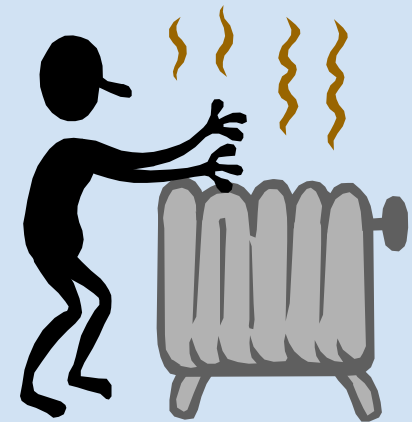


# Market Transformation Approaches/Strategies

- Primary goal: to achieve a permanent change in the way a market operates, one that leads to greater energy efficiency long after the program ends
- Often involve working “upstream” with manufacturers, retailers, etc.
- Often cost more up front, but over long term yields highly cost-effective energy savings
- Can appear in conjunction with other strategies
- “Done” when the less efficient alternative is either unavailable, unprofitable, or illegal.

# Market Transformation Success Factors

- A planned, sustained effort over several years.
- Trade allies who find ways to benefit from the change.
- Effective use of the key communications channels in the market.
- Substantial non-energy benefits.



# Steps in MT Program Evaluation

1. Conduct a market characterization study.
2. Develop program theory & logic model, identify market progress indicators.
3. Conduct a baseline study. Be sure to include baseline measurements of market progress indicators identified.
4. Track short term, intermediate term, and especially long term indicators of market progress over time.
5. Assess attribution of market effects to program.
6. Estimate energy savings from market effects.
7. Allocate energy savings to program as appropriate.

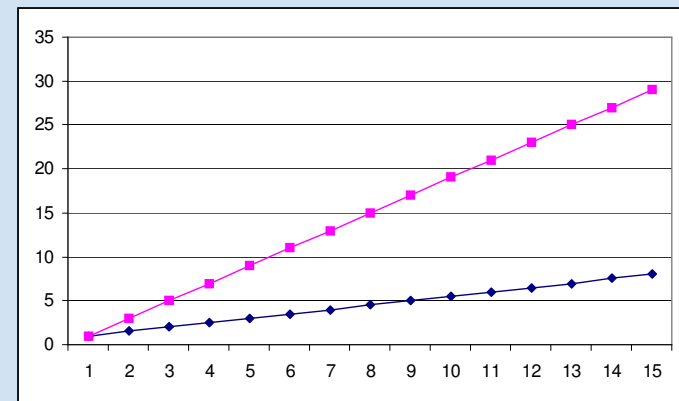
# Market Characterization Study

- For market transformation programs
  - With training, behavior change, etc., this step may not be relevant
- Part of formative evaluation—conduct before finalizing program design & logic model
- A solid market characterization is key to accurate understanding of the structure and functioning of a market
  - Feeds into baseline measurement



# Baseline Measurement

- To measure change, must know the starting conditions.
  - True for evaluation of all indirect strategies.
  - Unfortunately, people often don't think of this until the program has already been running a few years.
- One key to attribution is to develop a forecast, based on deductive reasoning, of where the market would go on its own.



# Market Indicators

- Elements of the baseline that are monitored over time to identify changes.
  - Key for market transformation activities: long-term indicators.
- Should be things for which the program theory explains a clear cause-and-effect relationship.
- Examples of market indicators for market transformation programs, progress indicators for training, education, behavior change programs:
  - Market/target audience awareness
    - Of product/service/practice
    - Of benefits/value
  - Market/target audience knowledge/know-how/technical capability (practices)
  - Market share/market penetration
    - Products/services
    - Practices

(Source: NWEA)

# Market Indicator Examples, Cont'd.

- Repeat purchase/persistence
- Product Availability
  - Can be purchased through existing market/distribution channels (pre-comm'l)
  - Shelf space or other metric of inventory % increases (post)
  - Units produced
- New market actors emerge/existing market actors begin to supply
- Market actors/partners promoting the product/service/technology, as evidenced by marketing communications, programs, and/or dollars spent
- Price
- More stringent standards/codes

(Source: NWEAA)

# Attribution: Causality Assessment and Allocation

- Causality: Are the market changes the result of this program, or of other forces acting on the market?
  - Causality assessment addresses this question, informed by program theory & logic model.
- Allocation: How much of the market effects and associated energy savings can be credited to this program versus other programs?
  - Principle: Look for and avoid double-counting of savings.

# Estimating Energy Savings Resulting from MT Programs

- Final step in the evaluation.
- Addressed after determining estimated program effects on sales/adoptions of the technology.
- Energy savings estimates should be reported with a range of uncertainty around them.
- Typically use gross energy savings evaluation methods to estimate savings.
- Low cost option is to use deemed estimates of savings based on assumptions rather than direct measurement.
  - Caveat: Historically, ex ante engineering estimates used in deemed savings assume everything will be installed and used properly. Results may be overstated.

# Getting Results



## You Can Rely On

# 1. Getting Reliable Results from Sampling (Precise and Unbiased)

- Questions about Samples
  - Is it unbiased (or properly weighted to be unbiased)?
    - Non-response bias
    - Survey method: Did it exclude relevant groups from the sample?
      - *Can you think of some examples?*
  - Does it give the needed level of precision?
    - Depends on sample size and variance in the population.
    - *How far off can an estimate be and still be useful?*

## 2. Getting Reliable Results from Analysis Methods

- Has the evaluator explored for omitted variables and sources of bias?
  - Described them;
  - Described actions taken to test for their effects;
  - Described actions taken to reduce them if possible?
- *Examples:*
  - *Survey questionnaires: What can lead to biased responses?*
  - *Doing pre/post billing analysis in California for measures installed in 2000.*

# 3. Comparing Results/Triangulation

- Similar results from two different studies increases confidence.
- Different results:
  - *Average them?*
  - *Or try to figure out why they're different and then develop a final estimate?*



# Assessing Cost-Effectiveness of Energy Efficiency Programs and Portfolios



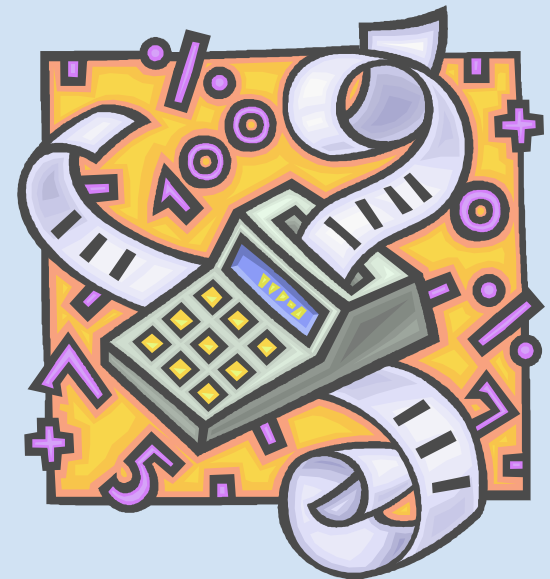
Comparison of benefits vs. costs of an EE program or portfolio, expressed in monetary terms.

# Uses of Cost-Effectiveness Analysis

- Regulatory: Is this a prudent use of ratepayer funds?
- Resource planning: How far we can substitute EE programs for supply sources?
- Program design: Lower than expected cost-effectiveness should spur search for program changes

# How is Cost-Effectiveness Calculated?

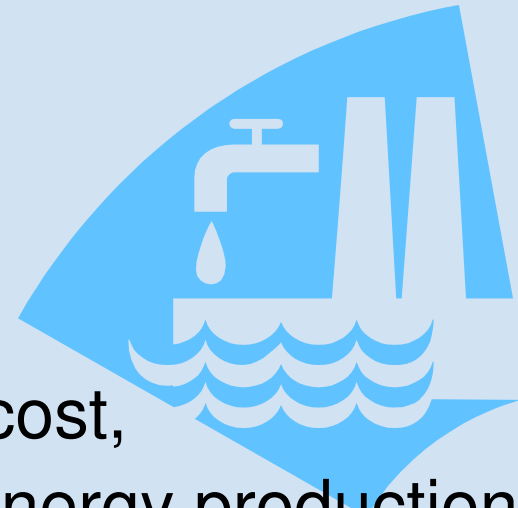
- It's a comparison of benefits vs. costs, expressed in monetary terms: B/C or B-C
- The calculation inputs vary depending on what perspective is being taken:
  - Total Resource Cost test
    - (TRC - primary test for public policy)
  - Participant Cost Test
  - Program Administrator Cost Test
  - Ratepayer Impact Test



# Definition: Basic Benefits

- Benefits = Avoided Costs of Energy
- = lifecycle value of the future energy costs avoided by running the program
- = SUM (For each measure and each year of the average lifetime of each measure) of
  - Number of measures installed
  - x Annual energy savings per measure (kWh/yr)
  - x Forecasted unit cost of energy that year (\$/kWh)

# Additional Benefits



- Can include not only the generation/transmission/distribution cost, but also the environmental costs of energy production
  - e.g. pollution damages, expressed in cost per unit of energy produced
- In some jurisdictions or applications, non-energy benefits are also included:
  - Value of reduced material waste in production
  - Increased comfort/health/safety for low income customers
  - Etc.

## Definition: Costs

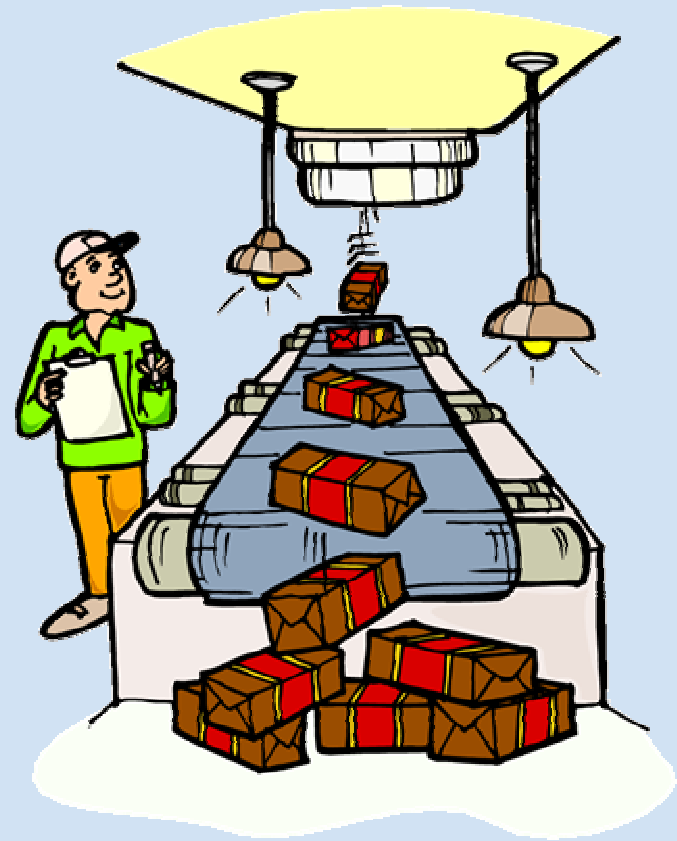
- Costs = the full costs of getting energy users to adopt the measures:
- = program cost plus part or all of cost of measure purchase and installation
  - Only the incremental cost of measure purchase is counted if the participant was going to replace equipment anyway
  - Rebate costs are only counted once, in program cost or measure purchase cost



# Three Cases with Different Benefits and Costs

- First-time installation, planned remodel, or replacement on burnout (incremental cost)
- Add-on energy efficiency measures (energy management systems, occupancy sensors, etc.) (full cost)
- Early replacement of still-functioning equipment, induced by the program (full cost)
- See slide 37 for how energy savings are calculated differently for these cases.

# Process Evaluation



# 1. Purpose of Process Evaluation

- To recommend ways to improve a program's efficiency and effectiveness.
- Frequency:
  - For a new program.
  - Whenever there are major changes in the program.
  - Or after 3-4 years.



## 2. Content of Process Evaluations

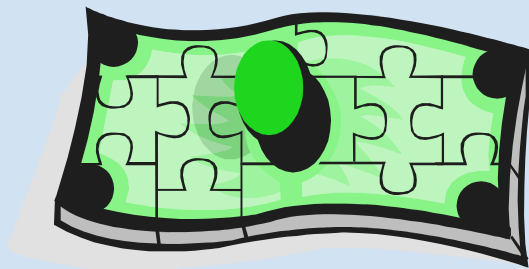
- Begin with
  - Program design (outline of program activities) and
  - Program theory (explaining causal links of how program activities will lead to the desired program outcomes).
- Examine how program was actually implemented.
  - What did the program do effectively, in terms of program activities; how could efficiency and effectiveness be improved?
  - Did the causal links work as expected? If not, why?
  - Should the market be reassessed to determine whether a more effective approach can be found, or is there a fundamental flaw in what the program is promoting?

### **3. Activities Involved in Process Evaluation**

- Review of program theory, program plan, and all available program materials and records.
- Interviews with program managers, others involved in the program, and the end user audience.
- Comparison with similar programs.
- Comparison with available information on market and its structure.
- Development of recommendations for program improvement.

# Evaluation Policies and Issues

Timing, Budgets, Data Requirements,  
Coordination, and Communication

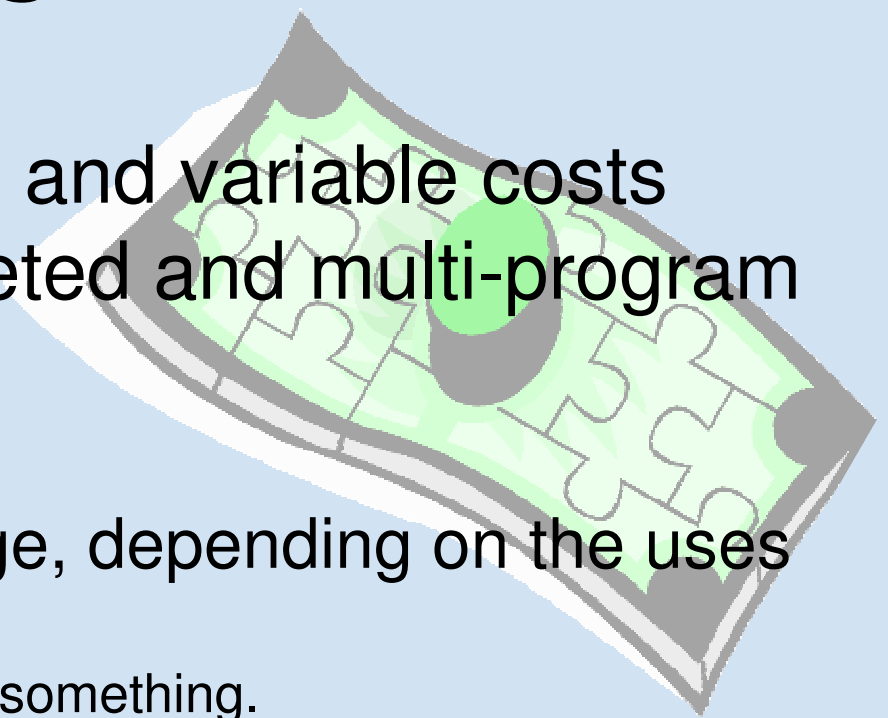


# Evaluation Timing

- Develop a multi-year plan for evaluation, and a multi-utility or multi-state plan if possible
  - To reduce costs and
  - To assure all important issues can be covered.
- Process and impact evaluations aren't always needed every year.
- It's valuable to start evaluations well before the program ends – even near the beginning.
  - Allows for input on evaluation data needs
  - Provide early feedback if program needs change

# Evaluation Budgets

- Evaluations have fixed and variable costs
- Cost-efficiency of targeted and multi-program evaluations
- Evaluation spending:
  - 3-6% is a common range, depending on the uses for the results:
    - How important it is to know something.
    - How precise you need to be.
    - What other issues are addressed with the budget.
      - End-use surveys for forecasting and program targeting, technology or market assessment, messaging, etc.



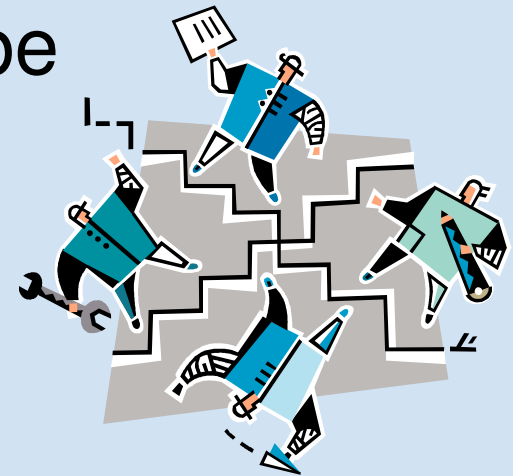
# Data: Lifeblood of Evaluation

- Regulatory implications – Tell utilities what to report.
- Program-supplied data – Needs QC.
- Budget impacts – How much is really needed.
- Market tracking costs/issues – May need cross-state cooperation.



# Information Sharing, Comparison and Coordination

- When and how can evaluation results from other areas be used?
- How can evaluation results be properly compared?
- When and how can evaluations be coordinated?
  - Benefits & challenges



# Communication: Life Insurance for Evaluation

- Useful information provided in a timely fashion and in a useable format to all of the stakeholders is essential to keep evaluation valuable.
- Communication
  - A) Ahead of time,
  - B) During the evaluation, and
  - C) With results afterward.



# Evaluation Resources



# Questions?