Consortium for Energy Efficiency

History of Energy Efficiency Programs

Designing Effective Programs

Program Evaluation

Key State Policy Considerations
Program administrators formed CEE

- To reach **binational markets**
- Accelerate market **uptake** of efficient products and services
- Which achieves **lasting public benefit** of energy efficiency
CEE MISSION

As the US and Canadian consortium of gas and electric efficiency program administrators, CEE works to accelerate the development and availability of energy efficient products and services, encourage market uptake, and attain lasting public benefit.
Membership is limited for credibility

- **Efficiency Program Administrators**—utilities and nonutilities with ratepayer funded programs

- **Public Stakeholders**—such as DOE national labs, state and provincial energy offices, government energy research agencies, regional and national efficiency organizations

- NO Organizations with private interests, for example, manufacturers, consultants, program contractors
CEE members direct 80% of energy efficiency expenditures

Source: CEE 2013 Annual Industry Report
Working Together, Accelerating Efficiency

✿ Credibility
  • Performance claim
  • Savings benefit

✿ Momentum
  • Binational market
  • Market position

✿ Leverage
  • Brand platforms
  • Trade associations
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When Did Efficiency Programs Start?

1970s:
- Energy crisis and OPEC oil embargo
- “Conservation”

1980s to early 90s: IRP

Mid-1990s:
- Deregulation
- Some abandon IRP
- Establish system benefits charge
Pressures on EE Programs in the New Millennium

- Restructuring
- Enron
- Reliability issues
- Increased focus on systems benefits
- Renewed emphasis on IRP and resource procurement
Recent Pressures on Programs

- Awareness of environmental impacts, global warming
- Climate change policies
- State energy policies
- Rising minimums standards and building codes
- Higher energy savings targets
- Integration of renewables—distributed generation
- “Connected” capabilities
Demand Side Management (DSM)

- Part of integrated resource planning (IRP)
- Paid directly through rates or system benefit charges
- Goal—to yield the lowest system cost
- Reduce energy and power demand
- Avoid costly construction and operation of new plants
Primary Design of Demand Side Management Programs

- Focused on short term savings
- Predominantly through financial incentives
- Influenced single transactions
- Temporary shifts in market share
Market Transformation

Markets replace IRP
Pressure to reduce costs
Leverage market forces
MT replaces RA for Public Benefit
Today’s Context for Market Transformation

- Paradigm shift occurred with reliability crisis
- IRP hasn’t gone away—distribution utility requirement
- Procurement of resources including efficiency
- Policies like CA efficiency first in “loading order”
- “All cost-effective efficiency”—climate change
- Sustainability is more valued and efficiency is recognized as the foundation of climate change policy
Program Administration

Two types of program administrators:

• Utility
  – IOUs and energy distribution companies, including co-ops
  – Municipally owned power providers

• Nonutility
  – State government
  – Nongovernment statewide or regional organizations

Utility program administrators

• Most common type of program administrator
• Administer ~ 80% of ratepayer funded energy efficiency budgets in the US as of 2008
2012 Expenditures Across Nations
US Gas 2012 Expenditure

- Residential: 42%
- Commercial and Industrial: 23%
- Low Income: 20%
- Other: 12%
- Multifamily: 3%
Sample Considerations for Program Administrators

1. Desired outcomes
2. Time horizon
3. Assets available
   a. Financial
   b. Endorsement
   c. Technical expertise
   d. Business, market expertise
   e. Communication infrastructure
   f. Service areas coverage
   g. Relationship with market stakeholders
Sample Considerations for Program Administrators con’t.

4. Tolerance for failure
5. Restrictions
   a. Legal
   b. Regulatory
   c. Management
   d. Political
6. Level of flexibility
7. Incentives and motivation to run programs
8. Renewable Portfolio Standards and other state clean energy policies
Market Considerations
To name a few . . . .

1. Magnitude of savings potential
2. Feasibility of savings
   a. Number of end users
   b. End user responsible for purchase
   c. Useful life of equipment or measure
   d. Price sensitivity
   e. Product performance
   f. Energy performance significantly different and noticeable
   g. Savings accrues to end user, decision maker

h. Complexity of distribution, installer network
i. Communication infrastructure in place

3. Stakeholder circumstances
   a. Number of stakeholder industries
   b. Presence of dominant stakeholders
   c. Motivations
   d. Business sophistication, marketing capabilities

4. Defining industry characteristics
   a. Commodity goods
   b. Seeking differentiation
   c. Duration of product cycles
The Role of Program Logic

- A blueprint or map for programs
  - Identifies goals and anticipated progress

- Provides description of:
  - Relationship between program activities and effects
  - Identifies market barriers and opportunities
  - Targets
The Cycle of Program Planning, Implementation and Evaluation

1. Program Objectives
   - Policies
   - Operational
   - Load shape

2. Program Design & Selection; Evaluation Planning
   - End uses
   - Technologies
   - Marketing techniques
   - Customer issues
   - Utility issues
   - Benefit/cost
   - Logic modeling & evaluation planning

3. Program Implementation
   - Experiments
   - Pilot programs
   - Full-scale programs
   - Evaluation data collection

4. Program Monitoring & Evaluation
   - Process & impact evaluation
   - Feedback on objectives
   - Redesign of programs

The Practice: Key Elements of Market Transformation for Programs

- Address market barriers and opportunities
- Seek to affect lasting changes
- Set long-term goals with near term objectives
- Work with existing market channels
- Build on market trends
- Track market changes and progress
- Coordinate efforts to leverage maximum effect
Specify Market Barriers to be Addressed

There are many reasons why energy efficient products and services are not standard practice:

- Low energy prices
- Lack of product availability
- Customer confusion and lack of awareness
- Vendor and institutional practices
- Split incentives
- First cost

Design programs to overcome particular barriers
Take Advantage of Market Opportunities

- Manufacturers looking for green, sustainable business strategies
- Whole supply chain engaged on efficiency
- Public’s attention to climate change and sustainability
- Policy makers increasingly turning to energy efficiency
Seek Lasting Change

- Program goals should incorporate market changes
- Market changes need to be credited to efficiency programs
- Test sustainability of the market changes
- When appropriate, lock in market changes through:
  - Industry standards and practices
  - Building energy codes
  - Appliance and equipment minimum standards
Set Long-term Goals and Short-term Objectives

- Establish a *multiyear goal* for large, systemic change
- Set *near-term objectives* tied to long-term goal, based on intervention logic and the story
- Identify and track *market indicators*
Work Through Existing Market Channels
Build on Market Trends

Conduct market research to identify:

- Current status and penetration of energy efficient products, services, and practices
- Customer values and needs
- Product innovations
- Market leaders
Coordinate or Leverage Efforts

- Work with others
- Adopt national programs
- Establish common goals and objectives
- Conduct joint market research and evaluation
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Program Evaluation

Key State Policy Considerations
Evaluation Purposes

Program evaluations are often done for the following reasons:

1. Document stated program activities, outputs, impacts and effects
   - Determine energy savings
   - Compare benefits and costs
2. Provide feedback to program management
3. Determine if program is being implemented as planned
4. Assess actual program impacts and effects
5. Identify opportunities for program improvement
6. Meet a statutory or regulatory requirement
Use of Evaluation Results

- Integrated Resource Planning
- System reliability
- Avoiding supply side costs
- Consistency with program design
- Utility recovery of costs and investments
- Enhancement of future programs
Four Main Types of Evaluations

1) **Process**—the how and the why—*program improvement*

2) **Market**—the what and the where—*program improvement*

3) **Impact**—shorter term direct effects—*attribute to program*

4) **Market Effects or Market Transformation**—longer term effects—*attribute to program*
Some Key Evaluation Questions

Process evaluations

• How satisfied are participants with the program?
• How effective and efficient are program activities

Market evaluations

• How much of the market has been captured by the program?
• What is the remaining market potential?

Impact evaluations

• What are gross impacts on energy and peak demand?
• What are net impacts on energy and peak demand?
Impact Evaluation—Net Effects

\[
\text{Net Energy Savings} = \text{Gross Energy Savings} + \text{Program Spillover} + \text{Additional savings} - \text{Free Riders savings not caused by program}
\]

Source: Ken Tiedemann, BC Hydro
Estimation of Market Effects or Transformation

What is the program baseline and the market effects on energy and demand

Ultimate indicator of intervention market effects is still energy savings

Market tracking and performance indicators are even more important under market transformation.
Some Consensus

*Principles of Evaluation*

- Program administrator goals are measurable.

- Align progress indicators with goals
  - “What you measure is what you get”
Evaluation Planning

Critical part of an effective EE portfolio
  • Baseline
  • Estimate of savings
  • Likelihood of success

Plan evaluation in conjunction with design

Consider and disclose causal factors other than the program activities
  • ARRA, codes/standards, fuel prices, etc.
Context Matters

Take into account how equipment and people interact.

Programs aimed at altering behavior, manufacturing and stocking practices, and other lasting structural change require a different evaluation approach than traditional rebate programs.
Evaluation Precision

How important is precision? It depends!

- How are the results to be used? What is practical and affordable?
- Disclose the level of precision associated with reported measurements.
- Recognize potential sources of bias that could produce inaccurate results
Evaluation Budgeting

Allocate resources in relation to:

• Expected program savings
• Level of uncertainty
• Difficulty of measurement
• Importance of the undertaking
Evaluation Quality Assurance

- Routine part of a continuous program improvement
- Capability to improve accuracy and to collect better data in the future and to do better planning.
- Collect necessary evaluation data along the way—more affordable, rapid and accurate.
- Timing of data collection is critical
  - Need to understand the timing of effect
Summative

- Assessment at the end of a period, looking backward, summing the results

Impact evaluation is usually summative

Market effect evaluation is usually summative, but can be formative
Approaches to Evaluation

Formative

• Assessment during implementation, to improve the program and identify needed changes or reasons to stop the program if design seems unlikely to work
  – Process evaluation is usually formative
  – Market progress evaluation is usually formative
MT Evaluation Data Sources

- **Primary Data**
  - Discussions
    - Individual interviews
    - Group interviews
  - Surveys
    - Mail
    - Telephone
    - Electronic
  - On-site
    - Site visits
    - Field observations
    - Ride-alongs
  - Informants
    - Stakeholders
    - Market experts
    - Participants and non-participants

- **Secondary Data**
  - Program-specific
    - Program collateral
    - Program planning
    - Program databases
    - Program records
  - Information about other programs
    - Evaluations
    - Conference papers
    - Best practice studies
    - Internet search
  - Market data
    - Trade press
    - Sales data
## Data Collection Advantages/Disadvantages

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<thead>
<tr>
<th>Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>Discussions and Interviews</td>
<td>Impressionistic Qualitative Depth</td>
<td>Potential for subjective bias</td>
</tr>
<tr>
<td>Surveys</td>
<td>Breadth Quantitative</td>
<td>Limited depth</td>
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<tr>
<td>Observation Site Visits</td>
<td>Impressionistic Qualitative Experimental</td>
<td>Potential for subjective bias</td>
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<tr>
<td>Program Documents</td>
<td>Qualitative Reference</td>
<td>Potential for screening bias</td>
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<tr>
<td>Program Databases</td>
<td>Quantitative Real time</td>
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Key State Policy Considerations
EE State Policy Considerations

- Administrator type
- IRP
- Cost recovery
- Incentives or removing disincentives:
  - Decoupling of profits from sales to stabilize revenues and reduce risks for utilities and customers
  - Regulation based on performance
- Longer planning and evaluation time horizons
Cost-effectiveness

• Broad array of benefits and market effects allowed in cost effectiveness measurement
• At minimum, program level; most recommended at portfolio level
• Shift from overall cost-effectiveness of DSM programs to measure by measure cost-effectiveness
• Valuing nonenergy benefits and environmental policy compliance
  – New England Forward Capacity Market, RGGI, etc.
  – Customer participation and satisfaction
  – Renewable Portfolio Standards (RPS)
Behavior and marketing strategies

• Great potential from applying social science to change behavior, for example, smoking cessation

Attribution and persistence is difficult

• New persistence research is promising

More latitude on EM&V necessary to accurately capture behavioral savings
Examples of Market Transformation

• T8 electronic ballasts became standard practice
Examples of Market Transformation

Resource efficient clothes washers, 1989-2001
• Proven market acceptance basis for future standard

Super efficient refrigerator program 1992-2000
Proof of technology leads to higher efficiency
Types of MT Programs

- Golden Carrot™
- Bulk procurement
- Design charrette
- Design competition
- Common program components
- Joint campaigns or branding
- Equipment directories
- Conferences or summits for focused interaction
Examples of EE Platforms to Achieve Scale

Lighting for Tomorrow

CEE Initiatives and Qualifying Products Lists

<table>
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<th>Initiative</th>
<th>Specifications</th>
<th>Program Summary</th>
<th>Qualifying Product List</th>
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<tr>
<td>Whole House—Existing Homes Exploration</td>
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<tr>
<td>Whole House—New Homes Exploration</td>
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<td>Central Air-conditioning and Air-source Heat Pumps</td>
<td>Equipment</td>
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<td>Quality Installation</td>
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<td>Gas Space Heating</td>
<td>High Efficiency Gas Furnaces</td>
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<td>High Efficiency Gas Boilers</td>
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<td>Super Efficient Home Appliances</td>
<td>Clothes Washers</td>
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<td>Room Air-conditioners</td>
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<td></td>
<td>Dishwashers</td>
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<td>Refrigerators</td>
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CEE members develop market initiatives and explorations with impact in America and Canada

Residential
- Whole House
- HVAC
- Gas Space Heating
- Appliances
- Swimming Pools
- Gas Water Heating
- Lighting
- Consumer Electronics

Commercial
- Building Performance
- Unitary Air-conditioning and Heat Pumps
- Gas Boiler Systems
- Clothes Washers
- Kitchens
- Gas Water Heating
- Lighting Systems
- Data Centers and Servers

Industrial
- Strategic Energy Management
- Premium Efficiency Motors
- Motor Systems
- Distribution Transformers
- Municipal Water and Wastewater

Work plans: cee1.org/committee-work
Initiative documents: cee1.org/content/cee-program-resources
Energy Efficiency Needs a Brand!

Brands:

- Differentiate
- Message to the heart and mind
- Project credibility
- Strike emotional chord
- Create loyalty
ENERGY STAR® Influence

Source: Fairfield Research, July 2009
Contact

John Taylor
Principle Program Manager
617-532-0944
jtaylor@cee1.org