Section 2

EVALUATION APPROACH AND METHODOLOGY

EVALUATION OVERVIEW

This section describes the approach and methodology used to monitor and evaluate the **New York Energy $mart**SM program progress and outcomes. This evaluation report assesses progress toward achieving the PSC's broad public policy goals as well as NYSERDA's **New York Energy $mart**SM program goals. Together, the PSC and NYSERDA goals define how program success will be measured, recognizing that many of the goals are longer-term in nature, and in many respects depend on successful market and infrastructure development. Therefore, a multifaceted approach to evaluation is used that views individual program efforts within the larger context of the **New York Energy $mart**SM program portfolio. Sections 4 and 5 of this report present preliminary evaluation results and findings and conclusions respectively.

This collaborative evaluation effort involves NYSERDA, the SBC Advisory Group (as the Independent Program Evaluator), GDS Associates, Inc. (GDS) and its subcontractors, Oak Ridge National Laboratory (ORNL), and program and project implementation contractors. NYSERDA is responsible for conducting the evaluation of the **New York Energy $mart**SM program and reporting its results to the SBC Advisory Group. NYSERDA contracted with ORNL and GDS Associates, Inc. for evaluation assistance.

ORNL has been under contract to NYSERDA since late 1998 and has assisted NYSERDA in developing the **New York Energy $mart**SM program *Evaluation Plan* (May 1999), that guided development of the evaluation framework, and the *Program Evaluation Baseline Report* (October 1999), that provided information on existing baseline conditions for selected programs. The October 1999 report also identified plans for developing baselines for those programs that did not have information already available. ORNL has also developed six case studies of **New York Energy $mart**SM programs that comprise Section 7 of this report.

GDS Associates Inc.,[1] has been under contract with NYSERDA since January 2000 and has completed a Gap Analysis, and assisted in data collection, analysis, and drafting of this evaluation and status report. GDS Associates Inc., has also completed an in-depth evaluation case study of the Standard Performance Contract Program (Appendix A), and is providing additional data collection, analysis, and evaluation support to help assess the **New York Energy $mart**SM program progress toward its broad public policy

[1] GDS Associates Inc., and its subcontractors, Megdal & Associates, and B&B Resources, Inc.

goals. The ***New York Energy $mart***^{SM} *Gap Analysis Interim Report*,[2] identified potential gaps in: (1) production measurements (performance indicators) for specific programs, used to evaluate program progress; (2) energy efficiency product end-uses addressed and market actors served by the **New York Energy $mart**^{SM} programs; (3) market characterization information within and across related programs; and (4) overall **New York Energy $mart**^{SM} program coverage. Results from GDS Associates Inc., ongoing evaluation efforts are being used by NYSERDA program staff to redesign efforts to improve program performance.

NYSERDA's approach to evaluation is based on an integrated cross-disciplinary model that includes evaluators as members of "project teams" involved in the various stages of program planning, design, monitoring, and evaluation, as described in the following section. The evaluation effort also relies on nationally-recognized evaluation consultants to help ensure that the **New York Energy $mart**^{SM} program evaluation effort is fair and objective.

Evaluation Planning and Implementation

NYSERDA's evaluation framework, depicted in Figure 2-1, includes program evaluators in all stages of program planning, design, and outcome tracking. NYSERDA's evaluation effort also includes contract consultants, program implementation contractors, New York Department of Public Service (DPS) staff, **New York Energy $mart**^{SM} program and project managers, and the SBC Advisory Group. Moreover, the process eases the burden of data collection, by only requiring data that is deemed necessary for progress and outcome evaluation, and supports development of quantitative estimates of benefits whenever possible. The framework also accommodates and relies on qualitative analysis of key benefits in certain instances where resources do not permit an extensive data collection and analysis effort.

Evaluation Guidelines and Process

The **New York Energy $mart**^{SM} program evaluation is based on the following guiding principles:

- Objectivity, fairness, and balance in terms of the types of data and information collected. (Only the necessary data and information is collected.)
- Sound methodology, credible data and analysis, and adherence to professional standards.
- Focus on early, intermediate, and longer-term outcomes as measures of progress; and on impacts and

[2] ***New York Energy $mart***^{SM} *Gap Analysis Interim Report*. Prepared for the New York State Energy Research and Development Authority by GDS Associates, Inc., (subcontractors, Megdal & Associates, and B&B Resources, Inc.), and NYSERDA. February 2000.

causality as final determinants of success.

The **New York Energy $mart**[SM] program evaluation uses a five-step sequential process designed to:

1. Work with program managers to identify the individual project goals that support major program area goals and ultimately, the PSC's broad public policy goals;

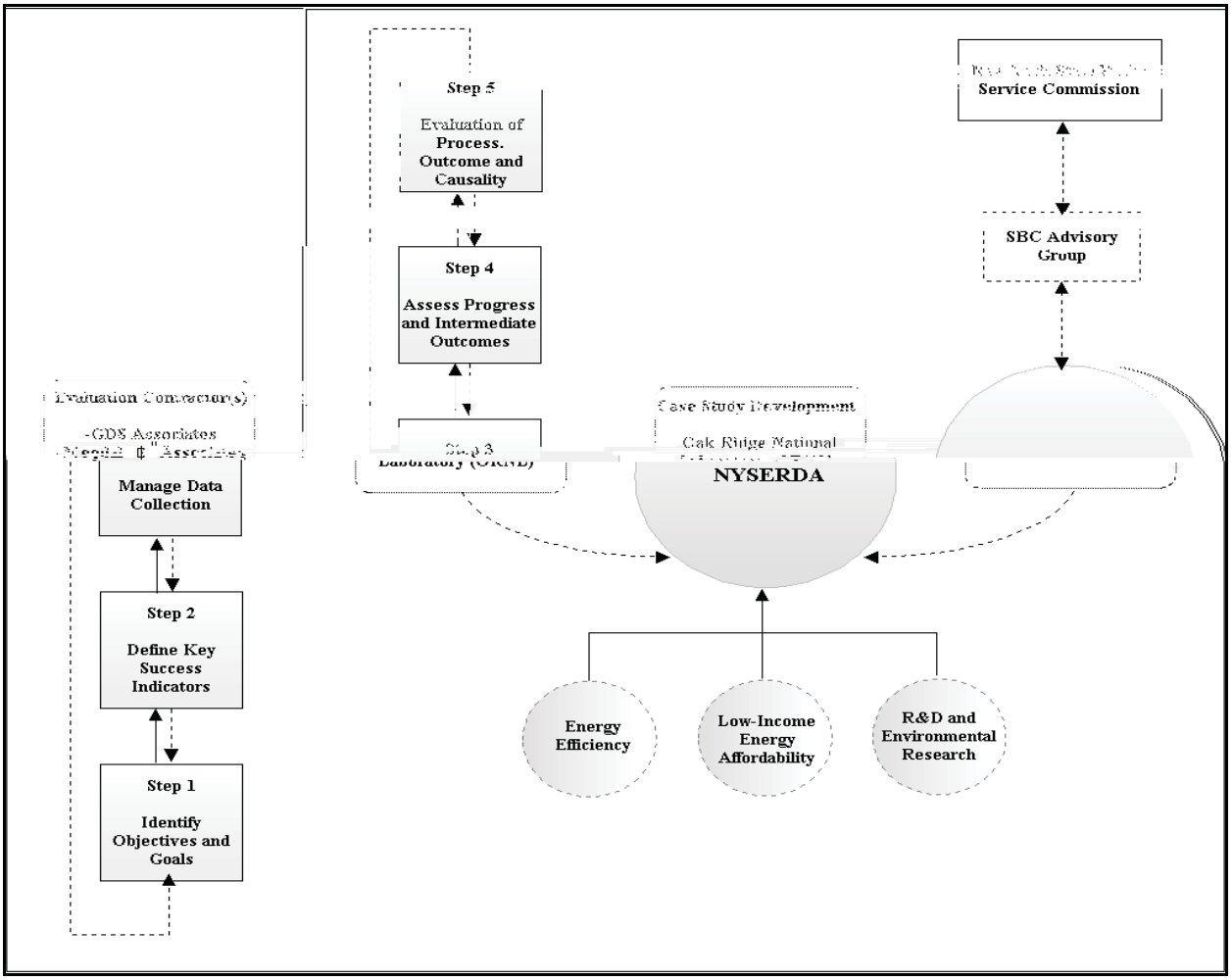
2. Define key success factors and criteria for measuring progress toward meeting program goals;

3. Manage data collection including design of data collection instruments, and conduct quantitative and qualitative analyses to determine the success of program efforts;

4. Assess progress and outcomes (*i.e.*, use data and information collected during program implementation to track program progress and identify opportunities to modify program designs, target audiences, and marketing, to improve outcomes); and

5. Evaluate process, outcomes, and causality and prepare a report summarizing evaluation findings.

FIGURE 2-1: NYSERDA Evaluation Framework



These five evaluation steps are each discussed individually, below. This sequential process is the framework that was employed in the design of this report, as well as used for evaluating the **New York Energy $mart**SM portfolio of programs.

Step 1: Identify Goals and Objectives

New York's public benefits program is designed to continue energy efficiency, low-income services, and R&D and environmental protection programs during the State's transition to electric retail competition. The program's broad overarching policy goals are to: (1) promote competitive markets for energy efficiency services; and (2) provide direct benefits to electricity ratepayers, or be of clear economic or environmental benefit to the people of New York. In support of these overarching goals, the **New York Energy $mart**SM program seeks to: facilitate competition by relying on market forces to help deliver energy efficiency and related services; transform markets for energy efficiency products and services; support the demonstration and use of the most efficient and environmentally protective technologies; and help aggregate energy loads to achieve better terms and conditions of energy sales for the State's most vulnerable customers. The **New York Energy $mart**SM program also strives to overcome market barriers to improving energy efficiency and energy decision making.

For the most efficient administration of the **New York Energy $mart**SM program, NYSERDA seeks to provide maximum leveraging of its resources and to keep its administration costs low. As such, each of the **New York Energy $mart**SM programs has its own planning goals, operating objectives, and expectations regarding leveraging and administration. Individual program goals are provided in Section 6 of this report. The evaluation team was involved in helping define and articulate program-level goals to ensure consistency with the PSC's broader public policy goals. The evaluation team also assisted in designing specific programs and identifying and tracking relevant indicators for gauging progress toward these goals, as described in the following sections.

Program Planning and Design. Working closely with DPS staff and NYSERDA's development assistance contractor for the Standard Performance Contract program, the NYSERDA evaluation team developed the methodology and economic framework for screening energy efficiency measures to be included in the **New York Energy $mart**SM energy efficiency programs (*e.g.*, Standard Performance Contract; New Construction; Premium-Efficient Motors; and Residential Lighting and Appliances - ENERGY STAR® ; and Direct Installation programs). This effort included:

1. Estimating the incremental cost of energy efficiency improvements for selected products, equipment, and the associated estimated energy savings;

2. Developing the analytical framework for screening the cost-effectiveness of measures to be installed (using a utility long-run avoided cost methodology); and

3. Helping to determine incentive levels for the Standard Performance Contract and New Construction programs.

Over 30 separate measures were screened to determine life-cycle cost-effectiveness for inclusion in the **New York Energy $mart^{SM}** program. Only measures with a life-cycle benefit-cost ratio exceeding 1.0 were included in individual program efforts. As a result of this pre-screening, these efforts are delivering economic benefit to participating customers. Since the **New York Energy $mart^{SM}** program is designed to overcome market barriers to wide-spread adoption of energy-efficient products, equipment, and practices, across all types of customers, the low-income programs and R&D programs were not screened for cost-effectiveness. These programs are justified for reasons other than economic cost-effectiveness because they provide needed public services that would not otherwise be provided by private markets.

New York Energy $mart^{SM} Program Theory. The following steps are crucial to successful program design: (1) developing an understanding of the public needs to be addressed; (2) identifying market barriers to energy efficiency; and (3) developing program theory that provides the basis for market interventions. This understanding, and adherence to the program logic informs program design and helps to identify the appropriate early, intermediate, and final outcomes to be tracked for each program. The **New York Energy $mart^{SM}** program logic is summarized in Table 2-1 and described in the following paragraphs.

TABLE 2-1: The New York Energy $mart^{SM} Program Logic

Program Planning, Design, Implementation, and Measurement

1. Research and assessment of public benefits and market needs through energy and end-use market sector characterization.
2. Identifying where the greatest energy benefits can be realized through public benefit investments in capital and resources.
3. Initial design of a program construct that is tailored to specific public and market needs. Design includes identifying goals and objectives that will overcome barriers within the marketplace and that directly effect public and market needs.
4. Implementation of program through a competitive solicitation process. This process identifies the most capable and cost-efficient implementor for program initiatives. As a result, there is a greater probability of addressing public needs and reducing market barriers.
5. Monitoring feedback from contractors, assessing program performance, and measuring and reporting results.

Individual **New York Energy $mart^{SM}** program efforts were developed to address the areas of greatest need, identified through an assessment of: market sectors (*i.e.* residential, commercial, industrial, and low-income), and various products and services available in the marketplace; market actors and decision-makers; barriers to energy efficiency; and general energy-use patterns. These programs take into consideration the flow of information and decision making regarding energy efficiency products and services (to market actors and end-users), in an attempt to help overcome identified market barriers. As a result, programs have been designed to reduce the possibility of implementing inefficient solutions.

Program design is a continuous process. Although each of the steps outlined in Table 2-1 are sequential, considerable latitude and flexibility exists to allow new information to be introduced into the process. For example, program design modifications are made during the implementation process as new information becomes available that would improve the effectiveness of program interventions (*e.g.*, as in the case of the Standard Performance Contract program and Premium Efficiency Motors program). The process of defining and enhancing **New York Energy $mart**^{SM} individual program design is continual with markets being reassessed regularly, so that mid-course revisions can be made to improve program performance and increase the likelihood of meeting program goals.

Step 2: Define Key Success Indicators

The evaluation team has worked closely with **New York Energy $mart**^{SM} program and project managers to identify progress indicators for tracking program performance throughout the various stages of program implementation. Tracking indicators identified by the evaluation team are listed in Table 2-2 for major program categories.[3] Table 2-2 also provides the logic behind the **New York Energy $mart**^{SM} major program efforts by: identifying the market participants being targeted by the programs, inputs to the programs, and early, intermediate, and longer-term outcomes and impacts.

Tracking indicators were developed with the assistance of ORNL, GDS Associates, Inc., Megdal & Associates, and program implementation contractors. Implementation contractors are providing selected information and data to NYSERDA as part of their on-going contract responsibilities to assist NYSERDA in tracking program progress. Contractors provide information on customer counts, sales, and pre- and post- market conditions where appropriate. Such information is generally gathered by contractors as part of program implementation, and as a result, requires little additional work on their part. NYSERDA project managers and evaluators have also developed survey instruments for selected programs to solicit feedback from participating customers.[4] NYSERDA evaluation assistance contractors are also helping NYSERDA to develop interview guides to collect additional information to evaluate the effects of the **New York Energy $mart**^{SM} program on consumer and business attitudes and behaviors regarding energy decision making and energy efficiency practices. A summary of key interview and survey instruments is presented in the following section.

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[3] Table 2-1 represents a simplified "Logic Model" that describes how programs are intended to work in sequential manner to bring about desired outcomes given the specific program inputs and activities undertaken. The simplified Logic Model presented aggregates programs among major program categories to illustrate the model concept and its use in evaluation.

[4] Additional survey efforts for non-participating customers and for other programs continue to be developed as part of the ongoing evaluation effort.

TABLE 2-2: Tracking Key Success Indicators (Logic Model)

Market Participants and Inputs	Program Activities & Products/Services	Early Outcomes	Intermediate Outcomes	Longer-Term Outcomes & Impacts
ENERGY EFFICIENCY SERVICES				
Small/medium customers Power marketers and brokers Manufacturers Dealers and vendors Design professionals Contractors Financial institutions	Design/implementation Financial incentives Technical assistance Management services Stimulating demand	Contractors selected Projects initiated Change in awareness Change in product stocking/promotion Partnering Changed design & construction practices	Leveraging of funds Change in buying habits Change in building equipment/product specifications Increase in purchases of energy-efficient equip./products Greater awareness of energy use & efficiency options	Reduced barriers Increased energy efficiency measure availability Increased sales Customer satisfaction Energy/cost savings Non-energy benefits Sustained change in market and customer behaviors
LOW-INCOME ENERGY AFFORDABILITY				
Households Private and public building owners Weatherization Program Financial institutions Community-based organizations	Design/implementation Installation of equipment and products Auditing/technical assistance services Energy management/ budget counseling	Contractors selected Projects initiated Change in awareness Partnering	Leveraging of funds Change in energy habits Increase in purchases of energy-efficient equipment/products Greater awareness of energy use & efficiency options	Reduced barriers Increased sales Customer satisfaction Energy/cost savings Non-energy benefits Sustained change in market and customer behaviors Improved ability of energy bills
RESEARCH AND DEVELOPMENT				
All sectors/applications Equipment manufacturers Processes Renewable energy industry Environmental Community	Design/implementation Engineering specification Product development and testing Environmental quality monitoring Cost-sharing Risk reduction	Contractors selected Projects initiated Overcoming technical & informational barriers Partnering Product development Data continuity	Leveraging of funds Meeting customers needs New products developed & tested Information dissemination	Reduced barriers Increased deployment Customer satisfaction Energy/cost savings Non-energy benefits New products and technologies Useful information to policy makers

Step 3: Manage Data Collection

Baseline information, sector energy use profiles, and market characterizations were derived through research, prior studies conducted in New York, and general industry knowledge. Several studies have been completed under the **New York Energy $mart**[SM] program (*e.g.*, motors, and residential lighting and appliances)[5] to help establish a baseline of pre-program conditions.

[5] For example: *Northeast Premium Motor Initiative Market Baseline and Transformation Assessment*. August 1999. Easton Consultants, Inc. and Xenergy, Inc. and *Selected Baseline Indicators, Residential Lighting and Appliance Program, Phase I.* April 16, 1999. Aspen Systems Corporation.

GDS Associates Inc., and Megdal & Associates also assisted NYSERDA evaluation staff in drafting interview guides and conducting surveys of participating and non-participating service providers and customers of the **New York Energy $mart**[SM] program.[6] Telephone interviews have been completed for the following programs:

- Standard Performance Contract.
- Premium Efficiency Motors.
- Residential Lighting and Appliances.

In addition, NYSERDA is collecting information from customers participating in the Standard Performance Contract and New Construction programs at the time of service delivery. This information is collected directly by service providers (implementation contractors) and is being used to determine the level of satisfaction with the services received, customer perceived benefits, value of the services received, and causal attribution, among other things. To date, NYSERDA has received over 100 written responses from customers in the New Construction program and about 10 from the Standard Performance Contract program. The results of the survey research are reported in Sections 4 and 6 as appropriate. Other surveys are planned over the next 12 months to inform subsequent evaluation efforts. Survey results are also reported respectively in the six case studies contained in Section 7 of this report and the more in-depth case study of the Standard Performance Contract program in Appendix A.

In addition to survey development, evaluation assistance contractors have completed in-depth process interviews with NYSERDA project managers, winning implementation contractors, non-winning contractors, and customers to collect insights on the solicitation and contract management process at NYSERDA. The results of these interviews are reported in Section 4 of this report.

Step 4: Assess Progress and Intermediate Outcomes

Progress indicators are being tracked quarterly throughout program implementation to ensure continuous data collection and feedback for improving program delivery and outcomes. Quantitative estimates of program effects are reported in kWh and dollars for energy savings, kW for demand savings, number of customers and market actors participating, sectors served, products and services provided, and economic impacts in terms of job growth, and environmental impacts in terms of reductions in air pollutant emissions. Non-energy and value-added benefits are qualitatively assessed to broaden awareness of the full effect of the **New York Energy $mart**[SM] program. These are shown in Table 2-3. Economic and environmental impacts associated with program outcomes are derived from the energy savings. For

[6] Survey instruments are being developed for the New Construction, Technical Assistance and Outreach, Direct Installation, and R&D programs. These results from these telephone interviews will be available for year-end reporting.

example, kWh savings are used to derive air emission reductions for NO_X, SO_2 and CO_2. The dollar savings in terms of bill reductions are used to derive an estimate of jobs created from the **New York Energy $mart**[SM] program.

In addition to survey work being conducted and planned, NYSERDA and its evaluation assistance contractors are performing a savings methods review for a number of the larger **New York Energy $mart**[SM] programs. When complete, the savings methods review will assess the (1) methodologies used to derive energy and dollar savings estimates for key programs, (2) the validity of the estimates and persistence of savings expected over time, and (3) rigor and relevance of assumptions used to derive savings. This work is underway and will be completed and included in the end of year report to the PSC.

Table 2-3: **Non-Energy and Value-Added Benefits**

Non-energy and value-added benefits include:

- Expanding the State's energy services industry.
- Transforming markets to deliver higher efficiency products.
- Leveraging funds.
- Reducing pollutant emissions and improving air and water quality, and reducing noise.
- Creating and retaining jobs, and increasing State income and gross State product.
- Increasing awareness of new technologies, and commercializing and demonstrating new sustainable energy technologies.
- Increasing energy affordability and comfort.
- Improving productivity, product quality, economic competitiveness, and marketing opportunities for the State's businesses, institutions, and municipalities.
- Improving energy diversity and efficient electricity use.
- Improving indoor living and work environment, in terms of air quality, health, and safety.
- Establishing a public "energy efficiency" ethic.
- Collecting environmental monitoring data continuously to inform environmental decision-making.

Step 5: Evaluation of Process, Outcomes and Causality

Public benefit programs are intended to meet broader public interests, unlike the earlier utility demand-side management programs, which were intended to procure reductions in electricity demand and energy use. For public benefit programs, it is necessary to evaluate the amount of energy savings, as well as other public policy objectives, including the effect on transforming markets to higher levels of energy efficiency. It is not always feasible to rely exclusively on direct performance measures to determine how well SBC-funded programs achieve their goals and objectives. In many instances, qualitative methods and market-related data are required to determine whether individual project outcomes have achieved a desired level of "public benefits." However, the combination of both performance measurement and market-based evaluation methodologies is needed for the most conclusive evaluation assessment. Both of these methods, and their use in the design of this report, are discussed below.

Performance Measurement. The **New York Energy $mart^{SM}** program is being evaluated from a "public benefits" perspective that includes measuring energy savings, estimating economic and environmental benefits, and assessing other non-energy public benefits. Evaluation activities are conducted at two distinct and equally important levels. The NYSERDA Evaluation Model discussed earlier measures the performance of the individual programs and projects as well as the overall **New York Energy $mart^{SM}** program portfolio. As part of the individual program and project evaluation tracking effort, sets of key indicators were developed and are tracked for each program, as shown in Table 2-2. Many of these indicators are similar across programs so they may be viewed comparatively and in aggregate. Other programs have more unique indicators that measure objectives and market elements specific to each program. Many of these individual program indicators are then arranged in sets to evaluate the overall **New York Energy $mart^{SM}** program. The sets of indicators were selected to provide key information on the **New York Energy $mart^{SM}** program's progress toward achieving each of the PSC's two overarching goals and NYSERDA's six program-specific goals.

The indicators at both the individual program level and the overall **New York Energy $mart^{SM}** program portfolio level include energy savings while other indicators are used to reflect the broad spectrum of desired outcomes. The importance of the different measurements varies depending on the goals and orientation of the individual program efforts, as highlighted below.

- Some programs, that predominantly provide direct energy savings, such as the Standard Performance Contract program, are evaluated in part, on the energy reductions achieved, and in part on other broader indicators of success. These other indicators include the effect on building facility managers to improve overall building energy performance, the increase in purchases of energy efficient equipment by equipment dealers and distributors, and the increase in the number of energy services companies (ESCOs) providing services in New York. Another important consideration is the number of smaller customers and new market segments included in ESCO business portfolios.

- Market Transformation (development) programs are evaluated using a broad set of criteria. These efforts are evaluated according to their ability to stimulate customers to buy and use, and dealers and distributors to stock and promote, more energy-efficient equipment and products. The ability of these programs to make lasting changes in customer purchase and use decisions, and in the manufacture and distribution of energy-efficient equipment is also assessed.

- Energy R&D, Renewable Energy, and Environmental Protection programs are intended to develop and demonstrate new technologies and better monitoring of pollution and mitigation strategies. These programs are evaluated according to their ability to: provide necessary and relevant information for public policy and business decision-making; focus attention on existing or emerging public benefit needs; develop renewable energy resources for wind and solar photovoltaics, and create an infrastructure of partnerships and collaboration to achieve public benefits that might not otherwise be realized in a competitive market.

Since it takes more than the initial three-year **New York Energy $mart^{SM}** program period to realize all

of the benefits available from these programs, particularly from Market Transformation efforts and Energy R&D and Environmental Protection programs, this evaluation views results from the perspective of direct program beneficiaries, including customers, equipment dealers, and energy service companies, among others. Where possible, quantitative estimates of future benefits are made based on the expected results from a program's implementation.

Market-Based Evaluation

In evaluating the **New York Energy $mart^{SM}** program, it is necessary to: (1) determine the extent to which program efforts have reduced market barriers; (2) assess improvements in developing competitive markets for products and services; (3) address the extent to which customer satisfaction and realization of non-energy benefits is sufficient to merit program success; and (4) determine the extent to which programs have caused or contributed to meeting stated public policy goals. Most importantly, it is necessary to determine the extent to which the **New York Energy $mart^{SM}** program has created lasting structural changes in market behaviors, including those of consumers and market actors, regarding energy efficiency.

NYSERDA's five-step evaluation model (Figure 2-1) broadly applies to administration, service delivery, and customer response and satisfaction. Applying this model requires that barriers to participation, customer beliefs and behaviors, program activities (such as outreach and delivery), and program timeliness are monitored continuously. Figure 2-2 illustrates a diffusion of innovation diagram, that is used in this evaluation to trace the effects of the **New York Energy $mart^{SM}** program on such behaviors. Viewing the process through which people make decisions and pass knowledge and information on to one another, as displayed in Figure 2-2, provides a perspective on the diffusion process that is critical to effective program design.

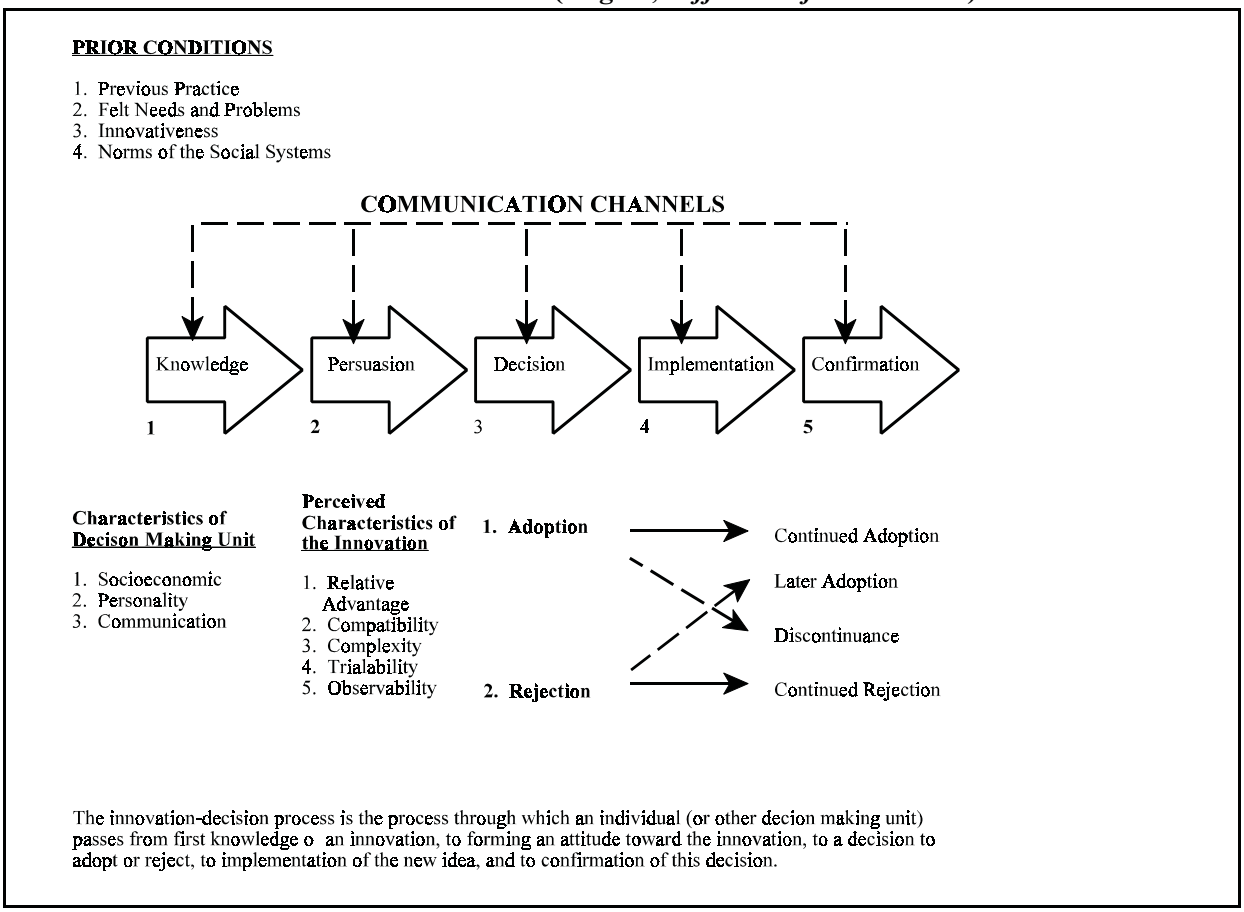
Defining key factors to measure a program's progress toward meeting its goals depends on determining an appropriate "baseline" of energy efficiency industry activities and practices, customer awareness of energy use and energy savings opportunities, equipment availability, and purchasing decisions. The need for an assessment of markets for the purpose of measuring public benefit program performance is described in greater detail, below. Section 3 of this report provides an overview of the market sectors addressed by the **New York Energy $mart^{SM}** program efforts.

Market Assessment. Understanding the energy-use patterns of residential, low-income, commercial and industrial sectors of New York State, and assessing the market for energy efficiency products and services, is necessary to ensure that programs meet the needs of each market segment. Market assessments identify, describe, and report on all of the components that comprise a specific market sector with the goal of constructing a complete and concise picture of how decisions are made within a market

and identifying the barriers that inhibit efficient functioning of the market. A comprehensive assessment of end-use sectors and markets includes, but is not limited to: defining relevant end-use sectors; identifying market actors and their relationship with one another; describing market barriers that are impeding the adoption of energy-efficient measures and services; and assessing the potential for a particular market sector or actor to invest in energy efficiency. In addition, market assessment leads to quantitative and qualitative program assessments that are essential for tracking program performance. All of the **New York Energy $mart**[SM] program market development efforts are supported by recently completed and on-going assessment and baseline work.

Information for conducting broad market sector reviews was derived from several sources, including the U.S. DOE, Energy Information Administration, the Nelson A. Rockefeller Institute of Government, and U.S. Department of Commerce, among others. The identification of sub-sector markets (*i.e.,* commercial heating, ventilation and air-conditioning (HVAC) equipment, and residential remodeling), required the use of more detailed studies. For example, market baseline studies performed by the Aspen Systems Corporation, "Selected Baseline Indicators, Residential Lighting and Appliance Program," or the

FIGURE 2-2: Innovation-Decision Process (Rogers, *Diffusion of Innovations*)



"Appliance Sales Tracking 1999 Residential Survey," by Opinion Dynamics Corporation, both under contract to NYSERDA, were primary sources of sub-sector market data. These sources offer qualitative and quantitative information on market actors and their communication processes, market barriers, and energy-efficient product and service saturations.

Market research tools, including survey and interviews and focus groups have been used to capture the higher level decision-making (and information) within end-user markets. Information collected from both secondary and primary sources is being gathered to increase the level of detail, as well as the depth and breadth of market assessments. This information on broad market sectors, sub-market sectors, and end-use sectors facilitates an understanding of end-use markets which is used to design program interventions to overcome specific market barriers.

Determining Program Effectiveness in Developing Markets

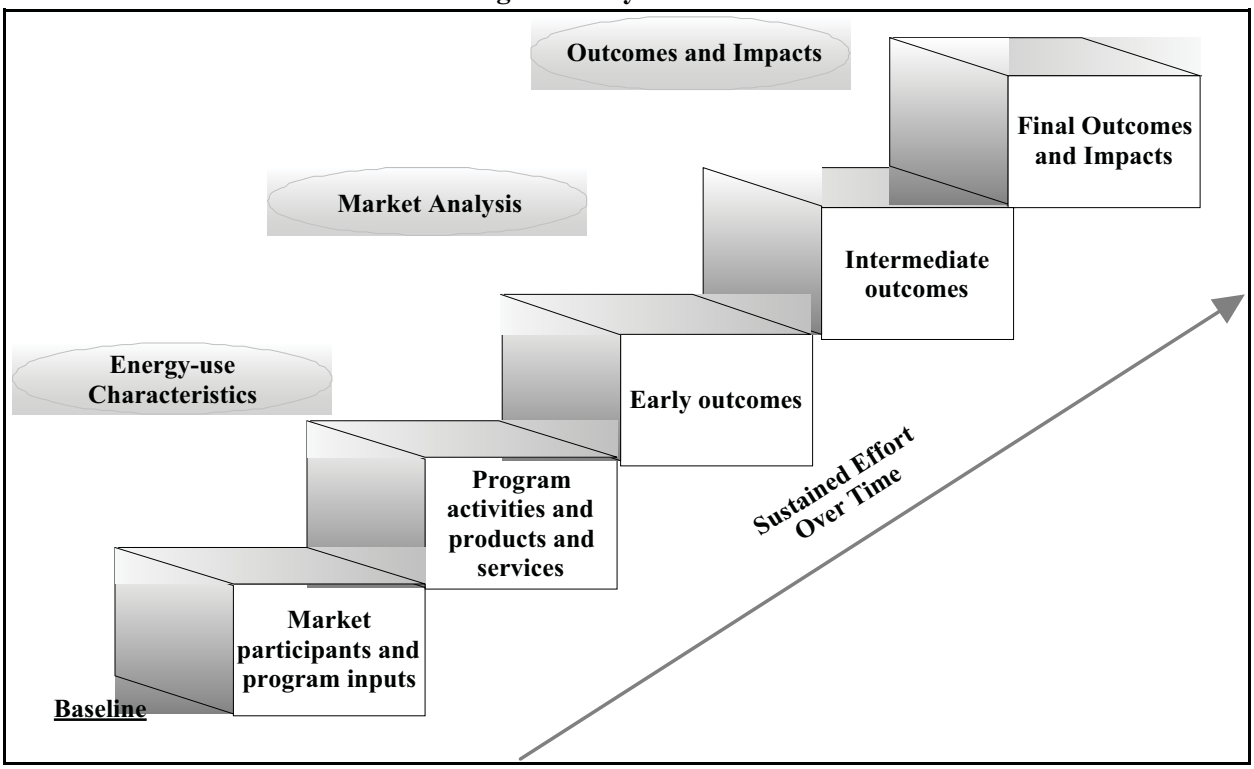
Major categories of the **New York Energy $mart^{SM}** program include Energy Efficiency Services, Low-Income Energy Affordability, and R&D and environmental protection. Evaluation of these programs consists of three broad components: (1) a process evaluation, (2) an outcome evaluation, and (3) an assessment of causality attribution. These elements are closely intertwined, each requiring that data is collected, analysis performed, and conclusions drawn regarding any one of these components. For example, an efficient and effective program planning and implementation process will improve the chances of delivering results that can be linked to program inputs and activities more directly. Accordingly, understanding the interrelatedness of these elements is critical to the **New York Energy $mart^{SM}** program evaluation. The evaluation components are described in the following text.

Process evaluation. Includes assessing the timeliness, efficiency, and effectiveness of program design and implementation services, and performance monitoring.

Outcome evaluation. Broadly defined, an outcome evaluation includes bench-marking performance against current market conditions and expectations. This step in the evaluation process requires a market assessment of baseline activities, behaviors and practices, as well as the energy use of the market sectors served by individual **New York Energy $mart^{SM}** program efforts. Once established, program progress can be measured against a program's goals. The sequencing and flow of program events used to track progress can help determine the causal relationship between program inputs and activities and outcomes as shown in Figure 2-3. The chronological order links the process to program outcomes. Intermediate outcomes provide mid-course indicators to ensure the program is progressing as intended, and to determine whether changes are necessary before a program is offered again. For example, to increase energy affordability for low-income customers, several intermediate outcomes might be identified. In the case of direct installation of measures in weatherization-eligible homes, eligible participants must first be

defined, products and equipment for installation must be available, economical, and meet specifications by application and building type. Additionally, equipment must be installed and operated according to specifications to provide benefits to low-income customers, such as improving affordability of energy and realizing the benefits of reduced energy use and lower costs.

FIGURE 2-3: Framework for Assessing Causality



Tracing outcomes and impacts to a specific program is difficult, although tracing them to a portfolio of programs that did not exist prior to the results being realized is more manageable. The nearer in time that outcomes are realized in relation to program's activities, the easier it is to draw conclusions or hypothesize about the causal relationship.

Causality. Broadly defined, causality assesses the efficacy of programs in changing attitudes, behaviors, energy use, energy affordability, policy decision-making, technology development, and creation of value for program participants. It is unlikely that any single event or activity can account fully for a given program outcome. However, in many instances, there is more than one desired outcome for a particular program. Often a series of outcomes is desired, with one outcome contributing to the achievement of another. A hierarchy of logically sequential and related events is defined and depicted in Figure 2-3 that allows causality to be assessed from the perspective of early, intermediate, and final outcomes. Relating specific program activities to achieved outcomes depends on identifying the continuum of events that

logically connects program activities to outcomes (Described more fully in Section 3 of this report). Analyzing the progress made along this continuum will help establish the causal link necessary to evaluate the efficacy of these programs. It is too early in the **New York Energy $mart^{SM}** program to attribute direct causal effects of program activities to outcomes. Nonetheless, assessing the causal relationship between the **New York Energy $mart^{SM}** programs and outcomes is an important component of this evaluation effort and activities are underway to provide some indication of the extent of this relationship.

Developing a clear picture of what has occurred becomes an essential part of developing an understanding of why it occurred (*i.e.*, assessing causality). One of the best methods of examining causality is by identifying the linkage between possible or expected consequences (outcomes) from each program intervention (program inputs and activities). Program theory and logic models provide the basis for this linkage. This evaluation perspective is at the core of the **New York Energy $mart^{SM}** program evaluation effort and has provided the framework for tracking progress. Movement along a continuum of expected outcomes can be examined to determine how market actors made decisions and how these decisions might have affected future decision actions. Viewing decisions in this way, allows both causality and sustainability to be at least partially assessed.

Examples of the kinds of behavioral information that this framework allows to be addressed include the following:

- A participant states that (s)he invested in an energy-efficient appliance that is more energy-efficient than the average appliance in the market. It is important to determine how critical a factor energy efficiency was in this decision. In addition, it is important to know: what other attributes were important and how important they were relative to improved energy efficiency; what kind of information was used to support the decision; where and how the information was obtained; and what specific information proved to be most influential in the decision. Similar information from consumers who did not select the higher efficiency appliance, could lead to an identification of what it would take to change their purchase decision.

  - Follow-up information is particularly helpful with respect to whether the consumer previously invested in energy efficiency, reasons for previous investment decisions, and what made the difference with this purchase.

  - If a consumer had recently changed how (s)he views investing in energy efficiency, it is important to know what caused this change.

  - If a business or firm encourages investments in energy efficiency, it is important to know what types of practices or policies are in place that support these decisions; whether they are formal, (*i.e.*, in writing); whether efficiency is required to be considered or not; when the management or business practices were initiated; and whether they changed recently and what caused them to change.

- For mid-stream actors, it is important to know about the types of behaviors that are used to promote energy efficiency as a product attribute: whether these activities increase profitability or provide some other reason for promotion; whether they offer the company a competitive advantage; why the firm offers energy-efficient products; how the market has changed for energy-efficient products; and why the company thinks the change has occurred.

These techniques of examining causality can also be used with mature programs as a method of examining the potential for lasting changes in behaviors and markets after program intervention is withdrawn. This type of examination requires an understanding of the market and its development (*e.g.*, created from programs or a complement of program interventions over a prolonged period of time). From this examination, criteria for sustainability can be identified. Some of the likely conditions for sustainability might include:

- New market entrants;
- Valuing of non-energy benefits;
- Position and momentum in the diffusion process (see Figure 2-2);
- Institutional adoption;
- Market structure changes that eliminate barriers; and
- The development of profitable private market entities to facilitate continued market transformation.[7]

Market transformation of energy efficiency markets involves strategic initiatives targeted at key market actors such as consumers, manufacturers, distributors, retailers, and energy service companies. While the concept of market transformation is not new, the use of market transformation approaches to changing consumer behaviors regarding adoption of energy-efficient technologies and practices is relatively new. Market progress data is just now becoming available from market transformation programs implemented in New England, Wisconsin, the Pacific Northwest, and California. As a result, it is too early in the SBC program deployment to judge whether markets have been permanently transformed as a result of the **New York Energy $mart**^{SM} program efforts. It is also premature to assess program causality fully. However, by using the evaluation and progress tracking approach and methodology discussed above, it is possible to assess movement on the market transformation continuum and progress toward achieving key SBC and NYSERDA program goals. This approach also provides the framework necessary for conducting a thorough assessment of market transformation and causality. Expectations of the **New York Energy $mart**^{SM} market transformation programs are discussed further in Section 3.

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[7] *Market Effects Summary Study, Volume 1*, prepared by Research Into Action, Inc., Pacific Consulting Services, and Megdal & Associates for the California Demand-Side Measurement Advisory Committee, December 15, 1998, page ES-X and ES-XI.