

Draft
New York Energy \$martSM
Gap/Opportunity Analysis
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Prepared for:

**The New York State Energy Research and
Development Authority**
(NYSERDA)



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SECTION 1: OBJECTIVES

The purpose of this analysis is to identify opportunities for NYSERDA to expand or modify its activities to more effectively meet its public benefits program goals. The opportunity analysis takes advantage of four distinct approaches to gathering information:

- A comparison of the programs offered through **New York Energy \$martSM** with those offered by other agencies in other regions of the country. This comparison is not intended to judge the relative effectiveness of the **New York Energy \$martSM** programs, but to compare their scope, magnitude and delivery mechanisms with those of others, to discover instances in which NYSERDA's approach differs from that of other agencies, and where opportunities might therefore exist for new or expanded programs.
- An analysis of responses from **New York Energy \$martSM** customers and staff about where opportunities for improvement exist within programs. Again, this analysis is not intended to judge the effectiveness of individual programs, but to identify opportunities for improving the flow of information and the efficiency of program delivery.
- A dialogue between the HMG team and NYSERDA directors and managers to determine whether prospective opportunities are worth pursuing, or whether they are technically infeasible, are already covered by other NYSERDA activities, or are inappropriate to the New York State climate or market conditions.
- Use of HMG team members' previous experience gained by advising other agencies about the operating efficiencies and delivery mechanisms of energy programs.

SECTION 2: METHODOLOGY AND CHRONOLOGY

2.1 THE PROCESS USED FOR DEVELOPING THE OPPORTUNITIES IS OUTLINED BRIEFLY IN THE FOLLOWING SECTIONS.

REVIEW OF PROGRAMS IN OTHER REGIONS

A few specific agencies were chosen as subjects for a program-by-program comparison with the **New York Energy \$martSM** portfolio, these included:

- Energy Trust of Oregon
- Northwest Energy Efficiency Alliance
- California Public Utilities Commission, California Investor Owned Utilities (IOUs) and Municipal Utility Districts (Munis)
- Energy Center of Wisconsin
- Efficiency Vermont.

In addition, reports on energy program “best practices” published by the American Council for an Energy-Efficient Economy (ACEEE) and the Energy Trust of Oregon were also compared.

INITIAL TEAM BRAINSTORMING MEETING

On November 17th 2003, a meeting of the HMG team was held at HMG’s office in Sacramento, CA. Prior to the meeting each team member had been allocated the task of mapping and comparing NYSERDA’s programs with those of one other agency. The full-day discussion allowed the team to talk in depth about NYSERDA’s portfolio and about their previous experiences with energy research and implementation programs. Several initial ideas for opportunities were discussed, and several more were identified during the meeting.

STAKEHOLDER REVIEW MEETING

On December 17th 2003 a presentation was made by the HMG team to NYSERDA’s directors and program managers at NYSERDA’s Albany office. The intention of the meeting was to present the process and findings of the opportunity analysis to NYSERDA staff, and for them to provide feedback. As a result of the meeting, some opportunities were dropped, some were redefined, and new opportunities were identified.

QUESTIONNAIRES SENT OUT TO NEW YORK ENERGY \$MARTSM CUSTOMERS AND STAFF

In addition to above activities, the four specialty evaluation contractors were asked to provide input regarding missed opportunities.

- Program theories and logic models. The GDS team asked opportunity analysis questions along with theory and logic questions during interviews with NYSERDA staff. Debriefing sessions were conducted with GDS to discuss program gaps that they encountered. These were followed up with telephone interviews with those program managers to ensure that we fully understood the opportunities they identified.

- Process evaluations. The RIA team asked opportunity analysis questions along with process questions in questionnaires to customers. The responses to the gap analysis questions were analyzed to identify opportunities to improve program delivery.
- Market characterization and assessment. The Summit Blue team asked opportunity analysis questions along with MCAC questions during interviews with representatives of programs in other regions.

2.2 DATA ANALYSIS

The depth of analysis conducted for each opportunity varied. The intention of the opportunity analysis was mainly to identify viable opportunities via a process of thorough discussion, rather than to gather numerical data to quantify potential energy savings or costs. Nevertheless, where numerical data exist they have been incorporated.

For each opportunity, a “candidate opportunities report” has been written to ensure that the opportunity is clearly described, and that its purpose and the steps necessary for its implementation are identified.

2.3 CANDIDATE OPPORTUNITIES REPORT OUTLINE

Each of the candidate opportunities selected for development and presentation to NYSERDA was described and explained in a Candidate Opportunities Report. The general outline for all of these reports is shown below in Figure 1.

Figure 1 Outline of Candidate Opportunities Report

CANDIDATE OPPORTUNITIES REPORT:

[NAME OF ISSUE]

Description

One paragraph description of the issue. Discuss the rationale for the recommendation. If applicable, briefly identify the market actors that are impacted by this opportunity.

Advantages

Identify and describe the advantages of implementing the recommendation. If applicable, identify the technology, market or process that would be addressed or improved. Describe roughly how big the market is which would be impacted. Describe how it applies in the market

Disadvantages / Challenges

Identify and describe the disadvantages or difficulties of implementing the recommendation. List any technical problems/difficulties that may be encountered and should be addressed.

Implementation Actions

Broad description of what needs to happen to make this work.

Next Steps

What needs to be done (by NYSERDA & the HMG Team) in 2004 to move this opportunity forward?

Sources

2.4 OPPORTUNITIES PURSUED - SUMMARY

A wide variety of potential opportunities were considered for recommendation. It should be noted that the review of programs in other regions found a high degree of similarity among the energy programs offered in each state. Differences in climate account for the majority of variation. Nevertheless, the few differences that were found suggest significant opportunities for **New York Energy \$martSM**

These are the opportunities that the HMG team, in consultation with NYSERDA staff, has recommended for further investigation or immediate implementation.

Table 1. Summary Table of Opportunities

Name	Description	HMG team goal	Future work by HMG team	Steps required by NYSERDA to develop opportunity
Program Consolidation & Relationship Marketing	Consider consolidating programs for the purpose of improving market connection, greater consistency and efficiencies in program delivery, communications and relationship marketing. This ties in with related ideas for data tracking and consumer education.	Describe potential advantages/efficiencies and disadvantages/inefficiencies from consolidation.	Facilitate a meeting between NYSERDA Efficiency Vermont to discuss the applicability of this approach for NYSERDA. Summarize the discussion and its implications.	Consult with Efficiency Vermont, and then decide why this approach would or would not work for NYSERDA.
New York Energy Information Center	We propose that NYSERDA consider the creation of an energy center.	Provide NYSERDA with a wide range of arguments for and against starting an energy center, and gather structured information about the activities of other energy centers.	Complete spreadsheet comparison of other energy centers, including costs Complete prioritized list of benefits to R&D and implementation programs Complete a comparison of the merits of a physical vs. virtual energy center	Decide whether an energy center would contribute to the goals of NYSERDA, and whether it would enhance the delivery of existing programs Estimate cost to NYSERDA of starting an energy center Consider sites for a physical energy center Consider whether other organizations might partner with NYSERDA

Name	Description	HMG team goal	Future work by HMG team	Steps required by NYSERDA to develop opportunity
Differentiated Marketing	Assess the feasibility for NYSERDA to experiment systematically with differentiated marketing to determine what is most effective in increasing awareness, changing attitudes, and stimulating demand. BH says that the prospective SBC3 makes this the right time to be considering this opportunity.	Describe potential advantages/efficiencies and disadvantages/inefficiencies of a systematic differentiated marketing approach, and some of the key elements of such an approach.	Coordinate discussions among NYSERDA evaluation staff, NYSERDA program staff, and possibly the MCAC contractor.	Analyze existing data on the effectiveness of various marketing approaches that have been tried. Assess the feasibility of incorporating quasi-experimental design into marketing and communications efforts.
Market Penetration Tracking	Market penetration data provide an important tool for attributing market effects to program efforts by assessing changes over time, and assessing geographic differences.		Tracking the effect of single systems within complex commercial buildings is problematic. Comprehensive whole-building energy surveys (HVAC, lighting, controls, windows, appliances, etc.) may be required	
Program Data Collection	Consider consolidating program data tracking into a small set (1-4) of databases that can centralize and standardize data and reporting.	Describe advantages and new evaluation/information that could be derived from improved program tracking and database consistency. Develop recommendations for possible improvements.	List existing datasets that have been accessed by evaluators to show extent of diversity.	Establish database working group to decide feasibility of consolidation, assess special needs, and develop specification for consolidated database. Gain authorization to proceed with database development, transition and implementation.
Federal Tax Credits from the Energy Policy Act of 2004	Investigate how to leverage pending federal tax credits for energy efficiency measures. This could be a short-term, rapid-response program to make New York the state that takes greatest advantage of the tax credits.	Provide recommendations for linkages between Energy Smart and new tax credits, and possible awareness campaign.	Help identify evaluation-based justifications for responses to the new tax credit.	Prepare contingency plan for communications, training, and program redesign in the event of passage of the federal legislation.

Name	Description	HMG team goal	Future work by HMG team	Steps required by NYSERDA to develop opportunity
Link to Codes and Standards Setting Process	Consider using a small portion of SBC funds to help improve building efficiency standards and other standards relating to NYSERDA programs. Ultimate market transformation step is to adopt efficiency practices into codes and/or standards.	Assess after discussion with Brian Henderson	Describe success of approach in CA, cite studies. Prepare recommendation for how NYSERDA could implement participation in code setting processes.	Initiate process to select codes and standards measures to target. Appoint project manager to oversee development of code change proposals. Allocate budget and hire technical experts. Work out process with DOS for review of proposals.
Industrial Process Improvements	NYSERDA could seek to increase energy savings in the industrial sector by targeting the most energy-intensive industries, especially small- to medium industrial customers, which tend to have fewer internal resources for such improvements than large industrial customers.	Identify program opportunities for better serving the industrial sector and helping to improve its energy usage efficiency	Help facilitate research on industries and processes to focus on.	The availability of experts specializing in key industries would have to be explored, including at Syracuse University. Potential savings and the cost effectiveness of energy efficiency measures in these industries would have to be verified, possibly with the aid of the industry experts.
Refrigerator Recycling Program	A Refrigerator Recycling program is currently run by CSGS for the New York Power Authority. NYSERDA may be able to serve the state better than the current program. The program replaces old, inefficient units with new energy-efficient units.	Costs associated with refrigerator recycling and demanufacturing.		Decide whether to implement a Refrigerator Recycling program. Determine program budget. Contract with a program implementation firm.
Small Commercial Lighting Program	We propose that NYSERDA consider implementing a Small Commercial Lighting Program that is targeted to the hard-to-reach non-residential sector. There are two program approaches: 1) A Direct Install program or 2) A Streamlined Incentive Program.	Present recommendation for direct install program.		Decide whether to incorporate a Small Commercial Lighting Direct Install program into the B&I Lighting Program Area. Determine program budget and measures. Hire or assign staff to the program.

Name	Description	HMG team goal	Future work by HMG team	Steps required by NYSERDA to develop opportunity
Utility Bill Financing	The capital cost of energy efficiency improvements, and the uncertainty about the saving that may accrue deter many businesses and individuals from investing in improvements. Paying for improvements through their electricity bill on preferential terms and at zero risk may encourage uptake	To assess the desirability of instigating a program to allow residential and commercial customers to finance EE improvements through their electricity bill.	Determine what lessons can be learned from New Hampshire's experience with utility bill financing; especially whether it increases likelihood of hard-to-reach and low-income customers implementing EE measures	Determine likely resistance from ESCOs to utility bill financing Determine whether NH experience is likely to be repeated in NY

SECTION 3: OPPORUTNITIES ANALYZED

3.1 PROGRAM CONSOLIDATION & RELATIONSHIP MARKETING

DESCRIPTION

Consider consolidating programs for the purpose of improving market connection, greater consistency and efficiencies in program delivery, communications and relationship marketing. This could be a structural consolidation, involving changes to all aspects program administration, or it could simply be a marketing shell consolidation, focusing on the customer experience and how the suite of NYSERDA programs is presented to customers before they are diverted to the individual program implementers. Affecting all market actors, this ties in with related ideas for data tracking and consumer education.

ADVANTAGES

Design programs, services, marketing, communication, and delivery around what makes sense for the customer so that it will be comprehensive and will get the most savings. The potential advantages of this approach include:

- Reduction in portfolio fragmentation and program proliferation
- Streamlined customer processes, marketing, communications, and contracting
- Consistent marketing messages
- Efficient and effective customer communications about service offerings
- Clearer customer knowledge/understanding of NYSERDA and its programs
- Easier for customers to participate in NYSERDA programs
- Fewer gaps in coverage
- Fewer missed energy savings opportunities
- No/fewer overlaps between programs
- Programs that are more integrated, making for operational synergies

Energy savings would depend on whether the resulting consolidated programs become more efficient than current programs in delivering energy savings. The experience of Efficiency Vermont (the only organization to have done this) suggests that this is the case, although whether this could occur in the larger and more complex New York market is another matter.

DISADVANTAGES

Potential missing links and barriers include:

- A unified internal database for tracking and sharing information
- Utility customer billing data
- An organization structure that is aligned with such an approach
- Current contractual obligations to vendors for the separate programs
- The size and diversity of New York compared with Vermont

- The relative size of NYSERDA's budget (per customer, or per dollar spent on electricity) in Vermont compared to New York

The fact that this approach has reportedly worked in Vermont is no guaranty that it would work in New York. The numbers and types of customers in New York and the contexts in which they live and work make the approach much more challenging than in Vermont. NYSERDA's existing programs are in various states of development and maturity, and have developed their own histories in staffing and deployment. These would have to be brought together around a shared vision and unified procedures. Restructuring for this would take time and a lot of discussion. The danger is in making it so complicated that it doesn't work. Having teams can be more confusing and cumbersome. Teams can also proliferate and take up time in meetings.

IMPLEMENTATION ACTIONS

This opportunity would require a clear understanding of goals and of vision. Changes would have to be made incrementally to transition program offerings, processes and marketing.

There are some things that Efficiency Vermont did in terms of moving away from a program model that may be applicable to NYSERDA, although the size and complexity of the New York market would make it much more difficult to realize these benefits.. The challenge will be to break up the market, as appropriate, into smaller market segments that NYSERDA serves.

Key areas for changes would be internal databases and organizational structure.

Internal Database. Efficiency Vermont has a single, statewide database for tracking and sharing customer information. Every contact and every measure that is implemented goes into that database. The database was initially populated with historical customer consumption, demand, and billing information from the 22 Vermont utilities and Efficiency Vermont receives quarterly updates on the data. The same system tracks activities with strategic partners, although the latter is still not as advanced. The database enables them to look across all the things individual customers have done, tied to usage and demand characteristics. It also allows them to do good tracking and analysis, doing such things as computing economic benefits for different political subdivisions.

Organizational Structure. Efficiency Vermont formerly had managers and implementation staff for each program. Now they have market managers who work with cross-functional teams to address a particular market. Current market groups include:

- Commercial New Construction
- Commercial Existing Buildings
- Residential New Construction
- Residential Existing Buildings
- Efficient products

Cross-functional teams can cut across any of these areas. The cross-functional teams include ski areas, schools, multi-family housing, codes and standards, and a residential and commercial new construction conference. (In the past, the latter has been co-sponsored and promoted by NYSERDA).

Integrated marketing and communications also is key to this approach. Efficiency Vermont does not have marketing and business development outreach as subsets of

programs. They now keep all that together and the same group of people does marketing and business development for all the market sectors. This ensures that they have efficiency, not only with consistent messages but also in terms of effectively communicating all of their service offerings to customers. They try to do multi-message marketing.

Efficiency Vermont also has a separate organizational structure for implementation of all the programs under an operations manager who supervises project managers and assigns them to individual projects. The project managers are not assigned to programs any more. Project managers are part of an operations group and, while they may have areas of specialty, they can be assigned to any different type of project.

Compared to other states, having to work with a proportionately smaller budget (per customer, or per dollar spent on electricity), further adds to the importance to NYSERDA of ensuring an optimal allocation of its resources. This approach of consolidating programs and integrating program marketing, communications, and service delivery merits serious consideration as the way for NYSERDA to optimize the use of its resources. Note further that the availability of utility billing data would be invaluable for strategic planning and resource allocation, allowing NYSERDA to more efficiently target customers and energy savings opportunities.

NEXT STEPS

This is a process that would have to be proceed cautiously. The first step would be for NYSERDA staff to develop a better understanding of this approach. Blair Hamilton from Efficiency Vermont has offered to meet with NYSERDA staff to discuss Efficiency Vermont's experience. A related step that would facilitate the implementation of this approach would be the consolidation of program databases (see Candidate Opportunity #3—Program Data Collection).

SOURCES

Efficiency Vermont website: www.encyvermont.com

Efficiency Vermont 2002 Annual Report

Efficiency Vermont 2004 Annual Plan

Interview with Blair Hamilton, Efficiency Vermont

3.2 NEW YORK ENERGY INFORMATION CENTER

DESCRIPTION

We propose that NYSERDA consider the creation of an energy center. Several state agencies and utilities operate energy centers that serve as focus points for energy efficiency research, education, implementation programs and project-specific activities. Typically, the main focus of an energy center is to host conferences, seminars and meetings for the local building community, both residential and commercial, although they all perform a wide variety of other functions.

Energy Centers are often physical buildings, such as PG&E's Pacific Energy Center, the Seattle Lighting Design Lab, the Florida Solar Energy Center, and the energy centers of Wisconsin and Iowa. Alternatively energy centers can be entirely virtual; a variety of online institutions and clearinghouses exist, including the New Buildings Institute, Betterbricks, and the Department of Energy's website. Online energy centers typically offer topical news, downloadable design advice, links to other resources including product manufacturers, and information about implementation programs.

Both physical and virtual energy centers typically circulate regular newsletters, to maintain their presence within their target market, and keep their clients informed about the latest developments. To this extent, an energy center might be a natural outgrowth of NYSERDA's move toward "relationship marketing".

ADVANTAGES

The main specific advantage would be to have a physical facility to demonstrate and explain energy efficient technologies. Many building designers, owners and developers are skeptical of the benefits or worried about the viability or cost risks of energy efficient technologies and design methods. Physical demonstrations and objective advice provide a level of reassurance that is often a prerequisite to their decision to adopt new technologies and new practices.

These actors form a hard-to-reach subset of the building community, including many low-cost developers and design-and-build contractors, many of whom build lower-cost (though not "affordable") housing.

A virtual or physical energy center could provide the following benefits to NYSERDA's existing programs:

	Benefits to R&D programs	Benefits to implementation programs
Virtual Energy Center	<p>Provide a convenient site for posting project updates that can be accessed by participants and other interested parties</p> <p>Allow researchers not already working with NYSERDA to see the range of NYSERDA's research activities, and find out more about specific projects and contact details</p> <p>Allow members of the wider building community to see more clearly the opportunities and value of NYSERDA R&D, and to submit comments or become involved</p> <p>Could share facilities (teleconferencing, IT hardware, office space) with the proposed Alternative Energy Research Institute</p>	<p>Provide downloadable energy-efficiency design advice specific to NY to architects, engineers and contractors ("designers")</p> <p>Allow designers to submit questions via email or phone to in-house experts, or a network or experts in other location</p> <p>Provide information and / or tutorials on energy-efficient technologies to designers</p>
Physical Energy Center	<p>Provide a venue for R&D project meetings. If the energy center is located close to NYSERDA's offices, it would be convenient for a number NYSERDA staff to attend without incurring travel time.</p> <p>Provide space and facilities to mock up R&D prototypes</p> <p>Provide space and facilities for researchers and graduate students seconded to NYSERDA projects</p> <p>Raise the profile of NYSERDA and its programs within the research community</p>	<p>Host professional education seminars, product showcases and social events for designers</p> <p>Host educational events for K-12 students and college students.</p> <p>Offer project-specific in depth design advice and demonstrations in specialist areas like daylight modeling and energy simulations</p> <p>Offer a venue for designers to invite their clients (developers, owners) or vice-versa for clients to invite their design team to see demonstrations of EE technologies and design practices</p> <p>Raise the profile of NYSERDA and its programs within the building community</p>

Further to the advantages to NYSERDA, there are additional advantages to New York State:

The facilities of either a virtual or a physical energy center could be rented by other organizations for their own use. This would provide a revenue stream to NYSERDA, and the potential for collaborate work.

NYS Manufacturers of energy efficient products could be supported in their marketing efforts by using the facilities or client base of either a virtual or physical energy center.

A high profile energy center could attract out-of-state customers to attend demonstrations of NYS manufacturers' products.

DISADVANTAGES / CHALLENGES

The main challenge is to meet to cost of providing the facilities, IT and personnel. The costs of running an energy center have been difficult to obtain. The figures in the attached spreadsheet give some indication of overall cost, but in all cases there are specific costs that may not be incurred by NYSERDA: The Pacific Energy Center occupies an expensive downtown San Francisco location; the Florida Solar Energy Center conducts extensive primary research, etc.

Integrating the energy center with NYSERDA's existing implementation and outreach initiatives, rather than competing with them for the same audience, would be a critical issue. There might also be competition between the NYSERDA energy center and other state and federal energy efficiency programs. These overlaps would need to be analyzed in detail.

IMPLEMENTATION ACTIONS

Broad description of what needs to happen to make this work.

NEXT STEPS

Estimate in detail the costs of a virtual or physical energy center.

Gather further evidence for the benefits of siting a physical center in an urban vs. a rural location (NYC is clearly a unique opportunity).

Consider possible sites (urban / rural, upstate / downstate). A building already owned by NYSERDA or another state agency might provide a good opportunity.

Conduct interviews with energy center managers to determine which of their activities offer the best ROI.

Complete spreadsheet comparison of other energy centers, including costs

Complete prioritized list of benefits to R&D and implementation programs

Complete a comparison of the merits of a physical vs. virtual energy center

3.3 DIFFERENTIATED MARKETING

DESCRIPTION

Assess the feasibility for NYSERDA to experiment systematically with differentiated marketing to determine what is most effective in increasing awareness, changing attitudes, and stimulating demand.

Because New York has many geographically distinct media markets (New York City, Syracuse, Albany, Buffalo, etc.), NYSERDA is able to vary marketing approaches, and in fact already does so—for example, television advertising may be used in Buffalo and newspaper advertising in Syracuse. There is an opportunity, however, not only to analyze the relative effectiveness of these approaches, but to systematically vary them by media market over time to maximize the ability to identify the most effective approaches. This is a form of quasi-experimental design, and would require that marketers and researchers develop the pattern and timing of differentiated marketing together. It would also require that mechanisms be in place to collect data on the relative effectiveness of the approaches, whether through pre- and post-advertising surveys, different toll-free numbers for each area or approach, post card returns, or sales. The approach or approaches that prove to be most effective may then be used more broadly.

Marketing media are not the only factor that might be systematically assessed. Messages and message types might also be experimentally varied by geography or by store to evaluate their effectiveness. Moreover, with the tools of geodemographic segmentation, it is possible to optimize media and messages by demographic and other individual characteristics.

Because mass media are involved, this is primarily an opportunity for the residential market.

ADVANTAGES

This approach would increase the efficiency of marketing efforts. Insofar as changes in awareness and attitudes can be demonstrated to be associated with increased market penetration, and insofar as the quasi-experimental design allows measurement of the sales resulting from different marketing approaches, the associated energy savings could be measured and could be substantial.

DISADVANTAGES

This could be seen as draining resources from other marketing and evaluation efforts. However, the payoff could be more effective leveraging of marketing dollars, and keeping this in the forefront could help generate support. The primary barrier to carrying out this approach is the time required to design differentiated marketing approaches before marketing implementation begins. Overcoming the barrier might require a longer planning cycle.

IMPLEMENTATION ACTIONS

Assessment of differentiated marketing could start small and then expand when and if its benefits are demonstrated; it could be that the increased cost of planning and analysis can be more than offset by marketing efficiency gains.

NEXT STEPS

Evaluate the possibility of establishing a pilot program for differentiated marketing. Planning for a limited effort would involve several joint meetings between marketing and evaluation staff and contractors (probably MCAC), and several days of individual work.

SOURCES

No formal sources

3.4 MARKET PENETRATION TRACKING

DESCRIPTION

- Traditional market share tracking entails working with individual product types, their manufacturing/distribution systems, and their sales results. In addition to the program areas for which market penetration estimates are already available and in use, such as ENERGY STAR[®] Homes, the technologies that now or in the near future may have cost-effective traditional market penetration tracking solutions available include:
- *Motors.* By June of 2004, the National Electrical Manufacturers Association (NEMA) expects to provide CEE with motor shipment data by efficiency (NEMA-Premium vs. standard efficiency), size (in increments of 50 hp), and either state or trading area. With data by trading area, Long Island could be easily be netted out to provide NYSERDA-specific data.
- *Appliances.* The Business Data Council of the Association of Home Appliance Manufacturers (AHAM) agreed to a trial run collecting shipment data for dishwashers, clothes washers, room air conditioners, and refrigerators starting in January 2004, and the Government Relations Council approved this effort. AHAM expects to have data in hand by mid-February, at which time they will review the results to determine if the data are of high enough quality to release. If they appear to be of such quality, AHAM will determine the frequency and level at which the data will be collected and the price they will charge for it. This effort is also being coordinated by CEE. The AMAH data could be compared to and perhaps calibrated by national retail chain sales data collected for DOE by D&R International.
- *CFLs.* For a few years, RER/Itron has been collecting point-of-sale data on CFL market penetration in California, and more recently in Wisconsin. Massachusetts has contracted with them as well. However, one of the main retail chains decided to stop providing data. The DOE has funded a study to be conducted by RER/Itron and D&R International and coordinated by NEEP on how to get this retail chain back into the fold. If this effort is successful, current historical data for CFLs may soon become available for New York (netting out Long Island), with comparison data for California, Wisconsin, Massachusetts, and the nation as a whole (or with CA, WI, MA, and NY netted out).
- *Commercial Packaged HVAC.* CEE is in the early stages of negotiating with the Air-Conditioning and Refrigeration Institute (ARI) for provision of these data. Given manufacturers' stated preferences, we strongly suggest that NYSERDA work through CEE on this issue.

The traditional approach works well for discrete technologies, such as heat pump water heaters or premium efficiency motors. It breaks down, however, when less discrete building systems are the target. For this, a better approach would center around building surveys and compilation of data on all building energy systems (HVAC, lighting, controls, windows, appliances, etc.). Market shares under this approach are based on sampling techniques that allow the survey data to be projected up to the population of buildings.

ADVANTAGES

Market penetration data provide an important tool for attributing market effects to program efforts by assessing changes over time, and assessing geographic differences. If a program is effective, one would expect the market penetration of energy-efficient equipment to increase over time. Similarly, one would expect the penetration of energy-efficient equipment to be higher in areas with programs than in areas without programs. However, if one has data over time but not over space, one cannot be sure whether the increases in market penetration are also occurring in areas without programs; if one has data over space but not over time, one cannot be sure if the higher penetration in the areas with programs is due to the program or to some other factor. Hence, attribution of market effects requires data over *both* time and space. The pattern that would allow one to attribute market effects to a program is to show *a higher rate of increase* in the market penetration of efficient equipment in areas with programs than in areas without programs. This makes it important to obtain data not just for the area covered by NYSERDA, but for other areas as well.

The market penetration tracking approaches rely on shipment data from manufacturers provided through their associations should be relatively inexpensive, and will also provide a way for NYSERDA to compare penetration in New York (sometimes excluding Long Island) to that in other states.

The building survey approach allows for direct measurement of the prevalence and efficiency level of a wide range of building energy equipment and systems within the population of both existing and newly built buildings. This information is important for setting program priorities and for addressing the real barriers to implementation in the field.

DISADVANTAGES / CHALLENGES

The main disadvantage to manufacturer data is that they capture shipments, rather than sales to end-users. Distributors and dealers often ship equipment across state lines—sometimes to entirely different regions of the country—to reach end users. This is likely to be less of a problem for motors and HVAC than for appliances given that distribution centers are more localized. However, for appliances, retail chain sales data collected for DOE by D&R International are available, which, while missing data from independent retailers, at least provide a point of comparison and possibly a basis for calibration. Moreover, shipment data are likely to have the same biases over time, so that changes can be meaningful. Basically, program effects have to be large enough to compensate for unknown border-crossing effects.

A related disadvantage of manufacturer data is that they do not tell what kinds of applications are using the equipment. For example, motors can be installed in applications where they run 24/7, and they can be installed in applications that only run intermittently. In many cases, the distributors cannot even tell which sectors (e.g., commercial or industrial or multifamily) are using the motors. If the data are to be used for measuring the effects of a broad-based motors program, that may not be a problem, but the data would not be as useful for measuring the effects of a more focused program, such as a commercial HVAC or refrigeration program.

Many of the measures installed in buildings do not lend themselves to traditional market share tracking. For example, it is possible to track the numbers of T8 lamps and electronic ballasts sold into the commercial sector, but those numbers do not tell you if lighting systems are using more or less energy – people could simply be installing more

of the more efficient products. The same holds true for many building system elements – window areas and assemblies, built-up HVAC systems, energy controls (e.g. occupancy sensors), etc. There is a secondary problem relating to the population of measures within the building stock: sales data do not necessarily tell on how many existing measures are out there and available for replacement.

A disadvantage of the whole-building approach—and every market penetration tracking approach except shipment data—is that it is very expensive. This may be mitigated by the fact that one set of survey data can provide measure penetration data for a wide range of equipment, in effect taking the place of numerous manufacturer sales data efforts. Another disadvantage of the whole-building approach is that it does not provide comparison areas unless other programs are doing similar tracking, making attribution of market effects more difficult.

IMPLEMENTATION ACTIONS

While NEMA (for motors) and AHAM (for appliances) have tentatively agreed to provide shipment data, ARI (for commercial packaged HVAC) still requires more courting. CEE has made significant inroads with ARI and we suggest leaving it in their hands. For CFLs, one retail chain is balking about providing data, but negotiations by RER/Itron and D&R International, representing DOE, are underway.

In the short term, little effort is required of NYSERDA for the manufacturer- and association-based tracking systems (motors, appliances, and commercial packaged HVAC), other than supporting CEE and keeping up with its efforts. The data for motors will likely be free for CEE members. AHAM will likely charge for data, but we expect the charges to be reasonable. Negotiations with ARI have not yet reached the point of discussing costs for commercial packaged HVAC data. For CFLs, NYSERDA should contact RER/Itron to explore pricing. The California utilities funded development of the original effort, which should make later efforts much less expensive. To get an idea about the costs of these more recently negotiated CFL tracking efforts, NYSERDA could contact the Massachusetts utilities.

If NYSERDA were to pursue the whole building survey approach, then a planning activity should be undertaken to scope out the sectors to be surveyed (e.g. residential or commercial new construction, existing buildings, etc.), the extent of the survey effort, the types of data to be collected, the evaluation uses to which the data would be applied, the frequency of data collection, etc. The planning effort should also take into account the formats and extent of other whole building survey efforts, so as to accommodate cross-comparisons with other regions of the country. Ultimately, NYSERDA could push for a national data collection effort using a consistent methodology and data format.

NEXT STEPS

Continue to monitor CEE's efforts to secure shipment data.

Establish a working group to consider establishment of a whole-building survey and tracking effort.

SOURCES

3.5 PROGRAM DATA COLLECTION

DESCRIPTION

NYSERDA should consider consolidating its program data tracking systems into a small set of databases (probably fewer than four) that can centralize and standardize program data and reporting.

NYSERDA's current program tracking databases have evolved on a program-by-program basis to meet the needs of the program managers. These needs varied according to the scope of the programs, the parties responsible for collecting and reporting the data, and the database tools used (e.g. Excel, Access, etc.). Evaluators, in attempting to use these databases for program evaluation purposes, have been frustrated by the large number and diversity of these databases, and by the numerous different contacts needed to access them. Certainly evaluation activities could be more efficient and valuable if there were fewer difficulties in accessing and using these databases. Ultimately, NYSERDA's program administration activities could also benefit from a more coherent data structure.

This is not a new concept for the management of a diverse portfolio of programs. At least three utilities are known for good data tracking of their programs: SCE, PG&E and National Grid. More recently, the Efficiency Vermont and the Energy Trust of Oregon have invested in up-to-date data tracking systems, and have made them an integral part of their program implementation activities, as well as their evaluation efforts.

ADVANTAGES

There are numerous and substantial advantages to database consolidation.

- ***Ease and consistency in rolling-up program savings estimates.*** Individual program accomplishments would be recorded as subsets of the database information, and the system would allow them easily to be added up across the portfolio. Furthermore, the system would impose consistency standards for how data is entered, so that all programs would record similar units and data types.
- ***Facilitation of program evaluation.*** The consolidated program evaluation mechanism introduced by NYSERDA in 2003 brought several teams of outside evaluators into contact with the existing program databases. A great deal of time was expended by these evaluators in gaining access to program tracking databases. Some databases are kept in-house by NYSERDA program staff, while others were kept by outside program implementation contractors. Some are kept in Excel spreadsheets, others in Access relational databases, still others in SBSS or other database programs. Some of the databases have complete information on all program activities and customers, while others were developed for more limited purposes such as tracking final program accomplishments. The evaluators themselves had different needs, ranging from market tracking to verification of individual measure installations. Extracting the necessary data for these diverse evaluation functions required coordination among many different data providers, program managers and evaluators. In some cases, more than one data request was necessitated for the same database, because the M&V data needs were quite different from the market characterization data needs. If the databases were consolidated, this would be a much less labor-intensive activity, and would allow for better analysis of program effectiveness.

- ***Support for program planning and marketing.*** A related candidate opportunity discusses program consolidation and the advantages for market connection, program delivery and marketing. Consolidated program databases would greatly facilitate all of these activities. For example, a program trying to reach small commercial customers could benefit from data on the numbers, types, locations and measures adopted by program participants from previous efforts, even if they were reached through different program elements. Or a program targeting multifamily buildings could use data on how many previously participating multifamily projects were central metered vs. tenant metered buildings to plan its next phase. The quantity and value of these kinds of data will increase over time and with greater levels of program activity.
- ***Consistent customer contact and tracking information.*** Many program activities are ultimately addressing similar market segments and customers. For example, residential customers can be targeted by air conditioner programs, lighting efficiency, appliance, window and water heating programs. Similar program targeting activities are addressed to commercial and even industrial customers. Rather than keeping customer contact and program participation data in several different databases, it would be more efficient and ultimately more useful to have this data consolidated. ***Standard data entry and quality assurance procedures.*** One of the persistent challenges of any database is keeping the data clean and up-to-date. When the databases are small and used by a small number of people, this task is a relatively small effort, although it sometimes is given lower priority and so falls behind in timeliness and usefulness. A larger, consolidated database structure can potentially provide more consistent data entry and quality assurance procedures, ensuring that the data are kept current and of maximum utility.
- ***Standard reporting and data presentation functions.*** The ability to extract useful reports and information from the data in a database depends upon how well that data is structured for the analysis purpose, and how up-to-date it is. A well thought-out, consolidated database has the potential to facilitate reporting, and to make it consistent across programs and portfolio. Also, it will be easier for more people to extract the data that is needed, because all of the data will be in the same format (as opposed to the present system where different people know how to extract data from different databases).
- ***Uniform database program and methods.*** Assuming that the consolidated database is well structured, and that it resides in a database program that many users know how to use, it will be possible to establish NYSERDA-wide methods for extracting data for the wide range of uses to which it can be put. Ultimately, this would result in reduced training needs, because there would not be different database programs and data structures to learn. This would also result in shorter turn-around times for making data extracts and preparing reports.
- ***Centralized data management and security.*** A final advantage has to do with the issues of managing the data and controlling access to it. When data resides in numerous locations, formats and jurisdictions, there are not necessarily consistent procedures for updating, backing up or securing the data. Under the current regime, there are several databases that do not reside at NYSERDA. With a consolidated database, it would be easier to manage and secure the data, limiting access to parts or all of the data to people who have a need to access it.

These advantages are primarily to the benefit of program administration, management, marketing and evaluation. They do not directly translate into energy savings, but they should ultimately improve the overall cost effectiveness of NYSERDA administration of PSC program funds.

DISADVANTAGES / CHALLENGES

Despite the numerous advantages of database consolidation, there are some disadvantages and challenges that would be involved in transitioning from the current system.

- ***Complications of a consolidated system.*** Centralization is not a virtue in and of itself, despite the potential advantages. A centralized system may well be more complex, at least to individual users, than the current, special-purpose databases. The challenge will be to design the consolidated database system so that users are shielded from the complexities that do not concern them or their needs for the data. This can be accomplished through the user interface design for data entry, for routine reporting, for access and security. It will also depend on having knowledgeable and responsive management of the database system.
- ***Coordination with existing contracts management database.*** NYSERDA has implemented a new database system in the past year to track its contracts. This database was developed for financial management purposes, and does not include all of the program and market tracking features that are envisioned for the consolidated program database proposed here. The two functions are not unrelated, however. The challenge will be to determine whether the proposed database would be a superset of the contracts database, or whether it makes more sense to keep them separated.
- ***Transition of database functions.*** Whenever a transition from one database system is made to another, there is the potential for lapses in functionality or, even worse, for loss of data. The challenge will be to get the consolidated system up and running without losing any of the functionality of the current systems. When this is done for accounting systems, it is frequently the practice to run both the old and the new systems side-by-side for a transition period, so that if any major problems with the new system arise the old system is still functional. While this increases transition costs, it is both prudent and, ultimately, less expensive if there are major glitches.
- ***Loss of contractor administered data functions.*** One of the advantages of the current system is that several of the existing databases are administered by contractors who are running NYSERDA programs on a third-party basis. This simplifies administration for NYSERDA, and keeps the program implementation and database functions closely connected. With a consolidated database, NYSERDA would either have to take over the database functions from the contractors, or else provide them access and training to use it as part of their program responsibilities. The challenge would be to set up a consolidated database that would retain the advantages of contractor data entry and tracking, and would work within existing contractual arrangements.
- ***Data access and security.*** A consolidated database would entail numerous people entering and using the data, often concurrently. This opens the possibility for unauthorized people to access the data, and for it to be used for inappropriate purposes. There's also a worst case scenario, where a rogue user damages or

destroys the data. The challenge would be to establish database structures and procedures that allow for efficient data entry and data access, while protecting confidentiality and data security. A consolidated database might also require remote access by contractors over a secure connection. These challenges can all be met with currently available database systems, which are designed for multiple users, and multiple levels of security and access, but they must be considered part of the database design from the outset.

- ***Administration budget.*** Administration of a consolidated database would be a centralized NYSEDA function. Currently, many of the databases are administered through third-party contracts or by individual program staff, and so the costs of database administration are spread throughout many different budgets and contracts. With a consolidated database, there would have to be a new administrative budget item to cover its costs. The challenge would be to establish a mechanism for allocating those costs to separate programs and contractors.

IMPLEMENTATION ACTIONS

Data consolidation requires careful planning and good execution to produce a consolidated and consistent data entry and reporting system that meets both the needs of the day-to-day program managers and of evaluators. Poorly done, a centralized system could be more opaque and less useful than the current, balkanized system. Well done, such a system could provide continuity and consistency in program tracking and evaluation, and a useful tool for program planners and implementers.

Where current databases are working well for their program managers, there is likely to be resistance to changing them. Where databases and programs are in transition, it may be easier. Evaluators would welcome the consolidation, and would cooperate in developing a new data structure that would allow for more timely and comprehensive program feedback and estimation of program achievements.

The planning process would entail development of specifications for a consolidated database system, including:

- Specification of all data fields that would be needed by all participating programs – first, a complete list of all existing fields and their data definitions would be compiled, then this list would be reviewed for ways to make the data more streamlined and consistent across programs.
- Specification of all information reporting that would be expected from the database – this would ensure that no important reporting function is missed or unavailable from the database.
- Specification of data entry and quality assurance protocols – a well-designed system should be easy for users to understand, and should incorporate built-in data checking features.
- Specification of user access methods – first, programs would be surveyed to determine who and how many people would need access to the data, what portions of the data should be restricted and to whom, how much access outsiders would have to the data, etc.
- Specification of hardware and software needed to implement the other specifications.

- Identification of who would be responsible for developing and implementing the database (in-house personnel, turnkey vendors, database consultants, etc.)

If the decision is made to move forward following the planning activity, the timeline and transition plan to the new system would be developed. Periodic progress checks on the developing database system should be built into the schedule so that any major problems can be dealt with at an early stage. Once the database is developed, then users would need to be trained, existing data would need to be imported, new data would begin to be entered, reports would begin to be generated and used, and the old database systems would need to be phased out.

NEXT STEPS

This opportunity would take a major effort to develop and deploy a new database system. The first step would be for NYSERDA to commit staff and financial resources, and to designate a project manager, to begin the planning process. This would necessarily include a process for winning the support of database users who may be invested in their current systems. An outcome of this process would be a budget, timeline and action plan for carrying out the full project. The project would likely require a year to carry to completion, and could well require several man-years of effort.

SOURCES

Identify all sources from your research.

List current databases, their purposes, operators, software, and size.

3.6 FEDERAL TAX CREDITS

DESCRIPTION

Investigate how to leverage pending federal tax credits for energy efficiency measures. This could be a short-term, rapid-response program to make New York the state that takes greatest advantage of the tax credits.

While the Federal Energy Policy Act of 2003 did not pass the Senate in November, it is likely to be passed and signed into law early in 2004. The law would provide the following tax credits and/or deductions*:

- *New Homes:* \$2,000 for builders who build homes that use 50 percent less energy for space heating and cooling than homes built according to the 2000 International Energy Conservation Code (IECC) and subsequent amendments, and \$1,000 for homes that use 30 percent less energy than the IECC.
- *New Commercial Buildings:* \$1.50 per square foot for new commercial buildings that reduce energy use by 50 percent relative to the requirements in the 2001 new construction standard developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE 90.1).
- *Existing Commercial Buildings:* \$0.50 per square foot per system for upgrading one or two major building systems (envelope, lighting, or HVAC).
- *Existing Homes:* A 20 percent credit up to \$2,000 for upgrading building envelope components (primarily oriented toward new windows, insulation upgrades, ENERGY STAR[®] metal roofs, and duct sealing/infiltration upgrades) to be in compliance with model codes for new homes.
- *Appliances:* Credits to the *manufacturer* of \$100 for clothes washers with a Modified Energy Factor (MEF) of 1.50 or more (compared to an ENERGY STAR threshold of 1.42 MEF for 2004) and for refrigerators that exceed the 2001 federal efficiency standard by 15 percent (the same as the 2004 ENERGY STAR criteria). This applies only to appliances produced in the United States.
- *Real-Time Metering:* A three-year depreciation period for utilities and other providers of electric and natural gas services for “energy management devices” used to enable consumers to manage their purchase or use of energy in response to energy price and usage signals.
- *Combined Heat and Power Systems:* A ten percent investment tax credit for CHP systems with total efficiency of 60-70 percent (varying with system size), for systems up to 15 MW in generating capacity.

* Adapted from “The Federal Energy Policy Act of 2003 and Its Implications for Energy Efficiency Program Efforts,” by Steven Nadel, American Council for an Energy-Efficient Economy, and from the Solar Energy News Center (www.solarbuzz.com)

- *Stationary Fuel Cells*: A 20 percent investment tax credit of up to \$1,000/kW.
- *Photovoltaics*: Fifteen percent of project costs for residential and commercial installations, with a credit cap of \$2,000.
- *Solar Water Heating*: Fifteen percent of project costs for residential and commercial installations, with a credit cap of \$2,000.

The market actors most directly affected by the legislation are:

- *New Homes*: builders, energy raters, new home buyers, insulation contractors, and to some extent HVAC contractors (the incentives are more oriented toward envelope than toward HVAC improvements).
- *New Commercial Buildings*: architects, engineers, developers, and building owners.
- *Existing Commercial Buildings*: building owners, HVAC contractors, lighting/electrical contractors, insulation contractors, and energy service companies.
- *Existing Homes*: homeowners; home improvement contractors; window manufacturers, distributors, and contractors; insulation contractors; roofing contractors; and duct sealing contractors. Note that HVAC contractors do not typically perform or want to perform duct sealing services, and that where duct sealing markets are most developed—such as Florida—a separate duct sealing industry has developed.
- *Appliances*: Manufacturers, retailers and buying groups, consumers, and appliance recyclers.
- *Real-Time Metering*: utilities, meter manufacturers, end-users, and regulators.
- *Combined Heat and Power Systems*: CHP manufacturers and contractors; engineers; utility system integrators and planners; and commercial and industrial customers.
- *Stationary Fuel Cells*: Fuel cell manufacturers and contractors; engineers; utility system integrators and planners; and commercial and industrial customers.
- *Photovoltaics*: PV manufacturers and contractors; residential and commercial customers; building inspectors; and utility system integrators and planners.
- *Solar Water Heating*: Solar water heating manufacturers and contractors; residential and commercial customers; and building inspectors.

ADVANTAGES

Very rough savings estimates in the year 2020 for most of these tax credits—based on national estimates calibrated to New York’s population—are as follows:

	TWh	MW
New homes	0.48	154
Appliances	0.26	82
Commercial buildings	2.64	839
Fuel cells	1.76	294
Combined heat & power	6.48	1080
Real-time metering	0.17	166
Existing Homes	0.15	49

DISADVANTAGES

The timing and logistics issues for NYSERDA include preparing a promotional effort to capitalize on the publicity surrounding the passage of the legislation, and providing training for market actors to respond to any increase in demand. The effort required to pull this off in a timely manner is quite substantial. Thus managing timing and logistics to maximize the opportunity will be a challenge.

There is some risk that the legislation will not pass, but given that these tax credits have been in all versions of the energy bill for the past couple of years, it is probably more a question of when than if. The “when” is generally expected to be early in 2004.

IMPLEMENTATION ACTIONS

These federal tax credits, of course, apply all over the country. NYSERDA can take the lead in leveraging the credits at least five ways:

- *Through a promotional campaign coinciding with the passage of the law and thus taking advantage of the associated publicity.* This could take the form of public service announcements and, given the prominence of the legislation, could involve support from and/or endorsements by major public figures.
- *By adding to incentives available from other sources, including Energy Smart.* For example, with photovoltaics, the 15% Federal tax credit—added to NYSERDA’s \$4-\$5/Watt incentives and interest rate reductions, tax credits provided by New York State of 25% up to a limit of \$3,750, and the benefits of net metering—could have a significant impact on the market. For some technologies, such as clothes washers and refrigerators, the tax credit might obviate the need for incentives from NYSERDA given sufficient promotion and marketing support.
- *By working to overcome other barriers not addressed by the legislation.* The federal government will not provide marketing or technical support at the local level. NYSERDA can fill this gap by ongoing marketing efforts and increased technical support to accommodate the increased demand. For example, it may be necessary to increase the number of qualified HERS raters for the ENERGY STAR Homes. NYSERDA could also provide technical guidance on how to

meet the savings thresholds in new commercial buildings, and could continue to address interconnection and emissions regulations for combined heat and power. While the tax credits may increase the penetration of ENERGY STAR refrigerators, NYSERDA can work with the appliance recycling community to make sure that the older refrigerators they replace do not remain on the market.

- *By developing new programs to complement the tax credits.* Solar water heating is one example.
- *By providing incentives for measures that exceed the levels necessary to receive the federal tax credits.* Such measures would still be eligible for the federal tax credits, so additional incentives from NYSERDA could push efficiency levels even higher.

NEXT STEPS

Awareness and understanding of this complex federal legislation is limited, which NYSERDA could address through a major promotional effort. If the response to such a promotional effort is substantial, NYSERDA would have to have the infrastructure in place to respond to inquiries, direct people to other market actors who can help them, and make sure these other market actors are informed and prepared to help.

Most of these tax credits build on and could be facilitated through existing Energy Smart programs. NYSERDA might want to consider developing programs to help utilities facilitate real-time metering, or for promoting solar water heating.

SOURCES

Nadel, Steven, 2003, "The Federal Energy Policy Act of 2003 and Its Implications for Energy Efficiency Program Efforts," American Council for an Energy-Efficient Economy

Solar Energy News Center (www.solarbuzz.com)

3.7 LINK TO CODES AND STANDARDS SETTING PROCESS

DESCRIPTION

NYSERDA should consider using a portion of SBC funds to help improve building efficiency standards and other standards relating to NYSERDA programs. This would be the ultimate market transformation step, adopting efficiency practices into codes and/or standards where they become part of standard practice for all subsequent buildings. The energy savings from codes and standards involvement can be very large, depending on the measures proposed and the success in having them adopted. In the latest round of Title 24 updates in California, PG&E spent approximately [\$1 million] and helped the state to achieve 10 year savings approaching [1 GW]. These were highly cost effective energy savings.

NYSERDA's new construction programs promote advanced levels of efficiency that extend beyond code minima. Participants tend to be early adopters or more progressive builders/designers. Lessons learned from NYSERDA program experience are essentially early trials of efficiency measures and practices that can be transferred into codes and standards once they become well established, reliable and have substantially penetrated the market. At that point, it makes sense for NYSERDA to apply its program resources into making the standards mandatory for all buildings, rather than continuing expend dollars eliciting program participation by the remaining percentage of the market. Codes and standards measures could ultimately cover most of the efficiency measures developed and promoted through NYSERDA programs.

This strategy has been followed with great success in California, most recently in their update to the 2005 state energy code (Title 24). PG&E's Codes and Standards program, using a team of expert consultants, prepared over a dozen Codes and Standards Enhancement (CASE) initiatives, most of which were adopted into code. They included time dependent valuation of energy savings, residential high efficacy lighting, existing buildings enhancements-upon-replacement (for residential windows and duct sealing), requirements for skylights and automatic controls in big box commercial spaces, cool roofs, etc. The Northwest Energy Efficiency Alliance has also devoted a portion of its resources to supporting upgrades to energy codes in the four northwestern states. This has been done by supporting energy code "champions" who actively participate in each state's code setting and adoption activities.

In New York, responsibility for code development and adoption resides with Dept of State (DoS) in New York. That responsibility extends to all aspects of building codes, so energy standards are a secondary priority. NYSERDA, with primary responsibility for energy efficiency, could be very effective in working with DoS on energy standards updates. The same could be done for national standards, such as those for appliance efficiency and even for EnergyStar. The building energy efficiency standards in NY are based on the national model energy code, the IECC. NYSERDA could either promote state-adopted enhancements (local amendments) to the IECC, or could work through the IECC committees to improve the model code.

ADVANTAGES

This approach to energy efficiency is a logical extension of the incentive- and information-based Energy \$mart programs, which encourage voluntary measures to enhance energy efficiency. It uses one of the most effective mechanisms for changing practices in the traditionally slow-to-change construction industry: codes and standards.

Since building practices were first regulated to reduce fire and structural hazards, this mechanism has been applied to other important public priorities, such as public health (waste water systems), handicapped access, and, more recently, energy efficiency. The current codes and standards applicable to energy efficiency in New York are based on reasonably up-to-date national standards, but there are many more well-established and cost effective energy efficiency practices that are workable in New York and that could be incorporated into those codes standards. With NYSERDA's credibility, technical expertise, and resources, New York's codes and standards could be advanced beyond the "lowest common denominator" levels adopted by national model code bodies. There are numerous advantages to doing this.

- ***Codes and standards requirements become standard practice.*** Once a measure is adopted, it becomes a legal requirement for all new buildings, enforced through the building permit and inspection process. Even without enforcement, licensed architects, engineers and builders have a legal obligation to comply with all applicable codes. Without the backing of codes, measures that may cost more tend to be dropped from construction projects due to cost pressures, even if they are ultimately cost effective. When measures are required by the code, they become standard practice, with designers used to specifying them, installers experienced in installing them, and suppliers stocking the necessary equipment.
- ***Codes and standards bring along the laggards.*** Measures adopted into codes and standards are typically representative of standard "good practice" (it's hard to adopt cutting edge measures into code). Standard good practice means that the majority of building owners and designers have recognized the benefits of the measure and are using it when appropriate in their buildings. Thus, most code requirements do not represent a hardship to most building projects. The primary resistance to new code requirements comes from the less progressive, more cost conscious building projects. Indeed, some of the real laggards must be forced by code to adopt measures that are clearly cost effective, valued by end-users, available and reliable. From NYSERDA's perspective, these people are the hardest to reach with the usual efficiency programs, and may never participate even when strong incentives are offered.
- ***Codes and standards are cost effective.*** NYSERDA may never be able to cost justify incenting these laggards to participate in its programs. At some point, when programs have achieved substantial market penetration, it becomes more cost effective to invest in making measures part of the energy codes and standards, rather than continuing to spend money on incentives and education. The technical resources and time investment to get measures adopted are relatively modest compared to these other costs.
- ***Codes and standards changes are persistent.*** Once a measure is adopted into a code or a standard, it is practically permanent and applies to virtually all new buildings. Unless a particular requirement proves to be unenforceable or unrealistic for people to adopt, it is likely to remain on the books until it is superseded by a more stringent measure. The same cannot always be said of measures that are obtained through incentives; sometimes after the incentives stop, measure adoption also stops, reverting to cheaper and less efficient measures.
- ***Increased emphasis on energy efficiency.*** Because DoS has broad responsibility for all building codes, the energy efficiency aspects tend to have lower priority in

the internal competition for resources. NYSERDA, on the other hand, is the lead agency for energy efficiency, it has great depth of experience and expertise in energy efficiency, and it has resources which could be directed toward improving the efficiency levels required by code. While the issue of experience and expertise is less true for the national model codes (e.g. ASHRAE 90.1) and for EnergyStar standards, NYSERDA's involvement and advocacy could have equally valuable results in helping to optimize those standards for greater energy efficiency in New York.

- ***Relatively low level of effort required.*** Unlike a deployment program, NYSERDA involvement in improving codes and standards would be a relatively small effort. It would require the time commitment of one or two technical experts to participate in the standards setting process (meetings, hearings, drafting and reviewing of language), supplemented as needed by technical consulting studies to document the desirability of proposed enhancements to the standards. There would be no rebates, no marketing materials, no field visits or verification, nor any of the other activities required for a deployment program.

DISADVANTAGES/CHALLENGES

While the concept of strengthening the linkages between NYSERDA programs and codes and standards is sound and has a solid theoretical underpinning in market transformation, the practical aspects of the codes and standards process can pose some disadvantages:

- ***Potential political difficulties.*** There can be opposition to the use of SBC-type funds for supporting a regulatory mechanism like codes and standards. NYSERDA's deployment programs are fundamentally voluntary in nature and provide a "carrot" for participants to improve energy efficiency. Codes and standards, on the other hand, employ a "stick" by requiring compliance through the building permit process. Some people object to anything that adds to the regulatory burden on buildings, even if the requirements are cost effective and widely used already. There is even the odd objection that increases to the stringency of codes makes the job of the procurement programs more difficult, because raising the minimum standards for efficiency forces these programs to push for still higher efficiency, which becomes more difficult and costly. The challenge is to explain that codes and standards have many advantages for transforming building practices, as discussed above, and are therefore a wise investment of SBC resources.
- ***Need for long-term involvement.*** The advances in codes and standards proceed at a slow pace; it is not uncommon for a code update cycle to span anywhere from three to ten years. This means that NYSERDA's involvement in these processes would have to remain consistent and vigorous over time. The challenge will be to maintain the resources and expertise needed to be effective over time and in competition with other NYSERDA priorities.
- ***Outcome depends on actions of other agencies.*** Because NYSERDA does not itself set standards or adopt codes, the effectiveness of this effort ultimately depends upon the actions of others. The challenge will be for NYSERDA's involvement to be seen as valuable by those other agencies, and for its contributions to be persuasive in determining the outcome.
- ***Results can be difficult to measure.*** Unlike a procurement program, the results of a codes and standards enhancement activity may not show up for several years

after the dollars are expended. For example, it may take one or two years of technical effort and advocacy for a code change to be adopted, another couple of years before the code change takes effect, and then several additional years before enough new buildings have been built to the new code for substantial energy savings to be realized. The evaluation challenge is to measure and forecast this stream of future energy savings, and to relate them back to the causal efforts for which the dollars were expended. There are rigorous methods for doing this, but they are different from the normal program measurement and verification procedures that are used, for example, with a simple retrofit program.

IMPLEMENTATION ACTIONS

Increasing NYSERDA's involvement with codes and standards would entail setting aside the resources and personnel to do the job, and setting targets for the best use of those resources.

- ***Setting targets and priorities.*** These will change over time, as different code enhancement processes work through their adoption cycles. Some will offer greater potential energy savings and so will present more inviting targets. The first priority is likely to be New York's own adoption of the IECC national model energy code, because that is the code that directly effects buildings in NYSERDA's domain. An assessment would be made as to whether state-specific enhancements to the model code can be adopted, and what the most valuable enhancements to New York buildings would be. This effort would need to be coordinated with DoS and other stakeholders in the state. A second priority might be the IECC itself, which undergoes an annual cycle of code change proposals and adoptions. This process should be very amenable to NYSERDA participation, although the decision to adopt changes to the IECC are influenced by national stakeholders as well as local. Other priorities and targets to consider would include updates to the EnergyStar standards which influence many appliances and building components, as well as electrical and plumbing model code changes, to the extent they affect energy efficiency measures.
- ***Budgeting staff and dollars.*** The expertise NYSERDA would provide to addressing these targets would depend on the technical details of the measures to be proposed. At the very minimum, however, NYSERDA would need to appoint a lead person who could devote a substantial portion of his/her time to this effort (likely more than half). This person would have to be or become intimately familiar with the agencies and processes that are targeted, and will likely be the point person representing NYSERDA at whatever hearings, meetings and conferences are involved. In addition, there would likely be a need for additional technical expertise to develop specific proposals, which could take the form of consulting contracts (if outside expertise is needed) or internal commitments of staff expertise.
- ***Administration and Evaluation.*** In addition to the technical work, this activity would also entail a modest amount of administrative oversight, to ensure that there is coordination with the other NYSERDA program activities. This coordination should be two-way, with the programs providing recommendations to the code processes and the code activities providing guidance for the programs on how to be better prepared for future code activities. The administration function should also help with the political dimensions of codes and standards activities, by ensuring that regulators, oversight bodies and stakeholders continue

to understand the rationale and recognize the value of the activity. There should also be an evaluation function established at the outset, with a program theory and logic document prepared, on-going data collection of program activities and accomplishments, and estimates of future energy savings developed.

NEXT STEPS

This activity could be started immediately, as it will not require high levels of resources or lead time to develop. The first step in initiating a codes and standards linkage activity is for NYSERDA to decide to do it, and to commit sufficient time and resources. This will require development of an action plan, initial targets, and the resulting budget and staffing needs. At this point, there should also be a request for buy-in from the PSC and NYSERDA management, so that the activity will have the kind of high-level support needed to weather any controversies or challenges should they arise.

SOURCES

3.8 INDUSTRIAL PROCESS IMPROVEMENTS

DESCRIPTION

NYSERDA could seek to increase energy savings in the industrial sector by targeting the most energy-intensive industries, especially small- to medium industrial customers, which tend to have fewer internal resources for such improvements than large industrial customers.

The New York industries with the greatest potential for energy efficiency savings are as follows:

- Chemical manufacturing, NAICS 325, Economic potential in 2007: 1867 GWh
- Alumina & aluminum production & processing, NAICS 3313, Economic potential in 2007: 753 GWh
- Paper manufacturing, NAICS 322, Economic potential in 2007: 621 GWh
- Other chemical product manufacturing, NAICS 3259, Economic potential in 2007: 591 GWh
- Pharmaceutical & medicine manufacturing, NAICS 3254, Economic potential in 2007: 543 GWh
- Primary metal manufacturing, NAICS 331, Economic potential in 2007: 526 GWh
- Machinery manufacturing, NAICS 333, Economic potential in 2007: 515 GWh
- Food manufacturing, NAICS 311, Economic potential in 2007: 421 GWh
- Computer & electronic product manufacturing, NAICS 334, Economic potential in 2007: 343 GWh
- Textile mills, NAICS 313, Economic potential in 2007: 320 GWh

ADVANTAGES

An Optimal Energy study estimates that there are 5,718 GWh of cost-effective savings in 2007 in New York state (including Long Island) in the industrial sector.

With a small- to medium-industrial program as the organizing force, NYSERDA's programs could be better leveraged. Current NYSERDA programs—including Technical Assistance/FlexTech, Energy Smart Loans, Premium Efficiency Motors, Performance Contracting, Innovative Opportunities, Smart Equipment Choices, Commercial Industrial Performance Program, and Peak Load Production (the last three of which are to be combined into the Existing Buildings Program)—address the industrial sector, but most the resources tend to go to the commercial sector.

The most successful industrial programs help customers address energy-efficiency simultaneously with other goals—such as waste stream reduction, increased productivity, and material cost savings.

DISADVANTAGES

The only disadvantages of this approach are the opportunity costs associated with allocation of resources for this activity.

IMPLEMENTATION ACTIONS

In making efficiency improvements that are linked with other improvements, the customer may be used as an expert, and with NYSERDA's help could put together a case to present to the company's CFO for making upgrades. Alternatively, NYSERDA could provide expertise in specific industries. One avenue for this is through the Department of Energy's Industrial Assessment Centers (IAC) Program, offered in New York through Syracuse University. The program involves conducting energy audits or industrial assessments and providing recommendations to small and medium manufacturers to help them identify opportunities to improve productivity, reduce waste, and save energy. The program is restricted to facilities with the following characteristics:

- Within SIC codes 20-39; this includes all the industries listed above that have the most energy saving potential in New York.
- Gross annual sales below \$100 million
- Fewer than 500 employees at the plant site
- Annual utility bills more than \$100,000 and less than \$2 million
- No in-house professional staff to perform the assessment
- Located within 150 miles of the host campus in Syracuse, which includes most of upstate New York.

NEXT STEPS

The availability of experts specializing in key industries would have to be explored, including at Syracuse University. Potential savings and the cost effectiveness of energy efficiency measures in these industries would have to be verified, possibly with the aid of the industry experts.

SOURCES

Industrial Assessment Center, Syracuse University <http://iac.syr.edu/>

Bensch, Ingo, Lori Megdal, George Penn, and Darren Schauf. 2001. "Finding the Promised Land in Non-Energy Programs? An Evaluation of 3 Approaches to Harvest Energy Efficiency from a Non-Energy Program," *Proceedings from the 2001 International Energy Program Evaluation Conference*, pp. 417-426.

Research Into Action, Shel Feldman Management Consulting, Nexus Market Research, and Quantec, LLC, 2002, *Best Practices from Energy Efficiency Organizations and Programs*, Energy Trust of Oregon.

3.9 UTILITY BILL FINANCING

DESCRIPTION

NYERDA should consider championing the creation of a mechanism whereby the financing of investments in equipment to improve the energy efficiency of a building are repaid through the customers' utility bills. Building owners are frequently reluctant to invest in energy efficiency measures for their buildings because the utility bills are paid by tenants and the economic benefits of those savings accrue to the tenants. Commercial tenants are often unable to invest in energy efficiency because capital improvements are owned by and must be approved by the building owner. Both commercial and residential customers are frequently unable or unwilling to take out financing for energy efficiency projects, and to pay off the financing, if they are not sure they will remain in the building for the life of the loan. All of these problems reduce the numbers of energy efficiency upgrades that are made in buildings.

If their energy retailer financed the initial capital costs of the efficiency measures, and the customer repaid these investments in installments through their electricity bills, more customers would be likely to invest in EE measures.

Implementing this opportunity would require establishment of the funding mechanism and of the debt service procedures through the retail electricity providers who are doing the customer billing. This would require the cooperation of the retail providers, and would also likely require authorization by the Public Service Commission. The costs of administering this financing mechanism would also have to be recoverable, with profit, by the providers. As the repayment of the financial obligation should be able to survive a change in the customer who occupies the facility and pays the utility bill, there may also need to be legislation or regulatory authorization for this mechanism to work.

ADVANTAGES

There are numerous advantages to utility bill financing of energy efficiency investments, as described here:

- **Energy cost savings repay the investment.** Perhaps the biggest advantage of utility bill financing of energy efficiency measures is that it removes the so-called "split incentive", whereby one party pays for the investment, while another party realizes the savings on the utility bill.
- **Improve participation of hard-to-reach customers.** The financial barriers to efficiency investments are especially difficult for smaller building owners and low-income customers, who often lack the necessary credit or other financial resources to invest in energy efficiency. Utility bill financing would provide a financing mechanism when there otherwise might not be any for these customers.
- **Reduced loan risk.** Unlike a conventional loan, which either requires collateral or else charges extra-high interest rates to reflect a higher risk, a utility bill financing mechanism could reduce the financing risk. This is because the repayment mechanism would be tied to the monthly utility bill, which seldom defaults because it is such a necessary expense. Also, the loan would be tied to the meter account, and the efficient equipment would be physically installed in the associated building, so the risks of a more conventional equipment loan are minimized (equipment disappearing, owner defaulting, etc.). These reduced

risks should translate into lower interest rates, which will also help this financing mechanism be attractive.

- **Both owner and tenant benefit.** With utility bill financing, under the scenario where the tenant pays the utility bills, the tenant should see a reduction in the monthly utility bill, assuming the efficiency measures installed are cost effective and functional, and despite the extra cost of the finance charge. Once the financing is repaid, the savings will be even larger through the life of the measure. In this scenario, the owner doesn't participate in the investment or in the savings, but does end up with a more valuable property. In the scenario where the owner of the building pays the utility bills, the same benefits accrue. In that case, the tenants will see a financial benefit if the owner passes the savings through to the monthly utility charge embedded in the rent, as well as from the operation of the measure.
- **Financing mechanism could be widely used by programs.** If utility bill financing were implemented, it could be used as an adjunct to virtually all of NYSERDA's programs that currently offer financial incentives or other inducements to customers to implement efficiency measures. The financing could be used for the customer share of the measure cost, rather than depending on customer financing which is limited by the split incentive problem. This could help to make other programs more effective.
- **Could reduce need for rebates and incentives.** Utility bill financing could even help reduce the rebates and other financial incentives that NYSERDA programs currently offer, by helping to reduce the economic barriers to customer investment.
- **Financing could survive change in account ownership.** If the financing mechanism were tied to the meter account, rather than to a particular person, then it would simply transfer to a new tenant or building owner whenever there is a change. The energy savings of the measure show up in the meter account, so the obligation should likewise appear there. The only difficulty with this mechanism would occur if the property disappeared (burned down, demolished, etc.) before the term of the financing ended. This could be handled by placing a lien on the property which would lay claim to a portion of the insurance settlement to repay the loss of the investment. Alternatively, the fund could self-insure against unrecoverable losses through a small surcharge on the finance rate.
- **Moves financing from balance sheet to expenses.** If the financing were done through the meter account, it is likely that building owners could reasonably treat the obligation as part of the utility bill, which is an operating expense rather than a capital liability. This helps to keep their balance sheet unencumbered, and would be substantially advantageous for many businesses. This would not be a factor for private residential customers.

The advantages of utility bill financing make it a very attractive mechanism. It has not been widely adopted, because of the problems that must be overcome to implement it, but in cases where it has been tried (New Hampshire, Oregon) it has been well-received by customers and energy efficiency program implementers.

DISADVANTAGES/CHALLENGES

Despite the numerous advantages of utility bill financing, there are some disadvantages and challenges that would be involved in setting up the necessary mechanisms.

- **Lack of an interested party to champion utility bill financing.** One of the primary reasons this mechanism is not more widely used is that the utilities themselves see little that is in it for them as businesses. It could help reduce load growth, and improve customer satisfaction, but by itself it offers only minor financial rewards. This is especially true if their regulators do not encourage them to implement utility bill financing, and ensure that the utility is made whole for its costs and potential lost revenues. The most likely champions of utility bill financing in New York are NYSERDA and the PSC, through their goal of improving the energy efficiency of buildings. Together, they could invest the time and effort that would be needed to make the mechanism work for all parties.
- **Complications of utility billing mechanisms.** In the recent past, the California Power Authority tried to persuade the utilities and the PUC to adopt a utility bill financing mechanism. The utilities opposed the proposal because they were concerned that the PUC would not allow them to recover their full costs of implementing and servicing the financing, and fearful that their billing systems were not smart enough to handle the extra calculations and line items on customer bills. The first concern could have been addressed by the PUC, but was not. The second concern was either false, or an admission that the utility billing systems were not as capable as those of the telephone company billing systems which routinely handle vastly more complicated billing problems than those presented by utility bills. There was also a concern that there would not be enough projects financed through this mechanism to cover the programming costs to upgrade the billing systems. Ultimately, the proposal was dropped because nobody had the vision or will to overcome the problems. These same kinds of problems can be expected to arise if New York decides to implement utility bill financing, but with clear policy and legal direction from the PSC, they should be addressable. The challenge will be to provide the leadership and will to make this happen.
- **Source of financing.** The source of funds for utility bill financing could come either from the utilities themselves, drawing on their solid financial standing, or from a publicly-created revolving loan fund, or perhaps even from a portion of the SBC funds that NYSERDA manages. Except for a small loss rate, which any such fund must anticipate and which the program could build into the financing structure, the monies could take the form of a revolving fund. As the financing is repaid, the dollars could be circulated back to new efficiency investments. The challenge will be to find and commit the initial pot of financing, and to make sufficiently large, to get the program off the ground.
- **Legal definition of financial obligation.** One of the early legal questions that must be answered in order to put utility bill financing in place is the nature of the financial obligation. In its simplest form, it could be a loan taken out by the owner of the property, with servicing of the loan appearing as a line item on the monthly utility bill. Better would be a utility service obligation, as has been done when the utility charges for equipment such as transformers or water heaters through the monthly bill. Another question is whether the presence of the equipment takes the form of a lien recorded on the property's deed, or whether it

is a simpler obligation attached to the utility bill. These questions and their answers will determine the feasibility of transferring the obligation through to a successor owner of the billing account, or whether the obligation must be closed out or renegotiated every time there is a new tenant or building owner. The challenge will be to provide the most flexible and least onerous form of obligation so that the principle of utility bill financing can be realized.

IMPLEMENTATION ACTIONS

To implement utility bill financing, several institutions must be involved. There must be clear legal authority and mechanisms established. The Public Service Commission must issue orders or authorizations for the retail utility billing companies to implement the mechanisms. The utility billing companies must develop the necessary enhancements to their billing systems, and they must establish suitable holding accounts to keep the financing monies separated from the other monies handled through the billing system. The costs of implementing utility bill financing systems must be established and built into the financing fees so that all parties involved are made whole for their costs, plus a reasonable profit for the extra risks and obligations they would undertake. The financing mechanisms for customers must be implemented with suitable marketing and explanatory materials, and the procedures of other NYSERDA programs that would take advantage of the mechanism must be adjusted. And, of course, there must be sufficient oversight to ensure that the monies are not misdirected.

NEXT STEPS

This opportunity would take leadership and persistence by NYSERDA to make it happen. As mentioned, there are no other stakeholders with a sufficiently strong interest to see it through to realization. The first step would be for NYSERDA to form a working group with legal, financial and regulatory expertise to develop one or more proposals for how utility bill financing would be implemented. This group would first determine what kind of authorization from the PSC would be required, and whether there were any legislative barriers. The group would also set targets for the size of the program and identify sources of funding for the revolving loan fund. If utility bill financing still appears feasible at that point, then the group would initiate discussions to win the support of the PSC and, if successful, would start working with the affected utilities to resolve the logistical problems and estimate costs to implement the financing mechanisms.

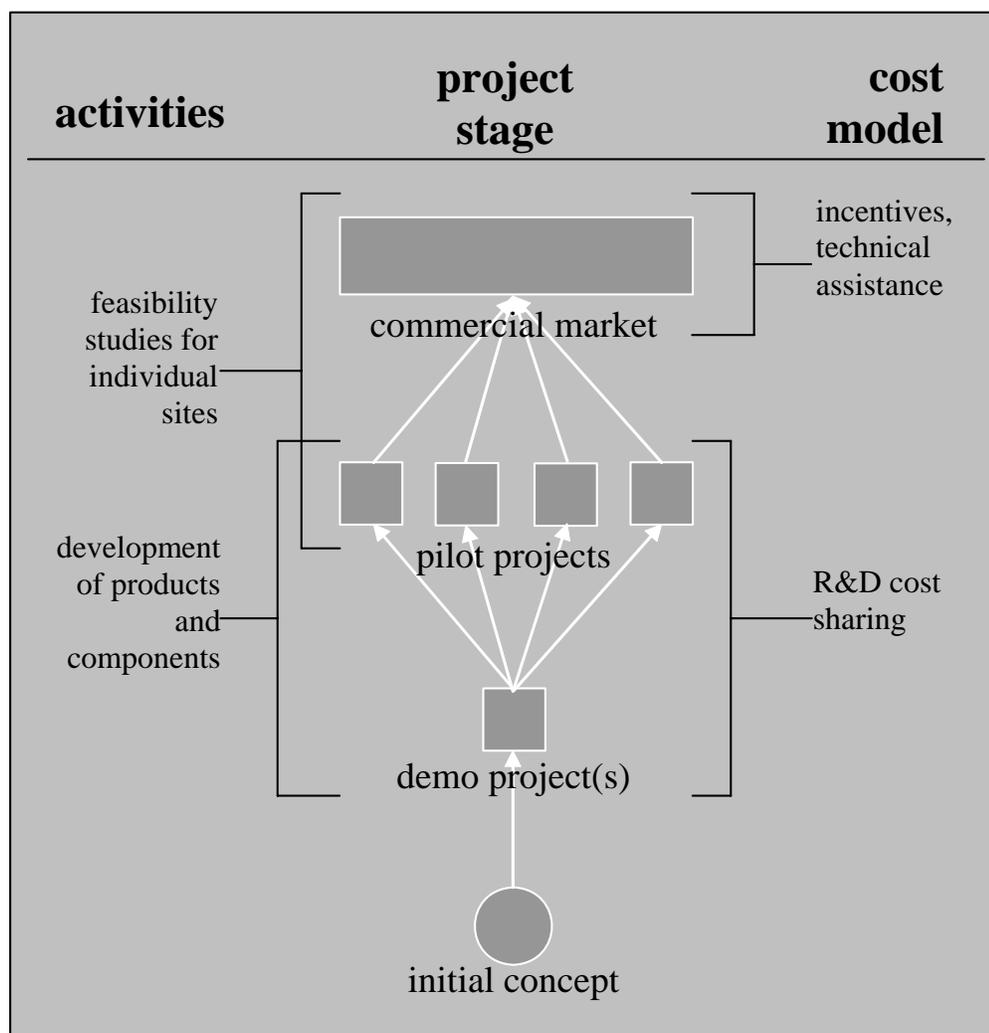
SOURCES

3.10 PROGRESSION OF R&D PROJECTS TO MARKET

DESCRIPTION

We propose that NYSERDA considers the mechanisms by which developing EE technologies move from R&D programs to full market implementation. These mechanisms are not formally defined, but the process involves at least the following stages:

Figure 2. Process of Moving from R&D to Market



One paragraph description of the issue. Discuss the rationale for the recommendation. If applicable, briefly identify the market actors that are impacted by this opportunity.

ADVANTAGES

It may be possible, however, to achieve quicker transition to market, or more successful pilot projects by using the client databases and marketing methods of the market

transformation programs, rather than only using those of the R&D programs. This would entail a more deliberate linkage between R&D and the deployment programs.

Energy savings would accrue from the cost savings to NYSERDA, which would allow funds to be spent on other programs.

The current R&D program approaches to technology commercialization appears to follow this general approach in many cases, so this suggestion may not be entirely new, but an opportunity exists to make the process quicker, more efficient and more thorough.

It may also be possible to use a defined set of criteria to judge the potential of a technology to make the leap to the commercial market, or at least to the next stage of the progression to market. Making these judgments early would help to minimize the time to market, thus reducing NYSERDA's costs. Alternatively, these criteria could help to identify technologies that are unlikely ever to reach the commercial market, and could be dropped from NYSERDA's programs.

These criteria could include, for instance:

- Potential energy savings in kWh/yr/\$
- Potential cost savings to NYSERDA / NYS in \$/\$
- The potential eventual size of the market for the product
- The expected speed and cost of transition to full market viability

DISADVANTAGES / CHALLENGES

It would be necessary to ensure close collaboration between R&D project staff and implementation project staff; this would require regular meetings and a regular formal review of projects

Databases to track project progress and project contacts such as manufacturers, potential users, and codes and standards contacts would need to be shared between the R&D and implementation programs.

IMPLEMENTATION ACTIONS

A single database, or complementary databases for R&D and implementation programs needs to be created

Responsibility for organizing and scheduling meetings needs to be assigned to a member of staff.

NEXT STEPS

We suggest that NYSERDA consider what administrative links currently exist between R&D programs and the relevant market transformation programs, and whether the status of each particular project (e.g. demonstration stage, pilot stage) is currently defined. Precise definitions for project status should be taken from the R&D logic model being developed as part of this evaluation.

Case studies of previous transitions from R&D to market implementation should be written and discussed. Both "successful" and "unsuccessful" examples could be described.

SOURCES

No appraisals of best practice have been made in this area. It does not appear that any other organizations make the transition from R&D to deployment any better than NYSERDA does.

3.11 REFRIGERATOR RECYCLING PROGRAM

DESCRIPTION

There is an opportunity to implement a statewide Refrigerator Recycling program that has potential synergies with the Keep Cool Program.

The New York Power Authority (NYPA) has just concluded an eight-year Refrigerator Recycling program for the New York City Housing Authority (NYCHA). The program replaced approximately 181,000 old, inefficient refrigerators at public housing with new energy-efficient units. The program is expected to save the Housing Authority and New York City taxpayers \$7.2 million annually in electricity costs.

There are various other similar programs: some programs will provide incentives for trade-ins in connection with ENERGY STAR® refrigerators, others provide vouchers for new units, and other programs pay for the pick-up of units without requiring the purchase of new efficient units. The benefit of the NYPA/NYCHA option is that the infrastructure for the program exists in New York State.

ADVANTAGES

As with the Keep Cool program, the emphasis for a NYSERDA Refrigerator Recycling Program would be a bounty for turning-in old working refrigerators at the time of purchase (or with proof of purchase) of a new efficient unit. The program activities would include demanufacturing of the units. The program benefits include:

Energy savings - through the removal of working inefficient refrigerators and freezers.

Reduction of landfill use - through recycling of all components of refrigerators and freezers. The scrap metal from the refrigerators can be sold to a resource recovery or waste management company.

Environmental protection – through recovery of ozone-damaging CFCs and HCFCs, dangerous PCBs and mercury.

CHALLENGES AND UNCERTAINTIES

The primary concern for NYSERDA at this point is to have a better estimate of costs associated with demanufacturing the units. There are several costs associated with dismantling the refrigerators. The issue is complicated by the fluctuating markets for the recycled products, based on supply and demand.

There are currently two types of refrigerant that are recovered from the units: R-12 and R-134A. Depending on the purity or contamination of the R-12 its value ranges from a disposal cost of up to \$3 cost per pound to a revenue of up to \$8 per pound. R-134A has no value and costs up to \$3 per pound if contaminated. More and more of the recycled refrigerators have R-134A. The percentage of R-134A units will increase over time, therefore increasing the associated costs to the program. Disposal costs for compressor oils range from \$150 to \$300 per 55 gallon drum plus additional transportation costs.

The table presented at the end of this section identifies the costs and revenues associated with refrigerator recycling on a per unit basis. These estimates were provided by Dennis Flack of CSGServices, New York, the NYPA/NCYHA program implementer.

IMPLEMENTATION ACTIONS

The program should be implemented through a third-party contractor. NYSERDA should pursue the option of working with the existing Keep Cool program implementation contractor. CSGS implemented the program for NYPA and has worked with NYSERDA on the Keep Cool Program.

NEXT STEPS

NYSERDA should decide whether to implement a Refrigerator Recycling program. The next step would be to determine the program budget and contract with a program implementation firm.

Recycled Materials		range per unit	ave	cost	revenue
Compressor Oils (55 gallons)				\$150 to \$300/drum	
Freons	R-12 (lbs.)	0.2 to 1.0	0.3	up to \$3/lb.	\$8/lb.
	R-134a (lbs.)	0.2 to 0.6		up to \$3/lb.	
Scrap Metal	Aluminum (lbs.)	1.0 to 8.0	2.0		\$0.35 to \$0.55/lb.
	Cu (lbs.)	0.5 to 1.0			\$0.45 to \$0.65/lb.
	Refrigerator weight & scrap price:	150 to 250 lbs			\$15 to \$50/ton

3.12 SMALL COMMERCIAL LIGHTING PROGRAM

DESCRIPTION

We propose that NYSERDA consider implementing a Small Commercial Direct- Install Lighting Program that is targeted to the hard-to-reach non-residential sector.

As the name implies, a Direct Install Program consists of direct installations of replacement fixtures that are more energy efficient than the existing system. Typical installations are T-8 replacements for T-12s and CFLs for incandescent lamps. The program should be contractor driven, meaning that an electrical contractor would contact the customers, install the equipment and complete all the paper work.

The program targets very small commercial customers. We consider these customers the under-served or hard-to-reach non-residential sector. These customers typically do not participate in rebate programs or performance contracting programs because they are focused on running their business. They are often retailers who spend most of the work week at the store. There is also potentially a language barrier with this segment of the market.

The current SCLP works with trade allies to implement the program, including designers, contractors, manufacturers and distributors. The program offers training, tools, design assistance and incentives to the trade allies.

ADVANTAGES

The advantage of this program is that it reaches a typically under-served segment of the market, as described above. A Direct Install program tends to have a relatively high net-to-gross ratio because these participants are not likely to implement the measures on their own.

CHALLENGES

The challenges to implementing this program will be in addressing the market barriers associated with this segment of the market. The barriers can be minimized if a primary contractor is retained for the program who can sell the benefits of the program to the target market. As mentioned above, language barriers may present unique challenges to this element of the commercial lighting program. Since this segment is really very similar to the residential sector, it may be helpful to utilize some of the strategies employed in the residential program area.

A disadvantage to this approach is that the cost per kWh savings may be high relative to other programs.

IMPLEMENTATION ACTIONS

The program should be able to be implemented through the existing commercial lighting programs.

In order to implement the program, NYSERDA staff will need to:

- Identify measures to be implemented, such as T-8s, CFLs, and occupancy sensors.
- Identify mechanism – hire contractors to implement the program

- Develop application forms, program database, and other program infrastructure.
- Define target market – if necessary describe the procedure for targeting the market in phases.

NEXT STEPS

NYSERDA should decide whether to incorporate a Small Commercial Lighting Direct Install program into the B&I Lighting Program Area. The next step would be to determine the program budget, identify measures and hire or assign staff to develop and implement the program.

If necessary, the HMG team can work with the NYSERDA commercial lighting staff to estimate the potential program market size and achievable energy savings.

SOURCES

3.13 UTILITY BILL FINANCING

DESCRIPTION

NYERDA should consider championing the creation of a mechanism whereby the financing of investments in equipment to improve the energy efficiency of a building are repaid through the customers' utility bills. Building owners are frequently reluctant to invest in energy efficiency measures for their buildings because the utility bills are paid by tenants and the economic benefits of those savings accrue to the tenants. Commercial tenants are often unable to invest in energy efficiency because capital improvements are owned by and must be approved by the building owner. Both commercial and residential customers are frequently unable or unwilling to take out financing for energy efficiency projects, and to pay off the financing, if they are not sure they will remain in the building for the life of the loan. All of these problems reduce the numbers of energy efficiency upgrades that are made in buildings.

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Implementing this opportunity would require establishment of the funding mechanism and of the debt service procedures through the retail electricity providers who are doing the customer billing. This would require the cooperation of the retail providers, and would also likely require authorization by the Public Service Commission. The costs of administering this financing mechanism would also have to be recoverable, with profit, by the providers. As the repayment of the financial obligation should be able to survive a change in the customer who occupies the facility and pays the utility bill, there may also need to be legislation or regulatory authorization for this mechanism to work.

ADVANTAGES

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- **Energy cost savings repay the investment.** Perhaps the biggest advantage of utility bill financing of energy efficiency measures is that it removes the so-called "split incentive", whereby one party pays for the investment, while another party realizes the savings on the utility bill.
- **Improve participation of hard-to-reach customers.** The financial barriers to efficiency investments are especially difficult for smaller building owners and low-income customers, who often lack the necessary credit or other financial resources to invest in energy efficiency. Utility bill financing would provide a financing mechanism when there otherwise might not be any for these customers.
- **Reduced loan risk.** Unlike a conventional loan, which either requires collateral or else charges extra-high interest rates to reflect a higher risk, a utility bill financing mechanism could reduce the financing risk. This is because the repayment mechanism would be tied to the monthly utility bill, which seldom defaults because it is such a necessary expense. Also, the loan would be tied to the meter account, and the efficient equipment would be physically installed in the associated building, so the risks of a more conventional equipment loan are minimized (equipment disappearing, owner defaulting, etc.). These reduced

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- **Financing mechanism could be widely used by programs.** If utility bill financing were implemented, it could be used as an adjunct to virtually all of NYSERDA's programs that currently offer financial incentives or other inducements to customers to implement efficiency measures. The financing could be used for the customer share of the measure cost, rather than depending on customer financing which is limited by the split incentive problem. This could help to make other programs more effective.
- **Could reduce need for rebates and incentives.** Utility bill financing could even help reduce the rebates and other financial incentives that NYSERDA programs currently offer, by helping to reduce the economic barriers to customer investment.
- **Financing could survive change in account ownership.** If the financing mechanism were tied to the meter account, rather than to a particular person, then it would simply transfer to a new tenant or building owner whenever there is a change. The energy savings of the measure show up in the meter account, so the obligation should likewise appear there. The only difficulty with this mechanism would occur if the property disappeared (burned down, demolished, etc.) before the term of the financing ended. This could be handled by placing a lien on the property which would lay claim to a portion of the insurance settlement to repay the loss of the investment. Alternatively, the fund could self-insure against unrecoverable losses through a small surcharge on the finance rate.
- **Moves financing from balance sheet to expenses.** If the financing were done through the meter account, it is likely that building owners could reasonably treat the obligation as part of the utility bill, which is an operating expense rather than a capital liability. This helps to keep their balance sheet unencumbered, and would be substantially advantageous for many businesses. This would not be a factor for private residential customers.

The advantages of utility bill financing make it a very attractive mechanism. It has not been widely adopted, because of the problems that must be overcome to implement it, but in cases where it has been tried (New Hampshire, Oregon) it has been well-received by customers and energy efficiency program implementers.

DISADVANTAGES/CHALLENGES

Despite the numerous advantages of utility bill financing, there are some disadvantages and challenges that would be involved in setting up the necessary mechanisms.

- **Lack of an interested party to champion utility bill financing.** One of the primary reasons this mechanism is not more widely used is that the utilities themselves see little that is in it for them as businesses. It could help reduce load growth, and improve customer satisfaction, but by itself it offers only minor financial rewards. This is especially true if their regulators do not encourage them to implement utility bill financing, and ensure that the utility is made whole for its costs and potential lost revenues. The most likely champions of utility bill financing in New York are NYSERDA and the PSC, through their goal of improving the energy efficiency of buildings. Together, they could invest the time and effort that would be needed to make the mechanism work for all parties.
- **Complications of utility billing mechanisms.** In the recent past, the California Power Authority tried to persuade the utilities and the PUC to adopt a utility bill financing mechanism. The utilities opposed the proposal because they were concerned that the PUC would not allow them to recover their full costs of implementing and servicing the financing, and fearful that their billing systems were not smart enough to handle the extra calculations and line items on customer bills. The first concern could have been addressed by the PUC, but was not. The second concern was either false, or an admission that the utility billing systems were not as capable as those of the telephone company billing systems which routinely handle vastly more complicated billing problems than those presented by utility bills. There was also a concern that there would not be enough projects financed through this mechanism to cover the programming costs to upgrade the billing systems. Ultimately, the proposal was dropped because nobody had the vision or will to overcome the problems. These same kinds of problems can be expected to arise if New York decides to implement utility bill financing, but with clear policy and legal direction from the PSC, they should be addressable. The challenge will be to provide the leadership and will to make this happen.
- **Source of financing.** The source of funds for utility bill financing could come either from the utilities themselves, drawing on their solid financial standing, or from a publicly-created revolving loan fund, or perhaps even from a portion of the SBC funds that NYSERDA manages. Except for a small loss rate, which any such fund must anticipate and which the program could build into the financing structure, the monies could take the form of a revolving fund. As the financing is repaid, the dollars could be circulated back to new efficiency investments. The challenge will be to find and commit the initial pot of financing, and to make sufficiently large, to get the program off the ground.
- **Legal definition of financial obligation.** One of the early legal questions that must be answered in order to put utility bill financing in place is the nature of the financial obligation. In its simplest form, it could be a loan taken out by the owner of the property, with servicing of the loan appearing as a line item on the monthly utility bill. Better would be a utility service obligation, as has been done when the utility charges for equipment such as transformers or water heaters through the monthly bill. Another question is whether the presence of the equipment takes the form of a lien recorded on the property's deed, or whether it

is a simpler obligation attached to the utility bill. These questions and their answers will determine the feasibility of transferring the obligation through to a successor owner of the billing account, or whether the obligation must be closed out or renegotiated every time there is a new tenant or building owner. The challenge will be to provide the most flexible and least onerous form of obligation so that the principle of utility bill financing can be realized.

IMPLEMENTATION ACTIONS

To implement utility bill financing, several institutions must be involved. There must be clear legal authority and mechanisms established. The Public Service Commission must issue orders or authorizations for the retail utility billing companies to implement the mechanisms. The utility billing companies must develop the necessary enhancements to their billing systems, and they must establish suitable holding accounts to keep the financing monies separated from the other monies handled through the billing system. The costs of implementing utility bill financing systems must be established and built into the financing fees so that all parties involved are made whole for their costs, plus a reasonable profit for the extra risks and obligations they would undertake. The financing mechanisms for customers must be implemented with suitable marketing and explanatory materials, and the procedures of other NYSERDA programs that would take advantage of the mechanism must be adjusted. And, of course, there must be sufficient oversight to ensure that the monies are not misdirected.

NEXT STEPS

This opportunity would take leadership and persistence by NYSERDA to make it happen. As mentioned, there are no other stakeholders with a sufficiently strong interest to see it through to realization. The first step would be for NYSERDA to form a working group with legal, financial and regulatory expertise to develop one or more proposals for how utility bill financing would be implemented. This group would first determine what kind of authorization from the PSC would be required, and whether there were any legislative barriers. The group would also set targets for the size of the program and identify sources of funding for the revolving loan fund. If utility bill financing still appears feasible at that point, then the group would initiate discussions to win the support of the PSC and, if successful, would start working with the affected utilities to resolve the logistical problems and estimate costs to implement the financing mechanisms.

SOURCES

3.14 OPPORTUNITIES CONSIDERED BUT DROPPED

These are the opportunities that the team has decided not to pursue, either because they are not viable, or because they are already covered by other NYSERDA programs.

Table 2 Opportunities Considered but Dropped

Name	Description	Reason dropped
Utility Data Availability	Consider major effort to gain access to utility customer/billing data	Legal concerns, need for major PSC or even legislative action to implement
Consumer Education – Outreach Program	Consider a focus on the grade school and high school opportunities. The type of education can include curriculum development that is geared toward teachers or educational activities that are directed at the students themselves. Community-based organizations could be engaged to assist in the program.	NYSERDA is about to sign a contract for K-12 education
Code Official Training	New York adopted the International Energy Conservation Code (IECC) in July of 2002. Training of local code officials could help assure that the codes are adhered to for residential new construction.	Effort like this already underway with cooperation of DoS
Building Commissioning / Recommissioning	Consider developing and implementing a program to promote building commissioning / recommissioning, to help ensure that buildings perform up to expected design parameters	This happens within existing programs – esp. New Construction
Agricultural process efficiency	Consider funding research, development and/or demonstration projects for agricultural process efficiency	NYSERDA already does this
Low head hydro	Consider feasibility studies into small hydro projects for distributed generation	NYSERDA already does this
Master Metering	Many buildings only a single ‘master’ electricity meter, and each tenant pays a fixed percentage. Consequently tenants have no incentive to save energy because they receive only a fraction of the benefit	Dependent on leasing practices, not on hardware. NYSERDA exploring technologies that could reduce costs
Tailor EnergyStar homes requirements to NY climate	Energy savings could be increased by ensuring that home design is optimized for NY weather	NYSERDA already does this