

Pennsylvania Coalition for Demand Resources

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SUBJECT: Comments of the Pennsylvania Coalition for Demand Resources on the
Staff's Proposed Outline of the DSR Working Group Report
Docket M-00061984

DATE: March 9, 2007

COPIES: Shane Rooney, Karen Moury, Cal Birge, Tom Charles, Chuck Covage, Paul Diskin

Thank you for the opportunity to comment on draft outline of the Demand Side Resources Working Group report prepared by Staff for the February 23, 2007 meeting. These comments represent the work of an on-going coalition of stakeholders in the DSR Working Group that we have named the Pennsylvania Coalition for Demand Resources. The members, many of whom have signed on to this report, sought to build consensus around the issues raised during the DSR Working Group.

We would like to offer four major comments to the Staff draft outline. We have also attached a revised version of our suggested outline for the report that addresses our recommendations on these issues.

1. To accomplish the Commission's goal of mitigating customer rates, the DSR Working Group report needs to establish strong measurable goals.

The Commission implemented this investigation in large part to explore the potential of various demand-side programs to mitigate customer rates. One of the objectives in the Staff outline is to “[m]aterially impact wholesale energy prices...” The Working Group should ask itself what level of rate mitigation would the Commission consider a success? If the recommendations of the Working Group are implemented and we see customer bills decline by twenty five cents a year, will the Commission consider that a success? Or is the Commission looking to mitigate customer bills at a level far in excess of twenty five cents a year? Determining that will allow the Working Group to design the level of program activity (and program budget) required to support those goals. Of course the goals can be set yearly if there is reluctance to rely on predicting market conditions too far into the future as long as there is a process to set and evaluate goals on a scheduled basis. Our proposed goals are ambitious but they are reasonable and achievable provided the Commission puts Pennsylvania on the right track and provides the policies and support needed to accomplish them.

Our recommendations for the goals of this demand-side effort are contained in Part 1 on pages 1-2 of the attached outline.

2. The DSR Working Group Report should call for an independent third-party, not the utilities, to manage and implement demand side programs.

We strongly believe that Pennsylvania will develop meaningful levels of demand-side resources only if the Commission creates a new model of managing these programs. We recommend that the Commission support the model of Efficiency Vermont and the Energy Trust of Oregon, where an independent organization receives the public benefits charges collected by the utilities and delivers programs under the oversight of the Public Utility Commission. This is the only way that the program manager would have the clear and exclusive mission of saving energy. This is also the only way to develop consistent programs across the Commonwealth and to quickly grow the expertise of the program manager.

The work of the Independent Statewide Program Administrator would be subject to the close oversight of the Commission. The Independent Statewide Program Administrator, with input from interested parties and stakeholders, would develop and propose an annual program plan and an annual budget that the Commission would review and approve. Funds could not be expended and program activities could not take place unless provided for in an approved program plan and budget. The Independent Statewide Program Administrator would have regular reporting to the Commission and interested parties and the Commission would have oversight of the program activity. Program results would be verified by independent evaluation and the programs would be adjusted to be more effective. .

Our recommendations for the Independent Statewide Program Administrator and other administrative issues are contained in Part 2 on pages 2-3 of the attached outline.

3. The DSR Working Group Report needs to recommend an initial set of specific energy conservation and efficiency, demand response and education programs.

The Commission's Order which initiated this investigation explicitly asked for specific recommendations for programs that were known to be effective and that were ready to be implemented with little further work.

Our recommendations for specific energy conservation and efficiency, demand response and education programs are contained in Part 4 on pages 4-6 of the attached outline. Appendix 1, which starts on page 8, is a narrative report describing the five residential programs we recommend. Appendix 2, starting on page 22, describes the commercial, industrial and institutional programs that we recommend. The programs recommended by the demand response committee can be inserted in this section. We have proposed a few key principles for the demand response section. The third and final subsection of the program recommendations are the education programs, which both general education and specific marketing of operating programs. Appendix 3, starting on page 30, describes the key education issues.

4. The DSR Working Group Report should support a rate mechanism that provides utilities with full and prompt cost recovery of demand resource program payments made by utilities to the Independent Statewide Program Administrator pursuant to a Commission-approved annual program plan and budget. The rate mechanism should also allow utilities to recover revenues that have been lost due to energy savings that have been shown to be the result of the demand side resource programs.

We support a rate mechanism that allows utilities to recover their payments to the Independent Statewide Program Administrator for demand resource programs. We also support a limited form of decoupling that allows the utilities to recover revenues that program evaluation has shown to be lost due to the demand resource programs. However, we do not support complete decoupling based on other factors such as temperature, economic activity and other factors that cause sales to change.

Our recommendations for the rate treatment of program expenditures and lost revenues are contained in Part 5 on pages 7-8 of the attached outline.

DRAFT OUTLINE OF THE
PENNSYLVANIA COALITION OF DEMAND RESOURCES
FOR THE
DEMAND SIDE RESOURCES WORKING GROUP REPORT
March 9, 2007

1) Introduction and Goals

- a) Introduction. Energy conservation and efficiency and demand response, if implemented effectively and at the appropriate scale, would have a major, direct and immediate impact on energy prices and would help make consumers' energy bills more affordable. These demand side resources also have substantial environmental benefits and reduce consumers' exposure to environmental compliance costs now and in the future. By setting explicit goals, the Commission communicates to all the scale and focus of the effort that is expected and required. The performance goals listed below are ambitious but they are reasonable, achievable and consistent with the goals of other state policies or national reports on energy conservation and demand resources.

- b) Performance Goals
 - (1) To reduce total electricity consumption in Pennsylvania by 1.5% per year beginning in 2010 and through 2020.
 - (2) To reduce total natural gas consumption in Pennsylvania by 2.0% per year beginning in 2010 and through 2020.
 - (3) To develop by 2010 and maintain the ability to reduce peak electrical demand by 10% through demand response measures.

- c) Other Goals
 - (1) To recognize energy conservation and efficiency and demand response as the highest-priority energy resource in all energy resource acquisition.
 - (2) To make a strong, long-term commitment to implement cost-effective energy conservation, efficiency and demand response as a resource.
 - (3) To broadly communicate to Pennsylvania residential, commercial, industrial and institutional ratepayers the benefits of and opportunities for energy conservation and efficiency and demand response through education and information campaigns.
 - (4) To promote sufficient, timely, stable program funding to deliver energy conservation, efficiency and demand response where cost-effective.

- (5) To review and adopt policies to align utility incentives with the delivery of cost-effective energy conservation, efficiency and demand response and to modify ratemaking practices to promote energy conservation and efficiency investments.

2) Implementation

a) Administration

- (1) Energy conservation and efficiency, demand response and energy education programs in Pennsylvania should be deployed and managed on a statewide basis by an independent organization (the “Independent Statewide Program Administrator”) that operates under the supervision and control of the Commission.
- (2) The Commission and the DSR Working Group (with representatives from electric distribution companies, natural gas distribution companies, electricity generation and natural gas suppliers, Commission Staff, the Office of Consumer Advocate, the Office of Small Business Advocate, the Pennsylvania Department of Environmental Protection, customer groups (for both residential, business and industrial customers), conservation/efficiency/demand response service providers, environmental groups, etc.) should identify the requirements for the Independent Statewide Program Administrator and design a process for creating or selecting an entity to serve as Independent Statewide Program Administrator to manage the conservation, demand response and education programs in Pennsylvania. The Independent Statewide Program Administrator would be responsible to designing the deployment of the programs and selecting contractors to assist in this deployment. Pennsylvania’s utilities, if they are interested, would be eligible to serve as contractors to the Independent Statewide Program Administrator for program deployment. The Commission’s recent experience in developing the AEPS program management functions can serve as a model for this.
- (3) The Commission and the DSR Working Group should prepare and the Commission should adopt bylaws and detailed procedures for the Independent Statewide Program Administrator. The procedures would include a process by which the Independent Statewide Program Administrator prepares, with input from interested persons and stakeholders, an annual program plan and an annual budget. The annual plan and budget would be reviewed by the Commission and approved. Funds could not be expended by Independent Statewide Program Administrator and program activities could not take place unless provided for in an approved program plan and budget. The Commission and the DSR Working Group should also establish program oversight requirements for reporting, auditing and evaluation.
- (4) The Commission and the DSR Working Group should prepare and the Commission should adopt a list of pre-approved energy conservation, efficiency, demand response and education programs for each customer class. These will serve at the starting

point for the first year's annual program plan that the Independent Statewide Program Administrator will prepare and submit for Commission approval.

- (5) We expect that over time, the utility Low Income Usage Reduction Programs should become the responsibility of the Independent Statewide Program Administrator. The funding level and the services to low income consumers should not be reduced as a result of moving this program to the Independent Statewide Program Administrator.

b) Funding Levels and Program Budgets

- (1) The Commission should establish a System Benefits Charge for assessing and collecting funds for the Independent Statewide Program Administrator for energy conservation and efficiency, demand response and education.
- (2) The level of the Systems Benefits Charge should be adjusted each year in the annual program plan and annual budget that is proposed by the Independent Statewide Program Administrator and approved by the Commission. Those funding levels will reflect the time needed to ramp-up program delivery capabilities and the level of effort needed to meet the goals. We expect the funding levels for energy conservation and efficiency, demand response and education programs to grow to approximately 2.0 % of utility revenues by the third year of the programs and thereafter.

c) Evaluation

- (1) Evaluation is critical in determining the effectiveness of the programs and their impact on statewide energy demand. Evaluation is also the primary vehicle for uncovering opportunities for improving the programs from year to year.
- (2) Evaluation must be a critical component of the program from the start and should be addressed in the initial program designs.
- (3) Evaluation must be conducted by independent third-parties and made public to guarantee transparency and accountability.
- (4) Projected budget for evaluation must be sufficient to determine which programs and program delivery approaches, including contractors and technology, are cost-effective.

3) Automated Metering Infrastructure

a) Key Principles

- (1) The Commission and the DSR Working Group should prepare and the Commission should adopt generic AMI technical standards for information sharing,

communication protocols, data architecture and other necessary and appropriate aspects of AMI. The Commission should also establish standards and procedures for the recovery of AMI costs. The utilities should file AMI plans and budgets for Commission review and approval. These plans need to report on current metering system and changes needed to bring current system up to the Commission's AMI standards.

- (2) To ensure that consumers have the ability to independently take actions to control their consumption or to review their consumption histories, the Commission should specifically recognize that consumers have the right to easily access, download, and share all of their metering data. These rights should be guaranteed without regard to metering infrastructure. Utilities and the Independent Program Administrator should have a right to use customer consumption data to support all legitimate, regulated activities. Consumers should have a right to give permission to allow third-parties to access their information for purposes of providing demand side services to the consumer.

b) Recommendations for AMI Standards

- (1) The AMI technical standards should require two-way communication to allow for future programs that automatically cycle equipment.
- (2) The AMI technical standards should require the capability of consumer-friendly display of current and past data on consumption, load and pricing.

4) Programs

a) **Introduction**

- (1) The Commission should use a multi-year planning cycle for programs. Programs should be approved and funded for more than one year. If programs are funded for just one year, there can be significant disruption in the energy efficiency marketplace that will undermine long-term transformation in the market. This is particularly true if programs are initially under-funded, so that funding runs out after only a short time. A three to five year planning cycle may provide a good balance of program responsiveness and flexibility on one hand, and market stability on the other. Whether directly as a part of program design or indirectly as a matter of the marketplace, effective programs will rely upon a network of energy efficiency allies and service providers. These include manufacturer representatives, lighting contractors, design engineers, and traditional ESCOs. These entities can only promote the program effectively if they know that the funding will be available at the end of their sales cycle. Many projects, particularly ESCO performance contracts, have very long sales cycles. Also, some programs might require several years to achieve cost-effectiveness and it is important to allow a reasonable "development" period for programs to take hold.

- (2) The Commission should focus on the program portfolio rather than individual programs. The Independent Statewide Program Administrator should be given a set of cost-effectiveness and portfolio impact goals and guidance on the mix of programs. This guidance might include: (a) the portfolio of programs must be cost effective (based on Total Resource Cost or other tests); (b) the program mix should allow all customer classes to be served; and (c) effort should be made to serve hard-to-reach customers like low-income residential and small commercial customers.
- (3) Demand side resource programs should seek to maximize overall energy efficiency regardless of the fuels involved. For example, micro-combined heat and electric power systems for homes and cogeneration systems for commercial and industrial customers have significantly higher overall efficiency levels than traditional electricity generation and heating systems. Technologies such as these, when they provide higher efficiency levels, should be part of the portfolio of energy conservation programs.

b) Energy Conservation/Efficiency Programs

Appendix 1 of this outline is the narrative description of five residential energy conservation and efficiency programs that we recommend to the Commission. Appendix 2 is the narrative descriptions of the commercial and industrial programs that we recommend to the Commission. These are the initial core proven programs that should be deployed promptly. Over time the programs will evolve and new strategies will be developed and implemented. The outline sections below simply list the title of each recommended program. More information about each program is available in the appendices.

(1) Residential Programs

- (1) Residential New Construction (“ENERGY STAR Qualified New Homes”)
- (2) Existing Homes (“Home Performance with ENERGY STAR”)
- (3) Residential HVAC
- (4) Cool Roofs (Reflective ENERGY STAR qualified roof coatings & roofing materials)
- (5) ENERGY STAR Products (Lighting, Appliances & Windows)

(2) Commercial / Industrial / Institutional Programs

- (1) C&I New Construction
- (2) C&I Retrofit and Replacement

- (3) Schools and Government Facilities – New Construction and Retrofit
- (4) Third Party Programs
- (5) Comprehensive Nonresidential Retrofit Program

c) Demand Response Programs

These are the initial core proven demand response programs that should be deployed promptly. Over time the programs will evolve and new strategies will be developed and implemented. The demand response programs should be linked to the demand response initiatives and products at PJM. The demand response programs managed by the Independent Statewide Program Administrator should complement these PJM programs.

(1) Residential Demand Response Programs

- (1) Time-of-Use rates
- (2) Control of HVAC systems and pool pumps

(2) Commercial / Industrial / Institutional Demand Response Programs

- (1) Time-of-Use rates
- (2) Control of Equipment

d) Education Programs

(1) Residential educational programs

- (1) General education about energy conservation and efficiency, demand response and AMI.
- (2) Specific marketing of energy conservation, efficiency and demand response programs to encourage participation in these programs.

(2) Commercial / Industrial / Institutional Educational Programs

- (1) General education about energy conservation and efficiency, demand response and AMI. Different educational approaches will be appropriate for small C&I customers and for larger C&I customers.
- (2) Specific marketing of energy conservation, efficiency and demand response programs to encourage participation in these programs.

5) Cost Recovery

- a) Key Principles for Energy Conservation and Efficiency, Demand Response and Education Cost Recovery
 - (1) Decoupling should only be considered as part of a package of cost-effective utility-funded energy efficiency and conservation measures.
 - (2) Decoupling is not an end in itself, but is a means to prevent revenue and profit loss to utilities from utility-funded energy efficiency and conservation programs that reduce overall utility costs and customer rates. The goal is to encourage and deliver cost-effective energy efficiency and conservation measures, not simply to insulate the utility revenue stream from all changes.
 - (3) Decoupling should follow, not precede, the establishment of significant, cost-effective utility-funded energy efficiency and conservation programs.
 - (4) Decoupling programs must benefit customers as well as utilities. An appropriate model might be the New Jersey natural gas settlements that were presented to the DSR Working Group on December 8, 2006. In the New Jersey program, lost revenues are recovered through reconciliation after the first year of the conservation program implementation. In addition, any recovery by the utility of weather-normalized incremental revenue must be matched by actual gas cost savings to consumers resulting from the utility's demand side resource programs. For more information, see *Petitions of South Jersey Gas Company and New Jersey Natural Gas Company*, Docket Nos. GR05121019 and GR05121020 (NJBPU Order, October 12, 2006).
 - (5) The decision of whether or not to go forward with decoupling by Pennsylvania's natural gas and electric distribution companies should be made by the Commission on a comprehensive policy basis. The decision of whether to implement decoupling cannot be left solely to the discretion of individual utilities on a purely voluntary basis. If it is, then only utilities with declining sales (or declining revenue per customer) are likely to implement decoupling; and utilities with increasing sales (or increasing revenue per customer) will likely seek to continue with traditional regulation. It is up to the Commission to determine whether decoupling is appropriate as a matter of general policy, while recognizing that utilities may have differences among themselves that should be taken into account in the specific design of a decoupling program.
 - (6) Decoupling should be done in a manner that does not discourage the use of the most efficient and environmentally sound resources for a particular application, such as residential heating.

(7) Decoupling should be accompanied by appropriate retail rate designs that encourage cost-effective conservation measures by individual customers. Results will be much better if customers – not just utilities – have the incentive to conserve. Rather than advocating higher customer charges and lower usage charges (which assure utility revenues but reduce the benefits of conservation to customers), it may be more appropriate to take exactly the opposite approach in order to maximize the benefits that customers receive from taking conservation measures. It should be noted that in its proposed electric POLR Regulations and Policy Statement, the Commission recommends the elimination of declining block rates in order to encourage conservation.

(8) Decoupling generally should be implemented in a base rate case in which all relevant revenues, expenses and return can be considered. While it may be possible to implement decoupling outside the context of a base rate case, it is not clear how to establish the appropriate pro forma revenue and variable operating and maintenance expense bases as a starting point for decoupling, especially for utilities that have not had distribution base rate cases in many years. Also, to the extent that revenue decoupling alters a utility's overall risks of providing service, it may be appropriate to reflect that changed risk in the utility's allowed rate of return.

b) Key Principles for AMI Cost Recovery

(1) The AMI plans submitted by the utilities must quantify operational savings from AMI and clearly reflect that only the net, remaining AMI costs are proper to attribute to demand response.

(2) The Commission needs to establish the appropriate time to recover AMI costs.

APPENDIX 1

Residential Program Narrative

The ENERGY STAR Portfolio of Residential Programs

The ENERGY STAR portfolio of residential programs is a suite of initiatives aimed at specific market segments and technologies. At the same time, each strategy compliments the effectiveness of the other by leveraging common branding and messaging, and by providing solutions for each of the primary elements of residential energy use. The programmatic themes are:

1. Residential New Construction (ENERGY STAR Qualified Homes);
2. Existing Homes (Home Performance with ENERGY STAR);
3. Residential HVAC (ENERGY STAR qualified central heating & air conditioning equipment and quality installation practices);
4. Cool Roofs: ENERGY STAR qualified reflective roof coatings and roof materials for new and existing homes;
5. ENERGY STAR qualified products (lighting, appliances and windows).

Various programs in each category have been operating in many regions of the country, including neighboring states, for as many as eight to ten years or more. Pennsylvania stands to gain from the extensive experience of these programs and the evolution that has occurred in the underlying EPA and DOE standards. Perhaps most critical among the lessons learned is the need to move beyond merely the promotion of higher efficiency rated equipment, to delivering measurably improved energy and building performance, sustainable demand and consumption savings, and permanent market transformation effects.

Each of the residential ENERGY STAR program strategies is outlined below.

1) Residential New Construction (“ENERGY STAR Qualified New Homes”)

Residential energy use accounts for 21% of U.S. primary energy consumption. New home construction offers a cost-effective approach to lowering demand and improving comfort. Each ENERGY STAR qualified home is at least 15 to 20% more efficient than the prevailing energy code while also reducing peak demand by approximately 1 kW. ENERGY STAR qualified homes reliably deliver above-code energy performance in large part due to the required 3rd party inspections performed by certified Home Energy Rating System (HERS) raters. These inspections incorporate on-site testing protocols for building envelope and duct leakage in addition to visual verification, builder education and energy modeling. Each home must meet minimum HERS index thresholds based on field verified results.

Currently, over 3,000 builder partners voluntarily label their homes including over half of the nation's top 100 largest builders. In 2005, over 160,000 homes earned the ENERGY STAR label or approximately 10% of all new homes. Cumulatively, there are over 600,000 labeled homes and a growing number of regional and local markets with 20 to 50+% market penetration. Together, these homes are saving homeowners nearly a half-billion dollars on their utility bills while reducing peak demand by 600 MW.

Regional ENERGY STAR Homes Initiatives are Flourishing

The Northeast region that neighbors Pennsylvania is host to a number of very successful ENERGY STAR Homes programs. New Jersey, Ohio and New York, Massachusetts, Vermont and other New England states, have all proven the viability of the ENERGY STAR Homes approach with varying degrees of state/utility (public benefits funding) support for infrastructure development, marketing and incentives. To date, more than 80,000 homes have been built in this region outside of Pennsylvania. These states currently exhibit market shares over 10% in the newer programs and in excess of 20% in the more established programs (such as New Jersey, Connecticut and Vermont).

In each case, significant attention has been given to both builder and rater training. The ENERGY STAR Homes program is based on a whole-house building science foundation which delivers the greatest savings while also addressing health & safety, comfort and durability. The launch of an ENERGY STAR Homes program has generally been the first introduction of these concepts to builders, contractors and third party inspectors serving these markets.

In many areas the upgrades in materials, equipment and installation practices are significant compared to standard construction, particularly in a mixed heating and cooling climate typical of much of Pennsylvania (in particular more rigorous building envelope and duct sealing, higher performing insulation, and HVAC and water heating equipment efficiencies). In order to encourage builders to make this commitment, program support for creating consumer awareness and demand has been essential. Well coordinated marketing and outreach that leverages the ENERGY STAR brand significantly boosts participation – builders respond to homebuyers inquiring about the label and value the market differentiation and quality benefits.

Seeds of Success in Pennsylvania

Pennsylvania has seen only limited uptake of the ENERGY STAR Homes standard in the absence of any substantial programmatic support (similar utility supported programs have been significantly reduced or eliminated in the last several years). However, since 2005 the Pennsylvania Housing Finance Agency (PHFA) has incorporated the Home Energy Rating System (HERS) standard into its funding criteria for affordable housing development, and more recently has emphasized ENERGY STAR compliance through its Request for Proposal for new construction. This is enforced through mandatory third-party inspection and testing by a HERS-certified rater (of which there are now about a dozen in Pennsylvania). The federal energy tax credits for ENERGY STAR-level homes has led to expanded awareness of the program and its benefits among both builders and homeowners.

In Western Pennsylvania, the West Penn Power Sustainable Energy fund has nurtured ENERGY STAR Homes demonstration-home and related training projects that have begun to develop market awareness among builders, contractors, consumers and raters.

As a result, the infrastructure necessary to support a full scale ENERGY STAR Homes initiative has begun to emerge in Pennsylvania. A small number of individual raters and rating provider organizations are now active in various parts of the state, and Pennsylvania has the potential and opportunity to take advantage of this expertise with a strategically applied program of infrastructure and marketing support. To truly kick start the market, such support could ideally include funding for builder, contractor and energy rater technical training, awareness marketing to builders and consumers, subsidies for a limited number of demonstration homes, and incentives to at least partially offset initial upgrade and certification costs.

Launching an ENERGY STAR Homes Program – Important Features and Key Actors

The “business model” for delivering ENERGY STAR Qualified Homes leverages a number of key actors in different roles, all of which will be pivotal to the success of the program and to delivering the performance expectations of each individual home: State administrators, EPA, utilities, HERS providers, HERS raters, builders, developers, trade contractors and, ultimately, home buyers.

Barriers to the adoption of energy efficiency technologies and practices in the home building industry include: industry resistance to change and concerns with risk; first cost decision making which ignores utility cost savings and improved comfort, durability and indoor air quality; lack of skills selling energy efficient homes; lack of contractor skills in key installation techniques (e.g., thermal bypass sealing); and lack of consumer awareness. An effective ENERGY STAR Qualified Homes program addresses these key market barriers and in doing so presents a strong business case for builders.

For Pennsylvania, a program design and pilot process will determine how to best apply available funding and resources in order to grow the HERS verification infrastructure, provide technical and sales training, and support awareness and marketing among both builders and consumers. While direct financial incentives can be enormously effective at kick-starting a market, numerous options exist for strategic application of available resources.

Measuring Success

There are a number of key metrics to track to ensure savings and peak load reduction targets are being met. These include the number of ENERGY STAR builder partners and ENERGY STAR labeled homes, field evaluations of the HERS verification process, assessments of actual utility bills for labeled and control homes, and measurements of peak energy use for labeled and control homes.

It is often easiest to determine net energy savings by identifying estimated savings for a typical “ENERGY STAR Qualified Home” and multiplying that savings by the number of labeled homes reported by HERS providers. Energy savings analysis inputs used by EPA based on the

new ENERGY STAR Qualified Homes specifications are 1,494 kWh plus 131 therms for a home with electric cooling and gas heating, or about 3,500 kWh for an all-electric home. EPA estimates 1kW peak demand reduction per home.

Consistently strong cost-effectiveness performance has been documented by many of the more than 50 regional sponsors implementing ENERGY STAR for Homes. Variables that may affect cost effectiveness include incentive levels, program maturity, market maturity, geographic concentration of builders and access to established home energy rating infrastructure. Additional cost savings can come into play where there are both electricity and heating fuel savings. Non-energy benefits such as improved comfort, indoor air quality and durability also add value to homebuyers.

Beyond the Basics

One of the most significant benefits of a state sponsored ENERGY STAR Homes program is its role as a building block for other targeted adaptations that can further enhance program effectiveness. These may be aimed at delivering energy savings in specific market segments (such as affordable/low income development), addressing geographic supply constraint issues, boosting policy initiatives such as redevelopment, promoting more comprehensive resource efficiency through “green building” (such as the LEED for Homes program, which has ENERGY STAR as a prerequisite element), or delivering even higher energy performance through “zero-energy” construction.

2) Existing Homes (“Home Performance with ENERGY STAR”)

General Description

Home Performance with ENERGY STAR is an EPA sponsored market transformation program aimed at saving energy in existing homes while improving its durability and the health and safety of the residents. Home Performance with ENERGY STAR (HPwES) may be seen as the existing homes counterpart to ENERGY STAR Homes for new construction. HPwES programs provide training and certification to participating contractors, offer zero or low interest rate financing or other incentives for homeowners who undertake Home Performance projects with participating contractors, and market the availability of this service to homeowners, supporting the marketing efforts of participating contractors. Typical HPwES jobs involve taking a “whole house” approach to building upgrades. For example, a homeowner might ask a contractor to replace the heating system; a HPwES contractor would make sure the replacement was a properly sized high-efficiency unit with sealed ductwork, and suggest improvements to the building envelope as well.

Regional Successes

HPwES was developed originally in New York State by NYSERDA. That program is entering its seventh year, with some 130 participating contractors completing between three and four hundred jobs a month saving on average 784 kWh and 473 therms per job. Similar programs are

underway in Massachusetts, New Jersey and on Long Island, and this approach is increasingly being adopted by states seeking to have a major impact on energy consumption in existing homes. Similar highly effective programs are underway in Wisconsin, California, Texas, Massachusetts and New Jersey - in all more than a dozen states and regions across the country. In addition, programs are beginning in neighboring regions in Maryland, Virginia and Washington, DC.

Seeds of Success in Pennsylvania

Pennsylvania has three strengths that would help build a successful Home Performance program: a new statewide energy loan program to finance home improvements, funded by the PA Treasury Department (the Keystone Home Energy Loan Program), a small but growing network of home energy raters, who could recommend improvements and provide quality assurance, and several energy-related organizations that could market programs regionally. The primary barrier to overcome is the lack of contractors with familiarity with a whole-house approach, necessitating a training and certification program, such as the Building Performance Institute certification recommended by Home Performance with ENERGY STAR.

Some aspects of a Home Performance program have been piloted in Northwest Pennsylvania by the Pennsylvania Environmental Council (PEC). PEC's Commonwealth Community Energy Project (CCEP) has been promoting residential energy-efficiency in Northwest Pennsylvania since 1997 by offering an array of programs including home energy ratings (CCEP is the only RESNET-certified home energy rater in Northwest Pennsylvania, see www.natresnet.org), energy improvement loans, and contractor training (five workshops attended by over 80 contractors offered in 2004, developed in consultation with Affordable Comfort, Inc.). These programs have lacked the critical mass necessary for a full-scale Home Performance program, due to limited marketing budgets and lack of contractor certification. PEC has been in discussions with the PA Department of Environmental Protection, the PA Treasury Department, and others about developing a Home Performance program for multiple regions of the state.

Launching Home Performance with Energy Star – Business model and key elements

HPwES can be launched in Pennsylvania by creating four key elements: 1) contractor training and certification; 2) a system of quality assurance to ensure that participating contractors provide excellent, comprehensive service making full use of what they have been taught about building science; 3) a system of reduced rate financing and other incentives for homeowners and contractors; and 4) a marketing program to create a “brand” for Home Performance contractors and to encourage homeowners to use the Home Performance Contractors to install energy efficiency upgrades in their homes.

- 1) **Training and Certification.** Most of the successful HPwES programs utilize the certification process developed and managed by the Building Performance Institute. This national non-profit, based in New York State, sets standards for various specialties in advanced home repair – Building Analyst, Building Envelope (insulation, windows, air sealing), Heating, AC or Heat Pump professional, and Manufactured Housing specialist. BPI provides a recognized standard for contractor skills, and helps differentiate the BPI certified technician from the rest

of the field. BPI Accredited firms are also part of a growing national Quality Assurance system and are legally bound to maintain high standards for customer care and satisfaction. BPI certification of technicians and accreditation of firms is required in New York, New Jersey and Massachusetts. There are a variety of firms that offer training recognized by BPI to help contractors prepare for the BPI certification tests. This training can be offered through a new program directly, or in partnership with an existing PA network of trade schools or community colleges. BPI certification is open to any and all contractors who go through the training and testing procedure, and is similar any technically rigorous trade licensing process that a competent contractor can benefit from. The New York experience indicates it takes contractors about 3 to 6 months to go through this process, since they must fit the training and certification into their work schedule. Production typically starts during the fifth or sixth month, but in small quantities. Volume production usually starts in nine to fifteen months. In a competitive marketplace a few enthusiastic participants can accelerate this timeline and effectively draw their competitors into earlier participation.

- 2) Quality Assurance. HPwES is building a brand identity for a new type of home improvement contractor. It is critical that the program have a quality assurance component that ensures that contractors use their building science training, and provide excellent and responsive service to customers. This maintains the value of the “Home Performance with ENERGY STAR” brand, differentiates participating contractors from their competitors, justifies the incentives and becomes a large part of the marketing campaign.
- 3) Incentives. Contractor and customer incentives may be as limited or extensive as the program budget allows. Ideally, a minimum level of support would combine contractor training with a zero or low interest loan buy-down for customers. The average home performance project value appears to be around \$8,000. This average includes many energy improvement project costs of \$2-3000, and a relatively small number of energy improvement project costs in the \$15-20,000 range. The interest buy down has been running at about 15% of the value of the loan, and New York has a customer cash alternative set at 10% of the cost of the project.
- 4) Marketing the Home Performance Brand. Home repair is one of the most distrusted and litigated occupations in the US. A critical part of a successful HPwES program is marketing that encourages customers to look for Home Performance with ENERGY STAR certified contractors. The marketing program must make customers aware of the Home Performance contractors and of the benefits of a whole house energy efficiency makeover. In a state as large and diverse as Pennsylvania, the marketing campaign would be used to boost the program in different media markets as the contractor network is created. Once the program matures in a market, and more and more contractors participate, program marketing tends to support marketing efforts by the contractors themselves.
- 5) HPwES and the ENERGY STAR New Homes programs would usefully reinforce each other (i.e., contractor training would benefit both the new and existing home markets, an expanded network of energy raters would also be able to assist with quality assurance provisions of HPwES), and speed the market transformation effects of both efforts.

Measuring Success

Home Performance with ENERGY STAR success is measured by numbers of firms accredited to participate in the program, by the number of technicians certified to oversee work in different fields, by the coverage of the state that the network of certified contractors provides, by the consumer investment stimulated by the program, and, of course, by the energy savings achieved through the program.

3) Residential HVAC

Introduction

Residential air conditioning through central air conditioning (CAC), window and through-the-wall units is the largest source of residential contribution to the summer peak of electric utilities, and, as such a valuable focus for program activities. Many programs have moved beyond simple incentives for the installation of higher efficiency equipment toward program designs that encourage proper sizing of equipment, quality installation verification (QIV), and encouragement of proper duct design and duct sealing. These programs, properly designed, have a dramatic and cost effective impact on kWh savings and reducing peak kW demand. A similar program can be implemented to replace existing gas furnaces with new, high efficiency models, in parallel or combination with the central air conditioning program. Micro-combined heat and electric power systems for homes are another important technology that offer significant energy efficiency savings.

Progress in Surrounding States

New Jersey and Long Island have well established residential air conditioning and heat pump replacement programs. These programs began with cash rebates to contractors who installed high efficiency (SEER 13 and higher) CAC units, and are now being adjusted to accommodate the new federal mandate that requires a minimum of SEER 13 for units manufactured in the US after January 1, 2006. The adjustments on Long Island require proof of proper sizing through a documented and inspected ACCA manual J calculation, and verification of proper charge and air flow through use of Proctor Engineering's CheckMe! quality assurance system – one of a number of available “Quality Installation Verification” systems. States such as Massachusetts, Connecticut, Rhode Island, and about seven others, have taken the lead in providing the net metering regulations that are important to unlock the large potential of micro-combined heat and power.

Program design and key components

An HVAC program concentrating on improving the efficiency of Central Air Conditioners should have a comprehensive approach towards enhanced efficiency, since the benefits of proper installation and duct sealing outweigh the savings from modest increases in SEER rating, and since a reduction in the tonnage of installed systems has the most direct impact on peak consumption of any available measure. Program design must aim to encourage all aspects of

efficient installation – proper sizing of equipment (where possible in homes with sealed ducts, improved insulation and heat rejecting windows or roof coatings), verified proper charge and air flow, and high SEER and EER ratings. These multiple objectives can be best achieved through a network of trained and certified independent HVAC contractors, who the program promotes with special marketing and though access to low interest financing or other incentives. In many ways an HVAC program can be seen as a subset of a Home Performance with ENERGY STAR program.

In this regard, Pennsylvania is in an excellent position to start a state of the art HVAC program. Other states have contractor networks who have grown attached to “single parameter” HVAC rebates tied to a particular SEER level and resist the more comprehensive approach that maximizes value to ratepayers. With only a limited history of single parameter rebates, Pennsylvania can start with a comprehensive approach and work, from the beginning, with the firms that embrace quality installations and strong documentation of results.

Measuring Success

HVAC programs have two basic measures of success: 1) How many contractors have been enrolled in the quality verified program; and 2) How much energy will be saved and demand reduced through program installations. The contractor count is easy to track and verify. Participating contractors will be required to report on each job, including both the information about the HVAC equipment installed and the improvements made, and information about the equipment being replaced and its condition. This information will provide the basis for estimating savings, and these estimates can and should be verified by before-and-after studies of a sample of installations. Quality assurance is critical to any open market contractor program. This is most effectively managed through the requirements for contractor training, certification and internal QA procedures, required use of a field verification system, an ongoing contractor participation agreement, and vigorous third party Quality Assurance monitoring.

4) Cool Roofs (Reflective ENERGY STAR qualified roof coatings & roofing materials)

Program Overview

According to the Oak Ridge National Laboratory, over one sixth of the electricity generated in the U.S. is used to cool buildings. Air conditioning demand is concentrated in summer afternoons, thus straining the grid at a single point in time, and resulting in “brownouts” and “rolling blackouts” in constrained conditions.

Regional Examples

California: For several decades, California has promoted numerous energy efficiency programs and has been so successful that the per capita electricity use has remained constant for the past 20 years, compared to most states which have experienced a 4% to 5% annual increase in electricity consumption (1.5 – 2% in Pennsylvania).

In October of 2005 the California Energy Commission got legislative approval for Title 24, which sets energy efficiency standards in the state's building code for new and existing residential and commercial buildings. One of the key components of the legislation is "cool roofing", which requires that all roofs must have high solar reflectance and thermal emittance. Evaluations from a number of states have found that white roofs reduce electricity consumption for cooling by approximately 22% on average. Researchers at the Florida Solar Energy Center have found that white roofs reduce peak electricity demand by 15% to 34% - a very large and extremely cost effective reduction when compared to other options.

The term "cool roof" refers to an outer layer or exterior surface of a roof that has high solar reflectance and high thermal emittance and reduces heat gain onto the building. As the term implies, the temperature of a cool roof is lower on hot sunny days than a conventional roof, reducing air conditioning cooling loads. The benefits of high reflectance are obvious: while dark surfaces absorb the sun's energy and become hot, light colored surfaces reflect solar energy and stay cooler. A "cool roof" can be installed using a white or light colored roof membrane or simply by coating a dark roof membrane with a specially formulated white coating.

Title 24 requires a solar reflectance of 0.70 and a thermal emittance of 0.75 as measured independently by the Cool Roof Rating Council. Currently the ENERGY STAR program requires low slope roofs to have greater than 0.65 reflectance. A thermal emittance requirement will be added in 2007.

Georgia, Chicago and Others: A cool roofing program has also been adopted in Georgia, where the building code allows for the use of lower tonnage HVAC when a "cool roof" is installed. The Chicago Building Code now prohibits black roofs and requires increasingly high solar reflectance for roofs through 2008 when roofs must conform to the ENERGY STAR 0.65 reflectance requirement.

Pacific Gas and Electric, Southern California Edison, and Florida Power and Light electrical utilities have given rebates to customers who install "cool roofs." This incentive reduces the electricity peak demand and also reduces the need for more generating capacity. Currently Pacific Power and Light (Washington State) and Austin Energy in Austin, Texas are among the utilities which offer a \$0.10 ft² incentive for "cool roofing".

Lessons Learned

These legislative initiatives have been the result of over 20 years of fundamental research and "proof statements" conducted by independent companies and the two national laboratories that confirm the benefits of "cool roofing." Both ORNL and LBNL have demonstrated the benefits of cool roofing on reducing energy demand and each has created mathematical models that enable the user to estimate the actual energy dollar savings from installing a "cool roof..

More recently, the Energy Coordinating Agency of Philadelphia has demonstrated that cool roofs reduce indoor temperature by 5 degrees and that a city block of row homes with "cool roofs" has a lower ambient outdoor air temperature in the summer than a "control" block with traditional

black asphalt roofs. This is the first documented existence of an “urban cool oasis”, the antithesis of an “urban heat island.”

Program Design for Pennsylvania

A Cool Roofs program for Pennsylvania could be based on the most cost effective programs currently operating in other states, which is typically an incentive per square foot, which ranges from \$0.25 to \$0.50 a square foot depending on the size of the roof. Cool Roof programs work equally well for commercially buildings which are air conditioned as they do in the residential sector.

5) ENERGY STAR Products (Lighting, Appliances & Windows)

An ENERGY STAR Products program promotes the purchase and installation of energy efficient lighting, appliances and windows at the time of initial purchase or replacement. The ENERGY STAR label makes it easy for consumers to identify and choose qualifying products in each category. The focus of the program is to increase both consumer awareness and product availability. In Pennsylvania, ENERGY STAR products have received little supporting promotion among consumers, retailers and installers. As a consequence, the higher efficiency products may be perceived as cutting edge, costing more, and unavailable. Awareness of the variety, quality and cost effectiveness of the thousands of qualifying products available today risks remaining on a slow track in the absence of a focused program that works with manufacturers, retailers and trade allies to bring these products to the forefront of the market.

Leverage an Existing Regional Framework

In the Northeast region, a well developed and proven collaborative strategy already exists in the Northeast Energy Efficiency Partnerships (NEEP) ENERGY STAR Products initiative.

NEEP facilitates this regional initiative through the Appliance and Lighting Working Group (ALWG), begun in 1998, now spanning an eight-state region in New England, New York and New Jersey. Through regional coordination, initiative sponsors have successfully leveraged resources to increase the availability and purchase of ENERGY STAR products significantly above national levels. Increasingly, initiative sponsors are engaging retailers and manufacturers to increase the role of industry resources to effectively promote ENERGY STAR products across the region.

Leveraging of resources towards program goals also involves coordination of regional marketing and promotional activities with national ENERGY STAR campaigns, sometimes in coordination with other regions. The program may sponsor marketing and retailer outreach coordinated through jointly procured contractors. In some cases, programs operate independent marketing and retailer outreach, but in coordination with joint regional or national efforts.

The strategic goals of the NEEP ENERGY STAR Products initiatives are to:

- Increase energy savings from ENERGY STAR lighting and appliances by maintaining regional market shares significantly above national levels;
- Increase ENERGY STAR lighting and appliance product choices and their availability at a broader range of retail outlets;
- Increase consumer and retailer awareness and understanding of the benefits of ENERGY STAR lighting and appliances; and
- Update ENERGY STAR specifications to increase energy savings opportunities in appliances and lighting product quality.

Learn from Existing Regional Models

New Jersey, New York and Massachusetts all offer valuable examples of successful programs built around the NEEP framework. All three offer various combinations of: (1) an integrated marketing campaign strategy that provides message consistency and builds consumer awareness of ENERGY STAR products and their benefits; (2) catalogs produced by the sponsors promoting new products and technologies; and (3) field support contractors that, among other functions, distribute point-of-purchase marketing materials to retailers and provide education and training on the program and products. The programs also interact with other initiatives including ENERGY STAR Homes and Home Performance with ENERGY STAR. This synergy allows further penetration of these products into the marketplace.

The long-term goal of these programs is to transform the market into one in which ENERGY STAR products become the standard purchasing practice of consumers. The programs employ several key strategies to accomplish this goal, including:

- Educating consumers on their energy usage and the role that energy efficiency plays in reducing their overall energy consumption and promoting a retail infrastructure whereby energy efficient products become the norm in a consumers buying decision;
- Marketing and training support for retailers, manufacturers and contractors selling ENERGY STAR products, including leveraging national programs, promotions, marketing materials and advertising;
- Targeting rebates or other incentives to reduce first cost barriers of ENERGY STAR lighting, appliances, windows and other products as appropriate.

Participate in National ENERGY STAR Campaigns

Regional ENERGY STAR Products initiatives can benefit from some of the most well developed national campaigns sponsored by EPA and DOE. These campaigns create nationally coordinated events, messages and supporting promotions that can be adapted to local markets. Recent examples include:

- “Change a Light, Change the World” (ENERGY STAR CFL bulbs and lighting fixtures);

- “Spring into a World of Savings” (ENERGY STAR clothes washers);
- “Cool Your World” (ENERGY STAR room air conditioners, programmable thermostats, dehumidifiers and ceiling fans).

Measuring Results

Major market transformation effects have been demonstrated in the markets participating in these initiatives. Primary metrics for measuring progress are the number and types of qualifying units sold and the market share of qualified products versus non-qualified products. Engaging manufacturers, retailers and trade allies in the planning and implementation of promotional strategies also helps generate their support for feedback on program impacts – critical to establishing the metrics noted above.

The Northeast ENERGY STAR lighting initiative alone has produced annual savings of more than 167 million kWh and \$20 million (assuming \$0.12/kWh) for the customers it has served. In Massachusetts the market share for ENERGY STAR labeled clothes washers increased from just 5% in 1998 to over 28% in 2002. Pennsylvania will have the advantage of supporting a market already much more developed (from the standpoint of the availability, type and performance of qualifying products) than the programs in neighboring states which began from six to eight years ago.

Beyond the Basics

Many national retailers have developed internal promotional campaigns around ENERGY STAR and the energy efficiency message which can be leveraged a Pennsylvania program. Additionally, as the EPA and DOE programs have matured in recent years, new themes are constantly emerging. For example:

- The “Advanced Lighting Package” for residential new construction provides a path for builders to engage more aggressively in incorporating ENERGY STAR lighting into their product;
- Refrigerator turn-in programs are aimed at removing old, very inefficient refrigerators from use, disposing of them in an environmentally compliant manner and replacing them with high efficiency, CFC-free ENERGY STAR refrigerators (or replacing two with one where an old, underused refrigerator had been kept running);
- Torchiere exchange programs similarly remove inefficient, heat producing incandescent (halogen) torchieres with safer, more efficient ENERGY STAR compact fluorescent alternatives.

A number of demand side energy services companies exist who are focused on providing implementation support specifically for market transformation programs of this type. They have developed the systems and resources necessary to support marketing, operations, logistics and tracking, and can be tapped into through a competitive procurement process.

APPENDIX 2

C & I Program Narrative

Commercial and Industrial Energy Efficiency Incentive Programs

This portfolio of programs for commercial and industrial (C&I) facilities (including municipal and agricultural energy users) is a suite of initiatives aimed at specific market segments and a vast array of energy-efficiency technologies. While each program focuses on specific markets, they could all utilize common branding and messaging. The programmatic themes are:

- Incentives for installation of energy-efficient equipment, both prescriptive and custom measures;
- Comprehensive design support for new construction projects;
- Technical assistance to facilities considering energy-efficiency improvements, including complex custom projects and guidance for professionals and small, less energy-aware businesses.

Various programs have been operating in many regions of the country, including neighboring states, for as many as eight to ten years or more. Pennsylvania stands to gain from the extensive experience of these programs. Perhaps most critical among the lessons learned is the need to move beyond merely the promotion of higher efficiency rated equipment, to delivering measurably improved energy and building performance, sustainable demand and consumption savings, and permanent market transformation effects.

Program goals include:

- Capturing lost-opportunity energy savings that occur when a business initiates construction or a renovation project, or buys new equipment for replacement or expansion;
- Transforming the market for energy-using equipment, by helping businesses, architects, engineers, designers and specifiers make energy-efficient choices at the times when they are most cost-effective – when the decision to purchase some equipment has already been made;
- Stimulate small business investments in energy efficiency measures.

Each of the commercial and industrial programs is outlined below.

1) C&I New Construction

Many construction projects (if not all) are focused on completion by a deadline and within a budget. Owners and developers, as well as their design teams (architects and engineers, and others), are all engaged in budget and time constrained activities. Typically, energy-efficiency is not a high priority, unless the owner says that it is. Penetrating this market and influencing equipment choices is the goal of the C&I New Construction program. The means for achieving that goal include:

- A Design Support component that works with owners and their design teams during the design phase, and provides incentives to the design team to consider energy-efficient equipment and systems for use in the building. Technical assistance is provided for building models and other analyses of design alternatives;
- A marketing effort focused on identifying new construction projects before they have proceeded beyond the point of specifying equipment, and approaching the players with the opportunity to enhance their project through energy-efficient design;
- Joint involvement of electric and gas utilities (or established experts in the use of all fuels in business and industry), so that energy source choices can be made for the best interest of the owner/user (that is, the best economic choice for the user) independent of utility marketing interests. This would permit consideration of micro combined heat and power systems, cogeneration and similar technologies;
- Custom measure incentives, made available for all sorts of energy-efficient options that provide energy savings well beyond standard practice. Such incentives to be based upon the savings of the options compared to a minimally Code-compliant building;
- Prescriptive measure incentives that specify clearly the cash incentive available for selecting specific energy-efficient equipment of various types, including, lighting, heating and air conditioning, motors and variable-speed drives.

Regional Examples

Programs similar to this have been active in neighboring states for several years, including New Jersey, New York, and several New England States. New Jersey's new construction program (a statewide program since May 2001) affected 198 projects in 2005, and saved 3.5 MW of electrical demand, 13 million kWh of annual electricity usage, and reduced annual natural gas usage by 12 thousand decatherms. Programs are also active in several western states.

Measuring Success

In order to measure success of a new construction program it is necessary to measure/estimate the total new construction activity in the state, as well as tracking the number of projects participating in the program and assessing the energy-savings impact of each participant. Another measure of success should be the number of architects, engineers, and other design professionals who participate in the program, the extent to which they participate on a second or

third project, and the extent to which they utilize what they learned from participation in other projects. Third party impact and process evaluations should be required.

Beyond the Basics

Opportunity exists for a program such as this to draw participants into other “green building” efforts, such as USGBC’s “LEED” program (Leadership in Energy & Environmental Design). Pennsylvania is already a recognized leader in the Green Building movement, and such a program will help solidify this position.

2) C&I Retrofit and Replacement

This is the largest of markets in the commercial and industrial sector. Installation of heating and air conditioning equipment in existing buildings (for new uses or for replacement) is many times as large as the new construction market. Please also refer to the large non-residential retrofit program description included at the end of this document.

Implementation strategies to impact retrofit and replacement include:

- A marketing effort focused on vendors of equipment, equipment installation contractors, manufacturers representatives, and energy service companies, as well as the business community in general (Chambers of Commerce, trade associations, manufacturers’ associations) can focus heavily on incentives and benefits when energy-efficient choices are made. Motor and HVAC contractors/supply houses are key to capturing the “I need to replace it today” market;
- Joint involvement of electric and gas utilities (or established experts in the use of all fuels in business and industry), so that optimum energy source choices can be made. This would permit consideration of micro combined heat and power systems, cogeneration and similar technologies;
- Custom measure incentives, made available for all types of energy-efficient options that provide energy savings well beyond standard practice. Technical Assistance studies can be utilized to develop specific data on technology options and their economic basis for specific facilities. Some states require co-funding of such studies while others feel that program impacts are increased by providing studies free of charge to customers willing to sign participation agreements;
- Prescriptive measure incentives that specify clearly the available incentives and benefits of selecting specific energy-efficient equipment of various types, including, lighting, heating and air conditioning, motors and variable-speed drives.

Regional Examples

Programs in this category have been active in neighboring states for several years, including New Jersey, New York, and several New England States. New Jersey’s C&I Retrofit program

impacted 1923 projects in 2005, saved 28.5MW of electrical demand, 260 million kWh of annual electricity usage, and reduced annual natural gas usage by 175 thousand decatherms.

Measuring Success

In order to measure success of a replacement/retrofit program it is necessary to measure/estimate the total activity in the state, as well as tracking the number of projects participating in the program and assessing the energy-savings impact of each participant. Another measure of success should be the number of equipment vendors, contractors, ESCOs, and other consultants who participate in the program. Third party impact and process evaluations should be required.

Beyond the Basics

Opportunity exists for a program such as this to draw participants into other “green building” efforts, such as USGBC’s “LEED” program (Leadership in Energy & Environmental Design).

Some states provide incentives for custom measures based upon savings calculations and a one-time inspection. Other states, including NY, have programs that require a year or more of measurement and verification (M&V) of the savings. There are successful versions of both options, and indeed some states have used both options.

3) Schools and Government Facilities – New Construction and Retrofit

This program is a combination of the C&I New Construction and the C&I Retrofit programs, but focused on the schools and government sectors. Because of its major contribution to schools construction, the State government could require or strongly encourage school construction to follow the Design Support path, enhancing the energy efficiency of all new schools. It is important that the State demonstrate its concern by participating in this program at every opportunity in State-owned facilities, new and existing. Schools and government facilities have long lives, with equally long futures paying energy bills. These facilities are not limited in their potential for forward thinking like many privately owned commercial and industrial facilities. Energy equipment decisions made for an expected life of 20 years, may in fact determine energy costs for 40 or even 80 years in schools or other major government facilities.

Features of this program should include:

- A Design Support component that works with owners and their design teams during the design phase, and provides incentives to the design team to consider and analyze energy-efficient equipment and systems for use in the building;
- A marketing effort directed at state, county, and local government officials and school boards;
- Joint involvement of electric and gas utilities (or established experts in the use of all fuels in business and industry), so that optimum energy source choices can be made. This

would permit consideration of micro combined heat and power systems, cogeneration and similar technologies;

- Custom measure incentives, made available for all types of energy-efficient options that provide energy savings well beyond standard practice. Technical Assistance studies, co-funded by owners and the program, can be utilized to develop specific data on technology options and their economic basis for specific facilities;
- Prescriptive measure incentives that specify clearly the available incentives and benefits of selecting specific energy-efficient equipment of various types, including, lighting, heating and air conditioning, motors and variable-speed drives.
- Conservation Education Component for School Maintenance Staff, Administrators, Teachers and Students - Established programs such as the Alliance to Save Energy's Green Schools program have proven extremely successful in teaching all stakeholders in the schools about energy conservation and how to maximize savings in the schools.

Regional Examples

Programs similar to this have been active in neighboring states for several years, including New Jersey, New York, and several New England States. New Jersey's schools (no other government facilities) program impacted 266 projects in 2005, and saved 4.3 MW of electrical demand, 13 million kWh of annual electricity usage, and reduced annual natural gas usage by 2 thousand decatherms.

Measuring Success

In order to measure success of a Schools and Government facilities program it is necessary to measure/estimate the total activity in the state, as well as tracking the number of projects participating in the program and assessing the energy-savings impact of each participant and cost of each project. Another measure of success should be the number of architects, engineers, and other design professionals who participate in the program, the extent to which they participate on a second or third project, and the extent to which they utilize what they learned from participation in other projects. Third party impact and process evaluations should be required.

Beyond the Basics

Opportunity exists for programs such as this to draw participants into other "green building" efforts, such as USGBC's "LEED" program (Leadership in Energy & Environmental Design).

4) Third-Party Programs

The most effective program portfolios are those that capture savings from all possible areas of the market. This is part of the reason that states with long experience with programs, such as NY and CA, eventually implement a long list of programs. The program concept that best serves the industrial compressed air market is unlikely to be the same concept that best serves the

commercial retro-commissioning market. Rather than require the program administrator to develop a large number of programs initially, third parties could be encouraged to submit and implement creative target programs.

Examples

Third parties administer a small portion of the program funds in California. Puget Sound Energy and Rocky Mountain Power recently had RFP processes to solicit third-party programs. Note that we are not suggesting a for profit entity administer all or even a majority of the program funds. This should be limited to a small percentage of total funding to explore new ideas, foster innovation, and better serve niche markets.

Measuring Success

Success should be largely tied to impact evaluations of each program. The third party administrator will track costs and benefits, and a separate independent party will verify this information. Payments to the program administrator should be at least partially tied to meeting savings or other performance goals.

5) Comprehensive Nonresidential Retrofit Program

Program Summary

A broad and flexible program is required to serve the nonresidential retrofit sector. There are three main program types that are typically used to serve this market: Express Incentives, Customized Incentives, and Standard Performance Contracts. “Express” programs provide prescriptive cash incentives for qualified equipment (such as \$10/fixture for a T8 and electronic ballast retrofit or \$60/HP for retrofitting VFDs on HVAC equipment). The application process is simple for the applicant and easy for the administrator. However, there are a large number of measures that can not be fairly compensated for under such a structure. Program administrators have primarily relied upon the other two options for serving these non-prescriptive measures: Customized Incentives, and Standard Performance Contract. Under both options, incentives are paid based on calculated energy savings. For example, paying \$0.12/kWh plus \$10/kW based on first-yr savings for a controls upgrade at an office building. Customized incentives rely on engineering calculations of the energy savings, while Standard Performance Contract programs rely on measurement and verification of the savings.

The current NYSERDA Enhanced Commercial/Industrial Performance Program (ECIPP) is essentially two programs in one, combining Express and SPC elements. Similarly, the Delaware Energy Answers Program combines Express and Customized Incentive elements. We recommend either of these combined approaches: either combine express and customized elements as DE has done, or combine express and SPC elements as NY has done. The program can serve both small and large nonresidential customers. It is to be expected that small customers will primarily take advantage of the “express” portion of the program, though ESCOs may also involve small customers with multiple sites in the custom or SPC portions.

Experience from Other States

California – The California utilities ran several versions of customized incentive programs through the 1990s. They later replaced the customized incentive programs with a Standard Performance Contract (SPC) Program. The SPC program was originally designed to promote performance contracting and required measurement and verification of savings. This program was the template for the New York CIPP program. NY still requires M&V while the M&V requirements were substantially reduced in the CA program.

New York – NYSERDA currently administers the ECIPP. It is the latest version of the program that began as the SPC program in 1998. See PON 1101 at www.nyserda.org/Funding/default.asp for the program specifics. I also encourage a review of the ACEEE “Exemplary Program” analysis of the program.

Delaware – Delaware recently launched a program that includes customized incentives for nonresidential customers. See www.delaware-energy.com/energy_answers_program_home.htm.

National Grid – Refer to the ACEEE “Exemplary Program” analysis of the “Energy Initiative Custom Program” for a good description of a customized incentive program.

How the Program Would be Implemented

An entity would be set up to administer the program. This could be the utilities, or more likely an independent agency in the mold of NYSERDA or the Energy Trust of Oregon. The administrator sets detailed program rules, accepts applications to the program and processes incentive payments. The administrator markets the program to end-users and to program allies such as lighting contractors, equipment vendors, ESCOs, and A/E firms.

The administrator in all likelihood will rely on outside consultants for technical tasks such as reviewing energy savings calculations for customized measures and conducting site pre-installation and post-installation inspections.

Need for the Program

Commission staff has expressed a desire to focus upon programs that serve residential and small commercial customers, but large C&I programs are also typically among the most cost-effective programs in a portfolio. The stated reasoning for focusing on smaller C&I customers is that large customers already have the knowledge and wherewithal to make proper energy efficiency choices without program intervention. We urge the Staff to reconsider. The mid- to large-commercial sector is much less energy savvy than this reasoning suggests. Only the largest facilities have a person that spends much time on energy issues. Where such a person exists, their focus is often on procurement issues rather than energy efficiency. Surprisingly perhaps, this is true to a large extent for industrial customers as well. While industrial facilities have technical staff with knowledge of site operations, their focus is on their processes and production. Also any available capital is used for process and production improvements.

Therefore, incentives are often necessary to encourage efficiency improvements. Best efficiency practices for items like compressed air are rarely used due to constraints on training and time.

Program Cost

The budget proposed above is based upon the current budget in New York. The present NYSERDA ECIPP funding is \$30 million for the 18-month period from September 2006 to March 2008. According to IIEEA, the nonresidential annual electric sales are nearly the same in PA as in NY. We should thus reasonably expect budgets and impacts to be roughly the same as those in NY. (www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html).

Barriers / Downsides

One of the primary barriers is the lack of a network of energy efficiency service providers. Due to the historical lack of significant financial support for energy efficiency, the Commonwealth suffers from a lack of energy efficiency service providers. Programs will take some time to produce results since they are starting from nothing. Though there will be an initial ramp-up period, in general this “barrier” should be viewed as an opportunity. Jobs will be created³. Lighting contractors and controls vendors will do more business and hire additional staff. Manufacturers will sell more VFDs. Energy Services companies will expand their engineering and sales staff within the state, and new ESCOs will likely be formed or enter the marketplace.

As an example, consider a corporate office park. They know, vaguely, that they have opportunities for improving the energy efficiency of the campus but have not acted on this knowledge. With the implementation of the program, they begin to hear more about energy efficiency options through direct program marketing and through their consultants and suppliers beginning to mention it more. Finally, they approach, or are approached by, a consultant or Energy Service Company (ESCO) that identifies a number of cost effective projects including lighting retrofits, a new control system, and new chillers. The cost of the project is \$1,000,000 with a 5 year simple payback. The \$200,000 incentive helps close the deal. Who benefits? The customer has new, better functioning equipment and is saving \$200,000 per year. This improves their competitive position with respect to firms in other states, and improves profitability with the attendant increase in tax revenue to the Commonwealth. The contractors have a \$1,000,000 project to construct. The \$1,000,000 will create or support good jobs in the Commonwealth. The \$200,000 of ratepayer funds has stimulated activity far in excess of the direct value.

Appendix 3 Education Program Narrative

Energy Efficiency and Demand Resource Education and Program Marketing

General Principles

Education must be an integral part of any and all energy efficiency/demand side programs and initiatives approved by the PUC. A look at the initial success in the early days of Pennsylvania's electric restructuring education program reveals the importance of a multi-faceted education effort. As a result of a comprehensive, well funded, coordinated effort, there were four volunteers for every one of the 250,000 available slots in the electric choice pilot program. The pilot was so successful that the phase-in to full competition was greatly accelerated. The education effort was both broad-based and grassroots with messages designed to motivate different customers through multiple approaches. General awareness and specific education campaigns were launched simultaneously. This shows both the potential results and the depth of effort needed to produce success for a broad demand response and efficiency program. Success will be difficult unless education is appropriately funded.

Education will only be effective if it (1) creates awareness; (2) creates acceptance; (3) helps consumers overcome any barriers or hurdles; and (4) moves consumers to active participation by going beyond general conservation messages. General motivational messages can have only a limited impact in influencing behavior. Education needs to be concrete, specific to the audience, easily replicated and validated, and come from a trusted source. It also needs to be tailored to the policy measures approved by the Commission and based on quantifiable goals for customer participation. However, a very specific action plan for education can not be designed until the program's goals and methods are determined, though general education should certainly be started now. By starting to build awareness now, the public will be better prepared to participate in new initiatives. In fact, since education is most effective when done over time and through the repetition of messages, the sooner resources can be allocated to "soften the market," the better.

It will be important for each demand response and efficiency program to have clearly defined educational goals and objectives whose value will need to be communicated to customers, whether they are residential, commercial, industrial, institutional or governmental. Specifically, consumers need to reduce consumption and that effort must be sustained. Pennsylvanians need to make permanent behavioral changes in consumption habits and not merely participate in a temporary campaign. In Ontario they refer to it as a "culture of change."

It is commonly understood that saving money is the main driver to reduce consumption, but there are clearly other motivators as well; environmental, hedging against future price increases, societal benefits, good business practices, community recognition, etc. For example, there is

ample polling data to support the premise that environmental benefits of reducing consumption are a strong motivator to move consumers to action. Growing concern about air quality, global warming and the environment in general can't be overlooked as a consumer motivator. Energy independence is another motivator for many customers. It is particularly important to understand the set of motivations that may lead customers to take action to save energy.

Consumers from all customer classes get stuck trying to decipher what steps to take to conserve or make dwellings more efficient. The best educational efforts should help consumers understand what measures and actions work and which do not. Consumers often do not know what measures will yield the best results which can lead to inaction.

APPRISE completed a detailed analysis to support education around working first to add measures that reduce the highest users first and have specific examples of how that can work in their evaluations. Others also have that level of detail and should be consulted as specific programs are designed. If the customer confusion of what actions will yield the best results is overcome, consumers can be convinced to invest. Consumers need to understand that saving energy has a clear value, both personal and societal, before they can be expected to change behavior. At the same time, the information has to come from a trusted source. Further, it may be necessary for consumers to understand that some actions are designed to shift load which will temporarily reduce costs and other actions are designed to permanently reduce overall consumption.

Drawing on other states experiences, there is plenty of information available to prioritize the measures that save the most energy. The data on savings can be used to educate on the best actions consumers can take to maximize savings. Testimonials and specific examples can serve to convince consumers to make changes. Educational messages will have to address how actions taken today will help them in the future as utility prices rise.

A combination of "active" and "passive" measures can be adopted by nearly every consumer. Passive measures are those which are installed and do the work with little or no consumer intervention. For example, once insulation is installed, there is little the consumer needs to do to get additional savings. Active measures are those that engage the consumer to adopt certain behavioral changes that leads to usage reduction. Turning off computers, televisions and other home electronics when not in use are obvious examples of active measures (although technology such as sleep mode in computers can turn active measures into passive measures).

People need to understand what impact their actions will have on lowering bills and the more specific, the better. For example, to tell someone to turn off unused lights will likely have a different impact than reducing central air conditioning use; although the overall impact over the course of a year may be closer than one would think. It will be important to review the data on these specific actions when setting policy objectives.

Understanding the kWh/ccf saved alone will not likely motivate many consumers. We have to go the next step and translate those kWh/ccf savings into financial concepts of payback and positive cash flow. Consumers should not be expected to have to understand the wattage of various appliances and electrical services. Those responsible for education need to have that

expertise in order to be credible advocates since most consumers will not be willing to do that analysis on their own even if they are motivated to take some action. It is a little like weight loss programs: if people see results fairly quickly, they will continue to forge ahead with improvements in their consumption. That is why it is important that any education programs are sufficiently customized.

Further, education efforts should ensure the benefits are directly and honestly stated. For example, real time metering is only as effective as people's willingness to accept the technology and manage their energy usage. If the technology is installed without the education, consumer complaints could dramatically increase. One primary goal should be to institutionalize a culture of conservation, not simply shift peak load, although certainly there are clear benefits to doing both.

In addition to education, the successful deployment of demand resources requires marketing of the specific energy conservation, efficiency and demand response programs to encourage participation in these programs.

Other Principles of Good Education

- It is important to conduct baseline knowledge and behavioral surveys to help determine appropriate actions.
- Consumers need to understand the terminology and the Commission should define terms so that there is consistency in the marketplace. For example, the difference between conservation and energy efficiency is a prime example where there is confusion for the sake of the policy discussion. At the same time, consumers, particularly residential consumers may be better served if the term "conservation" is used in the broadest sense. Ontario used this term because they thought it simplified the message and helped eliminate customer confusion.
- The difference between education and information should be clear and programs should include both.
- Education should be objective and should not endorse any specific product brands but should talk specifically about ways to save the greatest amount of energy and policies should be designed to reward consumers accordingly. An integral part of having a strong education program is having clear policies that reinforce positive customer behavior. Be good by doing good can work in the short-term but is not a sustainable strategy until a culture of change takes place.
- "Laundry lists" approaches to education are rarely effective. It is much better to provide specific information about the top energy efficiency actions consumers can adopt; preferably based on actual consumption data for homes and businesses.

- General public education should tie directly to actions that can most easily be taken by the largest number of consumers. That does not rule out looking at measures that can reduce consumption that are not the norm, swimming pools, hot tubs etc.

Data Gathering and Testing Assumptions

To date, analysis done on this subject has shown that the most effective education is personalized. That is, an analysis of the consumer's energy bills is performed, followed by diagnostic testing and then applying the results of those findings. There are many service providers who can calculate the kWh or ccf used, the energy reduction expected, and the dollars saved by applying those measures. If they are interested in kWh or ccf saved, that should be available to support the savings data. Quantifying that value though each action taken will serve to help the consumer prioritize the order of importance to take action. A key to good education is to have good data on if the consumer does "x", they will save "y". This approach provides the strongest incentive to make and sustain behavioral changes.

In some instances, it will be important to be able to calculate the pay-back period with or without any incentives offered. Instructions on how to install measures correctly may also be needed; in fact, in many cases it will be critical to obtaining the promised savings.

Applied Public Policy Research Institute for Study and Evaluation (APPRISE) reviewed several evaluation studies as part of their evaluation of several existing programs (including PPL's). By calculating savings by measure, the cost per kWh savings can easily be determined. For example, in the New Jersey program, compact fluorescent lamp (CFL) savings were compared to refrigerator replacement savings and it was found that the difference was not as significant as some thought it would be (\$0.061 per kWh for CFL replacement verses \$0.069 cents per kWh for refrigerator replacement (M. Blasnik and Associates). The same kind of analysis was done for natural gas measures measure across five state programs with similar results. Understanding this will help both policy makers and consumers make choices on where to put their investment. A full and complete analysis will help educate everyone involved and create the trust needed for consumers to feel their actions will have an impact.

Investing in pre and post energy usage data collection for program participants can yield some interesting results. Things like leaving CFLs for the consumer to install without an explanation as to their benefit can result in CFLs gathering dust. Other papers will discuss this in more detail but part of the problem can be a lack of education.

Measuring Success - Surveys

Good baseline surveys will help determine attitudes and knowledge of conservation and energy efficiency. It will be important to invest in baseline knowledge, attitudes and motivators across the state. Regional and other differences should be part of any survey data collected. There has been only a hand full of initiatives in this area in Pennsylvania so a comprehensive analysis should be undertaken as soon as possible. Once the baseline is completed, independent third-party educators will be able to develop the education plan.

One caution is that people will often say they will take action particularly if they know it is the right thing to say but there is often a disconnect between what consumers say they will do and what they ultimately do. One recent example is a study on energy efficiency and conservation behavior that was done in Ohio. APPRISE analysis noted that 54% had agreed to turn off lights and 16% followed through. Similar results were found using other measures. The point is to educate as to benefits of taking action and follow up to determine whether the action was taken.

When there are clearly defined goals in advance, it will be easy to measure success. One clear goal of any education program should to track the percentage of consumers who actively participate and reduce consumption; change behavioral habits to create a “culture of change” as the Ontario program noted; and sustain consumption reduction over time. It is important the program measures impacts that go beyond “awareness” of energy efficiency and conservation and looks at how consumer has changed and what the impacts of those changed have had.

When energy savings are achieved, it will be important to make public those milestone achievements. Those milestones should include dollars saved, the impact on protecting the environment and any other improvements on quality of life in their communities. For example, if the need to build a power plant or transmission line is displaced through energy savings, it is important that message gets out.

Funding Consumer Education

A statewide, coordinated approach to education is necessary to help achieve consistent results. Complimentary regional approaches can provide the grassroots support of a campaign. Objective and trusted messengers of the education work need to be utilized. A third party administer will be the most efficient, effective and credible entity to support such an effort. In other words, the utilities should not be expected to run separate and distinct education programs. It will be too difficult to overcome the problem with consumers trying to understand why their utility who is in the business of selling electricity is asking them to use less. The objectivity of the information will be questioned.

A consistent and reliable funding stream should be dedicated to any initiatives developed by the Commission or set through legislation such as a system benefits charge. One creative method for funding these programs is dedicating a portion of any approved future rate increases approved by the Commission to support education. A percentage of the overall rate increase could be allocated to education. This could become common practice in all rate cases, no matter what utility type.

Approaches to Education

- Grassroots nonprofit organizations have the credibility and knowledge of local communities and should be engaged to deliver both programs and education.
- Government education programs should lead by example and set reduction goals that meet or exceed that of the general population and share the results.

- Consider holding a non-government forum like they did in Ontario to gain a better understanding of the barriers to good conservation and energy efficiency. Work to reduce those barriers.
- Develop a “bank” of speakers you can draw upon to give statements etc. These people should represent various public interests and should be broad based and educated on the issues.
- Advisory boards can be useful.
- Take steps to educate children in schools and use incentives for the parents to get involved.
- Brand Pennsylvania’s energy efficiency and conservation program with a campaign theme and logo. The key is to make efficiency an easily recognizable choice that the consumer can make quickly and with confidence. The ENERGY STAR label should be emphasized and the PA initiative should be branded and emphasized as well.
- Track progress toward achieving conservation goals in a public way. Make it part of the campaign.
- Develop a creative “launch” event at which you will announce clear goals and establish clear time tables to reach milestones.
- Hire public relations consultants or other third party to coordinate the overall campaign.
- Don’t allow uncoordinated educational efforts and side goals to defuse the central goals and make those goals clear and measurable.
- Measure results periodically and make “mid-course” corrections as needed.
- Even though messages need to be branded and consistent, it is important to tailor approaches to delivery the conservation messages to diverse audiences.
- Provide milestone successful (and unsuccessful) results on a regular basis via the website.
- Borrow heavily from what has already been proven to work. Consult with and hire people who have been able to deliver successful programs and education and follow their advice.
- It is critical that education is not simply viewed as delivering rote messages to large and diverse audience. People and entities need to be educated as to the *right* actions to take and be provided with the technical knowledge to implement changes.
- Consumers will respond best if there are both financial incentives *and* a community goal at stake. Once incentives are available, the basis for your program is established and the

chances of success are greatly increased. Have specific actions you want people to take and tell them specifically what the benefits are of taking those actions.

Conclusion

The Commission needs to take a page from the Ontario Education Program and create a “culture of conservation” in Pennsylvania. The Commission should develop specific, measurable goals and actions that can lead to an efficient and conscientious use of energy for all customer classes that can be sustained over time. Education is a critical component of any policy initiative and should be properly funded. Hiring professional educators who would work with the Independent Statewide Program Administrator to develop an education plan to compliment program design will ensure program success.