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Pay-As-You-Save Energy Efficiency Products: Restructuring Energy Efficiency

The National Association of Regulatory Utility Commissioners

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Restructuring Energy Efficiency

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Prepared for the

National Association of Regulatory Utility Commissioners

Committee on Energy Resources & the Environment

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Pay-As-You-Save
Energy Efficiency Products

Restructuring Energy Efficiency

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Purpose

This paper explains how regulators and other policymakers can promote widespread market-based investment in energy efficiency. Establishing a new market infrastructure can dramatically increase the number of customers in every sector who buy cost-effective energy efficiency products. While especially suited to states that are restructuring their electric industry, this approach can be used by any state interested in maximizing the economic and environmental benefits of energy efficiency investment while minimizing the need to rely on public funding sources. Pay-As-You-Save efficiency products offer a way to restructure the energy efficiency market and release the pent-up demand of American consumers for energy efficiency in their homes and businesses.

Energy Efficiency and Market Barriers

There are long-term public benefits from investment in energy efficiency. Lower usage means less pollution and a smaller (and therefore less costly) transmission and distribution infrastructure. Using energy efficiently extends our limited energy resources. Most important to consumers, however, eliminating energy waste lowers energy costs. Lower costs improve the competitiveness of businesses and increase customers' discretionary income, thereby raising their standard of living.

While these benefits seem sufficient to justify investment in energy efficiency, individuals typically do not use societal criteria when making personal or business decisions. Consequently, if policy makers want individuals to invest in energy efficiency so that society can realize the benefits, they have to address the obstacles that inhibit individuals from making these investments.

Lack of money (or competing demands for available funds), lack of technical expertise, and uncertainty about one's continued occupancy at a particular location all combine to prevent customers from choosing to invest in energy efficiency in

their homes and businesses. The so called split incentive, when energy using equipment is purchased by someone other than the end user, also inhibits the selection of energy efficient equipment. Builders, developers and landlords profit by purchasing the least expensive equipment, even though the end user's life cycle cost for energy inefficient equipment may be much higher. Another significant barrier is the one least understood: rational, well-informed consumers with access to capital and an understanding of the life-cycle value of efficiency investments often do not make such investments because the up-front cost is more real to them than the theoretical future savings.

Attempts to address these obstacles or market barriers have produced a myriad of programs. Information programs are designed to provide the technical expertise that customers lack. Direct-install programs address customers' lack of technical expertise by sending out trained individuals to correctly install the right products in the proper locations. Incentive programs offer to pay people to purchase products they would not otherwise buy.

Most state utility efficiency plans, whether in the context of continued regulation or of a restructured industry, rely on either of two long-used approaches to promoting energy efficiency: utility-funded incentive programs or free market sales of energy efficient products.

Limitations of Utility Funded Incentive Programs

Utility-funded programs are paid for by all ratepayers and can be implemented statewide or through local distribution companies. The justification for using incentives to encourage people to invest in energy efficiency is sound, especially for new products. These programs allow experts in energy efficient technologies and the marketplace to offer subsidies to increase the number of purchases of cost effective measures. Some experts assert that subsidizing purchases of new energy efficiency measures will help these measures to gain market acceptance and will thus facilitate market transformation. Perhaps the strongest justification for incentive programs is that without subsidies, there is little customer investment in cost effective energy efficiency.

However, the incentive approach has drawbacks. Incentive programs do not eliminate the underlying market barriers for most customers. Large segments of the potential market for such measures have not chosen efficient alternatives despite the availability of rebates or subsidies of part of the up-front costs. And among those who do participate, many do not repeat such purchasing patterns.

Utility incentive programs also use ratepayers' money to pay for participating customers' savings. Subsidizing one customer's savings with other customers' money can create resentment that undermines public support for and limits the sustainability of such programs.

However, the most significant drawback to incentive programs is that they limit customer investment in energy efficiency. Customers learn to buy only those products that someone has determined merit a subsidy. Products without subsidies or with low subsidies, even if they are more cost effective, become less desirable and less likely to be purchased. For example, when the state and federal tax credits for solar water heaters ended in the early 1980s, the solar industry collapsed, even though the technology had improved and its cost effectiveness had increased as a result of rising energy prices.

Incentive programs also limit customer investment in energy efficiency because the decision about how much funding to make available for incentives is usually based on the amount of the wires charge, not on an analysis of how much is needed to ensure all customers purchase all cost-effective energy efficiency technologies. While a public benefits fund is a necessary component of operating an electric system, raising the additional funds for incentives unnecessarily increases the cost of electricity. Since regulators, distribution companies, energy service companies, and customers want to keep costs at reasonable levels, the tendency is to limit the funds available for subsidies and thereby limit investments in energy efficiency.

In most states (e.g., California, Connecticut, Illinois, Maine, Massachusetts, New Hampshire, Ohio), the amount allocated for incentives is the result of a decision by legislators or regulators about how large a surcharge ratepayers will tolerate. Whether one considers this amount large or small, it creates a ceiling on what can be accomplished that has nothing to do with the amount needed to fund customer installation of all cost effective or desirable energy efficiency products.

Limitations of Free-Market Energy Efficiency

The free market approach leaves it to vendors to decide whether or not to offer energy efficiency products and services and how much to charge. Typically customers choose vendors that offer desired services at reasonable prices. The justification of the free market approach is that little or no government involvement ensures that customers will get the best price and can buy only the services they want. Advocates for a free market approach to energy efficiency assert that entrepreneurs will invent and market products when there is money to be made.

However, the free market approach only works if the market for efficiency is structured in such a way that customers can actually express their desire for energy efficiency through purchases. This market structure does not exist. The same market barriers that led to the creation of utility programs continue to prevent most customers from purchasing energy efficiency measures.
Customers lack the capital and expertise required to install most energy efficiency technologies. Most customers have no guarantee they will remain at a location long enough to realize a sufficient return on an investment. Split incentives inhibit investment in energy efficiency products by builders, developers and property managers. Maintaining energy efficiency equipment to ensure savings is still a hassle. Consumers are risk adverse and most will not pay an up-front cost for an

efficiency measure, even if they are aware that there are life-cycle savings and can afford the initial outlay.

Additionally, electricity distribution companies and energy providers whose earnings decrease when sales decrease are unlikely to want to offer successful, widely available services that significantly lower their sales. Other companies lack the access to customers and a billing and payment system that might make the difference between a successful or failed energy efficiency venture. Unless all these market barriers are addressed, only a small percentage of the country's efficiency potential will be realized.

Defining the Problem

Although there is no universally accepted standard for quantifying the savings potential of all currently available energy efficiency technologies, there is agreement that the potential is significant. Neither traditional incentive programs nor the free market approach will effectively capture a significant amount of this energy efficiency savings potential.

Continuing to use the incentive approach will not significantly increase investment in energy efficiency because insufficient funds will be appropriated for incentives to subsidize installation of even a fraction of all cost-effective technologies. Additionally, once incentives exist, consumers are less likely to buy the product(s) without an incentive.

At the same time, simply returning to a free-market approach will reduce investment in energy efficiency. If there were no market barriers, there would already be enthusiastic investment in cost effective energy efficient products, those technologies whose savings exceed their cost (or incremental cost). Thus, if market barriers are not addressed and current subsides are eliminated, there would be nothing to attract customer investment in energy efficiency.

The problem is not a matter of money. Customers are already spending enough money on energy to pay for all cost-effective energy efficiency technologies. If a product's lifetime savings exceed its costs and if its costs were spread over time, customers would see immediate bill reduction. All that has to occur to fund the installation of all cost effective energy efficient technologies is to redirect the amount being spent on energy in today's marketplace to the purchase of cost-effective energy efficiency technologies. Market barriers are the reason this has not already occurred.
Utilities are not going solve this problem because if they were successful their sales would be reduced. Manufacturers and retailers of energy efficient products would supply a vibrant market if it existed. However, such a market cannot exist without a new infrastructure.

Key Assumptions for Energy Efficiency

Instead of ignoring market barriers or offering programs with incentives that artificially limit energy efficiency investment, we can restructure the way energy efficiency products and services are packaged and sold. By doing this, products with a very limited market can be made into products that most customers will want. The restructuring proposed in this paper is based on three fundamental assumptions:

1. How much you ask customers to pay for something is not as important as how you ask them to pay for it.

   There is a perception that people do not want to pay money for things. Actually, people are willing to pay money for things they value if the products are packaged in a way that responds to what consumers want. Bottled water is a good example. Offering to sell a three-year supply of bottled water for a fixed price of $500 may get a few takers. Selling a bottle of water for $1.00, however, responds to a real market and exponentially increases sales. Though an individual may spend much more than the $500 over the three years by purchasing one bottle at a time, portability, ease of purchase and the small financial commitment of each purchase change an unmarketable product into a marketable one.

2. People are more likely to pay for something if they only pay while they use it.

   Many products are purchased by paying a large amount of money in small increments over the time a product is used. There is a whole set of products (e.g., homes, cars, internet access, and even cable TV) that exist because of this payment approach. Part of the reason for the large number of owners of these products is that most people finance their purchases, knowing they can stop their payments when they sell their home or car or stop using internet or cable services. In fact, many people care more about the monthly costs for these products than their total costs.

3. People value what they pay for.

   Many people assign value based on the amount something costs. If someone has to pay money for something, they are more likely to use it. If customers are required to pay their own money for an efficiency measure, an implicit message is, "This efficiency measure is worth something." Conversely, to the extent the public has to be offered an incentive to buy a product, the message is, "You would not want this if you had to pay its full cost." Thus, perversely, if public funds are used to reduce or eliminate customers' costs for energy efficiency products, these products are less likely to be used and maintained properly and the savings from their installation are likely to be lower.

Pay-As-You-Save (PAYS) Efficiency Products

Restructuring energy efficiency requires a new set of products and services so that energy efficiency investment flows from marketplace decisions. End-user Pay-As-You-Save (PAYS) products involve restructuring the sale of proven technologies. Restructuring makes current products desirable to customers by eliminating the barriers to purchasing them. With no market barriers, consumers will purchase these products without incentives.

PAYS products:

- ensure that customers pay for a product as they realize its savings;
- save more than they cost; and
- are user friendly so customers will actually use the product and realize its savings.

PAYS products do not require consumers to have cash on hand or special technical expertise or to know they will stay in their current location for the next ten years. These products are designed to work for the consumers who want them.

<u>PAYS Product Infrastructure</u>

PAYS products cannot now be offered by vendors or energy service companies. They require the development of a new market infrastructure. The best way to discuss this concept of a product and how product design is affected by infrastructure is to use housing as an example.

Housing is a product. Few homes were purchased when people had to pay cash for the full value of the house. The market barrier to home ownership was lack of capital. Public subsidies to homeowners might have been a solution, but home ownership, though increased, would have been limited by the amount of money available for the subsidies.

Mortgaged financing within a regulated lending infrastructure was another solution. This solution involved creating a new product, mortgaged financed homes, that exponentially increased the number of homebuyers. Mortgage financed condominiums with legislated definitions and rules of ownership is another housing product that expanded the market for housing to even more customers.

These are familiar examples of packaging that transform what used to be an unmarketable product to one that is marketable. These new products were not possible without the legislative and regulatory lending and property transfer infrastructure that did not previously exist.

The new infrastructure for PAYS products includes a similar financing mechanism, the creation of an energy services charge. The energy services charge is the financial collection mechanism that allows PAYS products to exist. The energy services charge would appear each month on the customer's utility bill and remain a customer obligation at the meter location where the energy efficiency technologies were installed until the obligation is satisfied. An important new feature of the energy services charge is that more than one customer could end up paying for the installation at a location if occupancy changes hands during the term of the obligation.

The PAYS infrastructure must assure customers that PAYS products will save more than they cost. The monthly charge for a PAYS product has to be set so that the annual costs are less than the annual savings and the term of the charge is shorter than the life of the measure.

The PAYS infrastructure must also ensure that PAYS products are those that customers can and will use so that there are in fact savings. Products not installed or improperly installed will not produce savings. Therefore, PAYS products must be designed to be useable so that customers can easily learn where and how to install them (or the savings are great enough to pay for professional installation).

Usability also includes assurances that PAYS products deliver what customers want. For example, the earliest horizontal access washers were too small for American consumers and too difficult to use. The earliest energy efficient home heating systems were too complicated for local home heating companies to service. Just because a product is affordable and the payment system is consumer friendly does not make the product usable. PAYS products must be carefully designed to be desirable consumer products. Surveys, tests, and careful review can ensure customers get user-friendly products.

These assurances require a certification infrastructure that approves the products, payment terms, and the product installers or vendors. Initially, it is likely that states or utilities will establish or contract with a state agency, non-profit or business to certify PAYS products and set (or approve) the maximum monthly payment amount. Experts without a vested interest in the sale of a specific product will be better able to evaluate the likelihood that a product's annual savings will exceed its monthly costs and that a product is sufficiently reliable that it will last longer than the duration of the payments.

There are a number of ways to assure that customers will save more than they pay each year while assuring that product and financing costs are covered. Careful selection of reliable, long-life products is the simplest method. This could be combined with negotiated extended warranties from manufacturers or vendors for assured product life and savings.

Finally, states that have public benefits funds or other energy efficiency program funds used for incentives can redirect this money to supplement manufacturers'

warranties. Public funds in this case would be used to reimburse participants' costs that were not offset by promised savings after they made an investment in the public interest by selecting a PAYS product. In essence, this would be a publicly funded insurance program in a free market using funds that would otherwise have provided direct subsidies to every participant.

Regulators and or legislatures will have to approve these essential mechanisms for the PAYS approach to work. These include the appearance of the energy services charge on the distribution utility bill, the requirement that the obligation to pay for long-life measures stays with the meter, and the right to disconnect for non-payment of the energy services charge. Because of the need for consumer confidence in measures subject to these provisions, oversight of the market is required, especially at the beginning of a PAYS approach. Mandatory disclosure and warranties may also be beneficial.

How PAYS Products Work

Once the energy services charge and the other infrastructure changes are in place, PAYS products could be offered by a variety of vendors in the marketplace. Any cost-effective energy efficiency technology can be made into a PAYS product. The upfront capital for installation could be provided by a customer's electricity distribution company, energy supplier, a loan fund or even a product vendor. Whoever supplies the capital is repaid (including financing costs) through the customer's monthly payment of the energy services charge.

The electricity distribution company collects the energy services charge payments and forwards them to the capital provider (unless the distribution company supplied the capital). This is similar to the requirement that distribution companies collect energy charges and forward them to energy suppliers in both retail competition and non-competition states. Non-payment results in disconnection like any other billing charge.

The energy services charge for long-life, permanently installed measures, such as heating and ventilation systems, is assigned to the meter location. A customer's obligation to pay an energy services charge for such a measure ends when that customer's occupancy ends. The obligation automatically transfers to the next customer at that location. The energy services charge is structured to be less than the energy savings over the course of each year, so that future customers will pay less than they would have without the installed energy saving technology.

A different approach is used for shorter-life and removable measures, such as compact fluorescent light bulbs or room air conditioners. For these measures, customers will be required to pay any remaining balance or transfer the monthly payment obligation to their new location when they move.

The energy services charge mechanism ensures that the customers who get the savings pay the bill. Without this component, energy efficient technologies are

often not installed since developers and builders can keep their project costs low by not incurring the added expense of installing energy efficient technologies. Similarly, occupants (both renters and homeowners) who are uncertain about their future tenancy tend not to install energy efficiency technologies, unsure they will be there to see the savings.

For cost effective products, consumer assurance mechanisms can address consumer uncertainty. Certification of vendors and products, extended warranty requirements for product reliability and savings, and effective disclosure requirements combine to eliminate customer doubts. PAYS is not applicable to unproven technologies or technologies that are known not to be cost effective since there is no assurance the savings required to offset the monthly charges will be realized.

A PAYS Example

The Burlington Electric Department of Burlington, Vermont (BED) recently commissioned a study of PAYS products. As part of its design effort, BED staff and consultants developed the following example from a real-life project that illustrates how PAYS addresses the split-incentive problem.

A developer proposed a six-story project for downtown Burlington, Vermont with 16 tenants. To reduce costs and ensure that tenants paid for their own energy usage, the developer specified individual heating and cooling units for each tenant. BED proposed to upgrade each heat pump system with a high efficiency model and to build a cooling tower (metered on the building's main account) at a cost of $24,536. A conservative estimate of the life of these measures was fifteen years.
(All values are stated in nominal dollars.)

Measure	**Incremental Cost**	**Annual Owner Savings**	**Annual Tenant Savings**
Heat Pumps	$ 22,040	$ 0	$ 5,931
Cooling Tower	$ 2,496	$ 873	$ 0

Under Vermont's mandated new construction program, BED's customers would pay the entire $24,536. The developer and the tenants would pay nothing.

In BED's alternative, BED would pay for 100% of the up-front incremental cost. The developer has no additional out of pocket costs for installing the energy efficiency equipment.

BED would recover its costs through monthly energy service charges placed on each tenant location. The tenants pay each month out of their savings. The energy services charge would be collected over 10 years (two thirds of the estimated 15-year life of the measures) and be less than the projected monthly savings.

Since the tenants realize the savings from more energy efficient heat pumps, they (not the building owner) pay for their incremental cost. Since the building owner realizes the savings from a more efficient cooling tower, the building owner pays the incremental cost of the more efficient cooling tower. Assuming 10 years of payments and an 8.25% cost of capital, BED will eventually recover its costs while these customers receive the savings as follows:

Party	Total Payments	10 Year Savings
Tenants	$ 32,440	$ 59,310
Building Owner	$ 3,674	$ 8,730

If the building owner sells the building, the new owner, who now receives the savings from the more efficient cooling tower, continues to make the monthly payments until BED recovers all its costs, including financing, for that portion of the project. If tenants move out, their payment obligation is transferred to the new tenants, who now realize the savings from the more efficient heat pumps and pay the energy services charge until all BED costs have been recovered for that portion of the project. The monthly payments and savings for participants during the ten-year period would be as follows:

Party	Monthly Payment	Monthly Savings	Net Monthly Benefit
Tenants	$270.33	$494.25	$223.92
Building Owner	$ 30.61	$ 72.75	$ 42.14

In this example, the developer installs measures making his building more desirable to potential customers and society at no additional cost. The customers who occupy the building pay for the measures out of their savings until all project costs are recovered. BED's customers are not required to pay for individual customers' savings.

PAYS Products Track Record

PAYS is a new concept. In many states, regulations about disconnection and the charges that can appear on customers' bills make demonstration of this approach difficult. Further, we know of no state that currently allows charges for long-term obligations to be assigned to a meter location and automatically transferred to future occupants until the obligation is satisfied. However, various components of PAYS have been used in the past and there is a large body of data that may be instructive.

For example, many utilities rented water heaters to customers, especially in the 1960s. When customers left and new customers replaced them, the water heaters

remained and the new customers assumed the rental. While this was the new customer's choice, it may illustrate customer tendency to accept sensible decisions made by previous occupants.

Utilities in Vermont, Ohio and Texas have demonstrated that customers are willing to lease energy efficient products and pay monthly as part of their electric bills. Utilities in these states have leased thousands of compact fluorescent light bulbs. In Texas, utilities have also leased hundreds of refrigerators. BED set up its own loan program to help customers switch from electric heat to gas. In fact, an energy services charge that stays with the meter was used by Pacific Power & Light for commercial and industrial customers in the early 1990's. To a large extent, the PAYS approach builds on what was learned during the design and implementation of these programs.

Why PAYS Products Make Sense

Even though customers who install PAYS products will pay the entire cost, more energy efficiency will be realized than from incentive programs that enable potential purchasers to pay less. This is because PAYS products actually eliminate market barriers.

1.) The consumer does not need capital to purchase a PAYS product. Available measures are financed and there does not need to be any up-front payment.

2.) Customers need less technical expertise because they can trust that products eligible for PAYS will work and that savings will be guaranteed.

3.) Customers' concerns about their duration of occupancy and obligation to pay for long-life measures are mitigated because the obligation stays with the property not with the customer.

4.) The split incentives barrier is solved since designers, builders and landlords will not have to pay for more efficient installations. The end user who receives the savings will pay for them. In fact, designers and builders will be able to sell more valuable buildings at the same net cost.

5.) Savings from energy efficient technologies will be more likely to continue over the life of measures. Both the original customer and any subsequent customers will be more conscious about maintaining energy saving products since they will be paying the charges each month.

6.) There is no need for costly baseline studies to ascertain which measures require subsidies and which do not (and amount of the subsidy) and no need to compute avoided costs. Since there are no subsidies paid by all ratepayers, all proven cost-effective products can be turned into PAYS products and savings will be valued by the customer at the customer's energy cost.

Conclusion

In national surveys, consumers have expressed support for energy efficiency and a healthy environment. If policy makers want to realize a significant portion of the potential public benefits of energy efficiency, including the environmental benefits, they need to restructure the energy efficiency market so that vendors can develop and offer products that respond to consumers' unmet demand.

PAYS products have the potential to significantly increase customer investment in energy efficiency. If these products are going to exist, however, policy makers must establish a new market infrastructure. In order to develop the new infrastructure in any state, additional research will be needed. Appendix A provides a list of essential infrastructure elements needed to implement the PAYS approach. Establishing this infrastructure may require changes to state statutes or regulations. A review of current statutes and regulations is necessary to determine what changes are required for each state.

Once the new infrastructure is in place, PAYS products can be developed for all proven cost-effective technologies and for all classes and sub-groups of customers. These products do not require retail competition. However, if a state is restructuring its electric industry, it makes sense at the same time to put in place the infrastructure that enables the PAYS approach to work. PAYS products can effect real market transformation by turning existing technologies into desirable products.

Appendix A

Essential Elements of Pay-As-You-Save Infrastructure

(Statutory or Regulatory Action May Be Required)

The following are some of the essential elements that may require statutory or regulatory action in order to implement the PAYS approach. The nature of the action required (or whether an action is required) will vary by state. However, it is necessary that these elements be in place for PAYS products to be offered.

1. Electric distribution companies must be required to collect energy service charges (ESCs) when authorized by the Commission's designated agent (i.e., a certified vendor, a certifying agent, or certifying agency) and forward the collected funds to the financing entity (product vendor, bank, loan fund) or this designated agent.

2. Electric distribution companies must be permitted to follow their disconnection practices for non-payment of ESCs.

3. For specified long-life measures that become part of the real property at a meter location, after the initial customer terminates his/her account, the distribution company must be responsible for collecting ESC payments from successive customers at that meter location until all payments have been collected.

4. For specified portable measures, when customers terminate service at a location, distribution companies must be required to transfer the customers' ESC payment obligation to their next location or to collect all outstanding payments -- at the customers' option.

5. Distribution companies must be required to keep records of ESC charges assigned to meters, including the amount of each charge, the payment term remaining, a description of the measure(s), and the projected monthly customer savings.

6. Distribution companies must be responsible for disclosing to potential new customers, prior to establishing service, the existence of any ESC at a location and information about it such as the measure(s), the estimated savings per month, the remaining term of the payments, and other similar information. There needs to be performance criteria to ensure the utility communication to the new customer is successful. The designated agent should be empowered to contact the distribution company to verify its procedures for supplying this information to customers and its compliance with this requirement.

7. A designated agent needs to be authorized with specific responsibilities regarding assigning ESCs. Responsibilities 1must include, but not necessarily be limited to, approving specific measures, ensuring savings exceed costs (e.g., requiring adequate warranties, establishing conditions for sale or installation, limiting measure costs, etc.), and resolving customer complaints. Additionally, the designated agent could receive funds from the collecting utility and forward the appropriate amounts to each of the financing entities.