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More Distributed Generation With Pay-As-You-Save

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Introduction

The market-based Pay-As-You-Save (PAYS) approach to energy efficiency investment was first described in the authors' December 1999 paper.[1] PAYS allows customers to pay the total cost for certified cost-effective energy efficient measures over time using a portion of their expected savings. PAYS eliminates the customer's obligation to pay a large sum up front or to pay for savings that they may never receive. The first PAYS pilot program in the nation is awaiting approval from the New Hampshire Public Utilities Commission for a January 1, 2002, start up.[2]

Since PAYS was first discussed, regulators and other policy makers have suggested that a PAYS approach might also stimulate the distributed generation (DG) market. This paper provides a brief overview of PAYS, a review of the major barriers to widespread implementation of DG and discusses how PAYS could help to overcome some of these barriers.

PAYS Background: Market-Driven Energy Efficiency

PAYS offers a hassle-free way for consumers to purchase certified energy efficiency products with reduced risk and save money immediately. PAYS products:

- are hassle free because consumers can purchase them in one simple transaction with no up-front payment;
- relieve consumers of the major risks of investing in energy efficient technologies since these products are guaranteed by a consumer-trusted organization and there is no obligation for the customer to pay if for any reason the energy-saving measure stops working or the customer leaves the location where the measure was installed; and
- ensure that customers' savings are estimated to be significantly greater than their monthly payments.

PAYS products are packages of one or more cost-effective energy-efficient measures paid for over time on the monthly electric bills of the customers who receive the savings. PAYS packages energy-efficient technologies that benefit society as products that consumers want to buy <u>and</u> are willing to pay for. Only technologies that customers can be confident will produce savings are packaged as PAYS products.

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[1] "Pay-As-You-Save Energy Efficiency Products: Restructuring Energy Efficiency," Paul A. Cillo and Harlan Lachman, December 1999, prepared for the National Association of Regulatory Utility Commissioners (NARUC) Energy Resources and the Environment Committee.

[2] Docket Number DE 01-080, Pay-As-You-Save. If approved, as anticipated by the parties, the New Hampshire PAYS pilot program will be implemented by Public Service Company of New Hampshire (PSNH) and New Hampshire Electric Co-op (NHEC). PSNH's initial efforts will target larger municipal customers while NHEC's will primarily target residential and small commercial customers. NHEC will also allow its members to purchase PAYS products that save energy from all fuel sources and pay for them on their monthly electric bill. After eighteen months of operation, both utilities will prepare detailed process evaluations of their pilots to allow these utilities and the Commission to determine whether or not to expand the pilot.

While the benefits to society (less pollution, financial savings, and transmission and distribution system savings) may seem sufficient to justify investment in energy efficiency, individuals and businesses typically do not use societal criteria when making energy decisions. Consequently, if individuals are to purchase energy-efficient technologies so that society can realize the benefits, the obstacles that inhibit individuals from purchasing them need to be addressed. PAYS provides a vehicle to address these obstacles with significantly less public cost than most other approaches.

Unlike shared savings contracts, specific savings are not guaranteed. Instead, payments are structured so that for both the short and long term, customers' savings are estimated to exceed their payments. Additionally, PAYS does not use a traditional financing structure, which requires the purchaser to assume responsibility for making all of the payments. With PAYS, customers who purchase measures assume responsibility for making payments only while they are customers at that location. When a customer terminates occupancy at a location, the obligation to pay for measures is disclosed and transferred to the next customer at that location. The next occupant gets the savings and assumes any remaining payment obligation for the duration of occupancy.

The utility delivery service company provides billing and collection services for PAYS since it is the only entity that bills customers at every location and is capable of transferring energy charges to successive occupants. The PAYS arrangement is described by a tariff filed by the local utility distribution company and approved by regulators. Although PAYS relies on a tariff, it is a market-driven approach. The tariff only applies when customers decide to buy certified PAYS products in the marketplace.

As a tariff, PAYS is available to all customers who install PAYS-certified products. PAYS is similar to line extensions in that permanent energy-saving products for the benefit of the customer at a location are installed and then paid for by whomever the customer is at that location until the term of the tariff obligation has expired. The obligation to pay for PAYS products is not a debt assumed by an individual customer. Rather, it is simply a contractual obligation to make payments, with the tariff (which has the force of law) providing the assurances to the capital provider that would normally arise out of loan documents. Moreover, tariffs and the rules surrounding them are under the jurisdiction of state regulators, who can provide informal and expeditious consumer protections to supplement the costly and often lengthy court process. For government entities installing cost-saving measures, paying a tariff does not require voter approval since the installations do not involve customer assumption of any long-term debt.

Distributed Resources and Market Barriers

> *Distributed resources are demand- and supply-side resources that can be deployed throughout an electric distribution system (as distinguished from the transmission system) to meet the energy and reliability needs of the customers served by that system. Distributed resources can be installed on either the customer side or the utility side of the meter.*[3]

This definition of distributed resources includes two points that are important to this paper. First, distributed resources include both demand and supply-side resources. Demand-side investments

[3] "Profits and Progress Through Distributed Resources"; February, 2000; David Moskovitz, Regulatory Assistance Project.

(i.e., investments in energy efficiency and load management measures) were addressed in the 1999 PAYS paper. The possibility of using PAYS to facilitate customer investment in supply-side resources (i.e., generation) is the focus of this paper.

The second point included in this definition is that distributed resources can be installed on either side of the meter. PAYS was designed for products installed only on the customer side of the meter. PAYS is not a tool for utilities to determine whether to invest in efficiency or generation, but a system that enables customers to purchase and pay for cost-saving products. Therefore, this paper will discuss distributed generation installed only on the customer side of the meter.

Distributed generation technologies can provide benefits to the customers who install them, their utility and society. Customers can benefit from the lower costs and increased reliability from DG. Their utility can benefit from system improvements such as improved system reliability, reduction of excessive demand on the transmission and distribution system, and reduced line losses. DG can benefit society with lower emissions and reduced harmful impacts to land and water resulting from the use of more efficient technologies.[4] DG can also provide greater flexibility to meet the needs of customers, utilities and society because DG can be up and running quickly (i.e., it is generally easier to permit and install) and is readily adaptable to renewable energy sources.

If barriers did not exist, given these obvious advantages, there would be widespread customer purchase and installation of cost-effective DG throughout the country right now. The most obvious barriers are the regulatory issues that must be resolved. Many of these issues were discussed in a 1999 Arthur D. Little white paper.[5] Some of the key policy issues cited in the paper include:

- Interconnection and Interface.
  If customer-installed generation is to be interconnected to the utility grid, appropriate policies, protocols and equipment must be in place to ensure system safety and reliability and define issues such as market participation and pricing signals. This requires clear utility interconnection and interface policies that customers can readily understand and can count on and system requirements that are affordable for customers to implement.

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[4]There are many types of DG. All references to DG in this paper refer to clean DG such as wind, solar, gas microturbines, combined heat and power, etc. Regulators may want to inhibit or even prohibit the installation of dirty DG. For example, some fossil-fuel fired DG is less efficient than larger-scale generation and thus produces more carbon dioxide per kWh. In addition, nitrogen oxides, carbon monoxide, and particulate matter are produced in varying amounts with these systems, depending on the characteristics of combustion, and "tailpipe" clean up is usually cost prohibitive.

[5] "Distributed Generation: a Policy Framework for Regulators," 1999, Arthur D. Little, Inc.

- Grid-side Benefits and Costs.
  Customer-installed interconnected generation can be a cost and/or a benefit to the utility system depending on where the DG installation is located and how it is operated. Ideally, customers would install DG where it benefits the system as well as the customer, but customers do not have information about whether their sites provide those system benefits. Additionally, unless the utility or the government provides financial incentives to the installing customer, that customer does not share in the system benefits of DG beyond those benefits that all customers receive.

- Siting and Permitting.
  While small, standardized DG equipment would generally not require the lengthy permitting processes that large central generation requires, there are issues associated with DG that may require siting permits and emissions approvals. While permitting may equal a small percentage of the costs for a large power plant, they represent a much higher percentage of the costs for a DG installation and depending how policymakers structure siting and permitting requirements for DG, these issues may present real obstacles to customer installation of DG.

Regulators have the authority and ability to resolve all of these issues. However, to the extent that these issues remain unresolved or are resolved in a way that is unfavorable to customers who want to install DG systems, they present barriers to the DG market. Prohibitive fees, strict interconnection policy requirements, or withholding incentives for distributed generation in transmission or distribution-constrained areas are examples of policies that may or may not be justified but prevent customers, vendors, and society from realizing the benefits of DG. Clearly, finding a way to balance the legitimate concerns of utilities and the non-DG customer with the needs of individual DG customers and society is the important job of policymakers if customer-installed DG is to become viable.

However, resolving these major issues will not be sufficient to create a vibrant market for customer-installed DG. Even if the major regulatory issues specific to DG are resolved, a number of less-obvious market barriers remain. These market barriers threaten to inhibit widespread investment in DG as they have with energy efficiency for years. Several of the key market barriers to customer investment in any DG technologies were discussed in our 1999 paper relating to energy efficiency measures:

> *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.*[6]

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[6] " Pay-As-You-Save Energy Efficiency Products: Restructuring Energy Efficiency," Paul A. Cillo and Harlan Lachman, December 1999, prepared for the National Association of Regulatory Utility Commissioners (NARUC) Energy Resources and the Environment Committee.

Distributed Generation and PAYS

Customer investment in DG will encounter similar barriers to customer investment in energy-efficient technologies. Both types of investments require:

- large capital expenditures;
- informed customers who have the time to gather information, trust the information they find, and use it to evaluate their options;
- customers willing to accept the payment obligation for installations that produce savings that might be realized by subsequent customers; and
- landlords or developers who are willing to live with split incentives, i.e., invest additional money in their projects so that tenants or future owners can have lower energy costs.

PAYS was designed to address these barriers. Therefore, regulators and other policy makers can implement PAYS to help consumers interested in investment in DG to overcome them.

<u>Large capital expenditures</u>. PAYS does not require customers to make up front payments or even commit to assuming the costs for raising the necessary capital. Capital is provided by a third party (e.g., the vendor, manufacturer, or an investing party). A PAYS tariff is used to generate a stream of revenue to reimburse the capital provider. The purchasing customer only has to agree to make monthly payments that in combination with new fuel costs are estimated to be significantly less than the customer's current costs. The capital provider relies on the assurance and reliability of the utility billing and collection service, one of the most reliable payment streams in the nation, instead of loans, leases or other traditional financial mechanisms.

<u>Informed customers who gather key information they can trust</u>. PAYS makes the process easier for customers to decide whether to install DG. The same certification system that facilitates customer confidence in PAYS energy-efficient products can be used to provide confidence in PAYS DG technologies and their installation. If an independent entity verifies what a project entails (e.g., permits and interconnection equipment required), verifies the cost and savings estimates for the project, and provides the assurance that customers receive basic consumer protections (e.g., bonded contractors, contracts that clearly spell out all responsibilities, extended warranties), customers will be better positioned to confidently accept accurate vendor claims.

<u>Customer payment obligation</u>. Paying a PAYS tariff for a DG installation obligates customers to pay only during the time that they benefit from the installation. If the unit stops working, the charge ends. If the customer leaves the location, that customer's obligation to pay ends. The tariff binds successor customers at that location to assume the payments when they take occupancy and assume the benefits of the installation. As long as there is adequate disclosure, successor customers can decide whether to take occupancy based in part on their analysis of the cost and benefit of the DG installation at that location.

Split incentives. A PAYS tariff ensures a developer or building owner that installing a certified DG system will benefit subsequent building occupants and that the occupants who benefit will pay 100% of its cost. The PAYS tariff also enables a tenant or lessee who wants to install a certified DG system to do so with the landlord's permission. The PAYS tariff relieves tenants or lessees of any obligation to continue to pay the tariff for permanent equipment that cannot be taken with them once the period of their occupancy has ended. PAYS offers the first real opportunity to eliminate the split-incentive market barrier.

There are other benefits resulting from the use of a PAYS tariff to pay for DG. First, since a tariff is associated with a meter location and not an individual customer, there is no indebtedness created by the decision to install PAYS DG. Many customers cannot afford to borrow even for items that will lower their total annual expenses because their individual or business debt is at its maximum. Municipalities and institutions with annual budgets requiring board or voter approval also have difficulty accepting debt-encumbering purchases. However, since PAYS purchases do not require individual customers to assume new debt that will appear on the annual balance sheet, all of these difficulties may be avoided.

Secondly, even when individuals and businesses have available capital, there are usually competing demands for it (e.g., salary increases, expanded marketing, plant improvements). The capital for a PAYS purchase does not compete with these other interests. Whether supplied by a manufacturer, vendor, or third party, capital for a PAYS measure can only be used for a DG project that meets PAYS requirements. PAYS ensures that investments in DG do not have to be weighed against other competing uses for capital.

Thirdly, PAYS can target public funds to protect customers and investors who implemented desired DG projects in the event an installation fails. Public funds, when available, have been used for subsidies that lower the cost of installations. Used this way, public funds benefit participating customers whether or not they receive the expected savings. PAYS could be combined with publicly funded guarantees to protect customers and the capital providers, who fund their installations, from situations where the customer does not realize any savings and the capital provider will not be reimbursed.

For example, even if a measure is under warranty for the term of the PAYS charge, the measure could fail and the manufacturer could go out of business. In such cases, unless the manufacturer had provided the capital, someone would have to repay the money. A similar problem would exist if a business moved from a location and the location remained unoccupied. Without a customer in the location to receive the benefits from the DG investment, there would be no one to make the payments. In some cases, DG equipment could be removed and resold, but if that was not possible or did not produce sufficient funds, someone would have to repay the balance of the money owed. In these examples, societal funds could be used to guarantee the investment, transferring the risk away from customers and capital providers who invested in projects determined to have societal benefit.

Lastly, when the issue of lost revenues inhibits utility investment in DG, it could be addressed through use of a PAYS tariff. If all of the potential savings from a DG installation are sufficiently robust, the PAYS charge could be increased to allow the utility to recover the value of its lost revenues and the consumer could still be offered sufficient savings to warrant the investment. A PAYS DG tariff could offer vertically-integrated utilities (especially in those states that have not implemented restructuring), independent system operators (ISOs) responsible for overseeing T&D, and distribution utilities in restructured markets a way to help consumers realize the benefits of DG without the negative lost revenue impacts to the system normally associated with DG.

PAYS Distributed Generation Example

In 1999, a large east coast state university faced a number of problems with its energy systems. The problems included high energy bills, an aging infrastructure requiring costly maintenance, and an electricity distribution system that was inadequate to meet anticipated expansion. The institution was paying approximately $25 million annually for energy, primarily electricity and gas. A leading developer, owner and operator of combined heat and power (CHP) equipment worked with the university to develop a solution that addressed their infrastructure needs and lowered their energy costs. The solution required the installation of $71 million worth of new equipment including two dual-fired combustion turbines with heat recovery generators, a central chilled water plant, improved high-voltage electric distribution and a new metered-steam distribution system. The savings from reduced electricity and gas costs were estimated to exceed $6 million annually.

Were this to be a PAYS measure, the CHP developer would have secured financing, installed the equipment and arranged for its operation and maintenance for a total annual cost of less than $6 million. The utility would have instituted a PAYS tariff equal to the monthly project cost. The university and the state would have taken on no additional debt obligation since their only obligation would have been to pay the tariff and only if they continued to occupy the facility and receive the benefits of the installation. The project would look like this:

Project Cost	$71,000,000
Monthly Payment @ 5% for 20 Years	$ 468,568
Annual Payment	$5,622,822
Estimated Annual Savings[7]	$6,000,000
Net Annual Savings	$ 377,177

This project is currently being implemented without PAYS. The project capital for this state university was raised by the state using state bonds (at a rate of 4.5 to 5%) despite the opposition of the State Treasurer. This is an approach, however, that is not guaranteed to be successful in every state. If the State Treasurer, concerned about the implications of long term debt, had succeeded in denying approval for state bonding for the project, PAYS would have been the only way for the vendor to assure a third-party capital provider that the capital would be repaid by converting the project savings into a reliable payment stream. Additionally, if the client had been a business or institution other than a university with at least implicit ties to a specific location, PAYS would have been the only way to address concerns about occupancy by the client at that location.

[7] The estimated annual savings reflect the incremental savings from reduced operational and maintenance costs.

Market-Driven Distributed Resource Planning

The benefits of distributed resources have been well documented. But the best approach to incorporating distributed resources into the electricity supply and delivery system remains a subject of debate.

Some regulators have initiated distributed utility planning as a way to address some of these issues and move DR forward as a viable part of the utility-customer relationship. Distributed utility planning requires that utilities invest or encourage customers to invest in DR that is less expensive, based on the utility's avoided costs, than alternative utility investments in generation, transmission and distribution. Using a distributed utility planning approach modeled on integrated resource planning provides an orderly way to identify and target DR with sufficient quantifiable system benefits to justify the expenditure of utility funds to ensure that the DR is installed. While this is a worthwhile effort, it is likely to run into the same major problem that integrated utility planning and demand-side management programs have faced – the strong disincentive to reduce load inherent in traditional ratemaking.

The results of energy-efficiency efforts over the past two decades provides a glimpse of what might be ahead for DG if distributed utility planning is the only approach used. While utility demand-side management as part of integrated utility planning has stimulated energy efficiency investment, progress has been slow. Most of the cost-effective energy efficiency measures in the country that could have been installed over this period are still cost effective and waiting to be installed.

While a market-based approach to distributed resource planning on its face appears to be chaotic and riddled with obstacles, using open and fair markets provides one big advantage: the efficient use of public resources. DG vendors' desire to make their businesses grow requires that they develop projects that produce sufficient benefits at low enough costs that customers are willing to buy them. In a free and fair market, the level of investment is limited only by the number of good projects in which to invest.

In the absence of barriers, customers and vendors hoping to benefit from a money-making opportunity will actively seek each other out. The desire for and benefits of a more market-based approach to DG is summed up in the Arthur D. Little white paper's warning that "policymakers will be challenged by stakeholders" to establish fair policies for DG. Failure to do so could result in a failure to provide a level playing field for DG in a competitive market.[8] The challenge for regulators is to structure markets in a way that avoids chaos yet allows vendors, customers and society to benefit from DG.

There is a substantial difference between distributed utility planning and the market-driven PAYS approach. Distributed utility planning attempts to induce utilities to invest in or encourage their customers to invest in cost-effective distributed resources that are in all ratepayers' interest. This approach relies on establishing responsibilities, setting goals, carefully monitoring performance, determining whether or not goals have been met and, if not, identifying the reasons for non-performance, and instituting rewards or penalties. A market approach tends to invite all comers who think they can make money and requires regulators and other policy makers to establish the rules for a fair and open market to ensure that participants and society at large are not hurt as market forces are allowed to function.

[8] "Distributed Generation: a Policy Framework for Regulators," 1999, Arthur D. Little, Inc., p.v.

An approach that combines the focus and commitment to societal goals of distributed utility planning with the marketplace interactions of vendors and customers may have the best chance of realizing the full potential of DG for society. Regulators and planners could determine where DG offers society the most value, the amount of DG required to realize that value, and the implications to the utility system of incorporating DG. However, the goal of this regulatory effort would not be to mandate utility investment or subsidy of DG or to establish performance goals for utilities. The goal would be for states to:

- establish clear regulatory policies for DG installation where necessary (e.g., interconnection and stand-by policies for DG)[9],
- determine the amount of DG appropriate to specific T&D constrained areas,
- pre-approve installations up to that amount, and,
- allow vendors and their customers every opportunity to determine the best ways to provide the desired amount of DG in those locations using the PAYS approach.

Conclusion

While PAYS is still in the early stages of its development, in preparation for the pilot program to be launched in New Hampshire in 2002, many of the structural issues have been resolved. The PAYS strategy is to establish a structure that reduces risk for consumers and capital providers who are interested in working together to install cost-effective energy-efficient technologies. If successful in stimulating customers to invest in these technologies, it should be applicable to small-scale, customer-installed DG technologies as well.

Regulators in most states still have significant work to do in establishing the rules for customer installation of DG equipment. Issues such as interconnection, interface, siting, permits, and allocation of system costs and benefits need to be resolved before DG is cost-effective for customers to install. However, even if all of the major regulatory issues specific to DG are resolved in a way that gives customer-installed DG a fair chance, the same more-subtle market barriers that have inhibited widespread customer investment in energy-efficient technologies will dampen DG investment as well. PAYS can help address these market barriers.

Many states have not yet implemented restructuring. Regulators in these states may or may not be interested in allowing market forces to determine, at least in part, how their resource needs are met. However, in states that want to pursue market-driven DG, whether they have implemented restructuring or not, PAYS should be part of their overall solution. Regulators can improve the prospects for successfully incorporating DG into power systems nationwide by establishing not only the regulatory framework for distributed generation (e.g., methods for determining cost-effectiveness, interconnection policy, permitting and siting issues), but a PAYS market framework as well (e.g., tariffs, guarantees, certification).

Next Steps

Based on our efforts to implement PAYS for energy efficiency, we recommend that regulators interested in using the PAYS approach for DG:

[9] On February 4, 1999, the Public Utility Commission of Texas adopted clear interconnection guidelines for distributed generation (Project No. 20363, "Investigation into Distributed Resources in Texas, 1999 Interconnection Guidelines for Distributed Generation").

1. Consider opening a docket (or expanding an open docket) to address market-driven DG, perhaps on a pilot basis. Parties could provide information regarding the location(s) where DG would provide T&D benefits and the potential value to the system of such benefits. Parties could also evaluate the amount of DG that would be necessary to realize potential T&D relief in each area. Testimony could be sought regarding the environmental impacts of generation in these areas (including any corresponding offset in other areas). This analysis could be tempered by revenue and growth projections to calculate distribution company revenue impacts as well as system impacts and costs.

2. Use this information to pre-approve generic DG installations in the locations, in the amounts (i.e., energy and demand), and with the environmental impacts determined to be, on balance, beneficial to society. Since all pre-approved DG would be assured of having societal benefit(s), regulators might be able to justify more market friendly interconnection standards for pre-approved DG installations to ensure they are viable. Pre-approval would create a limited but open market for DG.

3. To further stimulate DG markets, approve the use of PAYS on a pilot basis limited to a specific portion of the pilot utility's system by establishing a tariff, and a certification and disclosure process. Certified DG vendors could offer their products to customers regardless of whether those customers owned or rented their premises or whether their capital or debt levels were limited. Vendors and customers could compete to access the limited pre-approved DG capacity and market forces would determine what specific customers, vendors and applications would satisfy this market.

4. Once the pilot results are evaluated, if successful, the PAYS approach could be expanded to other parts of the pilot utility's territory and in other utilities' territories.