

KeySpan Energy Delivery's Perspectives on Introducing a Renewable Solar Thermal Program by a Northeast Gas Utility

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KeySpan Energy Delivery launched a solar hot water incentive program to its commercial customers early in 2006. In doing so, KeySpan became the first gas utility in the U.S. known to promote and fund renewable energy installations for its customers. This paper will outline how KeySpan's solar program evolved, the success and challenges experienced during the solar program's development, and overall insight for other energy service providers to consider when introducing renewable energy efforts in their demand side portfolios.

Company Background

KeySpan Energy Delivery (KED) comprises all the regulated assets of KeySpan including the delivery of gas to New York, Long Island, Massachusetts and New Hampshire, as well as generating and managing the delivery of electricity on Long Island. KED is the largest gas distribution company

in the Northeast with a service territory of over 4,300 square miles, providing gas service to over 2.6 million customers. This paper will focus on the activity comprised within KeySpan Energy Delivery New England, (KED NE). The KED NE territory consists of 900,000 customers across 164 communities in Massachusetts and New Hampshire.

KeySpan offered its first energy efficiency programs for its Massachusetts customers in the early 1980's, and in 1997 made a fundamental shift to design and offer market transformation programs. Since 1997, the Company has offered an expanding portfolio of energy efficiency programs to its Massachusetts customers, and in 2003, received state approval to offer its efficiency programs to customers in New Hampshire. KeySpan's energy efficiency portfolio has grown to include 18 distinct programs today that incorporate dozens of energy efficient technologies and practices. While KeySpan offers separate programs for its business and residential customers, its programs support several efficiency-based technologies including, ENERGY STAR Homes, windows, and thermostats, high efficiency heating equipment, insulation and air sealing, and high efficiency water heating. The Company also provides opportunities to showcase new gas-saving technologies through its "Building Practices and Demonstration Program".

The objective of the Company's market transformation effort is to encourage the most efficient use of energy, especially natural gas, wherever practical. To achieve this objective, KeySpan plans, develops implements and evaluates targeted initiatives to overcome market barriers, modify energy decision-making processes, increase the availability of energy efficient products, and reduce the first cost of energy efficiency. The Company concentrates its efforts on market segments where not only are the gas efficiency barriers significant, but where investment yields other public benefits. The Company supports technologies and practices that meet this criterion.

Solar Program Background

Interest in "Green Building" within KeySpan's territory experienced tremendous momentum by the fall of 2004. As a result, the Energy Management Department recognized the rising number of opportunities for KeySpan to contribute to green projects. However, KeySpan was not asked to participate in their development. The Company responded with the development of the "Emerald Network Program." The Emerald Network connects KeySpan resources and expertise to promote the

development of green buildings. The Network brings together KeySpan's proficiency for high performance building design, emerging energy efficient technologies, alternative fuel vehicles, and efficient building operation. The Emerald Network was the first integrated approach from a natural gas utility for establishing, operating and sustaining green buildings. In addition to providing the link to green building solutions, KeySpan also provided \$250,000 to help support the design of new green buildings, aid in the placement of emerging energy efficient technologies, and provide a maintenance training course for operators of green buildings.

Early in 2005, KeySpan challenged itself to look further into the next generation of energy efficient technologies that would provide access to green projects and enhance the Company's efficiency offers. Until this time, KeySpan had not previously included any renewable opportunities for its customers. But by considering solar thermal installations, KeySpan added a new multi-dimensional program to its efficiency portfolio. A solar thermal program would provide both energy and environmental savings into its programs, and improve customer satisfaction to those in who have already taken advantage of KeySpan's energy savings programs, and are looking for additional ways to save, and diversify KeySpan's program to include renewable technologies. A solar thermal program was a revolutionary departure for any gas company to consider.

Because there were no large-scale funding opportunities for solar thermal programs in the United States in 2005, KeySpan was well-positioned to be a national leader to support solar thermal installations with the opportunity to provide a precedence for other utilities, government agencies, and municipalities to follow and support solar thermal applications. The time was right to move forward with a KeySpan Solar Thermal program.

Challenges & Barriers

KeySpan's announcement of a solar program quickly led to its awareness of the barriers in the solar market in New England, from climate, to equipment, availability of trained installers, to customer perception. Each presents a unique set of hurdles.

New England's solar thermal market is a comparatively underdeveloped one nationally, as the amount of installed thermal solar capacity in Massachusetts and New Hampshire is still very small. "Sunshine" states, such as California, Florida, and Arizona receive the majority of the market's solar

thermal collectors, though Table 2 shows that New Jersey is gaining a substantial share, illustrating the potential for solar thermal viability in more northern climates. Rising energy costs in the Northeast, combined with solar thermal's lower lifetime costs and immunity to commodity volatility, makes solar thermal energy increasingly attractive and economically viable in KeySpan's territory.

Table 1: Shipments of Solar Thermal Collectors by Destination, 2003

Destination	Shipments (ft ²)	Percent of National Total
Arizona	731,221	6.69%
California	3,514,290	32.16%
Florida	4,289,945	39.26%
Maine	1,860	0.02%
Massachusetts	35,826	0.33%
New Hampshire	258	~0%
New Jersey	803,579	7.35%
New York	92,995	0.85%
Vermont	10,099	0.09%
Shipments to United States/Territories	10,926,073	--
Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey"		

Not only is solar becoming more feasible in New England, the range of solar equipment and technology has broadened to include a range of installation capabilities. KeySpan needed to become more familiar with the range of equipment that could be considered for its program

Markets sectors and end uses are illustrated below in Table 2. From 2002 to 2003 there was a 45% increase in total solar collector shipments to the Commercial market sector, and a 14.5% increase in the Industrial market, indicating a growing market demand and better developed technologies. Table 2 also indicates growth in two end uses that KeySpan considered for the solar savings, space heating and pool heating. KeySpan also would support solar hot water heating.

Table 2: Shipments of Solar Collectors by Market Sector, End Use, and Type, 2002 and 2003 (Thousand Square Feet)

Type	Low-Temperature	Air	Medium-Temperature				High-Temperature	2003 Total	2002 Total
	Liquid/Air		Liquid				Parabolic Dish/Trough		
	Metallic and Non-metallic		ICS/Thermosiphon	Flat-Plate (Pumped)	Evacuated Tube	Concentrator			

Market Sector									
Residential	9,993	6	106	400	1	*	0	10,506	11,000
Commercial	813	0	3	40	1	0	7	864	595
Industrial	71	0	0	0	0	0	0	71	62
Utility	0	0	0	0	0	0	0	0	4
Other ^a	0	0	2	0	0	0	0	2	1
Total	10,877	6	111	440	2	*	7	11,444	11,663
End use									
Pool Heating	10,778	0	0	22	0	0	0	10,800	11,073
Hot Water	0	0	111	397	2	*	0	511	423
Space Heating	65	6	0	4	*	0	0	76	146
Space Cooling	0	0	0	0	*	0	0	*	*
Combined Space and Water Heating	0	0	0	16	0	0	7	23	17
Process Heating	34	0	0	0	0	0	0	34	4
Electricity									
Generation	0	0	0	0	0	0	0	0	0
Other ^b	0	0	0	0	0	0	0	0	0
Total	10,877	6	111	440	2	*	7	11,444	11,663
^a Other market sector include shipments of solar thermal collectors to sectors such as government, including the Military but excluding space applications. ^b Other end use includes shipments of solar thermal collectors for other uses such as cooking, water pumping, water purification, desalination, distillation, etc. *=Less than 500 square feet. ICS= Integral Collector Storage. Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."									

To further understand market factors at play for KeySpan's solar program, the market of distributors in New England would have to be considered, as well. Table 3 below indicates the distribution source for solar thermal equipment. Over half of all systems come directly from the wholesale manufacturer, while the majority of the remaining shipments operate on the retail distribution market. The high volume of wholesale distribution indicates that KeySpan would benefit from building relationships with the leading system manufacturers. Doing so not only helps KeySpan market its programs, but the manufacturers could then use that information to target new customers in their New England markets. The same line of thinking can then be applied to the retail distributors.

Table 3: Distribution of Solar Thermal Collector Shipments, 2002 and 2003 (www.eia.doe.gov)

Recipient	Shipments (ft ²)		Percent of Total (2003)
	2002	2003	
Wholesale Distribution	6,411,000	6,316,000	55.2%
Retail Distributors	4,509,000	4,283,000	37.4%
Exporters	177,000	262,000	2.3%
Installers	403,000	413,000	3.6%
End Users and Other	162,000	170,000	1.5%
Total	11,663,000	11,444,000	

As stated above, both the wholesale vendors and the retail distributors would be essential links for for KeySpan outreach for its solar program.

KeySpan also considered equipment as combined or “complete systems” versus an array of different components that could be part of any one solar thermal installation. The array of possibilities is both flexible and daunting, making complete solar thermal collector systems a simplified way to promote a solar program for interested customers.

Table 3: Shipments of Complete Solar Thermal Collector Systems, 2002 and 2003

Shipment Information	2002	2003
Complete Collector Systems		
Shipped	6,333	7,266
Thousand Square Feet	904	864
Percent of Total Shipments	8%	8%
Number of Companies	27	26
Value of Systems	\$10,363,000	\$13,586,000
Source: Energy Information Administration, Form EIA-63A, "Annual Solar Thermal Collector Manufacturers Survey."		

Complete solar thermal systems comprise only 8% of total shipments, though they account for over 37% of the total solar sale value in 2003. It is believed that packaged systems will allow for greater growth in the market, as well as possible simplification for customers’ understanding. Though custom thermal solar systems are not overly complicated, the uniform structure of packaged systems indicates that they may be an easier application to estimate therm savings.

Looking beyond the market for solar equipment and manufacturers, solar contractors was another essential component to any solar program. New England is a region with fewer experienced solar energy professionals compared to warmer regions. The regional demand had reflected this, but this, too, is changing. When KeySpan first announced its solar thermal program, there were fewer than ten solar installers working in KeySpan’s service territory, and much of the northeast. With the steady increase in energy costs in recent years, more installers now offer their renewable energy expertise to this region. Recent state and federal solar incentives now available have also energized the demand for solar thermal technology. Gradually, customers in the northeast have a growing choice of solar professionals to choose from. In fact, the Solar Energy Business Association of New England (SEBANE) confirms that in 2006, 12 new installers joined SEBANE and work in New England. In

addition, SEBANE now lists in 2006 sixteen different solar thermal installers on its website. KeySpan's support of solar technologies contributes to the momentum that boosts the demand for solar energy in New England.

Plumbers and installers are moving the market for solar thermal forward. Like KeySpan, they too must also contend with consumer perceptions of solar thermal benefits. In Massachusetts, there is a state-mandated pool of customer-funded resources which funds photovoltaic projects through the Massachusetts Technology Collaborative (MTC). This funding for photovoltaic applications comes from electric ratepayers, and is available for residential, commercial, municipal, mlow income, and green building projects. As the distributor of these solar funds, MTC has disbursed thousands of dollars for photovoltaic projects throughout the state. However, the public is not always aware that these dollars do not pay for solar thermal installations, only photovoltaic applications. There are no state-sponsored programs for solar thermal installations. And while current federal tax credits do include equally attractive incentives for both solar water heating and photovoltaic systems, Massachusetts consumers may be more familiar with solar technologies to alleviate electricity demand than with solar based water or space heating systems. Fortunately, current federal tax credits do include equally attractive incentives for both solar water heating and photovoltaic systems, which support KeySpan's promotion of solar thermal installations.

Internal challenges for KeySpan have also emerged with the launch of proposed solar thermal incentives. KeySpan must confront a common misconception that a gas utility would not sponsor support for renewable energy. KeySpan customers regularly wrestle with the notion that "a gas company sells gas, not saves it." The public, as well as architects and engineers, is more likely to look to "green," "sustainable," and "renewable" energy organizations or advocacy groups when seeking guidance or grants for renewable projects. Yet KeySpan's efficiency role in market transformation is perfectly suited to help direct and support additional energy savings projects through renewable energy programs. Proven gas utility models for KeySpan to learn from are rare, or at this time, remote. Its approach to promote solar thermal installations positions KeySpan to continuing its goal of designing nationally recognized energy efficiency programs.

Participation in KeySpan's Solar Program

KeySpan's aim is to keep the paths to participation open and easy to navigate. In order to participate in KeySpan's solar thermal program, a customer must currently have KeySpan as their natural gas provider and be on a commercial, industrial, multi-family, or residential rate code. KeySpan selected cost effective system types for both residential and commercial eligibility. These solar systems include, solar hot water heating, space heating, and pool heating. Commercial customers may also utilize solar thermal technologies for solar make-up air heating. Though all solar thermal technologies can be considered, the mentioned solar technologies have a relatively quick payback schedule. The cost effectiveness of solar thermal technologies dictate that for every dollar KeySpan spends on the program, substantial energy and cost savings will be returned to its customers.

KeySpan's interested commercial and industrial customers are first asked to have an energy audit of their business or facility to explore how the installation of a solar hot water system will provide cost effective, natural gas savings solutions. Through KeySpan's energy audit program, customers who have an opportunity to take advantage of solar thermal applications will be advised during the audit process. A follow up analysis using the RHET screen software will confirm the opportunity for gas energy savings and project gas therm savings numbers.

KeySpan Commercial auditors have been trained in the RETScreen Clean Energy Project Analysis Software, and are equipped to provide both KeySpan and the interested C&I participant with strategies on what systems might be most beneficial. If savings from such a solar thermal installation demonstrate energy savings, KeySpan will award \$1.50 per estimated, first-year therm savings modeled. Commercial incentives will not exceed \$100K or 50% of the installed project cost.

Energy Service Companies, such as Johnson Controls, Ameresco, Noresco, etc., often bundle a number of energy efficient measures into a performance contract with a customer. These companies possess a high level of technical skill and will be able to accurately assess where thermal solar applications can be successfully implemented. Additionally, partnerships with ESCOs may allow KeySpan's solar thermal program involvement in large, highly-visible projects.

For interested residential customers, the process is slightly different, as are the incentive dollars available to support solar thermal installations. Funding for the first year was allocated at \$30,000.00. This sum would allow up to 20 interested participants to take advantage of up to \$1,500.00 to be

rebated on the cost of the solar thermal installation in their home, weather for solar heating or pool heating. Customers and installers looking to take advantage of the program in this, the first year, must apply for the funding for their system which has to be installed between May of 2005 and April of 2006 to be considered. All residential systems will have to be willing to be monitored for water and therm use to be eligible for any funding. KeySpan will contract to have systems equipped with monitoring systems, and may inspect for basic installation practices. All systems must meet local and state plumbing and heating building codes.

All solar systems eligible for KeySpan's incentives must meet standardized performance levels. The leading solar standardization is performed by the [Solar Rating and Certification Corporation \(SRCC\)](http://www.solar-rating.org) (www.solar-rating.org). The SRCC is an independent, non-profit organization dedicated to the development and implementation of certification programs and national rating standards that establish durability and performance criteria for solar energy equipment. These rating systems pertain to Solar Collectors (Certification OG 100), as well as packaged systems for Solar Hot Water (Certification OG 300) and Solar Pool Heating (Certification OG 400). It is recommended that system eligibility be contingent on SRCC certification, where applicable. Virtually all leading solar manufacturer's systems are SRCC certified.

KeySpan aims to have a performance standard for installers, as well, as it does for other efficiency programs. The North American Board of Certified Energy Practitioners (NABCEP, www.nabcep.org) is currently developing a process for Solar Thermal Installer Certification. This certification is expected to be very similar in function to its already developed P.V. Installer Certification, which was established to provide a set of national standards by which P.V. installers with skills and experience can distinguish themselves from other non-certified installers. NABCEP has indicated that the solar thermal certification process will be completely developed and available within one year. KeySpan may evaluate inclusion of NABCEP's installer certification program to link customers with regional, certified installers.

To alert customers and installers about KeySpan's support of solar thermal installations, KeySpan's will allow for extensive outreach efforts of this program. KeySpan utilizes brochures, direct mail, bill inserts, electronic newsletters, and educational literature for this initiative. KeySpan's Energy Management staff will also disseminate the solar program in face-to-face venues, including trade

shows, community energy events, new homeowner workshops, and efficiency events. The Company's website is another avenue to promote this unique program, with application forms available on-line to download and complete.

Program Benefits

Supporting solar thermal technologies proves to be both a beneficial options for customer energy savings, and for the Company, as well. The advantage to the qualified customer will be realized in therm savings. Even if a commercial customer fails to meet the criteria to utilize solar thermal benefits, because the energy audit is a requirement for interested C&I participants, KeySpan is equipped to enhance any existing heating systems with efficiency upgrades recommended as a result of the commercial audit.

In the months after announcing its solar thermal program, KeySpan began to realize new gains in offering this renewable option. KeySpan's support of solar thermal technologies gradually attracted the attention of key stakeholders. By the summer of 2006, solar installers, plumbing and heating contractors, and regional sustainable energy organizations were contacting KeySpan prior to KeySpan connection with them. Organizations like *Green Roundtable* and the *New England Sustainable Energy Association* (NESEA) invited KeySpan it their planning meetings. In addition, engineering and design firms that incorporate green building techniques in to their practice were contacting KeySpan seeking additional information. The regional green building community has been energized by KeySpan's effort, especially homeowners, builders and architects designing to LEED standards, and companies seeking tax credits for renewable energy installations. And where KeySpan would previously have to ask for a seat at the planning table, these agencies and organizations now reserved one for KeySpan.

News of Keyspan's solar thermal program has extended beyond the private sector, and well into the community. I public outreach activities, KeySpan can anticipate unsolicited inquiries from the public about solar incentive, a new phenomena for this gas utility.

Sample Projects

KeySpan's initial solar thermal projects served both public and private sectors, and both involved solar pool heating. Facility in Roxbury, Massachusetts was the first project. This Boys & Girls Club serves over 2000 of Boston's youth population between the ages of six and 18. Its membership is predominately minority, with at least 40% of its members coming from families with annual incomes of less than \$23,000, and at least 60% living in single-parent households. The Roxbury Club had not been updated since opening 35 years ago, and was in desperate need of rehabilitation.

Beyond the standard efficiency measures installed to increase the overall building performance, the Club sought to increase the green attributes of the building, and thereby decreasing the building's environmental impact on the community. Through joint funding from both KeySpan and the Massachusetts Technology Collaborative, solar hot water and P.V. systems were installed to accomplish both goals. The installation is estimated to save 1,437 therms annually. KeySpan's incentive level for this project was set at \$1.50/therm, and is equal to \$2,155.00 for the production credit.

Another solar thermal project KeySpan supported in 2006 occurred in Cape Cod. In this installation, an unglazed, solar pool heating system was installed at the Hyannis Travel Inn in Hyannis. The installed system cost was over \$7,000 for labor and capitol. The newly installed pool heating system will deliver approximately 1,090 therms annually, though in operation it appears to be performing even better than anticipated. KeySpan's incentive level for this project was set at \$1.50/therm, and is equal to \$1,635.00 for the production credit. Additionally, KeySpan will fund \$800 towards the purchase and installation of therm monitoring equipment to evaluate the actual performance of the pool heating system.

Accomplishments

KeySpan's solar thermal program, even in its infancy, generated new leads for energy efficiency opportunities, extended The Company's connection with new industry players, and fostered a welcome entrée into green projects throughout KeySpan's service territory.

Since it was introduced, KeySpan has generated nearly 25 C&I solar prospects, coupled with the 12 interested customers from the residential sector. All the residential leads came without any targeted marketing from KeySpan. Solar leads and potential opportunities for KeySpan also emerged as a

result of the solar technology trainings sponsored by KeySpan. KeySpan funded and/or hosted a variety of solar thermal educational workshops since 2005. These workshops included a full-day training with Bill Guiney, General Manager of the Hot water Division at Solargenix Energy, LLC, and the solar thermal instructor at the Florida and North Carolina Energy Centers. KeySpan also held two hands-on solar thermal workshops for students of two technical schools. In addition, KeySpan also arranged extended solar trainings with the Massachusetts Department of Conservation and Recreation. This series included a three-day intensive seminar, and attracted over 65 participants, from plumbers, contractors, designers, and HVAC professionals, and members of the public. Each course was taught by both regional and national solar thermal experts.

Another component to KeySpan's solar education focused on enhancing the expertise of KeySpan's commercial auditors. Working in conjunction with the City University of New York's Bronx Community College, KeySpan's auditors were trained to use the RETScreen Clean Energy Project Analysis Software, and, as a result, are now equipped to provide interested C&I participants with strategies on what solar thermal and water heating systems might be most beneficial in their facilities.

These varied connections have broadened KeySpan's reach in the renewables market to include the green building sector. Unlike previous years, KeySpan is now involved in such projects working with the U.S. Green Buildings Council's Leadership in Environmental and Energy Design (LEED), and the Massachusetts Technology Collaborative (MTC) funded renewable projects in progress. Non-profit organizations, including NESEA, the Utility Solar Water Heating Initiative (USH₂O), and the Solar Business Energy Association of New England (SEBANE) now actively recognize or collaborate with KeySpan to promote solar thermal installations. Prior to the creation of KeySpan's solar program, connections with any of these organizations or agencies were rare. Instead of excluding KeySpan as a fossil fuel-based energy provider, KeySpan is now asked to participate, advise, and support a range of renewable energy, sustainable building, and green projects throughout its service territory.

Next Steps

KeySpan anticipates that consumer demand for solar thermal opportunities will continue to grow in the coming years, and at a rate that exceeds those in recent years. In order to ensure future funding for

solar thermal applications, KeySpan will need to make certain improvements and adjustments to enhance program development and delivery.

On-going work will include KeySpan's commitment to connecting interested customers to the growing installer community. KeySpan already refers customers to the SEBANE website for an updated list of active solar contractors in the region. This is beneficial to both KeySpan and its customers, as it separates KeySpan from recommending any one installer, and allows customers quick access to regional solar providers. KeySpan is also working with SEBANE to link its on-list list of installers with KeySpan's website and current solar program offer and information. Additionally, KeySpan is working to promote installer membership into SEBANE, which is intended to expand the exposure of trained solar professionals in New England that gives customers even greater options when choosing an experienced solar installer.

KeySpan's future solar promotions will also be improved when its existing projects are completed, and those initial projects can be used to demonstrate future savings and cost benefits to future customers. As part of any customer's commitment to KeySpan funding for solar thermal, on-site monitoring and data collection is requested of all participants. This necessary data will be used for evaluation purposes, and may spark increased participation based on hard data of solar-based savings in this northern climate. Savings data not only justifies cost benefits to continue the program in the future, but gives customers greater confidence when considering the paybacks and benefits of solar thermal installations.

The introduction of its solar thermal program, coupled with the efforts of KeySpan's Emerald Network initiative, moves KeySpan closer to its goal of providing the nation's most progressive, gas utility efficiency programs. It is hope that market transformation efforts in the 'green' arena will spur the continued growth of solar technologies throughout the Northeast, allowing KeySpan's Massachusetts and New Hampshire customers to become leaders in natural gas efficiency.