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*Commercial/Industrial Niche/Other Programs
Exemplary Program*

***Compressed Air Leak and Detection Remediation Program
NSTAR Electric***

PROGRAM OVERVIEW

The Compressed Air Leak Detection and Remediation Program began as an NSTAR Electric pilot program in the year 2000 targeting compressed air distribution system and end-use improvements in commercial and industrial manufacturing facilities. Since then, it has evolved into a long-term, sustainable compressed air system leak detection and remediation program, which integrates best practice techniques presented by the Compressed Air Challenge, offers financial and technical assistance incentives for end users to address compressed air leaks, and offers compressed air training to end users and their maintenance staff. Ultimately, the goal is to develop improvements in compressed air system reliability and air supply quality, and accompanying electrical savings, through sustainable changes in compressed air systems operations and maintenance. Consultants engaged by the NSTAR Electric evaluate options and enhancements to the proposed building design in order to identify energy savings and improved system operating efficiencies. Participation in the Compressed Air Leak Detection and Remediation Program requires an investment in time and resources by the customer.

To participate in the Compressed Air Leak Detection and Remediation Program, customers must have compressed air systems that meet the following eligibility requirements:

- Have a cumulative compressed air generation capability greater than or equal to 50 nominal Hp,
- Demonstrate the capability to efficiently reduce power demand (kW) as air flow load (CFM) is reduced,
- Operate a minimum of 2,000 hours annually, and
- Have a gross leakage rate of the compressed air system that is greater than or equal to 15% of the system capacity.

Key program services and participant responsibilities are described below.

System Assessment or Walk-through Evaluation

Compressed air system audits play a critical role in the leak detection and remediation process. A system audit documents the current state of compressed air system operation, identifies problems and system inefficiencies, quantifies the gross amount of leakage, identifies potential solutions, and quantifies benefits. The Compressed Air Challenge (CAC) has developed guidelines for compressed air system audits for both small and large compressed air systems. Customers must perform CAC system assessments for systems greater than or equal to 125 nominal Hp or a CAC walk-through evaluation for systems less than 125 Hp. In addition, customers must perform ultrasonic leak detection surveys of their compressed air systems.

Participation and Reporting

Participating customers must maintain system leak rates of less than or equal to 10% of their system capacity for a minimum of three (3) years from entry into the program. Customers agree to: (1) assess the system gross leakage rate, at a minimum, twice annually, (b) take remedial actions as required to reduce the system leakage back to the system assessment target rate, and (c) maintain a leak survey and remediation log that, at a minimum, details survey date, area, leak number, description, line pressure, line size, leak size or decibel reading, leak type, CFM impact, and remedial action. Customers agree to submit copies of their logs, and other required documentation, to NSTAR twice annually. Prior to Year 3, customers agree to submit re-assessment studies of their compressed air systems' gross leakage rates.

Training and Operational Maintenance

Customers have the option of purchasing and permanently installing power metering/energy monitoring equipment on air compressors and must participate in (at a minimum) a one-time on-site-training in use of their equipment to measure power utilization and monitor energy consumption of air compressors. Within one year of participation, customers must demonstrate successful completion of the Compressed Air Challenge Level 1 training. For systems greater than or equal to 300 Hp, customers must demonstrate successful completion of the Compressed Air Challenge Level 2 training. Customers must also demonstrate, in writing, the inclusion of a comprehensive leak detection and remediation protocol as part of their standard operation and maintenance practices. NSTAR will contribute up to 50% of the tuition requirements for the customers to attend the Compressed Air Challenge Level 1 and Level 2 training.

Customer Incentive Structure

NSTAR reimburses eligible customers for costs of assessment studies, walk-through evaluations, and ultrasonic leak detection surveys consistent with the following schedule:

EXISTING SYSTEM NOMINAL HP	ASSESSMENT STUDY & WALK-THROUGH EVALUATION	ULTRASONIC LEAK DETECTION SURVEY
50 – 74 HP	50% of study costs up to \$2,000	50% of survey cost up to \$2,000
75 – 99 HP	50% of study costs up to \$2,500	50% of survey cost up to \$2,500
100 HP or greater	50% of study costs up to \$5,000	50% of survey cost up to \$5,000

NSTAR also will reimburse eligible customers up to 100% of the cumulative cost, not to exceed \$2,500, for the compressed air power metering equipment and a one-day on-site training in its use.

Customers also may receive incentives from NSTAR for permanently repaired leaks in their systems. Customers must complete a CAIR Leak Remediation Incentive Form, submitted along with the Leak Survey Log. Incentives follow the schedule below:

PARTICIPATION QUARTER	INCENTIVE / CFM SAVINGS
Year 1: Period 1 and 2	\$14/CFM
Year 2: Period 3 and 4	\$12/CFM
Year 3: Period 5 and 6	\$8/CFM

Incentives at year three are conditional to a re-assessment study of the customer’s gross leakage rate of the compressed air system. In the event that the gross leakage rate is greater than the customer’s target rate (+3%), NSTAR will not provide incentives until the target rate is achieved through additional improvements.

PROGRAM AT A GLANCE

Program Name: Compressed Air Leak Detection and Remediation Program

Budget: Not available.

Targeted Customer Segment: Commercial and industrial customers with large compressed air systems.

Funding Sources: NSTAR electric energy efficiency program funding via statewide ratepayer public benefits charges

Program Start Date: Pilot program launched in 2000

Best Person to Contact for Information about the Program

Program Participants: Not available.

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Annual Energy Savings Achieved: Not available.

Peak Demand (Summer) Savings Achieved: Not available.

*Commercial/Industrial Niche/Other Programs
Honorable Mention*

***High Tech Energy Efficiency Program
Pacific Gas & Electric***

PROGRAM OVERVIEW

For several years, PG&E has promoted energy efficiency strategies related to the cooling systems for data centers, with only limited success. While the facility engineers who typically run these systems were receptive to adopting efficiency measures, they were often overridden by their information technology (IT) counterparts, who are responsible for the mission-critical activities that take place inside the data center.

Gradually, resistance to energy-saving measures in the IT industry has given way to interest. In 2006-07 average enrollment in PG&E's data center energy-efficiency courses tripled. PG&E's energy-efficiency experts now regularly receive invitations to speak at IT industry events. As many data center operators reach the physical and energy-supply limits of their facilities, they are increasingly coming to PG&E's high-tech team for help in managing growth. Some customers simply can't install any more computing equipment without freeing up energy capacity. This presents a great opportunity for energy efficiency: Data center operators want to learn how energy-efficient technologies can not only save energy, but also increase data center capacity.

Pacific Gas & Electric's High Tech Energy Efficiency program recognizes that the only way to drive efficiencies in data centers is to promote cooperation between IT and facility management professionals. In 2006 PG&E broadened its portfolio of service and program offerings to reach into the data center environment itself, as part of its broader approach of providing programs based on target markets. PG&E's program strategy is to partner with customers who operate data centers and IT infrastructure, as well as with high tech companies based in Silicon Valley and elsewhere, to develop a utility-leading portfolio of program and service offerings that will drive energy efficiency accomplishments in this rapidly growing market segment.

PG&E offers a comprehensive set of services to its high tech industrial customers; key elements of the program include:

- Educating end-use customers on energy-efficient data center practices and design.
- Providing technical support services to customers who seek to evaluate energy efficiency opportunities in their data center and IT operations, both for existing facilities and for new construction.
- Providing financial incentives to support energy efficiency upgrades of existing equipment, and to support the specification of premium-efficiency equipment and design in new construction.

- Identifying new technologies in the data center and IT market that have energy efficiency and demand response potential, and working with industry partners to qualify these products and practices in utility programs.
- Educating the industry on (1) energy efficiency in their operations, (2) the value of energy efficiency and demand response to utilities, and (3) how to participate in utility programs.
- Acting as an industry-leading advocate for the inclusion of energy efficiency metrics for computing equipment, and for energy efficiency in general.
- Providing leadership to the utility/energy efficiency industry by sharing program models and best practices.

This combination of activities has addressed a hugely high-profile market, where energy use and efficiency have recently reached prominence due to incredible IT growth rates for all industries both nationally and globally.

PROGRAM PERFORMANCE

2006 represents the first year of PG&E's expanded High Tech Energy Efficiency Program. Although much of the year was spent certifying technologies and designing updated programs, PG&E was still able to achieve significant energy savings and meet program goals. Most of these savings were achieved during the fourth quarter of 2006.

Since the fourth quarter of 2006, the High Tech Energy Efficiency Program has taken off, achieving high energy savings. Through November 16, 2007, year-to-date accomplishments in the high tech segment are:

2007 Goal	2007 YTD	2007 YTD Committed*
9.07 GWh	18.2 GWh	32.8 GWh
0.77 MW	2.18 MW	3.0 MW
0.07 MM Therms	0.18 MM Therms	0.49 MM Therms

* Committed figures are indicative of customer projects and incentive applications that have been received and technically vetted, but where the project is not yet completed.

These energy savings accomplishments are quite modest given the estimated load of data centers in PG&E's service area (approximately 400 to 500 MW, and growing); however, the program is expected to deliver 5 to 10 MW or more of load reduction over the 2007 and 2008 period.

Information technology efficiency measures typically have high capacity factors relative to demand (often running 24 hour/365 day schedules) and have high interactive energy savings (from reduced heating loads in data center environments). For that reason, energy savings accruing from equipment loads in the data center itself provide very high value from a utility perspective (peak demand from both direct energy use and decreased cooling load, and essentially a unitary capacity factor from the direct energy use savings).

LESSONS LEARNED

In late 2005 PG&E began planning for an innovative program design and delivery paradigm centered on targeted markets. This plan represented a shift from a program-specific model (structured around calculated retrofits, deemed-savings rebates, and new construction) to one that blended aspects of these programs with new program approaches to serve the needs of particular market segments.

This approach has led to the development of integrated programs that address the particular characteristics of each market. For example, a variety of retro-commissioning programs have been developed, with significant difference between program models for commercial office and, say, hospital customers.

Of more than a dozen specific target markets (i.e. agricultural, medical, schools, industrial, water/wastewater), the high tech market segment has seen a dramatic increase in the variety of technologies that have been identified and wrapped into program designs.

Additionally, the target market approach is leading to better integration across all demand-side management activities. Energy surveys now include identification of demand response and self-generation opportunities alongside energy efficiency recommendations for many business types.

In the high tech market segment, these opportunities were not apparent prior to 2005; data centers have never been considered a target market for demand response given their mission-critical nature. However, PG&E, in partnership with several companies that provide information technology workflow management systems, is now exploring the possibility of working with customers to process non-critical workloads in off-peak hours, to shut down equipment when it is not being used (an entirely novel concept in the IT industry), and even to shift IT workloads between data centers located across the country and the world.

The technologies that PG&E has evaluated and incorporated into integrated program offerings would not have occurred absent a target-market focus. This focus is continually leading to new opportunities that will drive success across all demand-side resource models and lead to significant benefits for customers and the environment in the communities PG&E serves.

The computing equipment, airflow management, and power conditioning systems in data centers are not easily tackled from an energy efficiency standpoint, but PG&E has put in place industry-leading efforts to address these end-uses and technologies. For example, PG&E worked closely with Sun Microsystems to develop an incentive program for energy-efficient computing

equipment. The program has garnered attention from AMD and Intel, and all of the major computing equipment manufacturers, who are now qualifying their premium performance equipment for the incentive program. Although the program is solely applicable to equipment replacement projects, it represents a bridge strategy to an eventual offering that may provide deemed rebates for servers that meet or exceed a high-efficiency standard.

PG&E announced the nation's first incentive program for virtualization, helping support projects that result in dramatic energy savings. Virtualization allows customers who are facing data center capacity issues to operate multiple IT workload streams on single servers. An implementation project involving the technology will typically allow a customer to consolidate their workloads on far fewer servers, in some cases allowing them to reduce equipment counts by over 80 percent. In addition, PG&E has partnered with VMware, the largest virtualization technology provider, and Intel Corporation and their equipment partners (such as IBM, HP, and Dell), to begin a major market education and outreach program.

PG&E has begun addressing power conditioning and distribution in data centers, starting with incentives for high-efficiency uninterruptible power supplies. PG&E is also closely following and evaluating a potential move to direct current power distribution systems in data centers, which has the potential of reducing voltage transformation and rectification losses.

The company also plans to extend the 80 PLUS Program to data center computing and data storage equipment. The current program provides upstream incentives to manufacturers of personal computers who incorporate high-efficiency power supplies into their product offerings. PG&E has secured interest and commitment from many computing equipment makers to participate in the extended program, which is likely to debut in mid-2007.

There are a wide variety of airflow and energy management strategies that can be implemented in data centers, including re-orienting equipment, using enclosed racks, and controlling computer room air conditioners, and PG&E is working with vendors to develop calculation tools that will accurately predict energy efficiency gains from implementation of these strategies. The calculations will in turn be used to qualify customers for financial incentives for projects at their sites.

Most recently, PG&E is focusing on energy efficiency opportunities in data storage equipment, which has been an overlooked area for potential gains. The company will offer incentives for software control systems that essentially offer the same benefits as virtualization technology, again allowing customers to consolidate poorly utilized equipment.

PG&E has developed calculation methodology to accurately predict energy savings for the use of MAID (Multiple Array of Idle Discs) data storage equipment. This technology stores rarely-used data on hard disks which are then nominally powered down, saving 75 percent of the energy used by standard systems. Further, PG&E is refining a methodology for determining the energy savings from converting a distributed PC-based network to a thin client system, with IT workloads hosted in the data center.

PROGRAM AT A GLANCE

Program Name: High Tech Energy Efficiency Program

Targeted Customer Segment: Customers involved in computer and information technology manufacturing, operations and support.

Program Start Date: 2006 in its expanded form; had been some previous program efforts in this market

Program Participants: Not available

Annual Energy Savings Achieved: 18.2 GWh in 2007 (savings through mid-November 2007); 0.18 MMtherms in 2007

Peak Demand (Summer) Savings Achieved: 2.18 MW in 2007 (savings through mid-November 2007)

Budget: \$4.5 million in 2007

Funding Sources: California ratepayers through public goods charge funds

Best Person to Contact for Information about the Program

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*Commercial/Industrial Niche/Other Programs
Honorable Mention*

***Local Government Energy Watch Partnership Program
Pacific Gas & Electric***

PROGRAM OVERVIEW

The Local Government Energy Watch Partnership Program works to establish “energy watch” partnerships with a variety of government entities—cities, towns, counties, and other public agencies—to help Californians lower their energy bills and enjoy a cleaner environment. Twenty-two cities, counties and agencies have joined forces with PG&E to extend the reach and effectiveness of PG&E’s energy efficiency programs, and to provide information about demand response programs, renewable energy and self-generation opportunities.

Each Energy Watch partnership develops its own outreach plan to increase energy efficiency program participation, based on the unique needs of the local area. Participating governments and associations can receive specialized energy efficiency offerings in their communities and are responsible for informing their communities about the wide variety of energy efficiency and demand reduction offerings available from PG&E.

Energy Watch partnerships offer a range of energy efficiency options for commercial, small business, and residential customers, as well as municipal facilities. PG&E works with local contractors, builders, building departments, and others to install energy-efficient equipment to reduce energy use. Locally based energy efficiency seminars may be offered to minimize travel time and expand the audience for energy efficiency education.

The Local Government Energy Watch Partnership Program is an umbrella initiative with two primary program directions:

- The Mass Market Program targets single family residential direct install, multifamily residential direct install and small business direct install.
- The Target Market Commissioning/Retro-Commissioning Program targets high tech, hospitality, industrial, large commercial, residential new construction, retail, schools, colleges, universities and municipalities.

In developing partnerships with state and local government PG&E reaches other customers by taking advantage of existing government infrastructure and leveraging the information and resources of local partners. By collaborating with municipalities, colleges, and universities, PG&E is helping to foster energy best practices. Energy program achievements are measured, and the lessons learned shared among the partnerships so that successful practices can be adopted by other community agencies throughout the State. PG&E's Local Government Energy Action Resources will assist other municipalities that wish to partner with PG&E in the future.

The Local Government Energy Watch Partnership offers a wide and comprehensive menu of services as part of the partnerships it develops, including:

- Adoption of new energy practices by cities and counties,
- Support for environmentally friendly ("green") buildings,
- Local energy efficiency codes and standards,
- Direct installation of selected residential energy efficiency measures (such as lighting) for a targeted area,
- Direct installation of selected energy efficiency measures for small businesses (such as lighting and light emitting diode (LED) "open" signs) for a targeted area or business type,
- Municipal building energy analysis and retrofits,
- Design assistance for new municipal buildings,
- Locally-based energy efficiency seminars,
- Local building codes and standards support,
- Specialized marketing and outreach to each local community, and
- Locally-based vendor and subcontractor training and education.

All partnerships are held accountable to mutually agreed-upon savings goals. This program model is unique in its efforts to achieve actual savings from each partnership, instead of merely setting goals for outreach and marketing efforts.

PG&E and its Energy Watch partners also focus on local energy policies that promote energy efficiency practices, codes, and standards. These local activities help customers take advantage of opportunities to retrofit buildings, replace equipment, and receive rebates. PG&E has always offered a large suite of energy efficiency services. With the partnerships, PG&E can offer additional technical assistance for those cities and counties that are most interested in promoting energy efficiency.

PROGRAM PERFORMANCE

PG&E began working with local governments in 2003 with the City and County of San Francisco's Peak Energy Program. In the 2004-2005 program cycle PG&E expanded on the successful partnership model to include seven partnerships with local governments. In addition, the first statewide partnership was established with the Higher Education Energy Efficiency Partnership.¹

In an increased effort to use energy efficiently, PG&E increased the number of partnerships from nine in 2004-2005 to the present 22 for 2006-2008. PG&E solicited feedback and established teams to evaluate the approximately 40 local government abstracts received. Selection criteria for the partnerships included a clear statement of the proposed partnership's goals, measurable, cost-effective energy savings, innovation, the market segments served, partner roles and qualifications, coordination of delivery channels, strategies to create customer equity while maximizing energy savings and coordination with other organizations. Next, PG&E completed

¹ The Higher Education Energy Efficiency Partnership is recognized and profiled separately as an exemplary program in this report's section on "Schools Programs."

the selection process and developed 19 partnerships with local governments. Seven were renewed from 2004-2005 and twelve are new. In addition, the Higher Education partnership from 2004-2005 was renewed for 2006-2008 and serves as the model for two additional, new statewide partnerships. As part of the integration process, PG&E adjusted the preliminary partnership budgets and goals using a methodology designed to optimize the ability of the integrated portfolio to meet energy savings targets established by the Commission. Partnerships that successfully meet early goals will potentially have access to additional funds.

Each partnership is unique in terms of its goals, services and initiatives. Energy savings and other results are reported and tracked separately. Below are a couple examples of existing partnerships to illustrate the types of services provided and results achieved.

The Association of Monterey Bay Area Governments (AMBAG) Energy Watch Partnership is implementing an innovative hospitality direct install program targeting hotels and motels in the coastal counties of Santa Cruz, San Benito and Monterey.

- From August 2006 to September 2007, AMBAG committed nearly \$1.7 million incentive with paid energy savings totaling nearly 2458 kW and 18,000,000 kWh. AMBAG expects its savings to reach far more than 100% of their 2006-2008 goals.
- With only 20% of the region's hotel/motel market served to date, AMBAG Energy Watch intends to increase the program budget in order to continue this successful program over the long-term.
- AMBAG Energy Watch receives steady media coverage in the region, including articles in the *Salinas Valley Business Journal*, *Central Coast Reporter*, and the City of Santa Cruz quarterly newsletter, *One Person's Trash*.

Another example is the Motherlode Energy Watch Partnership, which consists of PG&E; the Counties of Sierra, Nevada, Placer, El Dorado, Amador and Calaveras; and the Cities of Nevada City, Grass Valley, Auburn, Placerville, Jackson and Angeles Camp. The partnership promotes reduced energy use and energy savings for partner cities and counties by providing energy efficiency information and direct installation of energy-efficient equipment free of charge to multifamily residential and small business customers. An example project that resulted from this partnership was a successful LED replacement bulb program in downtown Placerville, which now serves as a model for other small, historic towns. Placerville is a charming "gold rush" town. The Motherlode Energy Watch Partnership there replaced more than 6,000 7-watt lights with new LED lights, which use approximately a tenth of a watt. These improvements to Downtown Main Street and the historic Belltower will save more than \$15,000 in energy costs. This example proves how other rural areas can use LED technology to replace old incandescent lights while saving energy costs and attracting tourists during the holiday season.

The diversity of the partnerships is then well illustrated by another partnership that involves industries and communities at the leading edge of modern technology. The Silicon Valley Leadership Group (SVLG) involves senior management from more than 200 companies across numerous Silicon Valley industry sectors. SVLG collaborates with local, state and federal government officials to address major public policy issues facing high-tech employers. PG&E and the Silicon Valley Leadership Group (SVLG) work together on the SVLG Energy Watch

Partnership (SVLGEW). SVLGEW will promote reduced energy use and energy savings targets for the SVLG members by providing energy efficiency information, commercial building energy assessments, energy-efficient equipment and energy system metering and monitoring equipment to small, medium and large business customers.

One of the initiatives in the SVLG Energy Watch Partnership is the Silicon Valley “Clean and Green” Energy Action Plan, engaging leaders in energy efficiency programs by using cutting-edge technology. The SVLG Energy Watch Partnership uses a monitoring-based commissioning (MBCx) program that is a comprehensive approach to obtaining energy savings. MBCx provides an innovative and sustainable process that delivers cost-effective retrofits to some of Silicon Valley’s leading companies.

LESSONS LEARNED

A core objective of the partnerships created under this program is to increase awareness of and participation in a wide variety of applicable energy efficiency and associated cost savings opportunities for the full range of energy customers—from individual home-owners to large institutions and industrial facilities. Each Local Government Energy Watch Partnership develops its own outreach plan to increase energy efficiency program participation, based on the unique needs of the local area. Participating governments and associations receive specialized energy efficiency offerings in their communities and are responsible for informing locals about the wide variety of energy efficiency and demand response offerings available from PG&E. In this way the partnerships “boost” the numerous other programs offered by PG&E, increasing participation and achieving greater savings.

This unique model has proven successful in providing energy savings to its partners. The examples described above show how various Local Government Energy Watch Partnerships are achieving significant results through promoting transferability, using innovation and creating market impacts that deliver both immediate and long-term savings.

PROGRAM AT A GLANCE

Program Name: Local Government Energy Watch Partnership Program

Targeted Customer Segment: The Local Government Energy Watch Partnership Program works with residential customers and non-residential customers including commercial buildings, small businesses, and municipal facilities

Program Start Date: In 2003 PG&E began working with local governments—first the City and County of San Francisco with the Peak Energy Program. In 2004 PG&E expanded this partnership model and formed seven partnerships with other local governments.

Program Participants: A total of 22 partnerships have been established to date.

Energy Savings Achieved: 66.23 GWh and 0.13 MM Thm for the period 1/06 through 9/07.

Peak Demand (Summer) Savings Achieved: 10.9 MW for the period 1/06 through 9/07.

Budget: \$123.6 million for 2006-2008 local and statewide partnerships

Funding Sources: California ratepayers through public goods charge (PGC) funds

Best Person to Contact for Information about the Program

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