LINCUS

ENERGY connection

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Insight and Expertise to Increase Energy Efficiency

In this issue...

Delivering Proven Results in Energy-Efficiency Engineering

Lincus, Inc., delivers energy-engineering consulting services that maximize the value of your utility company's assets while improving end-use client's mechanical building systems design, construction, and operation. Since 1984, Lincus professionals have been servicing utility giants, major corporations, city planners, and medical institutions with proven results.

DEMAND-SIDE MANAGEMENT PROGRAMS

PROGRAM DEVELOPMENT AND MANAGEMENT

Lincus has several years of experience in managing energy-efficiency programs. Based on this experience, we have identified a number of key practices to help ensure programs are developed and management successfully at the lowest Program Administration Cost (PAC).

1. Establish Program Goals, Policies and Procedures, and Timeline

At the onset of any project, it is crucial to establish the program's goals, develop the policies and procedures, and create a timeline for goal-attainment. The **goals** of the program should specify: a) the program's cost-effectiveness thresholds; b) energy- and demand-savings goals; c) deliverable deadlines; and d) the targeted customer segment. The **policies and procedures** should: a) set forth the process flow; b) define any information that will be required for reporting; c) identify what will be needed to establish the baseline; d) provide the savings verification (specifying acceptable evaluation and monitoring [EM&V] plans); e) establish quality assurance requirements and safety policies; and f) describe the required paperwork to balance the interests of the various constituencies (including the customer, implementer, reviewer, management, and Public Utilities Commission).

2. Key Kick-Off Meetings

A series of kick-off meetings should be scheduled once the goals and compliance protocols, have been established. These should consist of:

- **An Internal Program Management Meeting:** This meeting, consisting of utility management, the program manager, technical reviewers and processing personnel, is used to clearly identify and communicate all program goals, policies and procedures, and service level agreements (the agreed-to timeline for completion of various tasks within the project lifecycle process flow).
- **An External Implementation Meeting:** This meeting should be used to ensure that third party implementers and reviewer thoroughly understand all aspects of the program's goals, policies and procedures, and timelines prior to implementation.
- **An Account Representative Meeting:** This meeting consists of program managers and the applicable account representatives who will be working directly with the customers in marketing the program. All aspects of program rules including customer participation guidelines, budgets, and goals are disseminated to account representatives.

3. Development of Marketing Plan

- A detailed Marketing Plan should then be developed in partnership with account representatives. This will ensure that all account representatives will "buy into" the program thus improving customer enrollment. (We have found that in spite of a tough economy, many of our programs have attained full-budget commitment by utilizing this strategy.)

The Marketing Plan should specify:

a) Targeted Customers
b) Eligibility Requirements
c) Project Lifecycle
d) Measure Offerings
e) Project Limits
f) Procedures to Set Customer Expectations

4. Setting Expectations

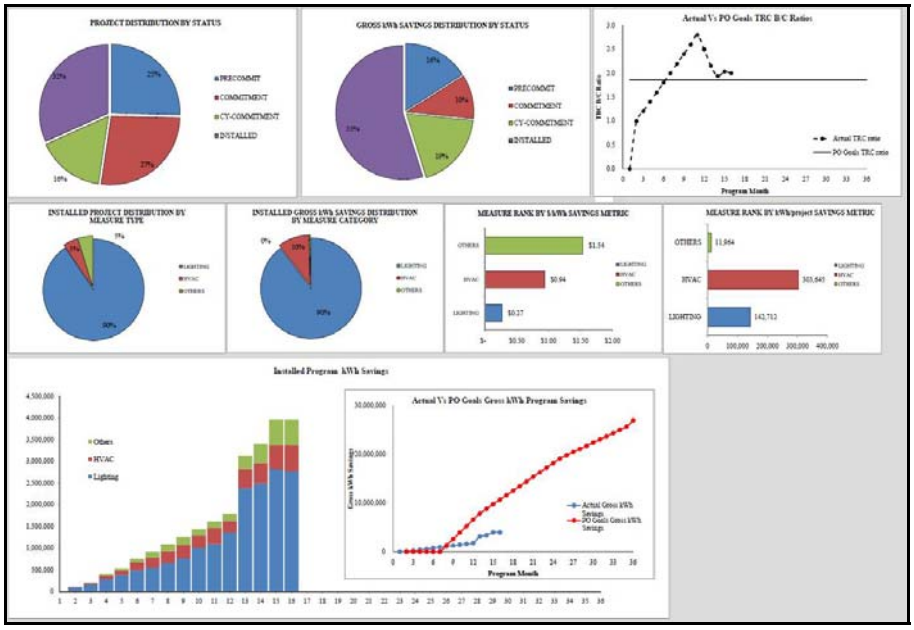
- Program Managers and Account Representatives should set attainable customer expectations for program participation prior to customer enrollment. This will help avoid unforeseen challenges during implementation. Customers should receive a **Service Level Agreement** that specifies general timeframe for project application approval, inspection, installation, and review. It also provides a clear understanding of required project documentation, signatures, and process steps. The offerings of the program should be clearly specified, and any common misconceptions should be identified. Most importantly, the customer should be informed about of the importance of not moving forward with project installation prior to the establishment of their baseline. We have found that customers who are unwilling to follow these procedures at the onset will likely not follow the required procedures after program enrollment.

5. Detailed Overview Meeting with the Customer

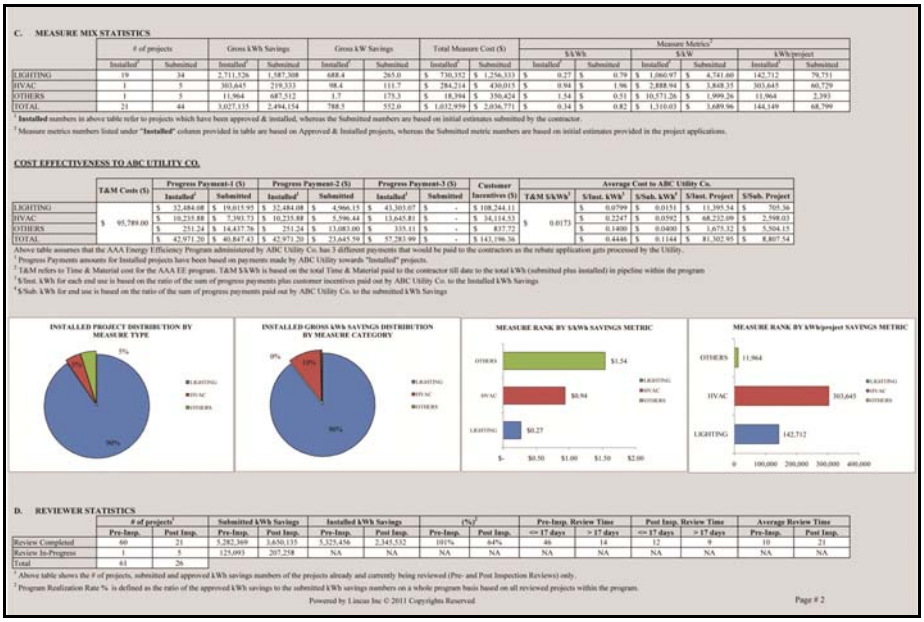
- Once a customer has enrolled in the program, we've found it helpful to set up a kick-off meeting with them directly for each project. These meeting should include the account representative, implementer, and reviewer to discuss the strategy for establishing the baseline along with the EM&V plans. These initial meetings are essential for: a) projects greater than 500,000 kWh; b) projects with emerging technology; or c) projects that are anticipated to have complications. These meetings prepare all parties involved for the project process on the front end and communicate important expectations. All agreed-upon next steps and responsibilities should be documented at this meeting to provide sound back-up over the lifetime of the project, which may last over a year and involve turnover.

6. Reporting

- Once the program moves to the implementation phase, the development and utilization of reporting and tracking systems are crucial for effective management. Successful program managers are able to efficiently track and communicate program and project statuses, energy and demand savings, percent-to-goal information, and cost effectiveness. We've found that Lincus **Energy Efficiency Program Management Software Tools** have significantly improved the ability to track and report program metrics in a clear and concise manner. For more information on utilizing these software tools to aid in your program implementation, please contact Lincus, Inc.



Pictorial Representations of the Program Status
Using the Lincus Energy Efficiency Program Manager Software



C. MEASURE MIX STATISTICS

	# of projects		Gross kWh Savings		Gross kW Savings		Total Measure Cost ($)		Measure Metrics[2] $/kWh		$/kW		kWh/project	
	Installed[1]	Submitted	Installed[1]	Submitted	Installed[1]	Submitted	Installed[1]	Submitted	Installed[1]	Submitted	Installed[1]	Submitted	Installed[1]	Submitted
LIGHTING	19	34	2,711,326	1,587,308	688.4	265.0	$ 730,352	$ 1,256,333	$ 0.27	$ 0.79	$ 1,060.97	$ 4,741.60	142,712	79,751
HVAC	1	5	303,645	219,333	98.4	113.7	$ 284,214	$ 430,015	$ 0.94	$ 1.96	$ 2,888.94	$ 3,848.35	303,645	60,729
OTHERS	1	5	11,964	687,512	1.7	175.3	$ 18,394	$ 350,424	$ 1.54	$ 0.51	$ 10,571.26	$ 1,999.26	11,964	2,393
TOTAL	21	44	3,027,135	2,494,154	788.5	552.0	$ 1,032,959	$ 2,036,771	$ 0.34	$ 0.82	$ 1,310.03	$ 3,689.96	144,349	68,799

[1] **Installed** numbers in above table refer to projects which have been approved & installed, whereas the Submitted numbers are based on initial estimates submitted by the contractor.
[2] Measure metrics numbers listed under **"Installed"** column provided in table are based on Approved & Installed projects, whereas the Submitted metric numbers are based on initial estimates provided in the project applications.

COST EFFECTIVENESS TO ABC UTILITY CO.

	T&M Costs ($)	Progress Payment-1 ($)		Progress Payment-2 ($)		Progress Payment-3 ($)		Customer Incentives ($)	Average Cost to ABC Utility Co. T&M $/kWh[3]	$/Inst. kWh[4]	$/Sub. kWh[5]	$/Inst. Project	$/Sub. Project
		Installed[2]	Submitted	Installed[2]	Submitted	Installed[2]	Submitted						
LIGHTING	$ 95,789.00	$ 32,484.08	$ 19,015.95	$ 32,484.08	$ 4,966.15	$ 43,303.07	$ -	$ 108,244.11	$ 0.0173	$ 0.0799	$ 0.0151	$ 11,395.34	$ 705.36
HVAC		$ 10,235.88	$ 7,393.73	$ 10,235.88	$ 5,596.44	$ 13,645.81	$ -	$ 34,114.53		$ 0.2247	$ 0.0592	$ 68,232.09	$ 2,598.03
OTHERS		$ 251.24	$ 14,437.76	$ 251.24	$ 13,083.00	$ 335.11	$ -	$ 837.72		$ 0.1400	$ 0.0400	$ 1,675.32	$ 5,304.15
TOTAL		$ 42,971.20	$ 40,847.43	$ 42,971.20	$ 23,645.59	$ 57,283.99	$ -	$ 143,196.36		$ 0.4446	$ 0.1144	$ 81,302.95	$ 8,807.54

[1] Above table assumes that the AAA Energy Efficiency Program administered by ABC Utility Co. has 3 different payments that would be paid to the contractors as the rebate application gets processed by the Utility.
[2] Progress Payments amounts for Installed projects have been based on payments made by ABC Utility towards "Installed" projects.
[3] T&M refers to Time & Material cost for the AAA EE program. T&M $/kWh is based on the total Time & Material paid to the contractor till date to the total kWh (submitted plus installed) in pipeline within the program
[4] $/Inst. kWh for each end use is based on the ratio of the sum of progress payments plus customer incentives paid out by ABC Utility Co. to the Installed kWh Savings
[5] $/Sub. kWh for end use is based on the ratio of the sum of progress payments paid out by ABC Utility Co. to the submitted kWh Savings

D. REVIEWER STATISTICS

	# of projects[1]		Submitted kWh Savings		Installed kWh Savings		(%)[2]		Pre-Insp. Review Time <= 17 days	Pre-Insp. Review Time > 17 days	Post Insp. Review Time <= 17 days	Post Insp. Review Time > 17 days	Average Review Time Pre-Insp.	Average Review Time Post Insp.
	Pre-Insp.	Post Insp.	Pre-Insp.	Post Insp.	Pre-Insp.	Post Insp.	Pre-Insp.	Post Insp.						
Review Completed	60	21	5,282,369	1,650,135	5,325,456	2,345,532	101%	64%	46	14	12	9	10	21
Review In-Progress	1	5	125,093	207,258	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total	61	26												

[1] Above table shows the # of projects, submitted and approved kWh savings numbers of the projects already and currently being reviewed (Pre- and Post Inspection Reviews) only.
[2] Program Realization Rate % is defined as the ratio of the approved kWh savings to the submitted kWh savings numbers on a whole program basis based on all reviewed projects within the program.

Statistical Program Information in Table Format
Using the Lincus Energy Efficiency Program Manager Software

FINANCING ENERGY-EFFICIENCY PROJECTS

Many Energy-Efficiency (EE) projects stall due to a lack of available funds needed for implementation. Often times the decision makers don't see room in the budget for the capital expense. This is where several different vehicles can be used to make the EE projects financially feasible. Some of these methods differ between the public and private sectors, and you will quite possibly be able to use one of these five options to facilitate funding for your EE project.

Alternative Funding Options

1. Tax-Exempt Lease-Purchase Agreements
2. Energy Service Performance Contracts
3. Anchor Tenant Financing
4. Shared Savings Agreement
5. On-Bill Financing

	Interest Rate	Loan Amount	Loan Range	Maximum Loan Amount	Maximum Loan Amount (not average)***	Maximum Loan Repayment Term	Maximum Loan Repayment Term Range (not average)
Residential	5.3%*	$9,100	$5,000-$12,500	$29,900	$13,000-$100,000	11 years	5-20 years
Commercial/ Industrial/ Public	2.8%**	$73,900	$3,950-$560,000	$327,000	$7,500-$750,000	8 years	2-15 years

Energy Efficiency Financing Programs, © ACEEE. Report U115

* *Residential Programs surveyed had interest rates that ranged from 0% - 15%. Low interest rates reflect interest rate buy down that occurred in some instances. For details see ACEEE Report U115 Appendix A.*

** *Commercial/Industrial/Public Programs surveyed had interest rates that ranged from 0% - 7.5%. Low interest rates reflect interest rate buy down that occurred in some instances. For details see ACEEE Report U115 Appendix A.*

*** *Maximum Loan amount is based on programs surveyed for ACEEE Report U115.*

ITEMS 1 AND 2: TAX EXEMPT LEASE PURCHASE AGREEMENTS AND ENERGY SERVICES PERFORMANCE CONTRACTS

In the public sector, capital improvements are traditionally funded through cash allotted in the capital budget or bonds. In a case where there is neither a budget nor bonds available to fund the project, a **Tax-Exempt Lease-Purchase Agreements** or **Energy Services Performance Contract** can be acquired to provide capital by using money from their operating budgets.

Tax-Exempt Lease-Purchase Agreements are similar to installment-purchase agreements in that the lessee owns the equipment at the end of the lease period. Usually these types of agreements do not require a voter referendum, which helps to expedite the process of implementing public sector EE projects. The lessor generally makes sure the equipment is essential for use to minimize the risk of funds not being appropriated in the operating budget. In many cases the existing equipment is already part of a lease agreement and new equipment can be easily added into the agreement. Certificates of Participation (COP) are a variation on this type of project financing. In these agreements multiple investors participate in financing the project. The table below list features of various financing options.

In situations where savings can easily be measured and documented, an Energy Service Performance Contract is recommended to help with funding. Energy Service Companies (ESCO's) enter into a contract to finance and implement an EE project, often guaranteeing certain levels of cost savings that can be applied to the purchase price of new equipment or deferred maintenance. The funding for this type of contract can come from either the capital or operating budgets. Energy Services Performance Contracts are available in both the public and private sectors.

Features of Various Financing Options

Financing Options*	Interest Rate	Up-front Costs	Requires Voter Approval	Complex	Staff Time	Ownership	Project Size
Self-financing	NA	No	No	No	Low	Agency	Neutral
Municipal Lease	Low	No	No	No	Low	Lessor	Neutral
State Loan	Low	No	No	No	Low	Agency	Small to Medium
COP	Low	Yes	No	Can be*	High	Lessor	Medium to Large
Pooled Bonds	Low	Yes	No	Can be*	High	Agency	Medium to Large

* *Can be complex because of the need for a financial advisor, bond counsel, underwriter, trustee and other service providers.*

ITEMS 3 AND 4: ANCHOR TENANT FINANCING AND SHARED SAVINGS AGREEMENT

Two variations to using Energy Service Performance Contracts that are gaining in popularity are **Anchor Tenant Financing** and **Shared Savings Agreements**. Anchor Tenant Financing can be used when an owner implements EE projects and passes the costs onto the primary building tenant. In this arrangement, tenants pay a higher lease amount, while benefitting from guaranteed energy savings to offset the higher rent payments. Often, the Anchor Tenant (usually a large department store) has enough clout to negotiate very low lease rates up front and may not be interested in reopening negotiations. On the other hand, if the owner negotiated lease rates that are in their favor, they may be reluctant to make additional investments in the property and/or reopen negotiations for lease rates. For Shared Savings Agreements, a third party finances the project for the owner for a set percentage of the energy cost savings (usually 80–90%) with the building owner keeping the remaining 10–20%.

ITEM 5: ON-BILL FINANCING

On-Bill Financing is another funding method that the private sector can use to implement EE projects. On Bill Financing is a method used by electric or gas utilities to provide direct financing for EE projects. In OBF, the utility pays for a portion or all of the project and the customer pays the financed amount with their utility bill. Once the financed amount is paid off, the customer reaps the benefit of a significantly reduced utility bill. We will be discussing On-Bill Financing further in our next issue of Energy Connection.

At Lincus, we can develop a full cash flow analysis for your capital improvement projects that accounts for all outflows and inflows of capital during and after construction. Our analysis will provide you with a monthly breakdown of your cash flow. With this detailed information a customers' financial services provider is more assured of the timelines, procurement process during construction and utility rebate payments.

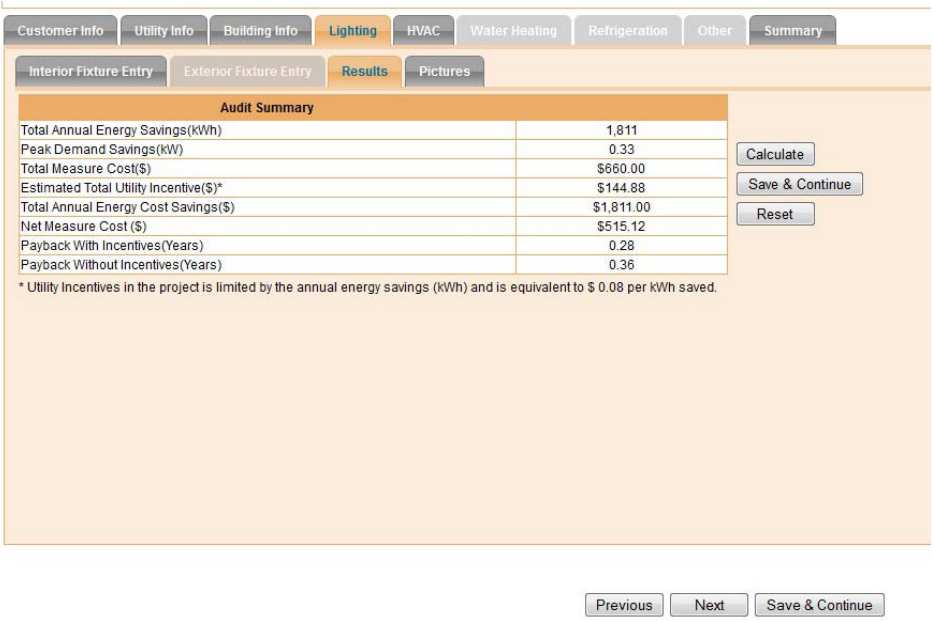
EFFICIENCY IMPROVEMENTS IN ENERGY AUDITING

This high-tech software tool will quickly give you a complete list of applicable energy-efficiency measures, utility rebates, reducing energy use and saving on costs at customers' buildings.

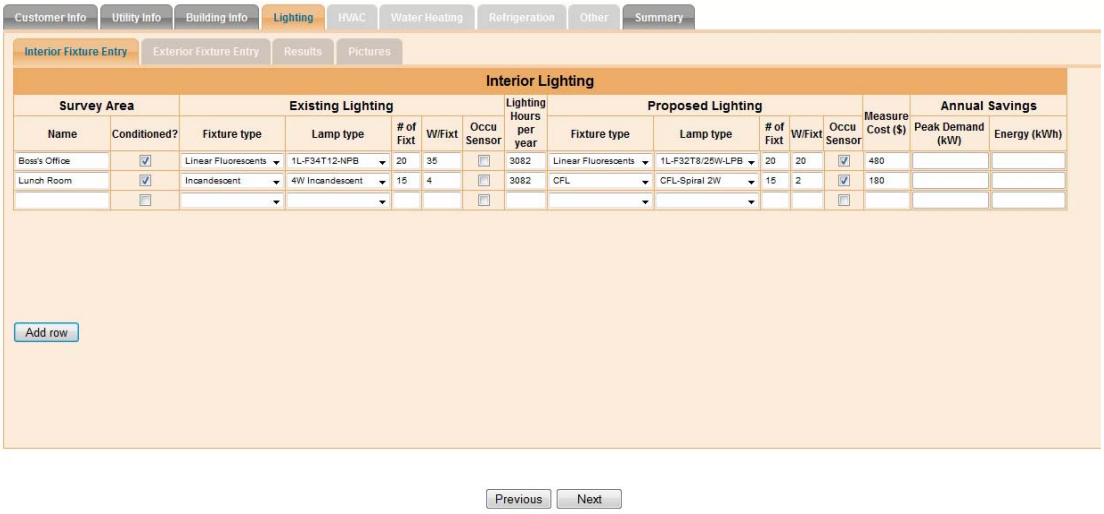
The **Commercial Energy Audit Tool (CEAT)** provides Lincus' clients with an advanced software tool that gathers, calculates, and reports on a building's energy consumption and energy saving alternatives. This web-based method collects building system inventory and calculates savings and installation costs, allowing for minimal delays in customer response, rebate applications, and project completion. Final reports are then delivered to customers much faster than by standard methods used in the past. An energy audit that used to take 2-3 weeks to produce a report, now can instantly develop a full report.

Benefits to You

- Improved EE program productivity -- kWh yield at the lowest $/kWh cost to the utility.
- Perform ASHRAE Level II audits through this web-based tool on virtually all types of lighting, HVAC systems, domestic water heating, refrigeration, I.T. systems.



- Scalable for various building types as well as specific weather zones.
- Accessible by iPhone, iPad, or tablet data-gathering tools to efficiently keep track of all collected data and calculations, photos, and standard reports directly from your handheld device, significantly eliminating errors in transferred or lost files.



- Support of local utilities Demand Side Management (DSM) programs. 12-month utility data and incentive amounts can be uploaded or entered manually into the system, including a list of energy conservation measures (ECMs) that could help reduce energy usage and costs in your building. In addition to the list, the Commercial Energy Auditor also provides a detailed description in the final comprehensive report for your facility.
- Simplify data automation and validation in the field. Not only will this tool help auditors, but also utility program managers with tracking and updating equipment inventory in their service area for future program design.

Please contact us to set up a demonstration and field test today! All analyses and costs are based upon accepted engineering principals, ASHRAE Level II auditing standards with use of interactive effects databases, with tangible reports easily verified and updated in the years to come.

MANAGING PRESSURE FLUCTUATIONS IN WATER DISTRIBUTION SYSTEMS

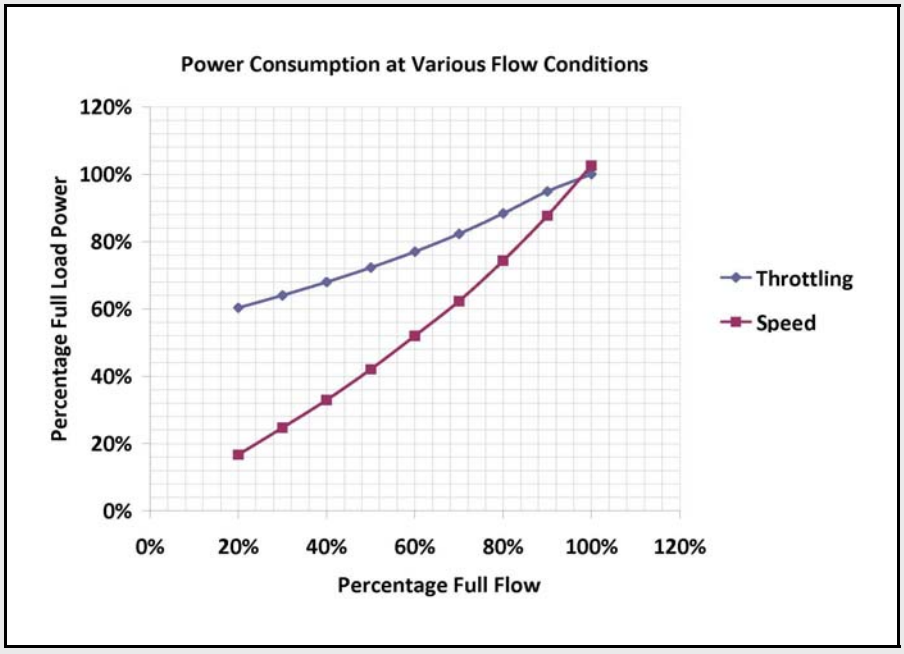
Q: We are a municipal water utility currently having difficulty meeting the increased demand without causing pressure fluctuations. This problem is causing damage to our distribution system, resulting in interrupted service and costly repairs. Do you have any ideas on how to resolve this issue?

A: Water distribution systems usually have miles of piping connecting water sources like well- and booster-pumps to points of use like irrigation wells, residences, etc. The pumping system that supports the distribution system is designed to maintain a certain level of pressure. With a VFD in place, drops or spikes in pressure resulting from the "water hammer" can be easily monitored and reduced. (A water hammer is the sudden increase in pressure in a local area when moving water is suddenly stopped.)

A Hydro-Pneumatic Tank Control System is the usual remedy for water distribution systems to handle large fluctuations in pressure. Hydro-pneumatic tanks contain pressurized air and water. The pressurized air is used to both absorb and exert pressure as needed and serve as a receiver. The primary goals of a Hydro-pneumatic control system are three-fold:

a) It can exert pressure on the water being delivered, allowing the tank to deliver water within a certain pressure range without needing the pumps to operate at all times.
b) The air within the tank can absorb pressure as well, therefore correcting any pressure spikes in the system directly by the tank due to the water hammer. The tank essentially serves as a "cushion" for the pressure wave.
c) The tank serves as a water receiver or "capacitor" in that the pumps will not need to replenish water to the distribution system all the time.

Hydro-pneumatic tanks must be recharged frequently. During this recharging process, the pump used to recharge the tank has to work through a very wide range of pressure set points. This means that the pump also must work through a wide range of operating efficiencies. By installing a VFD on the recharging pumps, the operator can make sure that the pump is running at its best efficiency point (BEP) the majority of the time.



During events of low demand, VFD control will not be as effective. A fundamental limitation of VFD is the minimum speed at which it can operate. If the system demand falls below this minimum speed requirement, the pumps must operate as if there were no VFD control in place (although this situation may happen less than 20% of the time the pump is operational.) Typical savings achieved are upwards of 10% of pumping energy.

We want to hear from you!

If you have a suggestion for any type of energy-efficiency related article topic, please send it to us at: energyconnection@lincusenergy.com.

Also, if you know of anyone else who would benefit from being on our distribution list, with their permission, please send us their email information, or simply forward this newsletter along to them directly.