

Fuels Utilization for Cost-effective Energy Management

Bruce A. Sher, CEM
Vice President—Performance Contracting
Thielsch Engineering

As energy costs continue to stabilize in a deregulated environment, there will be additional benefits available from load management, fuel-switching and interruptible strategies to maximize energy savings opportunities. Over the past few years, utility companies have prepared for full deregulation with specific plans to both defend their own territory and advance into new regions of the country. One concept is to form a non-regulated subsidiary that can assist a customer with energy management projects as a strategic energy partner. In this way, core competencies available from within the utility industry can be sold to the end-user through their non-regulated subsidiary.

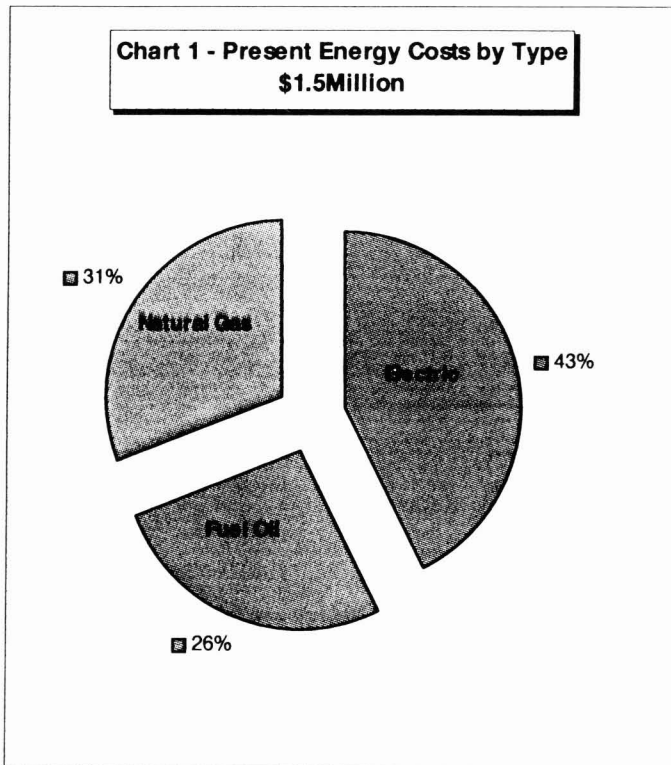
Utility subsidies may be available in some instances for end-users to increase energy efficiency and allow an Energy Services Company to finance these projects under a Performance Contract. In any event, the energy industry has been transitioning into a competitive environment which has created some unique and innovative opportunities to reduce energy costs through effective end-user fuel utilization programs.

A customer is often lead to believe that they can reduce costs by simply waiting for full deregulation and choosing the lowest price from a supplier, power marketer or load aggregator. However, a proactive approach can generate far greater benefits, as outlined in a recent study completed for a \$1.5 million per year energy customer in Connecticut. This customer had already reduced energy costs

through interruptible transportation gas programs, but was having a hard time cost justifying a cogeneration system to self-generate electricity at the site. The customer's present energy profile is depicted in Chart 1 below.

Upon further review, the total energy cost of \$1.5 million per year for this customer can be reduced by \$473,000 through the installation of a new efficient steam boiler and self-generation of electricity at favorable marginal rates utilizing re-refined fuel oil. The cost of the installation is projected to be \$1.84 million dollars or a 3.9 year payback on investment. In addition, the use of steam coils for process and heating load can be used to displace an additional \$75,000 per year in natural gas purchases further reducing the payback period.

Initially, the customer explored two other cogeneration schemes, the first being a traditional gas turbine with waste heat recovery steam generation capability. However, the purchase price of



natural gas used in this application to generate electricity makes this option less attractive with a longer payback period. The customer pays for electricity at a present rate of 8.5 cents per kWh, and therefore the implicit savings to produce electricity with this option is marginal at best.

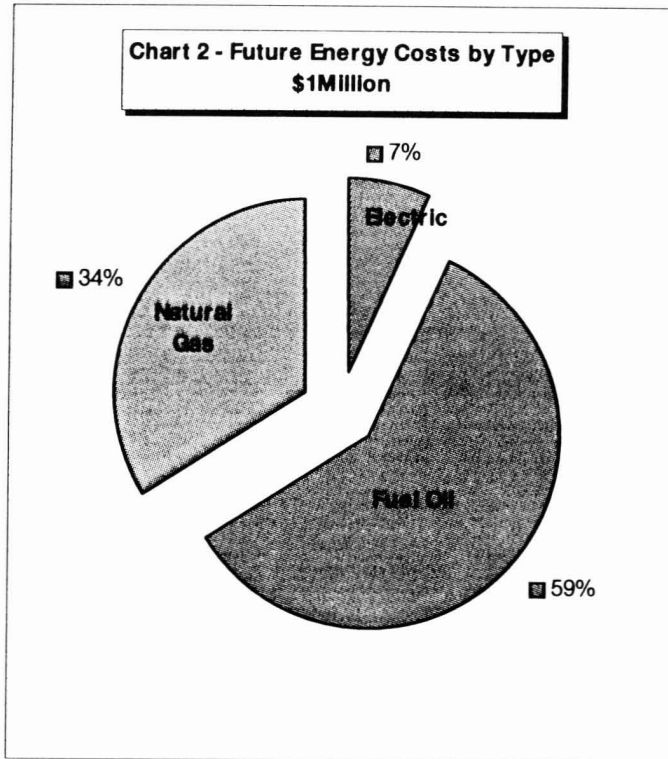
A second option of a gas or diesel engine with by-product steam and hot water recovery was rejected because of the customer's need for significant amounts of high pressure steam. This solution would produce only a fraction of the steam requirements, therefore making it not cost effective at all.

The ultimate solution presented itself after further investigation into fuels utilization with re-refined oil, which was already being consumed at the site for boiler steam production. A careful review of environmental permitting was done and then the recommendation for a "Rankine" cycle operation was made which can generate higher pressure steam at 450 psi to drive a steam turbine generator for the electric power.

The new 70,000 lb/hour boiler and 2000 kW auto extraction/condensing steam turbo generator set would not only satisfy all of the customer's present process steam loads, but also enable them to use steam coil heating in the drying process and produce most of their electric requirements. In addition, the steam turbine cycle requires the least amount of maintenance over a 10-year horizon. The new energy costs by fuel type are identified below in Chart 2.

Basically, through better use of more cost effective fuel oil, the customer can achieve close to \$500,000 in energy savings per year. By comparing the two charts, we see that the more expensive electric cost is substantially reduced, while the much less expensive use of fuel oil is dramatically increased at the facility. Natural gas as a percentage of cost stays relatively flat.

The customer may also choose to use this study to negotiate a more favorable electric rate with their local utility company in the face of deregulation. In specific instances, electric rate discounts of up to 18% have been realized by some companies through cooperative planning with a utility/consultant team approach. The opportunity for this type of rate negotiation still exists today as utilities try to retain their customer base and recover stranded investments of their own.



ABOUT THE AUTHOR

Bruce A. Sher, CEM, is vice president of RISE Performance Contracting, a division of Thielsch Engineering, Inc., Rhode Island. He manages energy performance programs, with the capability to finance, design, build and operate self-funded energy and resource efficiency projects, for industrial, commercial and institutional customers. The RISE Performance Contracting Group provides energy expertise from one reliable source, providing integrated energy products and services to its customers, and devoting full-time operations for Total Energy Management.

Bruce Sher has over 15 years of experience in the energy management field as a certified energy manager with The Association of Energy Engineers. He has successfully owned and managed an energy contracting business as vice president of K&S Energy Products,

Inc., during the late 1980s and early 1990s. Prior to joining Thielsch Engineering, he was responsible for integrated energy management and services projects in New England, designed specifically to address deregulation issues with electricity and gas, for Energis Resources, the non-regulated affiliate of Public Service Electric and Gas Company of New Jersey.

His experience includes the design, installation and monitoring of hundreds of lighting, variable speed drive and energy control systems for commercial buildings as director of energy for multiple corporate chain operations such as Montgomery Ward and the Howard Johnson Company. He also has extensive construction management and operation expertise in cogeneration systems for hotels and industrial customers.

Mr. Sher has identified and recovered hundreds of thousands of dollars for building owners and operators, property management companies and large corporations through specially designed energy accounting and monitoring systems. He is an active member of the Northeast Energy Commerce Association and the Association of Energy Engineers.