

IMPROVING ECONOMIC COMPETITIVENESS THROUGH ENERGY EFFICIENCY

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Executive Summary

The Flexible Technical Assistance (FlexTech) engineering service provided to businesses by New York State stimulates investment, increases productivity, reduces environmental impact, and improves energy efficiency. Each dollar spent by the program on engineering studies leverages 17 dollars in plant investment, 5 dollars in annual plant energy savings, and additional productivity improvements.

Key factors to the success of FlexTech have been good customer service and customer input to the improvements studied at each plant. The three main business customer goals which drive the focus of the engineering studies are increased productivity, reduced environmental impact, and energy efficiency.

The New York State Energy Research and Development Authority

The New York State Energy Research and Development Authority (NYSERDA) was created in 1975 as a public benefit corporation in New York State. NYSERDA has programs providing capital and engineering services to commercial and industrial businesses to increase the competitiveness of New York State businesses. NYSERDA operates an innovative, energy oriented research and development program which has earned over 40 national and international awards. This research and development program provides great stimulus to the New York State economy. NYSERDA also operates energy efficiency programs for developed technologies. The focus of this paper, the FlexTech engineering study service, is one of these programs.

Energy Efficiency in New York State

In New York State improving energy efficiency has a higher priority than in most other states. About 92% of the primary energy used in New York comes from sources outside the state borders. Annually, \$19 billion is paid to energy producers outside New York State. More efficient energy use helps stem the flow of dollars out of the state to pay for energy. These dollars remain in New York and are used to improve productivity, create new jobs, and provide vital services.

So, while energy efficiency is not as high a priority to the individual customer as the productivity aspects of a FlexTech study, energy efficiency does have a higher priority to the overall New York State economy.

Customers Served

FlexTech provides a wide range of professional engineering and architectural services to New York's businesses. Certain manufacturing sectors have been targeted for proactive marketing of FlexTech. These targeted sectors include food and kindred products, paper and allied products, electronics and other electrical equipment, instruments, and plastics. The criteria used to target these customers were the magnitude of energy consumption, number of firms, number of employees, and value added to State gross product. This targeting of sectors is also expected in the future, with likely new criteria. One likely criteria will be the building of partnerships with sector associations, so that the best knowledge of that sector customer's needs can be applied to the service to maximize the benefit of the service.

In addition to businesses, FlexTech serves anyone in need of energy-related engineering and architectural services. This includes commercial buildings, agribusiness, not-for-profit organizations, schools, hospitals, waste water and other municipal plants, and state and local governments.

Study Services Provided

FlexTech services include detailed analysis of specific projects, on-site surveys, detailed feasibility and technical assistance studies, and occasionally design. NYSERDA staff and the FlexTech consultants analyze manufacturing processes, building systems, waste and water treatment plants, renewable technologies, and energy related systems and equipment.

Project follow up services are provided to interested customers to assist them with implementation and operation of projects. These services include preparing technical information to support financing applications, assisting with equipment specifications and bid development, inspection, monitoring, and commissioning.

Training Services Provided

Technical training is an additional service provided through FlexTech. Training topics include:

- Variable speed drives and motor systems,
- Chiller and refrigerant strategies,
- Boiler plant water treatment,
- Boiler plant operation and maintenance,
- Boiler NO_x control,
- Electrical efficiency savings,
- HVAC plant improvements, and
- Indoor air quality.

Providing objective technical training information is considered a valuable part of the FlexTech service. Last year FlexTech provided 40 technical training seminars throughout New York State. Seminars cost \$30,000 to \$50,000 to develop. Seminars cost \$3,000 to \$5,000 to deliver. Customers or sponsoring organizations are generally asked to cost share the costs of delivering a developed seminar. Specific projects cannot be attributed to the training ,however, so this paper concentrates on the engineering study service.

Cost for Studies

FlexTech studies are geared to the needs of the customer facility. So, there is no set cost. It is important to have the flexibility to meet the customer facility needs. Costs have varied from \$1,000 to over \$40,000. Most studies fall in the price range of \$5,000 to \$20,000.

Costs are shared with the customer on a negotiated basis. Usually, the customer shares 50% of the cost when there are no additional partners, such as utility companies. In New York State's Economic Development Zones the customer usually shares 40% of the cost.

FlexTech Customer Process

The FlexTech process with a customer begins with a contact identifying the possible need for engineering assistance at the customer plant. The FlexTech staff confirm this need over the telephone and begin to interview the customer about needs of the plant and potential projects. If needed, FlexTech staff follows the telephone conversation with a plant visit to work with the customer and better identify the projects intended for the FlexTech consultant work. Then the FlexTech consultant is brought on site to perform a field visit and work with the customer to develop a study scope of work and cost estimate. The FlexTech consultant then provides the scope of work and cost estimate for approval. Modifications are made to the scope of work based on the FlexTech staff and the customer's understanding of the project needs. Up to this point there is no cost to the customer.

If the customer approves the scope, then agreements are signed between the customer and the FlexTech program and between the customer and the FlexTech consultant. The FlexTech program already has standing contracts with the consultants. Usually the customer and the FlexTech program each pay 50% of the study costs. Then the FlexTech contractor performs the study. The FlexTech contractor completes the study and submits it to FlexTech staff for review prior to submittal to the customer. Then the customer is provided the study for review. The customer is then asked if a meeting is desired to review the study findings and subsequently if any study modifications are desired.

The most important part of making this process successful is customer involvement during plant needs assessment discussions, the initial walkthrough, scope of work development, and for input to the study. Studying projects the customer is involved with and considers a priority will result in a better study and likely project implementation downstream of the

study. For these reasons, the FlexTech studies have primarily been focused technical feasibility studies of specific improvements identified by or jointly with the customer instead of generalized audits.

Process Improvement Goals

There are three primary goals of process improvement which drive most FlexTech studies; increased productivity, reduced environmental impact, and increased energy efficiency.

Productivity

Increasing productivity is the largest goal of most businesses assisted through FlexTech. These businesses are usually in competition for market share with businesses in other states or other countries. Often times the competition is from within their affiliated parent company, which has options to produce products at multiple locations. Improvements which will improve productivity are the best ways to increase business competitiveness. Productivity can be increased several fold with the proper process improvements or the addition of appropriate equipment. There is no limit to productivity improvement potential. Improvement measures which increase productivity, usually reduce energy consumption on a per unit of production basis, so there is an energy benefit also.

Reduced Environmental Impact

Reduced environmental impact is another goal which can drive a FlexTech study. Reduced environmental impact is a goal of most businesses in their communities. Frequently, businesses are up against air, water, or land discharge limits which can restrict production or potentially cause production shut down. This often becomes the driver for the scope of a FlexTech study. Then the main purpose of the FlexTech study is to find possible improvements which will keep production on line in an energy efficient manner. This often requires process changes involving new technology for the plant.

Energy Efficiency

Increased energy efficiency reduces the cost of production and therefore increases the competitiveness of the business. Energy represents 10 to 15 per cent of the total costs for the most energy intensive businesses in New York State. There are frequently energy related measures which pay back strictly based on energy savings. Though this is true, the FlexTech study normally attempts to find productivity improvements to the process which simultaneously provides energy benefits. This is because, as stated above, productivity can increase several fold, while the gains from energy efficiency only are limited to a percentage of 10 to 15 per cent for the affected process.

Partnerships

The New York State Energy Research and Development Authority maintains ongoing partnerships with many other state and local service providers to maximize the benefits of services provided. Within the state these include the Department of Economic Development, the Department of Environmental Conservation, and local Industrial Development Agencies. Investor owned utilities, the New York Power Authority, and local municipal power districts are frequently project partners also. As partners, all of these organizations bring financial and technical assistance to projects. Utilizing and learning from these partnerships is important for maximizing the benefit to the customer business and to understanding the different needs of the customer business.

Evaluation

An evaluation of FlexTech was completed last year. The evaluation surveyed 67 past customers with a series of questions. A key finding of the evaluation was that 64% of all measures recommended in FlexTech studies were implemented by the customer facilities and an additional 19% of measures were planned for implementation. This percentage was roughly the same for business and non-business customers.

The evaluation found that a key component to the success of FlexTech is good customer service:

- 84% of customers stated that FlexTech staff and contractors exceeded expectations.
- 83% of customers stated that FlexTech service was better than other government service, and 17% stated that FlexTech service was equal to other government service.
- 40% of customers stated that FlexTech service was better than private sector service, and 42% stated that FlexTech service was the same as private sector service.

The evaluation found that for the customers surveyed a \$575,000 investment in FlexTech engineering services leveraged a \$10 million capital investment in improvement projects. This ratio of investment in engineering assistance by the program

to leveraged capital project implementation is 17 to 1. The same projects are saving the customers \$3 million annually in energy bills. The ratio of investment in engineering service by the program to energy bill savings for customers is 5 to 1. Increased productivity could not be qualified.

Impact

Based on the recently completed evaluation, it is estimated that since the FlexTech service inception in June 1992, an investment of \$2 million in program costs for engineering services has leveraged capital improvements worth \$34 million. It is estimated that the 270 customers receiving the service in New York are saving \$10 million annually on their energy bills. In addition, there have been significant unquantifiable productivity improvements to increase the state's business competitiveness.

Capital Assistance

Previously, New York State operated the Energy Investment Loan Program (EILP) which helped implement FlexTech recommendations. This program provided interest subsidies to businesses implementing projects with up to a \$500,000 capital cost. The loans were subsidized at rates 25 to 50% below prime. From 1987 until its end in 1995, this program provided \$22 million in loan subsidies resulting in \$97 million in project investment.

The FlexTech evaluation found that roughly 1/3 of customers implementing measures used EILP assistance. This is consistent with the interest in the loan subsidy program shown by customers to FlexTech staff. From this we have learned the following. First, for the majority of business customers, providing reduced costs of loans for small loans, under \$500,000, is not a key factor in the decision to proceed. Instead, providing reliable technical, engineering knowledge that the project is a good investment is a more important factor. There are, however, a significant number of businesses who need access to less costly capital, for projects under \$500,000, in order to carry out their investment. So, there is a need for capital assistance to certain businesses to compliment the reliable technical information.

Success Stories

The following are some of the FlexTech success stories. It is important to note that the production gains from these energy related projects were the primary motivation for studying and implementing the improvements involved.

A commercial bakery received a FlexTech study which confirmed that upgrading the plant cooling system to include a spiral freezer would increase productivity and reduce energy use on a per unit of production basis. This particular customer also found the loan subsidy from the Energy Investment Loan Program to be useful. The project resulted in over \$1 million in private sector investment, the retention of 70 jobs, and the creation of 35 new jobs. The plant improvements will pay for themselves in less than three years.

A large electroplating customer obtained FlexTech assistance to identify methods to improve the waste water treatment system efficiency. The plant was having trouble meeting mandated effluent discharge standards and the waste water treatment plant was operating at capacity. The customer was limited from being able to expand production. The customer also requested assistance confirming lighting and electrical recommendations made by others. The FlexTech study made several recommendations including a new transformer and a waste water recycling system that allows reuse of water in the electroplating process. This helped eliminate the production constraints.

A plastic injection molder was delivered a study investigating improved heating efficiency, improved temperature control, potential waste heat recovery, and variable speed drive potential. The study found some of these improvements to not be cost effective. However, the improved temperature control allows for reduced cycle time in the injection molders, increasing productivity and also reducing energy use per unit operation. The implementation of this project has increased the plant competitiveness.

A paper mill was provided a FlexTech study recommending the use of a fine bubble diffusion system in waste water pretreatment and a gas infrared drying system. Both of these projects were implemented resulting in removal of limitations on production as well as energy efficiency improvements.

Conclusion

The FlexTech engineering study service provides valuable technical resources to businesses, increasing the competitiveness for the New York State economy. It leverages scarce dollars available for energy efficiency into valuable economic development. Each dollar spent by the FlexTech program on engineering leverages 17 dollars spent on capital plant improvements, 5 dollars reduction in plant energy bills, and additional productivity improvements.

Key factors in the successful program are good customer service and customer involvement in the decisions concerning which plant improvements to study. There are three main process improvement goals which drive most studies: increased productivity, reduced environmental impact, and energy efficiency. Increased productivity and reduced environmental impact, particularly when production is curtailed by environmental impact are usually the main goals of the business customer and often a central focus of the improvements studied. Energy efficiency is also a priority to the overall economy of New York State because 92% of the source energy in New York comes from outside its borders.

FlexTech increases New York State's economic competitiveness by stimulating investment, increasing productivity, reducing environmental impact, and improving energy efficiency.

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