

**THE INSTITUTIONAL CONSERVATION PROGRAM:
A FUNDING OPTION FOR ENERGY RETROFITS**

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ABSTRACT

The Institutional Conservation Program (ICP) provides matching grants to K-12 schools, colleges/universities, and hospitals for energy-related retrofit studies and the implementation of capital projects identified, analyzed, and recommended by these studies. Although grant dollars for the program are still appropriated at the federal level, Petroleum Violation Escrow (PVE) monies returned to the states now provide the largest source of ICP funds for most states. The program is administered at the federal level by the Department of Energy and at the state level in Texas by the Governor's Energy Management Center.

The purpose of the ICP is to assist eligible institutions in reducing energy consumption and its attendant costs. More specifically, the program gives an institution the financial incentive to hire a professional engineer to identify and analyze the most attractive package of energy retrofits for a given building. Matching financial assistance is then available for implementing part or all of the recommended measures. Typical projects funded through the program include computerized energy management systems, lighting system change-outs, boiler modifications, and HVAC change-outs and modifications. Funded projects must have a payback of 2-10 years and must be installed in buildings completed and occupied before April 20, 1977.

All applications submitted for funding consideration are subject to a programmatic and technical review. Applications compete for available monies according to specific criteria set for Technical Assistance Grants (study grants) and Energy Conservation Measures Grants (retrofit implementation grants).

Since 1979 ten ICP funding cycles have been held in Texas, and a program cycle funded by PVE dollars returned to the state is currently in progress. An eleventh funding cycle, using federally appropriated dollars, and a second "oil overcharge" cycle are anticipated for FY 89.

INTRODUCTION

A product of Title III of the National Energy Conservation Policy Act of 1978, the Institutional Conservation Program (ICP), originally called the Schools and Hospitals Program, is now ten years old. This matching grant program has provided almost \$32,000,000 to eligible institutions in Texas and leveraged \$48,000,000 in capital energy investments. The state's federal allocations have fluctuated from a high of \$7,400,000 to a low of \$1,500,000; however, in recent years federal

appropriations have dwindled, and the allocation has remained in the \$2,000,000 range. Program life, which was originally set for three years, has stretched to ten, and, thanks to an infusion of Petroleum Violation Escrow dollars at the state level, clearly will reach eleven and beyond.

The primary purpose of the ICP is to reduce energy consumption and stabilize energy costs for eligible institutions -- K-12 schools, colleges/universities, and hospitals. Its attendant purpose is to demonstrate the attractive economics of energy efficient retrofits and to encourage institutions to make added investments in this area. In Texas each participating institution must have or develop an institutional energy management plan if one does not already exist, so comprehensive energy planning may be seen as a third purpose of the program.

More specifically, the ICP provides matching grants to enable eligible institutions to identify needed energy retrofits, analyze their cost effectiveness, and implement those of highest priority. For the typical grant, project cost is shared 50/50 with the grantee; however, in some cases of severe hardship, up to 90% of the project may be funded by the grant. The program is administered at the federal level by the Department of Energy and at the state level by the Governor's Energy Management Center.

TYPES OF GRANTS AND TYPES OF PROJECTS FUNDED

Two types of grants are available. Technical Assistance (TA) Grants share the cost of hiring a professional engineer or engineering firm to identify and analyze the potential effectiveness of energy retrofits for specific buildings. Findings are presented in a Technical Assistance Report. Energy Conservation Measures (ECM) Grants provide matching funds to complete selected retrofit projects identified and documented in the TA Report. Funds are provided for the labor, equipment, supplies and design costs of a variety of projects: computerized control systems, HVAC modifications or replacements, boiler modifications, lighting change-outs, and additional insulation. The following project summary for Grant Cycle VI provides an overview of the types of projects funded through the program by institutional type. [Table 1]

Two important regulatory points should be stressed concerning the program: (1) buildings built and occupied after April 20, 1977, are not eligible for funding; (2) and all projects funded through ECM grants must have a payback of 2 - 10 years.

Table 1

**Summary of Projects Recommended for Funding
by Institution Type**

Cycle VI

HOSPITALS

Project Type	Total Projected Cost (includes applicant share)	Average Simple Payback Period	Annual Cost Savings	Annual Energy Savings (in BTUs x 10 ⁶)	
				Natural Gas	Electricity
Cogeneration Projects	\$1,350,000	6.7	\$ 201,232	63,689	77,337
Heat Recovery Projects	54,400	2.2	24,269	733	759
HVAC Modifications	174,297	4.0	40,516	2,367	5,689
Lighting Modifications	53,926	2.0	27,000	(556)	7,154
Energy Management Systems	<u>1,972,669</u>	<u>2.4</u>	<u>810,214</u>	<u>51,709</u>	<u>128,622</u>
TOTAL	<u>\$3,605,292</u>	<u>3.3</u>	<u>\$1,103,231</u>	<u>117,942</u>	<u>219,561</u>
				<u>337,503</u>	

COLLEGES AND UNIVERSITIES

HVAC Modifications	\$2,048,374	3.4	\$ 578,675	49,670	70,174
Lighting Modifications	105,119	2.4	43,091	(694)	9,824
Energy Management Systems	224,225	3.5	64,849	5,261	8,921
Insulation/Building Shell Projects	<u>204,220</u>	<u>3.3</u>	<u>61,203</u>	<u>10,773</u>	<u>2,790</u>
TOTAL	<u>\$2,581,938</u>	<u>3.5</u>	<u>747,818</u>	<u>65,010</u>	<u>91,709</u>
				<u>156,719</u>	

PRIMARY AND SECONDARY SCHOOLS

HVAC Modifications	\$ 428,594	3.3	\$ 129,532	16,923	10,064
Lighting Modifications	238,399	4.0	59,239	(1,171)	11,054
Energy Management Systems	208,001	2.8	75,142	9,150	8,694
Insulation/Building Shell Projects	<u>117,972</u>	<u>4.7</u>	<u>24,991</u>	<u>1,340</u>	<u>2,888</u>
TOTAL	<u>\$ 992,966</u>	<u>3.4</u>	<u>\$ 288,904</u>	<u>26,242</u>	<u>32,700</u>
				<u>58,942</u>	

TOTALS FOR ALL INSTITUTIONAL TYPES	<u>\$7,180,196</u>	<u>3.4</u>	<u>\$2,139,953</u>	<u>209,194</u>	<u>343,970</u>
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553,164

APPLICATION RANKING AND THE TECHNICAL REVIEW PROCESS

Since more grant dollars are always applied for than are available, TA and ECM applications for each funding cycle are ranked for funding consideration according to specific criteria. Ranking scores for TA grants are based on the following criteria for each building application: (1) gross energy consumption (Btu/ft²/yr) - 40%; (2) annual energy costs (\$/ft²/annual operating hours) - 40%; and (3) potential energy savings through maintenance and operations - 20%. Ranking criteria for ECM grants are as follows: (1) average simple payback for the package of projects applied for - 28%; (2) energy saved through conversion to renewable energy sources or to coal - 26%; (3) annual anticipated BTU savings from implementation of applied-for retrofits - 25%; and (4) the technical review score for the TA Report supporting the projects - 21%.

All ECM applications are accompanied by a supporting Technical Assistance Report, prepared according to a prescribed format included in the State ICP publication entitled Guidebook for Preparation of Technical Assistance Reports. A technical analyst orientation session is conducted by the ICP office between program cycles to review the required format, assess the technical quality of reports prepared for the previous cycles, review and emphasize technical policies, and discuss the evaluation sheet used to determine the technical review score for each supporting TA Report.

The technical review evaluates each TA Report submitted for technical accuracy, soundness of engineering principles, and project cost estimates. Each report reviewed is assigned a technical review score based on these criteria. The ICP views the technical review process as critical to insure the accuracy and soundness of all grant-ranking numbers. In a time of shrinking grant funds, the technical review is seen as the first line for screening ECM funding candidates.

PROJECTS FUNDED THROUGH THE ICP

Two brief case studies of ICP projects at Brazosport College and the Texas Medical Center Laundry Cooperative may provide a clearer understanding of the types of projects which may receive funding through the program.

ICP-funded retrofits at Brazosport College several years ago cut campus-wide energy usage by 50%, achieved a project payback of less than 2.5 years, and saved the college almost \$200,000 in energy costs the year following retrofit completion.

The primary retrofit centered around reduction in the flow of water through the college's HVAC system. The technical analyst discovered that two 600-ton chillers were being supplied with water 24 hours a day, as if both were fully loaded. Because one chiller could handle the load even in the middle of summer, the analyst concluded that energy could be saved by reducing the volume of water being pumped through the system. Knowing that a 10 per cent reduction in water flow would produce a 27 per

cent reduction in kilowatt consumption, the analyst concluded that cutting the flow in half would reduce 70-80 percent of the kilowatt consumption required for pumping.

The college achieved these savings by replacing the self-regulating water system with a variable speed drive system which automatically modulated the water flow. An EMS was then installed to improve temperature control throughout the campus. Chilled water pumps and shut off valves controlled by the EMS also offered the advantage of shutting off individual wings.

Energy efficient lighting change-outs also were recommended for the college, and standard 40-watt fluorescent tubes were replaced with high efficiency 34-watt models in the classrooms and offices. In addition, high pressure sodium lamps replaced incandescent lamps in the gymnasium.

In a recent interview on the project, Dr. W. A. Bass, President of Brazosport College, noted that both he and the Board of Regents have been pleased with the results of the retrofits: "Our projected savings are still on target even though we have added a welding lab and some air handler equipment to the campus. When you're getting more comfort for less money, you're winning both ways."

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In the first quarter of 1986, a 39% reduction in total energy usage and a 52% reduction in thermal energy were achieved through an innovative ICP project at the central hospital facility at the Texas Medical Center (TMC) in Houston. The project involved the installation of (1) a "continuous batch" washer line that recirculated water through twelve modules, (2) a high pressure batch hydraulic membrane extractor, and (3) a high efficiency batch-type gas-fired dryer.

The continuous batch washer required only 1.2 gallons of water per pound of linen as compared to 2.5 gallons per pound for the older equipment. The extraction equipment reduced the water content of the linen so that 47% less water had to be removed in the dryer. In fact, the higher efficiency extractor allowed some items to be taken directly to the ironers, thus bypassing the dryers completely. The new high efficiency batch gas dryers required only about 1,600 BTU's per pound of water removed as compared to approximately 4,000 BTU's per pound for the old steam continuous flow dryers. The new dryers saved about 60% of the energy formerly required for drying. It should be noted that the new automated equipment also reduced the need for two equipment operators.

The Technical Assistance Report covering this project also identified a number of low cost operations and maintenance actions for in-house staff. Several modifications to the scheduled run-time of the HVAC system and additional lighting control policies contributed to a significant energy cost savings for the facility.

Documented savings for the first quarter of 1986 reflected a \$.032 energy cost savings per pound of linen cleaned. Total annual cost savings attributed to the project was \$220,839. Since half of the cost of the project was paid by an ECM grant, the simple payback for their project was achieved in a matter of months.

CONCLUSION

The Texas ICP has provided TA and ECM funding for 41 colleges/universities, 45 hospitals, and 109 school districts; many of these institutions have participated in several grant cycles. Almost 800 facilities in these institutions have been involved with an ICP service at some level.

The program has survived in a highly volatile federal political arena. Popularity with Congress has saved it from extinction on more than one occasion. In spite of shrinking funding at the federal level, ICP continues to provide a viable funding option for institutional retrofits. However, funding competition in Texas has increased significantly in recent cycles. A new importance is now placed on the applicant's ability to accurately analyze prospective projects to assess their viability in competing for available funds.