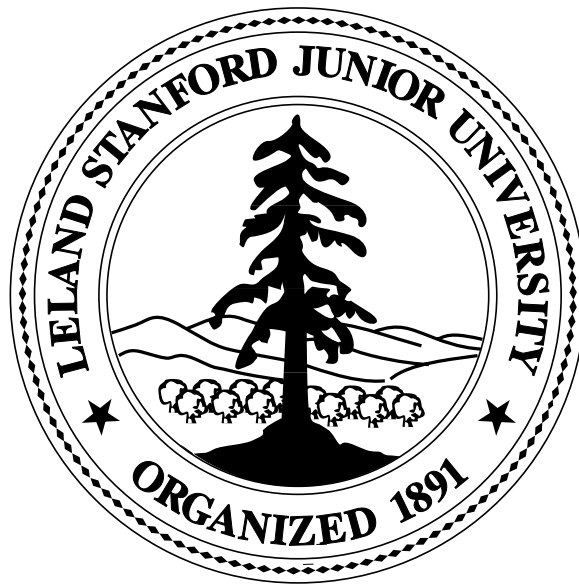


Energy Retrofit Program Guidelines

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Stanford University

Utilities Department

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Introduction

The purpose of the Energy Retrofit Program (ERP) is to reduce overall energy costs on the Stanford University campus by improving building-level energy efficiency. Funds are set aside each year to implement the most cost effective retrofit projects. Projects are ranked and funded on a simple payback basis¹ and must have a better than five year simple payback period to qualify for funding. A typical energy retrofit project will improve energy efficiency and reduce building energy costs as well as reduce utility demand, improve occupant comfort, and decrease maintenance costs.

Energy retrofit projects will be funded twice per year. Requests for the first round of funding must be received by October 15th. Requests for the second round of funding must be received by January 15th. Two funding rounds will allow project managers to have more flexibility when scheduling project work, including taking advantage of the winter break shutdown period. Additionally, end-of-the-fiscal-year project rush can be reduced and energy savings can accrue sooner.

To be successful, the ERP must blend the abilities of many different groups within Facilities Operations. In general, the projects are identified and implemented by the groups who work most closely with the building occupants -- the Zone Management Division Teams or their auxiliary equivalents. The Craft shops are encouraged to bid on the retrofit projects, not only reducing the real cost of the project to Stanford, but also improving troubleshooting service. The Utilities Division is responsible for providing consistency in the approval and implementation of projects, ensuring a representative distribution of ERP funds to the zones and auxiliaries, providing technical guidance, and evaluating new technologies and strategies for future implementation. In addition, the Utilities Division continually monitors both the effectiveness of the individual projects as well as the effectiveness of the entire program by analyzing metered consumption and demand before and after each retrofit project. How a retrofit project is initiated, approved, funded, and implemented is described in later sections of these guidelines.

Funding for the Energy Retrofit Program comes from the electricity, steam, and chilled water utility recharge rates. The percentage allocation from each utility is a function of the energy savings from the previous year. This allocation cannot be done in the same fiscal year as the projects since the budget for each utility must be completed well in advance of the start of the fiscal year. In FY03, the funding percentages were: Electric 95%, Chilled Water 05%, Steam 0%. Energy cost savings can only be based on the Stanford-supplied utilities since other utilities have their own programs.

¹Simple Payback period is the project cost in dollars divided by the annual avoided energy cost.

ERP History

The ERP has averaged a 4.1-year simple payback since its inception in 1993 (see appendix C). Over \$7.4 million dollars have been spent on nearly 250 projects. The estimated cumulative savings are over 20 million kWh. The Academic Zones, Residential Dining and Enterprises, DAPER, SUMC, and various campus auxiliaries have completed ERP projects. The distribution of the funding to these groups can be found in appendix D. In 1995, the ERP received a Business Environmental Award from the Peninsula Conservation Center Foundation. In 1998, the ERP completed the “Green Lights” program sponsored by the US Environmental Protection Agency by upgrading over 90% of the academic area lighting.

Changes to the ERP Funding (effective FY03)

Funding for Academic Zones: Due to a new interpretation of Stanford University policy enforced by the Budget Office, the ERP can no longer “front” money for Academic Zone projects. All Zone ERP projects will be funded upon project completion in the form of a “rebate”. (This is already the policy for DAPER, H&DS, and other auxiliaries.) As in the past, all projects must be completed in the same fiscal year they are approved. For FY03, the maximum rebate for any individual project must be less than \$50,000.

Project Funding Limits: ERP funding is offered on a first-come, first-served basis. If the requests for ERP funding exceed the available funding, then the projects with the shortest payback period are funded first. (Projects not approved because of insufficient funding in one year may resubmit the following year.) This approach is fairest to those groups who are competing for funding and ensures that ERP dollars go to the best projects. A secondary method of ensuring that ERP funding is distributed in an equitable manner is to “budget” the funds to each group according to the amount of electricity they use. Since utility ratepayers fund the ERP, and most of the projects are electrical in nature, we look at the percentage of total electrical consumption by group as a guide to distribution. For example:

Group	% of total electrical consumption
Academic Zones	57%
SOM	17%
R&DE	14 %,
DAPER	4%

So with a \$400,000 budget for FY03 the approximate budget was:

Group	Funding available with \$400,000 ERP budget
Academic Zones	\$228,000
SOM	\$68,000
R&DE	\$56,000
DAPER	\$16,000

Again, this is only a guide to help each group “budget” their ERP allocation. After the October 15th "deadline" for project submissions, whatever funds remain will be assigned to the best projects regardless of this distribution guide.

Shared Funding for ERP Projects: There may be situations when projects are simply too large to be entirely funded by the ERP. We will use the ERP percentage allocation as the funding ceiling as mentioned in the previous section to determine the funding split. For example, if DAPER applied for a \$50,000 project and their allocation was only \$16,000, then DAPER would pay for the \$34,000 share if all the other groups used their allotment.

Projects with a Greater Than Five Year Payback: The ERP will consider funding projects longer than five years if the group applying for the project pays for enough of the first cost to bring the simple payback to five years or less. For example, if R&DE wants to install new refrigerators in their large kitchens but the simple payback is seven years, then R&DE would pay for enough of the project to “buy down” the simple payback to five years. The only extra requirement would be that the life of the project or product must exceed the whole project simple payback. Using the refrigerator example, if the projected life is greater more than seven years than the requirement would be met.

Consultant Studies: As the ERP matures, projects are potentially more complex and may require outside assistance to help identify new projects and estimate the associated energy savings. To overcome this obstacle, the ERP will fund consultant studies up to 10% of the funds available to that group each fiscal year. Using the example from the previous section, R&DE would have roughly \$10,500 each year that could be used as “seed money” for consultant studies. Because the funding for these studies comes from the ERP budget, these consultant study dollars will count against the total available for each group. To obtain ERP money for a consultant study, please follow the same steps as a normal ERP project. The consultant’s scope of work can replace the detailed calculations.

Project Managers: The Project manager for ERP purposes is defined as the person implementing the ERP project. This person can be a zone engineer, zone manager, R&DE energy coordinator, facilities engineer, building manager, consultant, contractor, etc. Any non-Stanford project manager must be sponsored by a Stanford representative to ensure that the following takes place:

1. Stanford specific contract, safety, and insurance requirements are met
2. Project notification and coordination with end-users/building managers.
3. Construction coordination with the appropriate craft shops and shutdown coordinator.
4. Design and construction are according to the Facilities Design Guidelines.

If non-Stanford engineers or construction managers are used, their time may be charged as a project expense provided that the entire cost of the project meets the approved simple payback.

ERP Checklist

The following table outlines the ERP process. Please use it as a guide when submitting requests for ERP funding.

Table 1

<i>TASK</i>	<i>RESPONSIBILITY</i>	<i>Deadlines Round 1</i>	<i>Deadlines Round 2</i>
I. Submit Request for ERP approval	Project Manager	Before September 30	Before January 20
II. Review Request	ERP Manager	October 15	January 30
III. Send Commitment Letter	ERP Manager	October 15	January 30
IV. Obtain Competitive Bid	Project Manager/Procurement	Before June 1 (latest)	Before June 1 (latest)
V. Project Construction	Project Manager	Before June 1	Before June 1
VI. Project Inspection	Project Manager/ERP Manager	Before July 1	Before July 1
VII. Transfer of Funds	ERP Manager/Utilities Analyst	Before July 15	Before July 15

I) Submit Request for ERP project approval

1. Identify Project with Potential Energy Savings

Project managers should be on the look out for energy retrofit projects in their buildings. The Campus Energy Manager, Building Managers and the relevant craft shops and technicians (EMCS, Electric, & HVAC), should be consulted for additional project ideas. Additionally, the ERP will fund consultant studies that focus on energy efficiency up to 10% of the annual available funding for each group.

2. Calculate Energy Savings

Useful reference sources include, ASHRAE, IES, manufacturers' data, EPRI technical information, etc. Please contact the Utilities Department for additional sources. An example lighting calculation is attached in appendix "A." A student intern may be available to assist the project manager with the various phases of a retrofit project. This activity shall be coordinated through the Energy Retrofit Program manager. Other members of Utilities Division may be consulted when appropriate and as schedules allow. The Utilities Division maintains a small library of reference materials and catalogs that may be helpful when preparing a funding request.

3. Estimate Project Cost

Project managers are encouraged to seek assistance from the craft shops and outside contractors when preparing cost estimates. Budget overruns or changes in project scope will not be funded.

4. Send Request for Funding to ERP

Requests for Energy Retrofit Program funding will be initiated by the Project Manager and follow the schedule described in the checklist (Table 1). A funding request will not be considered complete unless it contains the following:

System Survey

- A concise description of the Energy system to be changed.
- The location of all the equipment to be retrofitted including supplemental sketches, drawings, bible sheets, etc. as necessary.
- The hours of operation of the system(s). For example, within a single building, labs, classrooms, offices, and common areas may have different hours of operation for lighting and plug load equipment. Similarly, different HVAC fan systems within a

building have different schedules. Estimates from outside sources have proven to be inaccurate.

- The rating of all the relevant equipment -- include all relevant nameplate data, wattage, tonnage, voltage, horsepower, etc.
- The condition and age of existing equipment.
- Calculations of existing energy use, including peak electrical demand (if applicable). Be specific and cite references if used.

Proposed System Modification

- A concise description of the proposed change to the energy system.
- An explanation of how the proposed change reduces energy consumption and cost.
- Proposed changes in the hours of operation.
- Square footage of the affected area.
- Number of units to be installed (motors, pumps, light fixtures, etc.).
- Rating of the new equipment.
- Calculation of new energy use. Include new peak electrical demand² if applicable.

II) Review Request

Each project will be evaluated for its potential energy savings. Projects with the shortest simple payback period will be given funding preference. Projects will not be considered if they include unproven technologies or will adversely affect building occupants. Projects that solely involve the replacement of damaged or worn out equipment are best funded through the Deferred Maintenance Program.

Energy Retrofit manager will prioritize all submitted projects based on the above criteria to ensure equity in the distribution of the annual program funds.

III) Send Commitment Letter

After receiving a completed retrofit package, projects are assigned an ERP number. If a project is determined to be viable, a not-to-exceed reimbursement amount will be committed in writing to the project manager. An example of this commitment letter can be found in appendix B.

²Peak period is noon to 6:00pm weekdays May through October.

IV) Obtain Competitive Bid

Once a project is approved for Energy Retrofit funding, the Project Manager should submit the bid and specification documents to the ERP manager. Specifications must conform to Stanford's Facility Design Standards. The ERP manager will contact the project manager if the scope of the work does not represent the proposed system modifications submitted in the funding request.

V) Project Construction

All phases of project implementation are the responsibility of the project manager. It is also the responsibility of the project manager to make sure that the project construction adheres to university health and safety standards and practices. The project manager should pay particular attention to the rules and regulations regarding confined space access, Asbestos Containing Materials (ACM) issues, proper disposal of PCB ballasts, and the proper disposal of fluorescent (or any other mercury-containing) lamps.

VI) Project Inspection

A post construction walk-through shall be conducted by the project manager and shall include the contractor, an ERP representative, and the appropriate shop personnel. This team shall review project completion for design compliance and completeness prior to closing the project.

VII) Transfer of Retrofit Funds

For an energy retrofit project to receive funding, the ERP manager must have approved the project in advance. A commitment letter from the ERP manager indicates approval and the amount of funding.

A retrofit project will be considered complete after the following criteria have been met:

1. The project installation is complete and the final project invoices have been received.
2. The project has been inspected by the ERP manager.
3. Paperwork documenting all project expenses including copies of work orders, material and or labor invoices, or requisitions have been received by the ERP manager.
4. A brief electronic-mail or memorandum describing the actual start and completion dates for the project and any changes made during construction that could affect the amount of energy saved by the project (for example, more fixtures are retrofitted than estimated).

It is the responsibility of the project manager to make sure that all steps listed above are followed. New funds will not be committed to zones or auxiliaries that have incomplete paperwork from previous projects.

Project Cost Over/Under Budget Estimate

If the actual project costs are less than the approved amount any remaining funds shall be retained by the ERP account. As stated earlier, the ERP is not responsible for funding cost overruns or changes in the scope of the project. However, if additional opportunities for energy savings are identified after a project has been approved, increased funding will be considered if sufficient uncommitted funds are available and the additional work or change in scope follows the normal ERP requirements.

Appendix A, Example Energy Savings Calculations

A calculation spreadsheet may be downloaded from the Bonair Public drive in the ERP subdirectory

(j:\doc\erp). Please contact the ERP manager if you need assistance.

Example Lighting Calculation Worksheet

Building Name _____
 Building Number _____

A Room #	B Light Source	Existing System					G Annual Hours of Operation	H Light Source	I Number of Fixtures	Proposed System				Annual Energy Savings	
		C Number of Fixtures	D Fixture Description	E Watts per Fixture	F kW	J Fixture Description				K Watts per Fixture	L kW	M Annual Hours of Operation	N kW	O kWh	
15, 16, 17	fl	24	4L2x4	72	1.728	2080	fl	24	2 x 4	60	1.44	2080	0.29	599	
Lobby	inc	20	recessed can	100	2	2080	fl	20	recessed can	15	0.3	2080	1.70	3,536	
18	fl	8	4L2x4	72	0.576	4800	fl	8	4L2x4	60	0.48	4800	0.10	461	
19	fl	8	4L2x4	72	0.576	2080	fl	8	3L2x4	50	0.4	2080	0.18	366	
20	fl	8	4L2x5	72	0.576	3600	fl	8	4L2x4	60	0.48	2080	0.10	1,075	
													-	-	
													-	-	
													-	-	
													-	-	
													-	-	
													-	-	
													-	-	
													-	-	
Total													2.36	6,037	

Instructions:
 Please enter building name and number.
 (A) Group rooms with the same fixture type and annual hours of operation
 Use the proposed area to describe changes.

Appendix B, Commitment of Retrofit Funds

STANFORD UNIVERSITY MEMORANDUM

To: Project Manager
From: Utilities Division
Subject: Commitment of Energy Retrofit Program (ERP) Funds
Date: January 20, 2003

Your project has been approved to receive ERP funding. The Energy Retrofit Program will commit to funding the following project based on the proposal that you sent to us.

Project Number: ERP-1
Zone: Campus
Building: Campus Building (00-000)
Project Type: Lighting Retrofit
Project Description: T8 Lamp/Electronic Ballast Retrofit
ERP XXX Funding Commitment: \$75,950

Please send your estimated start and completion dates to us when you receive this notification. Projects must be complete and invoices paid by July 15, 2003. We will contact you on or near June 3, 2003 (the beginning of the fourth quarter) to discuss the status of this project. Projects not likely to be completed before the end of the fiscal year will have funds withdrawn and reallocated to another project.

Please call with any questions.

Scott Gould
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Appendix C. ERP Summary
Energy Retrofit Program (ERP) Summary

FY	Cost Dollars/yr	Avoided kWh/yr	Avoided \$/yr	Avoided \$ Cumulative
2002	\$ 661,859	947,416	203,908	1,809,015
2001	\$ 620,000	1,873,500	200,465	1,605,107
2000	\$ 273,000	1,245,000	93,375	1,404,642
1999	\$ 779,000	2,200,000	176,000	1,311,267
1998	\$ 700,000	2,353,023	188,242	1,135,267
1997	\$ 799,000	3,176,000	254,080	947,025
1996	\$ 1,200,000	3,350,000	268,000	692,945
1995	\$ 1,669,776	4,174,677	333,974	424,945
1994	\$ 551,484	1,058,425	84,674	90,971
1993	\$ 186,012	78,715	6,297	6,297
	\$ 7,440,131	20,456,756	\$ 1,809,015	

Program Simple Payback to date: 4.11 years

ERP Distribution Summary
FY96-02

