

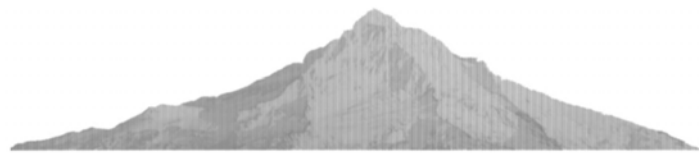
Proposal to Implement the
**INDUSTRIAL REFRIGERATION
RETROFIT PROGRAM**

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Other Programs Proposed
None



CASCADE ENERGY ENGINEERING INC



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1.0 Program Overview

A. Program Concept

The Industrial Refrigeration Retrofit (IRR) Program will provide specialized design assistance services and customized incentives for facilities with large refrigeration systems. This market sector offers abundant potential for energy and peak demand savings because the market consists of many systems that are old and inefficient by today's standards. The program will provide technical support that is tailored to each facility. This assistance will help customers overcome market barriers associated with evaluating energy efficiency options in these systems. The program will tap into large potential energy savings by providing technical assistance from industry experts who can provide owners with recommendations for energy efficient options, as well as case study information to help dispel performance uncertainties on their part. This technical assistance will be presented together with an incentive offer to the customer, with incentive rates parallel to the Statewide SPC program incentives for the sector.

B. Program Rationale

The IRR Program will offer customized technical design assistance and incentives to install energy efficient equipment and controls in large commercial and industrial refrigeration systems. The purpose of the program is to target the large potential for cost-effective energy and peak demand savings in industrial refrigeration systems that existing statewide programs have yet to fully realize.

Basis and Need

We have identified four reasons to create a targeted program for this sector:

- Large potential exists for energy savings
- Lack of information and risk aversion has inhibited measure adoption
- Existing Statewide programs are only capturing a small portion of market potential because of risks on the part of participants
- Energy savings in this market have significant peak demand savings impacts

Large Potential for Energy and Demand Savings

Industrial refrigeration systems are ubiquitous given California's population and its number one rank in agriculture. These systems are very energy intensive and most operate for long hours at high loads. Cold storage facilities on average consume twice as much electricity on a square foot basis as commercial office buildings. Production facilities are even more energy-intensive.

Excellent energy savings potential exists in both old and relatively new facilities. Typical energy savings are in the range of 20% to 30% with the occasional projects reaching 50% savings. Older facilities often utilize degraded or inefficient equipment. These older refrigeration systems have often evolved in an unplanned manner as the facility has

expanded. They are also often reliant on manual or simple controls. Opportunities exist throughout these systems. Newer systems also have opportunities – particularly for improving part-load controls. Often it is cost effective to integrate features that were omitted during the initial construction phase due to budget constraints and lack of information on life cycle energy costs.

Informational and Performance Uncertainties Inhibit Measure Adoption

Owners and operators do not recognize the specific opportunities in their refrigeration systems. Their highest priorities are adequate refrigeration capacity and system reliability. Energy efficiency is given less attention and a lower priority.

Systems are typically provided by design/build refrigeration contractors who must compete aggressively on first cost. These contractors are rarely energy efficiency experts and not in a position to evaluate life cycle energy costs of various system options. Furthermore, designers focus on the worst-case design conditions and not typical operations. Few designers take a holistic approach that maximizes efficiency.

The systems are complicated and difficult to model. There are few energy consultants that have experience with these specialty systems to gain the trust of the owners, operators, and refrigeration contractors. Owners and operators are risk averse until this trust has been earned.

Food processing is typically a low margin business where all costs must be aggressively managed. In this environment, owners are reluctant to make the upfront investment for a detailed energy study to evaluate energy savings opportunities.

The above factors provide significant informational market barriers that slow the adoption of new technologies and designs. These informational market barriers and performance uncertainties combine to form a powerful obstacle against the implementation of energy efficient technologies and control methods in this sector. The proposed program will seek to overcome these market barriers through detailed technical assistance to address informational barriers and case study information to address performance uncertainties.

Existing Statewide Programs Capturing Relatively Small Fraction of Potential

We believe that the existing Statewide Programs are not capturing the full potential of the industrial refrigeration market sector because of the market barriers discussed above. The primary vehicle for Statewide Program incentives in this sector is the Standard Performance Contract (SPC) Program. While SPC does offer customized incentives for these projects, it doesn't address the significant informational barriers that prevent potential customers from participating in the program. To participate in SPC a customer needs to identify a potential energy efficiency measure, estimate potential energy savings, develop an application with a rigorous savings estimate calculation, develop a measurement and verification plan, and defend the calculations and M&V plan while under review by energy efficiency experts. Needless to say these are daunting tasks for the facility owner or refrigeration contractor. In the commercial market there are any number of Energy Service Companies (ESCO's) who will help a customer through this process in return for the construction work associated with the project. Few ESCO's have pursued this sector due to their lack of experience with the technology. Facility owners are reluctant to pay for the assistance of an energy efficiency

expert without knowledge of the outcome. The limited pool of industrial refrigeration energy efficiency experts are reluctant to work at risk with deferred compensation in this environment.

Significant Demand Savings Associated with Measures

Taken as a market sector, large industrial refrigeration systems have generally flat electrical load profiles on both a daily or seasonal basis. These facilities typically run 24 hours per day, 7 days per week with some fluctuations depending on production level and weather. Thus energy efficiency measures at these sights produce both energy and peak demand savings. The average sum of energy efficiency measures have a generally flat load shapes as well. A few measures, such as floating head pressure control, have primarily off-peak savings. Many of the typical industrial refrigeration measures save proportional to baseline use and yield significant demand savings.

Operational Savings in this Sector Help California's Economy

The industrial refrigeration market helps to store and process products of the state's largest economic sector. The proposed program will help to make these important California businesses more competitive by lowering their operating costs. Because food processing, storage, and distribution operate on thin profit margins, these operating cost savings go directly to the bottom line and improving their profitability. This sector has been hard hit by past increases in energy costs.

The IRR Program targets a broad range of industrial refrigeration system owners ranging from multi-national food processors to small independent owner-operators.

Hardware / Incentive Program

We request that this proposal be evaluated as a hardware/incentive program. The primary purpose of the program is to provide measurable energy savings by overcoming informational barriers and performance uncertainties that hinder the adoption of energy efficiency measures in the large refrigeration market sector.

C. Program Objectives

The Industrial Refrigeration Retrofit Program will accomplish the following objectives:

- Provide 10,400,000 kWh of annual energy savings for the state.
- Provide 166,400,000 kWh of lifetime energy savings
- Provide average peak demand savings of 890 kW
- Provide commissioning for each participant site to ensure reliability of energy savings
- Provide California-specific industrial refrigeration case studies
- Provide a website where customers in California can find out more about the Industrial Refrigeration Retrofit Program and some basic information about potential energy saving measures for their facility

2.0 Program Process

This section outlines the basic process of the proposed Industrial Refrigeration Retrofit Program.

A. Program Implementation

The IRR Program seeks to stimulate the adoption of cost effective energy efficient technologies and operational strategies in the industrial refrigeration sector through an innovative combination of targeted marketing, detailed technical assistance, incentives, and commissioning. This combination of elements will help users to not only identify energy savings, but also to implement projects and ensure that the energy savings are real and demonstrable.

The program consists of the following basic elements:

- Targeted marketing to the industrial refrigeration sector through brochures, a web site, presentations to trade allies, and direct marketing to industry contacts.
- Scoping studies (brief audits) to identify energy saving opportunities including operational changes requiring no or little investment
- Detailed Engineering Assessments (DEA or detailed audits) to evaluate energy efficiency measures at sites
- Incentives (with incentive levels parallel to those of SPC) to encourage investments in energy efficiency
- Design assistance to participants during project development
- Commissioning of energy efficiency measures to ensure that energy efficiency measures are installed correctly and achieving expected energy savings

The remainder of this section discusses each of these elements following a brief discussion of the differences between the IRR and SPC programs.

Differences from Standard Performance Contract Program

The proposed program shares some similarities with the existing Standard Performance Contract (SPC) program. The proposed incentives levels are parallel to the SPC and the measures recommended under the IRR Program would typically be eligible for SPC incentives. However, there are a number of ways in which the IRR Program goes beyond the SPC program to tap the large potential of energy savings available in this very specialized target market. The IRR Program would feature the following program elements not available under SPC:

- Targeted marketing to increase participation from the industrial refrigeration sector
- Scoping studies (brief audits) to identify energy saving opportunities and alleviate informational market barriers

- Detailed Engineering Assessments (DEA or detailed audits) to evaluate energy efficiency measures at sites. These studies will help to alleviate informational market barriers that impede the adoption of energy efficient technologies.
- Design assistance to participants to make sure that energy savings are not compromised during the contracting and installation process
- Commissioning of energy efficiency measures to ensure that energy efficiency measures are installed correctly and achieving expected energy savings
- Case study briefs to help overcome performance uncertainties in the market sector
- Presentations to trade industry groups to help overcome informational and performance uncertainty market barriers that delay the adoption of energy efficiency

B. Marketing Plan

Our marketing plan is to use a multi-faceted approach for reaching potential project participants. It includes the following elements, each of which is discussed specifically below.

- Direct-mail marketing brochures
- Customer direct calls
- Case studies
- Program website
- Coordination with PG&E Account Reps

Program Brochure

Our Program team will develop a brochure that describes the program to support our marketing efforts. The brochure will be submitted to the Program Manager for approval prior to disseminating to the public. The brochure will summarize the program offerings, outline potential benefits to participants, and provide contact information for questions and enrollment. It will also include a disclaimer statement that identifies the program as a CPUC-funded energy efficiency initiative. The flier will be formatted for direct mailing or for distribution at meetings and events.

Our project team will compile a list of industry contacts to which we will send the brochure via direct mail. Such lists can be compiled directly from library databases using NAICS codes or purchased from vendors.

The total cost of developing and mailing the brochure to the target group is \$7,100.

Direct Contact with Customers

We will follow the brochure mailing with direct contacts to industry professionals to inquire about leads for potential facility contacts. These calls will be targeted at potential participants identified above or through previous industry contacts. Through previous work in the grocery

and cold storage markets the project team has extensive contacts throughout the industry with facility owners, refrigeration designers, system integrators, equipment suppliers, and contractors. We will make phone calls to these contacts to identify potential projects and disseminate information about the program. Because the network of designers, suppliers and contractors is relatively small, we expect this to be the most cost-effective means of marketing the program.

The cost of the direct contact calls over is estimated at 5 hours per month for the duration of the two-year program, or a total of \$15,000.

Coordination with Account Reps

In addition to networking with contacts known to the Program engineering teams, we will seek to cooperate with PG&E to promote the program through account representatives that serve this market. Account reps for industrial refrigeration facilities are in frequent communication with their customers and often know which facilities have high potential and which clients might be interested in investigating cost-effective retrofit opportunities.

We realize that PG&E staff have long-standing relationships with customers who may benefit from participation, and that these relationships are very important and valuable to PG&E. Therefore we will work together with account representatives to identify participants for the program, and to maintain good communication throughout the administration of program. Account managers have different needs in terms of communication with their customers with some preferring to be present for any communication, while others feel comfortable with a more “hands off” approach. We will maintain sensitivity to this issue and assess the desire of the account representatives to be involved in the design assistance process. We will strive to provide high quality service to those participants to ensure that our involvement with them strengthens their relationship with PG&E and their account representative.

Case Studies

Case studies are an important method of alleviating performance uncertainties for prospective program participants. Many facility owners and operators are naturally very cautious about making changes in equipment and controls on working refrigeration systems. Energy savings benefits may appear small as compared to potential problems associated with new equipment and controls. Many facility managers have a “if it’s not broke – don’t fix it” attitude with regard to energy efficiency measures.

Case studies help alleviate these concerns by showing what can be, and has been done. Owners and operators are much more likely to consider project options that have been demonstrated successfully at other facilities.

We propose to develop two (2) California-specific case studies as part of this program. The case studies will be brief reports documenting experiences at typical sites that have participated in the program and have completed installed projects.

The case studies will be published in printed copy and PDF formats for disseminating to interested parties. They will be posted on the program website as well as sent to Statewide Program project managers for distribution via their websites or printed media.

The cost of the case study briefs will be \$4,600 each.

Website

The IRR Program will use the website as a cornerstone for the marketing efforts. The site will have a program-specific URL and registered domain (e.g. www.industrialrefrig.org or similar) to make it easily referenced in the brochures, presentations, and calls to industry contacts. The website will contain the following elements:

- Information of the program – how to participate, incentive levels, services offered, how the program works, and applications to enroll
- Contact information for participants to call or email
- Case studies of successful projects
- Information about energy efficiency measures specific to the sector
- Industry links

The case studies developed by the program will be hosted on the website as soon as they are complete. Initially, the site will host available case studies from similar sites in other states.

The cost of the website development and maintenance for two years will be \$9,200.

Trade Group Presentations

Our project team will promote the program broadly through presentations to trade associations such as the International Institute of Ammonia Refrigeration (IIAR), the Refrigerating Engineers and Technicians Association (RETA), International Dairy Foods Association (IDFA), International Association of Refrigerated Warehouses (IARW), World Food Logistics Organization (WFLO) and the International Institute of Refrigeration (IIR).

As part of these presentations our staff will present information about the program and how to participate. In addition they will present information about common energy efficiency measures and their implementation as a means of general market transformation. The presentations will also include case studies and descriptions of past projects as a means of dispelling performance uncertainties surrounding new methods that can be applied in this sector.

The total cost for three (3) such presentations to industry trade groups is \$5,000.

C. Customer Enrollment

The following section describes the process for customer enrollment in the program. There are three successive stages of involvement for participants. As the customers participate in each stage the level of commitment is increased in proportion to the level of service provided by the program. These stages are summarized in the table below, and discussed in the following paragraphs.

Customer Commitment	Associated Program Service
Participation Agreement (PA)	Initial Scoping Study
Memorandum of Understanding (MOU)	Detailed Engineering Assessment
Incentives Application	Energy Efficiency Rebates

Participation Agreement

Any eligible customer may participate in the program as long as sufficient program funds remain. To participate at this level the customer need only sign a standard Participation Agreement (PA). The PA will include standard CPUC disclaimers and will be accompanied by a list of potential programs for which the customer may be eligible. The PA will include a provision that allows the implementer access to the customer's historical billing data and that this billing information will be held strictly confidential. By signing the PA the customer agrees to participate in any necessary phone surveys or other follow-up activity required by the EM&V process.

Memorandum of Understanding (MOU)

Once the customer has had a completed scoping study they will be eligible for a Detailed Engineering Assessment or DEA. To receive a DEA the customer will be required to sign a brief MOU as a demonstration of their level of commitment. In addition to contact information and information about the site, the MOU will contain the following elements:

- A statement that the signing party has contracting authority on behalf of the site
- A statement that the signing party has potential access to capital to install recommended measures
- A statement that the customer intends to install cost effective measures at the site provided the projects meet economic investment criteria of the customers choosing
- A summary of the program process that describes the DEA, inspection, design assistance, and commissioning phases of project development
- Agreement on the customers behalf to participate in EM&V efforts at the request of the program implementers
- Agreement not to pursue incentives from any other programs for energy efficiency measures installed under the IRR Program

The purpose of the MOU is to demonstrate that the customer has a sincere interest in exploring energy efficiency options. It is not intended to burden the customer unnecessarily with binding legal commitments. It is important the MOU be worded in such a way that it doesn't obstruct too many participants from proceeding with the program.

Seeking evidence of customer commitment at this phase of the project provides two things for our program. First, it causes our team to make a serious evaluation pertaining to the adoption of measures at an early date, so that, as program administrators we know before implementation what measures are likely to be included in the final measure package. This allows us to commit resources (or not) from that point forward in proportion to the potential

savings at the site. Secondly, looking for evidence of commitment provides a vehicle for continued communication with the participant, ensuring a more continuous contact with them throughout their decision-making process.

Detailed Energy Assessment and Design Assistance

The DEA will contain an incentive offer on behalf of the program for installing recommended energy efficiency measures. If the customer chooses to install these measures as recommended then these estimates will suffice as justification for the application.

Project Incentive Application

Once a customer has installed energy efficiency measures at the site they will submit a Project Incentive Application (PIA). The incentive application is a contract between the participant and the implementer to provide incentives (rebates) for installed and functioning energy efficiency measures. The customer will receive a partially completed PIA at the completion of the DEA. The customer will provide the following information on/with the application.

- Contact information and site summary statistics such as total square feet and NAICS code
- Receipts, invoices, or similar proof of payment for project costs associated with energy efficiency measures
- A list of installed measures with projected energy savings from the DEA

In addition, the PIA will include:

- A summary of the program process that describes the DEA, inspection, design assistance, and commissioning phases of project development
- A summary of the program rules to which the customer agrees

By signing the PIA the customer agrees:

- To abide by the program rules as set forth in the application
- To grant access to the site for the inspection and commissioning (if elected)
- To participate in EM&V efforts at the request of the program implementers

D. Materials

Not applicable.

The propose program does not include procurement, delivery or installation of equipment.

E. Payment of Incentives

Incentives will be customized based on detailed engineering estimates of the savings associated with recommended measures. Participants will only be eligible for incentives if they have a signed MOU and program staff have completed a DEA for the site. No-cost

measures will not be eligible for incentives.

Incentive rates will be set parallel to incentives offered through the SPC program to provide consistence across the portfolio of programs. Currently these incentives are set at the following levels (per annual kWh saved):

End Use	Incentive
Refrigeration Equipment	\$0.14 /kWh
Refrigeration Controls	\$0.08 /kWh
Lighting - Refrigerated Spaces	\$0.05 /kWh

See Section 4.C for detailed rules governing incentive levels and caps.

Projects must be installed and operating by the end of 2005 to be eligible for incentives.

75% of Incentive Payable Upon Measure Installation

Project participants will be eligible for 75% of the incentive amount following measure installation. To receive the incentive the customer must submit a completed Project Incentive Application and the appropriate invoices to document actual measure costs. The incentive will be paid to the participant following an inspection of the site to verify equipment installation and operation.

25% of Incentive Payable Following Commissioning of Measure

The remaining 25% of the potential incentive is available to the customer following commissioning of the energy efficiency measures at the site.

Commissioning is done on a short-term basis to demonstrate the performance of equipment in line with the assumptions underlying the energy savings analysis. The result of this process is a commissioning report that finalizes project energy savings estimates based on observed performance during the monitoring period. Commissioning will typically include two weeks of monitored data using the site's Energy Management System (EMS). See Section 4.D for a complete description of the commissioning activity.

F. Staff and Subcontractor Responsibilities

Management Plan

kW Engineering will be the prime contractor for the project and be the single point of contact for program administration. As such, kW will be responsible for project execution and the quality and timeliness of deliverables. kW Engineering will be responsible for most of the marketing aspects of the program including development of a program brochure, direct mailing, website and case study development. kW will also provide engineering services to some participants in the form of scoping studies and detailed assessments. kW will perform quality control of engineering analyses developed by Cascade Energy Engineering. kW Engineering will provide inspection services to document measure installation and verification.

Cascade Energy Engineering will act as a subcontractor to kW Engineering and will assist with marketing of the program through industry contacts. Cascade will be the primary deliverer of engineering technical assistance services to participants through scoping studies

and detailed assessments. Cascade will perform quality control of engineering analyses developed by kW Engineering.

Jim Kelsey, P.E. will be kW Engineering's project manager. As such, Jim will oversee the day-to-day operation of the project and make sure that it meets performance goals while staying on time and on budget. Jim has long-term experience in the administration of design assistance work as the program manager for delivery of technical services for the City of Oakland's Energy Efficiency Design Assistance project. In addition, his experience with grocery store and industrial refrigeration systems makes him an ideal candidate for this role.

Marcus Wilcox will be the Cascade project manager. His role will be to oversee technical services offered to industrial refrigeration projects. Marcus has over sixteen years of experience in the energy efficiency field, is a registered professional engineer, and has managed evaluations of energy efficiency at many industrial refrigeration projects nationwide.

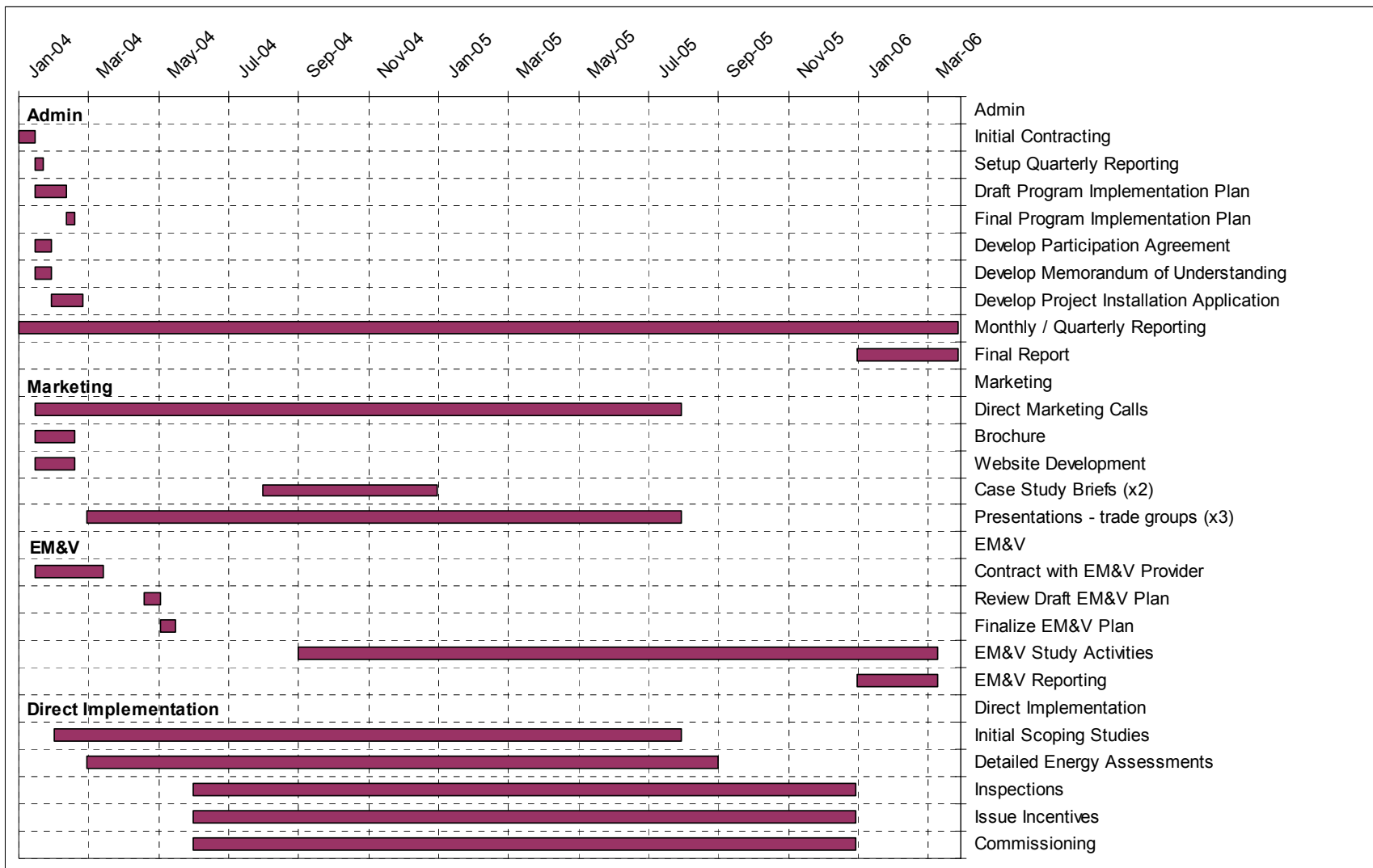
G. Work Plan and Timeline for Program Implementation

The IRR Program will run for 27 months beginning January 1, 2004 through March 31, 2006. All participant projects must be installed and operating by the end of 2005 to be eligible for incentives.

The timeline and deliverables for the project are shown in the following table for each major program budget heading.

Admin	Begin	End
Initial Contracting	1/1/2004	1/15/2004
Setup Quarterly Reporting	1/15/2004	1/22/2004
Draft Program Implementation Plan	1/15/2004	2/12/2004
Final Program Implementation Plan	2/12/2004	2/19/2004
Develop Participation Agreement	1/15/2004	1/29/2004
Develop Memorandum of Understanding	1/15/2004	1/29/2004
Develop Project Installation Application	1/29/2004	2/26/2004
Monthly / Quarterly Reporting	1/1/2004	3/30/2006
Final Report	1/1/2006	3/30/2006
Marketing	Begin	End
Direct Marketing Calls	1/15/2004	8/1/2005
Brochure	1/15/2004	2/19/2004
Website Development	1/15/2004	2/19/2004
Case Study Briefs (x2)	8/1/2004	12/31/2004
Presentations - trade groups (x3)	3/1/2004	8/1/2005
EM&V	Begin	End
Contract with EM&V Provider	1/15/2004	3/15/2004
Review Draft EM&V Plan	4/19/2004	5/3/2004
Finalize EM&V Plan	5/3/2004	5/17/2004
EM&V Study Activities	9/1/2004	3/12/2006
EM&V Reporting	1/1/2006	3/12/2006
Direct Implementation	Begin	End
Initial Scoping Studies	2/1/2004	8/1/2005
Detailed Energy Assessments	3/1/2004	9/1/2005
Inspections	6/1/2004	12/31/2005
Issue Incentives	6/1/2004	12/31/2005
Commissioning	6/1/2004	12/31/2005

These activities are summarized in a Gantt chart on the following page.



Program deliverable due dates by budget heading are as follows:

Deliverable	Due Date
Admin	
Monthly Reports	15th of Each Month
Quarterly Reports	15th Following Qtr End
Draft Program Implementation Plan	January 29, 2004
Final Program Implementation Plan	February 12, 2004
Draft Participation Agreement	January 22, 2004
Final Participation Agreement	January 29, 2004
Draft Memorandum of Understanding	January 22, 2004
Final Memorandum of Understanding	January 29, 2004
Draft Project Installation Application	February 12, 2004
Final Project Installation Application	February 26, 2004
Marketing	
Draft Brochure Copy	January 29, 2004
Final Brochure Copy	February 12, 2004
Brochure in Print	February 19, 2004
Draft Website Design	January 29, 2004
Final Website Design	February 19, 2004
Website Online	February 19, 2004
Draft Case Study Briefs #1	October 1, 2004
Final Case Study Briefs #1	October 15, 2004
Draft Case Study Briefs #2	December 17, 2004
Final Case Study Briefs #2	December 31, 2004
Trade Groups Presentations Complete	August 1, 2005
EM&V	
Select EM&V Contractor	March 15, 2004
Review Draft EM&V Plan	May 3, 2004
Finalize EM&V Plan	May 17, 2004
Draft EM&V Report	February 26, 2006
Final EM&V Report	March 12, 2006
Direct Implementation	
Scoping Studies Complete	August 1, 2005
DEA's Complete	September 1, 2005
Project Installations Complete	December 31, 2005
Final Report Submission	March 12, 2006

3.0 Customer Description

A. Customer Description

This program will target owners and operators of industrial refrigeration systems. These systems are found in:

- Refrigerated warehouses and grocery distribution warehouses
- Food processors or packers including meat, dairy, fish, egg, pre-cooked foods, freeze dry products, fruit juice and concentrates, frozen vegetables, fresh fruit and vegetables, beer, and wine.
- Miscellaneous other industrial refrigeration systems (ice rinks, PVC plants).

Facilities range from multinational corporations to small independent owner/operator farms. The program plan includes targeting customers throughout this cross-section.

Our project team has pre-existing relationships with many of the larger corporations and has done projects with them in other geographic areas. For customers of all sizes, we have gotten project leads and introductions by working closely with trade allies including refrigeration contractors and refrigeration control system vendors.

We have found that the key individuals within these companies have many demands on their time, but are willing to consider energy efficiency provided that the consultant shows a high level of competence and familiarity with the nuances of industrial refrigeration.

Total annual energy use of these facilities is typically between 1,000,000 kWh and 100,000,000 kWh. Baseline energy use of the refrigeration system is typically between 500,000 kWh and 20,000,000 kWh annually.

B. Customer Eligibility

All customers with refrigeration systems of 100 tons of refrigeration or larger in the PG&E service territory will be eligible for the program. The following detailed eligibility criteria will apply.

- The program has a limited budget. Applications will be accepted on a first-come, first-served basis until allocated funds are reserved, or by December 31, 2005, whichever comes first. The level of technical assistance provided will depend on the size of the project and the potential energy savings. Technical assistance will generally be provided on a first-come, first-served basis; however, preference may be given to projects based on design and development schedule, size of project, or other criteria.
- The Program only serves customers that contribute to the Public Goods Charge (PGC). This means that eligible customers must have an existing Pacific Gas and Electric Company electric account.

- Customers must not pursue any other PGC funded incentives for the work performed through this program. Customers may pursue additional PGC funded incentives for energy efficiency improvements that are outside the scope of this program.
- The customer must agree to being interviewed in regards to their intentions to implement the recommended energy efficiency measures. The customer, or their agents or assigns, must also agree to provide access to the site for evaluation purposes for three years after receiving technical assistance and incentives.

C. Customer Complaint Resolution

Customer Contact

Our team members will go out of their way to provide valuable and timely response to program participants. We will respect the needs of participant staff when they are responding to urgent project needs and will schedule our work to maximize opportunity during the implementation process. We will under all circumstances project a competent and professional image for the program.

In the event that the Customer has any questions, complaints or disputes regarding the IRR Program, the program team member (kW Engineering or one of it's subcontractors) will attempt to answer and resolve the customer's questions or complaints within a reasonable timeframe (typically five business days or sooner.) In the event that the Customer believes their questions or complaints have not been satisfactorily answered or resolved, the Customer will be referred to the kW Engineering IRR Program Manager. The Customer shall then be requested to state in writing the date, time, exact location, persons involved, specific nature of complaints, amount of any loss, and any other information relevant to the complaint, and deliver the complaint to Program Manager for consideration. The Program Manager shall investigate the claim and make a determination of the final disposition of the complaint within ten business days. When communicating this resolution to the customer, the Program Implementer will inform the Customer in writing of the option to appeal the decision to the contract administrator, PG&E, and, if still not satisfied, to the CPUC's Energy Division.

Appealing Complaints to the IOU Program Manager

Either the Program Manager or the Customer may send a complaint for appeal to PG&E. If the Program Manager cannot adequately resolve the conflict s/he shall notify PG&E program manager within 12 business days of receiving the written complaint from the customer. If the Customer wishes to appeal a decision by the Program Manager, s/he will have 5 business days from notification by the Program Manager to submit a written appeal to the PG&E program manager. The PG&E program manager will have 10 business days to recommend a solution to the issue, and will refer the claim to the Program Manager for final resolution. The Program Manager, in communicating this resolution, will inform the Customer in writing of the option to appeal the decision to the CPUC's Energy Division.

Appealing Complaints to the CPUC's Energy Division

If the Customer is not satisfied with the complaint resolution, s/he will have 5 working days to submit a written appeal to a contact person at the CPUC's Energy Division. The CPUC's

contact person shall make a determination of the final disposition of the complaint within ten business days. This determination will be final.

Remedying Complaints

If the IRR Program team members are determined to be at fault, the team member at fault shall remedy the claim at its own cost. The team members shall abide by the Program Manager's decision. Claims shall be remedied within ten normal business days of final resolution, unless the Program Manager gives approval for another timeframe.

Tracking Complaints

The Program Manager shall maintain a log of all customer complaints it receives and shall retain that log for at least three years after the end of the contract term. The Program Manager shall record notice of receipt of complaint and the resolution status in the Quarterly Reports. The Program Manager shall have a copy of the written complaint, along with copies of all written communications including resolutions, for inspection by request.

D. Geographic Area

The program will be eligible to customers with industrial refrigeration systems that are in Pacific Gas and Electric Company's service territory.

PG&E's service territory is chosen because it can be served locally by the contract's prime implementer, kW Engineering. If the program is shown to be successful we will consider a statewide roll-out in 2006.

The program is proposed for PG&E's service territory in general. It is not proposed specifically for a transmission constrained area as identified by the California Independent System Operator.

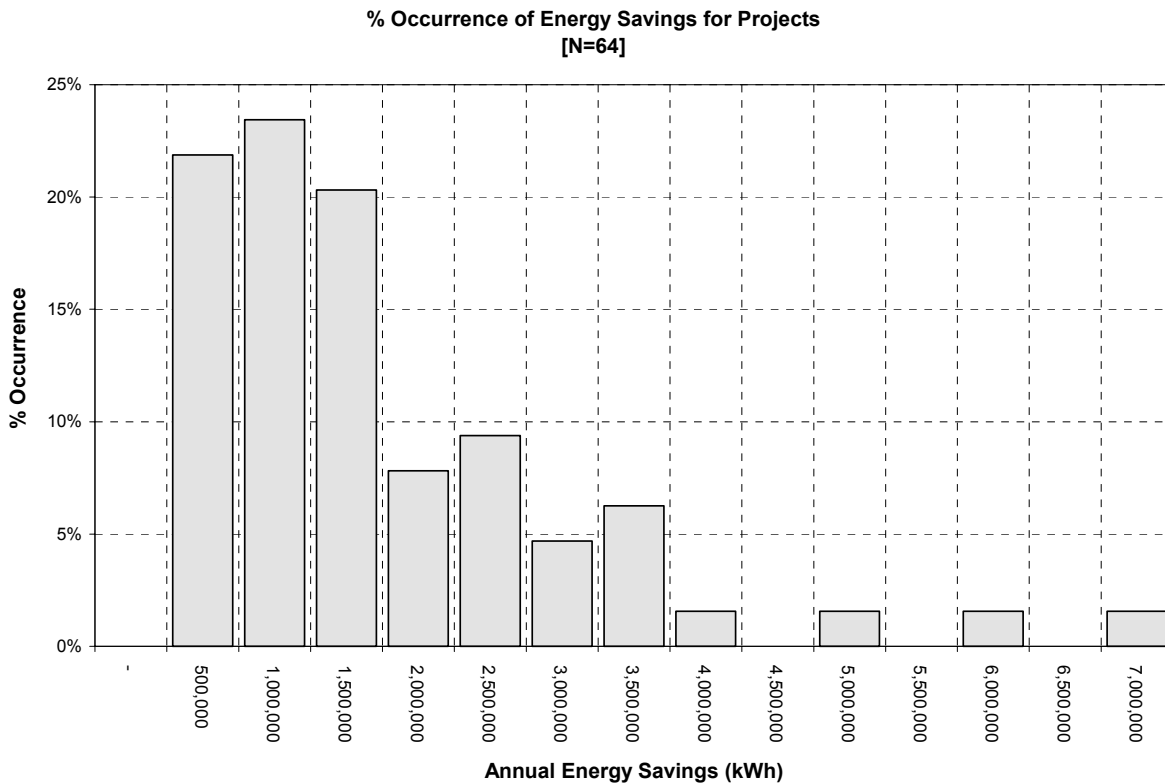
4.0 Measure and Activity Descriptions

A. Energy Savings Assumptions

DEER does not provide information about the energy savings in this sector. The following information is compiled from a database of detailed energy savings calculations from Cascade Energy Engineering’s records in 64 facilities with installed projects, primarily in the Pacific Northwest. Most of these sites had detailed commissioning efforts under which savings estimates were verified.

Electric Energy Savings (kWh)

Potential energy savings naturally range with the size with facility size and conditions. However, over a large sample of projects one can begin to develop a profile of average energy savings potential. The following figure shows the distribution of energy savings found at 64 facilities where projects have been installed.



The average annual energy savings of this sample are 1,300,000 kWh. This estimate is used to develop projected energy savings for completed projects.

The program plan makes the following assumptions for project enrollment and completion by phase:

Initial Scoping Studies	25
Signed MOU's	12
Detailed Engineering Studies	12
Installed Projects	10

The total net projected program savings based on 10 complete & installed projects is 10,400,000 kWh.

Coincident Peak Demand Reduction (kW)

Industrial refrigeration systems load profiles are highly case specific:

- Some facilities that handle field or fruit crops have large seasonal peaks
- Others have load profiles that vary significantly due to weekly production schedules
- Others are quite flat

Similarly, the energy savings profiles of individual measures are highly case specific:

- Some measures deliver the largest savings concurrent with peak times
- Others deliver uniform savings
- Some measures improve part-load efficiency and save disproportionately during off-peak periods

Despite these complexities, it is still reasonable to project a flat load profile for energy savings resulting from energy efficiency measures in this sector. Projected demand savings are therefore estimated as average annual energy savings (in kWh) divided by 8760 hours per year and reduced by 25% to assume a conservative safety factor. The total projected average peak demand savings for the program are 890 kW.

Typical Retrofit Measures

The following measures are typical measures for retrofit application in the industrial refrigeration sector. Because each facility is different and measures are customized to the facility, this list is not exhaustive.

- Computer Control Systems
- Evaporator Fan VFDs
- Evaporator Fan Cycling
- Reduced Head Pressure
- Condenser Fan VFDs
- Compressor VFDs
- Additional Condenser Capacity
- Increased Suction Pressure
- Purge system improvements
- Thermosiphon Oil Cooling Conversions
- Bi-Level Lighting in Refrigerated Spaces
- Motor Efficiency Improvements

- Cold Storage Door Improvements

B. Deviations in Standard Cost-effectiveness Values

The following assumptions are based on the guidelines provided in the Energy Efficiency Policy Manual.

Net-to-Gross Ratio

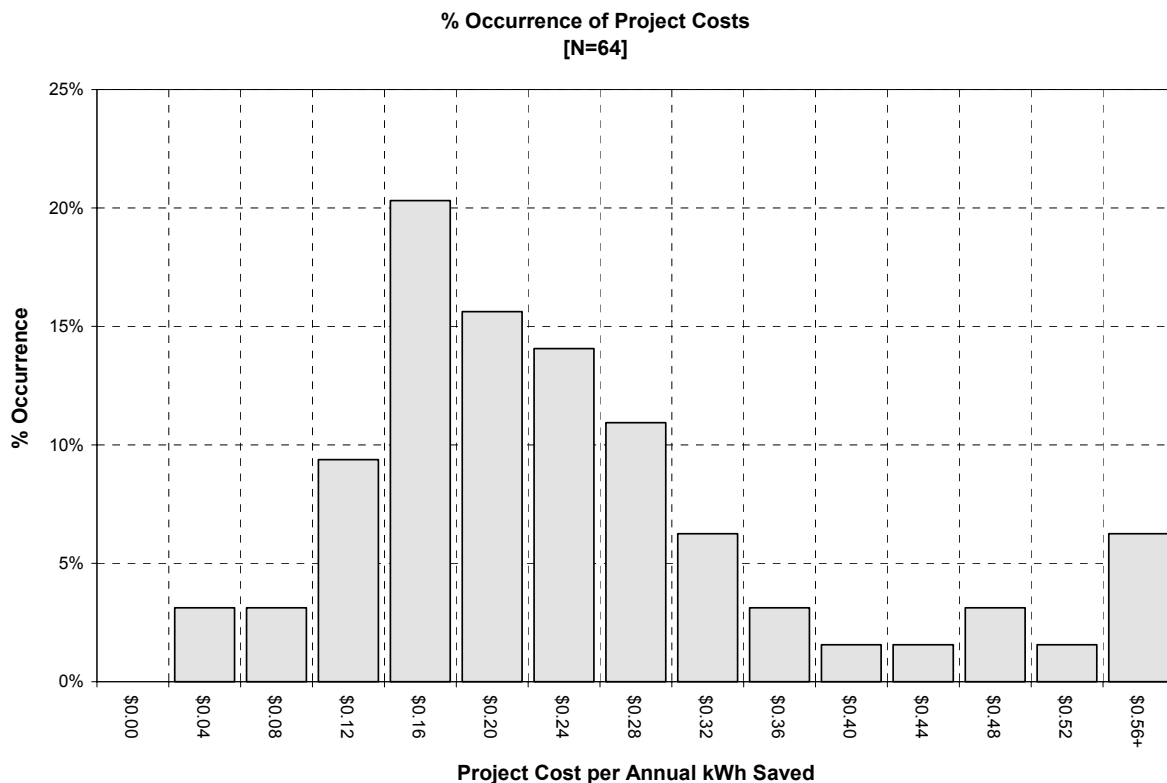
We have adopted the prescribed Net-to-Gross Ratio of 0.80 for this program because it is a new program concept and is not covered by the standard categories listed in the Energy Efficiency Policy Manual.

Estimated Useful Life

We have adopted the standard savings estimates for refrigeration hardware and control measures in our cost effectiveness analysis. The Energy Efficiency Policy Manual sets a value of 16 years for measures of this type.

Incremental Measure Cost

Projected incremental measure costs are based upon the same database of 64 installed projects used to develop the energy savings estimates in Section 4.0 A. Historical installation costs per project show the following distribution.



The average installed cost per unit of saved energy for these projects is \$0.20 per kWh. This estimate has been used to develop energy savings IMC assumptions in the cost effectiveness workbook.

C. Rebate Amounts

Incentive rates will be set to parallel incentives offered through the SPC program to provide consistence across the portfolio of programs. Currently these incentives are set at the following levels (per annual kWh saved):

End Use	Incentive
Refrigeration Equipment	\$0.14 /kWh
Refrigeration Controls	\$0.08 /kWh
Lighting - Refrigerated Spaces	\$0.05 /kWh

The definitions of the measure categories above will be applied similar to these categories in the SPC program. Refrigeration Equipment incentives will be available for equipment upgrades that directly affect the refrigeration system. This incentive will apply to compressor retrofits or replacements, condenser replacements, system piping modifications, and evaporator modifications or replacements. For consistency with SPC, all VFD applications will be treated as Refrigeration Control measures. The lighting incentive level will be applied only to the energy savings from lighting replacements. For lighting the interactive affects upon the refrigeration system will be included in the estimate of kWh and kW savings for the measure.

Incentive caps will also parallel those of the current SPC program. At the customer level the potential cap is

- \$300,000 per customer site, or
- 50% of the installed project cost

In addition a Project Sponsor or Corporate Parent is limited to 25% of the funds managed by the program.

Utility Affiliates are limited to 15% of the combined funds managed by any individual Utility Administrator. Therefore this cap would apply to the combined projects participating in the IRR Program and the SPC Program.

D. Activities Descriptions

The following activities will be offered to participants of the program. Initial Scoping Studies will be offered for any eligible customer who signs a participation agreement. Detailed Engineering Studies will only be offered to customers who sign a memorandum of understanding. For details on customer enrollment see Section 2 C.

Initial Scoping Studies

Participants will first receive brief scoping studies to identify potential for energy savings at

the site and to gauge the participant's economic criteria for implementing projects. Each participant will be provided with a brief report identifying potential energy saving opportunities at the site and ballpark estimates for cost effectiveness of potential measures.

As part of each Initial Scoping Study the Program's engineering team will do the following:

- Travel to the site to collect information about the facility including current equipment, operating parameters, controls settings, etc.
- Interview responsible site staff to determine operating modes, typical loads, product types and general operating characteristics
- Inspect equipment and review current operating temperatures, pressures, etc.
- Develop a brief inventory of primary equipment at the site
- Discuss potential energy efficiency measures with site staff
- Discuss investment criteria and access to capital with site staff

After conducting the site visit the engineering team will develop a scoping study. The initial scoping study report will contain the following elements at a minimum:

- Executive summary describing EEMs and potential for operational cost savings at the site including operational changes requiring no significant investment
- "Ballpark" energy savings estimates for each identified EEM at the site
- "Ballpark" operating cost savings estimates for each identified EEM at the site
- Estimated incentives that would be available through the program
- Estimated simple payback for identified measures
- Non-energy benefits associated with potential measures
- Historical billing summary for the site
- Benchmarking within industry as appropriate
- Clear instructions on how to proceed with Program

Each scoping study will undergo independent quality control by separate engineering firm than the one conducting the study.

The initial scoping study will clearly state that the energy savings estimates are preliminary and approximate, and that it is not an incentive offer under the program. Incentive offers will only be made following detailed engineering assessments at a site.

The initial scoping studies will cost an estimated average of \$5,000 per site. Our program plan calls for a total of 25 scoping studies. While costs for each will vary, the project will be managed to this overall average cost per site in proportion to the opportunity for energy savings. The exact amount will vary depending on the size and complexity of the site and will be billed on a T&M basis.

Detailed Engineering Assessment & Incentive Offer

Program staff will discuss potential measures and cost effectiveness with the participant and

then determine if they are interested in pursuing EEMs and a Detailed Engineering Assessment at the site. If the customer meets the eligibility requirements and agrees to sign an MOU, they may request a Detailed Engineering Assessment. See section 2 C for details about customer enrollment and eligibility for detailed assessments.

The Detailed Engineering Assessment will provide an in-depth study of the site to better define potential projects, refine recommendations and energy savings estimates. As part of the DEA the program team will do the following:

- Revisit the site and collect detailed equipment information
- Review design drawings and existing controls for the site
- Review maintenance logs if available
- Meet with site staff to discuss potential energy efficiency measures
- Present relevant case studies if appropriate to help alleviate performance uncertainties with site staff and encourage their “buy-in”
- Develop detailed computer simulations for existing equipment and controls
- Develop simulations for potential energy efficiency measures
- Contact vendors for pricing information for applicable measures
- Produce a DEA Report summarizing the results of the analysis for the site
- Provide independent quality control by separate engineering firm than the one conducting the DEA

In addition, the engineering team may collect the following as needed for the analysis:

- Trend data from site energy management system (EMS)
- Logging data using external data loggers

Upon completion of the analysis for the site the team will produce a Detailed Engineering Analysis Report (DEAR) for the site including the following:

- Executive summary encapsulating the results for the site
- A table summarizing the primary economic and energy savings results
- A detailed description of each proposed EEM including site specific information about how to implement the measure
- Refined energy savings estimates for each identified EEM at the site
- Refined operating cost savings estimates for each identified EEM at the site. Contractor quotes will be used where possible.
- An IRR Program incentive offer for each installed EEM
- Estimated simple payback for identified measures (with and without incentives)
- Non-energy benefits associated with potential measures
- Detailed instructions on how to proceed with the IRR Program
- An IRR Program incentive application customized for the site

The detailed assessment will include a proposed incentive amount based on projected savings at the site. This incentive offer will include a project application that once signed is a binding agreement between the program and the project sponsor (customer).

The Detailed Engineering Analyses will cost an estimated \$27,500 per site. Our program plan calls for a total of 12 DEA's assuming a level of project attrition following scoping studies. While costs for each site will vary, the project will be managed to this overall average cost per site in proportion to the opportunity for energy savings. The exact amount will vary depending on the size and complexity of the site and will be billed on a T&M basis.

Project Installation Design Assistance

The IRR Program will continue to offer site-specific technical assistance throughout the installation of the recommended measures. Our engineering team has found that this is an essential program element to ensure that aspects that are critical to energy savings are not lost in the design and installation process. Basically this provides the participant with continued technical support throughout the project development cycle. Because many key implementation decisions are made at this time, it is important to provide this involvement so that the energy savings are not lost or "value-engineered" out of the process.

As needed our engineering team will provide additional information to the participants design team to support our recommendations. Examples of this information that may be provided are:

- Design guidance to back up recommendations so that energy-saving design intent is not lost
- Review of bidders information
- Cut sheets or manufacturers data
- Suggestion potential suppliers of equipment
- Sample specification language
- Case study information for similar installations

Project Installation Design Assistance will cost an estimated average of \$4,500 per site. Our program plan calls for design assistance to serve a total of 10 sites. While costs for each will vary, the project will be managed to this overall average cost per site in proportion to the opportunity for energy savings. The exact amount will vary depending on the size and complexity of the site and will be billed on a T&M basis.

Site Inspections

Inspections will be performed at each site to verify the final installation of equipment and controls. An engineer familiar with the project will visit the site and record the list of final measures installed at the site that are eligible for incentives. Upon completion of the site visit the engineer will submit an inspection report consisting of the following at minimum:

- A final list of new equipment installed at the site
- A final list of measures adopted at the site
- A total revised incentive amount based on installed measures

Site Inspections will cost an estimated average of \$2,000 per site. Our program plan calls for

a total of 10 site inspections. While costs for each will vary, the project will be managed to this overall average cost per site in proportion to the opportunity for energy savings. The exact amount will vary depending on the size and complexity of the site and will be billed on a T&M basis.

Commissioning

Commissioning is done following inspection of the measures at the site. Commissioning is done on a short-term basis to demonstrate the performance of equipment in line with the assumptions underlying the energy savings analysis. The result of this process is a commissioning report that finalizes project energy savings estimates based on observed performance during the monitoring period.

Our Engineering Team is a firm believer in the value of commissioning energy efficiency measures in these systems. Too often energy savings suffer from poor follow-through after designs are built and operated. To address this problem our program offers full commissioning services to the building owner as a part of the program. Our experience shows that these services pay for themselves many times over in energy savings at the site.

Commissioning services will vary depending on equipment and the energy efficiency measures installed at the site. Typically these services include:

- Logging equipment performance over time to verify control sequences
- Using existing energy management systems to trend variables such as temperatures, pressures, VFD speeds, valve position/status and reviewing these trends for consistency with specifications and design intent
- Exercising controls on site to demonstrate that equipment responds properly to control calls

Commissioning procedures like this nearly always uncover problems that cause systems to fall short of energy saving goals. For example, the control sequences may show that lighting is supposed to shut off at night according to a schedule. Trends from the EMS may even make it appear that the lights are off because a log of the control signal may show the control signal off at night. However, logging with a portable logger may show that the lights in fact continue to operate at night due to a faulty control board or relay.

Commissioning is in the best interests of the owners since it ensures that their investment in energy efficiency is paying off. Promoting this effort under the proposed Program is appropriate because it helps realize the benefits that ratepayers hope to achieve through their financial support of the program incentives.

Commissioning will cost an estimated average of \$8,000 per site. Our program plan calls for commissioning activities at a total of 10 sites. While costs for each will vary, the project will be managed to this overall average cost per site in proportion to the opportunity for energy savings. The exact amount will vary depending on the size and complexity of the site and will be billed on a T&M basis.

5.0 Goals

The Industrial Refrigeration Retrofit Program is designed to achieve the following qualitative goals:

- Encourage facilities to adopt energy efficient technologies and practices
- Overcome Informational Market Barriers that hold back the adoption of energy efficient equipment and design strategies in industrial refrigeration markets
- Overcome Performance Uncertainty Market Barriers that reduce the adoption of energy efficiency measures
- Promote full realization of identified energy efficiency potential
- Promote energy efficient design practices in the industrial refrigeration sector

Each of the program activities outlined in this proposal goes toward achieving one the above goals (see Section 4.0).

Measurable Activities

The primary objective of the program is to cost effectively provide demonstrable energy and peak demand savings in the industrial refrigeration sector. The measurable goals of the program in this regard will be the verified energy savings at target facilities. These goals are stated below and are the projected net energy and demand savings at facilities.

	10,400,00
Projected Annual Energy Savings	0 kWh
Projected Peak Demand Savings	890 kW

The primary source of these energy savings will be energy efficiency measures that receive rebates through the IRR Program. However, we propose that other energy efficiency measures identified at participant sites also count toward this goal. While low-cost and no-cost commissioning measures at participant sites may not qualify for incentives, when installed they do produce measurable energy savings. Because considerable program time and expense is budgeted for customized energy efficiency recommendations at sites, these energy savings should also count toward program goals.

Marketing Goals

Program marketing activities are primarily designed to promote program participation. In addition the website and case study material developed as part of the program marketing activities will be used to help overcome informational market barriers for participants and non-participants alike.

The following table summarizes the marketing goals for the IRR Program.

Marketing Activities	Goal
Brochure	Produced and distributed to mailing list of 150 sites
Website Development	Website online including case studies as they become available
Case Study Briefs	Two California-specific case studies to be developed and distributed
Presentations to Trade Groups	Three presentations to industry trade groups in program service territory

EM&V Goals

The goal of the EM&V effort will be to evaluate, measure and verify how well the program meets qualitative and quantitative goals. The specific methods and deliverables for the EM&V portion of the program are included in the next Section. Specific quantitative targets for the EM&V process are as follows.

EM&V Activities	Goal
Calculation Review	All participant sites
On-site verifications	Minimum of 5 sites

6.0

Program Evaluation, Measurement and Verification (EM&V)

This section describes our basic approach to the Evaluation, Measurement and Verification process for the IRR Program. This approach is not intended to be a comprehensive EM&V plan. Our intent is to describe a process that we believe fulfills the needs of the EM&V component, while also adding positively to the program overall. The EM&V activities for the IRR will be designed to leverage the extensive data collected and procedures developed to support the commissioning component of the program. Given the nature of the IRR Program, which involves a relatively small number of sites with large savings, the focus of the EM&V activities will be on measurement and verification.

Approach to Measuring and Verifying Energy and Peak Demand Savings

EM&V of energy and demand savings for the IRR Program will be conducted by combining rigorous project development and commissioning components with an independent third party review and adjustment of program estimated savings. The anticipated IPMVP option for this program will be Option B, direct measurement of savings. Since the program participants will all be large and the savings calculations specific to that site and project, we believe that the M&V should be handled similar to an evaluation of a large customized incentive or SPC program. The three major components of the M&V for the program will be 1) Review of savings calculations; 2) Review of commissioning reports; and 3) Verification of a sample of program participants.

Review of Savings Calculations

The first technical task associated with determining energy and demand savings will be a review of the savings calculations by the EM&V contractor. Similar to a large customized incentive program evaluation, the EM&V contractor will be tasked with conducting an independent review of the savings calculations submitted to support program accomplishments. This activity will be conducted as a census, where each project will be reviewed for accuracy and reasonableness. In addition, the contractor will identify key parameters for monitoring that will assist in determining if projects are meeting the performance goals of the savings calculations.

Through these analyses, any discrepancies or questionable assumptions will be identified and noted, with the intent of resolving these issues with the review of the commissioning report. The list of key parameters for measurement will be compared to the data collected through the commissioning process to determine the degree of overlap. This process will reduce the data collection requirements of the EM&V process.

Review of Commissioning Data and Report

The objective of the commissioning process is to verify that the projects installed under the program are achieving energy savings as specified in the savings calculations. We believe that the selected EM&V contractor will be able to conduct a more robust study of the program by leveraging the data and analyses conducted in support of commissioning. This process will be carried out as follows.

Given a clear understanding of the projects from a review of the savings calculations, the EM&V contractor will approach the commissioning reports with a good idea of what information will be required to verify the savings estimates. These data requirements will be compared to the data collected under the commissioning task and any additional data collection needs will be developed and documented.

In a similar fashion, the calculations and verification completed under the commissioning task will be compared to the requirements of the EM&V contractor. The contractor will then be in a position to develop a data collection strategy that effectively utilizes all existing data and defines any additional needs at a minimum cost.

The result of the commissioning review will be an update of the verification conducted at the savings calculation level, but adjusted for the data and analysis conducted under the commissioning task. Lastly, the findings will include an assessment of the need for any on-site verification, potentially including limited metering.

On-Site Verification

Following the review of the commissioning reports and data, the contractor will set up brief on-site verification visits with program participants. The goal of the on-site visit will be to collect any additional data required to complete the independent assessment of energy savings for the project. The on-site visit will include verifying that the equipment specified in the savings calculations and commissioning report is installed and operating as documented. In some cases, the EM&V contractor may request additional operating data from the program participant or install short term monitoring equipment to finalize the EM&V report for that site.

Site Specific Reporting

The last step in the verification of savings will be the generation of a site specific report that documents how EM&V was conducted for each site, and includes a discussion of how the verified savings compare to the savings in both the initial savings calculations and commissioning report.

Potential EM&V Contractors

We propose two firms for consideration as the potential EM&V contractor for the IRR Program, 1) Xenergy & 2) Cogent Energy. An EM&V contractor will be hired in the first 60 days of program delivery to finalize the EM&V plan. Most EM&V activities and final report are due first quarter of 2006.

EM&V Activities

Program EM&V will occur throughout the course of the program, and culminate with the delivery of a final report documenting program achievements. The following activities are proposed to meet the EM&V goals of the IRR Program. A timeline for these activities is presented in Section 2.G – Work Plan.

- Select EM&V Contractor
- Develop EM&V Plan
- Review Savings Calculations as Completed
- Review Commissioning Data and Calculations as Completed
- Provide Feedback to Implementer
- Prepare and Submit Draft EM&V Report
- Prepare and Submit Final EM&V Report

Program Participation and Baseline Information

Program participation and measure data will be tracked in a summary database that operates under Microsoft Access. Information in the database will include basic contact information, utility account numbers, measure descriptions and savings estimates, both initial and commissioned.

The proposed measures are not included in the DEER database. For this reason the baseline information and development of savings estimates will need to be clearly documented in the initial savings calculations.

The baseline for refrigeration measures is defined by two criteria: Industry Standards and Title 24. For most measures the baseline for incentives under the IRR Program will be defined as industry standard practice. For some of the smaller well defined measures, Title 24 may define the baseline efficiency or operation of particular equipment.

7.0 Qualifications

This section presents the Program Team's qualifications to effectively execute the Industrial Refrigeration Retrofit Program. Both kW Engineering and Cascade Energy Engineering have extensive experience with the development and operation of energy efficiency programs, and have completed numerous projects with the proposed refrigeration technologies. The section begins with an overview of the projects and programs that our team has been involved with, followed by resumes for key management individuals. Please note that we have only included resumes for the lead program management positions as discussed in the proposal submission instructions. Complete resumes for all staff members are available upon request.

Although kW Engineering and Cascade Energy Engineering will formally be operating in Prime/Subcontractor relationship, our firms are really more of a partnership. Both firms are technically oriented and have a high degree of professional certification among our staff. Our combined resources include 16 professionals with nine licensed engineers. Both firms specialize in energy efficiency with a strong focus on refrigeration. The following pages provide an introduction to both companies. The two have joined forces in this proposal, combining expertise and resources, to develop and implement the Industrial Refrigeration Retrofit program.

Company Qualifications: kW Engineering

kW Engineering staff have extensive experience conducting energy efficiency projects in California. We have been hired by utilities to assist with energy efficiency program design and operation, as well as participated in major evaluation efforts. Recently we have had the opportunity to run the Trade Ally Outreach and Technical Support (TAOTS) Program funded under the Third Party Proposal Program. TAOTS successfully assisted customers in the small and hard to reach customer segments participate in the 2000, 2001 and 2002 Standard Performance Contract programs. More recently, we served as the technical lead for the Energy Efficiency Design Assistance programs, under the Oakland Energy Partnership.

Following are several brief project descriptions to introduce you to our company and capabilities.

Trade Ally Outreach and Technical Support Program

kW Engineering developed and ran the Trade Ally Outreach and Technical Support program, funded under Pacific Gas and Electric company's Third Party Proposal Program. This program provided training and expertise for first-time participants in the statewide Small Business Standard Performance Contract (SBSPC) program. In addition to training, the program marketed potential sponsors, provided an introduction to the SBSPC program and on-going support to participants in the form of telephone, email and FAX consultations. The program generated estimated savings of 2,241,000 kWh, 355 peak kW and 96,000 therms.

City of Oakland Energy Efficiency Design Assistance

kW Engineering provides energy efficiency design assistance to the City of Oakland as part of the City's EEDA program. The program is funded by the CPUC under the Oakland Energy Partnership. This state-funded initiative is designed to help businesses be more

energy efficient by providing free technical assistance to architects, developers, and other design team members. In the first year of the program provided technical assistance to projects totaling over 4.5 million square feet and identified energy savings measures totaling over 4,600 MWh of annual savings. An independent measurement and verification process found that the 2001 program exceeded goals by nearly 50%.

Energy Management Control Upgrades at Five Cold Storage Facilities

kW Engineering performed analysis of EMS installations for five large cold storage facilities totaling 750,000 square feet. Developed spreadsheet models to simulate interactive effects of energy-saving strategies including floating head pressure control, response of compressors to unloading, as-needed defrost control, and improved evaporator fan controls. Each EMS system was to consist of approximately 100 points. Installed cost estimates ranged from \$75,000 to \$150,000 for a total project cost of approximately \$500,000. To date the EMS systems have been installed in two of the facilities with plans to complete the remaining sites.

Technical Administration of Pacific Gas and Electric Company's Non-residential Standard Performance Contract Program

kW Engineering staff were responsible for all technical aspects of administering PG&E's SPC program. This work included site audits of all projects submitted to the program, review and development of engineering estimates of energy savings and review and development of Measurement and Verification Plans. Projects included central plant retrofits, refrigerated warehouse projects, industrial process enhancements and wastewater treatment plants.

Albertsons Grocery Store Technical Assistance

kW Engineering grocery store refrigeration model to estimate energy savings from control retrofits on refrigeration systems. kW Engineering conducted on-site surveys at 32 supermarkets in Oregon and Utah totaling approximately 1.5 Million square feet. Cost effective measures on refrigeration systems, lighting, and HVAC systems totaled over 9.3 million kWh annually. Installation of recommended measures is underway. The projects will qualify for energy efficiency incentives exceeding \$1 Million.

Grocery Store Refrigeration Model for Albertson's & Com-Trol

kW Engineering developed a proprietary model to estimate energy savings from control improvements on energy management system retrofits on grocery store refrigeration systems. The model was used to evaluate the cost effectiveness of controls measures in five different climates across the U.S. The results of the model were used to make changes to the standard prototype design for Albertson's grocery stores.

Dean's Services

kW Engineering conducted a site survey of the Dean's Services refrigerated warehouse facility and developed a savings plan integrating a new control system with the existing refrigeration plant to take advantage of floating head pressure operation. The project then successfully participated in Pacific Gas and Electric Companies Standard Performance Contract program, requiring two years of performance based M&V.

Company Qualifications: Cascade Energy Engineering

Founded in 1993 by three engineers, Cascade Energy Engineering has provided consulting services for over 500 industrial facilities. Cascade has a total of nine engineers on staff including five P.E.'s and has offices in Walla Walla, Washington and Portland, Oregon.

Cascade Energy Engineering has provided high quality refrigeration energy efficiency services to industrial and agricultural customers throughout the western United States. Cascade has in depth experience with all aspects of industrial and agricultural refrigeration system design, operation and commissioning. These services have been provided with and without the assistance of incentives from energy efficiency programs. Cascade will provide the analysis and follow up for industrial and agricultural projects.

Cascade has provided energy efficiency consulting on a multitude of energy-using subsystems encountered in the industrial sector. These subsystems include refrigeration, compressed air, pumping, fans, hydraulics, water treatment, and chilled water. Approximately 2/3 of Cascade’s work focuses on large industrial refrigeration projects.

Cascade has experience in virtually all applications of industrial refrigeration. This includes refrigerated warehouses, food distribution centers, controlled atmosphere fruit storage, meat processors, fruit & vegetable processors, creameries and dairies. Systems range in size from a single compressor to complex multi-stage systems of 5000 hp or more. Savings can exceed 50%, although typical projects realize 20% to 30% savings. A summary of ammonia refrigeration projects completed to-date by Cascade is presented in the following table:

Number of Implemented EEM's	315
Total Energy Savings:	103,197,954 kWh/yr
Total Cost Savings:	\$ 3,813,910 /yr
Total Installation Cost:	\$ 22,038,529
Average Pre-Incentive Payback:	5.8 years
Average Normalized Cost:	\$ 0.214 /kWh
Utility Incentives:	\$ 5,837,484
State Tax Credits:	\$ 2,052,772
Final Customer Cost:	\$ 14,148,273
Post-Incentive Payback:	3.7 years

Most of these projects were completed in geographic areas where energy costs were significantly lower than in the PG&E territories addressed in this proposal.

Following are several brief project descriptions to introduce you two our company and capabilities.

Evaporator Fan VFD Initiative

In 1997, Cascade was awarded a 3-year, \$1.7 million market transformation project through the Northwest Energy Efficiency Alliance. The Alliance is a consortium of utilities, states, non-profits, and industry, which tries to achieve market transformation of energy efficiency products and services. The Evaporator Fan VFD Initiative sought to improve market penetration of variable frequency drives (VFDs) on evaporator fans in refrigerated warehouses and fruit storage. This project involved recruiting facilities that were skeptical of this technology and getting them to try the evaporator fan VFDs on a very controlled test basis before committing to full scale installations. The intent of the program was to demonstrate both the energy efficiency performance and non-energy benefits (primarily fruit

quality improvement). The program was conducted in a three state region (Oregon, Washington, Idaho).

The project was extremely successful, leading to widespread acceptance and implementation of VFDs (penetration rates in the Northwest increased from less than 10% to over 40% in the five years from the start of this program. The project came in under budget and was later extended to include potato storage sheds, again with excellent results.

As a reference for this program, contact Andy Ekman of NEEA at 503-827-8416 Ext. 223.

Energy Trust of Oregon

As of March, 2002, all energy efficiency programs for Oregon utilities Portland General Electric and Pacific Power were handed over to the Legislature-created Energy Trust of Oregon (ETO). The ETO now offers the "Production Efficiency" program to industrial customers. In July, 2003, Cascade was selected as one of four state-wide Program Delivery Contractors (PDC's) to market and facilitate industrial energy efficiency projects.

Pacificorp Energy FinAnswer Program

Cascade has been the leading provider of industrial energy efficiency consulting services to Pacificorp, which has distributed territories throughout Oregon, central and eastern Washington, and Utah. Cascade has provided nearly all the industrial refrigeration consulting for this program. Industrial refrigeration projects and customers have accounted for a disproportionate share of overall program energy savings. All types of industrial refrigeration customers have been very active in the program and have willingly adopted energy efficient equipment and controls. Energy FinAnswer has been recognized by both peer utilities and participating facilities as a highly successful DSM program.

Resume for Jim Kelsey, P.E.

Jim Kelsey is a principal of kW Engineering, a firm specializing in energy efficiency in commercial and institutional buildings, and industrial processes. He has over 14 years of experience in the energy-efficiency field and has conducted analyses for hundreds of projects. His work history includes field surveys of energy use, identification and evaluation of energy-saving projects, and preparation of cost analyses. He has extensive experience conducting computer simulations of commercial buildings using DOE-2 and other models. He has also developed commercial software for use in the electric utility industry including internet-based applications and several models to assess energy use in large refrigeration plants and grocery stores.

EDUCATION

M.S. in Mechanical Engineering, 1995, University of Wisconsin – Madison, Solar Energy Laboratory. Concurrent degree in Energy Analysis and Policy from the Institute for Environmental Studies, University of Wisconsin at Madison.

B.A. in Applied Physics, 1986, Rice University. Graduated Magna Cum Laude.

PROJECT EXPERIENCE

Energy Audits

- Conducted study to optimize chiller plant performance for the Ordway, a 515,000 square foot office building in downtown Oakland. Performed in-depth measurement including chilled water temperatures, condenser water temperatures, chiller true power, flow and other spot measurements. Paired detailed data with trends from the site energy management system to project an annual load profile for the building. Provided the client with projected installation and operating costs for several chiller plant configurations including a new VFD chiller and a driveline retrofit. Cost-effective savings will exceed 400,000 kWh at the site.
- Project manager for audits of 42 Albertson's grocery stores in Oregon, Washington and Utah. Developed refrigeration model to evaluate savings opportunities through better refrigeration system controls. Cost effective EEMs on refrigeration systems, lighting, and HVAC systems totaled over 9.3 million kWh. The projects will qualify for energy efficiency incentives exceeding \$1 Million.
- Managed investment-grade energy audits of common area HVAC equipment in twelve malls as a subcontractor to a nation-wide ESCO. Over 40 million kWh of annual energy savings were identified through cost effective measures.
- Conducted scoping studies for four Safeway stores under PG&E's CustomNet program. Identified low- and no-cost measures, and energy efficiency upgrades eligible for PG&E's incentive programs.
- Project co-manager of PG&E's 1996 Commercial End Use Survey (CEUS), in which over 1,000 commercial businesses in northern California were surveyed. Supervised fieldwork, managed the site tracking database, and conducted 135 site surveys.

Resume for Jim Kelsey, P.E. (cont.)*Design Assistance*

- Managed the technical support effort for the City of Oakland's Energy Efficiency Design Assistance program. Used DOE-2 and other methods to evaluate energy impacts of design choices in new buildings and retrofit projects. To date have provided technical assistance to projects totaling over 1.7 million square feet. Estimated savings impacts are over 3,000,000 kWh annually.

Simulation Experience

- Developed DOE-2 models to simulate over 40 buildings on a variety of projects. Sites have included college campuses, office buildings, government service buildings, public schools, retail stores and others.
- Developed proprietary models to simulate energy use in grocery and warehouse refrigeration systems. Models included interactive effectiveness among components and controls and performance variation with load.

Simulation & Software Development

- Developed commercial software that allows users to calculate psychrometric properties in Microsoft Excel. The software also allows users to plot data on a psychrometric chart in Excel at any given altitude.
- Developed a comprehensive database of existing lighting technologies and applications for lighting retrofit software. Used this software and a laptop computer to generate lighting retrofit proposals and customized rebates on location at over 50 sites for PG&E.

Other Projects

- Prepared application that resulted in a \$2 Million grant from the California Energy Commission to fund refrigeration controls upgrades in over 350 Safeway stores in California. Prepared the curtailment savings calculations and entire submittal package for the application.

EMPLOYMENT HISTORY

Principal Engineer, kW Engineering	1998 to Present
Engineer, Newcomb Anderson Associates	1996 to 1998
Research Assistant, Wisconsin Center for Demand-Side Research	1993 to 1995
Energy Consultant, XENERGY Inc.	1990 to 1993
Energy Analyst, MHB Technical Associates	1989 to 1990

REGISTRATIONS, PROFESSIONAL SOCIETIES

- Registered Professional Mechanical Engineer in California, M31254
- Senior member of the Association of Energy Engineers (AEE), President of Bay Area AEE Chapter 2001, Energy Engineer of the Year 2002.
- Member of the American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE)

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 E-Mail: Marcus.Wilcox@CascadeEnergy.com

Marcus H. Wilcox, P.E.

Functional Summary

Mr. Wilcox utilizes a strong educational background and substantial field experience in his career as an industrial energy engineer. From his Master's thesis on ammonia refrigeration to award-winning energy conservation projects, Mr. Wilcox combines a rare combination of theoretical and real-world expertise in analysis, modeling, monitoring, metering, verification and commissioning.

Employment

1993 - Present Cascade Energy Engineering, Inc.

President, Professional Mechanical Engineer

- As president and founding-partner of Cascade, provides professional industrial energy conservation consulting, primarily to electric utilities and industrial customers. Responsibilities include scoping, analysis, reporting, commissioning and verification of energy efficiency projects. Since October, 1993, Cascade has provided services for 300+ projects. Also provides training seminars and presents to professional societies.

1990 - 1993 BRACO Energy Services Portland, OR

Lead Mechanical Engineer

- Lead engineer responsible for industrial energy efficiency projects including analysis of industrial equipment and process loads, equipment metering, evaluation and specification of energy saving technologies, management of equipment installation and energy savings verification testing. Also responsible for commercial/institutional building energy auditing and analysis, engineering design, technical studies and assistance for new construction.

1987 - 1989 Oregon State University EADC Corvallis, OR

Mechanical Engineer/Research Assistant

- Conducted over 70 industrial energy audits that included on-site inspection of equipment and motors, testing and measurement, sub-metering of equipment loads and identification of energy saving technologies. Supervised team of six student interns responsible for analyzing energy efficiency measures and compiling technical assistance reports.

Education

1986 - 1989 Oregon State University Corvallis, OR

M.S. Mechanical Engineering

1982 - 1986 Whitman College Walla Walla, WA

B.S. Physics

Contact Information

Jim Kelsey, of kW Engineering will be the project manager and primary contact for the program. His contact information is listed below:

Jim Kelsey, P.E.
Principal, kW Engineering
360 17th Street, Suite 100
Oakland, CA 94612
510.834.6420
kelsey@kw-engineering.com

Marcus Wilcox, of Cascade Energy Engineering, will be the technical lead in charge of industrial refrigeration sites. His contact information is listed below:

Marcus Wilcox, P.E.
President, Cascade Energy Engineering
6 ½ North 2nd Street, Suite 310
Walla Walla, WA 99362
(509) 529-8040
marcus.wilcox@cascadeenergy.com

8.0 Budget

The proposed IRR Program requires a total program budget of \$2,394,500 over two-years (inclusive of third party MV&E budgets.) Because all Program' activities occur inside the PG&E service territory, all funds should be allocated to the PG&E service territory account. The entire budget should come from the electric PGC funds.

The following table presents the detailed budget by project task and budget heading.

Admin	Cost
Labor - Clerical	\$ 5,474
Labor - Program Design	\$ 3,601
Labor - Program Development	\$ 4,323
Labor - Program Planning	\$ 6,483
Labor - Program/Project Management	\$ 93,638
Subcontractor Labor - Clerical	\$ 2,368
Benefits	\$ 112,263
Travel	\$ 61,500
Overhead	\$ 120,553
Subtotal - Admin	\$ 410,203
Marketing	
Brochures	\$ 5,813
Labor - Customer Outreach	\$ 13,505
Labor - Marketing	\$ 6,501
Subcontractor Labor - Customer Outreach	\$ 8,322
Subcontractor Labor - Marketing	\$ 5,528
Website Development	\$ 5,570
Subtotal - Marketing	\$ 45,239
Direct Implementation	
Scoping Studies	\$ 91,690
Detailed Studies	\$ 242,483
Design Assistance	\$ 39,736
Commissioning	\$ 58,869
Incentives	\$ 1,332,500
Labor - Site Inspections	\$ 14,406
Labor - Rebate Processing	\$ 34,574
Subtotal - Direct Implementation	\$ 1,814,258
EM&V	
EM&V Labor	\$ 47,539
EM&V Overhead	\$ 18,461
Subtotal - EM&V	\$ 66,000
Financing	\$ 58,800
Total Program Budget	\$ 2,394,500

Financing charges are based on a projected schedule of incentive disbursements and a financing charge of 12% per annum.

Note EM&V overhead, benefits, and payroll tax are assumed at typical rates.