

PGE2064 Refinery Energy Efficiency--Nexant

2006 - 2008

1. Projected Budget*	\$5,920,000
2. Projected Net Impacts	
MWh	23,760
MW (Summer Peak)	3
Therms	0
3. Cost Effectiveness*	
TRC	2.09
PAC	3.16

*Does not include PG&E contract administration costs, which are estimated at 5 percent of expected contract value and included at the portfolio level.

4. Descriptors

Market Sector: Refinery
 Classification: Third Party
 Status: New

The refinery industry is currently under-served by the current suite of energy efficiency (EE) programs, due to the industry’s long lead-time to develop and implement energy saving projects in refineries. The Refinery Energy Efficiency Program (REEP) is designed to address the key market barriers by leveraging Nexant’s refining experience from its Petroleum and Chemical division and DSM program implementation experience from its Energy Management division. The Program also fully uses the lengthened duration of the PGC funding cycle to specifically address the long lead-time for refinery projects. Among the identified strategies to address prevalent market barriers are the following:

- Demonstrate availability of proven technologies to potential participants by showcasing case studies and successful projects;
- Identify cost-effective projects, and provide and apply industry-specific experience for selection and design of the EE projects;
- Use of incentives to offset capital investments;
- Provide assistance in project management/coordination (hand-holding).

The Program will also produce at least three case studies upon successful installation of the projects and verification of savings. Case studies help to create and/or increase the awareness of energy efficiency in the refining industry through publication in trade magazines, possible presentation in PG&E’s energy centers, distribution at trade shows, and discussion in direct customer contacts.

The REEP will work closely with the refining customers and refining industry equipment and service suppliers to install energy efficiency measures. The program provides direct incentives and project management assistance for the projects.

5. Statement

The refining industry is one of the largest energy users in PG&E's service area. While the industry is critical for the health and stability of the California economy and has contributed significantly to the Public Goods Charge (PGC) fund, it has been largely under-represented in recent years' energy conservation and demand-side management (DSM) program participation. Market barriers for refineries to participate in DSM include lack of standards and proven reliability for new technologies in petroleum refining, lack of understanding of the refining process from the energy efficiency professionals, lack of capital investment, high up-front costs, short window of opportunity for installations (project can only be installed during scheduled maintenance shutdowns, typically for period of one to three weeks), long lead time for project development and installation, and lack of available on site staff. Previous DSM programs have not adequately addressed the market barriers, particularly the long lead-time to develop and implement energy saving projects in refineries. The last major DSM activities implemented in this market segment were seen in the pre-1998 PowerSaving Partners (PSP) program.

6. Rationale

The REEP is designed to break down the market barriers associated with this under-served market. Experts from Nexant's Petroleum and Chemical division will join the Energy Management team to assist in identifying and developing projects. Other program innovations include the following:

- Innovative technology applications—power recovery turbines (PRTs) and refining process optimization—applicable to a highly specialized industry. Nexant can demonstrate the availability of reliable technologies to the industry by showcasing successful projects.
- Extensive handholding and assistance for project development/design to ensure that windows of opportunities for installation will not be missed. Instead of waiting for potential participants to identify and submit applications to take advantage of passive “standard offer” programs features, this program delivery method is specifically addressing the barriers associated with short-staffing of the refining plants and limited shut-down time, which often lead to missed opportunities—unless proactively managed—for project installations.
- Collaborative marketing efforts to out-of-state corporate decision makers to promote industry-wide awareness and market transformation. Furthermore, development and maintenance of an information library or technical database for success projects and case studies will increase the awareness within the industry.
- Innovative incentive mechanism to address issues of free-ridership while increasing the likelihood of program participation.

7. Outcomes

The primary metric for the success of the REEP is the ability to acquire the energy savings and demand reduction goal. Other program metrics include measuring the success of the marketing strategy, program coordination between the customers, and customer satisfaction. The program metrics are summarized in table below.

Program Metrics	Goal	Strategy
Energy and Demand Savings	Add 3,200 MWH and 381 kW of savings in 2006 Add 9,120 MWH and 1,135 kW of savings in 2007 Add 11,440 MWH and 1,485 kW of savings in 2008	EE project installations
Prospect Customer Contact	Contact all refiners by end of 2006	Industry conferences Workshops and presentation Professional and personal contact
Case Studies	At least one case study per year	Sample of installed projects
Customer Satisfaction	Adequate assistance in project development, financing options, and project installation coordination Timely process of incentive payments Minimize vendor/customer complaints	Extensive hand-holding Timely process of incentive payments
Program Coordination	Timely update to and coordination with PG&E	Quarterly program status reports Coordination with account representative in business development front
Program Budget Monitoring	Quarterly review of program expenditures, marketing effort and results, and rate of resource acquisition	Quarterly program status reports

Please note that the net savings are calculated using the default NTG ratio of 0.8 for “other” nonresidential programs. Nexant has confirmed the existence of project opportunities that were identified in the 1998 to 2000 timeframe, but not installed during program implementation periods from 2000 through 2005, suggesting that the projects have not been—and would not be—installed in the absence of an attractive program offerings. Further, in implementing the

program, Nexant's preliminary assessments will include documentation of refineries' discussions and decision-making processes to validate (or refine) our estimates of the NTG ratio of 1.0.

8. Strategy

Nexant possesses personnel in both refining and DSM program implementation, critical ingredients for a successful energy efficiency program that targets the refining industry. However, such a program idea had not been feasible because California's recent history of one-year and two-year funding cycles made it difficult to address the industry's long project development lead times. With the approved three-year funding cycle, lengthened program implementation period, and increased flexibility in defining resource program guidelines, it is now possible to implement an effective refinery energy efficiency program. Over the implementation period from 2006 through 2008, the Refinery Energy Efficiency Program will:

- Identify project champions for interested refineries. A corporate champion will be established for refineries with multiple plants. A site liaison will be established for each refinery site. The project champions coordinate the identification and implementation of the energy efficiency project with the program administrator and coordinate the installation of the projects on the customer side.
- Identify, evaluate, and develop energy efficiency projects. An extensive list of candidate projects will be developed. Projects with the most savings potential and economic advantage will be selected for further engineering evaluations and coordination of implementation with scheduled maintenance periods to effectively maximize opportunity for comprehensive projects and minimize the potential for lost opportunities.
- Provide direct incentive for implementation of energy efficiency projects. Direct incentive will be provided to buy-down the capital investment to a reasonable payback period. Incentives will be capped at 80 percent of the project cost or enough to bring the simple payback period down to no less than nine months, whichever is less.
- Educate the industry through development of industry-specific case studies and a library of feasible EE projects.
- Assist in project design and assess financing options.

9. Objectives

Specific milestone objectives for the program include the following:

- Production of three case studies targeted for the refining market sector.
- Direct contact established with all identified refiners by end of 2006.
- Two workshop or conference presentations in each of first two program years.
- Customer enrollments for six preliminary assessments per year (see discussion in Section 10 – Program Implementation Task 2)

- Customer agreements for six projects in each of first two years and four projects in third year. (Note that project installation dates may occur months later than customer agreements are signed.)

10. Implementation

Implementation of the REEP consists of two major components, Development and Implementation, which are discussed in the following sections.

Development

Task 1: Program Design

Nexant will work with PG&E to finalize the program policies and procedures including, but not limited to, the following:

- Definitions and terminologies
- Participant and measure eligibility
- Application and payment processes
- Forms and instructions
- Program and project deadlines
- Incentive rates
- Incentive caps and limitations

Nexant will develop a program manual that will include the above-mentioned program rules and policies. Foremost among the considerations in developing program procedures will be simplicity and ease of participation from refinery customers' perspectives. Other key considerations include consistency with PG&E's themes for its target markets, coordination with other PG&E and third-party offerings for which refinery customers might be eligible, and compliance with PG&E and regulatory requirements.

Task 2: Marketing Strategy

A successful energy efficiency program requires a focused and well-executed marketing plan. Nexant will develop a marketing plan based on interviews with industry contacts and Nexant's and, if possible, PG&E's program implementation experiences. Marketing activities feature direct contact with customers' key personnel and will include hosting workshops with representatives from refinery and vendors and service providers to refineries, and presenting case studies in industry conferences, in addition to typical marketing pamphlets and flyers. Please refer to Section 1.R, Marketing Activities, for further details.

Implementation

Task 1: Marketing and Outreach

Nexant will market the program according to the marketing plan, which features outreach to potential participants through workshops and direct marketing to industry professionals known to Nexant's P&C division staff, augmented by contacts collected from trade associations.

Task 2: Preliminary Assessments

Upon establishing successful contact with a prospective participant, Nexant will review the customer's objectives, financial return requirements, and approximate timing of planned capital improvement or maintenance activities that might create windows of opportunity for efficiency improvement projects while production equipment is temporarily idled. Nexant will conduct a preliminary assessment of the project site and list potential measures with preliminary estimates of savings and measure cost estimates for each measure. The list will be reviewed with the customer and screened for most promising measures for further assessment.

Task 3: Project Development

After screening the preliminary measure list, Nexant will perform detailed feasibility studies for the most promising measures. A baseline model will be established and project savings will be estimated based on engineering estimate, spot measurements, and/or monitoring with temporary or permanent loggers and/or utilizing the customer's control system. Working with the site engineers and equipment and service vendors, a final list of measures will be developed with estimated savings and project costs, and estimated implementation timeline. A site-specific implementation plan will be developed with details for each measure such as: 1) measure description; 2) project design/specifications from the selected vendor; 3) estimated project savings and costs; 4) estimated project installation date(s); 5) estimated project completion date; 6) measurement and verification (M&V) plan; and 7) identification of project leaders and roles. The plan will be furnished to customer for review and approval. After the customer has approved the implementation plan, Nexant and the customer will enter into an agreement for project implementation.

Task 4: Project Installation

Nexant will work closely with the customers and vendors to ensure the projects are installed according to the agreed timeline. Off-site project engineering and assembly will be closely monitored and Nexant will facilitate issues that might delay the project installation start date. Nexant will also monitor the progress of the project installation and will work with site project manager and vendor to resolve engineering and installation issues.

Task 5: Post-installation Review and M&V

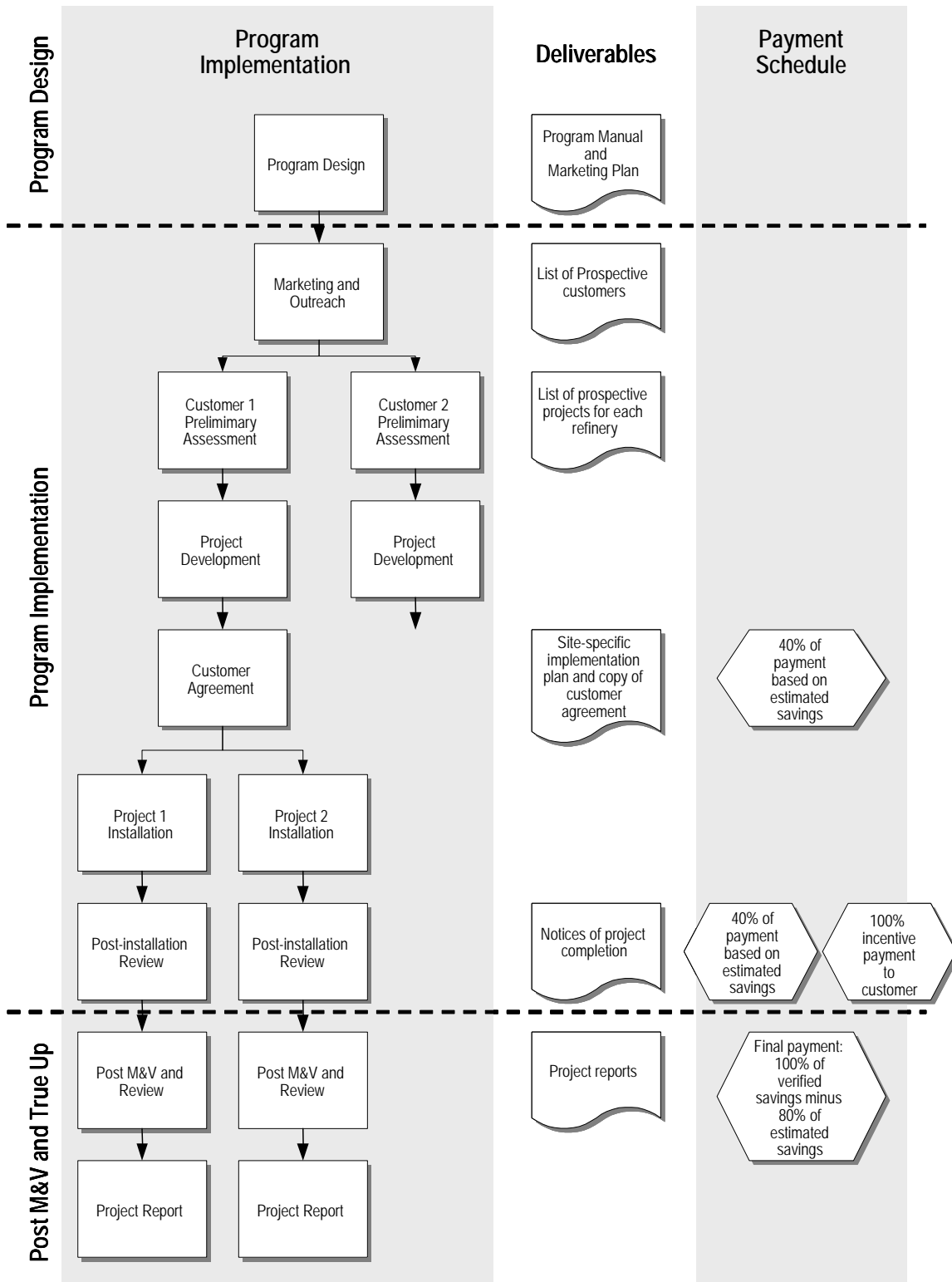
Immediately following completion of project installation, post-installation measurements and/or monitoring will be commenced. Project design intentions will be verified through commissioning processes conducted by the site project manager and vendors. When sufficient post-installation operation data is collected, Nexant will perform energy calculations and finalize the project savings base on engineering calculations, spot measurements, monitoring data, and/or regression analysis.

Task 6: Program Status Reports

Due to long lead times for project development and installation, Nexant proposes quarterly program status reports, in addition to any CPUC-required reporting requirements. The status reports will summarize the program's marketing activities and project status.

Figure 1 provides a graphical representation of the program processes.

Figure 1: Program Process Overview



11. Customer Description

Program participants are petroleum refining facilities in any size. These facilities are expected to be located in transmission-constrained areas of Greater Bay and Kern Areas, as defined by the California Independent System Operator.

12. Customer Interface

Eligibility for the Refinery Energy Efficiency Program is limited to petrochemical refiners. For the most part, Nexant can identify the customers yet would seek to coordinate customer contact activities with PG&E.

Customer enrollment will be a two-stage process. In the first stage, customers enter into the program by requesting a preliminary assessment (described above in Section 1.M.II), which results in identification of prospective projects. In the second stage, Nexant works with Program participants to develop a project implementation plan. The second stage culminates in a customer agreement that identifies estimated savings and a project installation schedule, and verifies the customer's intent to install energy savings measures that are identified in the plan.

13. Energy Measures and Activities

13.1 Prescriptive measures. Included in the cost-effectiveness calculator.

13.2 kWh Level Data. Included in the cost-effectiveness calculator.

13.3 Non-energy Activities

In addition to energy and demand saving goals, non-energy activities of REEP include development of an information library and at least three case studies of successful EE projects. These activities are intended to educate and raise the industry awareness for future outreach activities. Nexant expects to present case studies to industry trade shows, conferences, and/or training centers (such as the Pacific Energy Center). Quantitative indicators are identified above in Section 7.

Non-energy activities also include project savings verification and incentive payments to customers. To manage project submittals, reviews, customer correspondence, and incentive payments, Nexant will utilize its TRAKSMART™ application (with appropriate customization to the REEP).

13.4 Subcontractor Activities

No subcontractor has been selected, nor is any subcontractor anticipated.

13.5 Quality Assurance and Evaluation Activities

For each technical activity (e.g., preliminary assessments, project application reviews, implementation plan, etc.) conducted by Nexant staff members, a more senior technical reviewer will be responsible for a quality assurance (QA) examination of the deliverable work product.

As discussed in Task 3 of Program Implementation, a site M&V Plan will be developed for each measure identified. The site M&V Plan will provide details of the baseline and post-installation measurement and verification activities, including pre- and post-installation inspections, data trending from on-site control system, spot measurements, historical and forecast production data, and short-term monitoring, necessary to quantify the energy savings achieved from the installed measures. The M&V plans will follow the M&V options described in International Performance Measurement and Verification Protocol (IPMVP); in particular the measured approach will be most likely followed based on past refinery energy efficiency project experience. The site M&V Plan will be included in the site-specific Implementation Plan.

13.6 Marketing Activities

Nexant will aggressively market the REEP program to refiners in PG&E's service area, employing a range of strategies that will be designed to identify opportunities and to win participation in the program. Key aspects of the marketing plan are:

1. Prepare Marketing Materials
 - Prepare appropriately focused materials that clearly communicate the objectives, mechanisms and potential benefits of the REEP program to PG&E refiners
 - Where appropriate/possible, prepare preliminary estimates of benefits targeted for specific refineries in PG&E's service area – include in marketing materials
2. Identify decision makers at each PG&E refinery (some refiners may also approach energy management/efficiency at the corporate level, where Nexant's existing contacts with out-of-state corporate stakeholders may be influential in stimulating broader and deeper participation)
 - Attend or review proceedings of conferences focused on energy efficiency improvement in the industrial sector, with a focus on refining operations. Objective will be to identify key refinery participants from PG&E's service area.
 - Contact industry organizations associated with improving refinery efficiency, with the objective of identifying participants from PG&E's service area are. Example organizations include:
 - i. National Petrochemical and Refiners Association's (NPRA) Manufacturing Committee
 - ii. American Petroleum Institute (API)

- iii. American Council for an Energy-Efficient Economy (ACEEE)
 - iv. Annual - Industrial Energy Technology Conference (IETC) in Houston/ New Orleans / San Antonio
 - v. Council of Industrial Boiler Owners (CIBO)
 - vi. US DOE – Office of Industrial Technology (OIT) – with an emphasis on identifying corporate refinery personnel who are working with the US DOE
 - vii. California Energy Commission (CEC) – same approach
- At each refinery make initial contact with corporate staff members who have responsibility for energy efficiency improvement
 - Also make contacts at corporate level, as appropriate
3. Communicate the REEP Program to Refiners
- Hold Workshop for all PG&E refiners to:
 - i. Present the REEP program
 - ii. Answer questions/issues/concerns
 - iii. Hold break-out sessions with each refinery to identify preliminary specific opportunities under REEP
 - Arrange follow-up meetings and preliminary assessment at each interested refinery
 - Publicize by placing articles on the program in trade magazines such as Oil & Gas Journal, Hydrocarbon Processing, etc.
4. Obtain formal agreement to participate in REEP
- Meet with refiners to follow-up on preliminary opportunities identified at Workshop
 - Define (with refinery) preliminary cost/benefits of each opportunity, discuss scheduling requirements and project management needs
 - Obtain formal agreement of refinery to participate in REEP

14. Conclusion

The proposed refinery energy efficiency program (REEP) is designed to address the market barriers and tap into the savings potential from energy-intensive refining processes. The REEP will generate approximately 23,760 MWh of net energy savings and 3,000 kW of net summer peak demand savings, with an estimated program budget of \$5.92M.