Industrial Energy Efficiency Program

1.	**Projected Program Budget**	**$**	**37,360,338**
2.	**Projected Program Impacts**		
	MWh		159,333
	MW (Summer Peak)		30.04
3.	**Program Cost Effectiveness**		
	TRC		2.34
	PAC		3.39

4. Program Descriptors

Market Sector:	Nonresidential
Program Classification:	Local
Program Status:	New

5. Program Statement

The Industrial Energy Efficiency program is structured to reflect the process industry's reluctance to alter elements of a working production system for reasons other than product output or quality. These customers do not think of their business as a series of end-use pieces of equipment, but rather as a process that takes in commodity inputs and turns out finished products. As industrial customers think in terms of processes, so should utilities in order to maximize the industrial process customers' awareness and uptake of inter-related and complementary energy efficiency, demand response, and/or renewable self-generation opportunities. The program is a blend of both innovative and proven tactics.

What's New for 2006-08?

- Innovation
  - New program in 2006
  - Focuses on developing customer commitment to sustain energy efficiency in Industrial segment
- Integration
  - Combining elements of SPC, Express Efficiency and Audits
  - Focus on end-use technology and industrial process improvements to yield optimum energy savings

This approach does not replace other energy efficiency programs that focus on key end-uses such as motors and VSDs. The SPC and Express Efficiency programs will offer

The Industrial Energy Efficiency program is not about new measures. It is about looking for energy efficiency potential in a systemic, holistic way, integrating resources to overcome customer barriers to action and capturing energy efficiency opportunities…

both deemed and calculated/custom incentive offerings to industrial customers, portions of which will also be part of the tool kit that this Industrial Energy Efficiency program will offer as part of a more integrated review of energy efficiency options.

The Industrial Energy Efficiency program is not about new measures. It is about looking for energy efficiency potential in a systemic, holistic way, integrating resources to overcome customer barriers to action and capturing energy efficiency opportunities:

- Across an industrial process customers' operational and business objectives;
- Across energy-related program categories (energy efficiency, demand response, renewable distributed generation, etc.);
- Across marketing and delivery channels (SCE customer representatives and their network; third-party providers with geographic, industry-specific, or other avenues through which to gain entry to industrial process customers; trade associations; upstream process equipment supply chains, including respected sales representatives who can leverage the holistic approach being pursued by the project; registries of environmentally sensitive customers who would be likely more attuned to energy efficiency goals; etc.);
- Across enabling partners (financial institutions, trade associations, service providers, etc.); and
- Across value propositions from the customers' perspective (energy, water, materials management, recyclables, corporate citizenry, etc.).

6. Program Rationale

In addition to the barriers that limit adoption rates of energy efficiency measures across all customer groups, there are additional barriers that affect the decisions of process industries' management. This program is designed to mitigate those barriers through a systems approach to identifying potential and by means of presenting those opportunities within a comprehensive business context.

Recent evaluations of the California SPC (Standard Performance Contract) programs provide significant insight into the key barriers associated with installing energy efficiency measures within industrial process facilities. The key barriers identified include[1]:

1. Costs associated with increasing energy efficiency;
2. Uncertainty over project savings;
3. Time commitment required to get informed about energy-efficiency opportunities and projects;
4. Time and cost associated with selecting implementation contractors for projects; and
5. Uncertainty about the savings information provided by energy-efficiency firms.

[1] "Large Customer Needs and Wants Study – Executive Summary" Quantum Consulting Inc. Berkeley, California. January 2001.

Most energy efficiency programs are designed around direct (investment) costs and are aimed at reducing simple payback (SPB), or increasing return on investment (ROI) for projects that may be just above a company's threshold for investment. Given that time a) has economic value, b) is required to become informed about efficiency options, c) is linked to the cost associated with bringing in "experts," and d) is spent managing the uncertainty associated with efficiency claims and information. Therefore, energy efficiency programs for industrial customers need to incorporate elements to reduce the cost and time commitment associated with energy efficiency decisions.

7. Program Outcomes

The primary focus of the program will be to offer integrated industry and process-specific customer assistance in implementing projects from inception to completion, overcoming barriers at every phase and nurturing the customer relationship such that future savings opportunities occur within each facility on an ongoing, sustainable basis. This will be structured around the role of a Project Champion, whose job it will be to bring their industrial expertise overlaid with energy and related attributes to the table in order to maximize the industrial process customers' value derived from participation. SCE or a third party contractor will provide program implementation information and training to the customer champion. The champion will be equipped with knowledge and support tools to undertake analysis of opportunities and communicate the value of actions throughout the customer's company.

For example, audits would be undertaken to identify opportunities not just at the equipment level (one-for-one replacement), but also at the system and process level. The challenge will be obtaining a higher level of commitment from the participant if systematic process changes are proposed.

Beyond these more quantifiable goals, it is expected that financial strategies and vendor supply mechanisms will continue to be valued inputs for customers and that unique opportunities that are implemented will become less unique and more widely accepted. SCE foresees that the complementary and coordinated delivery channel approach will gain its footing and continue to provide ongoing impetus to pursue energy efficiency opportunities in the industrial process sector, as well as beyond. The desired long-term effect is a subtle but persistent market transformation and business culture shift that will place a greater emphasis on energy cost reductions by looking at systems rather than components, and customers rather than "program participants."

8. Program Strategy

The overall program strategy is to increase industrial customer participation in the full menu of existing and proposed energy efficiency programs by reducing market barriers through coordinated multi-channel program delivery mechanisms for traditional and non-traditional incentive structures. This will be accomplished by focusing on the customers' business needs, while continuing to zero in on the energy component of the business model.

The program strategy is based on integration:

- Across industrial customers' systems and overall business model – from a business model perspective, energy consumption and demand impacts (as well as benefits) can be optimized through consideration of a complementary suite of program offerings that include; O&M operational improvements (Retro-commissioning, Building Operator Certification Training, etc.), corporate energy planning (Industrial Energy MBA consulting, etc.), process system enhancements, etc.);
- Across energy-related program categories – along with the business model enhancements, energy impacts can be derived by looking across energy program categories that historically have been marketed as distinct offerings (energy efficiency, demand response, renewable distributed generation, etc.). From a process customer's perspective, they may well be complementary. The classic anecdotal example involves providing incentives for an enhanced automation energy management system, which delivers kWh savings on a 24/7 basis. It concurrently can increase the customer's discrete capabilities relative to being demand responsive on the few critical days when demand savings are highly valued.
- Across program sponsors – in looking at the industrial customer's integrated needs, the program will identify opportunities that may be best addressed through resources being made available via other program sponsors, such as the Metropolitan Water District of Southern California, Southern California Gas, the California Energy Commission, or other entities. While the emphasis will be on identifying and implementing energy-related energy efficiency projects, our holistic perspective will include keeping our eyes open for additional benefits that may be brought to bear on behalf of the industrial process customers.
- Across marketing and delivery channels – while SCE's customer representatives and their network are an invaluable resource in marketing and delivering such an integrated program, the program strategy calls for building upon their linkages with the industrial customer base through the extensive use of additional stakeholders. These will include: providers with geographic, industry-specific, civic or other avenues through which to gain entry to industrial customers; trade associations; upstream industrial equipment supply chains, including respected sales teams as identified, and registries of environmentally sensitive customers (e.g., Climate Change Registry).
- Across enabling partners – in many cases, industrial improvements require financial resources and technical acumen not readily available to many customers. The program will orchestrate, where necessary and appropriate, bringing those skill sets and resources to bear through financial institutions, trade associations, service providers, etc., though consummating the contractual relationship will remain within the customer's purview.
- Across value propositions from the customers' perspective – here we are referring to offering various traditional and non-traditional incentive mechanisms to better reflect the spectrum of options that are enticing to a given process customer (i.e., financial, equipment leaseback, corporate citizenry accolades, etc.).
- Across the time continuum - pursuing this approach will require consistent, regular, and relatively frequent interactions with the participating customers over

time. The role of the champion will grow over time as that individual is viewed as a regular resource that has the customer's interest in mind across the business model drivers embraced at the site. Recognizing that many of the projects will take time to assess, plan, obtain approval, design, and implement, the delay from original customer contact to project completion may take up to five years. Therefore, installations may occur as far into the future as 2011.

9. Program Objectives

In 2004, SCE's industrial customers collectively used over 13,000 GWh of electricity. Recent studies suggest that "Advanced Efficiency" savings from energy efficiency programs are about 3.4% while "Business-as-Usual" savings are on the order of 0.5% to 2.0%.[5] The Industrial Energy Efficiency program is designed to approach SCE's industrial process customer base in a more holistic and encompassing way. Using two-thirds of the "Advanced Efficiency" potential savings as a program goal is achievable and yields a target of 2.5% to be achieved over the proposed five-year schedule. Table 1 shows the savings resulting from installed projects during 2006-2011.

Table 1: Savings Targets

Year	Number of Projects Installed	Energy Savings Installed GWh	Demand Reductions Instaled MW
2006	3	0.9	0.2
2007	31	9.2	1.7
2008	97	76.4	14.4
2009	127	47.0	8.9
2010	40	24.4	4.6
2011	2	1.3	.2
Total	**300**	**159.3**	**30.0**

The projected savings assumes that each project saves 650 MWh and 130 kW on average. This indicates that large industrial process customers (> 500 kW) must be targeted in order to identify and achieve a composite of at least 100kW of savings per customer. Achieving these program goals while focusing on smaller projects would require significantly more transactional interfaces with customers for each MW harvested, thereby driving up the costs substantially.

As noted in Section 7, the qualitative objectives are to foster a shift in thinking about the importance of demand-side management projects, promote a holistic and integrated approach to industrial energy efficiency initiatives, and encourage market transformation among equipment vendors, service providers, financiers, and other stakeholders in the SCE's service territory.

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[5] Rufo, M., Coito, F. "California's Secret Energy Surplus: The Potential for Energy Efficiency" Xenergy Inc. Oakland, CA. Sept 2002, page 29.

10. Program Implementation

The program will provide a broad spectrum of services including information, training, technical investigations, measure quantification, implementation support, financial incentives, and linkages to existing programs to achieve sustainable energy and demand reductions.

Program Design Details

Marketing Strategy – the marketing strategy will center on coordinating with SCE's customer representatives, third parties active in the market, including product and service vendors, trade associations, Chambers of Commerce, civic organizations, regional government entities, etc. All avenues will be considered and managed in terms of maximizing the awareness and marketing push associated with presenting the program to the targeted customer base.

Incentive Structures – here again, the program will offer the industrial participants access to a variety of incentive structures in order to best meet their needs, interests, business constraints, opportunities, and corporate culture. The incentive structures envisioned include, but are not limited to:

- aligning the participants with more traditional energy efficiency program offerings (and their applicable incentive mechanisms),
- matching up participants with financial entities who have expressed an interest (and understanding) of capital-intensive process system improvement projects,
- educating program participants about the implementation role that could be played by one of the reputable service providers serving the southern California marketplace,

Third Party Roles and Responsibilities – because of the specialized industrial focus of the program, it is clear that knowledgeable and well-connected third party implementers/experts should have a significant role to play in implementing this program. Their roles could include, but are not necessarily limited to:

- Providing program management oversight and interface with customer representatives.
- Utilizing a well-established and trusted network interfacing with industrial customers to market the attributes of the offerings.
- Acting as a Project Champion, or providing a vehicle to identify and contract with Project Champions that reflect the Third Party's area of industry and technical expertise.
- Developing and managing the linkages with the service provider and financial institution communities.
- Developing and providing educational and marketing presentations to industry specific trade associations, geographic chambers or other business related entities, or civic organizations, etc.

Project Champion – once the marketing activities have been successful in securing a customer's interest in participation, the crucial implementation role falls to the Project Champion. This entity, whether a company or an individual, will be a well-respected expert on the participant's particular industry, in terms of its business aspects and drivers, its energy consumption patterns and nuances, its systems and processes, as well as its energy efficiency potential and emerging technologies.

The Project Champion will provide the breadth and depth of consulting expertise for the participating customer, and will be charged with the in-depth assessment of the participant's business norms, energy policies, process systems, and complementary enhancements that could be packaged for the participant's consideration. In most cases, the expectation is that the menu of complementary initiatives will lead to process system efficiency improvements, but equally important, to sustainable demand side management business practices within the participant's organization.

Program Stakeholders

Southern California Edison

SCE's customer representatives and experienced field engineers will be the 'front line' of implementation. Based on their knowledge of customer issues and established relationships, customer representatives are in the best position to communicate program benefits to their customers as well as provide feedback to the program managers. Their primary industrial contacts are expected to be at the corporate and management level, i.e., the financial decision-makers. Specific actions they will need to take include:

- Identifying large industrial users who may benefit from the program.
- Communicating how the program works to those customers.
- Inviting them to marketing and technical training seminars.
- Conducting follow-up activities to encourage participation.
- Listening to their concerns and perceived financial and organizational barriers.
- Remaining involved with participating customers.

Trade Associations

This program will use trade organizations as a source of industry-specific information, a marketing channel, and as a clearinghouse for future success case studies which can then be shared back with the association membership as well as via other venues. Within any industry sector, trade organizations are perceived as having high credibility relative to demand-side management information.

A key component of the outreach for this industrial process program, is focused trade organization presentations. The presentations will be tailored to a specific industrial sector audience and be provided by a recognized industry leader within that sector. These presentations will be provided to trade organizations representing the top industrial process sectors within SCE's service territory that account for nearly 80% of the industrial electric consumption. Targeted trade organizations include the California Oil Producers Electrical Cooperative, California Independent Petroleum Association, Society of Petroleum Engineers, California League of Food Processors, California Manufacturers & Technology Association (CMTA) and others. These trade presentations may be provided at SCE's Customer Technology Application Center (CTAC) and regional locations to increase participation.

Civic/Issue Organizations

Organizations and state agencies that have an interest in energy and air quality issues would make good candidates for alliances and marketing efforts. (Air quality in the public mind is linked to energy even though there are few generation assets within SCE service territory.) Such organizations may include, but not limited to:

- The California Climate Action Registry
- The California Air Resources Board (CARB)
- The South Coast Air Quality Management District (SCAQMD)
- A proposed regional energy forum for industrial customers and involved stakeholder groups (akin to the Silicon Valley Leadership Council, though with a SCE sponsorship)
- Chambers of Commerce
- Civic organizations (i.e., Kiwanis, Rotary, Lions, etc.)

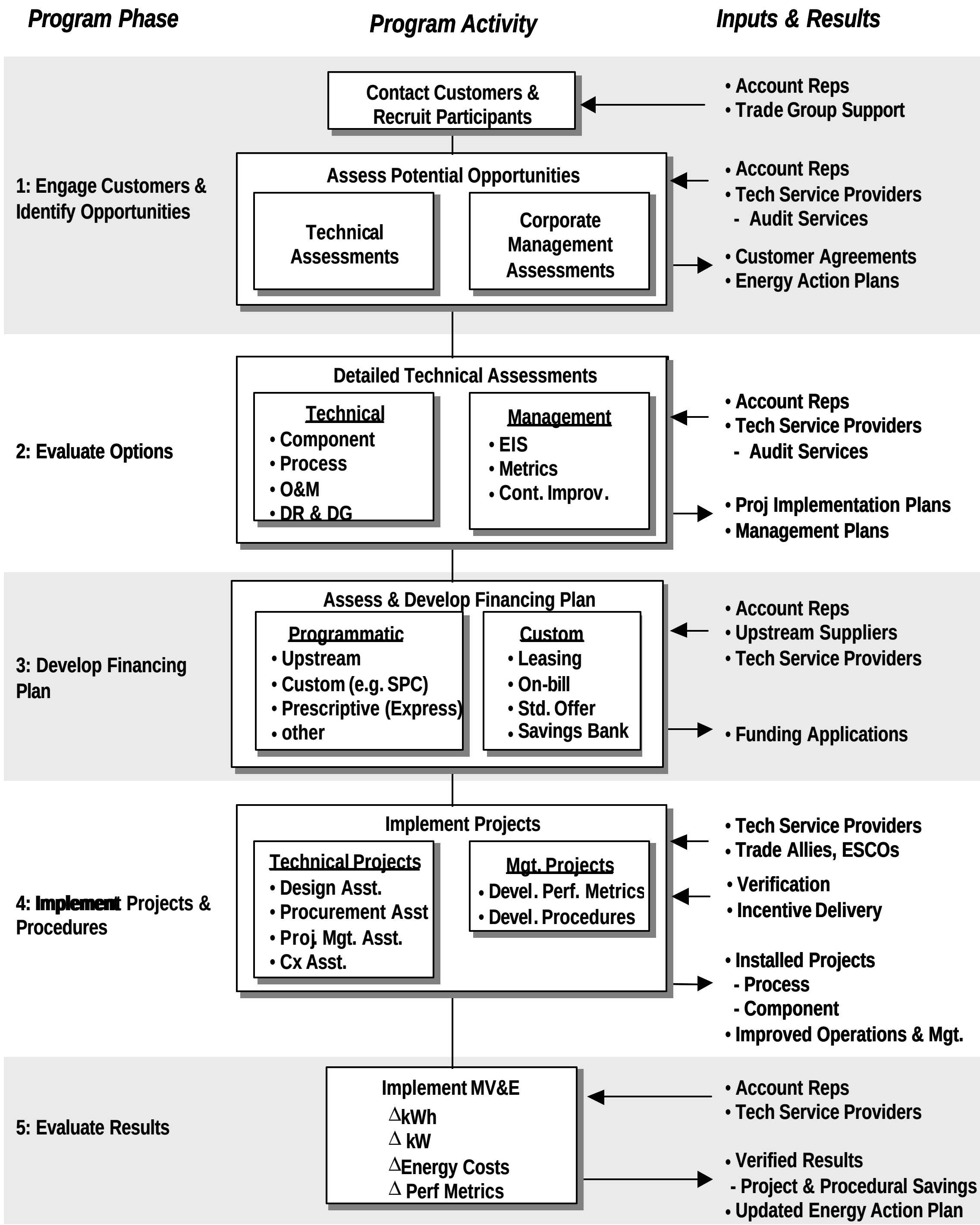
Financial Resources

Some customers may require support in securing financing for projects. Engaging financiers and service providers to underwrite and implement the more technically and financially challenging projects will increase overall penetration and success of the program. The assigned Project Champion/Manager will work with the customer to determine if special financing is required.

Program Process and Linkage Chart

Figure 1 illustrates how SCE envisions the different stakeholders working together to reinforce one another, facilitate industrial customer participation, integrate assessments across both O&M as well as capital-focused initiatives, and ensure project completion.

Figure 1: Integrated Industrial Energy Efficiency Program Implementation Linkages



11. Customer Description

Although this program is open to all industrial customers, SCE is targeting those with SIC classifications from 13 to 39, as well as water/wastewater customers. Emphasis will be on process-related operations that show demand-side management opportunities related to process improvement or reconfiguration. Initial marketing efforts will be directed at larger customers in the most energy-intensive sectors. Electricity use for 2004 among SCE's industrial customers was ranked according to use in order to identify opportunities for the greatest savings.

Figure 2: Electricity Use by Industrial Sector

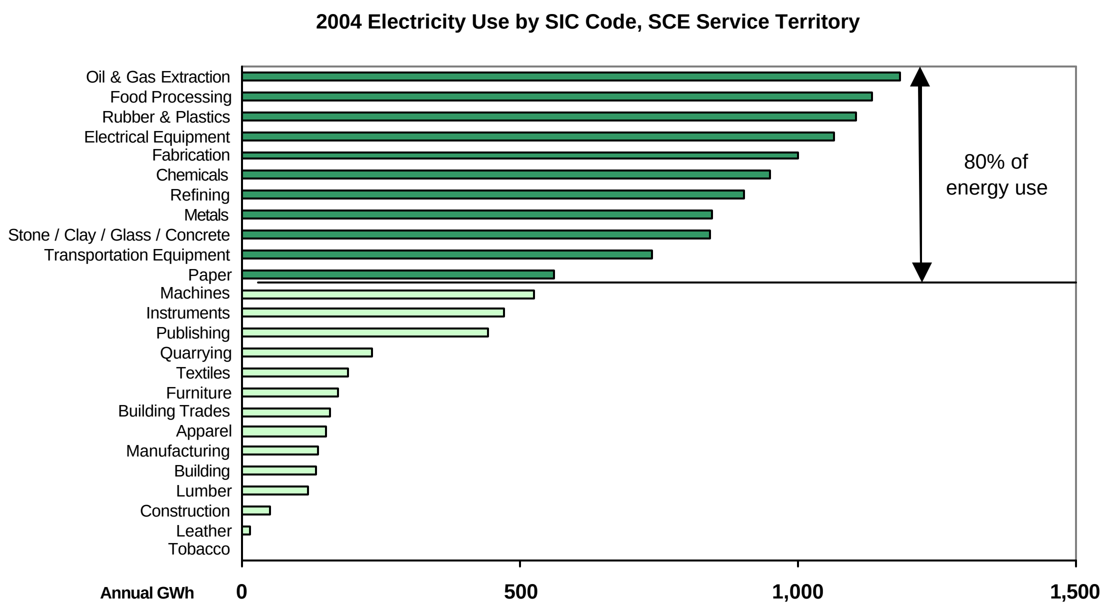


Figure 2 shows that eleven industries account for 80% of SCE's industrial customer electrical use with the top three being oil & gas extraction, food processing, as well as rubber & plastics. Table 2 lists the annual electricity use by two-digit SIC code along with the number of accounts and the fraction of use that goes to the three major end-use categories. Over two-thirds of industrial electrical use goes to non-HVAC motor systems, (e.g. non-thermal process loads).

Table 2: 2004 Industrial Electricity Use by Sector (sorted by use)

Industry	SIC	2004 GWh	# of Accounts	MWh / Acct	% Lighting	% HVAC	% Motors

Industry	SIC	2004 GWh	# of Accounts	MWh / Acct	% Lighting	% HVAC	% Motors
Oil & Gas Extraction	13	1,184	1,066	1,110			**90%***
Food Processing	20	1,132	1,716	660	13%	11%	**76%**
Rubber & Plastics	30	1,106	1,511	732	13%	8%	**79%**
Electrical Equipment	36	1,065	2,089	510	26%	27%	**47%**
Fabrication	34	999	4,337	230	18%	18%	**64%**
Chemicals	28	951	1,463	650	8%	3%	**89%**
Refining	29	902	200	4,512	3%	2%	**95%**
Metals	33	846	686	1,233	14%	9%	**77%**
Stone / Clay / Glass / Concrete	32	841	1,207	697	8%	5%	**87%**
Transportation Equipment	37	739	2,716	272	29%	36%	35%
Paper	26	561	655	857	13%	14%	**73%**
Machines	35	526	5,310	99	26%	15%	59%
Instruments	38	473	1,291	366	35%	16%	49%
Publishing	27	443	3,166	140	17%	30%	53%
Quarrying	14	236	323	729			**90%***
Textiles	22	193	308	627	15%	12%	73%
Furniture	25	173	1,353	128	23%	22%	54%
Building Trades	17	159	7,804	20			
Apparel	23	152	2,335	65	23%	38%	39%
Manufacturing	39	136	1,526	89	25%	33%	42%
Building	15	132	7,732	17			**70%***
Lumber	24	119	901	132	15%	11%	73%
Construction	16	51	722	70			
Leather	31	17	99	173	0%	0%	100%
Tobacco	21	0	1	5			
Total		**13,136**	**50,517**		**14%**	**13%**	**68%**

*Assumed value, not cited in original reference

Energy savings potential by end-use category was derived from a separate study[2] that did not include several industrial categories. As oil and gas extraction is mostly pumping and drilling, motors dominate the electrical use and an allocation of 90% was assumed.

TARGET MARKETS

In order to focus the efforts, several high-consumption, high potential sub-segment markets have been selected for initiating the implementation efforts. We are looking to have a reasonably high rate of success to produce demonstrable case studies that, along with other example-oriented information, will be effective marketing tools when

[2] "Large Customer Needs and Wants Study – Executive Summary" Quantum Consulting Inc. Berkeley, California. January 2001.

approaching the other sectors within the industrial arena. Sectors which will be specifically targeted are discussed below.

Oil and Gas Extraction

The oil/gas extraction industry consists of three subcategories: crude petroleum and natural gas (SIC 131), natural gas liquid (SIC 132), and oil and gas field services (SIC 138). In the SCE territory, crude petroleum extraction is most prevalent and involves extracting heavy petroleum from fairly depleted oil wells. Activities may include exploration; drilling, completing and equipping wells; steam injection; pumping; separation; and storage.

Petroleum extraction is an extremely energy intensive process, which uses about 3,700 GWh of electricity annually within the State of California (about 1.5% of all electricity consumed). Within this industry, oil well pumps are the biggest consumer for electrical energy.

Market Barriers

The industry focuses on increasing the output of the oil fields and rate of return of the investments, while also decreasing the environmental impact and energy consumption associated with the extraction. One of the market barriers for energy efficiency in this industry has been the cutback in activity. Domestic extraction has shown a declining trend since 1986, though is likely to increase with the jump in oil prices of late. Traditionally, the industry has resisted participating in energy efficiency practices because oil producers have first access to the fuels produced, and in some cases can deduct fuel costs as an operating expense. However, as the cost of electricity as well as electrical energy consumption increases due to increasingly depleted wells, energy efficiency is becoming a more important issue. The lack of advanced EE technologies specific to the industry and high demand for crude oil has also diverted financing opportunities to increasing output and "selective" exploration instead of energy efficiency.

Significant Target Industrial Processes

- Well pumps – most of the pumps deployed in the oil fields are beam-type pumps, which are overground drives for submersible pumps in boreholes.
- Steam generation and injection systems consume a fair share of electrical energy and significant non-electrical energy such as natural gas.

Integration Opportunities

Several programs will be explored. They include:

- Well pump controls (pump-off controllers) that can be integrated with demand response programs. This approach should be focused on wells with low extraction rates.
- Additional well pump demand response potential could be garnered when linked to the steam injection system so that blowers and pumps associated with steam injection could be slowed down (say with VFD controls).

- Integration with extraction-enhancing technologies such as use of diluent (lighter oils, diesel or naphtha) and microbes to reduce heavy oil viscosity and increase productivity, directional drilling to increase formation-wellbore exposure and reduce pressure drawdown, and acoustic and/or pressure impulses to increase flow from the formation to the wellbore.
- On-site generation using locally produced methane instead of methane re-injection. On-site generation could either be baseload or demand-responsive depending on what controls are installed and the quantity of methane available.
- Cogeneration with the steam being used in down-hole steam-injection systems.
- Possibly concentrating solar thermal collectors for additional steam production.

Food Processing

The Food Processing category (SIC Code 20) consists of several sub-segment industries, including;

- 201: Meat Products
- 202: Dairy Products
- 203: Canned, Frozen, And Preserved Fruits, Vegetables
- 204: Grain Mill Products
- 205: Bakery Products
- 206: Sugar And Confectionery Products
- 207: Fats And Oils
- 208: Beverages
- 209: Miscellaneous Food Preparations And Kindred

Market Barriers

Several market barriers have been identified in the Food Processing industry. These include:

- Payback considerations – food processors usually run on a fairly tight margin leaving little flexibility for longer term payback opportunities
- Primarily concerned with product quality; low tolerance for risk
- Energy cost as % of gross is small (but energy as % of net is much bigger)
- The industry is built on trust and relationships; these take a long time to build

Significant Target Industrial Processes

- Refrigeration
- Cogeneration
- Steam generation
- Product transport

Integration Opportunities

- There is *strong* potential for a combination of measures; management awareness and energy planning; O&M solutions; energy efficiency upgrades; demand response programs; renewable self-generation.

- In the industry, there are other significant capital investment streams that dictate how to best package an energy efficiency project as a positive offshoot of the larger project
- For food processing, thermal (cool) recovery represents an opportunity to reduce process-cooling loads.
- Integrate the energy program perspective with MWD's water conservation programs, including their Industrial Process Improvement Program [6].

Water/Waste Water

The water/waste water segment includes both water supply and sewage system submarkets.

Market Barriers [7]

- Energy efficiency is a low priority relative to meeting permit requirements. The penalties and management sensitivities to permit compliance make reliability the primary concern, which in turn encourages redundancy and increased energy consumption.
- Water systems are constrained by their need to handle increased flow through the facility to meet peak needs and long term growth.
- Operators in small and medium facilities lack the necessary resources for training and education – which has forced design firms to focus on designing "operator friendly" systems, which increases the energy consumption. Equipment capable of saving energy is in some facilities although is not currently being used.
- Operators noted that they have control and monitoring systems that are shut down due to a lack of the technical expertise necessary to maintain and operate the equipment.
- Many smaller facilities are aging and are capital constrained.
- Operators do not evaluate various treatment options when problems arise. There is a tendency to implement the first potential solution as long as the benefits of treatment outweigh the costs.

Significant Target Industrial Processes

- In water treatment, over 60% of the energy is used for finished water pumping.
- In an activated sludge wastewater treatment plant, ~50% of the energy serves aeration (blowers), the next highest user is the primary clarifier (pumps) at ~10%.

Integration Opportunities

- Water and wastewater treatment plants generally have flexibility within their operation to be demand responsive. In addition, they are good candidates for energy efficiency, time-of-use management, and cogeneration (the latter, specifically, wastewater plants). A compelling, cost effective offering can be developed by integrating these measures into a single project package.
- Integrate the energy program perspective with MWD's water conservation programs, including their Industrial Process Improvement Program [6].
- Integrate program marketing and delivery with technology and/or segment specific educational programs.

- Provide funding for new technology demonstration projects and subsequent case studies.

12. Customer Interface

Very simply, the intent of this program is for SCE and its companion delivery channel partners to go to the customer and be engaged at every step of the process. SCE will sponsor audits, perform economic analyses, identify service providers, arrange financing, and act as an ‘owner’s representative’ along the way. ‘Hassle factor’ is one of the significant barriers that this program is trying to reduce. Specific steps to communicate program benefits to potential participants and to implement projects include the use of:

- Customer Representatives and Field Engineers (sales, education, marketing)
- One-on-one meetings with customer representatives (sales, education, motivation to participate)
- Seminars to industry representatives (getting the word out)
- Engineering support interface (doing walk-through audits)
- Management support interface (conducting organizational diagnostics and energy action planning)
- Industry-specific engineering specialists (doing detailed audits if needed)
- Project owner’s representatives (Project Champion/Manager to be primary interface and support for a particular participant).

13. Energy Measures and Program Activities

Using the same format as seen in Section 11 above (Customer Description), below is a list of likely program measures to be explored in relation to each of the targeted sub-segments of the market.

Oil and Gas Extraction

- Prior northern California experience at two such facilities points to VFDs that were installed on the steam generator blower, saving about 50,000 to 100,000 kWh per steam generator. VFDs can also be programmed for demand response applications.
- Flue gas recirculation (FGR) and inlet modification on steam generators can reduce fuel consumption, and electrical power in pumps and blowers. These measures (and VFD) can also help meeting EPA emission requirements.
- Drag reducing agent (DRA) and diluent can be added into the pipelines (mixed with the crude oil) to reduce pumping energy. A DRA injection project installed in northern California for a main pipeline from Bakersfield to Bay Area saves as much as 3 million kWh annually.
- Well pump modifications. A case study from the Motor Challenge Program indicates 12% energy savings from making electrical and mechanical modifications for beam-type oil well pumps.
- Gas lift for areas with available gas production and high off-take wells.
- Hydraulic pumps for lower off-take wells
- Progressive cavity pumps for oil and sand production

- Electric submersible pumps for high volume, light oil gravity, low gas, and high water cut production.

Food Processing

- Refrigeration systems modifications
  - Floating head pressure
  - Economizers
  - Separate DX and liquid overfeed systems
  - Replace compressors
  - Upsize condensers
  - Replace air cooled condensers with water cooled units
  - Adjust flow rate on evaporator fans
  - Thermosiphon cooling
- Replace industrial fan wheels with more efficient units
- Fast closing doors on conditioned spaces
- Adjust process (for example, optimize blanch time v. temperature)
- Efficient motors
- Heat recovery
- Cogeneration
- Premium motors
- VFDs
  - For fans, product transport and pumps
  - Often in conjunction with process systems changes such as replacing 3-way valves with 2-way valves, etc.
- Lighting
- Compressed air
  - Fix compressed air leaks
  - Reduce pressure
  - Reassess inefficient end uses
  - More efficient staging / controls
  - Replace compressors
  - Better part load control / automation
  - Distribution system optimization
  - Heat recovery
  - Premium motors
- General HVAC RxCx and upgrades (Min OSA, pressurization control, economizers, new AC/chillers, swamp cooling)
- Steam trap programs
- Boiler efficiency improvements
- Water reuse
- Boiler stack economizers
- Gas-turbine cogeneration inlet air cooling
- Envelope upgrades
- Enhanced heat-transfer surfaces for batch processing of product
- Nighttime forklift battery charging

- Biogas digester for product waste streams

Water/Wastewater

- *Water* Treatment measures include:
    - Energy Efficiency
        - Energy efficient motors
        - Variable Speed Drives
        - Pump Testing and efficiency improvement
    - Time-of-use management
        - Reschedule backwash pumps
    - Demand Response
        - Reduce water treatment and pumping during a critical peak event utilizing storage as a buffer
    - Systems Approach
        - Water distribution system modeling
        - Pump systems benchmarking and optimization
- *Wastewater* Treatment measures include:
    - Energy Efficiency
        - VFDs on pumps
        - Energy efficient motors
        - SCADA systems and enhancements
        - Pump Testing and efficiency improvement
        - Aeration system improvements
            - Fine bubble aeration
            - Blower efficiency improvement
            - Dissolved oxygen monitoring and control
        - UV disinfection
        - Lighting retrofits
    - Time-of-use management
        - Reschedule pumping
    - Demand Response
        - Reduce wastewater treatment and pumping during a critical peak event utilizing storage as a buffer
        - Suspend wash down and other uses of #2 water during a critical peak event
    - Cogeneration
        - Use engine drive equipment for large and continuously operating equipment
        - Install a digester and cogeneration system

13.1. Measures Information

This program will not independently develop prescriptive measures. However, it may take advantage of existing prescriptive measures from other SCE programs as part of a project or portfolio of projects.

13.2. Energy Savings and Demand Reduction Level Data

Customer and end use characteristics in the industrial market segment are quite heterogeneous in nature. Accordingly, it is difficult to characterize end use- and measure-specific data. For illustrative purposes only, Table 3 lists estimated impact targets by end use.

Table 3: End-Use Level Impact Estimates

End Use	Annual kWh savings		
	2006	2007	2008
Ind. Motors	0	0	11,861,273
Ind. Adj. Speed Drive	252,000	2,402,000	11,391,741
Ind. Pump System Controls	210,000	2,001,000	6,302,000
Ind. Customized - Process	0	0	22,925,222
Industrial Lighting	252,000	2,402,000	11,391,741
Industrial HVAC	210,000	2,001,000	9,493,645
Institutionalized Maintenance	105,000	1,001,000	4,746,628
Total	1,029,000	9,807,000	81,303,895

13.3. Non-energy Activities

As noted in Section 10, the Program's implementation is centered on providing an integrated perspective on the process customers' energy wants and needs. That being said, integrated audits that look across the various energy efficiency program offerings, as well as complementary options available through other entities (such as the Metropolitan Water District of Southern California) will be the cornerstone for identifying the opportunities to be recommended to the specific industrial customer. In addition, and as noted in Section 10 as well, the program will also increase its visibility and likely uptake, while simultaneously offering energy efficiency services and education, through offering energy efficiency training at SCE's CTAC facility in Irwindale. Other more regional training locales may also be explored.

End Use Load

As this program is built around integration across processes, we will be focusing on processes and systems, rather than restricting our efforts to a given end-use load. This integrated industrial program will look beyond the motors and consider the loads that are being driven. Specifically, process piping reconfiguration, piping diameter & layout (especially for new construction), necessary pumping pressures, and pump (impeller) efficiencies are areas of opportunity to be explored.

Electric motors represent the largest single consumer of industrial process electricity. While focusing on the overall process improvements that can be made, increasing the efficiency of installed motors through replacement, better management practices, and improved motor rewinding methods will continue to be incorporated within the program purview.

During the marketing and outreach phase of program, industrial customers will be encouraged to develop a motor management plan that will identify candidates for replacement with efficient and properly-sized motors, either immediately or upon failure.

A motor management plan will also improve the rewind / replace decision process by giving customers the information and tools they need to make sound economic choices. This will be accomplished by directing interested customers to SCE's Motor Systems Management training classes held at the Customer Technology Application Center (CTAC) in Irwindale. Through the approach that will involve more intensive and repetitive customer interactions, it is expected that more industrial customers will participate in these training sessions and develop motor management plans. Some subset of the attendees will actually implement improvement projects.

In addition, opportunities in mechanical and electrical drive systems will be investigated. Synchronous and cog belts offer slight improvements over V belt drive systems. Variable-speed drives offer significant potential where variable loads are being driven. However, their benefits are highly dependant upon their application and must be evaluated individually.

Market Barriers

- Industrial customers may not have specific motor management plans in place, preferring instead to rewind motors rather than replace them. Rewinding often degrades a motor's performance, compounding the lost opportunity. Through marketing, education, and plan development, customers can identify motors that should be replaced with efficient and properly sized models.

Program Integration Opportunities

- Marketing of this program will involve customer outreach and education. It would be a logical step to use existing training programs such as those offered through SCE's Energy Center.
- Where an audit and evaluation has concluded that the customer would benefit from motor replacement and/or variable speed drives but little or no other opportunity exists, the customer may be directed to the SPC or Express Efficiency program for implementation. However, this program is not intended to be used as a marketing tool for existing programs.
- Where fuel savings opportunities are identified that are linked to electrical savings opportunities, potentially incentives from Southern California Gas may be applied towards a project in an effort to capture all potential savings and maximize the economic benefits to the customer.

Targeted Sector

This program targets the industrial sector with SIC classifications between 13 and 39, with the addition of water/wastewater customers. Initial marketing activities will be targeted at customers >500 kW in order to identify projects with the greatest savings potential.

Activity Description

Significant marketing by SCE's customer representatives and its partnering marketing channels will be needed in order to achieve program goals. Both senior management and facility operators will need to be engaged at this level.

The program will work directly with industrial customers to identify and implement all cost-effective energy efficiency applications. The program will also promote demand response and distributed generation programs to the customer. This will be accomplished by influencing and working with both corporate and facility industrial process system operations staff to secure their commitment to the undertaking, both from a financial as well as technical level. The following steps delineate how the program implementation will flow, thereby facilitating a successful program implementation.

a) Retain an accepted and credible U.S. DOE certified industry professional for each of the targeted industrial process sectors. The selected professional should have instant credibility with customers, be able to address sector specific concerns, talk in terms familiar to the sector, and be willing to find ways to solve production, quality, and other seemingly unrelated issues with top quality and complementary energy efficiency projects.
b) The retained industry specific professional will hold "Town Hall" meetings through various professional channels to explain and demonstrate the benefits of the industrial process energy efficiency program. These meetings will both increase program visibility and participation.
c) Once they have expressed an interest in pursuing the program, industrial process customers will be provided with a project manager who will act as their champion and oversee the process energy efficiency initiative(s) from concept through implementation. The project manager will arrange for the certified industry specialist to visit the site and perform a preliminary walk-through inspection to identify potential areas where savings can be attained.
d) Following the preliminary walk-through inspection, the project manager will discuss the findings with the customer and chart a course for further exploration of energy cost savings measures that meet the customer's interest, financial, and performance criteria. These could run the gamut from management practices through O&M initiatives, to efficiency improvements and/or DR enabling technologies, to renewable self-generation opportunities.
e) The customer will execute a Corporate Letter of Intent to demonstrate commitment to the identified projects and to the process.
f) The industry specialist will then thoroughly study each identified project and others that are found during the investigation phase. A focused report will be prepared by the specialist, detailing the proposed project(s), project costs and project savings, and potential incentives, whether available from SCE or other sources of funding.
g) The focused report will then be delivered to the customer. Subsequently, the Champion will schedule an in-person meeting with the customer, and the industry specialist. Projects will be reviewed and an implementation action plan will be prepared to chart the specific actions associated with each identified and complementary project.
h) For projects scheduled to be implemented, the assigned project manager will be available to assist the customer in preparing the appropriate incentive applications and provide the necessary implementation support to ensure the projects' success.

This may include coordinating measure specifications, contractor walks, bid review, and other activities as warranted.

i) The assigned project manager works with the customer to pursue initiatives selected for implementation.
j) The project manager will perform a post installation inspection to ensure that the project was completed as designed and assess the accuracy of the original savings estimates are valid. The project manager will also ensure that all post-installation requirements and documentation have been provided to the specific incentive program utilized.
k) Project Close-out – The project manager will ensure the incentive checks are delivered and close-out the project.

13.4. Subcontractor Activities

As noted in Sections 8 and 9, there are myriad roles that subcontractors and other third parties will likely play, such as:

- assisting with marketing (in the form of maximizing the linkages to the appropriate facility and decision-making staff at the targeted industrial process plants),
- functioning as, or recruiting Project Champions.
- offering the O&M-focused energy management planning (i.e., Industrial MBA concept) consulting;
- providing the industry expert assessment services;
- participant-specific Project Manager services; and
- process evaluation services as the program is rolled out and evolves.

Clearly the list above should not be viewed as definitive, but rather illustrative of the types of services that may be provided through subcontractor resources.

13.5. Quality Assurance and Evaluation Activities

Integrated project (i.e., one or more energy efficiency initiative per customer site) savings evaluation will be a necessary component of this program, not only for reporting results to SCE and the Commission, but also to learn from and build on program successes. Additionally, energy savings and project benefits will also be evaluated not only from SCE's and the Commission's perspective (energy and demand savings, free ridership), but also from the customer's perspective. Providing energy and cost savings information (as well as ancillary benefits) will help the customer evaluate the integrated project's benefits and promote future implementation and participation.

M&V procedures will be consistent with the CPUC's *Energy Efficiency Policy Manual* v.3 (EE Policy Manual) – and the EM&V Protocols being developed in this proceeding. This will require determining historical baseline energy use as well as the factors that drive energy use, which is primarily expected to be unit production over time.

Integrated Project-level Savings Determination

Each project begins with an integrated audit to identify all possible opportunities and economic benefits. In addition to the standard information captured during an industrial audit (e.g., motor kW and operating hours, monthly site energy use), information on production rates will be obtained in an effort to capture the energy intensity of the process. Given that this program will foster process modifications and changes, simple M&V techniques predicated on small efficiency increases may not be applicable in many cases.

In the post-retrofit period, both energy use and production rates will be measured or obtained. Depending on the project implemented, energy use measurements will take place at the component, system, or facility level depending on the M&V strategy chosen. Baseline and post-retrofit energy use may need to be adjusted to account for variations in production rates in order to accurately and fairly assess energy savings. Where process improvements result in increased production, better quality control, or better quality products, such benefits will be recorded and reported to the extent that they can be quantified.

For purposes of reporting to SCE and the Commission, energy and demand savings as seen at the customer's meter will be determined based on selected measurements and at typical production rates. Every effort will be made to quantify the savings as soon as reasonably possible to avoid delays in processing any financial incentives.

Customer Cost-savings Determination

The energy and demand savings will be translated to cost savings at the current rate schedule and typical production rates. This will allow the customer to see the integrated project's benefit in terms that they can understand and use. In addition, the cost savings per unit of production will also be reported. This metric is extremely useful to the customer to quantify benefits for future projects and for estimating a project's effect on net profits. For high-volume / low-margin businesses (e.g. food processing), small changes in unit cost of production can have large effects on the bottom line.

Program Evaluation Activities

With respect to outside evaluation, this program is predicated on the assumption that these industrial customers are hard-to-reach and would not participate in the breadth of energy efficiency program without the extensive support that will be provided. While it is not SCE's role to evaluate its own programs, enough information on each integrated project will be retained to demonstrate that virtually no participant would be considered a free-rider.

13.5.1 Expected Number/Percent of Inspections

Since the program intent is to work closely with the facility throughout a project's development and implementation, each and every site will be inspected more than once.

13.6. Marketing Activities

As noted in Section 5 (Program Statement), Section 8 (Program Strategy) and Section 10 (Program Implementation), the holistic approach to the Program's value proposition will hinge on our ability to network SCE's marketing resources with those equally respected by the industrial process customer community. These will include: third-party providers with geographic, industry-specific, civic or other avenues through which to gain entry to industrial process customers; trade associations; upstream industrial process equipment supply chains, including respected sales teams as identified, especially in the case of the motors end-use; and registries of environmentally sensitive customers (e.g. Climate Change Registry).

14. Program Changes

SCE has undertaken a Request for Proposals process to recruit implementers for the Industrial Energy Efficiency program. Although the process is still in progress at the time of this filing, it is anticipated that SCE will award one contract for a Program Management Contractor, and up to 5 contracts for sub-contractors to specialize in a specific market segment.