

# Comprehensive Packaged Air Conditioning Systems

<b>1. Projected Program Budget</b>	<b>\$ 59,149,186</b>
<b>2. Projected Program Impacts</b>	
MWh	161,885
MW (Summer Peak)	89.1
<b>3. Program Cost Effectiveness</b>	
TRC	1.04
PAC	2.46

## 4. Program Descriptors

Market Sector: Residential, Nonresidential  
 Program Classification: Local (with statewide coordination)  
 Program Status: Revised Existing

## 5. Program Statement

Residential and commercial air conditioning is responsible for the largest share of peak demand in California, contributing approximately 33% of peak demand.<sup>1</sup> In addition, it is a large overall consumer of energy. Within SCE's territory, commercial air conditioning

### What's New for 2006-2008?

- Innovation -- First integrated market-based program in California coordinating upstream through downstream market barriers in the packaged air conditioning market
- Focus on packaged air conditioning contractor opportunities -- operational improvements in refrigerant charge, air flow, duct seal, and economizer functions
- *California Cool* -- Cooperative promotions to provide SCE targeted packaged air conditioning energy savings
- Program structure that allows for adaptive management

consumes about 5,580 GWh per year and residential systems use 1,800 GWh per year.<sup>2</sup> Estimates suggest that 10 to 20% savings<sup>3</sup> are possible through packaged air conditioning (split systems and packaged units) related energy efficiency activities.

<sup>1</sup> Brown and Koomey, 2002

<sup>2</sup> Kema-Xenergy, "California Statewide Residential Sector Energy Efficiency Potential Study," April 2003, and Kema-Xenergy, "California Commercial Sector Energy Efficiency Potential Study," July 2002. Base information is factored by 0.367 to get SCE portion of savings.

<sup>3</sup> This range includes savings from high efficiency purchases and/or proper installation and maintenance. On the low end, purchases of High Efficiency 14 and 15 SEER units save 5 – 13% compared to 13 SEER. When combined with proper installation and maintenance, savings rise to 20%. The "Summary Report on Packaged Rooftop Unit Problems and Diagnostic Tools: Recommendations for Tools & Protocols." Report to Northwest Energy Efficiency Alliance, prepared by PECEI, 2002, notes that typical small rooftop units

To capture these energy savings, SCE proposes a comprehensive portfolio of packaged air conditioning activities to address opportunities in the upstream, midstream, and downstream markets in a coordinated program that encompasses new construction, replacements, and services in the commercial and residential sectors.

Up to now, packaged air conditioning efficiency programs have focused on encouraging the purchase of high efficiency equipment. However, the purchase of high efficiency equipment only captures a small portion of the potential savings. Research shows that there are significant savings opportunities in installation and operation of packaged air conditioning units.<sup>4</sup> Specifically, there are potential savings in:

*Proper Sizing.* Supporting proper sizing in residential and commercial units can yield savings. Contractors frequently install oversized systems to avoid potential comfort and call back risks.

Research shows that there are significant savings opportunities in installation and operation of packaged air conditioning units.

*Refrigerant Charge and Airflow.* Between half and three-quarters of all packaged air conditioning units suffer from incorrect charge and low airflow. For both new and existing equipment, ensuring the proper refrigerant charge and airflow can increase efficiency.<sup>5</sup>

*Duct Sealing.* Ensuring tight ducts in residential and commercial installations yields 10-18% energy savings.<sup>6</sup> The peak load reduction can be higher, yielding a demand savings of 25%.<sup>7</sup>

*Economizers.* Research shows that the majority of economizers do not function as intended.<sup>8</sup> Use of the Whole Building Diagnostician tool in new and existing buildings in California has confirmed that problems with outside air economizers are endemic.<sup>9</sup> The potential savings from fixing a malfunctioning economizer are approximately 10 – 15%

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waste at least 20% of cooling energy due to low refrigeration efficiency, nonfunctioning economizers, duct leakage, and other control and distribution problems.

<sup>4</sup> CEE Briefing on Improving Infield Performance refers to Nadel, 1999, and PIER 2003

<sup>5</sup> Chris Neme, *National Energy Savings Potential from Addressing HVAC Installation Problems*, prepared for US Environmental Protection Agency, March 1998.

<sup>6</sup> Robert Mowris & Associates, Statewide Residential and Commercial Upstream HVAC Verification Service Provider Program, HVAC PAG Presentation, March 29, 2005

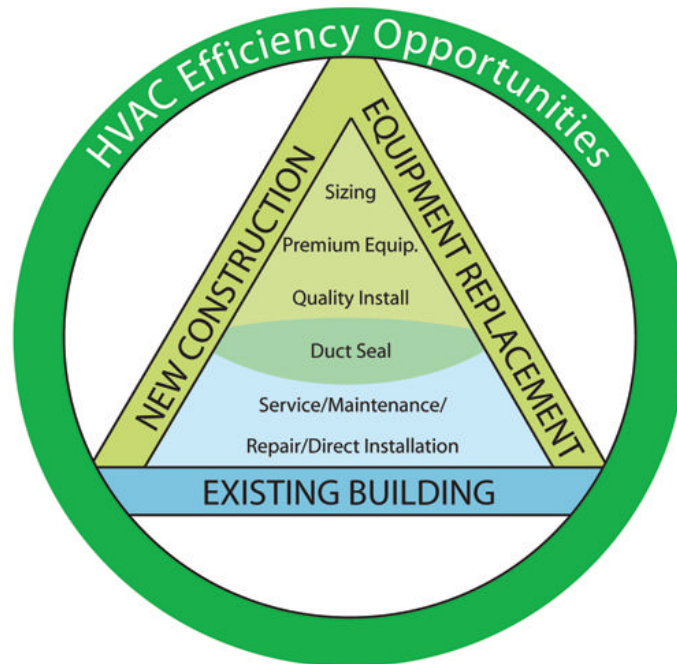
<sup>7</sup> John Proctor, PE, Residential and Small Commercial HVAC Potential, Program Advisory Group, March 29, 2005

<sup>8</sup> Harris, J. et al. 2002. "A Business-Venture Approach to Premium O&M Service for Commercial Packaged HVAC Systems" ACEEE Summer Study 2002

<sup>9</sup> Energy Efficient and Affordable Commercial and Residential Buildings, Final Report. P500-03-096, prepared for the California Energy Commission, PIER by Architectural Energy Associates, October 2003

of total packaged air conditioning load. In addition, enabling damper function is a prerequisite for further savings from demand controlled ventilation.

**Controls.** Appropriate controls which enable variable heating and cooling conditions based on occupancy are also critical. With a comprehensive program to address all of these opportunities, the savings per packaged air conditioning unit easily approach 20 percent.



**Figure 1: Packaged Air Conditioning Efficiency Opportunities**

Figure 1 shows the synthesis of savings opportunities in the context of existing buildings, new construction and equipment replacement. As this figure illustrates, packaged air conditioning efficiency opportunities exist well beyond equipment selection.

- For existing buildings, the primary opportunities are in tuning of refrigerant charge, air flow, duct sealing and economizers as well as in the implementation of minor retrofits primarily involving system controls.
- For equipment replacement, the opportunities are in the selection of premium equipment, better control technologies, the proper sizing and quality installation of the unit and in duct sealing. In addition, the new equipment must work within the existing building operating conditions.
- New construction addresses the same issues as equipment replacement, but adds complexity and opportunity. Design decisions such as those regarding the building envelope, including windows, insulation, and duct design affect cooling and heating load and the resultant packaged air conditioning sizing requirements.

Efficiency opportunities arise at the purchase, installation and service of units. Capturing these opportunities efficiently and cost effectively requires greater integration of these functions as they occur over the system's lifecycle elements, which in more detail

include: design, sizing, selection, installation, operation, service and repair, and eventual replacement.

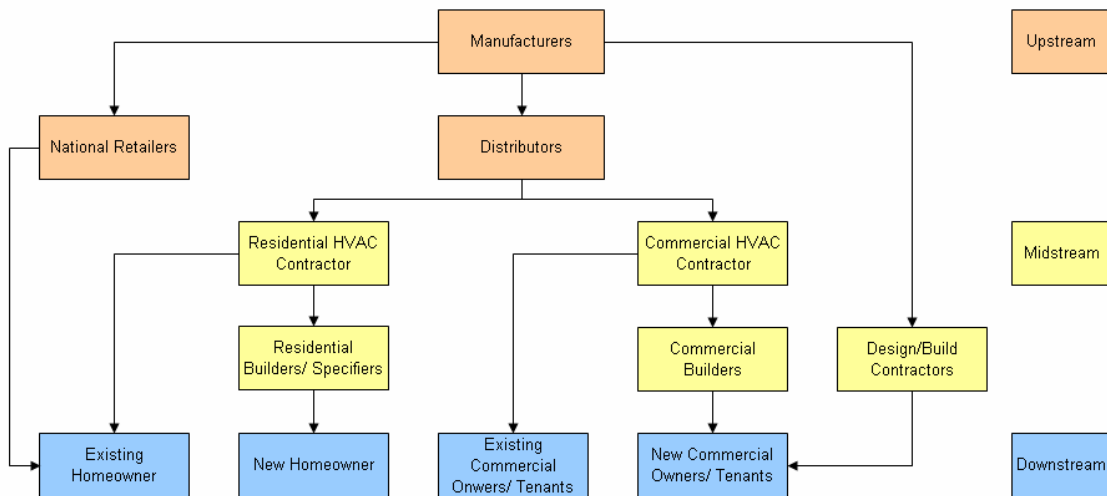
### **5.1.a Public Process Recommendations**

The Comprehensive Packaged Air Conditioning Systems Program (CPACS) significantly addresses recommendations of participants taking part in the public process review of SCE's 2006-08 Energy Efficiency program design and implementation.

- Comprehensive portfolio of packaged air conditioning activities targets upstream, midstream, and downstream markets
- Residential air conditioning units are included in the upstream strategy
- Stocking incentives for premium efficiency products
- Appropriate equipment controls and proper control function
- Linking equipment selection and purchase activities with quality installation practices and maintenance
- Quality installation strategy for residential and commercial air conditioning units that considers proper sizing, refrigerant charge and airflow, TXV, duct sealing, and comfort
- A service platform to include verification of installed equipment and technician-performed services such as refrigerant charge, air flow, and duct sealing
- Technician training on quality services protocols and specifications, certification
- Portfolio of activities that balance short and long term strategies including incorporating emerging technologies
- Awareness, promotion, and marketing with a combination of targeted activities and customer education, facilitating decisions and understanding on comfort, quality installation, and energy savings
- Implementation of major elements will be competitively bid to third parties
- EM&V activities that includes customer surveys.

### **5.2 Market Structure**

Understanding the market structure for packaged air conditioning and existing barriers to the adoption of efficiency provides the context for SCE's strategy for securing the cost effective potential for energy and demand savings. Figure 2, Typical Packaged Air Conditioning Market Channels, shows the basic relationships between manufacturers, distributors, providers and purchasers for the packaged air conditioning market.



**Figure 2. Typical Packaged Air Conditioning Market Channels**

Broadly, the packaged air conditioning market can be divided into three functional segments:

- Upstream market consists of manufacturers and distributors who make decisions regarding which units to develop, produce and stock.
- Midstream market consists of builders and contractors, both commercial and residential, who make purchasing decisions and perform installation.
- Downstream market consists of residential, commercial, and possibly industrial customers who purchase equipment and/or services from the contractors.

The packaged air conditioning market is mature, stable and very price competitive. It is characterized by many participants that often serve specific channels within the functional market segments described above, and these channels function relatively independently from each other. Fragmented markets such as this are slow to respond to issues (like the integration of packaged air conditioning lifecycle elements) that are largely external to current operations. In fact, there is significant inertia - market barriers - tending to keep such issues externalized in order to promote stability and predictability in the market.

### 5.3 Market Barriers

Each market segment has unique specific barriers that prevent realization of the full energy savings potential of packaged air conditioning systems.

#### *Overall*

Over the last year, there has been increasing attention to the full range of energy saving opportunities from purchasing to servicing packaged air conditioning equipment. There is little understanding of the linkages between high efficiency equipment and the efficiency opportunities in installation and ongoing service. Piecemeal programs have resulted in lost opportunities and reduced cost-effectiveness.

### *Upstream Market*

Only 12 to 15% of equipment stocked by distributors is above code.<sup>10</sup> This suggests a need to stimulate demand for premium efficiency products and educate customers about their value. It is also important to ensure that the products are available when requested, particularly for replacements that are driven by failures that require immediate fulfillment.

### *Midstream*

The purchase of high efficiency equipment does not inherently lead to ‘high efficiency system’ installation. Some contractors lack the training and understanding of how to install a system to optimize energy efficiency, while others lack the basic tools for appropriate tuning and calibration. Although Title 24 specifies installation protocols that yield energy savings, interviews with contractors and trade associations suggest that there could be limited<sup>11</sup> compliance.

Furthermore, contractors who service and maintain existing equipment rarely include energy efficiency in their scope of services. Even when contractors understand the value of efficiency tuning, they struggle to convey that message to customers who think, “If the air is cool, the system is working.” The service business is highly competitive and oriented towards the lowest bid, which often excludes the provision of services to maintain maximum system energy efficiency.

### *Downstream*

When customers buy high efficiency packaged air conditioning equipment, they assume that the installed system will perform at peak efficiency. However, equipment performance is affected by the quality of the installation as well as maintenance practices. Most residential and many commercial customers do not purchase ongoing service contracts. For those customers that have service contracts, the scope is usually limited to the minimum maintenance needed to keep the system functional, and optimizing energy efficiency is not considered.

## **6. Program Rationale**

Integration across all aspects of the packaged air conditioning market is necessary to deliver the full potential for efficiency and demand savings in the packaged air conditioning market. Program results and interviews with contractors, distributors, customers, and consultants suggest that both upstream and downstream programs are achieving the desired results. However, midstream activities are mitigating the ultimate energy efficiency benefits of those efforts. Poorly installed equipment and lack of current operating information and servicing options results in efficient equipment significantly underperforming. Consequently, it is important to continue the upstream and downstream efforts and augment them with an aggressive midstream agenda that integrates efforts across all aspects of the delivery channel.

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<sup>10</sup> Anecdotal information from Energy Solutions, third-party implementer of the Upstream program

<sup>11</sup> Between 5 to 10% at the high end.

The CPACS is designed to address all aspects of the market with an approach that utilizes several market channels and reaches across market sectors to increase impact. By systematically working on all aspects, SCE gains leverage in the market and creates synergies that will yield higher cost-effectiveness than a piecemeal program. In addition, this approach will prevent loss of savings potential through “weaknesses” in the delivery system.

**The CPACS is designed to address all aspects of the market with an approach that utilizes several market channels and reaches across market sectors to increase impact.**

Key elements of the comprehensive approach include:

- Linking equipment selection and purchase activities with quality installation practices.
- Integrating new construction design activities with quality installation services.
- Motivating service providers through incentives to deliver enhanced services within existing service contract relationships.
- Delivering targeted packaged air conditioning tune up services to markets that don’t commonly utilize service contracts.
- Developing consistent requirements for installation and service protocols for new and existing equipment in residential and commercial settings
- Providing training, technical assistance and quality assurance assistance to ensure SCE customers receive a consistently high level of packaged air conditioning services from participating program vendors.
- Developing long term relationships with market participants to cooperate on the timing of promotional opportunities and leverage marketing and incentive dollars.
- Incorporating emerging technologies and better controls technologies upon commercial availability.
- Offering promotions that take advantage of seasonal variations in sales and service market cycles.
- Targeting high value market opportunities for extra marketing and outreach based on savings potential, pace of development, climate, etc.

**For each of these elements it is critical that each be connected with and leverages others for maximum effectiveness. For example, new equipment sales need to be linked to quality installation services, which are delivered by a different segment of the market.**

For each of these elements it is critical that each be connected with and leverages others for maximum effectiveness. For example, new equipment sales need to be linked to quality installation services, which are delivered by a different segment of the market. With the CPACS, SCE addresses the interconnected nature of the packaged air conditioning market by providing a single point of contact with the market. SCE will cultivate ongoing long term relationships in order to participate in the market in the most

effective way. SCE will periodically conduct targeted focus groups and interviews with market participants to thoroughly understand their needs and positions in the market and to test promotion concepts. These sessions will also tend to foster stronger relationships within the market.

This crosscutting approach will include integration with other SCE and non SCE energy efficiency and demand response programs, and will develop ongoing working relationships with a variety of market participants including manufacturer/distributors, dealers, builders and service companies.

## **7. Program Outcomes**

The goals for the Comprehensive Packaged Air Conditioning Systems Program are to:

- Deliver cost-effective energy savings and peak demand reduction with an integrated portfolio of activities that balances short and long term strategies.
- Promote selection and proper installation of premium efficiency equipment.
- Increase the proficiency of contractors to deliver high quality, energy efficiency services.
- Increase efficiency in existing packaged air conditioning systems.
- Incorporate emerging technologies.
- Set conditions for long-term change.

## **8. Program Strategy**

The CPACS will be delivered through several coordinated program strategies that address both market barriers and technical opportunities. The program strategies are:

1. An upstream strategy to stimulate sales of premium efficiency packaged air conditioning equipment for the commercial and residential markets.
2. A midstream strategy aimed at contractors for new equipment installation and servicing existing systems. As well, the strategy would establish a new delivery infrastructure for proper selection, installation and maintenance.
3. A downstream strategy based on customer education to create demand for higher efficiency, also early retirement of less efficient units, and cooperative promotions to take advantage of joint marketing opportunities and seasonal selling and service cycles.

These program strategies address critical market barriers that exist in the packaged air conditioning market. The upstream strategy helps facilitate sales of premium efficiency equipment. The midstream contractor strategy ensures that the units are installed properly and existing building servicing captures the opportunities from years of improperly installed and serviced equipment. The downstream strategy continues existing efforts to ensure demand for premium efficiency products and services.

## **8.1 Upstream Packaged Air Conditioning Strategy**

The upstream packaged air conditioning strategy will enroll distributors to stock new high efficiency equipment, create informative material to encourage sales, and provide incentives.

The upstream strategy includes the following modifications to the existing program:

- Baseline for residential and commercial units will reflect the requirements of the 2005 Title 24 and Title 20 codes. Therefore the definition of premium efficiency will be changed to reflect the new higher baseline. Tiered rebates and qualified products will be changed accordingly.
- Residential units will be included in the program to get the incentive dollar leverage that has been demonstrated on the commercial side.
- SCE will work with California utilities and agencies to better integrate EER as well as SEER performance into the evaluation and selection of packaged air conditioning equipment, as EER is often a better measure of installed energy efficiency performance in many locations.

## **8.2 Midstream Strategy**

The midstream contractor market includes residential and commercial packaged air conditioning installation and service contractors. Current program experience shows that 80 percent of contractors specialize in either residential or commercial. Generally, residential contractors focus on installation and repairs, while commercial contractors provide installation and ongoing service and maintenance. The midstream contractor strategy taps into the potential for high quality installation and servicing. These savings can be realized from all new packaged air conditioning units, not just higher efficiency units.

### *Installation*

Current interest in the packaged air conditioning market presents a relatively unique opportunity to eliminate installation barriers to air conditioning efficiency. The Consortium for Energy Efficiency (CEE), ENERGY STAR®, Air Conditioning Contractors of America (ACCA), and the California IOU's are defining what constitutes a quality packaged air conditioning installation. SCE intends to leverage these efforts as much as possible, so that these initiatives may influence the final program design. To facilitate proper installation of equipment, SCE proposes developing a consistent service platform that would include training on proper installation procedures, equipment to implement proper installations, establish verification protocols, and provide incentives where necessary.

### *Service and Retrofit*

The sheer volume of units – 10 times more than the new sales – shows that there is substantial opportunity to capture energy savings from existing units. Most were never installed properly and are highly inefficient. For these units, savings of 1,000 kWh/year may be realized.<sup>12</sup>

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<sup>12</sup> PECEI, measured and estimated savings from small commercial tune-up and retrofit program, 2002-2004.

The service market can be segmented into those units that are regularly serviced and those with no service contract. This straightforward market reality implies a simple two-pronged approach:

*Units with Maintenance Contracts.* Maintenance contracts are more common in the commercial market where it is essential for effective business operations that the units are functioning and that there is a plan for emergencies.

Maintenance contracts typically cover cleaning and changing of filters, tightening electrical connections, checking belts for proper tension, and ensuring general working order. Although these contracts do not cover optimization for energy efficiency, they provide an opportunity for the program to take advantage of the business relationship between customer and contractor.

*Units without Maintenance Contracts.* The majority of packaged air conditioning systems do not have maintenance contracts. While service contracts are becoming more common on the residential side, most residential and many small commercial

units are not regularly serviced. The program will develop a

**The CPACS seeks to significantly raise the bar for the selection of high efficiency equipment and its subsequent installation and service.**

'direct install' approach to reach this market. These services will be offered in a sweep fashion in targeted geographic areas to increase the cost effectiveness of implementation.

#### *Training and Technical Assistance*

The CPACS seeks to significantly raise the bar for the selection of high efficiency equipment and its subsequent installation and service. At this point, many dealers and contractors are not prepared to deliver these services because they lack information and tools. The program will address this through training and developing proper tools. As the curriculum and tools are developed and enter the market, SCE will coordinate their distribution and use with associated technical organizations in the industry. There are many possibilities including working with North American Technician Excellence (NATE), which has been developing an energy efficiency certification. They are interested in leveraging utility efforts and may contribute to the overall understanding of energy efficiency in packaged air conditioning units.

### **8.3 Downstream Strategy**

The downstream (end-user) strategy is focused primarily on customer education and would employ periodic custom offers to reinforce efficient equipment purchase and use. The strategy has two main elements:

- Packaged air conditioning cooperative promotion
- Customer education programs

### *Packaged Air Conditioning Cooperative Promotions -- California Cool<sup>13</sup>*

The CPACS will work with market participants to take advantage of seasonal air conditioning selling and service cycles. SCE expects to use periodic custom offers with key market participants to deliver coordinated marketing and sales promotions throughout the year. These cooperative promotions would combine and leverage program equipment and service incentives, manufacturer rebates and dealer marketing to create attractive promotions at peak times in the market. These cooperative promotions, under the *California Cool* theme, would be used to present a consistent theme to the market. Promotional programs are used to create enough buyer interest that the various elements in the distribution channels see the benefits of participation.

### *Customer Education*

Interviews with distributors, contractors, builders and customers consistently confirm the value of customer education. The program would compile information that describes energy saving opportunities and reinforce program specific messages. The information should convey the benefits in terms that customers understand, including non-energy and community benefits.

## **8.4 Program Management**

SCE's objective is to competitively bid all program goals for each market element (upstream, midstream and downstream).

### Upstream Equipment Goals

1. Ensure production of premium efficiency air conditioning products for the CA market.
2. Ensure stocking and availability of premium efficiency products at the Distributor level.
3. Promote sales of premium efficiency equipment through development of up-selling tools.

### Midstream System Performance Goals

1. Promote service/maintenance Contracts
2. Motivate service providers, through incentives, to deliver enhanced air conditioning system maintenance services within existing service contract relationships.
3. Deliver consistent quality installation protocols for new systems.
4. Develop consistent service protocols for existing systems.
5. Develop consistent requirements for quality installation and service protocols for new and existing equipment in residential and commercial settings
6. Provide training, technical assistance and quality assurance so that SCE customers receive a consistently high level of services from participating program vendors.
7. Develop relationships with market participants to employ cross-promotional opportunities and leverage marketing and incentive dollars.

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<sup>13</sup> These promotional opportunities will use a unique promotional name, *California Cool* is an example.

### Downstream Customer Education Goals

1. Customer Education
2. Offer promotions that take advantage of seasonal variations in sales and service market cycles, including cooperative promotion such as “California Cool.”
3. Target high-value market opportunities for extra marketing and promotion based on savings potential, pace of development, season and climate.

SCE’s bid strategy is based on the generally un-integrated character of the packaged air conditioning systems market. Given the lack of integration, it is reasonable to assume that single sources of expertise, that spans all aspects of the market, do not provide a competitive market for support. Consequently, any comprehensive bid is likely to be from a generalist who, in turn, would hire discrete expertise from each of the three market elements.

### Approach

SCE will distribute a general RFP, including all of the elements described above, and request proposals to take on some or all of the elements identified. SCE will make the decision on which elements and how much should be managed by a single entity based on market responses to the solicitations. Each bid will be evaluated on the technical merits, process merits, experience and price. Based on its analysis and the scope of the bids received, SCE will determine how to best structure management and administrative plans for the program.

In general, the management and administration structure is defined by a continuum. At one end, SCE would award the entire management and implementation of the program to a single bidder. On the other extreme, SCE would retain all management and administrative responsibilities, but contract with delivery channel experts to design and deliver discrete elements of the program. In the middle would be a structure in which SCE retained responsibility to strategic management of the program, but would award the design and implementation of each delivery channel’s strategy to specialized third-party bidders. Nevertheless, even under the condition of SCE retaining all administrative and management responsibility, a significant majority of the program costs would be competitively bid to third parties who would provide both innovative design and implementation services.

### **9. Program Objectives**

The overall goals for the CPACS are:

- Install approximately 440,000 tons of high efficiency residential and commercial equipment (equivalent to approximately 40,000 residential units, 46,153 commercial retrofit units)
- Provide efficiency services to 55,000 residential units.
- Provide efficiency services to 40,000 commercial units.
- Increase the number of trained quality installation and service contractors (train 180 technicians).

- Increase consumer awareness of air conditioning energy efficiency opportunities and build recognition of the *California Cool*<sup>14</sup> identity.
- Coordinate packaged air conditioning energy efficiency activities with other programs and IOUs.

## **10. Program Implementation**

The Comprehensive Packaged Air Conditioning Systems Program will be implemented through multiple coordinated program channels that address market barriers and technical opportunities.

### **10.1 Upstream Implementation**

The upstream program incentives are designed to increase distributor stocking of premium energy efficient equipment and allow distributors to sell the equipment at compelling prices near the price of standard equipment. The program will offer incentives for packaged and split air conditioners and heat pumps, evaporative coolers and economizers.

For 2006-08, SCE proposes to expand the upstream efforts to include incentives on residential equipment. Examples of residential equipment that could be included are:

- Above Title 24 – SEER 14 and above
- Evaporative cooled systems
- Systems that include economizer functions
- Multi-zone systems

This activity will include modifications to the current equipment database to include residential products; enhancements to the electronic rebate applications; design and development of the information database and continuation of existing strategies to leverage resources. SCE will coordinate upstream incentives with other California utilities' upstream programs for statewide consistency.

#### *Recruit distributors*

The program will continue to recruit new distributors to create an environment of competition that creates a cascading effect of incentive impacts. Eligible distributors are businesses that purchase packaged air conditioning equipment directly from the manufacturer and sell it to vendors/contractors or directly to the customer. Participating distributors will be asked to sign a Distributor Participant Agreement and supply adequate customer data to verify the customer site.

#### *Create incentives*

The Program includes incentives to distributors for stocking and selling premium efficiency packaged air conditioning equipment to commercial and residential customers. The equipment must be installed on the premises of a qualifying SCE customer before the incentive will be paid.

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<sup>14</sup> These promotional opportunities will use a unique promotional name, *California Cool* is an example.

### *Develop marketing materials*

Marketing materials will be developed to provide comparison data on premium efficiency packaged air conditioning equipment and the associated quality installation services. These materials will make it easy for distributors to present and explain the benefits of premium efficiency equipment to their customers.

## **10.2 Midstream (Contractor) Implementation**

The midstream market has multiple products and services to address various needs. Appropriate installation of new packaged air conditioning equipment is critical to realizing the potential energy savings. On the service side, significant opportunities exist to go back to the installed base of equipment and find high-gain opportunities. To be cost-effective, these incentives and services will be delivered as a targeted retrofit and service opportunity.

The program will target efficiency services for all packaged air conditioning split and packaged systems. Large custom systems require individualized diagnostics and tune-ups, thus they are not cost-effectively addressed by a standardized efficiency service.

### *Create Incentives*

Efficiency services include tune-ups and retrofits such as:

- Refrigerant charge and air flow testing and adjustment
- Duct sealing
- Economizer function
- Proper control function
- Demand control ventilation

For each item listed above, the incentive may be tiered based on size or complexity of the associated service. The program will support a standard service platform to facilitate consistent results. Most existing program designs include the ability to capture pre and post-activity performance information so that energy savings can be calculated on a per unit basis.

### *Establish installation and service protocols*

The program service platform will combine training and technical support with innovative tools and technology to enable technicians to diagnose problems, troubleshoot system flaws and identify and implement necessary corrections. The program service platform will utilize a comprehensive suite of tools and protocols that dovetail with current market practices to streamline the process of diagnosing and solving packaged air conditioning problems. Standard testing procedures and protocols will ensure consistency in realizing energy savings.

### *Create program materials*

The program will develop supporting materials including rebate application, participation agreement, and licensing agreement.

### *Enroll contractors*

It is essential to program success to have qualified and committed contractors. The program will develop a list of potential contractors, using references, local contractor's association websites, the yellow pages, and, where applicable, any trade allies already participating in SCE programs. The program will screen participants for program viability and enroll qualified contractors and technicians into the training. Experience has shown that involving multiple technicians per service provider facilitates information sharing and results in long-term participation.

### *Develop tools*

Packaged air conditioning units are complex systems with many variables that affect the efficiency of their operation. Specialized tools are often required to address each major component of the packaged air conditioning system:

- Refrigerant cycle
- Evaporator air flow
- Economizer efficiency
- Duct sealing
- Thermostat optimization

The program will provide incentives to qualified providers to purchase any specialized tools necessary to perform program services

### *Implement technician training*

Program success depends on well-trained technicians who use the protocols to provide quality services. Training issues that must be addressed include understanding and working with the manufacturers' equipment application and installation protocols and issues related to system warranties. The training curriculum will include basic principles of packaged air conditioning and energy efficiency implementation protocols, and details about the latest equipment. The training may build on other efforts such as basic curriculum developed by NATE. Training will include both in-house and hands-on field application. Follow-ups by program personnel will be used to establish program certification.

### *Provide follow-up technical support*

The program will provide on-site post-training follow up support to make sure that the contractors and technicians are comfortable and capable of implementing the program. The program will provide on-call technical support during typical hours of contractor operations to help technicians work through problems and answer questions while they are in the field. This technical support function will also ensure quality control, prepare the technical analyses, and provide feedback and communication to the technicians. This will be an ongoing program role.

### *Analyze savings and ensure quality control*

The program will analyze data from the jobs in the field to analyze energy savings and verify that the technician has performed the services accurately. Experience shows that the quality of the data is a good indicator of whether the protocols are being implemented

well. Incentives will only be processed if the information shows that the services have been completed appropriately.

### **10.2.1 Quality Installation Services**

Successful installation involves incorporating energy efficiency as part of each step in the traditional installation process. This service must address existing barriers including tools, training, and compensation (time).

#### *Recruit installation contractor*

The availability of upstream and midstream incentives and services will be coordinated so that premium efficiency units are installed properly. The coordination effort will be targeted at equipment that qualifies for a program incentive. In addition, the program will encourage quality installation of code level equipment also, with possibly a smaller incentive.

#### *Develop installation marketing materials*

Marketing materials will be developed and used by builders and contractors to document and explain the benefits of quality installation. Particularly in residential installations, proper installation offers significant value in reduced costs and extended equipment life, since these installations generally are not serviced on a regular basis.

### **10.2.2 Servicing and Retrofit Opportunities**

The service market can be segmented into those units that are regularly serviced and those where there is no service contract. The market dynamics, specifically which contractors have access to these units and how they can be cost-effectively addressed, suggest that these services can be delivered with a two-pronged approach.

*Units with Maintenance Contracts.* Maintenance contracts are more common in the commercial market where it is essential for effective business operations that the units are functioning and that there is a plan for emergencies. Maintenance contracts typically cover cleaning and changing of filters, tightening electrical connections, checking belts for proper tension, and ensuring general working order. Although these contracts do not cover optimization for energy efficiency, they provide an opportunity for the program to take advantage of the business relationship between customer and contractor:

- Technicians are on-site on a periodic and predictable basis.
- They have a responsibility to provide customers with feedback about their systems.
- They have agreements that provide authorization to service units, provide structure about when to get customer involved, and cover liability issues.

The program will target providers working under maintenance contracts and supplement this existing structure by providing:

*Units without Maintenance Contracts.* The majority of units probably do not have maintenance contracts. While service contracts are slowly becoming more common on the residential side, most residential and many small commercial units are not regularly

serviced. Owners of these units need to be recruited and attracted with a different service delivery approach.

*Develop packaged air conditioning service marketing materials*

The marketing materials will be used by contractors to show customers the service benefits and encourage participation.

*Enroll a new customer base*

Customers must be contacted and need to understand what services will be provided. To obtain the most energy savings, these services will likely produce the most savings by focusing on the hot weather climate zones, where there are the greatest runtime hours for the compressor. Since residential customers generally do not have service contracts, a program that is targeted at them will not disrupt existing ongoing service relationships making it practical to serve them on a direct install basis. In fact, there is potential for participating contractors to enroll these residential customers into ongoing service contracts following the service.

*Mobilize tune-ups and retrofits*

A turnkey approach will be developed and implemented. Tune-ups and duct sealing will be grouped by location to reduce travel (and hence unproductive) time. The tune-up and duct sealing services will capture before and after system performance data to determine actual energy savings.

### **10.3 Downstream (Customer) Implementation**

The CPACS offers the opportunity to have a coordinated marketing campaign that addresses multiple aspects of energy savings from packaged air conditioning from selection through service.

*Customer incentives*

Interviews with contractors and distributors show that customer incentives can be a powerful selling tool for upgrading to higher efficiency equipment, ensuring proper selection and taking advantage of quality assurance services. Customer incentives will be offered to take advantage of this opportunity.

*Create aggressive customer outreach*

Interviews also show that contractors and distributors believe that a strong end-user campaign will help facilitate the decision making that SCE desires. Tactics to get the word out may include information on the SCE website, bill stuffers, radio announcements, home audits, brochures, cross promotion with or of other SCE programs, for example, the demand response program, Summer Discount Plan.

*Coordinate with statewide efforts*

Flex Your Power has been a very successful statewide program. Since all IOUs will be addressing packaged air conditioning efficiency, it may make sense to collaborate on high level messaging.

*Packaged Air Conditioning Cooperative Promotions - California Cool<sup>15</sup>*

The CPACS will work with market participants to take advantage of seasonal sales and service cycles that currently exist in the market. Periodic cooperative promotions will create a coordinated market response and include consistent marketing messages from all levels of the market under the *California Cool* theme. They will build market participant involvement in the program and create retail recognition of *California Cool* events.

*California Cool – summer offerings*

In the summer season the program will focus on residential packaged air conditioning promotional opportunities, particularly in hot climate zones. These will include:

*Coordinate promotions for new equipment and quality installation*

The program will seek to combine program and manufacturer's product incentives to increase in the stocking and installation of premium efficiency equipment.

This special promotion will occur from March through July, to achieve maximum visibility and program participation.

*Mobilize direct install tune-ups for residential customers*

These promotions will be geographically targeted to promote direct install system tune ups and duct sealing special offers available for limited times. The sweeps will focus on hot climate zones.

Residential customers will be offered a system tune up and duct sealing service coupled with a system maintenance contract to maintain performance and cleanliness.

It might be effective to work with local government and community organizations to get involved in increasing visibility of the value of this service. General mailers would be produced and distributed several times over a 6-week period.

These 'sweep' campaigns would be run during the summer when people are acutely aware of their air conditioning bills.

*California Cool – winter offering*

In the winter season the program will focus on commercial packaged air conditioning promotional opportunities, particularly around commercial servicing and retrofits. These will include:

*Create and implement economizer retrofit promotions*

Most economizers function improperly, yielding little savings and in some cases increasing energy use. Enabling or restoring proper economizer function can yield significant savings, particularly in climate zones with moderate evening and shoulder season temperatures. These opportunities include economizers on commercial packaged air conditioning systems and the use of night cooling on certain residential systems.

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<sup>15</sup> These promotional opportunities will use a unique promotional name, *California Cool* is an example.

The program will define the opportunities for economizer retrofit including the installation of an enabling control package with associated repairs of existing equipment if necessary or, in extreme cases, retrofit of a new economizer. Residential installations will be targeted to retrofit a night cooling system. These packages will be developed with manufacturers/distributors to reduce system costs. The program will enroll participating contractors, seeking to leverage existing sales personnel or trained technicians who will market to their customer base the great value of economizers – particularly in the winter months. This timing will also take advantage of the slack season for packaged air conditioning contractors.

#### *Early retirement of package terminal air conditioning units*

Sector specific promotions will also be considered. An example is to promote early replacement of package terminal air conditioning units in the hospitality market. Many existing hotel room units have poor efficiency, while commonly supplied replacement models exceed current standards. A cooperative promotion joining SCE with distributors and hospitality associations could effectively accelerate the replacement of large numbers of inefficient units.

#### **10.4 Manage Packaged Air Conditioning Program Elements**

SCE and/or successful bidder will provide ongoing management of the program elements. As new information arises, changes in program design will be implemented. Focus will be on delivering cost-effective packaged air conditioning savings, capitalizing on new opportunities as they arise.

The program will coordinate implementation of all program elements to provide consistency and optimize performance for all market players. This includes development of terms and conditions that will guide eligibility, participation and availability of various program benefits. These terms and conditions will define the payment of program incentives and the development of ongoing promotional activities.

The CPACS will require extensive management systems to coordinate efforts on a variety of fronts upstream, midstream and downstream. All program elements and initiatives will utilize a common data and customer tracking system developed for this effort.

#### *Coordinate with other SCE programs*

SCE programs will include a “portal” element that provides easy program entry and helps manage the participation of individual customers in all relevant program offerings to maximize the energy savings from each customer opportunity.

In particular, it is essential to coordinate closely with new construction programs since in new buildings packaged air conditioning efficiency is part of a whole building system. Opportunities to go above and beyond Title 20/24 in terms of packaged air conditioning efficiency will be encouraged. These include the mundane, such as proper sizing and duct design, to the innovative use of emerging technologies. The program will coordinate training efforts to incorporate these packaged air conditioning issues into general training and helps assure that new construction is HERs and CHEERs certified.

*Continuously improve energy savings information*

Current information on energy savings for the various packaged air conditioning components varies widely. Given the importance of determining accurate savings information, the program will make measurement and feedback an integral part of all program elements. The program will coordinate with statewide programs to ensure consistency in equipment standards, technical issues surrounding SEER/EER ratings, quality installation, and energy savings estimates. By working with targeted statewide efforts and by capturing pre- and post-measurement data, the program will enhance existing energy savings information. This information will be used in later years to revise projected energy savings and to adjust program elements.

*Coordinate with California utilities and national initiatives*

This will include coordination on these initiatives with other California utility programs and the CPUC to develop statewide consistency in incentives and in marketing messaging. SCE will also continue its participation with CEE and manufacturers on equipment standards and research. Finally, SCE will coordinate this effort with national initiatives like ENERGY STAR®.

*Convene statewide advisory committee*

The packaged air conditioning industry in California involves many participants at several levels in the market (previous illustrations). The Comprehensive Packaged Air Conditioning Systems Program seeks both to leverage the capabilities of these participants and also to transform and bring added value and efficiency to the market. SCE anticipates a Statewide Advisory Committee including manufacturers, distributors, dealers, contractors, installers and service providers to assist in the ongoing development of the CPACS. We expect the program and SCE's position in the packaged air conditioning market to evolve as the program grows. The Advisory Committee will provide invaluable review, practical advice, and market intelligence that will help ensure long-term program success.

**11. Customer Description**

All SCE customers will be eligible for the program. Since the program focuses primarily on small packaged air conditioning units, the customers are residential and commercial. As the program moves into implementation, there may be some opportunity for industrial customers. This type of opportunity would be analyzed and the appropriate implementation program would be employed to achieve the best results.

Residential customers will have savings opportunities through:

- Education on packaged air conditioning saving opportunities
- Buying new homes with state-of-the-art packaged air conditioning equipment
- Participation in the servicing of existing packaged air conditioning equipment
- Selection and proper installation for system replacement

Commercial customers will be addressed by:

- Service opportunities
- Equipment replacement
- System specifications and design of new buildings with state-of-the-art packaged air conditioning equipment

## **12. Customer Interface**

SCE will ensure that customers receive a consistent and coherent message about energy efficiency opportunities, and, in particular, opportunities related to air conditioning. Depending on the results of the competitive bidding process, the message may be delivered by SCE, by a third-party(s), or a combination. In addition, customers will have an interface with the midstream delivery channel. SCE will coordinate to ensure that the midstream interface is consistent with the direct interface.

## **13. Energy Measures and Program Activities**

The cost-effectiveness calculator and Portfolio workbook list the proposed measures for this program. This list may be supplemented during the strategy refinement, as additional information is obtained, through responses to Requests for Proposals and as emerging technologies become commercially available.

### **13.1 Measures Information**

The program intends to use prescriptive measures to simplify application processing and tracking. Measure information is provided in the corresponding cost effectiveness calculator and portfolio workbook.

### **13.2 Energy Savings and Demand Reduction Level Data**

For the June 1, 2005 submittal, cost effectiveness calculator and portfolio workbook contains the best available information compiled from a variety of sources. For the quality installation program element, which includes refrigerant charge, airflow and duct sealing, the baseline for energy savings is generally existing industry practices. At this time, there is significant effort focused on determining the appropriate energy savings for packaged air conditioning-related measures. Further analysis may yield more accurate energy savings and demand reduction information. SCE intends to revise program measures and energy savings as new information warrants. The intention is not to change the ex ante numbers based on extenuating circumstances, but to capitalize upon the best available information.

### **13.3 Non-energy Activities**

The program will have a combination of energy and non-energy activities. Non-energy activities include:

- Interview and focus groups to refine program design (manufacturer, distributor, contractor, trade associations)
- Meetings of advisory committee – quarterly
- Dealer and contractor training on sizing, specification, installation and servicing
- Seminars on best practices for new buildings targeted at designers and builders (coordinated with new construction programs)

- Marketing materials

### **13.4 Subcontractor Activities**

Not Applicable

### **13.5 Quality Assurance and Evaluation Activities**

Quality assurance is critical to ensuring that the program actually delivers the planned energy savings and for ongoing program modifications over time. The program incorporates quality assurance at multiple points.

Upstream program – Approximately 10 percent of installations will be checked to ensure that the right units were installed.

Linking purchase through installation -- The program will match units sold through the upstream program with contractor participation in the installation component to determine if the units are truly being installed correctly. Gaps will be identified and corrective actions taken to realize full integration.

Midstream activities – Close attention is needed for the midstream activities including installation and servicing of refrigerant charge, air flow, duct sealing, and economizers -- as they represent new and evolving practices in the market. There needs to be strong quality assurance as well as evaluation to ensure that energy savings are realized.

- Quality tools, protocols, and training. Most contractors today do not have the tools to accurately perform tune-ups and adjustments. The program will require a defined tool set, which provides consistency for measurements and for accurate adjustments. In addition, defined methodologies and protocols will provide consistency in what constitutes quality installation and servicing.
- Pre and post-data acquisition. Available market tools can take pre and post activity measurements. This information will be uploaded into a database for analysis. The analysis will enable the program to:
  - identify technicians who need assistance in applying the protocols
  - highlight anomalies that suggest inappropriate application
  - establish energy savings estimates
- Verification of savings. It is important to have dedicated program support to provide both technical support and verification of savings. The automated data acquisition is a critical tool, but it must be supplemented with regular spot checks on 10-15 percent of units to make sure that everything is being done to program protocols.

Evaluation activities – The Program will include rigorous data logging studies on air flow, duct sealing and refrigerant charge impacts to calibrate program design.

### **13.5.1. Expected Number/Percent of Inspections (planned percent of projects)**

Upstream element: 10% of units installed

Midstream element: 10% of the quality installation services to ensure compliance with program protocols and specifications. Sampling will be conducted on the measures and contractors.

### **13.6 Marketing Activities**

Marketing the Comprehensive Packaged Air Conditioning Systems Program will require a combination of targeted activities and customer education. From previous program experience, program marketing efforts should be primarily targeted toward educating the end user. It may be possible to leverage the Flex Your Power resources to develop statewide messaging regarding packaged air conditioning efficiency. These messages can be supplemented by program specifics.

The upstream and midstream market participants need limited recruitment due to their awareness of existing SCE programs and the utility's credibility. The upstream market needs to be informed about the program opportunities which can be accomplished through existing relationships and targeted outreach. Recruitment of the midstream market would be similar, and could use tools to help sell the value proposition to their customers.

The end user, which can be a residential customer, a builder or a commercial building tenant, needs to be informed about the features and benefits of the equipment or service. Although they might not in every case receive an incentive for a measure, to help achieve market transformation it is critical they understand the benefit.

#### *Upstream*

Distributors can be enrolled to participate in the program as a means to have a competitive advantage when offering high efficiency equipment. To support contractors, materials can be developed that support contractors in working with customers on the selection process for new equipment. Issues such as coil matching and appropriate sizing can be explained. The advantages of high efficiency equipment and the value of ongoing servicing should be included.

#### *Midstream*

Contractors will enroll in the program to give them a value-added service for their customers. In addition, technicians want to enhance their skill set. Being part of a leading edge program with innovative tools is attractive to them. Contractors need materials as well to support activities. Summary results of servicing and proper installations that discuss improved indoor air quality, higher levels of comfort, and reduced emergency replacements reinforce the value of these activities.

#### *Downstream*

Interviews show that contractors and distributors believe that a strong end-user campaign will help facilitate the decision making that SCE desires. Tactics to get the word out may include:

- Information on the SCE website
- Radio announcements
- Brochures

End customers messages may include, but not limited to:

- Comfort
- Cleanliness
- Quality installation
- Extended life of equipment
- Early retirement of less efficient equipment
- Lower cost of ownership
- “Green” message

#### **14. Program Changes**

SCE has not yet made any modifications to the CPACS program. SCE is currently in pre-award discussions with the selected bidder. These discussions will encompass many different aspects of the program including program design and implementation. During this time, SCE will continue to work with the other IOUs on statewide coordination. It is expected that the new program will take several months to implement. In the meantime, SCE will continue to offer incentives for various HVAC equipment, in both the residential and nonresidential markets, through existing programs. This will eliminate any potential gap in service in the very important HVAC market. SCE discussed this approach with its PRG during the program solicitation process and the PRG was very supportive of SCE’s approach.