November 30, 2011

Elk Valley Rancheria

Crescent City, California

DOE Grant DE-EE0002510 - Energy Efficiency and Alternatives Analysis

Prepared For:

Elk Valley Rancheria, California

Prepared By:

Frank Zaino & Associates, Inc.

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Executive Summary of Energy Efficiency Study

The Elk Valley Rancheria, California ("Tribe") is a federally recognized Indian tribe located in Del Norte County, California, in the northwestern corner of California. The Tribe, its members and Tribal enterprises are challenged by increasing energy costs and undeveloped local energy resources. The Tribe currently lacks an energy program. The Tribal government lacked sufficient information to make informed decisions about potential renewable energy resources, energy alternatives and other energy management issues. To meet this challenge efficiently, the Tribe contracted with Frank Zaino and Associates, Inc. to help become more energy self-sufficient, by reducing their energy costs and promoting energy alternatives that stimulate economic development.

Frank Zaino & Associates, Inc. provided a high level economic screening analysis based on anticipated electric and natural gas rates. This was in an effort to determine which alternative energy system will performed at a higher level so the Tribe could reduce their energy model by 30% from alternative fuel sources.

The feasibility study will identify suitable energy alternatives and conservation methods that will benefit the Tribe and tribal community through important reductions in cost. The lessons learned from these conservation efforts will yield knowledge that will serve a wider goal of executing energy efficiency measures and practices in Tribal residences and business facilities.

Pacific Power is the provider of electrical power to the four properties under review at $ 0.08 per Kilowatt-hour (KWH). This is a very low energy cost compared to alternative energy sources.

The Tribe used baseline audits to assess current and historic energy usage at four Rancheria owned facilities. Past electric and gas billing statements were retained for review for the four buildings that will be audited. A comparative assessment of the various energy usages will determine the demand, forecast future need and identify the differences in energy costs, narrowing the focus of the work and defining its scope. The Tribe's peak demand periods will help determine the scope of need for alternative energy sources.

The Tribe's Energy Efficiency and Alternatives Analysis report included several system investigations which include fuel cells, wind turbines, solar panels, hydro electric, ground source heat pumps, bio mass, cogeneration & energy conservation and implementation for the existing properties.

The energy analysis included site visits to collect and analyze historical energy usage and cost. The analysis also included the study of the building systems for the Elk Valley Casino, Elk Valley Rancheria administration complex, United Indian Health Service/Small Community Center complex and the Tribal Gaming Commission Offices.

The analysis involved identifying modifications, performing an engineering economic analysis, preparation of a rank ordered list of modifications and preparation of a report to provide recommendations and actions for the Tribe to implement. Below are listed action items for the four facilities investigated:

The summaries of options to reduce energy cost are as follows:

Action item #1:

Casino Complex

- Conservation and replacing the high energy consuming lamps, ballasts and older equipment. Budget value $50,000
- New Building Management System Budget value $37,300
- Indirect Lighting portals Budget value $38,000
- Solar hot water Thermal Budget value $66,834
- Small 4KW Solar Photovoltaic system Budget value $21,792
- Insulate ductwork Budget value $8,500
- Patch abandoned roof exhaust openings Budget value $2,500

Administration Facility

- Conservation and replacing the high energy consuming lamps, ballasts and older equipment. Budget value $25,000
- Tribal Council Chamber AHU unit Budget value $12,475
- New Building Management System Budget value $37,300
- Indirect Lighting portals Budget value $38,000

Gaming Facility

- Conservation and replacing the high energy consuming lamps, ballasts and older equipment. Budget value $12,000
- New AHU unit replacement w/ BMS system Budget value $40,000
- Indirect Lighting portals Budget value $12,000

Community Center Complex

- Conservation and replacing the high energy consuming lamps, ballasts and older equipment. Budget value $15,000
- New Building Management System Budget value $14,300
- Indirect Lighting portals Budget value $27,000

Action item #2:

Casino Complex

- Phased Solar Photovoltaic system Budget value $ 1,347,250
- Large Solar Photovoltaic system Budget value $10,778,000

Administration Facility

- Small 4kw Solar Photovoltaic system Budget value $21,792
- Tribal Council Chamber AHU unit replacement Budget value $86,400

Community Center Complex

- Solar hot water Thermal — Budget value $28,500
- Small 4kw Solar Photovoltaic system — Budget value $21,792

The following options to reduce energy cost cannot be recommended at this time without alternate funding sources. The overall cost to design, install, operate and maintain the alternative energy options provided to the Tribe leaves an extended period for payback, high fuel costs, and large capital investment.

The following items are not recommended as alternative energy sources for the Elk Valley Rancheria based on the Tribes location, cultural traditions, environment and current state of the technology:

Not Recommended Systems

Anaerobic Digestion
Combined Heat and Power
Biomass
Fuel Cell Technology
Hydroelectric
Geothermal Energy
Nuclear Energy
Wind
Ocean Energy

See fatal flaw analysis starting on page 34.

FRANK ZAINO & ASSOCIATES, INC.

Frank Zaino & Associates, Inc. has been providing Professional Construction Management Services and Engineering Services in New England since 2001. Working in fields as diverse as alternative energy, industrial pipeline steam and chilled water distribution, to construction in the hospitality and gaming industries.

Frank Zaino & Associates, Inc. has set new standards in performing energy studies, sensitivity analysis, and construction implementation of alternative energy incentives. Frank Zaino & Associates, Inc. was the Construction Managers for a 15 megawatt combined heat and power plant with a total construction value of $36,000,000. This 5-year project began with a fatal flaw analysis, construction design, equipment requisition construction management and startup in order to provide the customer a project that has a 3.4 year payback with 65% return on investment to save on utilities (approximately $7,500,000 per year). This project went online in July of 2010 and has been producing both electricity and steam for the resort use. All contracts, RFP's, purchase orders, equipment needs, contract bids, applications for DPUC grants, operational bids, 3rd party consulting and construction bids, EPA air-permitting calculations, interconnect agreements with the local utility company, utility company integration, scheduling and delivery/storage arrangements were coordinated by our staff.

Our company's continued success and growth in providing construction management services has been primarily generated through our strong commitment to a project's success by meeting project deadlines and budgets, while controlling costs without sacrificing quality. This management approach is found at every stage of the project which includes: pre-construction planning; complete construction oversight; and post construction services.

Frank Zaino & Associates, Inc. handles a diversified mix of clientele ranging from utility, institutional and manufacturing organizations to hospitality, gaming and industrial power production, as well as the retail and food service industries. Frank Zaino & Associates, Inc., guaranties its expertise and reputation in the special field of Professional Construction Management for a clientele demanding a first in class service.

ELK VALLEY RANCHERIA, CALIFORNIA

Elk Valley Rancheria is located in Del Norte County, California. Del Norte County is California's northernmost coastal county, located roughly halfway between Portland, Oregon (330 miles north) and San Francisco, California, (350 miles south). Elk Valley Rancheria located in Crescent City California is compressed of a Tribal nation consisting of Tolowa, Yurok, Chetco and Hupa Native American Indians.

The Tribe is a federally recognized Indian tribe located in Del Norte County, California (the "County"). The County is California's northern-most county on the Pacific coast, approximately 1,129 square miles in size. The largest and only incorporated city is Crescent City, population 7,609, including approximately 3,461 who are incarcerated in the Pelican Bay State Prison. The total population of the County is 27,507[1], equating to nearly 28 people per square mile. Nearly 80% of the land in the County is publicly owned and includes the Redwood State and National Parks, which border the Tribe's reservation; and the Smith River National Recreation Area, part of the Six Rivers National Forest.

The Reservation (aka Rancheria) was established in 1906 for homeless and landless Indians of predominantly Tolowa and Yurok ancestry when 100 acres was set aside for Indians on the east side of Crescent City. However, the Tribe was terminated in 1962 pursuant to the federal California Rancheria Act and, as a result, the Tribe lost its federal recognition and much of the Tribe's reservation was converted to fee simple lands that were subsequently sold or seized for tax defaults. In 1979, individual members of several California Indian tribes filed suit in the United States District Court to challenge the illegal termination of several California Indian tribes and to seek restoration of tribal status and reservation status. In 1983, the United States entered into a stipulated judgment restoring the Tribe's status as a federally recognized Indian tribe. In 1987, the County entered into a stipulated judgment recognizing the restored boundaries of the Rancheria and declaring the Rancheria as constituting "Indian country" within the meaning of federal law and recognizing the Rancheria as a "reservation." Since restoration, the Tribe has re-acquired approximately 15% of the original reservation in trust status and has acquired additional aboriginal lands. The Tribe's current land base is approximately 591 acres comprised of both fee and trust properties.

Some of the Tribe's 93 members are dispersed around the United States, however, the Tribe's records indicate that 41 Tribal members reside in the County and a total of approximately 59 Tribal members reside within 250 miles of the Tribe's reservation. In recent years, an increased number of Tribal members have returned to the Rancheria in large part because of opportunities for employment created by the Tribe. The Tribe is the second largest private employer in the County and has also initiated various educational, health, housing and cultural programs that provide services to the Tribal membership.

The Tribe has developed a Tribal Energy Program for energy efficiencies at their facilities to aggressively reduce the total overall energy used by 30% by alternative energies.

[1] United States Census 2000 - http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=04000US06&-_box_head_nbr=GCT-PH1&-ds_name=DEC_2000_SF1_U&-format=ST-2

This study is to evaluate each alternative energy system and calculate the most economical means to reduce the overall utilities used by Elk Valley Rancheria.

- **Conduct baseline assessment –** Conduct an evaluation of the historical energy costs for the Rancheria and its associated facilities energy demands to identify the historic energy usage and supply, as well as heating and cooling loads.
- **Define energy vision –** As needed, review Tribal goals for energy usage and redefine vision for conservation, efficiency and alternative energy sources that create a self-sufficient environment consistent with the long-term reduction of energy use. The options analyzed in this feasibility study should form the guiding principles for future activities concerning conservation and alternative energy.
- **Conduct economic screening analysis –** Use baseline data to analyze anticipated electric energy demands and natural gas rates for available fuel as well as anticipated power, heating and cooling loads. Analysis should reflect a strategic plan that sets up an achievable vision for the Tribe.
- **Conduct energy conservation analysis –** Research potential modifications to practices, equipment and facilities along with methods to increase energy awareness within the Tribe and staff to develop a strategic energy use reduction program.
- **Research alternative energy options –** Provide a general description of all power generation technologies available to the Tribe and their relative costs, including renewable energy sources such as, geothermal, wave, wind and solar power. Determine the advantages and disadvantages of sustainable energy sources, including their potential environmental, cultural and social impacts. This research will aid in the identification of the optimal technology options.
- **Conduct preliminary engineering for energy-efficient systems and feasibility work** – Develop preliminary block layout of alternative energy locations and an electric schematic indicating the interconnection of utility and Rancheria facilities.
- **Develop action plan –** Through strategic planning sessions, review analysis of conservation efforts, energy-efficient technologies and optimal alternative energy sources to outline future activities necessary to become energy self-sufficient.
- **Adopt action plan** - Submit a final report and recommendations to the Elk Valley Rancheria Tribal Council, the governing body of the Tribe, for review, consideration and appropriate action.

The Tribal energy efficiency and alternative analysis evaluated and estimated select alternative energy systems and provided calculations and payback schedules for the Tribes review. The decision of what systems provided the Tribe with the most benefit and energy savings will be evaluated by the Tribal Council.

Crescent City has a mild, Mediterranean climate and is one of the wettest places in California; the annual rainfall is 70 in (1,800 mm). The wettest months are from October to March; the wettest month is January with 13.3 inches (340 mm) and driest month is July with less than 0.5 in (13 mm). The average high and low temperatures in January are 53 °F (12 °C) and 39 °F (4 °C). The average high and low temperatures in August are 67 °F (19 °C) and 50 °F (10 °C). Average number of days below 32°F/0°C is 15 days.

The highest temperature recorded in Crescent City was 93 °F (34 °C), observed on September 24, 1964, June 1, 1970, and October 10, 1991. The lowest temperature on record was 19 °F (−7 °C) on December 21, 1990.

The maximum monthly precipitation was 31.25 inches (794 mm) in November 1973. The maximum 24-hour precipitation was 7.73 inches (196 mm) on January 9, 1995. The most snowfall in one month and in 24 hours was 6.0 inches (15 cm) on January 6, 1972.

End of Introductions

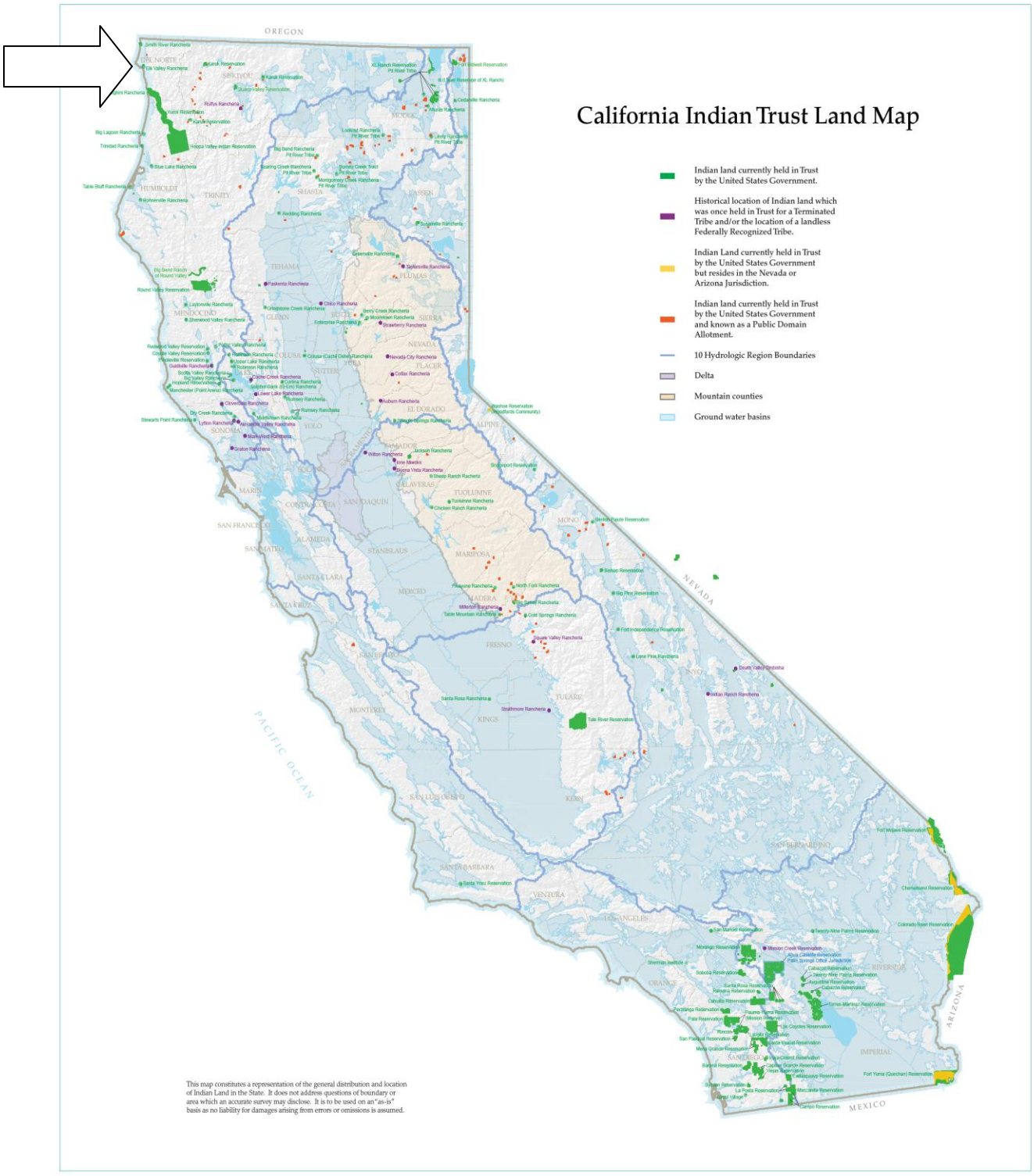

Figure 1. Physical Location Map of the Reservation

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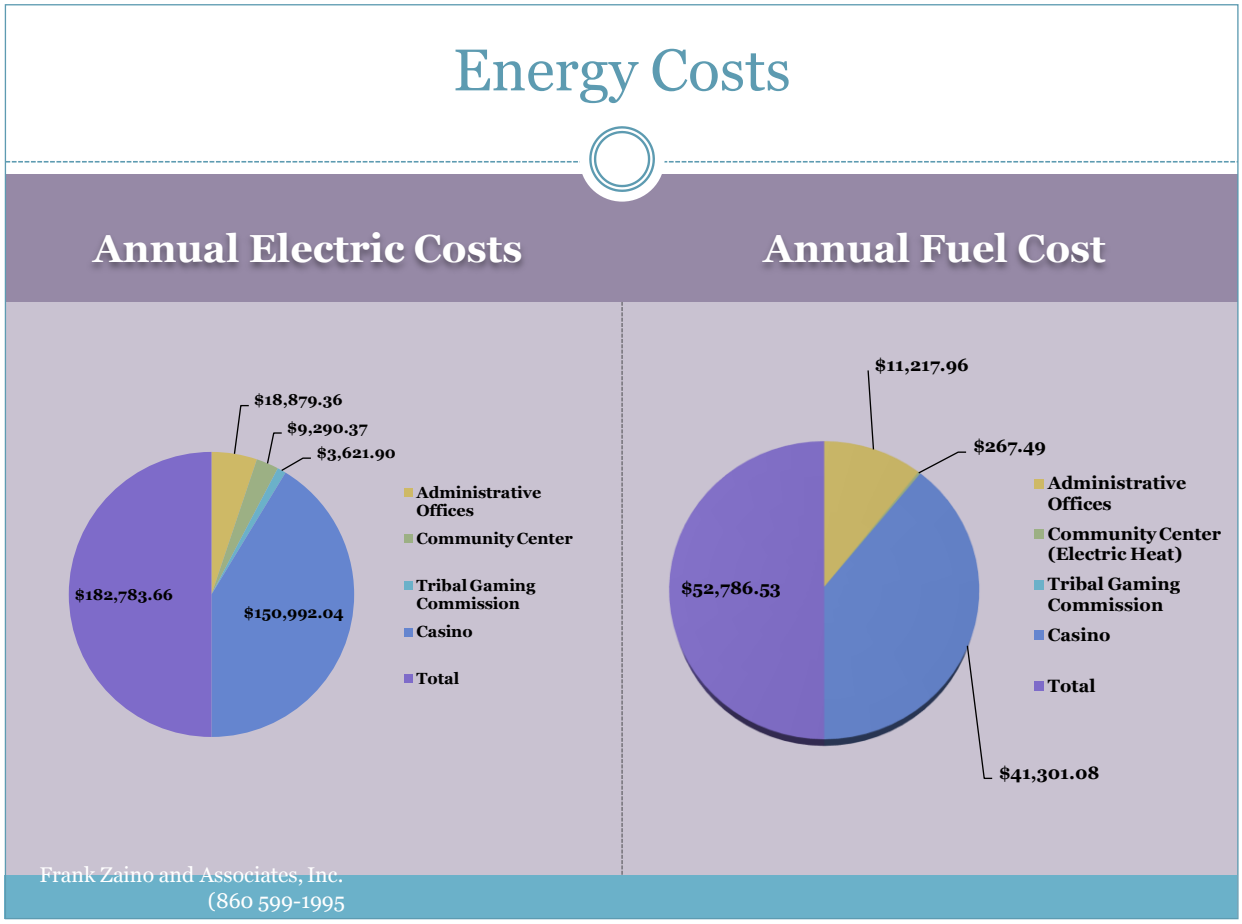

**This information was based off actual usage at the studied properties.*

Figure 2. Elk Valley Rancheria Energy Usage Graph, by Facility

OVERVIEW

Casino
2500 Howland Hill Road
Crescent City, California 95531

- Largest electrical demand
- Recommended energy efficiencies
- Conservation and retrofit
- Solar hot water
- Solar Photovoltaic
- Solar Skylights
- Occupancy detection
- Insulate ductwork
- Patch openings

Administration Building
2332 Howland Hill Road
Crescent City, California 95531

- Recommended energy efficiencies
- Conservation and retrofit
- Solar hot water
- Solar Photovoltaic
- Solar Skylights
- Occupancy detection
- AHU Replacement

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Community Center
2298 Norris Ave.
Crescent City, California 95531

Recommended energy efficiencies

Conservation and retrofit

Solar hot water

Solar Photovoltaic

Solar Skylights

Occupancy detection

Tribal Gaming Commissioners Complex
440 Mathews Street
Crescent City, California 95531

Recommended energy efficiencies

Conservation and retrofit

Replace HVAC system

Install Ductwork

Solar Skylights

Occupancy detection

Elk Valley Casino

General

Casino building which is comprised of approximately 400 to 450 slots machines, a small bingo hall/banquet room, retail shop, remaining surveillance, security, coin cage area, dining area, a few table games and all other auxiliary areas. The Casino is a metal skinned building with multiple additions which is of single story construction with an asphalt tar flat roof approximately 26,000 square feet.

Electrical

The main electrical service is a 3000 ampere service transformer which supplies power to the facility backed up by a 200KW diesel emergency generator and the building is equipped with a flywheel inverter connected to a power conditioner UPS unit. The Flywheel design is for the momentary loss of power prior to the generator starting within 10 seconds of the outages.

In discussions with the staff there have been very few long term outages for the electrical grid which would cause an effect on operations and or revenue to the gaming facility. The use of a diesel tank for short term outages can be utilized but limitations to the term of the systems longevity is an upper management decision. It is recommended that a larger sized storage tank for a long term outage be installed.

The lighting in the Casino is comprised of a combination incandescent, florescent and metal halogen lighting which is in need of updating with a foot candle analysis to reduce the quantity of lights, upgrading reflector lenses, ballasts and high efficiency lighting lamps. The exterior lighting at the parking area should also be replaced with High Efficiency light fixtures and accent lighting across the front of the Casino entry replaced with LED accent high efficiency lighting. Incentives from the local power supplier, Pacific Electric, need to be explored to identify the contribution and rebates that can be obtained thru them.

The average electrical usage of this facility is approximately 2,430,300 KWH per year.

Food service

The main Kitchen at the Casino has gas fired propane cooking and some of the penetrations thru the roof which has been connected to abandoned and removed equipment need to be sealed. The main cooking gas fired equipment is supplied by independent propane storage tanks.

Heating Ventilation and Air Conditioning

The HVAC system is comprised of a combination of electric heat pump air units and four propane gas fired on the ground Air Handler Units. The air handling units are not maintained by an automated building management system and are not correlated to outside air temperature resets to maintain temperature or times of activation. The Primarily the Air Handler Units providing cooling for the Casino floor run central cooling around the clock because of the heat generated by the slot machines. The ductwork running from these air handling units was not externally insulated to maintain temperatures in the supply or return runs, which is recommended. The remaining units supply air to the Bingo Hall, administrative section and the Bingo Hall and run a combination heating and cooling manual run modes. The need for a central building control system, at the bare minimum programmable thermostats to control the building profile, is recommended.

The average gas utilized at this facility is approximately 11,870 gallons of propane per year for the heating and cooking.

Energy Conservation and controls

A. Building Automation System (BMS) should be installed without outdoor air sensors and occupancy time zones installed in this facility wired to programmable thermostats.

Casino

1.	DDC control system 128 point system	$ 6,925.00
2.	Host package with Computer Modem, front end cost, basic software	$ 9,375.00
3.	Date fiber optic with lease line	$ 2,500.00
4.	Wiring & conduits/electric	$15,000.00
5.	Patching & paint	$ 3,500.00
		$37,300.00

This system will integrate all existing thermostatic controls back to a central command center that can be located off site. This system can be connected to beepers which would report back to the Head of Maintenance or the Authority Having Jurisdiction (AHJ) for remote monitoring log-in and adjustments. This control system will control the building temperatures per the occupancy time zones and outdoor air temperatures.

B. Lamps and Occupancy Sensors which includes T-8/T-15 lamps, fluorescent to replace incandescent bulbs, LED to replace fluorescent occupancy sensors in all office and administrative areas and labor to replace the fixtures. Budget value $50,000
This cost will be offset by Pacific Powers Rebate Program attached to this report.

C. Insulate existing exposed duct work outside the facility at the exterior outside air handling unit is located. Budget value $8,500

D. Patch abandoned roof exhaust openings Budget value $2,500

E. The provisions for indirect sun portal light fixtures to be installed in the back of house and Bingo Hall. Budget value $25,000

F. Small 4KW Solar Photovoltaic system Budget value $21,792

G. Phased Solar Photovoltaic system Budget value $1,347,250

H. Large Solar Photovoltaic system Budget value $10,778,000

The Administration Complex

General

The Administrative facility is approximately 8,840 square feet and is of the newest in construction.

The building houses the main administrative offices for the tribal council members and auxiliary staff, the main library, a small museum tribal display and the main tribal council chamber for conducting tribal conferences or meetings.

Electrical

The main electrical service is a 400 ampere service transformer which supplies power to the facility backed up by a 200KW diesel emergency generator is for the loss of power and the generator starts within 10 seconds of the outages.

The average electrical usage of this facility is approximately 116,400 KWH per year.

Heating and Cooling

The building is heated and cooled by a combination of electric heat pumps with electric ground mounted condensing units connected to air handling units located above the ceilings and attic areas.

The main Tribal council chamber is heated and cooled by two electric air handling units located in attic spaces with separated gas fired duct burners in-line with the main duct supplies. These units that serve the Tribal Council chambers have central return ducts and exposed supply ducted systems that serve this space and as observed at site they have a unacceptable decibel rating for the room use and are not energy efficient. It is recommended that a sound attenuation study and or removal of existing equipment with a more energy efficient system. Also, the installation of a sound attenuator in the supply and return ductwork will significantly reduce the noise level caused by rotating the heating and cooling system equipment.

The average gas utilized at this facility is approximately 5,822 gallons of propane per year for the heating.

The Tribal Council Chambers are served by two inefficient gas fired air handling unit's located in the attic spaces. These units should be replaced by more energy efficient systems ducted with insulated ductwork to the Tribal Council Chamber. These units should be located at grade level and ducted into the chambers by utilizing high efficiency gas fired units with high efficiency motors.

This new energy efficient air handling unit shall be located at grade level at the administrative building kitchen area outside the facility and ducted through the attic space to the Tribal Council Chambers.

Evaluation Study and Preliminary Engineering		$12,475.00
Tribal Council Chamber AHU unit replacement	Budget value	$86,400

Building Management System

1.	DDC control system 128 point system	$ 6,925.00
2.	Host package with computer modem, front end cost, basic software	$ 9,375.00
3.	Date fiber optic with lease line	$ 2,500.00
4.	Wiring & conduits/electric	$15,000.00
5.	Patching & paint	$ 3,500.00
	Total:	$37,300.00

New energy efficient light fixture lamps

The provisions for indirect sun portal light	$25,000.00
Fixtures in the 2nd floor offices and Council Chambers	$38,000.00
Small 4kw Solar Photovoltaic system	$21,792.00

The Tribal Gaming Commissioners Complex

General

The gaming offices are comprised of two double wide trailers connected together to form the Tribal Gaming offices and is approximately 3,355 square feet.

Electrical

The facility is equipped with two electrical services that are sub-metered to each section of the connected double wide trailer and should be rewired to utilize one electrical service. The lighting is florescent tube surfaced mounted fixtures similar to trailer type design and incentives from the local power supplier which is Pacific Electric, needs to be explored for the contribution and rebates that can be obtained thru the local power supplier.

The average electrical usage of this facility is approximately 14,901 KWH per year.

Heating and Cooling

One of the sections of this facility has one electric central heating and cooling unit typical to a mobile trailer system.

The other section is equipped with electric baseboard only. There is no duct work for distribution of the heating and cooling ventilation system. The controls at each system have been overridden in most areas by the occupants because of inappropriate zoning issues.

Thermostats in most areas have been placed in bypass operation and are preventing automatic control of the heating and cooling systems this needs to be addressed to prevent wasted energy.

The recommendation for this site is to remove and replace the existing electric DX cooling/electric heating antiquated wall mounted air unit and replace with a more energy

efficient gas fired ground mounted unit with supply and return ductwork and floor grilles and registers. The facility shall be equipped with a BMS system and monitored back to an offsite command center. All motors shall be of the high efficiency type and the unit shall be provided with an outside air temperature setting with occupancy time zones: $40,000.00

The provisions for indirect sun portal light fixtures should be installed in this facility. The cost for this installation shall be: $12,000.00

Lamps and energy efficient light fixture replacement for this facility: $ 8,000.00

The Small Community Center Complex:

General

The community center complex is approximately 11,625 square feet and houses a health center, learning center and community development offices.

Electrical

The electrical service is comprised of a 200 ampere service which supplies power to the facility and is equipped with surface mounted light fixtures. The building is supplied by three electrical services that are sub-metered. The lighting is florescent tube surfaced mounted fixtures similar to trailer type design and incentives from the local power supplier which is Pacific Electric, needs to be explored for the contribution and rebates that can be obtained through the local power supplier.

The average electrical usage of this facility is approximately 76,299 KWH per year

Heating and Cooling

The heating and cooling system in this facility is an electric heat pump system with grade mounted condensing units connected to air handler units located in the attic space.

The building is equipped with a small kitchen facility and cooking is gas fired, the average gas utilized at this facility is approximately 185 gallons of propane per year for the heating.

A small solar domestic hot water thermal panel should be installed for this complex and connected to a central storage and distribution system. The solar panel system shall be located on the southern exposure of the facilities roof: $28,500.00

The provisions for indirect sun portal light fixtures should be installed throughout this complex in the interior room and office spaces: $27,000.00

Lamps and energy efficient light fixtures replacement and upgrades for this facility: $15,000.00

Building Management System

1. DDC control system 24 point system	$ 1,925.00
2. Host package with computer modem, front end cost, basic software	$ 3,375.00
3. Date fiber optic with lease line	$ 2,500.00
4. Wiring & conduits/electric	$ 5,000.00
5. Patching & paint	$ 1,500.00
	$ 14,300.00

- Solar hot water Thermal $28,500.00
- Small 4kw Solar Photovoltaic system $21,792.00

Energy Opportunities

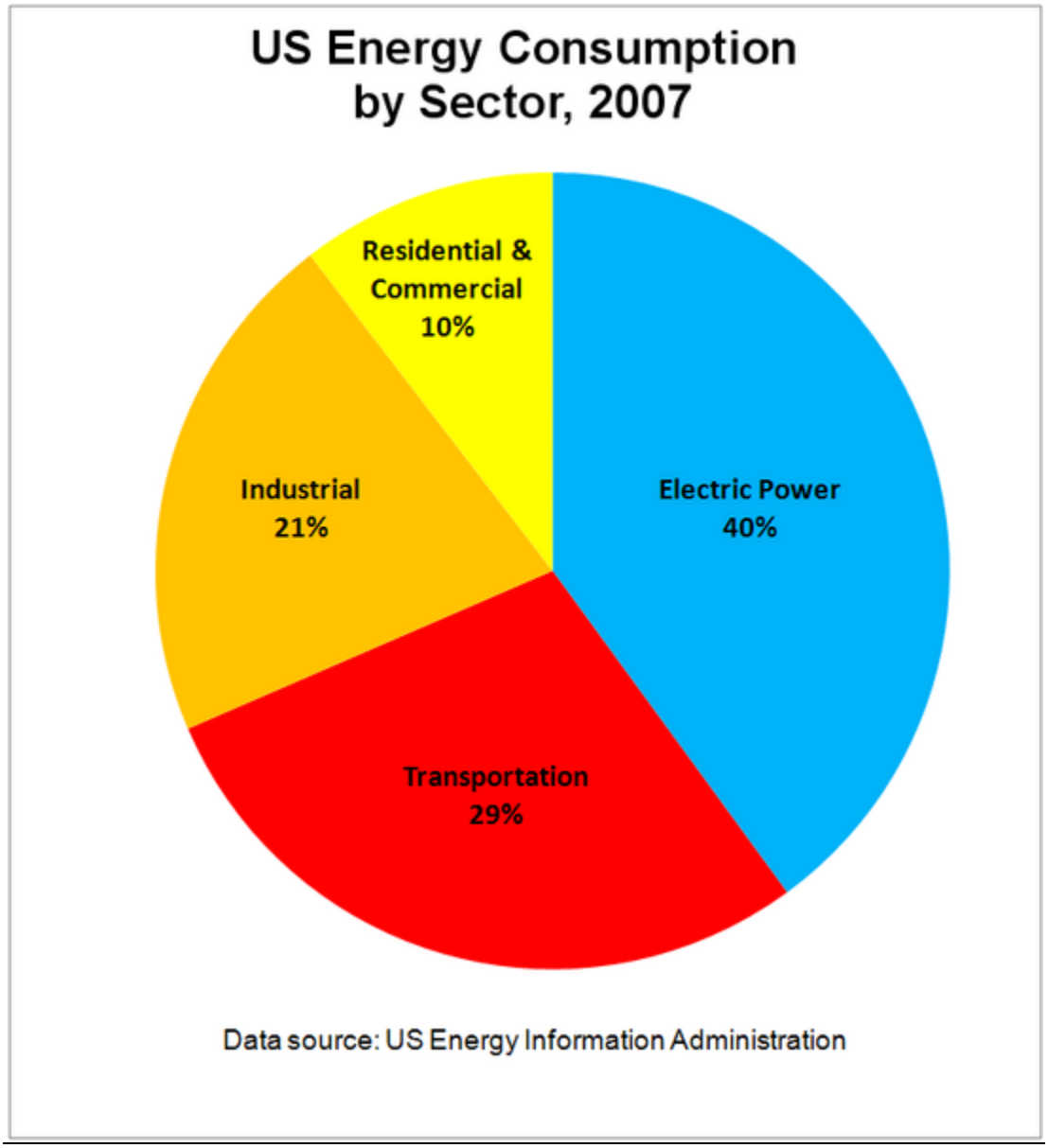

Figure 3. Energy Opportunities

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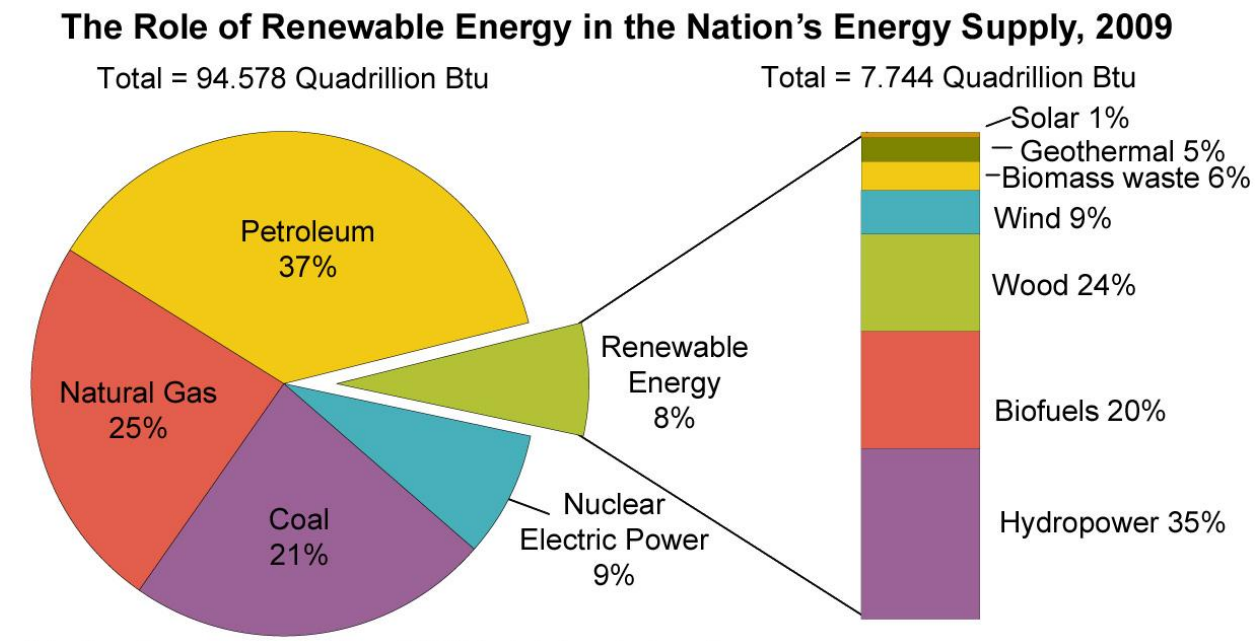

Figure 4. The Role of Renewable Energy

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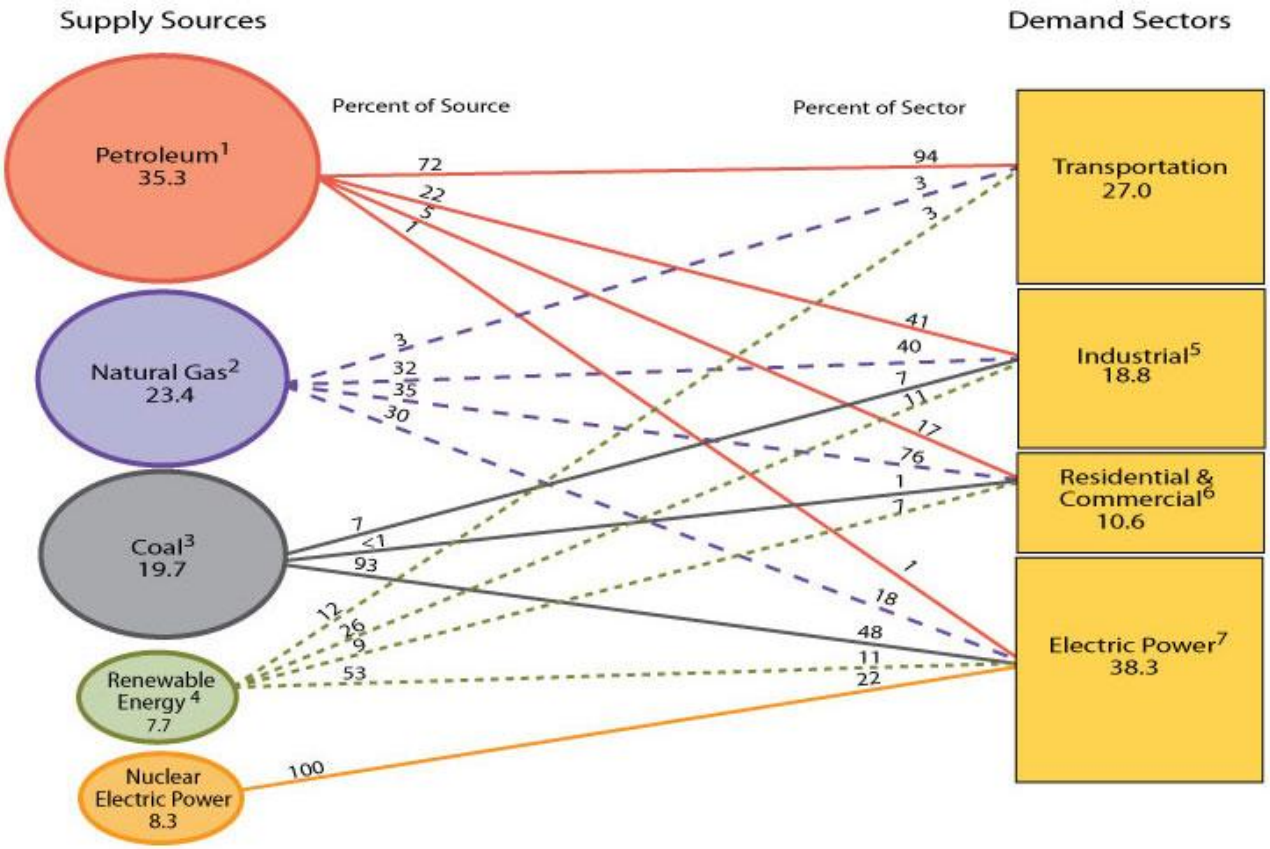

[1]Does not include bio-fuels that have been blended with petroleum—bio-fuels are included in "Renewable Energy."
[2]Excludes supplemental gaseous fuels.
[3]Includes less than 0.1 quadrillion Btu of coal coke net exports.
[4]Conventional hydroelectric power, geothermal, solar/PV, wind, and biomass.
[5]Includes industrial combined-heat-and-power (CHP) and industrial electricity-only plants.
[6]Includes commercial combined-heat-and-power (CHP) and commercial electricity-only plants.
[7]Electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public.

Note: Sum of components may not equal total due to independent rounding.
Source: U.S. Energy Information Administration, *Annual Energy Review 2009*, Tables 1.3, 2.1b-2.1f , 10.3, and 10.4.

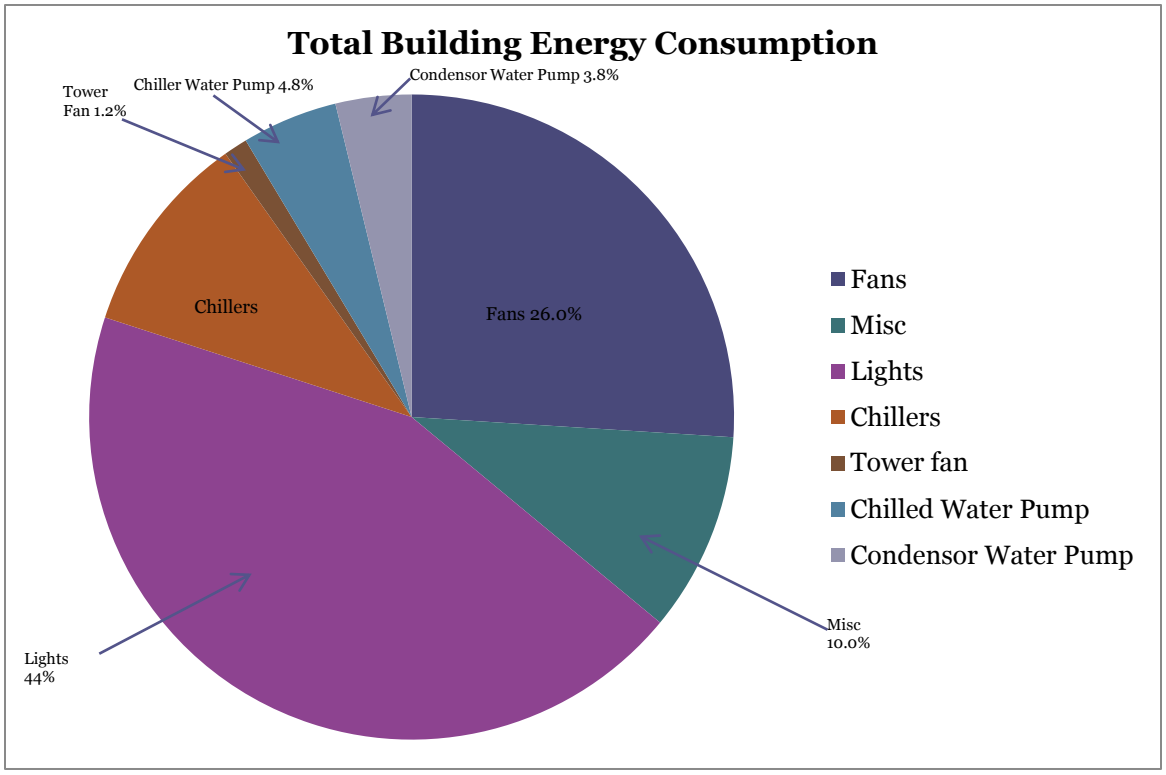

Figure 5. Normal System Energy Consumption by System for an average building complex.

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Facility Upgrades for Energy Efficiency Retrofits for all Existing/New Facilities

Retrofit of existing fixtures or equipment would be the most cost effective option at this time for the overall reduction of energy use by Elk Valley Rancheria. The retrofits could or should, as previously recommended, include the replacement of incandescent lamps, upgrade of older fluorescent lamp and ballast types, installation of occupancy detector, and the installation of an overall building monitoring system.

The retrofits would not only save energy but would give the facilities the ability to monitor the energy being used.

Energy Efficiency Measures

- Replacement of high energy fixtures, lamps and ballast.
- Replacement of older equipment with energy efficient motors.

Retrofit Product and Services

- Office Lighting
    - Re-lamping from T-12 to high performance T-8/T5
    - Replacing a fixture with high performance, high efficient T5 fixture

- Compact Fluorescent Hard Wire Fixtures
    - Saves 75% over incandescent

- Controls
    - Occupancy – stand alone offices, conference room, daylight dimming

- Energy Management Systems
- Air Compressors
- Variable Frequency Drives

Lighting

- Match operating hours to activities
- Unoccupied lighting
- Add occupancy sensors
- Verify foot candles (light levels) appropriate for tasks
- Install efficient light sources

Avoid Incandescent Bulbs

- The federal energy code will become effective on January 1, 2012 requiring new standards for lamps and ballasts.
- California legislative body adopted the standard as of January 1, 2011 incandescent lamps have been restricted by the code.

Energy Efficiency Measures

Air Systems

- Match running time to activities
- Lower hot air temperatures
- Raise cold air temperatures
- Lower fan pressure in ducts
- Adjust static pressure in set points
- Minimize outside air quantities
- Minimize exhaust quantities
- Match ventilation to number of occupants
- De-energize exhaust fans and close dampers when unoccupied
- Make best use of economizer operation
- Eliminate simultaneous heating and cooling
- Reduce air flow in constant volume (CV) systems
- De-energize non-essential loads
- Seal leaky ducts
- Convert CV systems to VAV

Pumping Systems

- Convert CV system to variable flow using variable speed drives
- Match running time to activities
- Verify proper flow
  - Use VSDs to balance system flows
  - Trim pump impellers
- Lower pressure set point
- De-energize nonessential loads

Boilers

- Lower hot water temperatures
- If steam, lower steam pressure
- Install modulating burners
- Optimize boiler sequencing
- Minimize losses in de-energized boilers

Chillers

- Match running time to activities
- Raise chilled water set points
- Reduce condenser water temperature
- Optimize cooling tower fan speed
- Optimize chilling staging
- Minimize chiller cycling
- Reduce chilled water speed

Renewable/Alternative Energy Opportunities

Renewable / Alternative Energy: Day Lighting

- Monitors ambient daylight levels in perimeter space and supplements with artificial lighting as needed.
- Reduces energy demands for artificial lighting.
- Products now mature and Affordable Renewable/Alternative Energy
- Cogeneration
- Combined Heat and Power, or CHP
- •Uses heat that is otherwise discarded from conventional power generation to produce thermal energy, which in turn is used to provide cooling, heating or hot water.
- Requires "match" between electrical and thermal energy demand to maximize efficiency

Renewable / Alternative Energy: Fuel Cells

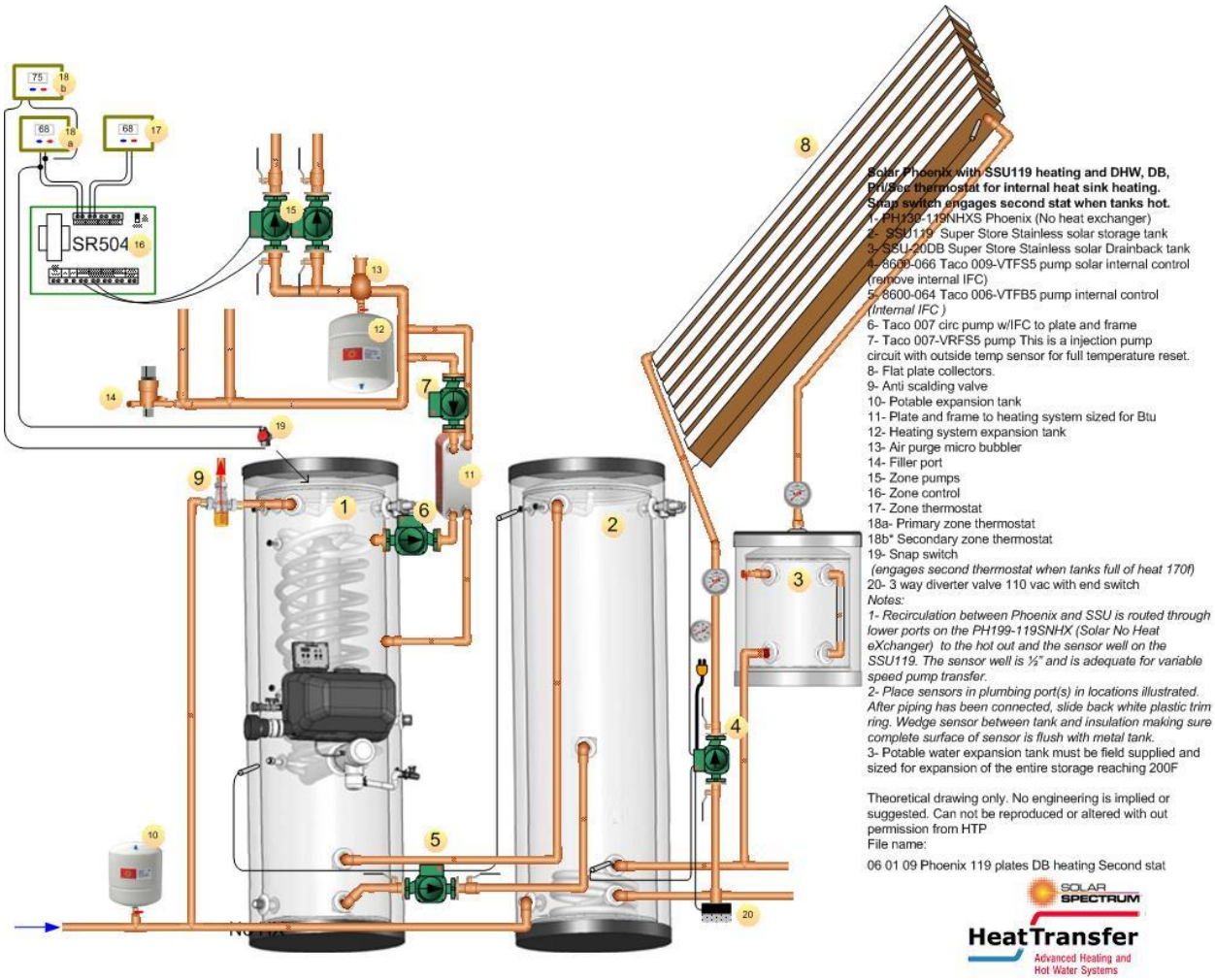
- Hydrogen based
- No moving parts and do not involve combustion – highly reliable as a result.
- Often connected to the grid as well for emergency backup or supplemental power.
- Significant up-front capital cost investment.

Renewable / Alternative Energy: Biomass

- Likely wood by-product from industrial processes.
- Availability of biomass fuel in perpetuity, range and frequency of deliveries.
- It releases the same amount of CO2 absorbed by growing plants. However, recent studies indicate that releasing this CO2 in a single pulse is a greater contributor to greenhouse gases than woodland timber rotting slowly over decades.

Renewable / Alternative Energy: Solar Thermal

•Use energy from the sun to heat water or air



Renewable / Alternative Energy:

Geothermal Ground Source Heat Pump

- Geothermal heat pumps use the earth or the aquifer as a heat sink to reject or absorb heat.
- Uses the earth's relatively constant temperature
- Reduces energy consumption associated with heating and air conditioning systems
- Buildings consume 20% to 30% less energy

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Geothermal Power Economics

- Typical payback period: 5 to 15 years
- Factors include:
  - Actual Thermal Effectiveness of the Ground
  - Local Fuel Costs
  - Assumed rate of energy escalation
  - Geothermal systems are viewed as a hedge against possible fuel escalation costs

Types of Geothermal Systems

Closed Loop System

- Uses a series of plastic (HDPE) "U" tube pipes
- Installed 200 to 500 ft below grade
- Fluids circulate down/up each tube, gaining the earth's ambient temperature
- The warmed or cooled water is sent through a heat pump, which draws heating (or cooling) energy from the fluid via compressor to condition the building being served.
- Vertical or horizontal installation 2 to 3 tons of cooling per well
- Well cost: $8500 to $10,000 each
- 15' on center minimum

Disadvantages:

- Offers the least amount of thermal exchange per given length of well bore.
- Vast fields of "U" tubes are required

Advantages:

- Does not interface with the underground water (noncontact)
- Wells can be anywhere (below field, parking, building)
- No permitting

Types of Geothermal Systems

Open Loop System (Supply & Diffusion Wells)

- Uses wells or surface body water as the heat exchange fluid
- Installed 500 to 1,500 ft. deep
- Once circulated through the system, the water returns to the ground through the well, a recharge well, or surface discharge.

Advantages:

- Up to 5 to 10 times more efficient than closed loop systems in terms of energy exchange per square foot.

Disadvantages:

- Infeasible where bedrock is very deep
- Requires adequate supply of relatively clean water
- May need supplemental boiler
- Requires more permitting, operation and maintenance
- Well cost: $1000 per ton for standing column

Fatal Flaw Analysis

History of Alternative Energy in California

California, with its abundant natural resources, has had a long history of support for renewable energy. In 2008, 10.61 percent of all electricity came from renewable resources such as wind, solar, geothermal, biomass and small hydroelectric facilities. Large hydro plants generated another 11.7 percent of the state's electricity.

Around the turn of the 20th century, tens-of-thousands of homes in Southern California took advantage of the "California sunshine" to heat water for their homes. The oil crises of the 1970s gave rise to concerns over dependence on fossil fuels. At that time, federal and state tax credits helped establish a new solar and wind industry. Wind turbine farms cropped up on the slopes of hills in three primary locations; Altamont Pass near San Francisco, Tahapchi Pass near Bakersfield and San Gorgonio Pass near Palm Springs, a distance of approximately 285 miles to 680 miles respectively away from Crescent City, California.

Using these statistics and following California's ambitious renewable energy standards Frank Zaino & Associates, Inc. based their Fatal Flaw Energy Analysis on the most feasible alternative energy sources available to the Elk Valley Rancheria, including; Anaerobic Digestion, Biomass Energy, Hydroelectric Energy, Nuclear, Ocean and Wave Technology, as well as Combined Heat and Power while also investigating the use of Fuel Cell Technology, Geothermal Energy, Solar Photovoltaic's , Wind Energy and Solar Hot Water.

The following is an overview of Renewable Energy Sources available and defines the Pros and Cons of each technology as it pertains to the economical and environmental concerns of the Elk Valley Rancheria.

The California State Assembly has adopted the Federal Energy Code as of January 1, 2011 which restricts the use of all 100 watt incandescent lamps to 72 watts. Incandescent lamps produce more energy in heat than light. The federal energy code will go into effect in January 1, 2012.

Energy Conservation

Energy conservation and efficiency is the Tribes most cost effective way for reduction of operating expenses. Replacing high energy drawing lamps, ballast, equipment, and processes with low wattage lamps, electronic ballasts, high efficiency motors, and new equipment will reduce cost.

Pacific Power has rebate and incentive plans for replacement and retrofit of tribal equipment. We have included various grants for specific applications of equipment and processes.

New technology has developed compact fluorescent lamps, LED replacement lamps, occupancy detection and retrofits will drive energy consumption thereby down reducing power usage.

Maintenance cost continues to escalate and with the above noted new technology of these products with their extended life of 6 to 10 times the existing lamps. The reduction of labor hours can be allocated to other functions.

Anaerobic Digestion Process

Anaerobic Digestion is a biological process that produces a gas principally composed of methane (CH_4) and carbine dioxide (CO_2) otherwise known as biogas. These gases are produced from organic wastes such as livestock manure, food processing waste, etc.

Anaerobic processes could either occur naturally or in a controlled environment such as a biogas plant. Organic waste such as livestock manure and various types of bacteria are put into an air tight container called a digester so the process could occur.
Depending on the waste feedstock and dependant upon the system design the biogas is typically 55 to 75 percent pure methane. State of the art systems report production of biogas which is more than that 95 percent pure methane.

The Process of Anaerobic Digestion Consists of Three Steps

1. The first step is the decomposition (hydrolysis) of plant or animal matter. This step breaks down organic material to usable-sized molecules such as sugar.
2. The second step is the conversion of decomposed mater to organic acids.
3. Finally, the acids are converted to methane gas.

Process temperature affects the rate of digestion and should be maintained in the mesophillic range (95 to 105 degrees Fahrenheit) with an optimum of 100 degrees F. It is possible to operate in the thermophillic range (135 to 145 degrees F), but the digestion process is subject to upset if not closely monitored.

Many anaerobic digestion technologies are commercially available and have been demonstrated for use with agricultural wastes and for treating municipal and industrial wastewater.

The Disadvantages of Anaerobic Digestion

- No available waste stream to generate fuel
- Substrates in the biogas have an unpleasant odor
- High investment is required to prepare a biomass plant
- No waste water treatment facility available

Conclusion

Combined with the lack of a viable waste stream to generate fuel and no waste water treatment facility available to process waste water, and coupled with the high investment costs associated with the implementation of this technology, it is

viewed as a highly unfeasible solution to the Elk Valley Rancheria's alternative energy needs.

Biomass

Biomass consists of organic residues from plants and animals which are obtained primarily from harvesting and processing of agricultural and foresting crops. Biomass is wastes and byproducts that could be utilized as fuels for producing energy, instead of becoming landfill wastes.

Examples

Examples of some biomass residues that are utilized for direct combustion are: forest slash, urban wood waste, lumber waste, and agricultural waste. The term biomass refers to structural and non structural carbohydrates and other compounds produced through photosynthesis consisting of plant material and agricultural, industrial, and municipal wastes and residues. The components of biomass include cellulose, hemicelluloses, lignin, lipids, simple sugars, starches, water, hydrocarbons, ash and other compounds. The total estimated biomass resource potential of California is approximately 47 million bone dry tons.

From about 1990 to 1993, California's biomass generation was as its highest with more than 800MW of installed capacity, but as of 1996 energy production from biomass has dwindled consistently due to the expiration of price support to the biomass industry and the downside effects due to pollution and other environmental concerns. Other contributing factors are.

- Fossil fuel reserves are limited and are most likely to run dry in a couple of decades.
- Thanks to their declining reserves, the cost of fossil fuels is only likely to increase due to the classic case of demand vs. supply
- Fossil fuels cause a significant amount of pollution and environmental damage and contribute towards global warming.
- Restrictions on biomass removal from the Redwood Nation Park Reserve.
- No outlet for thermal heat generation at the Elk Valley Rancheria

Conclusion

- In conclusion, due to the environmental implications listed above and lack of a thermal outlet needed for biomass generation this form of technology is not a viable alternative energy source of The Elk Valley Rancheria. Restrictions on biomass removal from the Redwood Nation Park Reserve.

Hydroelectric

Producing hydroelectric energy is one of the older sources of power known by man. However, over the years, methods used for the process has definitely evolved due to technological advancements. Mills powered by rivers in older days have been replaced by dams and turbines these days. Hydroelectric power is used to produce almost a quarter of the total electricity needs around the world. Electricity produced in this manner is very much desired as a hydroelectric power plant does not cause pollution, is environmental friendly and is a form of renewable energy. However, a hydroelectric power plant can seriously disrupt ecosystem balance in the water bodies around the dam. A detailed account of hydroelectric energy pros and cons is given below.

Hydroelectric Energy Generation Process

A reservoir and a dam are required to generate electricity in the manner. Along with these, pipes, turbines and generators are also required. Water flowing from the dam is diverted to the place where power generation takes places, wherein the flowing water propels the turbines to create power which is converted to electricity by the generators. This electricity generated is carried over to a substation for electrical power, and from there it is supplied to consumers. There are certain factors which determine how much electricity is produced through the hydroelectric energy generation process. An important factor here is the height from which water falls on the turbines. The more the height, more electricity is produced. Other than the height, the volume of water flow is also a crucial aspect which determines the amount electricity generated in the power station. More electricity is generated if the volume of water flow is high.

Pros and Cons of Hydroelectric Energy

Pros of Hydroelectric Energy

Electricity produced through the hydroelectric energy generation method is without any pollution or harmful environmental effects. Neither are any dangerous greenhouse gases emitted, nor burning of fossil fuels is necessary to generate electricity this way. Hydroelectric power plants generate renewable energy. Building this type of an energy plant is not very costly and there are government grants which help relax the financial burden of building a power station.

The dams are useful for storing water which is useful for proving nearby areas with water in case of a drought. In case lake water is not being used for supplying drinking water, there can be few recreational activities like boating, fishing or swimming that can be carried out.

It is simpler and cheaper to maintain a hydro electric power plant than a nuclear power plant and breakdown instances are also fewer. Hydro electric plants last long and since the power generation process is mostly automated, less labor is needed to operate and supervise the power station.

Cons of Hydroelectric Energy

Hydroelectric energy plants, at times, can alter the local environment of an area to a great extent. As hydroelectric energy plants require a reservoir to function, it could cause flooding in neighboring lands. If this is the case, then areas around the reservoir need to be evacuated, resulting in people having to shift to different areas. Ecosystems are also affected by dams and natural changes in the river according to seasons are disrupted. The dam ends up blocking the silt which flows through the river to the beaches. If there are instances of drought in the area, dams are not that effective in producing electricity.

Plants that get destroyed because of the dams, tend to decay in an anaerobic environment. Methane, a greenhouse gas, is produced because of this. The damage caused through this process is more harmful than what would have resulted if the forest was destroyed naturally.

Compensation needs to be provided for transferring people and necessary arrangements for the same need to be made as well, for areas around where the dam is to be built. This is a tough task and could result in major disagreement and opposition from people if their demands are not met.

Conclusion

The economic investment and logistics involved in the production of a Hydroelectric Power Plant and associated infrastructure does not make this a feasible choice of technology as an alternative energy for the Elk Valley Rancheria.

Nuclear Energy

Nuclear energy in California (and imported from outside the state) accounted for 36,970 gigawatt-hours, represents 12.8 percent of electricity from all sources in 2004. The total dependable capacity of California's nuclear-supplied power is more than 5,300 megawatts, including the two operating nuclear power facilities in California and portions of nuclear facilities located in other states that are owned by California electrical companies.

Nuclear Energy Process

There are two fundamental ways to release energy from nuclear reactions: fission and fusion of atomic nuclei. Electricity generating technologies based on fission are commercially available, whereas fusion is still in the early stages of research and development and is at the present only a theoretical possibility for controlled power generation. Nuclear fission is the process of splitting the nuclei of atoms, which release energy from within those atoms. Nuclear fusion is the process of joining rather than splitting, such atomic particles with similar releases of energy.

Issues with Nuclear Power

- Nuclear plants may not be economically feasible in the United States.
- Need for a spent fuel disposal facility and a decommissioning plan
- Use of large amounts of water for cooling purposes (if wet cooling towers are used)
- Biological impacts on the ocean due to thermal discharge (if sea water cooling is used)
- Designing for seismic safety
- Public safety concerns
- Transportation issues associated with the development of an emergency evacuation plan
- Changes in visual quality due to the power plant structures, including the reactor vessel containment structure and cooling towers (if applicable)
- Potentially significant amounts of land
- Potentially significant public opposition

Conclusion

Most of the disadvantages with nuclear energy have to do with the inherent properties of nuclear fission. The energy and byproducts released by nuclear fission are health hazards--either because of being extremely hot, due to the highly energetic release of heat during nuclear fission, or because of the destructive effects of radiation poisoning. Other disadvantages tend to be industrial in nature. Not only does nuclear power come with an extremely high initial expense, but the storage of waste products remains a difficult and controversial problem

In conclusion the risks associated with Nuclear Energy as outlined in the Issues with Nuclear Power section above, far outweigh the benefits gained through its implementation both publicly and privately and renders this technology an unfeasible option for the Elk Valley Rancheria when all of the aforementioned costs and issues are taken into account.

Ocean Energy

Ocean Energy Process

Generating technologies for deriving electrical power from the ocean include tidal power, wave power, ocean thermal energy conversion, ocean currents, ocean winds and salinity gradients. Of these the three most well developed technologies are tidal power, wave power and ocean thermal energy conversion. Tidal power requires large tidal differences which in the US, only occur in Maine and Alaska. Ocean thermal energy conversion is limited to tropical regions such as Hawaii, and to a portion of the Atlantic coast. Wave energy has a more general application with potential along the California coast. The western coastline has the highest wave potential in the US, in California the greatest potential is along the northern coast.

California has more than 1,200 kilometers (745 miles) of coastline, and the combined average annual deep water wave power flux is over 37,000 megawatts of which an upper limit of about 20 percent could be converted into electricity. This is sufficient for about 23 percent of California's current electrical consumption. However, economics, environmental impacts, land-use and grid interconnection constraints will likely impose future limits to how much of the resource can be extracted. Although technology is still at a relatively immature pilot project stage, economic projections indicate that ocean energy could become cost-competitive in the long-term.

Wave Energy Process

Wave energy conversion takes advantage of the ocean waves caused primarily by interaction of winds with the ocean surface. Wave energy is an irregular and oscillating low-frequency energy source that must be converted to a 60-Hertz frequency before it can be added to the electric utility grid.

Although many wave energy devices have been invented, only a small proportion have been tested and evaluated. Furthermore, only a few have been tested at sea, in ocean waves, rather than in artificial wave tanks.

As of the mid-1990s, there were more than 12 generic types of wave energy systems. Some systems extract energy from surface waves. Others extract energy from pressure fluctuations below the water surface or from the full wave. Some systems are fixed in position and let waves pass by them, while others follow the waves and move with them. Some systems concentrate and focus waves, which increases their height and their potential for conversion to electrical energy.

A wave energy converter may be placed in the ocean in various possible situations and locations. It may be floating or submerged completely in the sea offshore or it may be located on the shore or on the sea bed in relatively shallow water. A converter on the sea bed may be completely submerged, it may extend above the sea surface, or it may be a converter system placed on an offshore platform. Apart from wave-powered navigation buoys, however, most of the prototypes have been placed at or near the shore.

The visual impact of a wave energy conversion facility depends on the type of device as well as its distance from shore. In general, a floating buoy system or an offshore platform placed many kilometers from land is not likely to have much visual impact (nor will a submerged system). Onshore facilities and offshore platforms in shallow water could, however, change the visual landscape from one of natural scenery to industrial.

The incidence of wave power at deep ocean sites is three to eight times the wave power at adjacent coastal sites. The cost, however, of electricity transmission from deep ocean sites is prohibitively high. Wave power densities in California's coastal waters are sufficient to produce between seven and 17 megawatts (MW) per mile of coastline.

According to the European Union, "Among the different converters capable of exploiting wave power, the most advanced is unquestionably the Pelamis Wave Energy Converter, a kind of "undulating sea serpent" developed by Ocean Power Delivery. This technology is the object of a commercial contract for installation of a farm in Portugal. In 2007, three machines, with a total capacity of 2.25 megawatts (MW), are in installation phase, and should be joined by 27 others in the years to come. Another 5 MW project is being studied for England this time."

None of these plants are located in California, although economic feasibility studies have been performed for a 30 MW wave converter to be located at Half Moon Bay. Additional smaller projects have been discussed at Fort Bragg, San Francisco and Avila Beach. There are currently no firm plans to deploy any of these projects.

As of the mid-1990s, wave energy conversion was not commercially available in the United States. The technology was in the early stages of development and was not expected to be available within the near future due to limited research and lack of federal funding. Research and development efforts are being sponsored by government agencies in Europe and Scandinavia.

Many research and development goals remain to be accomplished, including cost reduction, efficiency and reliability improvements, identification of suitable sites in California, interconnection with the utility grid, better understanding of the impacts of the technology on marine life and the shoreline. Also essential is a demonstration of the ability of the equipment to survive the salinity and pressure environments of the ocean as well as weather effects over the life of the facility.

Permitting Issues. Some of the issues that may be associated with permitting an ocean wave energy conversion facility include:

- Disturbance or destruction of marine life (including changes in the distribution and types of marine life near the shore)

- Possible threat to navigation from collisions due to the low profile of the wave energy devices above the water, making them undetectable either by direct sighting or by radar. Also possible is the interference of mooring and anchorage lines with commercial and sport-fishing.

- Degradation of scenic ocean front views from wave energy devices located near or on the shore, and from onshore overhead electric transmission lines

Conclusion

Due in part to the extremely high investment cost associated with this form of technology and the infancy of it coupled with fact that there are currently no plans to deploy any wave technologies systems in California makes this energy system unfeasible for The Elk Valley Rancheria's future energy needs.

Combined Heat & Power

Cogeneration, also known as combined heat and power (cogeneration) or CHP, and total energy, is an efficient, clean, and reliable approach to generating power and thermal energy from a single fuel source. That is, cogeneration uses heat that is otherwise discarded from conventional power generation to produce thermal energy. This energy is used to provide cooling or heating for industrial facilities, district energy systems, and commercial buildings. By recycling this waste heat, cogeneration systems achieve typical effective electric efficiencies of 50% to 70% — a dramatic improvement over the average 33% efficiency of conventional fossil-fueled power plants. Cogenerations' higher efficiencies reduce air emissions of nitrous oxides, sulfur dioxide, mercury, particulate matter, and carbon dioxide, the leading greenhouse gas associated with climate change.

Cogeneration now produces almost 10% of our nation's electricity, saves its customers up to 40% on their energy expenses, and provides even greater savings to our environment.

Cogeneration, as previously described above, is also known as “combined heat and power” (CHP), co-gen, district energy, total energy, and combined cycle, is the simultaneous production of heat (usually in the form of hot water and/or steam) and power, utilizing one primary fuel.

Cogeneration technology is not the latest industry buzz-word being touted as the solution to our nation's energy woes. Cogeneration is a proven technology that has been around for over 100 years. Our nation's first commercial power plant was a cogeneration plant that was designed and built by Thomas Edison in 1882 in New York. Primary fuels commonly used in cogeneration include natural gas, oil, diesel fuel, propane, coal, wood, wood-waste and bio-mass. These "primary" fuels are used to make electricity, a "secondary" fuel. This is why electricity, when compared on a btu to btu basis, is typically 3-5 times more expensive than primary fuels such as natural gas.

Combined Heat and Power Process

An example of a cogeneration process would be the automobile in which the primary fuel (gasoline) is burned in an internal combustion engine - this produces both mechanical and electrical energy (cogeneration). These combined energies, derived from the combustion process of the car's engine, operate the various systems of the automobile, including the drive-train or transmission (mechanical power), lights (electrical power), air conditioning (mechanical and electrical power), and heating of the car's interior when heat is required to keep the car's occupants warm. This heat, which is manufactured by the engine during the combustion process, was “captured” from the engine and then re-directed to the passenger compartment.

Due to competitive pressures to cut costs and reduce emissions of air pollutants and greenhouse gasses, owners and operators of industrial and commercial facilities are actively looking for ways to use energy more efficiently. One option is cogeneration, also known as combined heat and power (CHP). Cogeneration/CHP is the simultaneous production of electricity and useful heat from the same fuel or energy. Facilities with cogeneration systems use them to produce their own electricity, and use the unused excess (waste) heat for process steam, hot water heating, space heating, and other thermal needs. They may also use excess process heat to produce steam for electricity production. Cogeneration currently coexists with a regulated industry that is going through major structural changes that may limit or expand its application.

Disadvantages of CHP

- Generally small scale thermal electricity generation has low efficiency compared to large scale generation.
- Novel generation technologies for small scale thermal electricity generation are being developed but conversion efficiencies remain low compared to heat only applications. There needs to be a valid use for the heat produced during electricity generation and consideration given to what this will be during summer months when heat demand may be lower.
- Using the heat to drive an absorption chiller to provide cooling when heat is not required has been pursued by some manufactures, Elk Valley Rancheria has electric direct expansion cooling units where chilled water is not available for piping to cooling equipment.
- An alternative approach is to generate electricity only when there is sufficient demand for heat, and use electricity from alternative sources at other times. However, this may extend the financial payback times for the installation.

Conclusion

Without an alternative outlet for the steam produced by co-generation this technology is not a viable renewable energy source for the Elk Valley Rancheria.

Fuel Cell Technology

A fuel cell is an electrochemical device that combines hydrogen fuel and oxygen from the air to produce electricity, and useable heat and water. Fuel cells produce Direct Current (DC) electricity without the conventional combustion reaction.

The Fuel Cell Process

A fuel cell is made up of an electrolyte member sandwiched between fuel and oxidant electrodes. Typically, a fossil fuel or biogas from which hydrogen is extracted is used for most common applications. The oxidant is typically plain air. The fuel is oxidized at the "anode electrode", releasing electrons that move to the "cathode electrode" via the external circuit. These electrons meet the hydrogen and push charged ions across the electrolyte. The charged ions (positively or negatively charged) move across the ion conducting electrolyte member, completing the electrical circuit. This electrochemical process requires very few moving parts, typically limited to air blowers and fuel/water pumps. Because of high fuel conversion efficiency, the flexibility to generate Combined Heat and Power (CHP), low-impact characteristics, and negligible environmental emissions, fuel cells are a desirable source of power generation for a broad range of markets and applications. Fuel cells are fast replacing reciprocating engines and gas turbines as the most environmentally-friendly sources of on-site power.

Carbonate fuel cell power plants can utilize many fuel sources, including

- Natural gas
- Industrial and municipal wastewater treatment gas
- Landfill gas
- Propane
- Coal gas

The Pros of Cell Fuels are:

- Very clean, Fuel cells produce electricity for just about anything, and the only waste is water vapor and heat.

The Cons of Cell Fuels are:

- Costly. Very high operational maintenance cost
- No natural gas line available to the property
- Large propane tank would need to be installed on the Rancheria property
- Propane would need to be trucked to the property impacting the cost of production
- Projected cost of purchased power is less expensive than the cost to produce through the fuel cell

Fuel cells are different from conventional electrochemical cell batteries in that they consume reactant from an external source, which must be replenished – a thermodynamically open system. By contrast, batteries store electrical energy chemically and hence represent a thermodynamically closed system.

Conclusion

With the inability to effectively disperse the thermal load created by the fuel cells at the Elk Valley Rancheria this technology is not a feasible means of power generation.

Geothermal Energy

Because of its location on the Pacific's "Ring of Fire" and because of tectonic plate conjunctions, California contains the largest amount of geothermal generating capacity in the United States.

The largest concentration of geothermal plants is located north of San Francisco in the Geysers Geothermal Resource Area in Napa and Sonoma Counties. This location has been producing electricity since the 1960s. It uses dry steam; one of the only two places in the world for this resource (the other being in Larderello, Italy.)

Geothermal Process

Heat pumps move heat energy from one place to another. Your refrigerator works using the same scientific principles. By using the refrigeration process, geothermal heat pumps remove heat energy stored in the ground and/or the earth's groundwater and transfer it to the system.

The earth has the ability to absorb and store the heat energy. To use the stored energy, heat is extracted from the earth through a liquid medium and is pumped to the heat pump or heat exchanger. There the heat is used to heat the system.

Conclusion

Because of the location of these deposits in the Napa and Sonoma counties the use of Geothermal Energy at the Elk Valley Rancheria is not economically feasible with the existing installed HVAC systems.

Solar Energy

Photovoltaic Process

Photovoltaic (PV) systems use solar electric panels to directly convert the sun's energy into electricity. This conversion of sunlight to electricity occurs without moving parts, is silent and pollution free in its operation. The solar electricity fed through electronic equipment is converted to utility grade electricity for use directly in the building. The solar electricity can be used to offset the need for purchased utility electricity or, if the PV electricity exceeds the building's requirements, the excess electricity can be sent back to the utility, typically for credit.

Different types of photovoltaic products are available today from numerous manufacturers. The supply of PV collectors worldwide has increased from 20 to 30 percent annually to keep up with the demand for this renewable energy technology. PV modules (or solar electric collectors) are different from solar thermal collectors that convert the sun's energy into thermal (typically hot water) energy. Photovoltaic modules are usually rigid, rectangular devices ranging in size from 2' by 4' to as large as 4' by 8'. Some PV module technologies are flexible and as large as 2' by about 20' or even larger. Rigid PV modules typically have a glass cover while the flexible modules have a high grade durable film cover. Both types of PV module construction have been rigorously tested to survive storm and hail damage and are resistant to degradation from ultra-violet rays.

Most residential PV systems are used in conjunction with utility-supplied power. Excess power produced during daylight hours can be fed back into the utility's lines, while utility electricity is used in the home when the house demand is greater than can be supplied by the PV roofing. Typical residential PV systems commonly have a peak power production of between 1,200 and 5,000 watts, alternating current and requires from between 150 to over 1,000 square feet of installed area depending on the efficiency of the PV technology used.

Most often, PV panels are installed on roofs, but they can also be installed as free-standing units, fixed on a fixed pole in the groung, or even on complex tracking structures that change with the sun's angle during the day.

Electricity produced using Photovoltaic's energy reduces the amount of energy used from non-renewable resources such as coal, gas, and oil and nuclear. In addition, there are significant environmental benefits resulting from reductions in air pollution from burning fossil fuels, reductions in water and land use from central generation plants, reductions in the storage of waste byproducts. In addition, the solar technologies produce energy with little noise and few moving parts

One of the greatest barriers to the widespread adoption of PV systems is their high initial cost. Photovoltaic panels require an unobstructed exposure to sunlight to obtain their maximum efficiency. Most PV panels are tested to meet both electrical and environmental performance criteria. Experience with existing photovoltaic products over

the past 20 years has shown that they have excellent reliability with very little maintenance required.

Expected cost of electricity produced from a PV system is equal to about 25 to 50 cents per kilowatt-hour (kWh) when considering initial cost spread over the lifetime of the system, plus maintenance costs. This compares with an average rate of now over 9.53 cents per kWh for utility supplied power. However, many states and the federal government have active programs to reduce the capital cost and/or the installation cost of PV systems by providing tax credits, tax deductions and rebates for PV systems. Some of the government provided benefits are significant enough to make the PV electricity nearly competitive with utility supplied electricity. An additional consideration in energy planning is the impact that deregulation has had on the electrical power market. Facilities with self generating capabilities will have the greatest flexibility to positively plan and manage their energy expenditures during periods of dynamic electricity and fuel gas pricing.

For homes not in proximity of electric power lines, PV systems may be less costly than extending power lines to the home. Unlike gas generators, they operate silently and require maintenance primarily for the battery storage.

Because reliability has proven good thus far, PV systems actually reduce the cost of powering homes and other buildings. The amount varies depending on the size of the system, the building's location, and the building's energy needs.

Most PV products have undergone extensive testing and certification for fire, wind uplift, and electrical safety performance. Some have obtained evaluation reports from major model building codes to assure their acceptance. Many PV products are listed through a testing laboratory such as Underwriters Laboratory.

The efficiency of PV will depend on the maximum sun exposure, so the house location is important. Panel photovoltaic systems are ready to install and supplied by distributors. PV installations require a portion of the roof to be exposed to direct sunlight. Depending on the PV product, they can be installed by roofing professional, an electrician, or both. They must be wired to the house power supply by an electrician.

Manufacturing warranties vary from 10 to 25 years for workmanship and defects. However, many companies also guarantee a minimum power produced by the PV system for a certain number of years. The percentage depends on the technology and the rated peak power of the PV system and is generally about 80% of the rated power.

Panel PV products provide environmental benefits because they do not produce pollution or carbon dioxide emissions like fossil fuel-based utility power. They are also more attractive than many other solar systems, which increases consumer acceptance. Unlike utility supplied power, once purchased, the cost of producing PV electricity remains constant over the life of the system since the only fuel used is sunlight.

Conclusion

In conclusion, with Redwood State Park's initiative to Photovoltaic conversion and its immediate proximity to the Elk Valley Rancheria this technology would appear to be the best suited alternative energy for the Rancheria's energy goals while incorporating an environmentally friendly energy source for the Rancheria.

Elk Valley Solar Hot Water

Fatal Flaw Analysis

Solar Hot Water Technology

Solar Hot Water Process

In general there are solar collectors that capture the sun's heat and transfer it to some liquid medium. That liquid medium can be the hot water used later or a special liquid that transfers the heat through a heat exchanger to the water, warming it.

The solar collectors can be made from different materials. Copper and Glass are common. If you look at your car's radiator you'll see fins attached to a series of pipes. Here the engine's heat is transferred through an antifreeze solution or unaltered water to the radiator. The radiator will then RADIATE the heat to the surroundings and therefore cooling the engine's cooling fluid. The fins provide added physical radiation area for faster cooling and smaller radiator.

Now, Solar Water Heating works just like that, only the process is reversed. The fins or other surface expanding area is used to capture the sun's heat and heat the water or some other fluid.

All solar water heating systems have a storage tank and circulation systems. The water is heated in the solar panels and then stored in a storage tank that looks like a typical storage water heater tank. The solar tank differs as it is better insulated and retains the heat better since it doesn't have a venting flue like the traditional tank.

In a direct solar system the water in the storage tank is then circulated through the panels to be heated when exposed to the sun and returns to the tank again. This system can work without a pump or with a pump, depending on the system's design.

A temperature controlled mixing valve will then mixes the water from the tank with fresh cold water to get the desired water temperature that is set to. There are various safety components to control the water pressure and temperature in the panels to the tank and prevent over heating of the components.

Combined with Tank less Water Heater

The tank less water heater's computer always measures the incoming fresh cold water temperature and adjusts its gas burner's so the set hot water temperature can be

achieved. The measurement of the outgoing heated water and the incoming water happens many hundred times a minute. The computer then regulates the gas supply to the burner and measures the burner's efficiency and regulates the oxygen for optimum combustion.

The incoming water to the tank less water heater can be almost any temperature. The computer can normally vary the combustion from approx. 5% to 100%. A simple example without consideration of water volume is if the hot water temperature is set to 120 deg. F and the incoming water temperature is at 60 deg. F the combustion would be set for 100%. If the incoming water temperature is 120 deg. F then the combustion is set to 0% and the burner would not be fired up. The tank less water heater is able to "pass through" the incoming water if it is approx. equal to its set hot water temperature but it CANNOT cool the water.

A solar water heating system can easily be used with a tank less water heater. It is one of the most economical ways of heating water. The outgoing heated water supply of a solar heating system can be the incoming water supply of the tank less water heater. Anytime the water is below the desired hot water temperature the tank less water heater would heat it to the set temperature and if already at that temperature it would simply "pass through" the hot water.

If such a system is designed and sized properly it can be run with a small tank less water heater that will act only as an auxiliary heater to the solar system during cloudy days and be very cost effective and energy saving.

Pros and Cons of Solar Hot Water

Solar Hot Water Advantages:

1. Solar energy is, for all practical purposes, a renewable resource.

2. Except for the processes involved in manufacturing the materials, solar energy does not produce harmful substances.

3. Unlike fossil fuels, solar energy does not exist only in specific pockets of the earth: it is everywhere, although not in evenly distributed concentrations.

4. Sunlight is free.

5. While far from perfect, the technology required using solar radiation as energy to produce heat, light, mechanical power and electricity already exists.

6. Small solar power systems are easily installed.

7. The systems are very low maintenance: they have minimal moving parts (except for fans and pumps, for example) and can last a long time.

8. Small systems require very little in the way of "monitoring" for routine operation.

9. Given the right data, it is almost always possible to predict how much power a solar energy system will produce.

10. The systems are quiet and increasingly unobtrusive.

Solar Hot Water Disadvantages

1. The initial costs for components can be high.

2. Not every location is a feasible site for solar.

Conclusion

In conclusion the initiative to install Solar Hot Water Technology at the Elk Valley Rancheria would appear to be a suitable energy alterative for the Rancheria's future energy goals while maintaining an environmentally friendly footprint.

Wind Energy

Process

The conversion of wind energy to various other useful forms, like electricity, is known as wind power. Wind energy is converted into these forms using wind turbines. Wind energy can be converted into electrical energy by the use of an electrical generator.

The first use of wind energy was through wind mills. Wind mills had engines which used to produce energy using wind. This energy was usually used in rural and agricultural areas for grinding, pumping, hammering and various farm needs. Even today, wind energy is used in large scale wind farms to provide electricity to rural areas and other far reaching locations.

Wind energy is being used extensively in areas like Denmark, Germany, Spain, India and in some areas of the United States of America. It is one of the largest forms of Green Energy used in the world today. Wind Energy is highly practical in places where the wind speed is 10 mph or more.

Advantage's

One of the greatest advantages of Wind Energy is that it is ample. Secondly, wind energy is renewable. Some other advantages of Wind Energy are that it is widely distributed, cheap, and also reduces toxic gas emissions. Wind Energy is also advantageous over traditional methods of creating energy, in the sense that it is getting cheaper and cheaper to produce wind energy. Wind Energy may soon be the cheapest way to produce energy on a large scale.

The cost of producing wind energy has come down by at least eighty percent since the eighties. Along with economy, Wind Energy is also said to diminish the greenhouse effect.

Also, wind energy generates no pollution. Wind Energy is also a more permanent type of energy. The wind will exist till the time the sun exists, which is roughly another four billion years. Theoretically, if all the wind power available to humankind is harnessed, there can be ten times of energy we use, readily available.

One other advantage of wind energy that it is readily available around the globe, and therefore there would be no need of dependence for energy for any country. Wind energy may be the answer to the globe's question of energy in the face of the rising petroleum and gas prices.

Disadvantages

There are some disadvantages for wind energy, which may put a dampener in its popularity. Though the costs of creating wind energy are going down, even today a large number of turbines have to be built to generate a proper amount of wind energy. Though wind power is non-polluting, the turbines may create a lot of noise, which indirectly contributes to noise pollution.

Wind can never be predicted. Even the most advanced machinery may come out a cropper while predicting weather and wind conditions. Since wind energy will require knowledge of the weather and wind conditions on long term basis, it may be a bit impractical. Therefore, in areas where a large amount of wind energy is needed, one cannot depend completely on wind.

Many potential wind farms, located where wind energy can be produced on a large scale, are far away from locations at which wind energy is best suited. Therefore, the economical nature of wind energy may take a beating in terms of costs of new substations and transmission lines.

Wind Energy is non-dispatchable. Wind energy depends upon the wind in an area and therefore is a variable source of energy. The amount of wind supplied in a location where the amount of energy produced from it will depend on various factors like wind speeds and the turbine characteristics. Some critics also wonder whether wind energy can be used in areas of high demand.

Conclusion

In conclusion the sustained winds needed for energy production for this technology is limited, making the feasibility of wind power as an alternative energy solution questionable and probably, ineffective.

Carbon Footprint Reduction

A solar panel installation of 414.16 KW will help to reduce the tribal carbon footprint by 4,031828 pounds per year or 4,467,761 miles driven in an average size car or 10,080 trees.

414.16 kilowatts equals 41,416 square feet of solar panels or 10 watts per square foot.

Panel size 39.1" X 64.6" = 2525.86 square inches divided by 144 = 17.54 square feet per panel.

2361 panels producing 234 watts per panel.

The installation of solar panels will cost approximately 3.0 million dollars with a 30 percent tax credits toward capital costs.

Energy Efficiency Credits (EEC) may be available through the Department of Energy or the Bureau of Indian Affairs.

Estimates

- Break out of cost for recommended energy efficiencies Page 65

Grants and Incentive

- **Federal** Page 73
  - Corporate Tax Credit would only apply if the Tribe was to partner with an investor who could apply the credit towards the project investment.
  - Performance based incentives apply to renewable energy generate by a tribal government at 2.2¢ per kilowatt hour. Page 77
  - Grant program for renewable energy generation, 30 % of property that is part of the qualified facility. Page 79
  - Grant program for tribal government for Eligible efficiency technologies. This program is approved on a solicitation for the specific project on tribal lands. Page 82

- **Pacific Power Company**
  - Lighting retrofit Page 84
    - Upgrade of existing fixtures.
    - Replace lamps types
    - Conversion of existing fixture
    - List of light fixtures and lamp types
  - **Major renovation of existing facilities** Page 87
  - Lighting
  - Controls
  - Motors
  - Incentives are eligible for funding of up to 60 % based on project.

- **Pacific Power example** Page 94
  - **Meek's hardware**
    - Lighting retrofit

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Local examples: Solar Photovoltaic

United Indian Health Services
1600 Weeat Way
Arcata, California 95521

The UIHS solar system produces 42 Kilowatts, which is equivalent to the energy needed to support 12-16 average size homes. The system is comprised of 216 Evergreen solar modules distributed to six 6 KW Sunnyboy inverters; each inverter receiving three series of twelve panels. This is only the first phase of the project, and as additional funds from fundraising efforts become available, UIHS plans to increase the size of the solar electric system to be able to meet the energy demands of Potawot.

UIHS is producing electricity from its solar array and inverters with limited sunshine available. The UHIS complex is approximately 80 miles from Elk Valley Rancheria, California.

National Park Services
North Operations Center
1024 Aubell Lane
Crescent City, California 95521

National Park Service's dedication of the new maintenance facility, August 27, 2009
This 34,000 square-foot facility received a silver rating as set forth by Leadership in Energy Efficient Design (LEED). A number of energy conservation and environmentally sensitive measures were incorporated in the construction.

North Operations Center

The new facility has indirect skylights, solar panels, and waste water recycle system for equipment cleaning. The NPS is just 2.12 miles from the tribal property. The facility's proximity to Elk Valley Rancheria makes it a good example of solar electrical production in the area.

Conclusions

These are the most economical and energy efficient measures that can be concluded from this report and listed as follows.

Action Plan Recommendations

The summaries of options to reduce energy cost are as follows:

Action item #1

Casino Complex

- Conservation and replacing the high energy consuming lamps, ballasts and older equipment. Budget value $50,000
- New Building Management System Budget value $37,300
- Indirect Lighting portals Budget value $38,000
- Solar hot water Thermal Budget value $66,834
- Small 4KW Solar Photovoltaic system Budget value $21,792
- Insulate ductwork Budget value $8,500
- Patch abandoned openings Budget value $2,500

Administration Facility

- Conservation and replacing the high energy consuming lamps, ballasts and older equipment. Budget value $25,000
- Tribal Council Chamber AHU unit Budget value $12,475
- New Building Management System Budget value $37,300
- Indirect Lighting portals Budget value $38,000

Gaming Facility

- Conservation and replacing the high energy consuming lamps, ballasts and older equipment. Budget value $12,000
- New AHU unit replacement w/ BMS system Budget value $40,000
- Indirect Lighting portals Budget value $12,000

Community Center Complex

- Conservation and replacing the high energy consuming lamps, ballasts and older equipment. Budget value $15,000
- New Building Management System Budget value $37,300
- Solar hot water Thermal Budget value $28,500
- Indirect Lighting portals Budget value $27,000
- Small 4kw Solar Photovoltaic system Budget value $21,792

Action item #2

Casino Complex

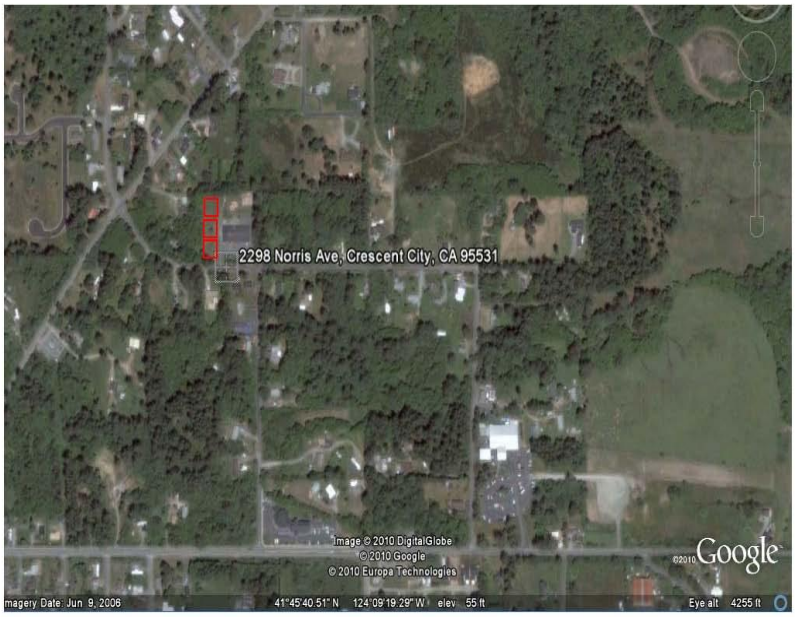
- Phased Solar Photovoltaic system — Budget value $1,347,250
- Large Solar Photovoltaic system — Budget value $10,778,000

Administration Facility

- Small 4kw Solar Photovoltaic system — Budget value $21,792
- Tribal Council Chamber AHU unit replacement — Budget value $86,400

Community Center Complex

- Solar hot water Thermal — Budget value $28,500
- Small 4kw Solar Photovoltaic system — Budget value $21,792
- Ground mounted system would eliminate the need to do a structural evaluation of the building.

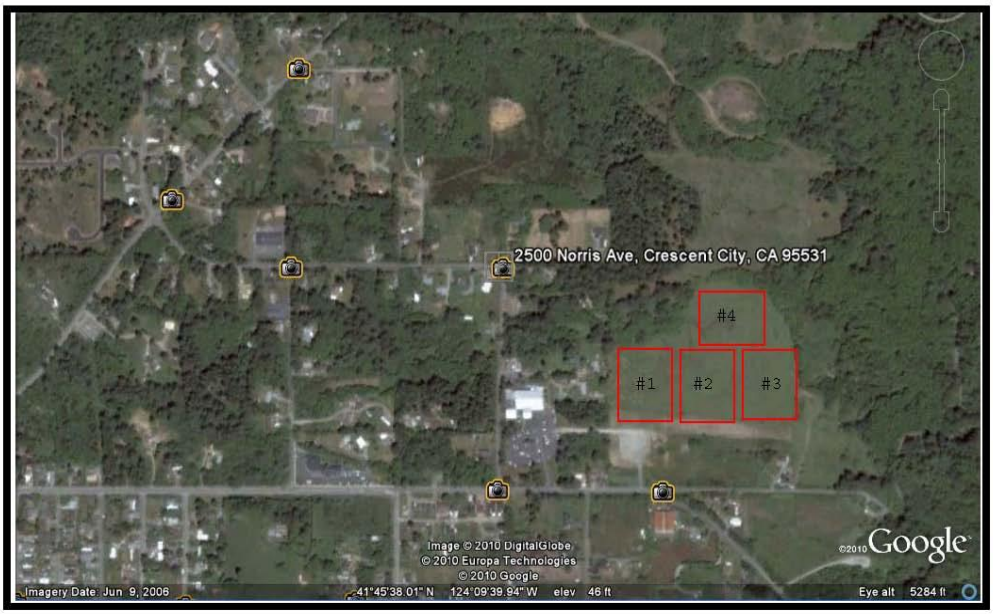


Proposed solar panel installation at the Tribal Community Center 2298 Norris Ave, Crescent City, California 95531

Frank Zaino and Associates, Inc.

Proposed Solar Panels at the Tribal Community Center

Proposed Solar Array Locations



Proposed Solar panel locations to produce a total 2.5 million watts of energy when all phases are complete to be distributed to Pacific Power as a revenue source For Elk Valley Rancheria and to offset the energy cost to the Tribal properties. The proposed field to be installed in a phased approached to reduce capital costs. The area will cover an undeveloped site east of the Elk Valley Casino. This installation will be self ballasted solar panels placed on level land. The production is based on a witnessed solar array output in Arcata, California and this estimate is at 3066 hours of production. (8760 hours per year/2 = daylight hours- 30% overcast hours = 3066)

Frank Zaino and Associates, Inc.

Proposed solar panel installation the Elk Valley Casino

A ground mounted system would eliminate the need to do a structural evaluation of the building. This system would be installed in a phased approach to reduce capital costs and provide revenue to help support additional installations.

Not Recommended Systems

The following options to reduce energy cost cannot be recommended at this time without alternate funding sources. The overall cost to design, install, operate and maintain the alternative energy options we have reviewed leaves an extended period for payback, high fuel costs, and large capital investment.

Anaerobic Digestion
Biomass
Hydroelectric
Nuclear Energy
Ocean Energy
Combined Heat and Power
Fuel Cell Technology
Geothermal Energy
Wind

See fatal flaw analysis starting on page 34

Frank Zaino and Associates, Inc. are pleased to have worked with Elk Valley Rancheria, California in preparing this Energy Efficiency and Alternatives Analysis. This process will serve as the beginning for the Tribe to reach its goal of reducing its overall energy costs and to improve its carbon footprint.

Solar Hot Water Energy Project Cost Estimator

Project Name	**Crescent City, Cal, 95531**
System Size (BTUH)	**2,200**

Cost/Watt	Estimated Price	Total
Equipment		
Panels and piping systems	$ 17.0000	$ 37,400
Racking	$ 0.3500	$ 770
Concrete INV Pad	$ 0.2500	$ 550
Inverters & Switch Gear	$ 0.4600	$ 1,012
Combiners	$ 0.0075	$ 17
	$ -	
Total	$ 18.0675	$ 39,749
Pre Development Soft Costs		
Insurance	$ 0.0140	$ 31
Developers Risk		$ -
Open	$ -	$ -
EFP Service Fee	$ 0.2500	$ 550
Initial 3rd Party Due-Diligence	$ 0.0140	$ 31
Open		$ -
Initial Solar Design & Site Visits	$ -	$ -
Fence, Seed	$ 0.0150	$ 33
Interconnection	$ 0.2000	$ 440
Total	$ 0.4930	$ 1,085
Development Soft Costs		
Electrical Services	$ 0.3700	$ 814
Site Work	$ 2.0000	$ 4,400
Racking Installation	$ 0.0800	$ 176
Panel Installation	$ 2.5000	$ 5,500
Wiring Harnesses/Trenching	$ 0.2000	$ 440
Punch List Labor	$ 0.2500	$ 550
Equipment Rental	$ 0.2000	$ 440
Mounting Screws	$ 0.1500	$ 330
Security Camera	$ -	$ -
Monitoring	$ 0.0009	$ 2
Mobilization	$ 2.0000	$ 4,400
Lodging, ,Meals , Home Tickets	$ 0.5000	$ 1,100
Gas	$ 0.5000	$ 1,100
Vehicles & Gas	$ 0.5000	$ 1,100
Disposal	$ 0.2500	$ 550
Sanitary Services	$ 0.7500	$ 1,650
Hardware & Hand Tools	$ 0.6500	$ 1,430
Total	$ 10.9009	$ 23,982
Post Development Soft Costs		
Permits and Legal	$ 0.4000	$ 880
EPC Fee 15% of Actual Cost	$ 0.5175	$ 1,139
Demob	$ 0.0001	$ 0
Total	$ 0.9176	$ 2,019
Total Costs	**$ 30.3790**	**$ 66,834**
	Cost per watt	

Incentives and Credits		
Solar Hot Water	**Cost**	**$ 66,834**
Tax Credit 30%		$ (20,050.00)
Property Grant 30%	$ 39,749.00	$ (11,924.00)
Performance based incentive by Kilowatt hour		
Kilowatt hours reduced		
Total cost after incentives		$ 34,860
Payback		**15 years**

Total production of BTUH per year calculation is per year based on an average of 4.41 hours of sunlight per day
118,326,000 BTUH of solar energy thermal per year
118,326,000 \ 22,000 BTUH per pound of LP = 5378 Pounds of LP Per Year = $2312 savings per year
15 year payback
The need to get other grant opportunities or lobby to have the California Legislature support solar renewable energy credits is critical to support these type of installs.

4KW Energy Project Cost Estimator

Project Name	**Crescent City, Cal, 95531**
System Size (W)	**4,000**

Cost/Watt	Estimated Price	Total
Equipment		
Panels	$ 1.8000	$ 7,200
Racking	$ 0.3500	$ 1,400
Concrete INV Pad	$ 0.0278	$ 111
Inverters & Switch Gear	$ 0.4600	$ 1,840
Combiners	$ 0.0075	$ 30
	$ -	
Total	$ 2.6453	$ 10,581
Pre Development Soft Costs		
Insurance	$ 0.0140	$ 56
Developers Risk		$ -
Open	$ -	$ -
EFP Service Fee	$ 0.2500	$ 1,000
Initial 3rd Pary Due-Dilligance	$ 0.0140	$ 56
Open		$ -
Initial Solar Design & Site Visits	$ -	$ -
Fence, Seed	$ 0.0150	$ 60
Interconnection	$ 0.2000	$ 800
Total	$ 0.4930	$ 1,972
Development Soft Costs		
Electrical Services	$ 0.3700	$ 1,480
Site Work	$ 0.2000	$ 800
Racking Installation	$ 0.0800	$ 320
Panel Installation	$ 0.1500	$ 600
Wiring Harnesses/Trenching	$ 0.2000	$ 800
Punch List Labor	$ 0.0300	$ 120
Equipment Rental	$ 0.2000	$ 800
Moutning Screws	$ 0.1500	$ 600
Security Camera	$ 0.0010	$ 4
Monitoring	$ 0.0009	$ 4
Mobilization	$ 0.0020	$ 8
Lodging, ,Meals , Home Tickets	$ 0.0030	$ 12
Gas	$ 0.0002	$ 1
Vehicles & Gas	$ 0.0007	$ 3
Disposal	$ 0.0020	$ 8
Sanitary Services	$ 0.0007	$ 3
Hardware & Hand Tools	$ 0.0015	$ 6
Total	$ 1.3920	$ 5,568
Post Development Soft Costs		
Permits and Legal	$ 0.4000	$ 1,600
EPC Fee 15% of Actual Cost	$ 0.5175	$ 2,070
Demob	$ 0.0001	$ 0
Total	$ 0.9176	$ 3,670
Total Costs	**$ 5.4479**	**$ 21,792**

Large Scale Solar Energy Project Cost Estimator Section 1 of 8

Project Name	**Crescent City, Cal, 95531**
System Size (W)	**312,500**

Cost/Watt	Estimated Price	Total
Equipment		
Panels	$ 1.8000	$ 562,500
Racking	$ 0.3500	$ 109,375
Concrete INV Pad	$ 0.0278	$ 8,688
Inverters & Switch Gear	$ 0.4600	$ 143,750
Combiners	$ 0.0075	$ 2,344
	$ -	
Total	$ 2.6453	$ 826,656
Pre Development Soft Costs		
Insurance	$ 0.0140	$ 4,375
Developers Risk		$ -
Open	$ -	$ -
EFP Service Fee	$ 0.2500	$ 78,125
Initial 3rd Pary Due-Dilligance	$ 0.0140	$ 4,375
Open		$ -
Initial Solar Design & Site Visits	$ -	$ -
Fence, Seed	$ 0.0150	$ 4,688
Interconnection	$ 0.2000	$ 62,500
Total	$ 0.4930	$ 154,063
Development Soft Costs		
Electrical Services	$ 0.3700	$ 115,625
Site Work	$ 0.0200	$ 6,250
Racking Installation	$ 0.0800	$ 25,000
Panel Installation	$ 0.0150	$ 4,688
Wiring Harnesses/Trenching	$ 0.0020	$ 625
Punch List Labor	$ 0.0003	$ 94
Equipment Rental	$ 0.0020	$ 625
Moutning Screws	$ 0.1500	$ 46,875
Security Camera	$ 0.0010	$ 313
Monitoring	$ 0.0009	$ 281
Mobilization	$ 0.0020	$ 625
Lodging, ,Meals , Home Tickets	$ 0.0030	$ 938
Gas	$ 0.0002	$ 63
Vehicles & Gas	$ 0.0007	$ 219
Disposal	$ 0.0020	$ 625
Sanitary Services	$ 0.0007	$ 219
Hardware & Hand Tools	$ 0.0015	$ 469
Total	$ 0.6513	$ 203,531
Post Development Soft Costs		
Permits and Legal	$ 0.0040	$ 1,250
EPC Fee 15% of Actual Cost	$ 0.5175	$ 161,719
Demob	$ 0.0001	$ 31
Total	$ 0.5216	$ 163,000
Total Costs	**$ 4.3112**	**$ 1,347,250**

Incentives and Credits		
1 of 8 SolarArray	Cost	**$ 1,347,250.00**
Tax Credit 30%		$ 404,175.00
Property Grant 30%	$ 826,656.25	$ 121,252.50
Performance based incentive by Kilowatt hour	357954	$ 7,874.98
Kilowatt hours reduced	357954	$ 28,636.32
Total cost after incentives		$ 821,822.50
Payback		**22.5 years**

Total production of power per year calculation is 357954 kwh per year based on an average of 4.41 hours of sunlight per day

357954 x 0.08 kwh = $ 28,636.32 per year

357954 x 0.022 kwh = $ 7874.98 per year

22.5 year payback

The need to get other grant opportunities or lobby to have the California Legislature support solar renewable energy credits is critical to support these type of installs.

Large Scale Energy Project Cost Estimator

Project Name	**Crescent City, Cal, 95531**
System Size (W)	**2,500,000**

Cost/Watt	Estimated Price	Total
Equipment		
Panels	$ 1.8000	$ 4,500,000
Racking	$ 0.3500	$ 875,000
Concrete INV Pad	$ 0.0278	$ 69,500
Inverters & Switch Gear	$ 0.4600	$ 1,150,000
Combiners	$ 0.0075	$ 18,750
	$ -	
Total	$ 2.6453	$ 6,613,250
Pre Development Soft Costs		
Insurance	$ 0.0140	$ 35,000
Developers Risk		$ -
Open	$ -	$ -
EFP Service Fee	$ 0.2500	$ 625,000
Initial 3rd Pary Due-Dilligance	$ 0.0140	$ 35,000
Open		$ -
Initial Solar Design & Site Visits	$ -	$ -
Fence, Seed	$ 0.0150	$ 37,500
Interconnection	$ 0.2000	$ 500,000
Total	$ 0.4930	$ 1,232,500
Development Soft Costs		
Electrical Services	$ 0.3700	$ 925,000
Site Work	$ 0.0200	$ 50,000
Racking Installation	$ 0.0800	$ 200,000
Panel Installation	$ 0.0150	$ 37,500
Wiring Harnesses/Trenching	$ 0.0020	$ 5,000
Punch List Labor	$ 0.0003	$ 750
Equipment Rental	$ 0.0020	$ 5,000
Moutning Screws	$ 0.1500	$ 375,000
Security Camera	$ 0.0010	$ 2,500
Monitoring	$ 0.0009	$ 2,250
Mobilization	$ 0.0020	$ 5,000
Lodging, ,Meals , Home Tickets	$ 0.0030	$ 7,500
Gas	$ 0.0002	$ 500
Vehicles & Gas	$ 0.0007	$ 1,750
Disposal	$ 0.0020	$ 5,000
Sanitary Services	$ 0.0007	$ 1,750
Hardware & Hand Tools	$ 0.0015	$ 3,750
Total	$ 0.6513	$ 1,628,250
Post Development Soft Costs		
Permits and Legal	$ 0.0040	$ 10,000
EPC Fee 15% of Actual Cost	$ 0.5175	$ 1,293,750
Demob	$ 0.0001	$ 250
Total	$ 0.5216	$ 1,304,000
Total Costs	**$ 4.3112**	**$ 10,778,000**

Vertical Turbine Wind Energy Project Cost Estimator

Project Name	**Crescent City, Cal, 95531**
System Size (W)	**2,400**

Cost/Watt	Estimated Price	Total
Equipment		
Wind Turbine	$ 3.5000	$ 8,400
Footing	$ 0.4000	$ 960
Concrete INV Pad	$ 0.2780	$ 667
Inverters & Switch Gear	$ 0.4600	$ 1,104
		$ -
	$ -	
Total	$ 4.6380	$ 11,131
Pre Development Soft Costs		
Insurance	$ 0.2500	$ 600
Developers Risk		$ -
Open	$ -	$ -
EFP Service Fee	$ 0.5000	$ 1,200
Initial 3rd Party Due-Diligence	$ 0.2500	$ 600
Open		$ -
Site Visits	$ -	$ -
Fence, Seed	$ 0.2500	$ 600
Interconnection	$ 0.2500	$ 600
Total	$ 1.5000	$ 3,600
Development Soft Costs		
Electrical Services	$ 0.4500	$ 1,080
Site Work	$ 0.4500	$ 1,080
Racking Installation		$ -
Panel Installation		$ -
Wiring Harnesses/Trenching	$ 0.3500	$ 840
Punch List Labor	$ 0.2500	$ 600
Equipment Rental	$ 0.2000	$ 480
Mounting Screws	$ 0.2500	$ 600
Security Camera		$ -
Monitoring		$ -
Mobilization	$ 0.6500	$ 1,560
Lodging, ,Meals , Home Tickets	$ 0.2500	$ 600
Gas	$ 0.2500	$ 600
Vehicles & Gas	$ 0.2500	$ 600
Disposal		$ -
Sanitary Services		$ -
Hardware & Hand Tools	$ 0.1500	$ 360
Total	$ 3.5000	$ 8,400
Post Development Soft Costs		
Permits and Legal	$ 0.4000	$ 960
EPC Fee 15% of Actual Cost	$ 0.5175	$ 1,242
Demob	$ 0.0001	$ 0
Total	$ 0.9176	$ 2,202
Total Costs	**$ 10.5556**	**$ 25,333**
	Cost per watt	

Incentives and Credits		
Vertical Turbine	Cost	**$ 25,333**
Tax Credit 30%		$ (7,599.00)
Property Grant 30%	$ 11,331.00	$ (3,399.00)
Performance based incentive by Kilowatt hour	4470 KWH	$ 98.34
Kilowatt hours reduced	4470 KWH	$ (357.60)
Total cost after incentives		$ 14,076
Payback		**30 years**

Total production of power per year calculation is 4,470 kwh per year
based on an average wind speeds
4,470 x 0.08 kwh = $ 357.60 per year
4,470 x 0.022 kwh = $98.34 per year
30 year payback
The need to get other grant opportunities or lobby to have the California Legislature support solar renewable energy credits is critical to support these type of installs.

DSIRE™
Database of State Incentives for Renewables & Efficiency

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

IREC INTERSTATE RENEWABLE ENERGY COUNCIL

NORTH CAROLINA SOLAR CENTER

03/18/2011

Federal

Incentives/Policies for Renewables & Efficiency

Business Energy Investment Tax Credit (ITC)

Last DSIRE Review: 06/09/2010

Program Overview:

State:	Federal
Incentive Type:	Corporate Tax Credit
Eligible Renewable/Other Technologies:	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Wind, Biomass, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, CHP/Cogeneration, Solar Hybrid Lighting, Microturbines, Geothermal Direct-Use
Applicable Sectors:	Commercial, Industrial, Utility, Agricultural
Amount:	30% for solar, fuel cells and small wind;* 10% for geothermal, microturbines and CHP*
Maximum Incentive:	Fuel cells: $1,500 per 0.5 kW Microturbines: $200 per kW Small wind turbines placed in service 10/4/08 - 12/31/08: $4,000 Small wind turbines placed in service after 12/31/08: no limit All other eligible technologies: no limit
Eligible System Size:	Small wind turbines: 100 kW or less* Fuel cells: 0.5 kW or greater Microturbines: 2 MW or less CHP: 50 MW or less*
Equipment Requirements:	Fuel cells, microturbines and CHP systems must meet specific energy-efficiency criteria
Authority 1:	26 USC § 48
Authority 2:	Instructions for IRS Form 3468
Authority 3:	IRS Form 3468

Summary:

Note: The American Recovery and Reinvestment Act of 2009 allows taxpayers eligible for the federal renewable electricity production tax credit (PTC)** to take the federal business energy investment tax credit (ITC) or to receive a grant from the U.S. Treasury Department instead of taking the PTC for new installations. The new law also allows taxpayers eligible for the business ITC to receive a grant from the U.S. Treasury Department instead of taking the business ITC for new installations. The grant is only available to systems where construction begins prior to December 31, 2011. The Treasury Department issued Notice 2009-52 in June 2009, giving limited guidance on how to take the federal business ITC instead of the federal renewable electricity production tax credit.

The federal business energy investment tax credit available under 26 USC § 48 was expanded significantly by the *Energy Improvement and Extension Act of 2008* (H.R. 1424), enacted in October 2008. This law extended the duration -- by eight years -- of the existing credits for solar energy, fuel cells and microturbines; increased the credit amount for fuel cells; established new credits for small wind-energy systems, geothermal heat pumps, and combined heat and power (CHP) systems; allowed utilities to use the credits; and allowed taxpayers to take the credit against the alternative minimum tax (AMT), subject to certain limitations. The credit was further expanded by *The American Recovery and Reinvestment Act of 2009*, enacted in February 2009.

In general, credits are available for eligible systems placed in service on or before December 31, 2016:

- **Solar.** The credit is equal to 30% of expenditures, with no maximum credit. Eligible solar energy property includes equipment that uses solar energy to generate electricity, to heat or cool (or provide hot water for use in) a structure, or to provide solar process heat. Hybrid solar lighting systems, which use solar energy to illuminate the inside of a structure using fiber-optic distributed sunlight, are eligible. Passive solar systems and solar pool-heating systems are *not* eligible.

- **Fuel Cells.** The credit is equal to 30% of expenditures, with no maximum credit. However, the credit for fuel cells is capped at $1,500 per 0.5 kilowatt (kW) of capacity. Eligible property includes fuel cells with a minimum capacity of 0.5 kW that have an electricity-only generation efficiency of 30% or higher. (Note that the credit for property placed in service before October 4, 2008, is capped at $500 per 0.5 kW.)

- **Small Wind Turbines.*** The credit is equal to 30% of expenditures, with no maximum credit for small wind turbines placed in service after December 31, 2008. Eligible small wind property includes wind turbines up to 100 kW in capacity. (In general, the maximum credit is $4,000 for eligible property placed in service after October 3, 2008, and before January 1, 2009. *The American Recovery and Reinvestment Act of 2009* removed the $4,000 maximum credit limit for small wind turbines.)

- **Geothermal Systems.*** The credit is equal to 10% of expenditures, with no maximum credit limit stated. Eligible geothermal energy property includes geothermal heat pumps and equipment used to

produce, distribute or use energy derived from a geothermal deposit. For electricity produced by geothermal power, equipment qualifies only up to, but not including, the electric transmission stage. For geothermal heat pumps, this credit applies to eligible property placed in service after October 3, 2008. Note that the credit for geothermal property, with the exception of geothermal heat pumps, has no stated expiration date.

- **Microturbines.** The credit is equal to 10% of expenditures, with no maximum credit limit stated (explicitly). The credit for microturbines is capped at $200 per kW of capacity. Eligible property includes microturbines up to two megawatts (MW) in capacity that have an electricity-only generation efficiency of 26% or higher.

- **Combined Heat and Power (CHP).*** The credit is equal to 10% of expenditures, with no maximum limit stated. Eligible CHP property generally includes systems up to 50 MW in capacity that exceed 60% energy efficiency, subject to certain limitations and reductions for large systems. The efficiency requirement does not apply to CHP systems that use biomass for at least 90% of the system's energy source, but the credit may be reduced for less-efficient systems. This credit applies to eligible property placed in service after October 3, 2008.

In general, the original use of the equipment must begin with the taxpayer, or the system must be constructed by the taxpayer. The equipment must also meet any performance and quality standards in effect at the time the equipment is acquired. The energy property must be operational in the year in which the credit is first taken.

Significantly, *The American Recovery and Reinvestment Act of 2009* repealed a previous restriction on the use of the credit for eligible projects also supported by "subsidized energy financing." For projects placed in service after December 31, 2008, this limitation no longer applies. Businesses that receive other incentives are advised to consult with a tax professional regarding how to calculate this federal tax credit.

** The American Recovery and Reinvestment Act of 2009, which allows PTC-eligible facilities to use the 30% ITC, has implications for some technologies that were already potentially eligible for either incentive in some form. Certain geothermal and open- or closed- loop biomass systems (including biomass CHP projects) now qualify for a 30% tax credit through December 31, 2013, the in-service deadline for these technologies under the PTC. Wind-energy systems of all sizes -- not only systems of 100 kW or less -- also now qualify for the 30% ITC through the wind-energy PTC in-service deadline of December 31, 2012. Applicants should refer to the eligibility definition contained in the PTC to determine if and how their project might qualify for this treatment.*

Contact:

Public Information - IRS
U.S. Internal Revenue Service
1111 Constitution Avenue, N.W.
Washington, DC 20224
Phone: (800) 829-1040
Web Site: http://www.irs.gov

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NORTH CAROLINA SOLAR CENTER

03/18/2011

Federal

Incentives/Policies for Renewables & Efficiency

Renewable Energy Production Incentive (REPI)

Last DSIRE Review: 01/18/2011

Program Overview:

State:	Federal
Incentive Type:	Performance-Based Incentive
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal
Applicable Sectors:	Local Government, State Government, Tribal Government, Municipal Utility, Rural Electric Cooperative, Native Corporations
Amount:	2.2¢/kWh (subject to availability of annual appropriations in each federal fiscal year of operation)
Terms:	10 years
Expiration Date:	10/01/2016 (in-service date)
Web Site:	http://apps1.eere.energy.gov/repi
Authority 1:	42 USC § 13317
Date Enacted:	10/24/1992 (subsequently amended)
Authority 2:	10 CFR 451

Summary:

Note: Contact the program administrator to find out the current funding status of this program.

Established by the federal *Energy Policy Act of 1992*, the federal Renewable Energy Production Incentive (REPI) provides incentive payments for electricity generated and sold by new qualifying renewable energy facilities. Qualifying systems are eligible for annual incentive payments of 1.5¢ per kilowatt-hour (kWh) in 1993 dollars (indexed for inflation) for the first 10-year period of their operation, *subject to the availability of annual appropriations in each federal fiscal year of operation.* REPI was designed to complement

the federal renewable energy production tax credit (PTC), which is available only to businesses that pay federal corporate taxes.

Qualifying systems must generate electricity using solar, wind, geothermal (with certain restrictions), biomass (excluding municipal solid waste), landfill gas, livestock methane, or ocean resources (including tidal, wave, current and thermal). The production payment applies only to the electricity sold to another entity. Eligible electric production facilities include not-for-profit electrical cooperatives, public utilities, state governments and political subdivisions thereof, commonwealths, territories and possessions of the United States, the District of Columbia, Indian tribal governments or political subdivisions thereof, and Native Corporations.

Payments may be made only for electricity generated from an eligible facility first used before October 1, 2016. **Appropriations have been *authorized* for fiscal years 2006 through fiscal year 2026; however, program funding is determined each year as part of the U.S. Department of Energy budget process.** If there are insufficient appropriations to make full payments for electricity production from all qualified systems for a federal fiscal year, 60% of the appropriated funds for the fiscal year will be assigned to facilities that use solar, wind, ocean, geothermal or closed-loop biomass technologies; and 40% of the appropriated funds for the fiscal year will be assigned to other eligible projects. Funds will be awarded on a pro rata basis, if necessary. In past years this has meant that actual incentive payments have corresponded to only a small fraction of the theoretical inflation adjusted incentive level of ~2 cents/kWh.

Contact:

Program Coordinator - REPI
U.S. Department of Energy
Golden Field Office
1617 Cole Blvd.
Golden, CO 80401-3393
E-Mail: gorepi@go.doe.gov
Web Site: http://apps1.eere.energy.gov/repi

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Federal

Incentives/Policies for Renewables & Efficiency

U.S. Department of Treasury - Renewable Energy Grants

Last DSIRE Review: 12/17/2010

Program Overview:

State:	Federal
Incentive Type:	Federal Grant Program
Eligible Renewable/Other Technologies:	Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, Municipal Solid Waste, CHP/Cogeneration, Solar Hybrid Lighting, Hydrokinetic, Tidal Energy, Wave Energy, Ocean Thermal, Microturbines
Applicable Sectors:	Commercial, Industrial, Agricultural
Amount:	30% of property that is part of a qualified facility, qualified fuel cell property, solar property, or qualified small wind property 10% of all other property
Maximum Incentive:	$1,500 per 0.5 kW for qualified fuel cell property $200 per kW for qualified microturbine property 50 MW for CHP property, with limitations for large systems
Funding Source:	The American Recovery and Reinvestment Act (ARRA)
Start Date:	1/1/2009
Expiration Date:	12/31/2011 (construction must begin by this date)
Web Site:	http://www.treasury.gov/initiatives/recovery/...
Authority 1:	H.R. 4853
Date Enacted:	12/17/2010

Authority 2:	H.R. 1: Div. B, Sec. 1104 & 1603
Date Enacted:	2/17/2009
Date Effective:	1/1/2009
Authority 3:	U.S. Department of Treasury: Grant Program Guidance
Date Enacted:	07/09/2009, subsequently amended

Summary:

Note: The American Recovery and Reinvestment Act of 2009 (H.R. 1) allows taxpayers eligible for the federal business energy investment tax credit (ITC) to take this credit or to receive a grant from the U.S. Treasury Department instead of taking the business ITC for new installations. The new law also allows taxpayers eligible for the renewable electricity production tax credit (PTC) to receive a grant from the U.S. Treasury Department instead of taking the PTC for new installations. (It does not allow taxpayers eligible for the residential renewable energy tax credit to receive a grant instead of taking this credit.) Taxpayers may not use more than one of these incentives. Tax credits allowed under the ITC with respect to progress expenditures on eligible energy property will be recaptured if the project receives a grant. The grant is not included in the gross income of the taxpayer. This grant cannot be taken for systems where construction began after December 31, 2011.

The *American Recovery and Reinvestment Act of 2009* (H.R. 1), enacted in February 2009, created a renewable energy grant program that is administered by the U.S. Department of Treasury. This cash grant may be taken in lieu of the federal business energy investment tax credit (ITC). In July 2009 the Department of Treasury issued documents detailing guidelines for the grants, terms and conditions and a sample application. There is an online application process, and applications are currently being accepted. See the US Department of Treasury program web site for more information, including answers to frequently asked questions and program guidance. The Treasury also maintains a list of award recipients on the website. The Department of Treasury has also filed a sample form that recipients of the grant must fill out each year to avoid recapture.

Grants are available to eligible property* placed in service in 2009, 2010 or 2011 or placed in service by the specified credit termination date,** if construction began in 2009, 2010 or 2011. Originally, this program was only available to systems placed in service in 2009 or 2010 or where construction began in 2009 or 2010, but *Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010* (H.R. 4853), signed in December 2010, extended the program through 2011. The guidelines include a "safe harbor" provision that sets the beginning of construction at the point where the applicant has incurred or paid at least 5% of the total cost of the property, excluding land and certain preliminary planning activities. Generally, construction begins when "physical work of a significant nature" begins. Below is a list of important program details as they apply to each different eligible technology.

- **Solar.** The grant is equal to 30% of the basis of the property for solar energy. Eligible solar-energy property includes equipment that uses solar energy to generate electricity, to heat or cool (or provide hot water for use in) a structure, or to provide solar process heat. Passive solar systems and solar pool-heating systems are *not* eligible. Hybrid solar-lighting systems, which use solar energy to illuminate the

inside of a structure using fiber-optic distributed sunlight, are eligible.

- **Fuel Cells.** The grant is equal to 30% of the basis of the property for fuel cells. The grant for fuel cells is capped at $1,500 per 0.5 kilowatt (kW) in capacity. Eligible property includes fuel cells with a minimum capacity of 0.5 kW that have an electricity-only generation efficiency of 30% or higher.

- **Small Wind Turbines.** The grant is equal to 30% of the basis of the property for small wind turbines. Eligible small wind property includes wind turbines up to 100 kW in capacity.

- **Qualified Facilities.** The grant is equal to 30% of the basis of the property for qualified facilities that produce electricity. Qualified facilities include wind energy facilities, closed-loop biomass facilities, open-loop biomass facilities, geothermal energy facilities, landfill gas facilities, trash facilities, qualified hydropower facilities, and marine and hydrokinetic renewable energy facilities.

- **Geothermal Heat Pumps.** The grant is equal to 10% of the basis of the property for geothermal heat pumps.

- **Microturbines.** The grant is equal to 10% of the basis of the property for microturbines. The grant for microturbines is capped at $200 per kW of capacity. Eligible property includes microturbines up to two megawatts (MW) in capacity that have an electricity-only generation efficiency of 26% or higher.

- **Combined Heat and Power (CHP).** The grant is equal to 10% of the basis of the property for CHP. Eligible CHP property generally includes systems up to 50 MW in capacity that exceed 60% energy efficiency, subject to certain limitations and reductions for large systems. The efficiency requirement does not apply to CHP systems that use biomass for at least 90% of the system's energy source, but the grant may be reduced for less-efficient systems.

It is important to note that only tax-paying entities are eligible for this grant. Federal, state and local government bodies, non-profits, qualified energy tax credit bond lenders, and cooperative electric companies are not eligible to receive this grant. Partnerships or pass-thru entities for the organizations described above are also not eligible to receive this grant, except in cases where the ineligible party only owns an indirect interest in the applicant through a taxable C corporation. Grant applications must be submitted by October 1, 2012. The U.S. Treasury Department will make payment of the grant within 60 days of the grant application date or the date the property is placed in service, whichever is later.

** Definitions of eligible property types and renewable technologies can be found in the U.S. Code, Title 26, § 45 and § 48.*

*** Credit termination date of January 1, 2013, for wind; January 1, 2014, for closed-loop biomass, open-loop biomass, landfill gas, trash, qualified hydropower, marine and hydrokinetic; January 1, 2017, for fuel cells, small wind, solar, geothermal, microturbines, CHP and geothermal heat pumps.*

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03/18/2011

Federal

Incentives/Policies for Energy Efficiency

Tribal Energy Program Grant

Last DSIRE Review: 01/20/2011

Program Overview:

State:	Federal
Incentive Type:	Federal Grant Program
Eligible Efficiency Technologies:	Clothes Washers, Refrigerators, Water Heaters, Lighting, Lighting Controls/Sensors, Chillers , Furnaces , Boilers, Central Air conditioners, Programmable Thermostats, Energy Mgmt. Systems/ Building Controls, Caulking/Weather-stripping, Duct/Air sealing, Building Insulation, Windows, Doors, Siding, Roofs, Comprehensive Measures/Whole Building, other energy efficiency improvements may be eligible
Eligible Renewable/Other Technologies:	Passive Solar Space Heat, Solar Water Heat, Solar Space Heat, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Geothermal Heat Pumps
Applicable Sectors:	Tribal Government
Amount:	Varies by solicitation
Maximum Incentive:	Varies by solicitation
Web Site:	http://apps1.eere.energy.gov/tribalenergy

Summary:

NOTE: There are currently several solicitations for renewable energy and energy efficiency projects. The deadlines to apply for these solicitations range from March 3 to March 31, 2011. Total funding for these solicitations is around $10 million.

The U.S. Department of Energy's (DOE) Tribal Energy Program promotes tribal energy sufficiency, economic growth and employment on tribal lands through the development of renewable energy and energy efficiency technologies. The program provides financial assistance, technical assistance, education and training to tribes

for the evaluation and development of renewable energy resources and energy efficiency measures.

DOE's Tribal Energy Program consists of program management through DOE headquarters, program implementation and project management through DOE's field offices, and technical support through DOE laboratories. Program management for the Tribal Energy Program is carried out by DOE's Weatherization and Intergovernmental Program, which provides programmatic direction and funding to DOE field offices for program implementation. DOE's field offices, specifically the Golden Field Office, issue solicitations and manage resulting projects.

Program funding is awarded through a competitive process. Click here to view current program funding opportunities.

Contact:

Lizana Pierce
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard, MS 1501
Golden, CO 80401
Phone: (303) 275-4727
Fax: (303) 275-4753
E-Mail: lizana.pierce@go.doe.gov
Web Site: http://www.eere.energy.gov/tribalenergy

Casino Fixture count and replacement lamps Savings

FIXTURE TYPE	LAMP QUANTITY	Fixture Type	voltage	wattage	style	Lamp type	Hours used per day	Controls	Location	Replacement	Savings in watts	Total
A	658	Fluorescent Electronic	120	32W	Troffer	Sylavnia Fo32/t8/741	12	Switch	Casino	Replace with F25 watt	7	20174.28
B	77	Fluorescent Magnetic	120	40w	Troffer	F40/cw	12	Switch	Casino	Replace with F25 watt	15	5058.9
C	90	Recessed can	120	100w	Down Light	incandescent	24	Switch	casino main floor	Replace with 17 watt	73	57553.2
D	62	Recessed can	120	100w	Down Light	incandescent	12	dimmer	bingo/conference	Replace with 17 watt	73	19823.88
E	8	suspended	120	100w	Globe	incandescent	24	Switch	dinning/bar	Replace with 17 watt	73	5115.84
F	10	Recessed can	120	20w	Down Light	halogen	24	dimmer	bar	Replace with 5 watt	15	1314
G	18	surface mnt	120	175w	down light	metal halide	24	Switch	casino canopy	Replace with 100 watt	75	11826
H	39	pole lighting	240	400w	down light	metal halide	12	photo cell	parking lot	Replace with 320 watt	80	13665.6
J	800	trailing light	120	12w	String Lighting	incandescent	12	photo cell	casino front	Replace with 3 watt	9	31536
										Annual Kilowatt hours savings		166067.7
										Kilowatt hour cost		0.08
										Annual Savings		$ 13,285.42

Elk Valley Rancheria annual savings are based on the wattage saved per fixture times the number of fixtures times the hours per day times the days of annual operation times kilowatt hour cost. Additional saving could be considered for the reduction in air conditioning, cost of replacement lamp, cost disposal fee's, and maintenance cost of installation. The following pages are the incentives for lamp replacement for your local utility rebate program. The actual cost of purchase, installation and evaluation should be submitted to the Department of Energy and your local power company for consideration. This is a overview of the lamps types at the casino property only. This model should be evaluated for all tribal properties.

FinAnswer® Express California

Incentives for lighting retrofits

Category	Replace	With	Customer Incentive
Fluorescent Fixture Upgrade to Standard T8 Fixtures [Standard T8 lamps and electronic ballasts with ballast factor (BF) ≤ 0.88]	4'-1 or 2 T12 lamp(s) + 1 magnetic ballast (MB)	4'-1 or 2 T8 lamps + 1 electronic ballast (EB)	$6
	4'-3 or 4 T12 lamp(s) + MB(s)	4'-3 or 4 T8 lamps + EB	$12
	8'-1 or 2 T12 lamp(s) + MB(s)	4'-2, 3, or 4 T8 lamps + EB	$12
	8'-1, 2, 3 or 4 T12 lamps + MB(s)	8'-1, 2, 3 or 4 T8 lamps + EB	$12
	8'-1, 2, 3 or 4 T12 HO/VHO lamps + MB(s)	8'-1, 2, 3 or 4 T8 HO/VHO lamps + EB(s) See note 5	$18
Fluorescent Fixture Upgrade to 4' Premium T8 Fixtures [Lamps with initial lumens ≥ 3100 or wattage ≤ 30 W; electronic ballasts with BF ≤ 0.8]	4'-1 or 2 T12 lamp(s) + MB or standard T8 lamp(s) + EB	4'-1 or 2 premium T8 lamp(s) + EB	$12
	4'-3 or 4 T12 lamps + MB(s) or standard T8 lamps + EB	4'-3 or 4 premium T8 lamps + EB	$18
	8'-1 or 2 T12 lamp(s) + MB(s)	4'-2, 3 or 4 premium T8 lamps + EB	$20
Fluorescent Delamping and Standard T8 Fixture Upgrade [Standard T8 lamps and electronic ballasts with BF ≤ 0.88 - Fixture removal is not eligible]	4'-2 T12 lamps + MB	4'-1 standard T8 lamp + EB	$12
	4'-3 T12 lamps + MB(s)	4'-1 or 2 standard T8 lamp + EB	$18
	4'-4 T12 lamps + MB(s)	4'-3 standard T8 lamps + EB	$18
	4'-4 T12 lamps + MB(s)	4'-1 or 2 standard T8 lamp + EB	$30
Fluorescent Delamping and Premium T8 Fixture Upgrade [Lamps with initial lumens ≥ 3100 or wattage ≤ 30 W; electronic ballasts with BF ≤ 0.8. Fixture removal is not eligible]	4'-2 T12 lamps + MB	4'-1 premium T8 lamp + EB	$18
	4'-3 T12 lamps + MB(s)	4'-1 or 2 premium T8 lamp + EB	$24
	4'-4 T12 lamps + MB(s)	4'-3 premium T8 lamps + EB	$24
	4'-4 T12 lamps + MB(s)	4'-1 or 2 premium T8 lamp + EB	$35
T8 Fluorescent Lamp Upgrade	≥32 W T8 lamp	≤ 30 W T8 lamp, see note 4	$0.50
Compact Fluorescent Lighting (CFL) - hardwire fixtures	Incandescent	< 10 W (nominal) CFL hardwire fixture	$10
	Incandescent	≥ 10 W and < 20W(nominal) CFL hardwire fixture	$15
	Incandescent	≥ 20 W (nominal) CFL hardwire fixture	$20
T5 Fluorescent Fixture Upgrade	≥ 250 W metal halide (MH), mercury vapor (MV) or high pressure sodium (HPS)	3 T5HO lamps (nominal 4')+ EB (high bay)	$70
	≥ 400 W MH, MV or HPS	4, 5, or 6 T5HO lamps (nominal 4') + EB(s) (high bay)	$75
	≥ 750 W MH, MV or HPS	≥ 8 T5HO lamps (nominal 4') + EB(s)	$110
	4'-4 T12 lamps + MB(s)	2 T5 lamps (nominal 4') + EB (interior fixtures)	$30
	4'-4 T12 lamps + MB(s)	2 T5HO lamps (nominal 4') + EB (interior fixtures)	$25
High Intensity Discharge Upgrades (based on lamp wattages)	Incandescent or tungsten	≤ 100 W ceramic metal halide	$25
	≥ 400 W MH, MV or HPS	≤ 320 W ceramic metal halide	$100
	≥ 750 W MH, MV or HPS	≤ 400 W ceramic metal halide	$120
	≥ 150 W and ≤ 250 W MH, MV or HPS or ≥ 150 W incandescent	≥ 125 W and ≤ 175 W pulse start MH	$50
	> 250 W and ≤ 400 W MH, MV or HPS	≥ 175 W and ≤ 320 W pulse start MH	$60
	> 400 W MH, MV or HPS	≤ 400 W pulse start MH	$100
	≥ 1000 W MH, MV or HPS	≤ 750 W pulse start MH	$100
	≥ 250 W and < 750 W MH, MV or HPS	4'-4, 5 or 6 T8 lamps + EB(s) (high bay)	$75
	≥ 750 W MH, MV or HPS	4' ≥ 8 T8 lamps + EB(s) (high bay)	$100
Exit Signs	Incandescent or fluorescent exit sign	Light-emitting diode (LED) or electro luminescent exit sign – 1 or 2 faced	$15
	Incandescent or fluorescent exit sign	Photoluminescent or Tritium	$20
Lighting Controls	Wall switch or no control	Wall or ceiling mounted occupancy sensor (per sensor)	$35
	No control	Integral occupancy sensor	$30
	No control	Photocell (per sensor) exterior lights only	$20
	No control	Time clock (per control)	$20
	No control	Daylighting control	$0.10/ connected watt
	No control	Bi-level controlled fixtures with integral occupancy sensor (per fixture)	$35
Light-Emitting Diode (LED) Lighting	Indoor incandescent, neon or fluorescent signage	LED channel letter signage ≤ 2' high	$4/linear foot
		LED channel letter signage > 2' high	$6/linear foot
	Outdoor incandescent, neon or fluorescent signage	LED channel letter signage ≤ 2' high	$2/linear foot
		LED channel letter signage > 2' high	$3/linear foot
	Fluorescent refrigeration case lighting	LED case lighting	$10/linear foot
	Incandescent, neon or fluorescent	LED fixed or scrolling message center signage	See note 7

Requirements for retrofits of existing lighting: To be eligible for the incentives listed, new fixtures must use less energy than the fixtures they replaced.
For additional requirements, please refer to the lighting table notes on the next page.

Notes for retrofit lighting incentive table:

1. Incentives are capped at 60 percent of project costs and incentives will not be available to reduce the project simple payback below one year.
2. 2' U-tube lamps may be substituted for 4' linear fluorescent lamps in the above table.
3. For retrofits of existing equipment, lighting incentives will be paid on a one-for-one equipment replacement basis. If fixture counts are changing, the project may be eligible for a custom energy efficiency incentive.
4. Incentives for T8 fluorescent lamp upgrades may not be combined with other fluorescent fixture incentives and will only be paid once per facility.
5. T8 HO/VHO and high bay T8 electronic ballasts are required to have a BF ≤ 1.2 to be eligible for incentives.
6. To determine the length of LED channel letter signs, measure the length of individual letter at the centerline and add the individual values; do not measure the distance between letters.
7. LED fixed or scrolling message center signage incentives are $0.10 per kilowatt-hour of annual energy savings - see note 1. Savings is subject to Pacific Power approval.
8. LED traffic light upgrades are not eligible for incentives.
9. Lighting equipment listed only in the "Replace" column is not eligible for incentives.

PACIFIC POWER

Let's turn the answers on.

PACIFIC POWER

Lighting Technologies

Pacific Power provides incentives for many types of energy efficient technologies. Please read the following sections carefully to ensure that you follow the appropriate steps for securing your incentive.

Incentives for additional measures may be available. For more information about the FinAnswer Express program, eligibility requirements, incentive levels or other general inquiries, contact your local lighting dealer or Pacific Power. You can visit the program website at **pacificpower.net/wattsmart** and submit your inquiry online, or you can call our **energy services hotline** at **1-800-222-4335**.

NEW CONSTRUCTION/MAJOR RENOVATION HIGH EFFICIENCY LIGHTING

Measure Description: Installing high efficiency lighting during construction can be a cost-effective means of saving electricity.

Applicability:

1. *New Construction*: A newly constructed facility or newly constructed square footage added to an existing facility.
2. *Major Renovation*: A change in facility use type or where the existing system will not meet Owner/Customer projected requirements within existing facility square footage.

Equipment Eligibility: Qualifying lighting equipment is shown in Table 1. In order to qualify for lighting incentives, the whole building's total connected interior lighting power (watts/square foot) for new construction/major renovation projects required to comply with the energy code, must be 10 percent lower than the interior lighting power allowance calculated under the applicable version of the California energy code (See Table 2). The date of the building permit application shall establish the applicable version of the energy code. For new construction/major renovation projects not required to comply with the energy code, the total connected lighting power must be 10% lower than common practice as determined by Pacific Power. Equipment must be purchased and installed, and meet all other program terms and conditions.

Items to submit for project approval: To qualify for incentives, please submit the following:

1. Dated sales receipt/invoice (to confirm date of equipment installation).
2. Completed and Signed Customer Incentive Application/Agreement for Lighting Incentives (2 pages).
3. Completed Pacific Power lighting software tool.
4. A current copy of the Pacific Power utility bill for the address where the item(s) are installed.

Note: Pacific Power has a lighting calculation software tool available for vendors participating in our Energy Efficiency Alliance (EEA) to calculate project-specific energy savings, project economics, and eligible incentives for new construction/major renovation projects. Visit the program website at **pacificpower.net/wattsmart** for a current list of EEA participating vendors. Contact your EEA participating vendor or Pacific Power for next steps.

Prequalification Required? Incentives for new construction/major renovation lighting upgrades are available via a post-purchase incentive application process. Applying prior to placing purchase orders is recommended but not required.

NEW CONSTRUCTION/MAJOR RENOVATION HIGH EFFICIENCY LIGHTING (CONT.)

Table 1. New Construction and Major Renovation Lighting Incentives

Category	Install	Customer Incentive
Premium T8 Fluorescent Fixture Upgrade [Lamps with initial lumens ≥ 3100 or wattage ≤ 30 W; electronic ballasts with BF ≤ 0.8]	4' - 1 or 2 Premium T8 lamp(s) + EB	$7
	4' - 3 or 4 Premium T8 lamps + EB	$10
T5 Fluorescent Fixture Upgrade	2 T5HO lamps (nominal 4') + EB (interior fixtures)	$24
	3 T5HO lamps (nominal 4') + EB (High Bay)	$48
	4 - 7 T5HO lamps (nominal 4') + EB(s) (High Bay)	$60
	≥ 8 T5HO lamps (nominal 4') + EB(s) (High Bay)	$120
	1 T5 lamp (nominal 4') + EB (interior fixtures)	$12
	2 T5 lamps (nominal 4') + EB (interior fixtures)	$30
	3 T5 lamps (nominal 4') + EB (interior fixtures)	$36
T8 Fluorescent Fixture Upgrade (High Bay)	4' ≥ 4 T8 lamps + EB(s) (High Bay)	$45
High Intensity Discharge (HID) Upgrades	≤ 100W Ceramic Metal Halide	$20
	> 100W Ceramic Metal Halide	$40
	> 500W Pulse Start Metal Halide	$36
Lighting Controls	Integral occupancy sensor	$30
	Daylighting control (See Note 3)	$0.10 per connected watt
	Bi-level controlled fixtures with integral occupancy sensor (per fixture)	$35
LED Channel Letter Signage	Indoor LED channel letter signage ≤ 2ft high	$4/linear foot
	Indoor LED channel letter signage > 2ft high	$6/linear foot
	Outdoor LED channel letter signage ≤ 2ft high	$2/linear foot
	Outdoor LED channel letter signage > 2ft high	$3/linear foot

Notes for new construction and major renovation lighting incentives**:**

1. Incentives are not available for lighting controls required under the applicable version of the California energy code.
2. The total connected interior lighting power for New Construction/Major Renovation projects required to comply with the energy code must be 10 percent lower than the interior lighting power allowance calculated under the applicable version of the California energy code. For New Construction/Major Renovation projects not required to comply with the energy code, the total connected lighting power must be 10% lower than common practice as determined by Pacific Power.
3. Incentives are not available for lighting controls required under the applicable version of the California energy code. Incentives are not available for daylighting controls and bi-level fixtures if utilized to comply with the applicable version of the California energy code. See Section 146 of the California State Energy Code Title 24-2008 for specific details on daylighting control and other interior control requirements.
4. Two-foot U-tube lamps may be substituted for 4' linear fluorescent lamps in the above table.
5. Electronic ballasts for High Bay T8 fixtures are required to have a ballast factor (BF) ≤ 1.2 to be eligible for incentives.
6. To determine the length of LED channel letter signs, measure the length of individual letter at the centerline and add the individual values; do not measure the distance between letters.
7. Incentives are not available for LED traffic light upgrades.

HO = High Output **VHO** = Very High Output **LED** = Light-emitting diode

Table 2. California State Energy Code Maximum Lighting Power Densities (LPD)

(California State Energy Code Title 24-2008, Table 146-E)

Type of Use	LPD (watts/sq. ft.)
Auditoriums	1.5
Classroom building	1.1
Commercial and industrial storage buildings	0.6
Convention centers	1.2
Financial institutions	1.1
General commercial and industrial work buildings	
High-bay	1.0
Low-bay	1.0
Grocery stores	1.5
Library	1.3
Medical buildings and clinics	1.1
Office buildings	0.85
Parking garages	0.3
Religious facilities	1.6
Restaurants	1.2
Schools	1.0
Theaters	1.3
All others	0.6

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HIGH EFFICIENCY LIGHTING RETROFITS

Measure Description: Lighting retrofit projects are the most common and effective energy conservation opportunities available to commercial and industrial customers.

Applicability: Retrofit applications only.

Equipment Eligibility: Pacific Power offers prescriptive and custom incentives for qualifying lighting equipment as follows**:**

- *Prescriptive Incentives* are offered for common lighting improvements as shown in Table 3 and are subject to project incentive caps detailed below. Equipment listed in Table 3 is eligible for the listed incentive when retrofit on a one-for-one basis.
- *Custom Incentives* are offered for lighting retrofits where fixture counts change or the specific retrofit is not listed in Table 3. Incentives are not available for equipment listed in the "Replace" column. Custom incentives equal $0.10/kWh and are subject to project incentive caps as detailed below.
- *Incentive Caps***:** Eligible incentives are limited for projects in two ways**:**
  - The incentive will be capped to maintain a simple payback greater than or equal to 1 year (including incentives).
  - The eligible incentive will be limited to 60% of the eligible project cost.

Prequalification Required? Incentives for retrofit lighting upgrades are available via a post-purchase incentive application process. Applying prior to placing purchase orders is recommended but not required.

Post-installation Inspection: An inspection of the installed equipment may be required prior to incentive payment.

Items to submit prior to incentive payment: To qualify for incentives, please submit the following**:**

1. Dated sales receipt/invoice showing labor and material costs.
2. Completed and Signed Customer Incentive Application/Agreement for Lighting Incentives (Two (2) pages).
3. Completed Pacific Power lighting software tool.
4. A current copy of the Pacific Power utility bill for the address where the item(s) are installed.

Note: Pacific Power has a lighting calculation software tool available for vendors participating in our Energy Efficiency Alliance (EEA) to calculate project-specific energy savings, project economics, and eligible incentives for retrofit projects. Visit the program website at **pacificpower.net/wattsmart** for a current list of EEA participating vendors. Contact your EEA participating vendor or Pacific Power for next steps.

Information on Lamp and Ballast Recycling: Fluorescent and High-Intensity Discharge (HID) lighting contains trace amounts of Mercury and other toxic materials. Lamps and ballasts should always be disposed of properly in accordance with State and Federal regulations. Please consult with the California Department of Toxic Substances Control (DTSC) or the Integrated Waste Management Board for information on recycling lamps and ballasts. Information on collection programs or recyclers can be found on the DTSC website: **http://www.dtsc.ca.gov/HazardousWaste/UniversalWaste/index.cfm**

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Table 3. Retrofit Lighting Efficiency Requirements & Incentive Levels

Category	Replace	With	Customer Incentive
Fluorescent Fixture Upgrade to Standard T8 Fixtures [Standard T8 lamps and electronic ballasts with ballast factor (BF) ≤ 0.88]	4′ - 1 or 2 T12 lamp(s) + 1 magnetic ballast (MB)	4′ - 1 or 2 T8 lamps + 1 electronic ballast (EB)	$6
	4′ - 3 or 4 T12 lamp(s) + MB(s)	4′ - 3 or 4 T8 lamps + EB	$12
	8' - 1 or 2 T12 lamp(s) + MB(s)	4' - 2, 3 or 4 T8 lamps + EB	$12
	8′ - 1, 2, 3 or 4 T12 lamps + MB(s)	8′ - 1, 2, 3 or 4 T8 lamps +EB	$12
	8′ - 1, 2, 3 or 4 T12 HO/VHO lamps + MB(s)	8′ - 1, 2, 3 or 4 T8 HO/VHO lamps +EB(s) (See Note 5)	$18
Fluorescent Fixture Upgrade to 4′ Premium T8 Fixtures [Lamps with initial lumens ≥ 3100 or wattage ≤ 30 W; electronic ballasts with BF ≤ 0.8]	4' - 1 or 2 T12 lamp(s) + MB or Standard T8 lamp(s) + EB	4' - 1 or 2 Premium T8 lamp(s) + EB	$12
	4' - 3 or 4 T12 lamps + MB(s) or Standard T8 lamps + EB	4' - 3 or 4 Premium T8 lamps + EB	$18
	8' - 1 or 2 T12 lamp(s) + MB(s)	4' - 2, 3 or 4 Premium T8 lamps + EB	$20
Fluorescent Delamping and Standard T8 Fixture Upgrade [Standard T8 lamps and electronic ballasts (EB) with BF ≤ 0.88. Fixture removal is not eligible]	4′ - 2 T12 lamps + MB	4′ - 1 Standard T8 lamp +EB	$12
	4′ - 3 T12 lamps + MB(s)	4′ - 2 or 1 Standard T8 lamp +EB	$18
	4′ - 4 T12 lamps + MB(s)	4′ - 3 Standard T8 lamps +EB	$18
	4′ - 4 T12 lamps + MB(s)	4′ - 2 or 1 Standard T8 lamp +EB	$30
Fluorescent Delamping and Premium T8 Fixture Upgrade [Lamps with initial lumens ≥ 3100 or wattage ≤ 30 W; electronic ballasts with BF ≤ 0.8. Fixture removal is not eligible]	4′ - 2 T12 lamps + MB	4′ - 1 Premium T8 lamp +EB	$18
	4′ - 3 T12 lamps + MB(s)	4′ - 1 or 2 Premium T8 lamp +EB	$24
	4′ - 4 T12 lamps + MB(s)	4′ - 3 Premium T8 lamps +EB	$24
	4′ - 4 T12 lamps + MB(s)	4′ - 1 or 2 Premium T8 lamp +EB	$35
T8 Fluorescent Lamp Upgrade	≥ 32 W T8 lamp	≤ 30 W T8 lamp (See Note 4)	$0.50
Compact Fluorescent Lighting (CFL)	Incandescent	< 10W (nominal) CFL hardwire fixture	$10
	Incandescent	≥ 10W and < 20W (nominal) CFL hardwire fixture	$15
	Incandescent	≥ 20W (nominal) CFL hardwire fixture	$20
T5 Fluorescent Fixture Upgrade	≥ 250 W MH, MV or HPS	3 T5HO lamps (nominal 4′) + EB (High Bay)	$70
	≥ 400 W MH, MV, or HPS	4, 5, or 6 T5HO lamps (nominal 4′) + EB (High Bay)	$75
	≥ 750 W MH, MV or HPS	≥ 8 T5HO lamps + EB(s)	$110
	4′ - 4 T12 lamps + MB(s)	2 T5 lamps (nominal 4′) + EB (interior fixtures)	$30
	4′ - 4 T12 lamps + MB(s)	2 T5HO lamps (nominal 4′) + EB (interior fixtures)	$25
High Intensity Discharge (HID) Upgrades (based on lamp wattages)	Incandescent or tungsten	≤ 100W Ceramic Metal Halide	$25
	≥ 400W MH, MV or HPS	≤ 320W Ceramic Metal Halide	$100
	≥ 750W MH, MV, or HPS	≤ 400 W Ceramic Metal Halide	$120
	≥ 150W and ≤ 250W MH, MV, or HPS, or ≥ 150W incandescent	≥ 125W and ≤ 175W Pulse Start MH	$50
	> 250W and ≤ 400W MH, MV, or HPS	≥ 175W and ≤ 320W Pulse Start MH	$60
	> 400W MH, MV, or HPS	≤ 400W Pulse Start MH	$100
	≥ 1000W MH, MV or HPS	≤ 750W Pulse Start MH	$100

Category	Replace	With	Customer Incentive
High Intensity Discharge (HID) Upgrades (continued)	≥ 250 W & < 750 W MH, MV, or HPS	4′ - 4, 5, or 6 T8 lamps + EB(s) (High Bay)	$75
	≥ 750 W MH, MV or HPS	4′ - ≥8 lamp T8 + EB(s) (High Bay)	$100
Exit Signs	Incandescent or fluorescent exit sign	Light Emitting Diode (LED) or Electro luminescent (EL) Exit Sign (1 or 2 faced)	$15
	Incandescent or fluorescent exit sign	Photo luminescent or Tritium	$20
Lighting Controls	Wall switch or no control	Wall or Ceiling Mounted Occupancy Sensor (per sensor)	$35
	No control	Integral occupancy sensor	$30
	No control	Photocell (per sensor) (exterior lights only)	$20
	No control	Time clock (per control)	$20
	No control	Daylighting controls	$0.10/connected watt
	No control	Bi-level controlled fixtures with integral occupancy sensor (per fixture)	$35
LED Lighting	Indoor Incandescent, neon, or fluorescent signage	LED channel letter signage ≤ 2ft high	$4/linear foot
		LED channel letter signage > 2ft high	$6/linear foot
	Outdoor Incandescent, neon, or fluorescent signage	LED channel letter signage ≤ 2ft high	$2/linear foot
		LED channel letter signage > 2ft high	$3/linear foot
	Fluorescent refrigeration case lighting	LED case lighting	$10/linear foot
	Incandescent, neon or fluorescent signage	LED fixed or scrolling message center signage	See Note 7

Notes for retrofit lighting incentives**:**

1. Incentives are capped at 60 percent of energy efficiency project costs and subject to a one-year payback cap.
2. Two-foot U-tube lamps may be substituted for 4′ linear fluorescent lamps in the lighting incentive table.
3. For retrofits of existing equipment, lighting incentives will be paid on a one-for-one equipment replacement basis. If fixture counts are changing, the project may be eligible for a custom energy efficiency incentive.
4. Incentives for T8 fluorescent lamp upgrades may not be combined with other fluorescent fixture incentives and will only be paid once per facility.
5. T8 high-output/very high-output (HO/VHO) and high bay T-8 electronic ballasts are required to have a ballast factor (BF) ≤ 1.2 to be eligible for incentives.
6. To determine the length of LED channel letter signs, measure the length of individual letter at the centerline and add the individual values; do not measure the distance between letters.
7. LED fixed or scrolling message center signage incentives are $0.10 per kilowatt-hour of annual energy savings (see Note 1). Savings is subject to Pacific Power approval.
8. Incentives are available via a post-purchase incentive application.
9. Incentives are not available for LED traffic light upgrades.
10. Lighting equipment listed only in the "Replace" column is not eligible for incentives.

CFL = Compact Fluorescent Lamp
MH = Metal Halide
MV = Mercury Vapor
HPS = High Pressure Sodium
HO = High Output
VHO = Very High Output
LED = Light-emitting diode

LED CHANNEL LETTERS

Measure Description: Channel letters are individually illuminated letters and graphics that are typically found on storefronts. Channel letters that are installed or retrofit with high efficiency LED illumination are eligible for incentives. Incentives for LED traffic light installations are not available.

Applicability: New construction/major renovation and retrofit projects may be eligible for incentives. For retrofit projects, LED technology must replace incandescent, neon or fluorescent illumination.

Equipment Eligibility: Equipment must be purchased and installed, and meet all other program terms and conditions.

Items to Submit with the Incentive Application:

1. Dated sales receipt/invoice with install date and retailer/contractor name, address and phone number.
2. A current copy of the Pacific Power utility bill for the address where the item(s) are installed.

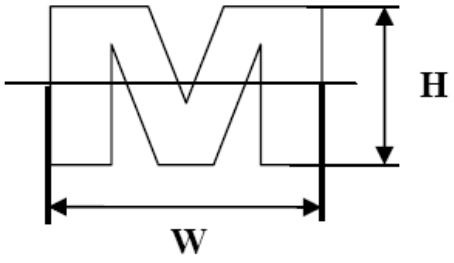
Prequalification Required? No. Incentives are available via a post-purchase incentive application process. Applying prior to placing purchase orders is recommended but not required.

Table 4. Channel Letter Efficiency Requirements, Incentive Levels & Equipment Codes

Location	Type	Letter Height	Incentive / Unit	Equipment Code
Indoor	Retrofit	≤ 2 ft. High	$ 4 / Linear ft.	LEDCIR
		> 2 ft. High	$ 6 / Linear ft.	LEDCIR
	New Construction	≤ 2 ft. High	$ 4 / Linear ft.	LEDCIN
		> 2 ft. High	$ 6 / Linear ft.	LEDCIN
Outdoor	Retrofit	≤ 2 ft. High	$ 2 / Linear ft.	LEDCOR
		> 2 ft. High	$ 3 / Linear ft.	LEDCOR
	New Construction	≤ 2 ft. High	$ 2 / Linear ft.	LEDCON
		> 2 ft. High	$ 3 / Linear ft.	LEDCON

To calculate the incentive, conduct the following steps:

1. Measure the width of each individual letter at the centerline. **Do not** measure the distance between letters.
2. Measure the height of each letter (H).
3. Select the incentive associated with the Project Type and Letter Height (H).
4. Multiply the incentive in Table 4 by the letter width (W).
5. Add the incentive for each letter to calculate the total incentive.



Note: Pacific Power has a lighting calculation software tool available for vendors participating in our Energy Efficiency Alliance (EEA) to calculate project-specific energy savings, project economics, and eligible incentives for retrofit LED Channel Letter projects. Visit our website at **pacificpower.net/wattsmart** for a current list of participating vendors.

Equipment Code	Measure Description	Incentive
LEDLTR	LED Message Letter	$0.10 / kWh (60% cost cap and 1-year simple payback cap apply)

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LED MESSAGE CENTER SIGNS

Measure Description: Message center signs display text and are commonly found on storefronts, restaurants, and arenas.

Applicability: Message center retrofit projects that replace incandescent, neon or fluorescent lamps with LED illumination may be eligible for incentives. N**ew installations of message center signs are not eligible for incentives**.

Equipment Eligibility: It is recommended to contact your lighting vendor or Pacific Power prior to purchasing your equipment to calculate incentives for message center signs, but is not required. Equipment must be purchased and installed, and meet all other program terms and conditions.

Items to submit for project approval:

1. Dated sales receipt/invoice with install date and retailer/contractor name, address and phone number
2. A completed copy of Table 5.
3. A current copy of the Pacific Power utility bill for the address where the item(s) are installed.

Prequalification required? No. Incentives for message center retrofit projects are available via a post-purchase incentive application process. Applying prior to placing purchase orders is recommended but not required.

Note: Pacific Power has a lighting calculation software tool available for vendors participating in our Energy Efficiency Alliance (EEA) to calculate project-specific energy savings, project economics, and eligible incentives for retrofit LED Message Center Sign projects. Visit our website at **pacificpower.net/wattsmart** for a current list of participating vendors.

Table 5. LED Message Center Sign Information Table

Customer Name	
Facility Address	
Facility City, State, Zip	
Pacific Power Account Number	
Pacific Power Rate Schedule	
Rated power use of existing sign (watts)	
Rated power use of new LED sign (watts)	
Estimated Project Cost	
Weeks Operated per year	
Open major holidays (circle one)	YES NO

Operating Schedule (hours in use per day)						
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**

Equipment Code	**Measure Description**	**Incentive**
LEDMSG	LED Message Center Sign	$0.10 / kWh (60% cost cap and 1-year simple payback cap apply)

*To calculate project savings and incentives, contact Pacific Power on our energy savings hotline at **1-800-222-4335** or via e-mail to: **ca.lighting@pacificpower.net**

FinAnswer® Express California

RETROFIT INCENTIVES

A change can do you good.

PACIFIC POWER

Let's turn the answers on.

Meek's branch manager Sandy Johnson (pictured above) reported that customers are enthusiastic about lighting upgrades at the Yreka store.

Meek's Lumber and Hardware

"Our employees are more productive. It's a better atmosphere to work in."

Sandy Johnson
Branch Manager
Meek's Lumber and Hardware

The old T12 fluorescent lighting at Meek's Lumber and Hardware in Yreka, Calif., was not living up to the company's standards – the lights were dim and consuming more energy than necessary, driving up costs.

At first, branch manager Sandy Johnson considered just replacing a few lamps to see if that would help. Then one of his suppliers told him about our FinAnswer Express incentive program, which Meek's used to help upgrade to T8 fluorescent lamps with electronic ballasts throughout the store.

Meek's received more than $2,000 in FinAnswer Express incentives for its lighting project. In addition, the building supply retailer has lowered its annual lighting energy usage by 44 percent and will save an estimated $2,000 in energy costs each year.

FinAnswer® Express California

Is it costing more to run your facility than it should?

If your lighting, HVAC and other equipment haven't been upgraded recently, the answer is probably "yes." We have a brilliant solution for you. With FinAnswer® Express, one of our energy efficiency programs for California business customers, we can help you upgrade to energy-efficient lighting, comfortable, energy-saving heating and cooling, and other cost-saving measures.

Surprising as it may sound, we'd like to help you use less energy.

Using less will not only save you money, it can enhance your employees' comfort, productivity and efficiency. Good news for your bottom line. And it's good for all of us and the environment. Participating in energy efficiency programs helps shrink our environmental footprint and is one of the lowest cost resources to meet future energy needs. Just how good does it get?

FinAnswer Express includes incentives and technical expertise.

The incentives apply to lighting and other equipment upgrades that increase your electric energy efficiency and exceed code requirements – both retrofits of existing equipment and new construction/major renovation are eligible.* The incentive amount is based on the equipment installed, so see the incentive tables for a complete list of equipment included in the program. Plus, we provide technical expertise to help you weigh your options. You can choose a Pacific Power Energy Efficiency Alliance vendor or an independent energy consultant for technical expertise.

How it works

Lighting retrofits

Step 1 Please contact us or an Energy Efficiency Alliance vendor if you'd like help getting started.

Step 2 Obtain an incentive application and catalog from us or your Energy Efficiency Alliance vendor.

Step 3 Upgrade your lighting.

Step 4 Submit incentive application and project cost documentation, including invoices with breakdown of materials and labor, and contact us or your Energy Efficiency Alliance vendor for a post-installation inspection.

Step 5 Receive your incentive check within 45 days of completion of Step 4.

Pre-approval is recommended but not required for lighting retrofits.

Non-lighting retrofits

Step 1 Obtain an incentive application and catalog from us or your dealer.

Step 2 Purchase and install a qualifying unit for use at an eligible location.

Step 3 Submit your incentive application.

Step 4 Receive your incentive check within 45 days of completion of Step 3.

Pre-approval is recommended but not required for chiller incentive applications.

Doing something not on the list? Please contact us before you start your project. It may qualify for a custom incentive.

To get started

- Inquire online at **pacificpower.net/wattsmart**.
- Call our energy services hotline toll free at **1-800-222-4335**.
- E-mail us at **energy.expert@pacificorp.com**.

A list of Energy Efficiency Alliance vendors as well as incentive applications are available on our Web site.

For a copy of the approved tariff, visit the California information at **pacificpower.net/regulation** and go to Schedule A-115.

**Certain restrictions apply for new construction and major renovations since incentives are for upgrades that exceed energy code requirements. See our FinAnswer Express brochure for new construction and major renovations. Pacific Power's Energy FinAnswer® incentive program is available for more comprehensive projects. Customers can receive one incentive per project. Contact us or visit our Web site for details.*

Dr. Vanston Shaw, Yreka Union School District superintendent, visits a classroom at Jackson Street Elementary. The district is saving energy and money with lighting upgrades made at the school with help of FinAnswer Express.

Yreka Union School District

"We're sold on it – we're looking to expand it to other schools."

Dr. Vanston Shaw
Superintendent
Yreka Union School District

With the help of our FinAnswer Express program, officials at the Yreka Union School District in Siskiyou County are working to reduce energy costs by upgrading to energy-efficient lighting.

At Jackson Street Elementary School, the school district replaced outdated T12 lamps and fixtures with magnetic ballasts in classrooms, the library and other rooms with high-efficiency T8 lamps and fixtures with electronic ballasts.

The upgrades are estimated to save nearly 40,000 kilowatt-hours of electricity and $3,000 in energy costs anually. Plus, the school district received $4,335 in incentives from FinAnswer Express to help pay for the project.

FinAnswer® Express California

Incentives for lighting retrofits

Category	Replace	With	Customer Incentive
Fluorescent Fixture Upgrade to Standard T8 Fixtures [Standard T8 lamps and electronic ballasts with ballast factor (BF) ≤ 0.88]	4'-1 or 2 T12 lamp(s) + 1 magnetic ballast (MB)	4'-1 or 2 T8 lamps + 1 electronic ballast (EB)	$6
	4'-3 or 4 T12 lamp(s) + MB(s)	4'-3 or 4 T8 lamps + EB	$12
	8'-1 or 2 T12 lamp(s) + MB(s)	4'-2, 3, or 4 T8 lamps + EB	$12
	8'-1, 2, 3 or 4 T12 lamps + MB(s)	8'-1, 2, 3 or 4 T8 lamps + EB	$12
	8'-1, 2, 3 or 4 T12 HO/VHO lamps + MB(s)	8'-1, 2, 3 or 4 T8 HO/VHO lamps + EB(s) See note 5	$18
Fluorescent Fixture Upgrade to 4' Premium T8 Fixtures [Lamps with initial lumens ≥ 3100 or wattage ≤ 30 W; electronic ballasts with BF ≤ 0.8]	4'-1 or 2 T12 lamp(s) + MB or standard T8 lamp(s) + EB	4'-1 or 2 premium T8 lamp(s) + EB	$12
	4'-3 or 4 T12 lamps + MB(s) or standard T8 lamps + EB	4'-3 or 4 premium T8 lamps + EB	$18
	8'-1 or 2 T12 lamp(s) + MB(s)	4'-2, 3 or 4 premium T8 lamps + EB	$20
Fluorescent Delamping and Standard T8 Fixture Upgrade [Standard T8 lamps and electronic ballasts with BF ≤ 0.88 - Fixture removal is not eligible]	4'-2 T12 lamps + MB	4'-1 standard T8 lamp + EB	$12
	4'-3 T12 lamps + MB(s)	4'-1 or 2 standard T8 lamp + EB	$18
	4'-4 T12 lamps + MB(s)	4'-3 standard T8 lamps + EB	$18
	4'-4 T12 lamps + MB(s)	4'-1 or 2 standard T8 lamp + EB	$30
Fluorescent Delamping and Premium T8 Fixture Upgrade [Lamps with initial lumens ≥ 3100 or wattage ≤ 30 W; electronic ballasts with BF ≤ 0.8. Fixture removal is not eligible]	4'-2 T12 lamps + MB	4'-1 premium T8 lamp + EB	$18
	4'-3 T12 lamps + MB(s)	4'-1 or 2 premium T8 lamp + EB	$24
	4'-4 T12 lamps + MB(s)	4'-3 premium T8 lamps + EB	$24
	4'-4 T12 lamps + MB(s)	4'-1 or 2 premium T8 lamp + EB	$35
T8 Fluorescent Lamp Upgrade	≥32 W T8 lamp	≤ 30 W T8 lamp, see note 4	$0.50
Compact Fluorescent Lighting (CFL) - hardwire fixtures	Incandescent	< 10 W (nominal) CFL hardwire fixture	$10
	Incandescent	≥ 10 W and < 20W(nominal) CFL hardwire fixture	$15
	Incandescent	≥ 20 W (nominal) CFL hardwire fixture	$20
T5 Fluorescent Fixture Upgrade	≥ 250 W metal halide (MH), mercury vapor (MV) or high pressure sodium (HPS)	3 T5HO lamps (nominal 4')+ EB (high bay)	$70
	≥ 400 W MH, MV or HPS	4, 5, or 6 T5HO lamps (nominal 4') + EB(s) (high bay)	$75
	≥ 750 W MH, MV or HPS	≥ 8 T5HO lamps (nominal 4') + EB(s)	$110
	4'-4 T12 lamps + MB(s)	2 T5 lamps (nominal 4') + EB (interior fixtures)	$30
	4'-4 T12 lamps + MB(s)	2 T5HO lamps (nominal 4') + EB (interior fixtures)	$25
High Intensity Discharge Upgrades (based on lamp wattages)	Incandescent or tungsten	≤ 100 W ceramic metal halide	$25
	≥ 400 W MH, MV or HPS	≤ 320 W ceramic metal halide	$100
	≥ 750 W MH, MV or HPS	≤ 400 W ceramic metal halide	$120
	≥ 150 W and ≤ 250 W MH, MV or HPS or ≥ 150 W incandescent	≥ 125 W and ≤ 175 W pulse start MH	$50
	> 250 W and ≤ 400 W MH, MV or HPS	≥ 175 W and ≤ 320 W pulse start MH	$60
	> 400 W MH, MV or HPS	≤ 400 W pulse start MH	$100
	≥ 1000 W MH, MV or HPS	≤ 750 W pulse start MH	$100
	≥ 250 W and < 750 W MH, MV or HPS	4'-4, 5 or 6 T8 lamps + EB(s) (high bay)	$75
	≥ 750 W MH, MV or HPS	4' ≥ 8 T8 lamps + EB(s) (high bay)	$100
Exit Signs	Incandescent or fluorescent exit sign	Light-emitting diode (LED) or electro luminescent exit sign – 1 or 2 faced	$15
	Incandescent or fluorescent exit sign	Photoluminescent or Tritium	$20
Lighting Controls	Wall switch or no control	Wall or ceiling mounted occupancy sensor (per sensor)	$35
	No control	Integral occupancy sensor	$30
	No control	Photocell (per sensor) exterior lights only	$20
	No control	Time clock (per control)	$20
	No control	Daylighting control	$0.10/ connected watt
	No control	Bi-level controlled fixtures with integral occupancy sensor (per fixture)	$35
Light-Emitting Diode (LED) Lighting	Indoor incandescent, neon or fluorescent signage	LED channel letter signage ≤ 2' high	$4/linear foot
		LED channel letter signage > 2' high	$6/linear foot
	Outdoor incandescent, neon or fluorescent signage	LED channel letter signage ≤ 2' high	$2/linear foot
		LED channel letter signage > 2' high	$3/linear foot
	Fluorescent refrigeration case lighting	LED case lighting	$10/linear foot
	Incandescent, neon or fluorescent	LED fixed or scrolling message center signage	See note 7

Requirements for retrofits of existing lighting: To be eligible for the incentives listed, new fixtures must use less energy than the fixtures they replaced. For additional requirements, please refer to the lighting table notes on the next page.

Notes for retrofit lighting incentive table:

1. Incentives are capped at 60 percent of project costs and incentives will not be available to reduce the project simple payback below one year.
2. 2' U-tube lamps may be substituted for 4' linear fluorescent lamps in the above table.
3. For retrofits of existing equipment, lighting incentives will be paid on a one-for-one equipment replacement basis. If fixture counts are changing, the project may be eligible for a custom energy efficiency incentive.
4. Incentives for T8 fluorescent lamp upgrades may not be combined with other fluorescent fixture incentives and will only be paid once per facility.
5. T8 HO/VHO and high bay T8 electronic ballasts are required to have a BF ≤ 1.2 to be eligible for incentives.
6. To determine the length of LED channel letter signs, measure the length of individual letter at the centerline and add the individual values; do not measure the distance between letters.
7. LED fixed or scrolling message center signage incentives are $0.10 per kilowatt-hour of annual energy savings - see note 1. Savings is subject to Pacific Power approval.
8. LED traffic light upgrades are not eligible for incentives.
9. Lighting equipment listed only in the "Replace" column is not eligible for incentives.

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Let's turn the answers on.

FinAnswer® Express California

Incentives for premium efficiency motors

Horsepower	Customer Incentive ($/motor)	1200 RPMs		1800 RPMs		3600 RPMs	
		Open Drip-proof (ODP)	Totally Enclosed Fan-cooled (TEFC)	Open Drip-proof (ODP)	Totally Enclosed Fan-cooled (TEFC)	Open Drip-proof (ODP)	Totally Enclosed Fan-cooled (TEFC)
1	$45	82.5	82.5	85.5	85.5	77.0	77.0
1.5	$45	86.5	87.5	86.5	86.5	84.0	84.0
2	$54	87.5	88.5	86.5	86.5	85.5	85.5
3	$54	88.5	89.5	89.5	89.5	85.5	86.5
5	$54	89.5	89.5	89.5	89.5	86.5	88.5
7.5	$81	90.2	91.0	91.0	91.7	88.5	89.5
10	$90	91.7	91.0	91.7	91.7	89.5	90.2
15	$104	91.7	91.7	93.0	92.4	90.2	91.0
20	$113	92.4	91.7	93.0	93.0	91.0	91.0
25	$117	93.0	93.0	93.6	93.6	91.7	91.7
30	$135	93.6	93.0	94.1	93.6	91.7	91.7
40	$162	94.1	94.1	94.1	94.1	92.4	92.4
50	$198	94.1	94.1	94.5	94.5	93.0	93.0
60	$234	94.5	94.5	95.0	95.0	93.6	93.6
75	$270	94.5	94.5	95.0	95.4	93.6	93.6
100	$360	95.0	95.0	95.4	95.4	93.6	94.1
125	$540	95.0	95.0	95.4	95.4	94.1	95.0
150	$630	95.4	95.8	95.8	95.8	94.1	95.0
200	$630	95.4	95.8	95.8	96.2	95.0	95.4
250	$687	95.4	95.8	95.8	96.2	95.0	95.8
300	$770	95.4	95.8	95.8	96.2	95.4	95.8
350	$960	95.4	95.8	95.8	96.2	95.4	95.8
400	$1,049	95.8	95.8	95.8	96.2	95.8	95.8
450	$1,139	96.2	95.8	96.2	96.2	95.8	95.8
500	$1,229	96.2	95.8	96.2	96.2	95.8	95.8

Notes for motor incentives:

1. Motors larger than 500 horsepower may be eligible for a custom energy efficiency incentive.
2. The National Electrical Manufacturers Association (NEMA) premium efficiency ratings listed are nominal full load efficiency ratings. Motors that meet or exceed these efficiency requirements may qualify for an incentive.
3. Incentives are available via a post-purchase incentive application process.
4. Motors that are installed or placed in inventory may qualify for an incentive.
5. **Incentives are available for qualifying motors purchased prior to December 19, 2010. Incentives are not available for Premium Efficiency Motors purchased on or after December 19, 2010.**

FinAnswer® Express California

Incentives for other motor retrofits

Equipment Type	Size Category	Sub-Category	Minimum Efficiency Requirement	Customer Incentive
Electronically Commutated Motor (retrofit only)	≤ 1 horsepower	Refrigeration application	—	$0.50/watt
		HVAC application	—	$50/horsepower
Variable Frequency Drives (HVAC fans and pumps)	≤ 100 horsepower	HVAC fans and pumps	See note 3	$65/horsepower
Green Motor Rewinds (retrofit only)	≥ 15 and ≤ 500 horsepower	—	Must meet GMPG standards	$1/horsepower

Notes for other motor incentives:

1. Equipment that meets or exceeds the efficiency requirements listed for the equipment category in the above table may qualify for an incentive.
2. Incentives for equipment listed in the incentive table are available via a post-purchase application process.
3. Throttling or bypass devices, such as inlet vanes, bypass dampers, three-way valves, or throttling valves must be removed or permanently disabled to qualify for HVAC fan or pump VFD incentives. VFDs required by energy code are not eligible for incentives. California energy code requires a VFD on HVAC fans greater than or equal to 10 horsepower. Savings will only be realized for installations where a variable load is present.
4. For green motor rewinds, the participating electric motor service center is paid $2/horsepower for eligible Green Motor Rewinds. A minimum of $1/horsepower is paid by the service center to the customer as a credit on the motor rewind invoice. The balance is retained by the service center.
5. For retrofits of existing equipment, incentives are for one-for-one same size equipment replacements.

VFD = Variable Frequency Drive

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Let's turn the answers on.

FinAnswer® Express California

Incentives for HVAC equipment

Equipment Type	Size Category	Sub-Category	Minimum Efficiency Requirement & Customer Incentive		
			$50/ton	$75/ton	$100/ton
Unitary Commercial Air Conditioners, Air-Cooled (cooling mode)	< 65,000 Btu/hr (single phase)	Split system and single package	15.0 SEER and 12.5 EER	—	—
	< 65,000 Btu/hr (three phase)	Split system and single package	—	14.0 SEER and 11.6 EER	15.0 SEER and 12.0 EER
	≥ 65,000 Btu/hr and < 135,000 Btu/hr	Split system and single package	—	11.5 EER and 11.9 IPLV	12.0 EER and 12.4 IPLV
	≥ 135,000 Btu/hr and < 240,000 Btu/hr	Split system and single package	—	11.5 EER and 11.9 IPLV	12.0 EER and 12.4 IPLV
	≥ 240,000 Btu/hr and < 760,000 Btu/hr	Split system and single package	—	10.5 EER and 10.9 IPLV	10.8 EER and 12.0 IPLV
	≥ 760,000 Btu/hr	Split system and single package	—	9.7 EER and 11.0 IPLV	10.2 EER and 11.0 IPLV
Unitary Commercial Air Conditioners, Water and Evaporatively Cooled	< 135,000 Btu/hr	Split system and single package	14.0 EER	—	—
	≥ 135,000 Btu/hr	Split system and single package	14.0 EER	—	—
Package Terminal Air Conditioners and Heat Pumps (PTAC/PTHP) (heating & cooling mode)	≤ 8,000 Btu/hr	Single package	11.8 EER and 3.3 COP	—	—
	> 8,000 Btu/hr and < 10,500 Btu/hr	Single package	11.4 EER and 3.2 COP	—	—
	≥ 10,500 Btu/hr and ≤ 13,500 Btu/hr	Single package	10.7 EER and 3.1 COP	—	—
	> 13,500 Btu/hr	Single package	10.0 EER and 3.0 COP	—	—
Heat Pumps, Air-Cooled (cooling mode)	< 65,000 Btu/hr (single phase)	Split system and single package	15.0 SEER and 12.5 EER	—	—
	< 65,000 Btu/hr (three phase)	Split system and single package	—	14.0 SEER and 11.6 EER	15.0 SEER and 12.0 EER
	≥ 65,000 Btu/hr and < 135,000 Btu/hr	Split system and single package	—	11.5 EER and 11.9 IPLV	12.0 EER and 12.4 IPLV
	≥ 135,000 Btu/hr and < 240,000 Btu/hr	Split system and single package	—	11.5 EER and 11.9 IPLV	12.0 EER and 12.4 IPLV
	≥ 240,000 Btu/hr	Split system and single package	—	10.5 EER and 10.9 IPLV	10.8 EER and 12.0 IPLV
Heat Pumps, Air-Cooled (heating mode) - See note 3	< 65,000 Btu/hr (single phase)	Split system	8.5 HSPF	—	—
		Single package	8.0 HSPF	—	—
	< 65,000 Btu/hr (three phase)	Split system	—	8.5 HSPF	9.0 HSPF
		Single package	—	8.0 HSPF	8.5 HSPF
	≥ 65,000 Btu/hr and < 135,000 Btu/hr	47°F db/43°F wb outdoor air	—	3.4 COP	
		17°F db/15°F wb outdoor air	—	2.4 COP	
	≥ 135,000 Btu/hr	47°F db/43°F wb outdoor air	—	3.2 COP	
		17°F db/15°F wb outdoor air	—	2.1 COP	

Equipment Type	Size Category	Sub-Category	Minimum Efficiency Requirement & Customer Incentive		
			$50/ton	$75/ton	$100/ton
Heat Pumps, Water-Source (cooling mode)	< 135,000 Btu/hr	86°F entering water	14.0 EER	—	
Heat Pumps, Water-Source (heating mode) - See note 3	< 135,000 Btu/hr	68°F entering water	4.6 COP	—	
Heat Pumps, Ground-Source (cooling mode)	< 135,000 Btu/hr	77°F entering water	14.1 EER	—	
Heat Pumps, Ground-Source (heating mode) - See note 3	< 135,000 Btu/hr	32°F entering water	3.3 COP	—	
Heat Pumps, Groundwater-Source (cooling mode)	< 135,000 Btu/hr	59°F entering water	16.2 EER	—	
Heat Pumps, Groundwater-Source (heating mode) - See note 3	< 135,000 Btu/hr	50°F entering water	3.6 COP	—	

Equipment Type	Size Category	Sub-Category	Customer Incentive
Ground-Source or Groundwater-Source Heat Pump Loop	All sizes	Open loop	$25/ton
		Closed loop	

Notes for HVAC equipment incentives:

1. For retrofits of existing equipment, incentives are for one-for-one same size equipment replacements. Exception: PTHPs can replace electric resistive heating, which must be removed.
2. Equipment that meets or exceeds the efficiency requirements listed for the equipment category in the above table may qualify for an incentive. Equipment must meet both listed efficiency requirements to qualify for incentives.
3. Incentives for heat pumps are $50-$100 per ton of cooling capacity ONLY. No incentives are paid per ton of heating capacity. Heat pumps must meet both the cooling mode and heating mode efficiency requirements to qualify for per-ton cooling efficiency incentives.
4. Incentives for all equipment listed in the incentive table are available via a post-purchase application process.
5. Except where noted, all equipment listed in the table will be eligible for incentives in both new construction and retrofit projects.
6. Equipment size categories are specified in terms of net cooling capacity at AHRI standard conditions as determined by AHRI Standard 210/240 for units < 65,000 Btu/hr, AHRI Standard 340/360 for units ≥ 135,000 Btu/hr, and AHRI Standard 310/380 for PTAC and PTHP units.
7. Ground- and water-source heat pumps must meet or exceed listed efficiency requirements when rated in accordance with ISO-13256-1 to qualify for an incentive.

SEER = Seasonal Energy Efficiency Ratio
COP = Coefficient of Performance
IPLV = Integrated Part Load Value
PTAC = Package Terminal Air Conditioner
EER = Energy Efficiency Ratio
HSPF = Heating Seasonal Performance Factor
PTHP = Package Terminal Heat Pump
HVAC = Heating, Ventilation and Air Conditioning
AHRI = Air-Conditioning, Heating and Refrigeration Institute
IDEC = Indirect Direct Evaporative Cooling

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Let's turn the answers on.

FinAnswer® Express California

Incentives for other HVAC equipment and controls

Equipment Type	Size Category	Sub-Category	Minimum Efficiency Requirement	Customer Incentive
Evaporative Cooling	All sizes	Direct or indirect	Industry Standard Rating (ISR)	$0.02/ISR CFM
Indirect-Direct Evaporative Cooling (IDEC)	All sizes	—	Applicable system components must exceed minimum efficiencies required by energy code	See note 4
Chillers	All except chillers intended for backup service only	Serving primarily occupant comfort cooling loads (no more than 20% of process cooling loads)	Must exceed minimum efficiencies required by energy code	See note 5
365/366 day Programmable Thermostat	All sizes in portable classrooms with mechanical cooling	Must be installed in portable classroom unoccupied during summer months	365/366 day thermostatic setback capability	$150/thermostat
Occupancy Based PTHP/PTAC control	All sizes with no prior occupancy based control	—	See note 6	$50/controller

Notes for other HVAC equipment and controls incentives:

1. For retrofits of existing equipment, incentives are for one-for-one same size equipment replacements.
2. Equipment that meets or exceeds the efficiency requirements listed for the equipment category in the above table may qualify for an incentive.
3. Incentives for all equipment listed in the incentive table are available via a post-purchase application process.
4. Incentives are paid at $0.12/kwh annual energy savings + $50/kw average monthly demand savings. IDEC energy and demand savings subject to approval by Pacific Power.
5. Incentives are paid at $0.12/kwh annual energy savings + $50/kw average monthly demand savings. Chiller energy and demand savings subject to approval by Pacific Power.
6. Controller units must include an occupancy sensor and include the capability to set back the zone temperature during extended unoccupied periods and set up the temperature once the zone is occupied.

CFM = Cubic Feet per Minute
ISR = Industry Standard Rating
IDEC = Indirect-Direct Evaporative Cooling
PTAC = Package Terminal Air Conditioner
PTHP = Package Terminal Heat Pump

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Let's turn the answers on.

FinAnswer® Express California

Incentives for building envelope retrofits

Equipment Type	Category	Minimum Efficiency Requirement	Customer Incentive
Cool Roof	Low-slope roofs only	ENERGY STAR® qualified	$0.10/square foot
Roof/Attic Insulation	—	Minimum increment of R-10 insulation	$0.08/square foot
Wall Insulation	—	Minimum increment of R-10 insulation	$0.10/square foot
Windows See note 4	Site-built	U-Factor ≤ 0.30 and SHGC ≤ 0.33 (glazing only rating)	$0.34/square foot
	Assembly	U-Factor ≤ 0.35 and SHGC ≤ 0.33 (entire window assembly rating)	$0.34/square foot
Window Film	Existing windows	See note 6	See note 6

Notes for building envelope retrofit incentives:

1. Equipment that meets or exceeds the efficiency requirements listed for the equipment category in the above table may qualify for an incentive.
2. Incentives for all equipment listed in the incentive table are available via a post-purchase application process for retrofit projects only.
3. Building must be conditioned with mechanical cooling to be eligible for envelope incentives.
4. Energy performance of window assemblies and glazing products must be rated in accordance with NFRC. Site-built metal window systems must include a thermal break within the frame or other appropriate NFRC certification to qualify for incentives. Skylights are not eligible to receive incentives.
5. Window square footage is determined by the dimensions of the entire window assembly, not just the window glass.
6. Incentives for window film are calculated based on film specifications and window orientation at $0.12/kwh annual energy savings. Energy savings subject to approval by Pacific Power.

NFRC = National Fenestration Rating Council

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Let's turn the answers on.

FinAnswer® Express California

Incentives for food service equipment

Equipment Type	Equipment Category	Minimum Efficiency Requirements	Customer Incentive
Residential Dishwasher (electric water heating only) See note 3	Used in a commercial facility	ENERGY STAR® qualified	$20
Commercial Dishwasher (electric water heating only) See note 3	Undercounter	ENERGY STAR qualified	$500
	Stationary rack, single tank, door type	ENERGY STAR qualified	$1,000
	Single tank conveyor	ENERGY STAR qualified	$1,500
	Multiple tank conveyor	ENERGY STAR qualified	$2,000
Electric Insulated Holding Cabinet	Full size	ENERGY STAR qualified	$300
	3/4 size	ENERGY STAR qualified	$250
	1/2 size	ENERGY STAR qualified	$200
Electric Steam Cooker	3-, 4-, 5- and 6-pan sizes	ENERGY STAR qualified	$750
Electric Convection Oven	—	≥ 70% cooking efficiency (tested in accordance with ASTM F1496)	$350
Electric Griddle	—	≥ 70% cooking efficiency (tested in accordance with ASTM F1275)	$300
Electric Combination Oven	—	≥ 60% cooking efficiency (tested in accordance with ASTM F1639)	$1,000
Electric Commercial Fryer	—	ENERGY STAR qualified	$200
Ice Machines (air-cooled only)	All types, ≤ 500 lbs/day	ENERGY STAR qualified	$125
		CEE Tier 3 qualified	$150
	All types, > 500 lbs/day	ENERGY STAR qualified	$250
		CEE Tier 3 qualified	$400
Residential Refrigerator	Used in a commercial facility	ENERGY STAR qualified	$20
Commercial Glass Door Refrigerator	≤ 30 cubic feet volume (V)	CEE Tier 2 qualified	$125
	31-60 cubic feet		$150
	≥ 61 cubic feet		$175
Solid Door Refrigerator	≤ 30 cubic feet volume (V)	CEE Tier 2 qualified	$50
	31-60 cubic feet		$70
	≥ 61 cubic feet		$90
Solid Door Freezer	≤ 30 cubic feet volume (V)	CEE Tier 2 qualified	$150
	31-60 cubic feet		$175
	≥ 61 cubic feet		$200

Notes for food service equipment incentives:

1. Equipment that meets or exceeds the efficiency requirements listed for the equipment category in the above table may qualify for an incentive.
2. Incentives for all equipment listed in the incentive table are available via a post-purchase application process.
3. Dishwashers must be supplied with electrically heated domestic hot water. Models with either electric or gas booster heaters are eligible for incentives.

CEE = Consortium for Energy Efficiency **ASTM** = American Society for Testing and Materials

PACIFIC POWER

Let's turn the answers on.

FinAnswer® Express California

Incentives for appliances

Equipment Type	Equipment Category	Minimum Efficiency Requirement	Customer Incentive
Ceiling Fans	Residential (used in a business)	See note 4	
High-Efficiency Clothes Washer (must have electric water heating)	Residential (used in a business)	See note 4	
	Commercial (Coin-operated/Laundromat)	ENERGY STAR® qualified	$150
		CEE Tier 2	$200
Electric Water Heater	Residential - 40 gallon or larger (used in a business)	See note 4	
Room Air Conditioners	Residential (used in a business)	See note 4	
Residential Refrigerator/ Freezer Recyling	Residential (used in a business)	See note 4	
Clothes Washer Recycling	Residential (used in a business)	See note 4	

Notes for appliances incentives:

1. Equipment that meets or exceeds the efficiency requirements listed for the equipment category in the above table may qualify for an incentive.
2. Incentives for all equipment listed in the incentive table are available via a post-purchase application process.
3. All equipment listed in the table is eligible for incentives in both new construction and retrofit projects.
4. Please refer to Pacific Power's Home Energy Savings program for efficiency requirements and incentives for listed residential appliances used in a business. Visit pacificpower.net/hes for details.

EF = Energy Factor
MEF = Modified Energy Factor
WF = Water Factor
CEE = Consortium Energy Efficiency

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Let's turn the answers on.

FinAnswer® Express California

Incentives for irrigation retrofits

Irrigation Measure	Replace	With	Limitations	Customer Incentive
Repair Leaking Wheel Lines, Hand Lines and Portable Mainlines	Worn and leaking pipe connections	Cut and pipe press or weld repair of leaking pipe connections	Invoice must show number of joints repaired	$8/joint
Rotating type, Spray Heads or Low-Pressure Pivot Sprinkler Heads	Worn rotating, impact, or spray-type sprinklers	New rotating type, spray heads, or low-pressure pivot sprinkler heads	1. Must be same design flow or less 2. Limited to 2 replacements per irrigated acre	$3 each (up to 60% of measure costs)
Center Pivot Base Boot Gasket	Worn and leaking center pivot base boot gasket	New center pivot base boot gasket	—	$80 each
Drains and Gaskets for Wheel Lines, Hand Lines, Pivots or Portable Main Lines	Worn and leaking drains and gaskets	New drains and gaskets See note 4	—	$1 each
Flow-Controlling Type Nozzles	Existing brass or worn flow-controlling type nozzles	New flow-controlling type nozzles	1. Must be same design flow or less 2. Limited to 2 replacements per irrigated acre	$1.50 each
Sprinkler Nozzles	Existing worn nozzle	New brass or plastic range nozzle	1. Must be same design flow or less 2. Limited to 2 replacements per irrigated acre	$0.25 each
Gooseneck Elbow with Drop Tube or Boomback	Worn or leaking gooseneck elbow with drop tube or boomback	New gooseneck elbow with drop tube or boomback	—	$1/outlet
Wheel-line Hubs (on Thunderbird Wheel Lines)	Worn or leaking hub	New wheel-line hub	—	$12 each
Sprinkler Pressure Regulators	Worn or faulty regulator	New pressure regulator	1. Must be same design pressure or less 2. Limited to 2 replacements per irrigated acre	$2.75 each
Brass-Impact Sprinklers	Worn or leaking brass-impact sprinkler	New or rebuilt brass impact sprinkler	Limited to 2 replacements per irrigated acre	$3 each (up to 60% of measure costs)
Wheel-line Leveler	Worn or faulty wheel-line leveler	New or rebuilt wheel-line leveler	—	$0.75 each
Wheel-line Feed Hose	Worn or leaking wheel-line feed hose	New or rebuilt wheel-line feedhose	—	$15 each

Notes for irrigation retrofit incentives:

1. Irrigation measures that meet the replacement requirements listed in the above table may qualify for an incentive.
2. Incentives for all equipment listed in the incentive table are available via a post-purchase application process.
3. All equipment listed in the table will be eligible for incentives only in replacement or retrofit projects.
4. Also includes seals and riser caps (dome discs) for valve openers.
5. For measures where the incentive is limited to 60 percent of energy efficiency measure costs, energy efficiency measure costs are subject to Pacific Power approval.

PACIFIC POWER

Let's turn the answers on.

FinAnswer® Express California

Incentives for dairy/farm equipment retrofits

Equipment Type	Equipment Category	Minimum Efficiency Requirements	Customer Incentive
Automatic Milker Takeoffs (retrofit only)	—	Equipment must be able to sense milk flow and remove milker when flow reaches a pre-set level.	$235 each
Tractor Block Heater Timers	—	Timer must be a UL-listed device and rated for a minimum of 15 amps continuous duty.	$10 each
Circulating Fans See note 3	12-23" diameter	Fans must achieve an efficiency level of 11 cfm/W	$25/fan
	24-35" diameter	Fans must achieve an efficiency level of 18 cfm/W	$35/fan
	36-47" diameter	Fans must achieve an efficiency level of 18 cfm/W	$50/fan
	≥ 48" diameter	Fans must achieve an efficiency level of 25 cfm/W	$75/fan
Heat Reclaimers	—	Heat reclaimer must use waste heat from compressor to heat water. Customer must use electricity to heat water.	$220/condenser kw
High-efficiency Ventilation Systems See note 3	12-23" diameter	Fans must achieve an efficiency level of 11 cfm/W	$45/fan
	24-35" diameter	Fans must achieve an efficiency level of 13 cfm/W	$75/fan
	36-47" diameter	Fans must achieve an efficiency level of 17 cfm/W	$125/fan
	≥ 48" diameter	Fans must achieve an efficiency level of 19.5 cfm/W	$150/fan
Milk Pre-coolers	—	The equipment must cool milk with well-water before it reaches the bulk cooling tank.	See note 4
Programmable Ventilation Controller	—	The equipment must control ventilation fans based on temperature or environmental settings.	$20/fan controlled
Variable Frequency Drives for Dairy Vacuum Pumps (retrofit only)	—	The equipment must vary the motor speed in accordance with the air flow needs of the vacuum system. Incentive available for retrofit only.	$165/hp

Notes for dairy/farm equipment incentives:

1. Equipment that meets or exceeds the efficiency requirements listed for the equipment category in the above table may qualify for an incentive.
2. Incentives for all equipment listed in the incentive table are available via a post-purchase application process.
3. Fan performance must be rated by an independent testing body in accordance with the appropriate ANSI/AMCA standards.
4. Incentives are paid at $0.12/kwh + $50/kw. Milk pre-cooler energy and demand savings subject to approval by Pacific Power.
5. Except where noted, all equipment listed in the table will be eligible for incentives in both new construction and retrofit projects.

AMCA = Air Movement & Control Association International, Inc.
ANSI = American National Standards Institute

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Let's turn the answers on.

FinAnswer® Express California

Incentives for compressed air

(for systems with a single operating air compressor up to 75 horsepower)

Equipment Category	Replace	With	Limitations	Customer Incentive
Low-Pressure Drop Filters	Standard coalescing filter	Rated low-pressure drop filter where: 1. Pressure loss at rated flow is ≤ 1psi, ≤ 3 psi at element change 2. Particulate filtration is 100% at ≥ 3.0 microns, 99.98% at 0.1 to 3.0 microns, ≤ 5 ppm liquid carryover 3. Filter is of deep-bed "mist eliminator"	Compressor must be ≥ 25 hp.	$0.80/scfm
Receiver Capacity Addition	Limited or no receiver capacity (≤ 2 gallons per scfm of compressor capacity)	Receiver capacity > 2 gallons per scfm of compressor capacity	1. Compressor must use load/unload controls without inlet modulation or on/off control. 2. Systems with a VFD or using variable displacement control are not eligible.	$1.50/gallon above 2 gallons per scfm
Refrigerated Cycling Dryers	Non-cycling refrigerated dryer	Cycling refrigerated dryer	1. Rated dryer capacity must be ≤ 500 scfm. 2. Dryer must operate exclusively in cycling mode and cannot be equipped with the ability to select between cycling and non-cycling mode. 3. Refrigeration compressor must cycle off during periods of reduced demand.	$1.50/scfm
VFD-Controlled Compressor	Compressor 75 hp or smaller	VFD-controlled oil-injected screw compressor	1. Compressor must adjust speed as primary means of capacity control. 2. Compressor must not use inlet modulation when demand is below minimum speed air production.	$0.15/kwh See note 4
Zero Loss Condensate Drains	Fixed timer drain	Zero loss condensate drain See note 6	Drain is designed to function without release of compressed air into the atmosphere.	$90 each
Outside Air Intake	Compressor intake drawing air from compressor room	Permanent ductwork between compressor air intake and outdoors	Ductwork must meet manufacturer's specifications, which may include: (a) ≤ 0.25" W.C. pressure loss at rated flow, and (b) allow use of compressor room air during extremely cold conditions.	$6/hp

Notes for compressed air incentives:

1. Eligibility for incentives is limited to customers with compressed air system(s) containing a single operating compressor less than or equal to 75 hp in size. Multiple compressor systems and compressors larger than 75 hp will not be eligible for incentives listed above.
2. Equipment that meets or exceeds the efficiency requirements listed for the equipment category in the above table may qualify for an incentive.
3. Incentives for all equipment listed in the incentive table are available via a post-purchase application process.
4. Incentives for VFD-controlled compressors are calculated based on compressor size and other system parameters at $0.15/kwh annual energy savings. Energy savings subject to approval by Pacific Power.
5. All equipment listed in the table will be eligible for incentives in both new construction and retrofit projects.
6. Zero loss condensate drains purchased as requirements for other compressed air measures are eligible for incentives.

SCFM = Cubic Feet of air per Minute at standard conditions (14.5 psia, 68°F, and 0% relative humidity)
VFD = Variable Frequency Drive

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Let's turn the answers on.

ELK VALLEY RANCHERIA ADMINISTRATION BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
7/14/2008	409.20	$2.70	$1,104.84
10/2/2008	404.60	$2.63	$1,064.10
11/8/2008	425.80	$2.49	$1,060.24
12/1/2008	283.30	$2.49	$712.89
12/15/2008	424.10	$2.49	$1,056.01
12/23/2008	446.80	$2.49	$1,112.53
2008	**2393.80**	**Total**	**$6,110.61**

ELK VALLEY RANCHERIA ADMINISTRATION BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
1/9/2009	481.60	$2.39	$1,151.02
1/27/2009	663.00	$2.02	$1,339.26
2/16/2009	331.10	$2.02	$668.83
3/3/2009	498.90	$2.02	$1,007.78
3/24/2009	728.80	$2.02	$1,472.18
4/15/2009	601.90	$1.82	$1,095.46
5/18/2009	461.20	$1.64	$756.37
6/2/2009	206.30	$1.60	$328.48
8/31/2009	388.70	$1.49	$582.66
11/2/2009	406.20	$1.93	$787.62
12/4/2009	560.10	$2.04	$1,147.64
12/14/2009	447.30	$2.19	$983.61
12/29/2009	424.70	$2.22	$946.66
2009	**6199.80**	**Total**	**$12,267.57**

ELK VALLEY RANCHERIA ADMINISTRATION BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
1/19/2010	373.50	$1.97	$735.42
2/12/2010	609.70	$1.96	$1,200.50
3/8/2010	498.80	$1.89	$947.22
3/29/2010	528.10	$1.82	$960.61
4/19/2010	316.40	$1.78	$564.25
5/17/2010	310.80	$1.78	$556.02
6/12/2010	207.40	$1.78	$371.04
9/20/2010	349.10	$1.80	$631.52
11/1/2010	307.60	$2.05	$633.35
11/22/2010	501.80	$2.13	$1,073.35
12/13/2010	502.10	$2.19	$1,104.12
12/27/2010	438.30	$2.19	$963.82
2010	**4943.60**	**Total**	**$9,741.22**

ELK VALLEY RANCHERIA ADMINISTRATION BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
1/10/2011	538.10	$2.28	$1,231.71
1/24/2011	283.80	$2.28	$649.62
2/21/2011	608.80	$2.33	$1,423.98
3/7/2011	558.40	$2.33	$1,294.40
2011	**1989.10**	**Total**	**$4,599.71**
2008-2011	**15526.30**		**$32,719.11**
.			
Average gallons per month		**443.61**	
Average cost per month		**$934.83**	

ELK VALLEY RANCHERIA CASINO BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
5/27/2008	414.80	$2.65	$1,098.87
6/16/2008	1290.70	$2.66	$3,433.26
7/8/2008	935.10	$2.71	$2,531.90
8/26/2008	1017.60	$2.69	$2,737.30
9/26/2008	1432.50	$2.66	$3,810.76
10/27/2008	1763.30	$2.58	$4,553.97
11/24/2008	1186.60	$2.49	$2,954.63
12/29/2008	2798.00	$2.49	$6,967.01
2008	**10838.60**	**Total**	**$28,087.70**

ELK VALLEY RANCHERIA CASINO BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
1/26/2009	1594.60	$2.31	$3,680.02
2/23/2009	2596.70	$2.02	$5,246.33
3/31/2009	2933.90	$1.90	$5,577.38
4/28/2009	1749.00	$1.76	$3,083.69
5/22/2009	1265.80	$1.64	$2,075.91
6/22/2009	1271.40	$1.61	$2,052.06
7/24/2009	1759.30	$1.60	$2,810.48
8/31/2009	1609.30	$1.50	$2,412.34
9/25/2009	1116.00	$1.55	$1,727.56
10/26/2009	1820.80	$1.47	$2,674.64
11/23/2009	1937.20	$1.63	$3,160.78
12/28/2009	2948.50	$1.76	$5,195.01
2009	**22602.50**	**Total**	**$39,696.20**

ELK VALLEY RANCHERIA CASINO BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
1/20/2010	1561.60	$1.93	$3,016.42
2/22/2010	2551.50	$1.95	$4,972.28
3/29/2010	2575.40	$1.87	$4,811.25
4/29/2010	2369.20	$1.81	$4,284.65
5/28/2010	2597.50	$1.79	$4,646.93
6/28/2010	1556.80	$1.79	$2,785.29
7/19/2010	868.90	$1.70	$1,476.33
8/16/2010	1141.70	$1.69	$1,926.65
9/30/2010	2074.60	$1.32	$2,728.51
10/22/2010	1055.10	$1.92	$2,027.89
11/29/2010	2925.70	$2.11	$6,174.44
12/27/2010	1116.10	$2.20	$2,454.31
2010	**22394.10**	**Total**	**$41,304.95**

ELK VALLEY RANCHERIA CASINO BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
1/24/2011	2010.10	$2.27	$4,572.09
2/21/2011	1592.70	$2.34	$3,725.32
3/14/2011	1299.50	$2.37	$3,075.58
2011	**4902.30**	**Total**	**$11,372.99**
2008-2011	**60737.50**		**$120,461.84**
.			
Average gallons per month		**1735.36**	
Average cost per month		**$3,441.77**	

ELK VALLEY RANCHERIA 2298 Norris Ave BUILDING GAS USAGE 2008-2011			
Date	Quantity gallons	Cost	Total
11/11/2008	73.20	$2.49	$182.27
2008	**73.20**	**Total**	**$182.27**
5/22/2009	143.80	$1.64	$235.83
2009	**143.80**	**Total**	**$235.83**
2/22/2010	133.40	$1.89	$253.33
2010	**133.40**	**Total**	**$253.33**
1/27/2011	174.10	$2.28	$398.51
2011	**174.10**	**Total**	**$398.51**
2008-2011	**524.50**		**$1,069.94**
.			
Average gallons per year		**131.13**	
Average cost per year		**$267.49**	

ELK VALLY RANCHERIA ADMINISTRATION ELECTRICAL COST 2009-2011

Date	KWH		Bill Amount
3/5/2011	25,399.07		$2,193.54
2/8/2011	30,013.55		$2,592.06
1/8/2011	23,041.00		$1,989.89
	78,453.62	**2011 Total**	**$6,775.49**
	26,151.21	**Monthly Average**	$2,258.50
	59,899.79	**2009-2011**	
	19,966.60	**Average KWH per month**	

ELK VALLY RANCHERIA ADMINISTRATION ELECTRICAL COST 2009-2011

Date	KWH		Bill Amount
12/21/2010	16,678.67		$1,440.42
11/18/2010	17,323.16		$1,496.08
10/19/2010	15,803.41		$1,364.83
9/30/2010	15,426.28		$1,332.26
8/19/2010	17,133.73		$1,479.72
7/21/2010	15,577.62		$1,345.33
6/21/2010	13,933.98		$1,203.38
5/20/2010	19,421.86		$1,677.33
4/15/2010	20,242.81		$1,748.23
3/25/2010	16,854.90		$1,455.64
2/16/2010	27,716.96		$2,393.72
1/25/2010	18,351.49		$1,584.89
	214,464.88	**2010 totals**	**$18,521.83**
	17,872.07	**Monthly Average**	**$1,543.49**

ELK VALLY RANCHERIA ADMINISTRATION ELECTRICAL COST 2009-2011

Date	KWH		Bill Amount
11/30/2009	14,888.78		$1,285.84
10/27/2009	18,409.62		$1,589.91
9/2/2009	17,521.74		$1,513.23
8/27/2009	15,790.91		$1,363.75
7/29/2009	15,673.61		$1,353.62
6/29/2009	18,542.20		$1,601.36
5/29/2011	16,917.20		$1,461.02
4/28/2009	16,075.98		$1,388.37
3/31/2009	17,971.59		$1,552.08
2/27/2009	19,011.85		$1,641.92
1/29/2009	19,714.69		$1,702.62
	190,518.16	**2009 totals**	**$16,453.72**
	15,876.51	**Monthly Average**	**$1,371.14**

ELK VALLY RANCHERIA CASINO ELECTRICAL COST

Date	KWH		Bill Amount
12/6/2010	180,118.80		$15,555.60
11/2/2010	164,671.33		$14,221.51
10/4/2010	160,867.39		$13,892.99
9/2/2010	155,653.58		$13,442.71
8/4/2010	151,080.09		$13,047.73
7/6/2010	175,215.31		$15,132.12
6/3/2010	143,518.17		$12,394.66
5/6/2010	131,295.46		$11,339.07
4/12/2010	171,428.16		$14,805.05
3/10/2010	174,361.24		$15,058.36
2/4/2010	142,063.38		$12,269.02
1/7/2010	195,973.62		$16,924.87
	1,946,246.54	**2010 totals**	**$168,083.69**

ELK VALLY RANCHERIA CASINO ELECTRICAL COST

Date	KWH		Bill Amount
12/4/2009	176,852.12		$15,273.48
11/2/2009	138,976.18		$12,002.40
10/6/2009	187,591.45		$16,200.96
9/2/2009	178,448.87		$15,411.38
8/4/2009	165,095.70		$14,258.16
7/2/2009	155,143.17		$13,398.63
6/4/2009	176,373.68		$15,232.16
5/4/2009	151,796.49		$13,109.60
4/3/2009	142,561.75		$12,312.06
3/6/2009	163,278.49		$14,101.22
2/4/2009	176,285.56		$15,224.55
1/6/2009	155,241.94		$13,407.16
	1,967,645.40	**2009 totals**	**$169,931.76**

ELK VALLY RANCHERIA CASINO ELECTRICAL COST

Date	KWH		Bill Amount
12/4/2008	166,683.19		$14,395.26
11/6/2008	153,542.49		$13,260.39
10/3/2008	148,151.06		$12,794.77
9/3/2008	147,070.04		$12,701.41
8/7/2008	150,634.88		$13,009.28
7/2/2008	154,364.72		$13,331.40
6/3/2008	135,504.21		$11,702.55
5/5/2008	143,961.30		$12,432.93
4/3/2008	138,555.75		$11,966.09
3/5/2008	133,847.13		$11,559.44
2/5/2008	129,348.10		$11,170.89
1/8/2008	146,646.48		$12,664.83
	1,748,309.35	**2008 totals**	**$150,989.24**
Total KWH	5,662,201.29	2008-2010 total	$489,004.69
Average KWH per month		**157283.37**	

ELK VALLY RANCHERIA COMMUNITY CENTER ELECTRICAL COST 2009-2011

Date	KWH		Bill Amount
3/5/2011	14,735.82		$1,272.63
2/8/2011	12,278.99		$1,060.45
1/8/2011	12,696.64		$1,096.52
	39,711.45	**2011 Total**	**$3,429.60**
	13,237.15	**Monthly Average**	$1,143.20
	29,032.42	**2009-2011**	**$2,507.33**
	9,677.47	**Average KWH per month**	**$835.78**

ELK VALLY RANCHERIA COMMUNITY CENTER ELECTRICAL COST 2009-2011

Date	KWH		Bill Amount
12/21/2010	8,356.70		$721.71
11/18/2010	7,248.47		$626.00
10/19/2010	5,486.72		$473.85
9/30/2010	5,773.19		$498.59
8/19/2010	6,649.38		$574.26
7/21/2010	7,425.98		$641.33
6/21/2010	6,761.46		$583.94
5/20/2010	11,045.01		$953.88
4/15/2010	11,169.83		$964.66
3/25/2010	8,670.84		$748.84
2/16/2010	14,381.74		$1,242.05
1/25/2010	9,754.41		$842.42
	102,723.74	**2010 totals**	**$8,871.53**
	8,560.31	**Monthly Average**	**$739.29**

ELK VALLY RANCHERIA COMMUNITY CENTER ELECTRICAL COST 2009-2011

Date	KWH		Bill Amount
11/30/2009	7,320.50		$632.22
10/27/2009	7,581.72		$654.78
9/2/2009	5,053.32		$436.42
8/27/2009	4,614.59		$398.53
7/29/2009	4,890.06		$422.32
6/29/2009	8,450.84		$729.84
5/29/2011	8,794.28		$759.50
4/28/2009	8,981.62		$775.68
3/31/2009	10,621.33		$917.29
2/27/2009	10,354.67		$894.26
1/29/2009	10,156.55		$877.15
	86,819.47	**2009 totals**	**$7,497.99**
	7,234.96	**Monthly Average**	**$624.83**

ELK VALLY RANCHERIA TRIBAL GAMING COMMISSION ELECTRICAL COST 2009-2011

Date	KWH		Bill Amount
3/5/2011	5,084.01		$439.07
2/8/2011	4,891.56		$422.45
1/8/2011	4,804.02		$414.89
	14,779.59	**2011 Total**	**$1,276.41**
	4,926.53	**Monthly Average**	$425.47
	11,318.43	**2009-2011**	**$977.49**
	3,772.81	**Average KWH per month**	**$325.83**

ELK VALLY RANCHERIA TRIBAL GAMING COMMISSION ELECTRICAL COST 2009-2011			
Date	**KWH**		**Bill Amount**
12/21/2010	2,693.40		$232.61
11/18/2010	2,159.84		$186.53
10/19/2010	2,294.27		$198.14
9/30/2010	2,256.17		$194.85
8/19/2010	2,844.39		$245.65
7/21/2010	2,725.94		$235.42
6/21/2010	2,135.75		$184.45
5/20/2010	5,314.31		$458.96
4/15/2010	4,043.86		$349.24
3/25/2010	3,496.17		$301.94
2/16/2010	5,533.85		$477.92
1/25/2010	3,422.76		$295.60
	38,920.72	**2010 totals**	**$3,361.31**
	3,243.39	**Monthly Average**	**$280.11**

ELK VALLY RANCHERIA TRIBAL GAMING COMMISSION ELECTRICAL COST 2009-2011

Date	KWH		Bill Amount
11/30/2009	2,307.01		$199.24
10/27/2009	2,673.37		$230.88
9/2/2009	2,142.70		$185.05
8/27/2009	2,245.17		$193.90
7/29/2009	2,019.85		$174.44
6/29/2009	3,221.87		$278.25
5/29/2011	3,439.78		$297.07
4/28/2009	3,808.23		$328.89
3/31/2009	6,545.28		$565.27
2/27/2009	4,567.58		$394.47
1/29/2009	4,811.20		$415.51
	37,782.04	**2009 totals**	**$3,262.97**
	3,148.50	**Monthly Average**	**$271.91**