



SAN LUIS OBISPO COUNTY

DEPARTMENT OF PUBLIC WORKS

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MEMORANDUM

April 30, 2009

TO: Dean Benedix, P.E.
Utilities Division Manager

FROM: Tom Trott, P.E.
Project Manager

SUBJECT: Solar Energy Evaluation for the Lopez Water Treatment Plant

PURPOSE

The purpose of this memorandum is to provide a basic evaluation of implementing solar energy to power the Lopez Water Treatment Plant (LWTP).

BACKGROUND

The LWTP, a 6 million gallon per day (MGD) water treatment facility, was recently upgraded from a gravity multimedia filtration to a low pressure membrane filtration process. The new membrane filtration process requires a considerably greater amount of energy than the pre-existing gravity multimedia filtration process. The increase in energy usage and recent availability of \$2 million in stimulus grants for solar energy implementation in San Luis Obispo County have encouraged the San Luis Obispo County Flood Control and Water Conservation District (District) to perform a basic evaluation of the advantages and disadvantages of using solar energy to power the LWTP. The evaluation included basic consultation with two solar companies to review past energy usage, assess the site's capability to support a solar power generation plant, and to develop options to implement solar energy.

ENERGY USAGE AND COSTS

The LWTP currently receives all its energy from Pacific Gas and Electric Company (PG&E). In 2008, normal LWTP operations required more than 1.5 million kilowatt-hours (Kwh) of electricity, costing the District over \$200,000. Table 1 summarizes an analysis of the District's PG&E billing statements for the LWTP for calendar year 2008.

Table 1. LWTP 2008 Energy Usage and Costs

	Energy Usage (Kwh)	Energy Costs
Average Daily	4,185	\$560
Peak Daily	4,910	\$688
Average Monthly	127,302	\$17,026
Peak Monthly	147,300	\$20,651
Total Year	1,527,619	\$204,307

The District currently purchases energy for the LWTP in accordance to PG&E's E-19S rate schedule. The E-19S rate schedule is a time-of-use schedule, meaning rates are dependent on the time of year and time of day that energy is used. It is set up to provide low rates with small variances to facilities that require a large amount of energy use. Since the LWTP is operational 24 hours per day, the District benefits from the E-19S rate schedule's low, consistent rates. As of March 1, 2009, the average E-19S rate throughout the year is approximately \$0.13 per Kwh.

SITE ASSESSMENT

The LWTP site is capable to support the installation of a solar energy power generation plant. Although the site does not provide for the most efficient angle of rotation for the solar panels, its spaciousness provides enough room to support an approximate 700 Kw solar power generation plant. A plant of this size could produce roughly 60 to 70 percent of the LWTP's yearly energy usage.

SOLAR ENERGY OPTIONS

Option 1 – Complete Purchase and Installation

Description

The complete purchase and installation option requires the District to completely fund the design, equipment purchase, and installation of the solar energy power generation plant. After purchase and installation, the District would fully own, operate, and maintain the solar plant.

Costs

- Approximate Up-Front Cost: \$4,000,000
- Approximate Payback Period: 20 years

Benefits

- *Immediate Energy Cost Savings* – The solar plant could potentially cut LWTP's energy usage by 60 to 70 percent. Actual monthly savings depends on the time of power generation.
- *Long Term Energy Cost Savings* – Solar companies guarantee that their solar panels will continue to maintain at least 80 percent efficiency after 25 years of use.
- *State Rebates* – The State of California offers a one-time rebate for solar installation, as well as paybacks for extra energy produced in the first five years. The amount of this rebate and these paybacks is unknown; however, the District has been informed that it would not be enough to substantially offset large up-front costs.

Disadvantages

- *Large Up-Front Costs* – It would be very difficult for the District to obtain \$4 million for a solar generation plant project. The District may be able to acquire some of the \$2 million in available grants; however, it is unknown how much, if any, could be obtained for the LWTP.
- *Maintenance Costs* – Solar panel maintenance costs are normally small; nevertheless, they would be borne by the District.
- *Tax Refunds* – Since the District is a government agency, it could not benefit from any tax refunds offered by the government for implementation of solar energy.

Option 2 – Power Purchase Agreement (PPA)

Description

The PPA option requires the District to enter into a 20-year agreement with a solar energy company for purchase of solar energy. Under the PPA, the solar company would be responsible to fund the design, equipment purchase, and installation of the solar energy power generation plant. The solar company would maintain the solar equipment and would charge a fixed yearly rate for the energy produced by the solar plant. PPA's usually include annual rate escalators of 2 to 3 percent. At the end of the 20-year agreement, the District would have the option to renegotiate rates or to buy the complete solar energy power generation plant from the solar company at a depreciated cost.

Costs

- Approximate Up-Front Cost: \$0
- Approximate Starting Energy Rate: \$0.15 - \$0.19 per Kwh

Benefits

- *No Up-front or Maintenance Costs* – The District could use energy from the solar plant for 20 years without any up-front costs or maintenance costs.
- *Accurate Budgeting* – The District would know the exact solar energy rates that it would pay for the next 20 years.
- *Possible Long Term Energy Cost Savings* – Solar companies claim that energy costs will increase by five percent per year in the future. If this trend is predicted accurately, PG&E energy rates could overtake the solar energy rates established by the PPA.
- *Potential Solar Plant Ownership at Reduced Cost* – At the end of 20 years, the District could purchase the solar energy power generation plant, albeit less efficient, for a much smaller up-front cost.

Disadvantages

- *High Energy Rates* – The District would experience initial increases in energy rates of approximately 15 to 45 percent (approximately \$31,000 to \$92,000 annually). There is a possibility, however, that the District could place some funds up-front to “buy down” the rates. A more in-depth study would have to be conducted to quantify these up-front costs. Some, if not all, of these funds could possibly be acquired through stimulus grants.
- *Energy Cost Variability* – Although, solar companies claim an annual increase in energy costs of five percent, energy costs have not always followed this trend in the past and have even dropped in some instances. This type of trend behavior could potentially result in a loss of energy savings in the future.

CONCLUSION

The implementation of solar energy at the LWTP does not appear feasible at this time, unless a large amount of funding becomes available to fund the complete purchase and installation of a solar energy power generation plant or the District is able to acquire stimulus grant monies to “buy down” PPA energy rates. Grants to perform feasibility studies for implementing solar energy are available should the District wish to further pursue solar energy implementation at the LWTP. If this is the case, solar energy companies have offered to provide the District with a complete information package for all available grants relating to solar energy implementation.