SLO Green Build

Board of director's Sustainability and Energy Self Reliance Recommendations:

For

County of San Luis Obispo Technical Advisory Committee
Los Osos Wastewater project and water reclamation projects.

Introduction

The County of San Luis Obispo has an excellent opportunity to design into the LOWWP project methods of water conservation, re-use and wastewater treatment that are based on the balanced metrics of Environmental, Social, and Financial Sustainability[1]. The State Water Resources Control Board has indicated, because of fossil fuel depletion, Greenhouse Gas mitigation, and global warming, that water and wastewater projects cannot continue assuming it is "business as usual" disregarding future energy costs and global environmental issues . With this in mind the SLOGB board makes the following recommendations to the technical advisory committee after our review of the fine screening report.

Recommendations

1. **Prioritizing Sustainable Design** The application of smart growth principals need to recognize sustainable design is a core value effecting future urban planning. If sustainability is better represented throughout the planning process using the specific implications of the trimetrics mentioned above such as Energy consumption, Social impacts, and Financial Planning for future environmental challenges, then the needs of all socioeconomic groups in Los Osos can be treated equally.

   SLOGB recommends continuous tri-metric sustainable design analysis throughout the wastewater implementation program. It would benefit homeowners and the County to know the real cost of various treatment and reclamation plans as they relate to escalating costs of energy due to fossil fuel depletion, and required green house gas mitigation in 2012 under AB 32-2006. (By Jan 1, 2012, Green House Gas rules and market mechanisms adopted by Air Resources Board take effect and are legally enforceable.)

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If the County chooses as its core value project choices on energy self sufficiency, energy conservation and tiered implementation to economize energy consumption by economy of scale (cluster or staged sewer development), then it will have prepared partially for fossil fuel depletion and its ancillary economic shocks. Many recent studies expect these shocks by 2011 to 2015.

Energy modeling requirements are part of an accurate and complete sustainability assessment. Life cycle cost analysis, embedded energy analysis, greenhouse gas analysis and integrated sustainability analysis should accompany any project of this magnitude in today's changing environmental and energetic reality. With operations and maintenance ultimately accounting for 75% of the life cycle cost of any design, the water reclamation and wastewater systems energy footprint will impact lesser income groups in the community. The result would be pressures for displacement of lower income people. Potential displacement of up to 40% of the community to implement water goals does not meet sustainable design standards.

Social impacts are weighed equally with energy and environmental impacts in sustainability analysis. People are a resource. Behavioral participation is part of sustainability design management. Behavior is viewed as an energy offset and resource. It is well known that Los Osos has a high level of low income families. Thirty percent of the families with children going to Baywood Elementary are using the school free lunch program. To qualify these famlies, they have to be proven low income by federal standards. Seniors on low or fixed income amount to another 20 percent of the residents of the prohibition zone.

With this in mind, SLOGB submits to the County in electronic format a sample sustainability assessment titled: Assessment of the Environmental Sustainability Of Urban Water Systems by MARGARETA LUNDIN. [2]. This document will help the TAC and public works deal with sustainable design and its implementation. Also submitted is , Energy Baseline Study For Municipal Wastewater Treatment Plants complied for PG&E by Base Energy Inc. to help in efficient wastewater systems design [3].

2. **Energy use & Sustainiblity** – Consistent with Surfrider Foundation's position on this issue SLOGB emphasizes also minimizing dependency on non-renewable energy sources through the use of smart design, cogeneration of energy, and other renewable energy sources. The present fine screening design assumes the cost of electricity at 12 cents a KWH for the life of the plant without interruption.

   In actuality future energy prices and availability are better represented by cost curves related to past increases in energy costs which place power prices well above the 12 cent a KWH rate by 2015. With tight natural gas supplies, reductions in hydroelectric power due to reduced snow pack from global warming, and higher summer energy peaks for air conditioning, PG&E expects safety margins to reduce substantially

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unless renewables are aggressively utilized. Fuel purchase costs could escalate dramatically for PG&E and will be passed on to the consumer. Energy depletion and resource scarcity, and price shocks are real issues directly related to operations and management of Los Osos wastewater and reclamation from 2012 to 2050 and beyond.

For the cost to produce energy, SLOGB submits to the County CEC data on the levelized cost to produce power. Wind energy is by far the winner at 4.93 cents a KWH. The price of natural gas will be impacted by resource shortages by 2015. Present peak loading costs for natural gas power of 15 cents a KWH reflect new added capacity constraints that the wastewater plant represents. (See electronic attachment CEC Cost Analysis- Power [4]). Spray fields and grid connected wind power dual use sites could cut 'net' energy consumption for wastewater operations to near zero with a capital recovery of 4.93 cents a KWH.

Table 1
Levelized Costs by Technology

Technology	Energy Source Fuel	Operating Mode	Economic Lifetime (years)	Gross Capacity (MW)	Direct Cost Levelized (cents/kWh)
Combined Cycle	Natural Gas	Baseload	20	500	5.16
Simple Cycle	Natural Gas	Peaking	20	100	15.71
Wind	Wind; Resource Limited	Intermittent	30	100	4.93
Hydropower	Water; Resource Limited	Load-Following, Peaking	30	100	6.04
Solar Thermal					
Parabolic Trough	Sun; Resource Limited	Load-Following	30	110	21.53
Parabolic Trough-TES	Sun; Resource Limited	Load-Following	30	110	17.36
Parabolic Trough-Gas	Sun/Natural Gas; Partially resource limited	Load-Following; Peaking	30	110	13.52
Geothermal					
Flash	Water	Baseload	30	50	4.52
Binary	Water	Baseload	30	35	7.37

Table courtesy Calif. Energy Commission

Added Sustainability for STEP /STEG Systems.

After reviewing the LOCSD 's STEP collection and treatment energy consumption estimates in Los Osos and comparing them to the Counties estimate of STEP collection, SLOGB anticipates that the County will revise its energy consumption figures and energy infrastructure costs for STEP collection to reflect the more realistic industry based comparative reporting. The Counties on site costs for power interface, I&I estimates, and assumptions of 20 percent reduction in solids from STEP collection appear understated.

SLOGB recommends that lower cost Photovoltaic power be used to operate the STEP pressure interface instead of a separate extra power service at 5000 dollars cost to each home (County estimate). This could be done for a cost considerably less than the projected cost of an additional service drop. Photovoltaic's with battery backup could

harden individual STEP systems from power outages as PG&E margins for peak loading diminish from 7% in 2007 to 0.8% in 2008 and beyond. (PG&E estimate)

Another method, presented by the Pacific Energy Company, offers a submersible pump to be installed in a pump vault after the existing septic system with a direct drive pump using only photovoltaic power eliminating the battery backup entirely at an estimated cost of 2200 dollars per parcel, well below the fine screening estimate of 5000 dollars.

SLOGB recommends that instead of replacing every septic tank that wherever possible a 250 to 350 gallon surge pump vault be installed after an existing certified septic tank. This would cut air pollution construction impacts to a minimum and reduce homeowner lifestyle and yard disturbances. In sand, tanks of this size could be hand dug in problematical locations with minimum OSHA shoring.

SLOGB agrees with Surfrider foundation that STEP/STEG pressurized design allows for diagnosis and repair of breaks or leaks in the system and allows control, redundancy and monitoring not available in gravity systems. Gravity systems do not allow the scale of monitoring and Bay protection that STEP/STEG does. Therefore we agree with the Surfrider Foundations support of the STEP/STEG approach.

Directional boring of STEP/STEG piping systems is preferred by the Chumash Council, reduces PM10 emissions, reduces road repair, reduces dewatering and dewatering dumping costs, eliminates shoring costs 95%, eliminates disposal of contaminated soil, reduces pipe footage exposed to groundwater in low lying areas, and trenching re-compaction. Cost analysis for STEP/STEG should include these sustainability comparisons in a realistic evaluation.

Added Sustainability for Gravity Based WW infrastructure.

SLOGB submits to public works a key document from PG&E that outlines incremental energy savings in wastewater plant design. Energy Baseline Study For Municipal Wastewater Treatment Plants complied for PG&E by Base Energy Inc. [5] to help in efficient wastewater systems design.

Facultative ponds used for solids digestion may offer more sustainability and optimized energy footprint when coupled with photovoltaic aerators. Submitted is evaluation for the City of Planada as part of the California Wastewater Process Optimization Program funded by the PUC outlining the use of Solar Bee photovoltaic pond aerators. (DETAILED PROCESS AUDIT SUMMARY & RECOMMENDATIONS FACILITY Planada WWTP" [6].The payback for Solar aeration was studied and estimated to be 2.2 years. Solar Bees can reasonably be estimated to provide 300 lbs of dissolved oxygen (DO) per surface acre per day, or more per unit. Solar Bee website is: http://www.solarbee.com/ww.shtml

Secondary use of existing septic systems. SOLGB recommends that the existing septic tanks not be abandoned but that they are used for greywater and impervious runoff recharge into the upper aquifer. Greywater reuse is certified under California law.

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Watering stations for landscaping could be established with the final overflow returning to the old septic system. The saved water is applied to subsurface landscape watering and upper aquifer recharge. Diffuse discharge of greywater and drainage in Los Osos represents zero energy consumption to recharge up to 200 AF per year. No proposed County recycling system matches this efficiency.

Improved sustainability for water reclamation.

All proposed water recycling systems need energetic evaluation in terms of water reclaimed per KWH. Using the Broderson site for water reclamation is unsustainable due to the physical principal of lifting 4 million pounds (500,000 Gal. X 7.4 Lbs per gallon) of water every day to a height of 200 feet. The work (KWH per gallon delivered) required to implement the 10% potential recharge of the deep aquifer would in our opinion eliminate the process as an option.

3. **Environmental Sustainability**

Sea Level Rise related to global warming.

While other costal communities are undergoing extensive planning to mitigate sea level rise and its effect on Costal aquifers there is no modeling in the groundwater assessment here. Sea level rise due to global warming will have the following impacts:

A) Adverse impacts on the collection of sewage especially gravity sewers including excessive levels of salt water intrusion into the waste stream. Gravity systems are vulnerable to sea level rise impacts.

B) Condemnation of homes and or rolling easements and service contracts related to water levels may be necessary and are unplanned here. Legal ramifications of having to supply waste disposal in or at water level situations may be problematical. Zones of impact should be identified and legally accounted for.

C) Salt water intrusion has not been modeled in varying scenarios for sea level rise in the WWTP life cycle. No impact on water resources has been evaluated. The range of study should include assumed sea level rises from a minimum of 1.5 feet to 23 feet within the life cycle of the sewer plant. Existing water resources and plans for water balance in the basin should be modeled for varying sea level impacts.

An international project of the Arctic Council and the International Arctic Science Committee (IASC), has evaluated knowledge on climate variability, climate change, and increased ultraviolet radiation and their consequences. The results of the assessment were released at the ACIA International Scientific Symposium held in Reykjavik, Iceland in November 2004. I that report, Sea level rise during the life of the LOWWP life cycle will be from 1.5 feet to 23 Feet. Greenland ice melt has accelerated rapidly since the year 2000. With no planning for mitigation, there

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would be large added costs, legal ramifications and environmental failures of system components related to sea level rise that could be planned for now.

Sustainability and Greenhouse Gas Emissions

50% energy reduction goals by 2020 required by AB 32-2006.
By Jan 1, 2012 GHG rules and market mechanisms adopted by ARB take effect and are legally enforceable. These constraints would then need to be reviewed as part of any CEQA evaluation. No planning presently exists for the LOWWP relative to Green house gas emissions. The emissions are directly contributing to estimated habitat collapse from sea level rise.

Carbon dioxide accounts (by weight) for almost all of the human produced greenhouse gases emissions (although it is important to remember that total CO2 emissions account for 60% of the warming potential. In 1991 the human activities that contribute to global warming were: fossil fuel combustion 85%, land use clearing 13% and cement production 2%. Since carbon dioxide is the major human-produced greenhouse gas, it is important to note that the average American releases about 20 tons of carbon dioxide into the atmosphere each year . This figure is an estimate and includes transportation and home electricity usage and industrial and governmental production.
Human Activities Contributing to CO2 in the Atmosphere in Metric Tons and as a percent:
Fossil Fuel Combustion : 22,079,264,000 - 85%
Land Use and Clearing : 3,400,000,000 - 13%
Cement Production : 593,568,000 - 2%
TOTAL : 26,100,000,000 - 100%
Amounts of CO2 produced from different sources used to produce 1 kwh (kilowatt hour) electricity are:

- 2 lbs. CO2 if coal-generated
- 0 lbs. CO2 if hydropower
- 0 lbs. CO2 if nuclear power
- 1.25 lbs. CO2 if natural gas
- 1.7 lbs. CO2 if oil

Amount of CO2 produced from combusting 1 gallon of gasoline is 19 lbs. (about 5.3 lbs. of carbon which combines with atmospheric oxygen in combustion to yield this larger amount) which goes directly into the atmosphere. In other words, for every 15-gallon fill-up at the service station, about 300 pounds of carbon dioxide are eventually released into the atmosphere. 600 to 1200 Tons of Greenhouse Gasses per year for electricity and transportation are required to operate the most efficient proposed Sewer Plant. Existing primary treatment in Septic Systems creates "0" Tons of greenhouse gasses. "All studied systems do not meet State of California goals for 20% Carbon reduction by 2020 and 80 % carbon reduction by 2050. No alternative studies of pollution management have been done to assess other methods of mitigation that do not involve vast amounts

of greenhouse gas increases. SLOGB recommends limiting Greenhouse gas emissions by using sustainable design principals as outlined. Without this evaluation at the present time the County risks added cost to plant operations related to GHG mitigation at a later date.

Thank you for considering our recommendations concerning this very important project.

SLO GREENBUILD BOARD OF DIRECTORS

Submitted to John Waddell on 7/23/7

References [1]-[6] will be emailed to your office Wednesday morning 1/25/7

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