American White Pelicans at Anaho Island in Pyramid Lake

Profits
in the Graveyard

Entropy and the Tahoe–Pyramid Lake Aquatic Ecosystem

Sempra Energy, a San Diego-based power company, has proposed a monstrous coal-fired power plant just north of Pyramid Lake near Gerlach, Nevada. The plant will consume nearly 47 million pounds of pulverized coal every day, thus producing more than 146 million pounds of carbon dioxide and consuming some 100 million pounds of oxygen from the air every day. Absurd amounts of entropy will be released into the Tahoe–Pyramid Lake aquatic ecosystem in the form of carbon dioxide, mercury, heat and water vapor (to name only a few).

The Tahoe–Pyramid Lake aquatic ecosystem is one of the most sensitive ecosystems in the world. It is a system that is unique specifically because of the distinct energy content and exchange via the Truckee River and its proximity to the sky above. Sempra's proposed Granite Fox coal-fired power plant will irreversibly disrupt the balanced energy exchange and biodiversity of this ecosystem.

Lake of the Sky

Lake Tahoe is the second largest alpine lake in the world and the second deepest in the United States. Lake Tahoe covers a total of 191 square miles and holds enough water to submerge the entire state of California at a depth of over 14 inches. The total watershed area of Lake Tahoe is 519 square miles – more than a quarter of the total area of the entire state of Delaware.

The lake is fed by more than 63 alpine steams that occur as a result of melting snow-pack from the mountains surrounding the lake. Heavy snow pack accumulates at elevations above lake level, which ranges to more than 10,000 feet in the Lake Tahoe Basin. Seasonal glaciers gain mass throughout the long Tahoe winter and begin receding in late spring and continue to melt well into late summer. Decomposing organic material becomes trapped under the heavy snow pack, as does the methane gas and anaerobic bacteria produced as a result of organic decay. The summer melt releases the methane gas, anaerobic bacteria and decomposing organic material thus providing nutrient rich run-off for the sixty-three-plus streams that eventually empty into the Tahoe-Pyramid Lake aquatic ecosystem (this process is what is responsible for the rotten-egg smell that seeps out from the meadow in Olympic Valley with every reoccurring spring).

Water escapes the Lake Tahoe Basin in only one of two ways; either by surface evaporation (which is in one year enough to provide the entire city of Los Angeles with water for five years), or by drainage into the Truckee River. The Truckee River begins at the northwest shore of the lake and travels 140 miles, mostly north, eventually emptying into Pyramid Lake 40 miles northeast of Reno. The Truckee is one of the only rivers in the world that flows opposite of the equator and does not eventually flow out to sea.

Pyramid Lake lies within an endorheic basin for which there is no outflow of water except through evaporation. Pyramid Lake is one of the few endorheic saline lakes left in the world. It is all that remains of Lake Lahontan, a prehistoric lake, which once covered the Great Basin of northwestern Nevada. Exotic tufa rock formations surround Pyramid Lake; some have taken the shape of pyramids, beehives, and human profiles. The largest of these formations is Anaho Island, which lies in the southern end of the lake.

Anaho Island is a national wildlife refuge and home to a large colony of American White Pelicans and many Common Loons. Protected under the 1972 Migratory Bird Treaty, the American White Pelican comes to feed and nest at Anaho Island in April and departs in August for the western coast of Mexico and Guatemala. They are a large bird, with an average bodyweight of 16.5 pounds, a wingspan of up to ten feet, and a large protruding orange bill. When in flight, their strokes are powerful and broad.

The earth surrounding Pyramid Lake is ideal for the temporary storage of solar energy. Shortly after the sun reaches its highest point in the sky, the desert floor will begin to release a significant amount of this energy in the form of heat. The warm air rises creating a great upward force known as a 'thermal column.' This force will become more intense as it climbs the gradual upward slope of the hills just east of Pyramid Lake.

Several times a day, shortly following the sun's descent in the western sky, the pelicans of Anaho Island will depart from their nesting grounds to engage in a ritual, that which the native Paiute Indians call 'dancing.' In large numbers, the dancing pelicans of Anaho Island fly east crossing the lake and the desert floor. They follow each other single file and fly relatively low – maybe 50 or 100 feet above the earth. The lead bird searches for an upward thermal force. Once discovered, the pelicans will fully extend their wings in order to maximize surface area and all thermal-induced lift. They follow one after the other into an upward spiral. They continue this while drifting laterally to take advantage of the increasing upward slope of the desert floor and hence the increasing thermal force. The thermal column is very strong, for it is only necessary for these birds to beat their wings one to three times for every two revolutions in an upward winding helix over 50 meters in diameter. They will continue to fly higher and higher until they can no longer be seen with the naked eye.

Enter Sempra Energy

Sempra Energy is a Fortune 500 services holding company based in San Diego, California. It has more than 10 million customers and in 2004, Sempra Energy reported $9.4 billion in revenues. A recent report authored by Sempra president Michael Niggli states that "Sempra Energy has assembled a power-plant fleet that is strategically located to maximize profitability." Sempra's plan is to build, or otherwise acquire, coal-fired power generation in regions where the energy grid is more dependent on gas-fired power generation, as Sempra is well aware of the impending natural-gas fuel shortage in North America.

Sempra Energy Partners was organized in 2003 in order to muster financial support necessary to acquire "energy assets such as power plants, pipelines and related energy facilities," according to Niggli. Sempra has bolstered its strategic influence by partnering with the Carlyle Group to procure nearly 2,500 megawatts (MW) of energy to be sold in the United States. The Carlyle Group is a private equity firm that specializes in the buying and selling of large private companies, in particular, government regulated industries. Carlyle currently has holdings that include large-scale weapons manufacturers, commercial energy production facilities, and local utilities. The Carlyle Group has a long list of powerful consultants and heavily vested interests. This list

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includes members of the Saudi Bin-Laden Group and Saudi Royal Family, former president George H. W. Bush, former secretary of defense Frank Carlucci, former secretary of state James Baker, and several individuals appointed to interim governments in Iraq and Afghanistan.

Sempra Energy has proposed the construction of several coal-fired power plants in the United States over the next five years. Among these is the Granite Fox Station (GFS) destined for northern Washoe County, Nevada, just north of Pyramid Lake in the Black Rock Desert. The plant will cost more than $2 billion to construct, consume more than 47 million pounds of pulverized coal each day, and use over 6.7 billion gallons of scarce desert water every year. In the first 25 years of operation, the GFS will require more than 1.7 million train-cars of coal, which is a train over 16,342 miles long, a train more 58 times the entire width of Colorado. This coal-fuel will cost more than $4.5 trillion in capital and the resulting entropy will permanently devastate the Tahoe-Pyramid Lake aquatic ecosystem, one of the most sensitive ecosystems in the world.

Most of the energy produced by the GFS will be exported to southern California via an existing DC power line that runs from southern California, through most of western Nevada, Oregon, and into Washington State. There is an estimated 1000 to 2000 MW of transmission capacity currently available on this line. The GFS will tie up all of this available capacity, which will leave no available access for the interconnection of several renewable energy projects currently under proposal along this line.

Lake of the Dead

Sempra's Granite Fox Station will emit approximately 710 lbs. of elemental mercury into the immediate environment every year. In an environment such as the Tahoe-Pyramid Lake aquatic ecosystem, the mercury will be quickly metabolized by the anaerobic bacteria residing within the lake and shoreline sediments to be transformed into methyl mercury, an extremely dangerous neurotoxin. This organic form of mercury is subsequently taken up the food chain to bio-accumulate in the living tissue of fish. According to the EPA, a six-ounce serving of perch (sold domestically) will contain an average of 42.5 micrograms (mcg) of methyl mercury. The maximum safe level of methyl mercury for human consumption is 0.046 mcg for every one pound of body weight in one day (EPA). The American White Pelican consumes 4 pounds of fish every day. Its diet includes perch, catfish, chubs, carp, and many other fish of similar size and habitat. If we apply the guidelines provided for human fish consumption by the EPA to the diet of the American White Pelican of Pyramid Lake, and assume that the amount of methyl mercury found in one 6 oz. serving of perch from Pyramid Lake will, after sufficient exposure from the GFS, eventually reach that of the national average, we find that the amount of methyl mercury consumed by each one of these birds will be approximately 674 times the maximum safe level as designated by the EPA, every day. The results of mercury exposure to the Tahoe-Pyramid Lake aquatic ecosystem and the effects it will have on the American White Pelican and Common Loon of Pyramid Lake have been proven. In New England and eastern Canada the Common Loon is exhibiting obvious signs of mercury poisoning. Animals have basic instincts: to feed, secure habitat, and to ensure reproduction. The Common Loon of northeastern North America is beginning to lose the ability to perform these basic tasks. Their sensory mechanisms have become impaired as the result of degradation in their nerves' myelin sheathes; such degradation is the result of methyl mercury poisoning, Alzheimer's, multiple sclerosis, and Parkinson's disease.

Methyl mercury poisoning of the Common Loon is now being extensively studied by Canadian scientists. According to Mark Pokras, a veterinarian in charge of the wildlife clinic at Tuft's University Veterinarian School in North Grafton, Massachusetts, the levels of methyl mercury in the Common Loon of northeastern North America are among the highest in the world. In 1999, a Loon was found dead in Kejimkujik National Park, Nova Scotia. The cause of death has been attributed to methyl mercury exposure via the bird's immediate aquatic environment.

The death of such animals was once considered mysterious, as was the mass destruction of birds and cats in Minamata Bay, Japan during the 1950's. A number of animals are currently dying as the result of such strange circumstances, but science is now available that can determine the cause of death, and the disease's symptoms are well known. According to the Natural Resource Defense Council, at least one endangered Florida Panther (whose diet consisted of Raccoons, which feed mostly upon fish) has died as a result of methyl mercury exposure. In Utah, state officials have issued a warning on two species of ducks recently found to have toxic levels of methyl mercury too high for human consumption.

Fatal mercury poisoning has been documented in humans as well. In August of 1996, Karen Wetterhahn, a professor of chemistry at Dartmouth College, spilled a small drop of dimethyl mercury on her latex lab glove (dimethyl mercury is the synthesized component of methyl, or organic, mercury.) A few weeks later, Dr. Wetterhahn began exhibiting symptoms of acute mercury exposure; loss of motor skills, slurred speech, and blurred vision. Six months after the accident, Karen Wetterhahn slipped into a coma and died a few months later in June of 1997. When Dr. Wetterhahn was admitted to the hospital her blood mercury level was 80 times the lethal dose. Ironically, Dr. Wetterhahn was investigating the toxicity of heavy metals at the time of the accident – evidence that little is known regarding the toxicity of methyl mercury.

What comes there, stays there

The combined watershed area of the Tahoe-Pyramid Lake aquatic ecosystem is immense. Anything organic that dies in the boundaries of this watershed will eventually be washed into these waters and ultimately find itself in Pyramid Lake. As these materials decay, they will produce anaerobic bacteria. These bacteria will eventually become trapped within the sediment in and around Pyramid Lake; this is an immeasurably ancient process. The Fox, Granite, Selenite, and Lake Mountain Ranges east of the Smoke Creek and Black Rock Desert will prevent the escape of much of the 710 pounds of elemental mercury emitted by the proposed Granite Fox Station. The unique sediments existing in the Smoke Creek Desert, Black Rock Desert, the Pyramid Lake watershed, and the anaerobic bacterial content therein will quickly metabolize the elemental mercury for subsequent uptake of methyl mercury by the food chain. Flashfloods are common in this desert region, and Pyramid Lake acts as a reservoir under such conditions. The final destination for the elemental and organic mercury will therefore be Pyramid Lake. As a result, the Common Loon and the American White Pelican of Anaho Island and Pyramid Lake will eventually lose their ability to nest, reproduce, and survive; some will simply die from acute methyl mercury exposure. It has been estimated that only 25 pounds of methyl mercury is enough to render all of the fish in Pyramid Lake too toxic for human consumption for more than the remainder of our lifetime and generations to come.

Pyramid Lake from above

Lake Titicaca is the largest alpine lake in the world and is located on the border of Bolivia and Peru. Like Lake Tahoe, Titicaca was once ultra oligotrophic, meaning that the average temperature is too cold to sustain most vegetative life forms. But entropy was added to the lake and alpine watershed from pollution and runoff. Lake Titicaca is no longer as clear as it was just a generation ago, and it no longer reflects the sky above.

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Unique Americana

Soon to Play Truckee

What do you call a musical group consisting of an NGO project manager, ex-punk rocker, high school teacher, and a multi-media designer that just piled out of a blue propane-fueled passenger van? Answer: The Bottom Dwellers, a new country act out of Yolo County, Ca., whose cut, "Company Truck" was recently featured on NPR's Car Talk.

The thought of country music leaves, at best, a bitter-sweet taste in many a mouth. Fear not, this brand of country is not the prosaic crooning synonymous with Nebraska rest stops, nor will it ever be rotated on Country Music Television. The Bottom Dwellers (BD's) are re-inventing honky-tonk while maintaining their roots, having been compared to the likes of Merle Haggard and Hank Williams. Their blend of old and new should prove a strong match for Truckee's historic/developing dichotomy.

Attempting to classify the group's niche in the country world is difficult. The sterile "Alternative Country" suffices for those perusing the aisles at the local corporate music depot. And, in a general sense this label would be hitting a broad nail on its broad explanatory head.

However, something a bit more creative is necessary to evoke the group's musical essence. The BD's self image lands somewhere near the "electric swamp boogie" and "chicken-fried honky-tonk twang" mark. Their debut album title, Twang Americana, doubles also as a definition.

"[We] don't think many people realize how many sub genres of country music there actually are. And just like anything it lends itself to experimentation," says the Woodland quartet.

After listening to a few tracks, the band's experimental tendencies become evident. "We're starting to play around with some new styles at rehearsal." For example, "[we have] a great new Banda fusion tune about Paso Robles." Another work in progress includes some Commodore-esque riffs.

The bottom line is, the BD's musical scope is as packed as a paper plate at a backwoods barb-q. Contributing to this varied repertoire are the members' individual musical backgrounds. Together they produce a chemistry capable of heel stomping across the spectrum of country traditions.

Before drummer Chris Enyon's conversion to "swampy dirt," he was perhaps the member most likely to have played Moody's Bistro, with an impressive San Francisco jazz/funk resume.

Mark Eaglton, on bull fiddle, used to play bass for Floss, a Sacramento indie rock band. He says, those "who knew [me] before the haircut," still have trouble believing the transition.

A fascination with swing and gypsy jazz guitar evolved for Ivan Sohrakoff, the group's founder, into western swing, a genre they briefly explored together before morphing into their current sound. The BD's joke, "now…[we wear] older clothes and hats."

Adjectives like 'speedy' and 'dexterous' smatter recent write ups describing the edgy pick work of guitarist/vocalist Adam Hancock. To sample some tasty tunes check out the band at www.bottomdwellersmusic.com. Free music is offered along with further details.

Supplementing the country ensemble's original scores is a healthy catalog of covers ranging from some obscure John Sebastian tunes to unique renditions of the classics like "Folsom Prison." About covering the man in black, the plaid clad twangers say, "you have to give it that extra juice. No one can get away with playing Johnny Cash like Johnny Cash."

Look for The Bottom Dwellers on January 20 and 21 at the Past Time Club and Bar of America respectively. They predict, "a rip snortin twang fest on stage."

~ Greg Watkins

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The Granite Fox Station will add entropy to the Tahoe-Pyramid Lake aquatic ecosystem as a natural consequence of the second law of thermodynamics. The Tahoe-Pyramid Lake ecosystem will absorb entropy in the form of heat, carbon dioxide, sulfur, mercury, as well as unknown forms of energy, which will permanently devastate the natural balance of energy exchange within the system.

The effects of mercury will be first witnessed in the birds and fish of Pyramid Lake, for the anaerobic bacterial content (necessary for methylation) is much greater here than in most ecosystems. The Lake Tahoe Basin will absorb energy from the 47 million tons of coal burned just 100 miles north every day.

If we consider the toxicological effects of the Granite Fox Station on one of the most sensitive aquatic ecosystems in the world; if we consider the real environmental and economic costs of the GFS on the local community, it becomes unclear why the Granite Fox Station would be allowed by the residents of this region, since it is the public who will ultimately fund the Granite Fox Station through heavy state and federal energy project subsidizations.

In the end, the public will indeed pay for it all: for the health effects, for the irreversible environmental damage, and the construction and eventual decommissioning of the Granite Fox Station. Not only will such a project require an incredible amount of financial capital, it will cost irreplaceable indigenous creatures their lives and will cripple the biodiversity of an ecosystem thousands of years in the making.

~ Written by Brian M. Woody; Questions or comments email fossilfuels@gmail.com; Sources available upon request.

Authors' Note: Do our representatives in government truly believe that the GFS is a good idea for the people they were elected to represent? Congressman Jim Gibbons represents Nevada's 2nd district. He is the founding member and Co-chairman of the Congressional Mining Caucus, and Chairman of the Subcommittee on Energy and Minerals. Representative Gibbons is incidentally running for Governor of Nevada in 2006. If you would like to know what he think is best for the community, ask him. Here is the contact information for his Washington DC and Reno, Nevada offices:

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