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FOR IMMEDIATE RELEASE: January 20, 2011
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EEG strategy turns Alaskan town's failing wastewater treatment plant into a super-cleaning power generator—without costly upgrades and expansion

A year ago, Palmer, Alaska, faced a problem common to thousands of towns and cities: Its aging 3-lagoon wastewater treatment plant was failing. The town braced for an estimated $60 million price tag for upgrades.

Today, Palmer's treatment plant is on track to treat more wastewater with less energy—and even generate power—without expanding the facility's size or paying staggering upgrade costs. "We're going to significantly reduce capital costs," says Palmer's Public Works Director Carter Cole. "But this has so many other implications. We're taking the waste out of wastewater."

The town contracted wastewater system consulting firm, Ecological Engineering Group (EEG) to design a phased solution that optimizes the existing lagoons with insulation (phase 1) as well as free waste heat from a nearby power plant fueled with biogas produced by the wastewater treatment plant itself (phase 2). The treatment plant's biodigester will use wastewater combined with organic and carbon wastes diverted from the landfill to generate power to fuel the entire plant, reducing the town's utility rates. Excess power can be sold to the gas pipeline or the electric power grid. "The plant will be one of a few in the country that's energy neutral," Cole says.

These low-cost additions to the plant, funded by the American Recovery and Reinvestment Act, boost natural processes to get more effective treatment in a smaller space, thereby helping the town ward off a utility rate hike.

"Ecological Engineering Group is the front-runner in this field," Cole says. "No other firm came close to meeting our needs. Most of the other firms wouldn't even consider this. They wanted to sell us on an expensive new treatment plant." EEG, he adds, "was the only one that gave us accurate information about what's going on in the treatment works. This pushed off a $60 million-dollar improvement cost."

The current 1 million-gallon-per-day (gpd) plant will increase its capacity to 8 million gpd—a factor of eight—simply by capturing waste heat discharged from a power plant and using it to super-charge microbial activity that treats wastewater faster and produces methane. This strategy eliminates a common obstacle to biogas production in cold Alaska: Methane doesn't form efficiently in cool places.

EEG calls this patent-pending approach the Del Porto Q10 System. "Q10" refers to the principle that warming a biological process by 10 degrees Centrigrade doubles its rate of activity, according to the system's principal designer David Del Porto. That means twice the treatment in the same space for every 10-degree C rise in temperature (within limits).

For Palmer, the result is cleaner water discharged to its creek (and perhaps one day piped for irrigation use), as well as energy efficiency, power generation, and avoided costs.

“This has larger implications for cities and the private sector,” Cole says. “It shows that wastewater utilities can be self-sufficient for costs and energy, and even serve as clean power plants.” With this solution, Cole sees communities and funders taking a keen interest in infrastructure’s potential to generate significant power, as well as reusable water, while doubling as water infrastructure and preventing pollution.

“Ultimately, what we learned here should go statewide,” Cole predicts. “This approach uses an untapped resource in this country. It’s economically and ecologically sensible.”

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Palmer’s wastewater treatment plant seen from the air.