Fuel from Aquatic Biomass (F.A.B.) Overview

The City of Santa Rosa's Laguna Treatment Plant, in collaboration with Sonoma State University, has constructed channels to demonstrate the water-purifying capacity of *aquatic vegetation* in wastewater and produce renewable energy. Thanks to grants from the Bay Area Air Quality Management District (BAAQMD) and the California Energy Commission (CEC), the City recently built Phase II of this project. Two *anaerobic digesters* were built in order to transform harvested *biomass* and local agricultural waste into methane-rich biogas. The methane is captured from the digesters and used for on-site power.

The City's aquatic biomass to fuel technology could provide other municipalities with a renewable energy source that increases water quality, improves air quality by capturing greenhouse gases, and provides a healthier environment for residents.

* *Glossary of terms on back*

Channelized Wetlands at the Laguna Treatment Plant

Glossary

Aquatic Vegetation: plants and algae that live in water

Eutrophication: explosive plant or algal growth due to excessive nutrients; can lead to low oxygen levels in water and death of fish

Biomass: material that comes from a living organism; can be used as a source of energy

Anaerobic Digester: oxygen-free tank where microscopic organisms break down biomass and convert it into methane gas

To learn more about our Fuel from Aquatic Biomass Project please contact Project Development:

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City of Santa Rosa
Utilities Project Development

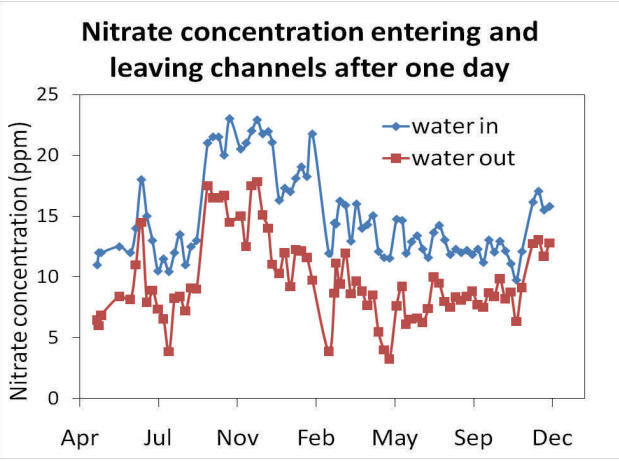
Producing Energy from Wastewater

Fuel from Aquatic Biomass

Cleaning Water

When nutrients such as nitrate are present in water in large quantities they can harm natural waterways in a process called *eutrophication*. Growing aquatic plants and algae in wastewater can help prevent this from happening. In July 2007, the City worked with R. S. Duckworth, Inc., to build six channels for wastewater to flow through. As the water flows through the channels, the aquatic plants and algae clean the water by absorbing nutrients as they grow.

In the graph below, you can see that in the water entering the channels (blue line), nitrate levels were much higher than in the water leaving the channels after being treated for only one day (red line). Treating the water for more than one day would remove even more nitrate. The City has also found that this system can remove other contaminants, including endocrine disrupting compounds, that can be present in very small levels in wastewater.

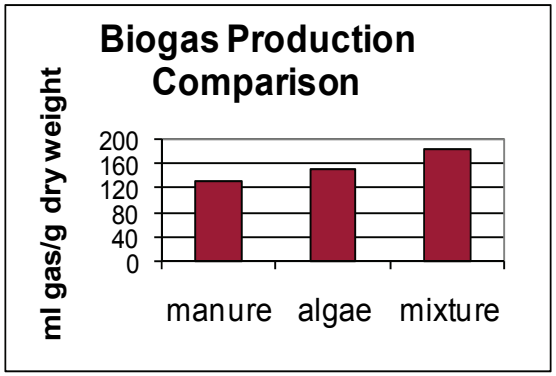


The Process

Energy from Wastewater

As the plants grow in wastewater they absorb solar energy from the sun. Once the sun's energy is stored as plant *biomass* it can be used as a clean, renewable energy source.

The best way to do this is to put the biomass into an *anaerobic digester* that turns the biomass into methane-rich biogas that can be used for on-site power. Researchers at Sonoma State University tested the digestion of algae and manure (see figure below).



Results showed that more methane was produced in digesters fed with algae than digesters fed with manure. A mixture of the two produced even more methane than expected, showing the promising occurrence of a synergistic effect. To demonstrate this process on a larger scale the City is currently measuring gas production from two anaerobic digesters built with funding from BAAQMD and CEC grants.