

# Chena Power Quarterly

*“Imagination is more important than knowledge.”*

*-Albert Einstein*

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Issue 1 - Spring 2010

### Alaska Rural Energy Conference

Come visit us at the Westmark Hotel April 27, 28, and 29th. Chena Power will be hosting an evening reception the evening of the 28th. Come see our renewable energy projects. More information available at [www.uaf.edu/acep](http://www.uaf.edu/acep) April 27 - 29

### Earth Day 2010

Happy 40th Anniversary Earth Day. More about the days activities at [chenapower.com](http://chenapower.com) April 22



### 2010 Business of Clean Energy in Alaska Conference

Alaska-centric focus on business and policy development of Energy Efficiency (EE) and Renewable Energy (RE) within the state. June 7 & 8



### Chena Fresh Produce Now Available!

Chena Fresh produce is now available on a limited basis at Home Grown in Fairbanks. They are located off of Geraghty Street near Airport Way. More info at [chenafresh.com](http://chenafresh.com) Now Available!

### 5th Annual Chena Renewable Energy Fair

Don't forget to mark this date on your calendar. More information at [chenapower.com](http://chenapower.com) and [chenahotspings.com](http://chenahotspings.com) August 15



## Biomass Power

Currently Chena Power is in the latter phases of completing a biomass power plant. The project applies technology already in use at the Chena Hot Springs Resort. It utilizes an Organic Rankine Cycle (ORC) to convert heat into electricity. The difference in this project is that the heat is not provided by a geothermal resource, but rather is provided by the burning of paper, cardboard, and wood waste from the Fairbanks North Star Borough landfill and supplemented by fire line trimmings.

Chena Power, with funding from the Alaska Energy Authority is installing a 500kW biomass power plant near Fairbanks, Alaska. The emissions from this power plant will be used to heat and provide carbon dioxide to greenhouses that will grow produce for the local market and algae for biofuel production. Chena Power has an ultimate goal to expand the power plant to 2.5MW



Photo Courtesy FECON

**The FECON Bio-Harvester is designed to harvest small diameter woody biomass. This equipment is ideally suited for Alaska's forest and terrain.**

gross power production that will operate off of willow trees and landfill waste. Using algae bioreactor technology and the vertical growing systems, it is calculated that 4 acres of greenhouses will be able to sequester the carbon from a 2.5MW biomass power plant installation.

This project will provide nearly zero emission power to the local economy and help reduce the cost of the electricity to the market. This project will also help reduce the local use of coal and gas as the primary sources of electricity in Fairbanks, Alaska. Through the combustion of paper and cardboard this project will also reduce the amount of land used for the storage of waste. Through the collocated greenhouses, the project will supply biofuels, valued added polymer opportunities, and produce to the local market.

Chena Power is seeking partnerships and financial support to forward this innovative and groundbreaking project. United Technologies Research Center, Pratt &Whitney Power Systems, the University of Alaska Fairbanks, and the Fairbanks North Star Borough are all contributing to the success of this pioneering project. ■

# CHENA HOT SPRINGS, ALASKA

*Chena Hot Springs is located 56.5 miles North East of Fairbanks. It's a year round destination resort, but is also home to the world lowest temperature commercial Geothermal power plant, operated by Chena Power.*

## The Chena Geothermal Power Plant



The Chena geothermal power plant came online in late July 2006, putting Alaska squarely on the map for new geothermal technologies. Chena Hot Springs is the lowest temperature geothermal resource to be used for commercial power production in the entire world. We hope this will be the first step toward much greater geothermal development in the state. The cost of power production, even in semi-remote locations such as Chena, was reduced from 30¢ to less than 7¢ per kWh once installed.

The challenge for moderate temperature small scale geothermal development has been to bring the cost down to a level where it is economical to develop small geothermal fields. Chena Power now has vital knowledge and experience in the geothermal field, uniquely positioning our team to provide expert advice on operating in Alaska's rugged environment. ■

## Geothermal Heated Production Greenhouse



Chena Hot Springs in collaboration with Chena Power is working toward becoming a self-sustaining community, and an important part of making this vision a reality is to strive for greater independence in food production. Chena installed a small test greenhouse in 2004, which has operated year round and is heated entirely with water from our geothermal resource. Last January, we were able to maintain greenhouse temperatures of 78°F while outside temperatures dropped to -56°F, which is typical for Interior Alaskan winters. This 134°F temperature differential was the largest recorded for any controlled environment production facility in the U.S. last year.

Chena has recently added to its controlled environment facilities with the construction of a new 4320 ft<sup>2</sup> greenhouse to provide our restaurant with a greater variety of fresh produce on a year round basis. Crops planned for the greenhouse include tomatoes, lettuce, green beans, peppers, cucumbers, and numerous greens and herbs. Chena Hot Springs is also working in partnership with the University of Alaska Forestry and Agriculture Experiment Station on a controlled environment research project for investigating the opportunities of establishing similar projects throughout the State of Alaska, using geothermal or other waste heat streams. ■

## Chena Hot Springs, Alaska



Alaska's only year round 100+ year old hot springs resort! Chena Hot Springs Resort is the most accessible and developed hot spring resort in Alaska's Interior. Chena Hot Springs was discovered in August 1905 and became famous for curing crippled prospectors of their aches and pains.

Today, many local, state, national and international visitors enjoy Chena's natural outdoor hot springs, adult rock lake (ages 18+) or indoor family pool.

Chena Hot Springs is also home to one of the interiors most well attended renewable energy fairs. This summer will be Chena's 5th Annual Renewable Energy Fair. The fair will be held on August 15th.

In addition to our relaxing hot springs try a free geothermal renewable energy tour of the *Chena Power* geothermal power plant and *Chena Fresh Greenhouses*. In 2009 Chena conducted an exit poll. We found that over 14% of the customers decided to visit Chena to learn more about our renewable energy projects. We provide free tours to the general public as well as to local community organizations. We have free daily geothermal renewable energy tours that begin at 2PM. ■

*“There’s more opportunity now than there ever has been in the history of man, but it’s in reinventing ourselves”*

— Bernie Karl

Photo Courtesy Gary Schultz

### The Mobile Geothermal Power Plant

Producing oil and gas wells are an underutilized source of geothermal energy. Most wells produce 95% water and 5% oil and gas. One of the significant economic barriers to developing geothermal power is the cost of drilling wells that have predictable access to fluid temperatures high enough to generate electricity.

Chena Power has previously demonstrated the feasibility of developing low temperature geothermal resources for energy production. At Chena Hot Springs Resort, three organic rankine cycle (ORC) units are installed that have a gross capacity of producing 680 kW of electricity. The electricity produced at Chena Hot Springs Resort represents the lowest temperature geothermal resource (165°F) developed for electricity production in the world.

The power plant is designed to be non-site specific and mobile so that electricity can be produced in one location and be operational for the majority of the oil wells in the world without the need for permits associated with building and ground work. The dimensions of the ORC are designed for easy movement through all 50 states.

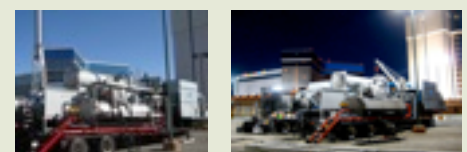
Oil and gas resources are also only extracted when they can be developed economically. When a well is no longer producing economically, this mobile geothermal power plant can be relocated to another well. This non-site-specific power plant is capable of providing its own cooling and is able to extract cooling water from the hot water coming from the well. The power plant requires minimal on site work and can be installed in one hour from the time it is dropped off.

At Quantum’s Jay Florida Field, the estimated daily production capacity is 4,500 barrels of crude per day plus 5-7 million cubic feet of natural gas. Furthermore, in addition to the above mentioned hydrocarbons, 120,000 barrels per day of approximately 200 °F water is extracted and re-injected into the field. The temperatures we will be working with in the field are approximately 185-195°F. Overall, hot water represents approximately 95% of the fluid stream that returns to the central processing facility. This hot water represents an untapped energy resource.

In the initial demonstration system, it is estimated that a range of 100kW to 280 kW of electric power will be generated by the ORC

power plant depending on ambient conditions. The net power generated will be used to offset part of the electric load at the oil field. While this initial demonstration unit will generate up to 280 kW, it is estimated that the total generation capacity available on the inflow stream is well in excess of 5MW.

The water will be separated from the production fluid and the fluid will then be fed into a 25 gpm oil/water separator. The 20 gallons of water separated out will be added to replenish the water lost from the evaporative cooling, and the oil will be pumped back into the pipeline at 5 gpm. ■



**The Mobile ORC powering part of the 2009 Geothermal Resources Council Conference in Reno, Nevada at the Peppermill Resort Casino.**

# *Chena Power* is a locally owned renewable energy company.

*We are committed to our goal of providing affordable, practical, and renewable ways to generate power and food for all Alaska. We are available for consulting, LED lighting, solar thermal water heaters, and more. Information at [chenapower.com](http://chenapower.com) or by calling (907) 488-1505.*



*“Renewable solutions for tomorrow, today.”*