

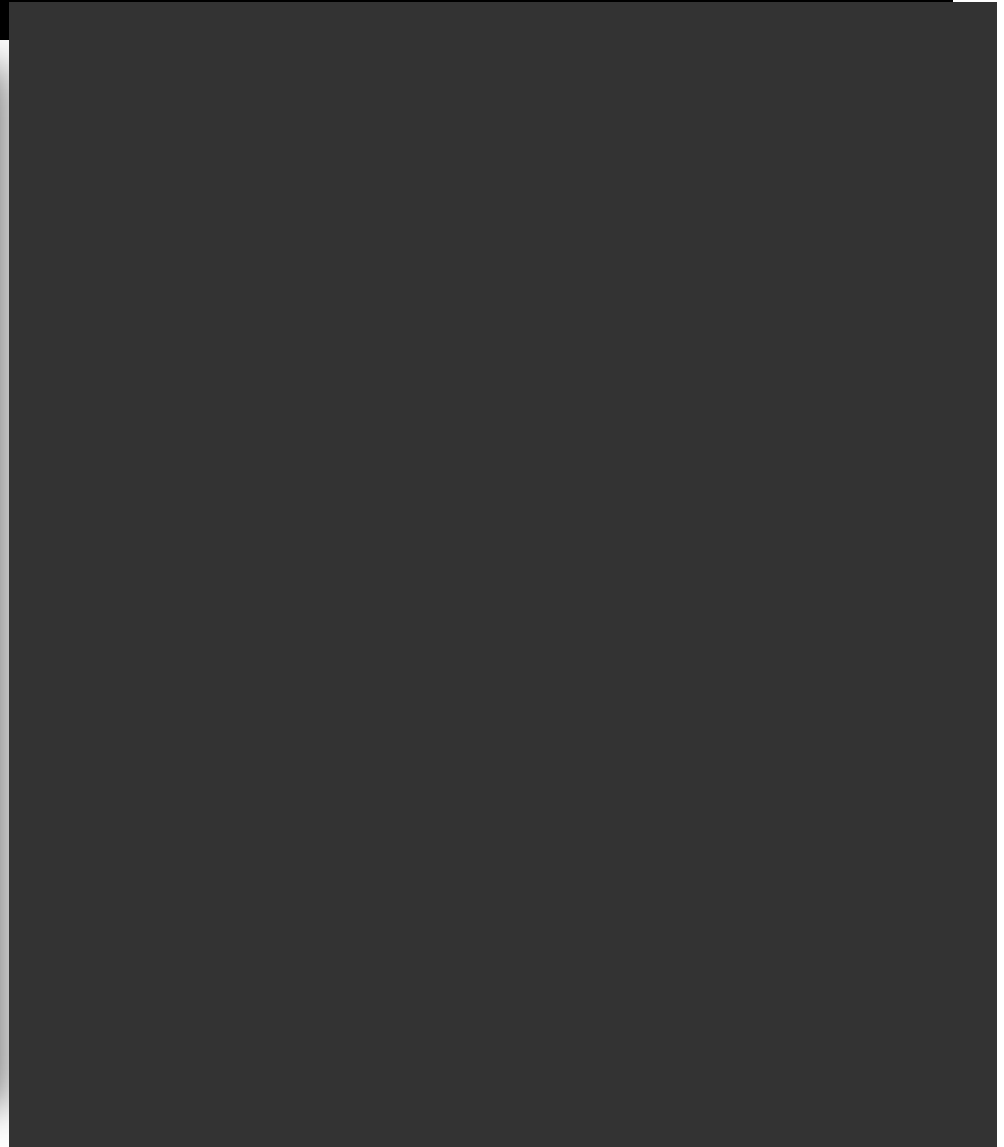


# Geothermal Energy Technology Powering Projects in Alaska and China

Bernie Karl



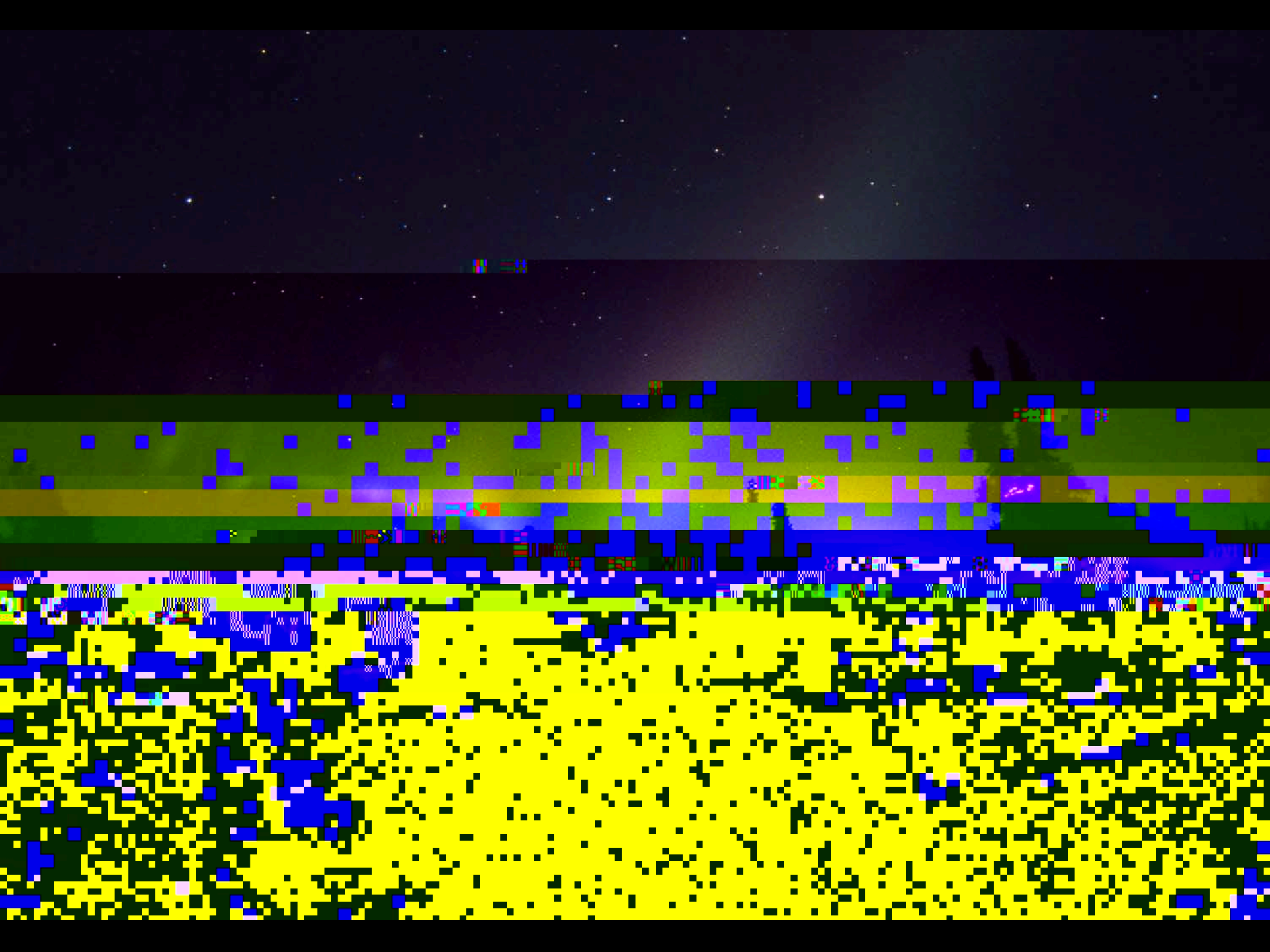
# Chena Hot Springs Resort



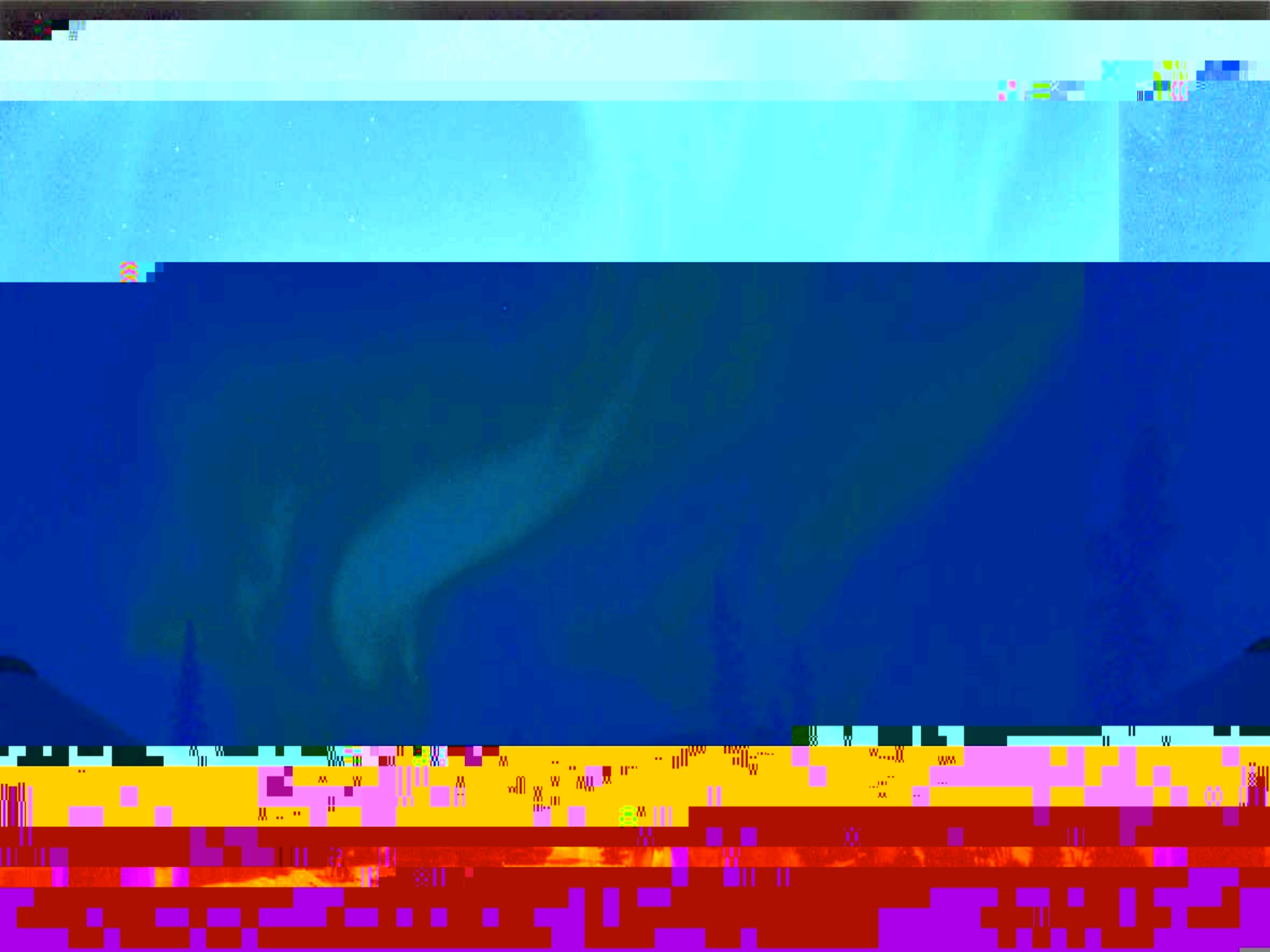
# OUR VISION











# SUSTAINABLE LIVING





# CHENA HOT SPRINGS RESORT

Accommodations

Activities

Healing Waters

World Class

Dining

Aurora Viewing

Wildlife Viewing

And many other

adventures!

*All made possible with renewable  
energy!*

# THE HEALING WATERS

# ENERGY USE AT CHENA HOT SPRINGS



# CHENA AURORA ICE MUSEUM



# CHENA ABSORPTION CHILLER



# DISTRICT HEATING

First geothermal well drilled in November 1998

All buildings on property are heated geothermally using ~300gpm of 165°F water

Estimated yearly savings of \$383,000 in heating fuel costs

# CHENA FRESH GREENHOUSE

The LED and hydroponic systems decrease winter energy costs and increase production. It is the largest of its kind in Alaska and the USA.

# NEW GEOTHERMAL WELLS

Deepening well TG-8 increased the geothermal capacity of the reservoir, and produces water at 174 °F

The total project cost to drill the two wells will be an estimated \$2,154,000.



NEW 2500' PRODUCTION WELL  
174°F WATER DRILLED WITH A JEFECO 50K USING A  
WASSARA WATER HAMMER. 2000-2500 PSI COLD WATER.

**NEW INJECTION WELL 2700'**

# DRILLING 2700' INJECTION WELL

**TESTING WELL**

# 2000 PSI AIR BOOSTER

# DRILLING WITH 2000 PSI AIR AND HIGH PRESSURE COLD WATER

10,000 PSI MUD PUMPS  
WITH WATER FILTERS

2500 FT PRODUCTION WELL 174° F





Project support provided by

DOE, U.S. Department of Energy  
United Technologies Corporation

# CHENA POWER GEOTHERMAL POWER PLANT

# CHENA POWER MOBILE ORC



# CHENA POWER MOBILE ORC PROJECT GOALS

To validate the production of low temperature resources

To help realize the potential for geothermal production on oil  
& gas sites

Both producing and non-producing wells, in terms of  
fossil fuel

Show that lower cost geothermal projects are possible,

# MOBILE ORC PROJECT TIMELINE

Construction  
Phase  
July 1, 2008

Aurora Energy  
Validation of ORC using  
a waste heat stream  
for urban municipal  
energy generation in  
Fairbanks, AK

Planning for future  
deployments to Oil & Gas  
fields for coproduction

Unit was producing power  
from Chena Hot Springs  
geothermal resource at  
the Renewable Energy  
Fair and U.S. Senate  
Energy and Natural  
Resources Sub  
committee Field Hearing

Display and Confirmation of  
the unit's mobility and its  
effectiveness for power  
generation for urban  
applications.

# MAP OF THE MOBILE ORC'S PROGRESS



# MOBILE ON LOCATION IN UTAH



Christenson Farm and Castle Valley Greenhouse in Newcastle, Utah

MOBILE ON LOCATION IN

UTAH



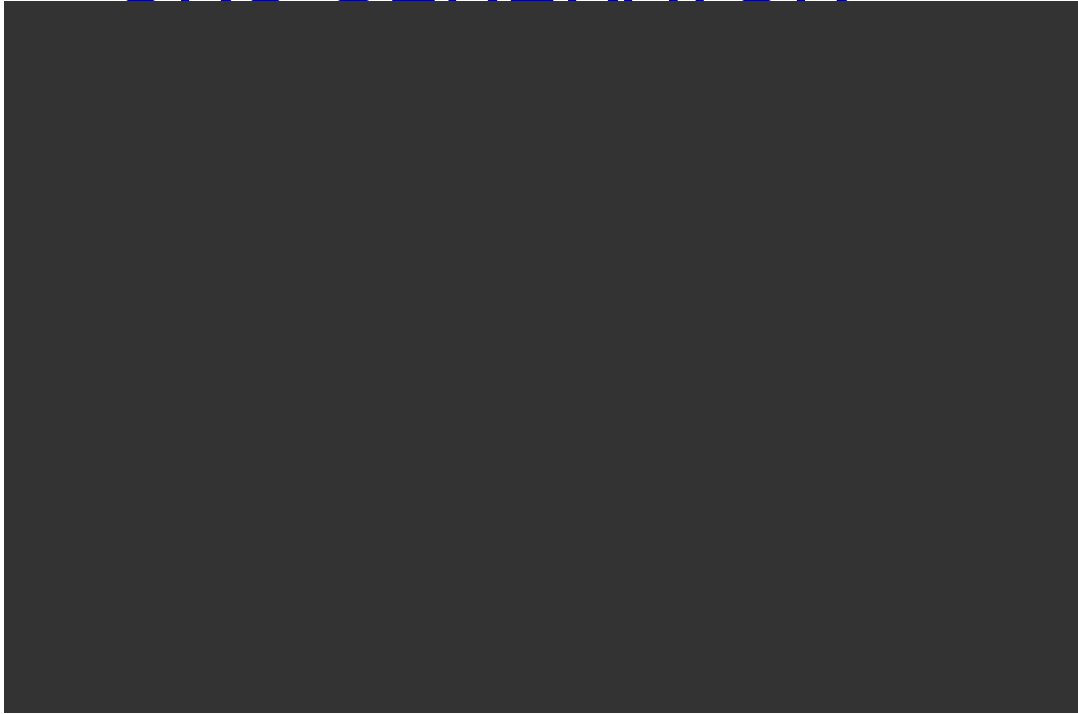
The Mobile ORC is currently in Newcastle, Utah set to power a large scale greenhouse.





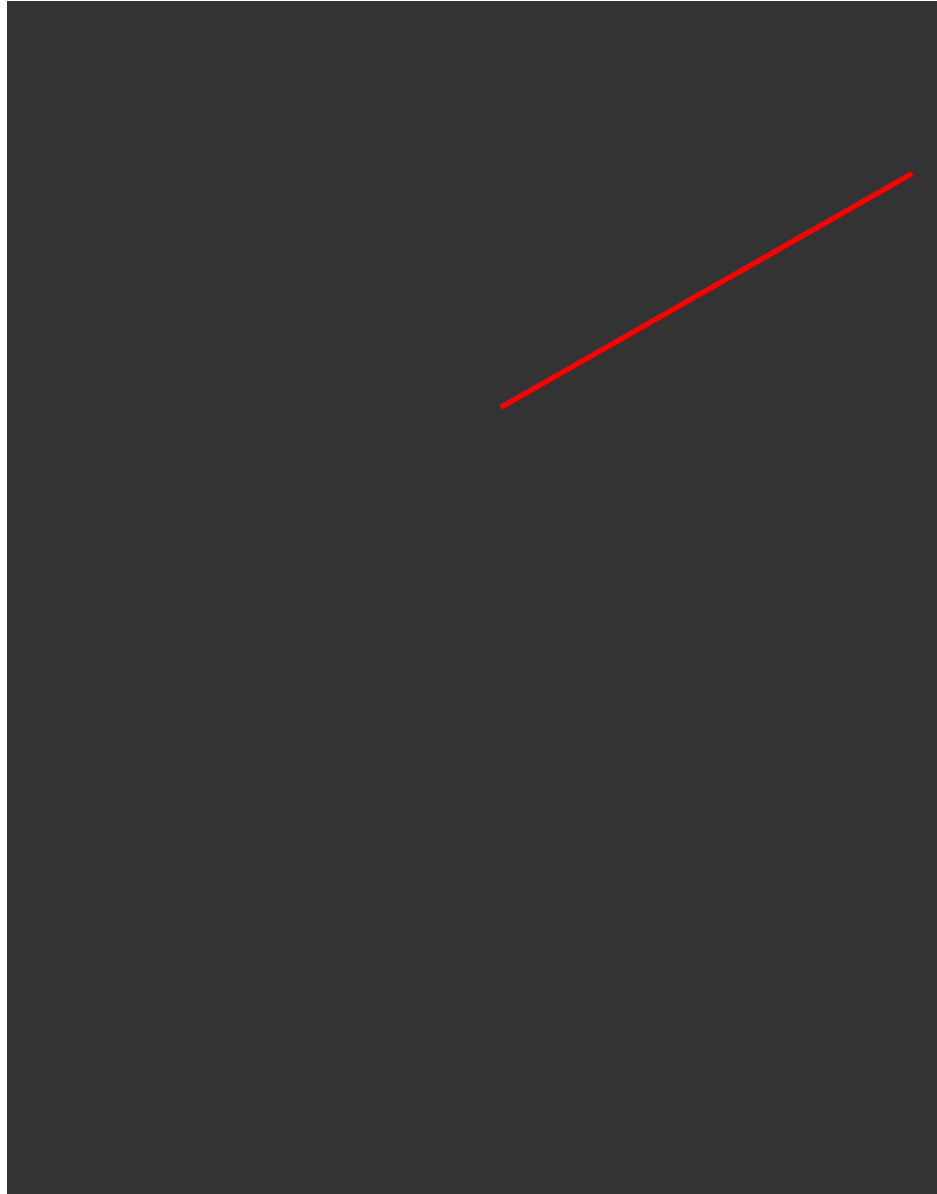


# CHENA POWER ORC GENERATOR



*Front view of heavy duty electronics  
cabinets.*

# Generator Assembly

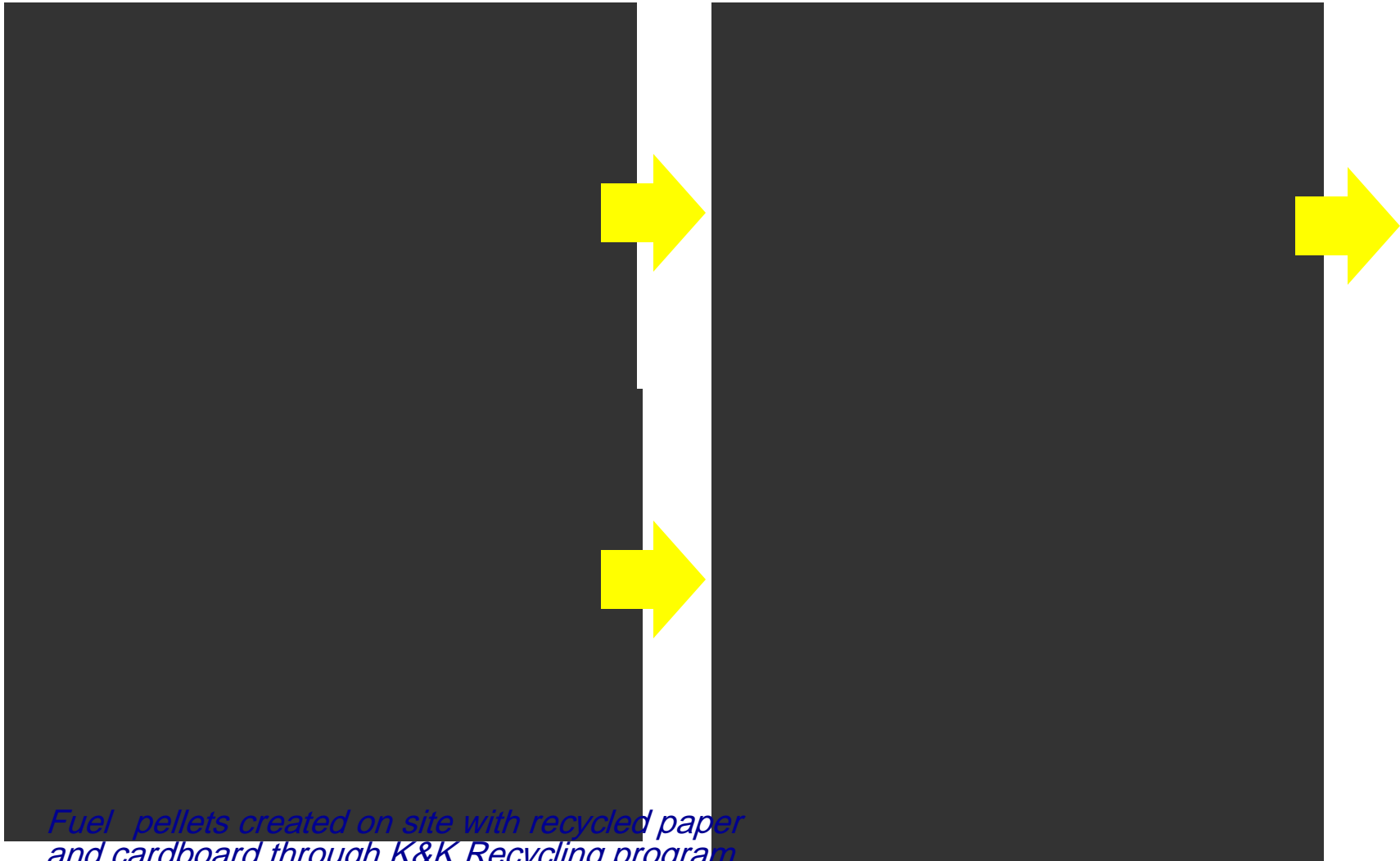


# REVOLUTIONARY TURBINES



View of turbine assembly.

# BIOMASS FUEL SOURCE: PELLETS



# THERMAL OIL HEATER







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## Designed in USA, Made in China

$\frac{3}{4}$  What most companies are doing

$\frac{3}{4}$  Kerry North America Development Center + Kaishan Compressor Co., Ltd



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## Kaishan Compressor Co., Ltd

¾ Zhejiang Quzhou Site (Headquarter):

¾ 3 Hours by Train , 4 Hours by Driving to Shanghai

¾ Foundry, Pressure Vessel, Heat Exchanger and Sheet Metal Plants

¾ ORC Screw Expander Power Station

¾ Small Screw Compressors

¾ Reciprocating Compressors

¾ Screw and Reciprocating Air Compressor Units

¾ Centrifugal Compressors



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## Main Products

$\frac{3}{4}$  Refrigeration Screw Compressors and Screw Expanders



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New at Chena Hot Springs Resort  
300 KW screw expander with a synchronous generator



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New at Chena Hot Springs Resort  
300 KW screw expander with a synchronous generator

# THANK YOU

United State of America  
Department of Energy

Pratt & Whitney Power

Fairbanks North Star  
Borough

K & K Recycling





