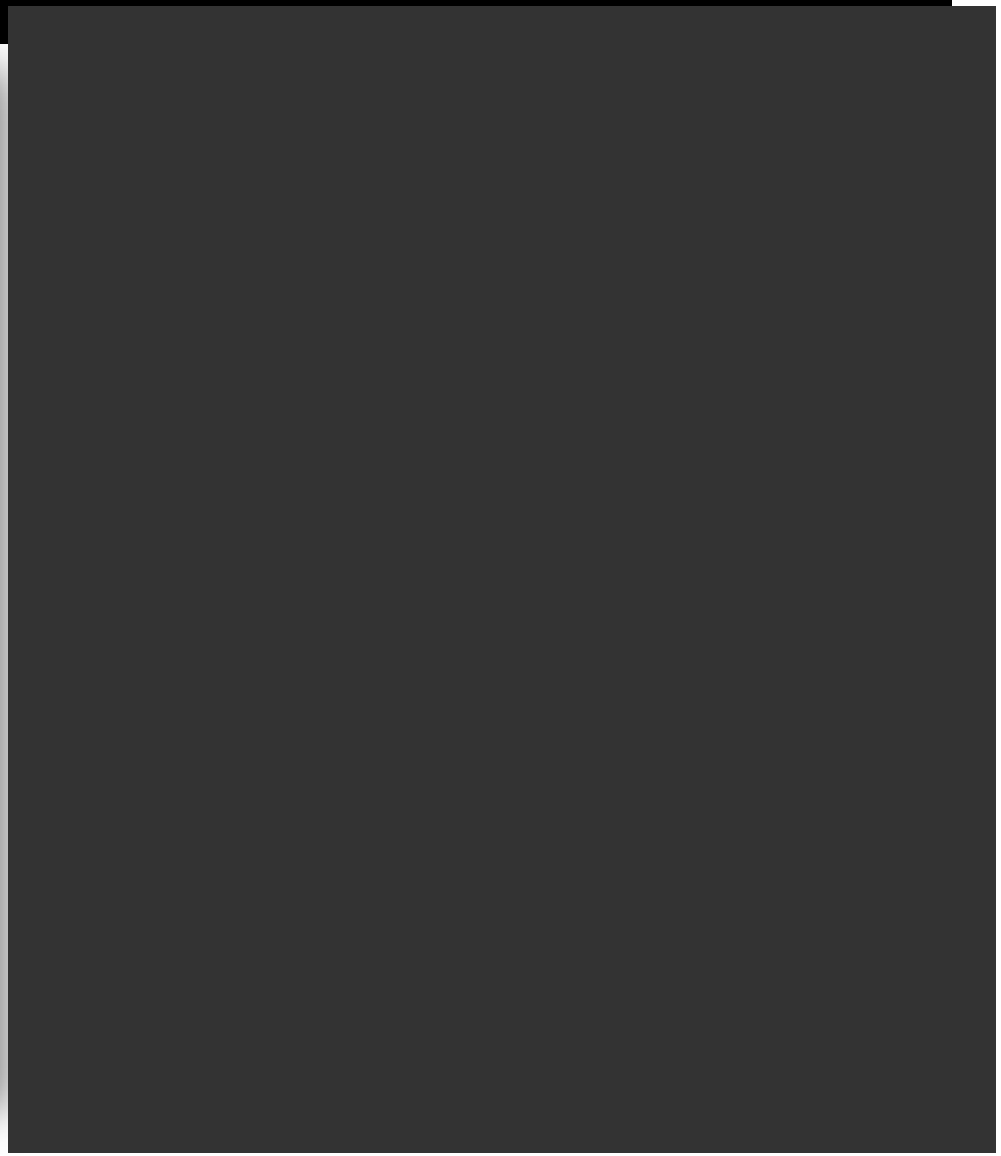
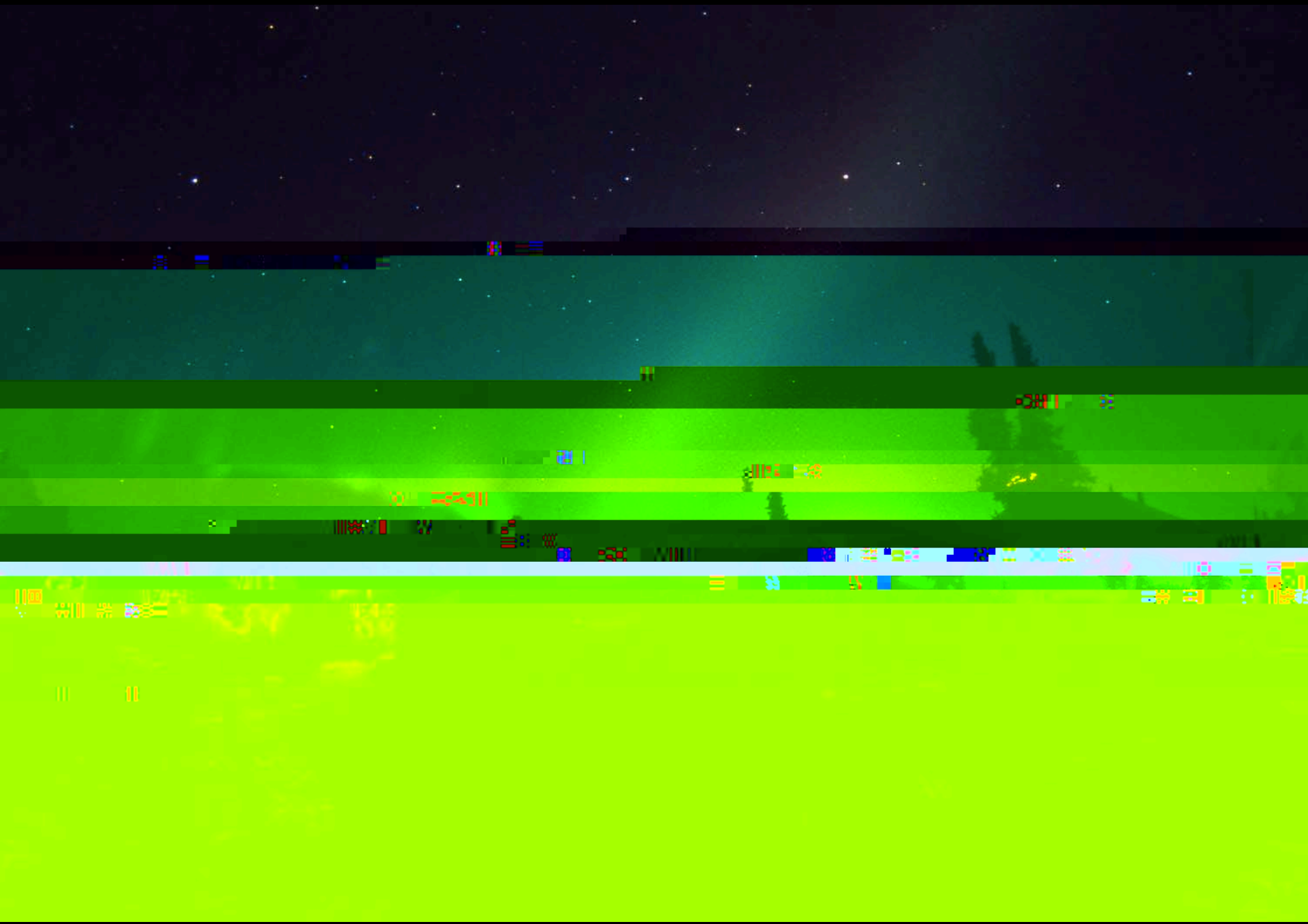
Geothermal Energy Technology
Powering Projects in Alaska and China

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

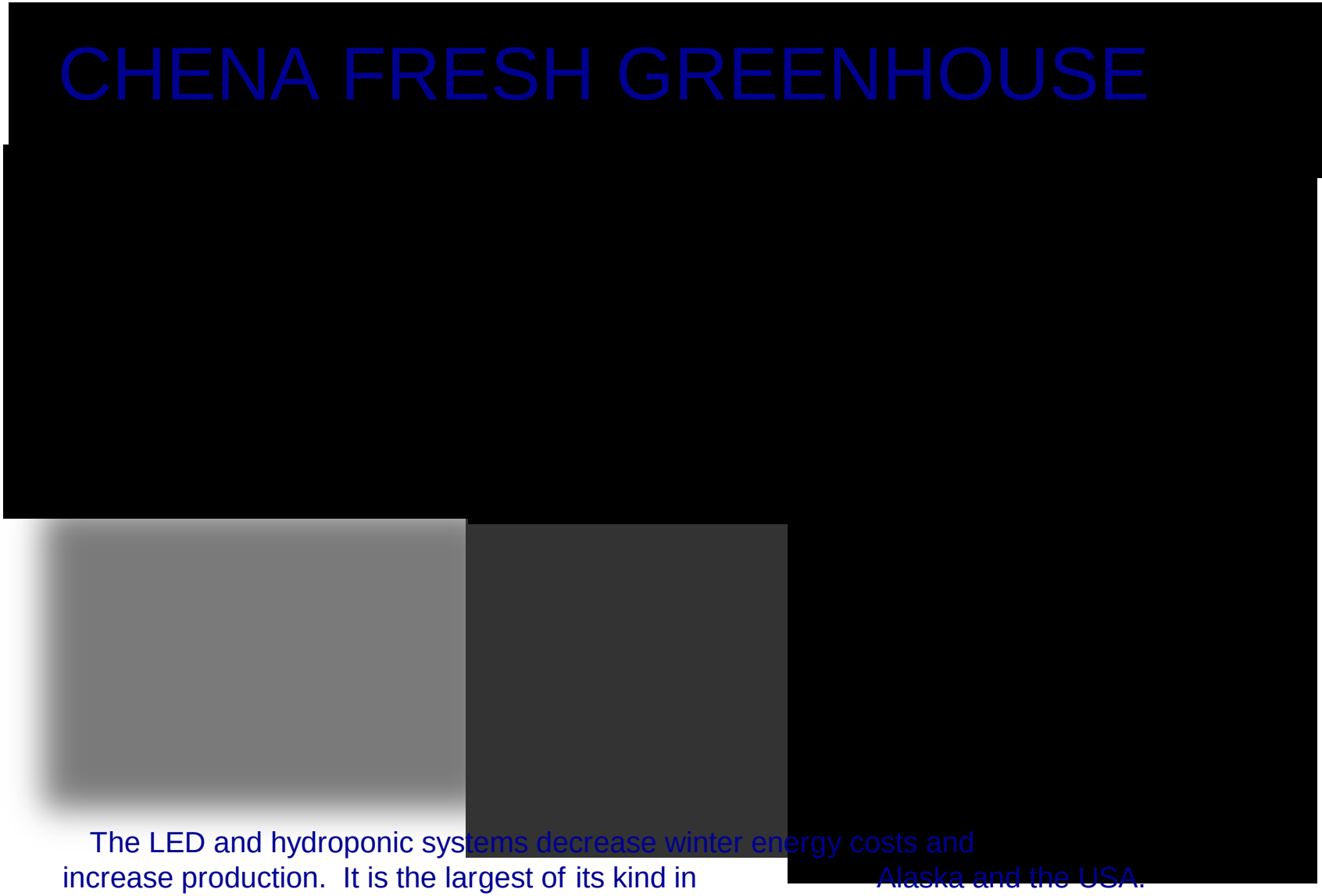
DISTRICT HEATING

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 ºF

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

NEW 2500’ PRODUCTION WELL
174ºF WATER DRILLED WITH A JEFCO 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 174º 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

lanning for future oyments to Oil & Gas es for co-production

t was producing powe m Chena Hot Springs othermal resource at e Renewable Energy air and U.S. Senate Energy and Natural Resources Sub mmittee Field Hearing

isplay and Confirmation of he 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

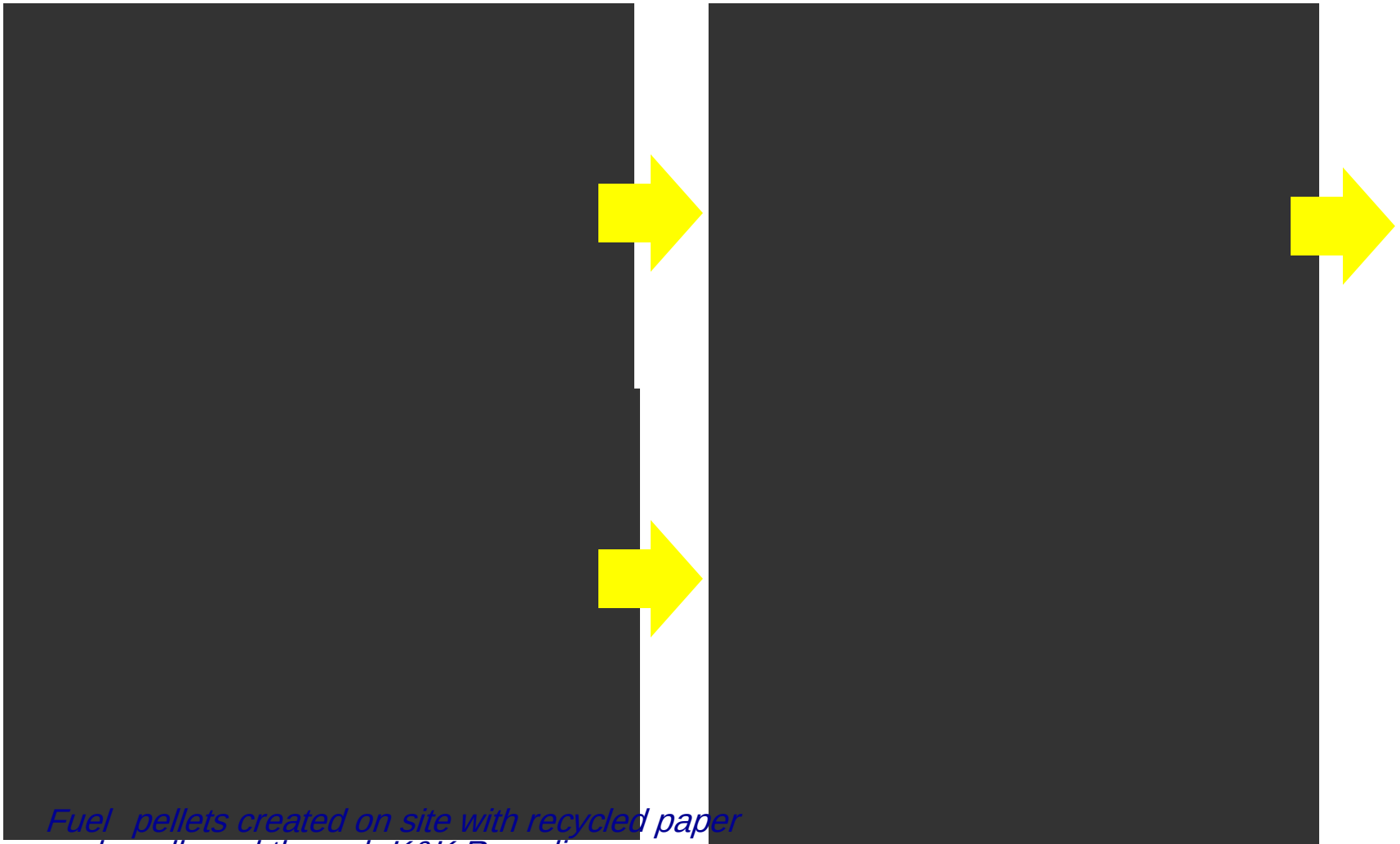
Front view of heavy duty electronics cabinets.

Generator Assembly

REVOLUTIONARY TURBINES

View of turbine assembly

BIOMASS FUEL SOURCE: PELLETS



Fuel pellets created on site with recycled paper and cardboard through K&K Recycling program.

THERMAL OIL HEATER

Designed in USA, Made in China

- What most companies are doing
- Kerry North America Development Center + Kaishan Compressor Co., Ltd

Kaishan Compressor Co., Ltd

- Zhejiang Quzhou Site (Headquarter):
  - 3 Hours by Train , 4 Hours by Driving to Shanghai
  - Foundry, Pressure Vessel, Heat Exchanger and Sheet Metal Plants
  - ORC Screw Expander Power Station
  - Small Screw Compressors
  - Reciprocating Compressors
  - Screw and Reciprocating Air Compressor Units
  - Centrifugal Compressors

Main Products

- Refrigeration Screw Compressors and Screw Expanders

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

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