



Community Power Corporation

Energy Systems for Sustainable Power

Small Modular Biopower Systems Sustainable Power, Heat & Cooling For the 21st Century

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President

BioMax Biopower System At Walden, Colorado

On-site NEWS Denver, Colorado

May 22, 2003



 Community Power Corporation

 US FOREST SERVICE

 NREL (US DOE)

North Park High School

Small Biopower: In the Right Place,at the Right Time

**Catastrophic
Forest Fires**



**Healthy Forest Initiative =
Forest Thinning Resources**

**War on
Terrorism**



**Energy Independence
Energy Security**

**Need for
BioMax
Systems**

Environment



Green Energy

**Use on-site biomass
residues for power,
heat & cooling**

BioMax: Alternative To Fossil Fuel Gensets



Caption: *“Yeah, so what if diesel is \$3.00/gal, whadaya think these things run onWOOD?”*

Why **Small** Biopower?

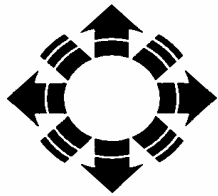
- ✓ Simple to site
- ✓ Uses on-site residues
- ✓ Fuel flexible
- ✓ Power flexible
- ✓ Simple to connect
- ✓ CHP capable
- ✓ Fully automatic
- ✓ Provides energy security
- ✓ Transportable
- ✓ Reliable: dual fuels

CPC's Modular Biopower System

Sustainable Power for The 21st Century

- ✓ **“Turn Key” - Fully automatic operation and control**
- ✓ **“Tar Free” - New gasifier design – simple gas cleanup**
- ✓ **No harmful emissions, no liquid effluents**
- ✓ **Simple design / low cost / easy manufacture**
- ✓ **Modular, easily transported, simple installation**
- ✓ **Power modules from 5 to 50 kW**
- ✓ **Grid interconnect and CHP capable**

Contributing Organizations to Develop BioMax



NREL (DOE)



Shell Renewables & Foundation



California Energy Commission



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Primary Products: BioMax 5 to BioMax 50

World's first, fully automated, environmentally friendly, small modular biopower systems, designed for high volume, low cost manufacture



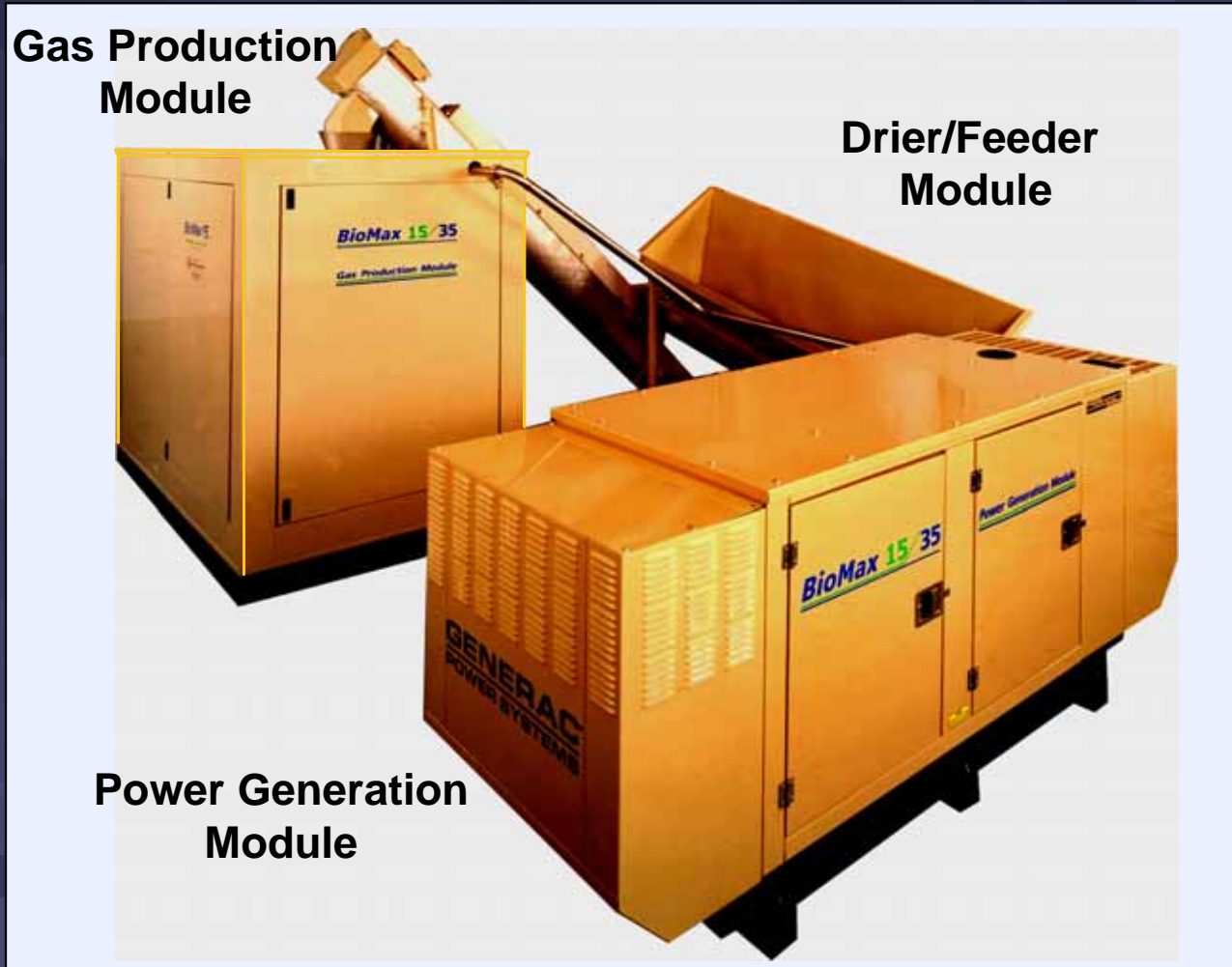
Uses wide variety of woody residues to provide power and heat for:

- Rural communities (US and foreign)
- Homes (net-metering, prime / back-up)
- Small enterprises (use on-site residues)
- Government facilities

Stand-alone Gas Generator for:

- Crop & wood drying (sawmills, wood working)
- Back-up for propane and/or natural gas
- Building heat (workshops, green houses, etc.)
- Cooling/chilling (buildings, food & crop preservation, etc.)

Primary Products: BioMax 5 to BioMax 50



Small Modular Biopower Systems for Homes, Enterprises and Rural Communities

CPC's New BioMax 50

US Forest Service & California Energy Commission

Utility-grade Power For Distributed Generation
(San Bernardino Forest & Mt. Shasta, California)



- ✓ Continuous 24hr Operation
- ✓ Automatic char & ash extraction
- ✓ Automated feeder/dryer
- ✓ Dispatchable power (50 kW)
- ✓ Auto startup, monitoring & shutdown
- ✓ Grid interconnect
- ✓ Meets ARB emission standards
- ✓ Maintenance less than 3 hours/week
- ✓ Prime power rated

CPC's BioMax 5 Home Biopower System

**Utility-grade power (and heat) for
homes, offices & small enterprises**

Features:

- Capacity: 5 kWe; 110/220VAC; 60/50 Hz
- Fuels: wood pellets & chips, nut shells, propane
- Energy: 10 –30 kWh/day
- 24 hour AC power
 - biopower operation – 4-6 hr/day
 - battery/inverter - 24 hr/day
- Automatic operation

Advantages:

- Lower cost than PV or wind systems
- Uses waste wood or pellets as fuel
- Provides power and heat
- Utility-grade power, 24/7



FOREST
SERVICE

CPC's BioMax: A Versatile, Bioenergy Fuel-Gas Generator

BioMax



Converts forest/ag residues to a gas capable of fueling a variety of power generation and heating/cooling technologies

RUNS:

IC Engines

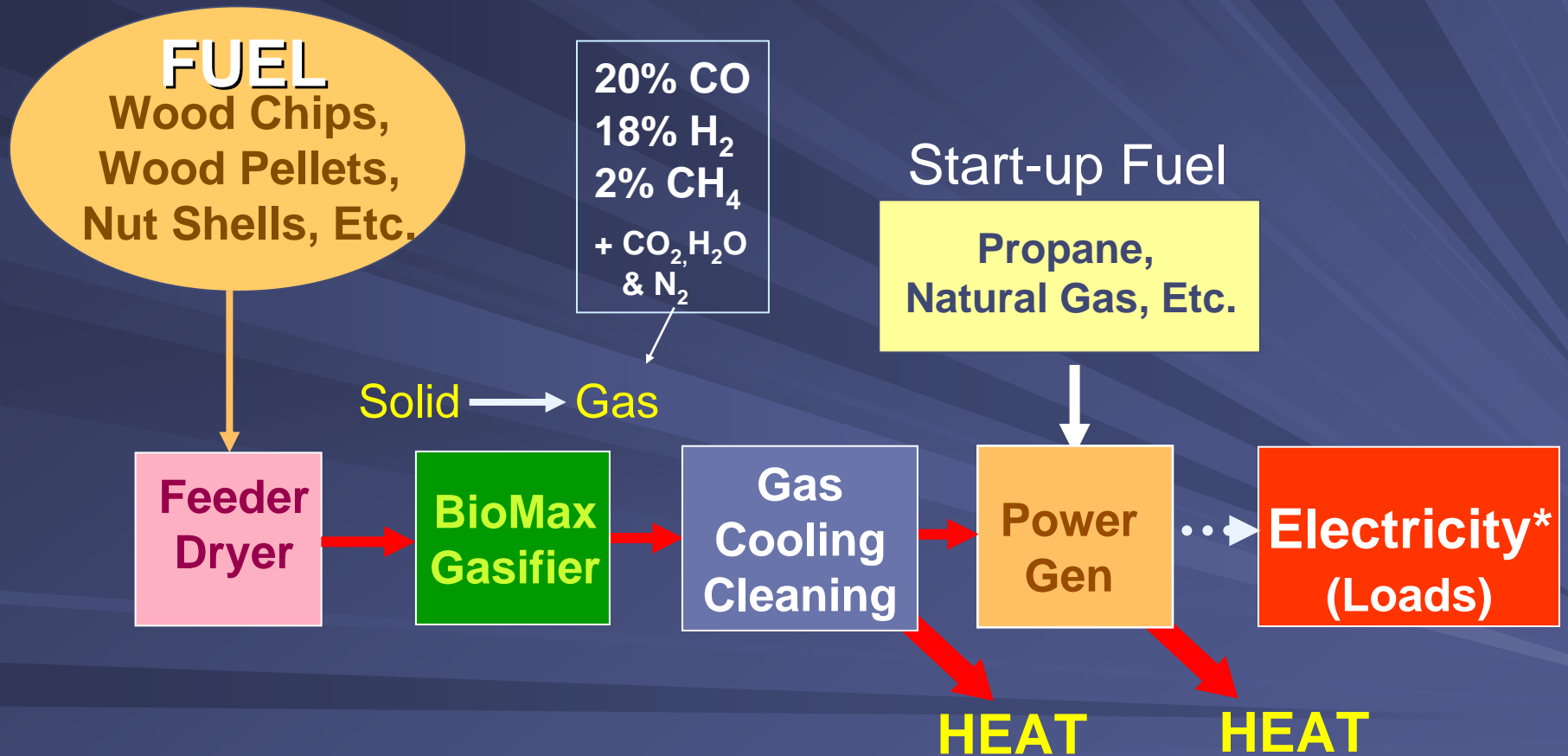
Stirling
Engines

Fuel Cells

Microturbines

Furnaces
Driers & Chillers

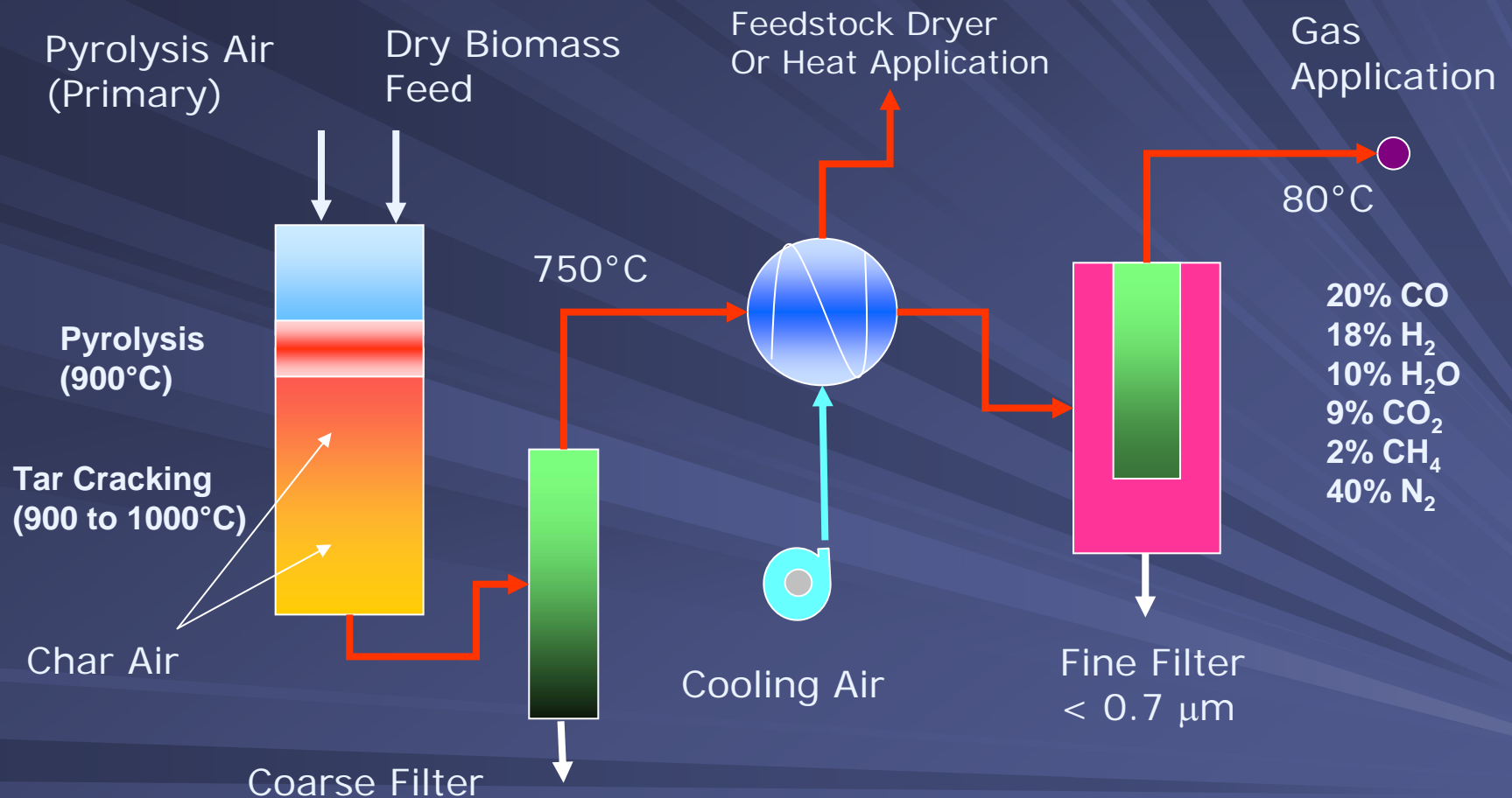
BioMax: Gasification Converts Woody Materials to a Clean Fuel Gas for Heat, Power and Cooling



Wood Energy Conversion Efficiency: 80%
System CH&P Efficiency = +70%

* and/or shaft power

CPC's Direct Air Gasification



3 lbs wood = 1 kWh

~70% of Biomass Energy = Chemical Fuel

~20% of Biomass Energy = Recoverable Heat, Gas Cooling

Biomass Fuels for BioMax

Tested

- All kinds of wood
- Any kind of pellet
- All orchard prunings
- Most nut shells
 - coconut shells
 - pecan shells
 - walnut shells
 - nutmeg shells
 - pistachio shells
 - palm oil shells
- Corn (tainted)

Potential

- Cubed grasses
- Dried cakes
 - ethanol
 - canola

Problematic

- Rice husks
- Corn stover
- Sawdust
- Sugar cane leaves
- Straw

Opportunity: Take the power system to the fuel instead of taking the fuel to the power system

BioMax Fuels: Problem Woody Residues (3 lbs/kWh)



Wood-working Factory Residues



Forest Thinning Residues



Sawmill Residues

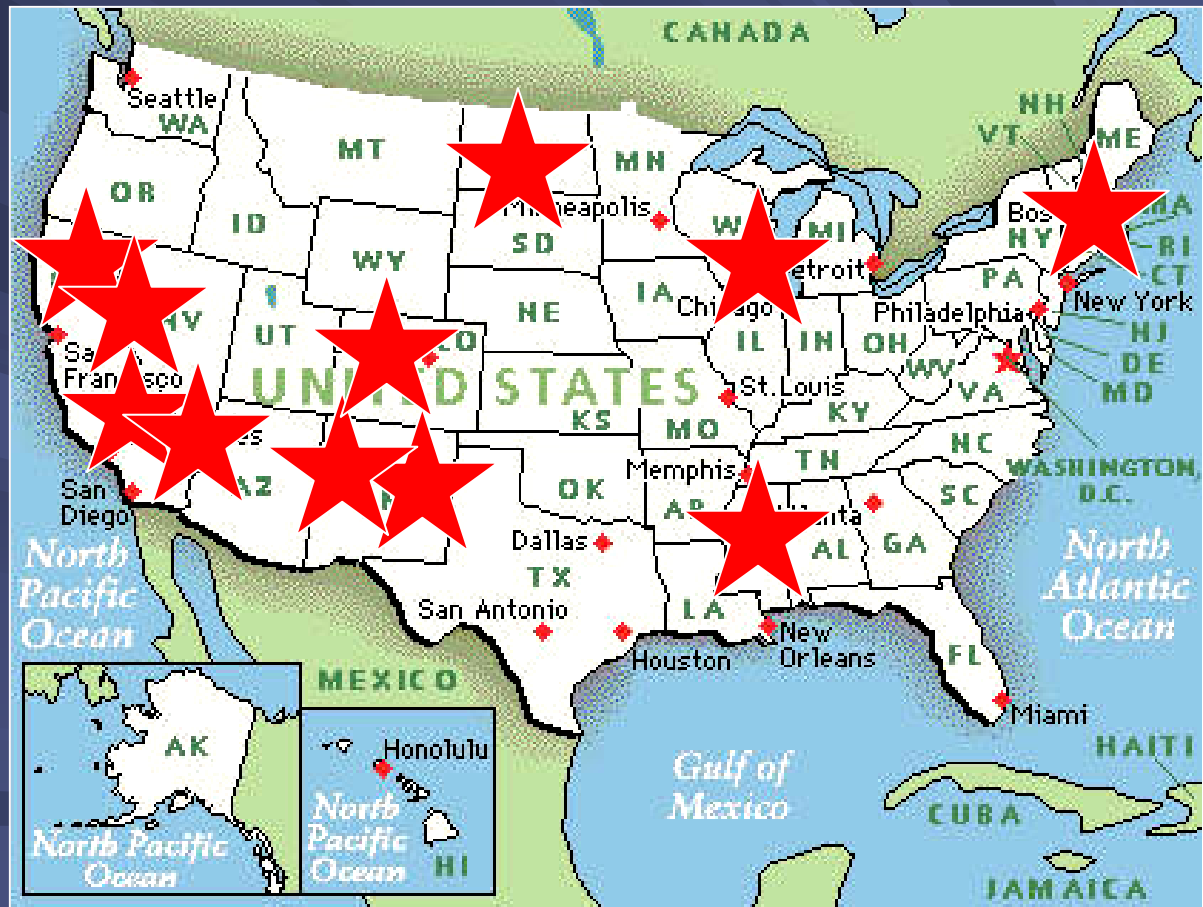


Coconut Residues - Philippines

BioMax 5, 15, & 50 Development & Demonstration Projects (USFS + NREL/DOE + CEC + CPC)

11 Sites

- Zuni, NM
- Ruidoso, NM
- Walden, CO
- Mt. Shasta, CA
- San Bernadino, CA
- Big Bear Lake, CA
- Truckee, CA
- Madison, WI
- Starkville, Ms
- Grand Forks, ND
- Mt. Wachusett, MA





BioMax 15 Biopower System

Zuni Furniture Enterprises

Zuni, New Mexico



Zuni Workshop



BioMax 15 at Zuni

Zuni Furniture Company

- Application: Power & Heat Furniture making shop
- Fuel: Wood scraps and forest thinning residues
- Operation: Daily
- Wood Consumption: 3 lbs/kWh
- Daily Load: 8 to 12 kW, 60-80 kWh
- Maintenance: 30 minutes per week
- Installation: October 2003
- Advantage: Disposes of on-site wood wastes and reduces costs of electricity and propane for heat



BioMax 15 Biopower System

North Park High School

Walden, Colorado



Power & Heat For Greenhouse

Strong Community Support



BioMax 15 – Operated by Students

- Application: Power & Heat for High School Vocational Horticulture Program
- Fuel: Forest thinning residues
- Operation: Daily by high school students
- Wood Consumption: 3 lbs/kWh
- Daily Load: 6 to 8kW, 40-80 kWh
- Maintenance: 30 minutes per week
- Installation: September 2003
- Advantage: - Reduces costs of electricity and propane for heat
- Provides students with hands-on learning experience about renewable energy and biopower



BioMax 15 Biopower System SBS Wood Shavings Company Ruidoso, New Mexico



BioMax 15 System



Automatic Control System



Wood Chip Feeder/Drier

- Application: Power & heat for wood shavings company
- Fuel: Wood scraps and forest thinning residues
- Operation: Daily
- Wood Consumption: 3 lbs/kWh
- Daily Load: 12 to 15 kW, 80-120 kWh
- Maintenance: 30 minutes per week
- Installation: October 2003
- Advantage: Reduces costs of electricity and propane for heat
Provides "green" marketing advantage for company

CPC's New BioMax 50 - Power and Heat For the Big Bear Discovery Center San Bernardino Forest

March 2005

BioMax 50



US FOREST SERVICE



NREL / USDOE



Community Power Corporation

- Power and heat from forest thinnings –1 ton/day
- Automatic operation
- Meets current CARB emission standards
- Grid interconnected
- Demonstrate to the public the high value of forest resources