



*Farm and Rangeland Restoration  
Through Biochar+Energy*



# A Demonstration of Conversion of Pinyon/ Juniper Slash to Biochar+Energy

- ◆ Follow along as we convert liability biomass to valuable heat and biochar
- ◆ A one-seed juniper bush about 10' in diameter and 8' tall





# Chipped using a portable chipper

- ◆ 16 cubic feet of chips
- ◆ 240 lbs at 45% moisture content





# The small amount of firewood was saved

- ◆ Estimated at about 3 cubic feet
- ◆ This could be chipped, too, but many people still need firewood





# The chips were dried

- ◆ Using a simple drum dryer and ambient air the chips were dried to about 12% moisture content
- ◆ The 240 lbs of green biomass became 130 lbs of dried biomass
- ◆ Volume is 16 cubic feet





# Pelletizing the dry biomass

- ◆ Using a hammermill and a pellet mill the dried chips were converted into pellets





# Now we have an ideal feedstock for biochar+energy

- ◆ Using a 3/8" pellet die the dried biomass became a storable and transportable energy source
- ◆ The volume was condensed to 4.5 cubic feet
- ◆ The density increased to 30 lbs per cubic foot





# Pyrolyzing the feedstock

- ◆ Pyrolyzing the 130 lbs of pellets in a Trollworks Sys3 produces 690,000 Btus of heat energy
- ◆ That many Btus would cost \$20 in propane
- ◆ It would also produce 40 lbs of high quality biochar worth \$20-\$80 in today's marketplace





# How does that translate to value per acre?

- ◆ Assuming 10 green tons per acre of thinning, this process would produce between \$3,000 - \$8,000 per acre. Not bad for waste biomass!
- ◆ 20 acres could heat a 12,000 sqft institutional/ commercial building a year and produce 40 tons of worth \$20K to \$40K.
- ◆ 20 acres could heat six 2,000 sqft homes with each home producing \$3,000 to \$6,000 worth of biochar.





# What about other benefits? When the biochar is used as a soil amendment:

- ◆ 11 tons of atmospheric CO<sub>2</sub> would be directly sequestered in the biochar
- ◆ Another 10 tons of CO<sub>2</sub> from burning fossil fuels would be displaced
- ◆ Soil carbon would be regenerated improving health and productivity
- ◆ Significantly more water would be retained in the soil
- ◆ Mine reclamation would be enhanced
- ◆ Costs of forest management would be reduced
- ◆ And more!



# Pilot Demonstration Project at El Rito

- ◆ The Trollworks, Southwest Energy Integrators, and Northern New Mexico College are engaged in a 3-year Collaborative Forest Restoration Program grant project that will demonstrate this technology.
- ◆ The project will use forest thinning residual biomass to heat a classroom building while making biochar.
- ◆ Trollworks projects that the pilot will generate a positive cash flow replacing the former substantial heating expense for the building.



# What can you do to be involved?

- ◆ Get involved in the discussion - Biochar+Energy Systems establish a new paradigm in biomass utilization concepts
- ◆ Compare to standard biomass disposal models to understand why this is different and how it works
- ◆ Work with us to model the economic, community, and environmental benefits



# For More Information

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